ProCurve
Networking by HP

Access Control Security Implementation Guide 2.1

ProCurve Solutions

www.procurve.com

ProCurve Access Control Security

Implementation Guide

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Applicable ProCurve Products

Network Access Controller 800	(J9065A)
ProCurve Manager Plus	(J9056A)
Identity Driven Manager	(J9012A)
IPsec VPN Base Modules	(J9026A, J8471A)
Secure Router 7102dl	(J8752A)
Secure Router 7203dl	(J8753A)
Switch 5406zl	(J8697A)
Switch 5406zl-48G	(J8699A)
Switch 5412zl	(J8698A)
Switch 5412zl-96G	(J8700A)
Switch 5304xl	(J4850A)
Switch 5304xl-32G	(J8166A)
Switch 5308xl	(J4819A)
Switch 5308xl-48G	(J8167A)
Switch 5348xl	(J4849A)
Switch 5372xl	(J4848B)
Switch 8212zl	(J8715A)
Wireless Edge Services xl Module	(J9001A)
Redundant Wireless Services xl Module	(J9003A)
Wireless Edge Services zl Module	(J9051A)
Redundant Wireless Services zl Module	(J9052A)
AP 530	(J8986A)
AP 420 na/ww	(J8130B, J8131B)
RP 210	(J9004A)
RP 220	(J9005A)
RP 230	(J9006A)

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Wireless Edge Services xl Module Program
GNU GPL Source Code
Attn: ProCurve Networking Support
MS: 5550
Roseville, CA 95747 USA

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Introduction

Contents

Using This Guide

This implementation guide is designed to be used in conjunction with the *ProCurve Access Control Security Design Guide*. The design guide outlines the planning process for creating a comprehensive access control solution: it explains each step in the process and provides decision-making guidelines to help you evaluate your company's needs and design a solution that best meets those needs.

After you plan your network access control solution, this implementation guide is designed to help you deploy and configure the components required for this solution, including the infrastructure devices, network access controllers, wireless devices, and RADIUS servers. To help you understand how these devices and servers can be combined to provide a comprehensive access control solution, this implementation guide provides the steps for implementing access control solutions for five different network environments. Although ProCurve Networking knows that your network environment will not match any of these environments exactly, this guide will provide the information you need to adapt the instructions as needed for your unique environment.

For each access control solution, this implementation guide will provide:

- A list of components used.
- Step-by-step instructions to lead you through the process of setting up the components.
- Example network (including diagrams, IP addresses, and so on) that illustrates exactly how the access control solution is applied. You can also use these settings and instructions to set up a test network. You can also substitute the IP addresses on your network and customize the instructions accordingly.
- Tables and worksheets to help you understand how to configure the solution.

Network Access Control Solution 1

Solution 1 is designed to provide the strongest security for both wired and wireless access. It implements 802.1X as the access control method for wired access and 802.1X with Wi-Fi Protected Access (WPA/WPA2) for wireless access. To protect the inside network from viruses, worms, and other attacks, solution 1 also includes endpoint integrity checking.

This access control solution is implemented for a network environment that includes:

- Microsoft Active Directory domain
- Microsoft Windows 2003 Servers, which provide services such as:
  - Domain controller
  - Dynamic Host Configuration Protocol (DHCP) services
  - Domain Name System (DNS) services
  - Certificate services (Public Key infrastructure, or PKI)
    - Certificate Authority (CA) root
    - Certificate templates

Note

If you want to customize certificate templates as explained in Chapter 2: “Implementing 802.1X with ProCurve IDM and Endpoint Integrity,” you must use Windows 2003 Server Enterprise Edition. Although Windows 2003 Server Standard Edition supports certificate templates, it does not allow you to customize them.

- ProCurve Wireless Edge Services zl Module, which controls multiple coordinated (or lightweight) Access Points (APs) referred to as radio ports (RPs)
- ProCurve Redundant Wireless Edge Services zl Module, which provides load balancing and redundancy for wireless services
- ProCurve Switch 5400zl Series

For this solution, several ProCurve Network Access Controller (NAC) 800s provide RADIUS services for 802.1X access and endpoint integrity checking. Accordingly, the NAC 800s are placed using the 802.1X deployment method. The NAC 800 synchronizes with the Microsoft Windows domain controller and uses it as its data store.

In addition, ProCurve Manager Plus (PCM+) and ProCurve Identity Driven Management (IDM) are used to simplify the management tasks associated with 802.1X and endpoint integrity.

Chapter 2: "Implementing 802.1X with ProCurve IDM and Endpoint Integrity" describes this network access solution, providing detailed information for configuring the following:

- Windows 2003 Server
  - Installation
  - Active Directory setup
  - DHCP scopes
  - DNS reverse lookups
  - Domain users and groups
  - Certificate services
- Wireless Edge Services zl Module
  - Initial setup (such as setting the IP address and default gateway)
  - Wireless LAN (WLAN) (using 802.1X with WPA/WPA2 for authentication and encryption)
  - Certificate installation
  - Redundancy group
  - Simple Network Management Protocol (SNMP) settings
  - 802.1X authentication for RPs
- NAC 800s
  - Basic settings (such as server type, IP address, and passwords)
  - Certificate installation
  - Enforcement cluster settings
  - Quarantine settings
  - NAC policies
  - Testing methods
- PCM+/IDM
  - Installation
  - Initial setup for enabling endpoint integrity
  - Access profiles
  - Policy groups
  - Network resource assignments
- Endpoints
  - Certificate installation
  - 802.1X supplicant
  - NAC EI agent
- Switches
  - Activating port authentication

In addition, Chapter 2: “Implementing 802.1X with ProCurve IDM and Endpoint Integrity” provides example startup-configs for:

- Routing switches
- Edge switches
- Server switches

Network Access Control Solution 2

Solution 2 is similar to solution 1. However, there are two significant differences:

- Solution 2 uses Microsoft Windows Internet Authentication Services (IAS) as the RADIUS server (rather than NAC 800). The NAC 800 still enforces endpoint integrity.
- Solution 2 does not incorporate PCM+ and IDM.

Chapter 3: “Implementing 802.1X with Endpoint Integrity but without IDM” describes this solution, providing detailed instructions for configuring the following:

- Installing IAS
- Registering IAS with Active Directory
- Installing a certificate on the IAS server
- Configuring properties
- Configuring remote access policies
- Adding RADIUS clients
- Enabling remote logging
- Installing and configuring the connectors for the NAC 800
- Configuring the NAC 800

In addition, Chapter 3: “Implementing 802.1X with Endpoint Integrity but without IDM” provides example startup-configs for:

- Routing switches
- Edge switches
- Server switches

(For instructions on setting up the remainder of this solution, refer to Chapter 2: “Implementing 802.1X with ProCurve IDM and Endpoint Integrity.”)

Network Access Control Solution 3

Solution 3 explains how to set up a client-to-site virtual private network (VPN) using the ProCurve Secure Router 7000dl Series and the ProCurve VPN Client. It also explains how to set up and configure endpoint integrity checking for the remote endpoints accessing the network through this VPN. Because all the users' traffic is transmitted onto the network through the router, there is a "choke point," which means the NAC 800 is best implemented using the inline deployment method.

Solution 3 focuses only on the devices that are providing and securing remote access for users. The infrastructure devices used for this solution are added to the network described in Chapter 2: "Implementing 802.1X with ProCurve IDM and Endpoint Integrity."

Chapter 4: "Implementing a VPN with Endpoint Integrity" describes this solution, providing instructions for configuring the following:

- Windows CA server
  - Customizing templates
  - Generating certificate requests and certificates
- ProCurve Secure Router 7000dl
  - Ethernet interface settings
  - WAN interface settings
  - Routing Information Protocol (RIP) settings
  - VPN settings
  - Certificates
- NAC 800s
  - Basic settings (such as server type, IP address, and passwords)
  - Certificate installation
  - Enforcement cluster settings
  - Quarantine settings
  - NAC policies
  - Testing methods
- Endpoints
  - ProCurve VPN Client
  - Certificate for VPN access

In addition, Chapter 4: "Implementing a VPN with Endpoint Integrity" provides example startup-configs for:

- Routing switch
- Secure Router 7000dl

Network Access Control Solution 4

Solution 4 explains how to deploy and configure the NAC 800 to provide only RADIUS services (without endpoint integrity checking) in an environment that uses OpenLDAP as the directory service. The NAC 800 is used as the RADIUS server to verify access for both wired and wireless connections, and OpenLDAP provides the data store.

On the wired network, this solution imposes 802.1X as the access control method for endpoints that support it. For endpoints that do not have this capability, MAC authentication (MAC-Auth) is used to secure the port. For some ports, both 802.1X and MAC-Auth are enabled, and 802.1X is implemented in user-based mode for these ports.

On the wireless network, this solution uses 802.1X with WPA/WPA2 for one WLAN and Web authentication (Web-Auth) for another WLAN.

In addition, PCM+ and IDM are used to simplify the management tasks associated with 802.1X.

Chapter 5: "Using the NAC in a RADIUS-Only Configuration" describes this network access solution, providing detailed information for configuring the following:

- Wireless Edge Services zl Module
  - Initial setup (such as setting the IP address and default gateway)
  - Wireless LAN (WLAN)
    - 802.1X with WPA/WPA2 a
    - Web-Authentication
  - Simple Network Management Protocol (SNMP) settings
  - 802.1X authentication for RPs
- OpenLDAP
  - Extending the schema to support RADIUS
  - Creating users for a RADIUS environment
  - Using OpenSSL to create a CA and intermediate certificate
  - Loading the CA certificate on an OpenLDAP server
  - Understanding how to bind to OpenLDAP

- NAC 800s
  - Basic settings (such as server type, IP address, and passwords)
  - Directory service settings (so that the NAC 800 can bind to OpenLDAP and use the directory service as a data store)
  - Quarantine settings
  - Disabling endpoint integrity checking
  - Configuring redundancy for the OpenLDAP data store
- PCM+/IDM
  - Initial setup for NAC 800
  - Access profiles
  - Policy groups
  - Network resource assignments
  - Location and time restrictions for users
- Endpoints
  - 802.1X supplicants (both wired and wireless)
- Switches
  - Concurrent MAC-Auth and 802.1X access on a single port
  - Activating port authentication

In addition, Chapter 5: “Using the NAC in a RADIUS-Only Configuration” provides example startup-configs for:

- Routing switches
- Edge switches
- Server switches

Network Access Control Solution 5

Solution 5 enforces endpoint integrity checking for a network that does not implement port authentication using an access control method. Access to applications and data are secured through Novell eDirectory.

This solution does enforce endpoint integrity, using NAC 800s that are implemented using the DHCP deployment method.

This solution also includes a wireless network, which is secured through WPA-pre-shared key (PSK) encryption.

Chapter 6: “Enforcing Endpoint Integrity without Port Authentication” describes this solution, providing detailed instructions for the following:

- ProCurve AP 530
  - Initial settings
  - WLAN setup using WPA-PSK
  - Basic radio settings
- NAC 800s
  - Basic settings (such as server type, IP address, and passwords)
  - Enforcement cluster settings
  - Directory service settings (so that the NAC 800 can use the directory service as a data store)
  - Quarantine settings
  - NAC policies
  - Testing methods
- Endpoints
  - Windows Zero Configuration utility settings for WPA-PSK

In addition, Chapter 6: "Enforcing Endpoint Integrity without Port Authentication" explains how to enable DHCP snooping and ARP protection so that untrusted endpoints must receive dynamic IP addresses before being allowed to transmit traffic on the network. Because the DHCP deployment method relies on endpoints receiving a dynamic IP address, this additional security measure prevents a knowledgeable user from trying to circumvent integrity checking by assigning his or her endpoint a static IP address.

Summary of the Access Control Solutions

Table 1-1 shows the variable elements of each access control solution. Use the table to find the set of conditions that best match your setup, and then go to the appropriate chapter for specific instructions on configuring those elements.

Table 1-1. Elements of Each Access Control Solution

Element	Solution 1 (Chapter 2)	Solution 2 (Chapter 3)	Solution 3 (Chapter 4)	Solution 4 (Chapter 5)	Solution 5 (Chapter 6)
Endpoint integrity	X	X	X		X
802.1X access control	X	X		X	
Web-Auth access control				X	
MAC-Auth access control				X	

Element	Solution 1 (Chapter 2)	Solution 2 (Chapter 3)	Solution 3 (Chapter 4)	Solution 4 (Chapter 5)	Solution 5 (Chapter 6)
No access control (only application and data control through a directory service)					X
WPA/WPA2 for wireless access	X	X		X	
WPA-PSK for wireless access					X
Certificate services	X	X	X	X	
NAC 800 deployment methods					
• 802.1X deployment	X	X		X	
• Inline deployment			X		
• DHCP deployment					X
NAC Testing Methods					
EI agent testing	X	X	X		X
Agentless	X	X	X		
ActiveX testing					X
PCM+	X		X	X	
ProCurve IDM	X		X	X	
NAC 800 RADIUS server	X			X	
IAS server		X			
No RADIUS server					X
Active Directory	X	X	X		
OpenLDAP directory				X	
Novell eDirectory					X
VLANs	X	X	X	X	X
VPN			X		
ProCurve Wireless Edge Services Module	X	X		X	
ProCurve AP 530					X
DHCP server	X	X	X		X
DNS server	X	X	X		
DHCP snooping					X
ARP protection					X

Hardware and Software Versions

Table 1-2 shows the hardware and software versions that were used to create the instructions for this guide. If you are using a different version of the software, refer to the documentation for that version.

Table 1-2. Hardware and Software Used in the Solutions

Solution instructions were devised using the following equipment:		
Product	**Software Version**	**Service Pack**
ProCurve NAC 800	1.0.22	n/a
ProCurve 3500yl-24G Switch (routing, edge)	K.12.25	n/a
ProCurve 5406zl Switch (servers)	K.12.25	n/a
ProCurve Secure Router 7000dl	J.08.03	n/a
ProCurve Wireless Edge Services xl Module	WS.02.07	n/a
ProCurve Wireless Edge Services zl Module	WS.02.02	n/a
ProCurve AP 530	WA.01.19	n/a
Laptop or workstation	Windows XP Pro	SP2
Server hardware	PCM+ 2.2, IDM 2.2	n/a
Server hardware	Windows Server 2003	SP2
Server hardware	NetWare 6.5	SP3

2

Implementing 802.1X with ProCurve IDM and Endpoint Integrity

Contents

Introduction

This chapter teaches you how to build a network that implements network access control using:

- 802.1X
- Endpoint integrity

This network access control solution incorporates ProCurve Manager Plus (PCM+) and ProCurve Identity Driven Manager (IDM), which simplify many of the management tasks required for implementing both 802.1X and endpoint integrity.

To meet the needs of most organizations, this solution is designed to control access for both wired and wireless zones. (For more information about wired and wireless zones, see the *ProCurve Access Control Security Design Guide*.) Although this solution uses ProCurve Wireless Edge Services Modules to provide the wireless zones and control wireless users' access, you could alternatively use an access point (AP) such as the ProCurve AP 530 or ProCurve AP 420.

For this access control solution, it is assumed that the network has a Microsoft Windows domain with a full Public Key Infrastructure (PKI), which allows end-users to authenticate with digital certificates.

Note

If you do not intend to implement a PKI, you can skip "Configuring Certificate Services" on page 2-53. When you set up the endpoints, configure them for an Extensible Authentication Protocol (EAP) method that does not require user certificates.

In this chapter, you will learn how to configure, from beginning to end, all of the components of such a network:

- Routing switches
- Edge switches
- Wireless Edge Services Modules
- Domain controller, which runs:
  - Microsoft Active Directory
  - Domain Name System (DNS) services
- Dynamic Host Configuration Protocol (DHCP) servers
- Certificate Authority (CA) server

- ProCurve Network Access Controller (NAC) 800s, which provide the Remote Authentication Dial-In User Service (RADIUS) and endpoint integrity services
- PCM+/IDM server

Although your network environment is probably not identical to this environment, the instructions should help you understand the processes involved so that you can then modify the instructions as needed to meet your organization's unique requirements. To help you, the instructions include examples, which will be based on a sample network for a university called ProCurve University. The instructions also include tables and worksheets that you can use to record information for your network.

ProCurve University includes three user groups:

- Network administrators
- Faculty
- Students

The network is divided into virtual local area networks (VLANs) that allow users to access the resources that they require. Table 2-1 shows one approach to designing the VLANs.

Table 2-1. Example VLANs

VLAN Category	Name	ID	Subnet
Management VLAN	Management	2	10.2.0.0/16
Server VLAN	Servers	4	10.4.0.0/16
	Faculty_Databases	5	10.5.0.0/16
User VLAN	Faculty	8	10.8.0.0/16
	Students	10	10.10.0.0/16
Test and quarantine VLAN (for endpoint integrity)	Quarantine_Faculty	32	10.32.0.0/16
	Quarantine_Students	34	10.34.0.0/16
Infected VLAN (for endpoint integrity)	Infected_Faculty	33	10.33.0.0/16
	Infected_Studets	35	10.35.0.0/16

The VLANs divide into these general categories:

- **Management VLAN**—for infrastructure devices and the network administrators that manage them

Note

This solution does not use the securemanagement VLAN feature. Instead, switches are configured with the **ip authorized-managers** command to allow management traffic only from sources within the management VLAN or the NAC 800s.

- **Server VLANs**—for servers

  In this example, servers are placed in different VLANs according to which users need to access them. All users need the services in VLAN 4, which includes DHCP servers and DNS servers. However, only the faculty should be able to reach data stored in VLAN 5.

- **User VLANs**—one for each user group

  You could create more VLANs and place users into different VLANs according to when and how they connect to the network. For example, you could create a Faculty_Wireless VLAN.

  In this example, however, a particular user always receives the same VLAN assignment, and IDM isused to grantusers various resources under various conditions.

- **Test and Quarantine VLANs**—one for each set of endpoints to which you want to apply a different NAC policy

  The test VLAN is the VLAN for endpoints that have not yet been tested (Unknown status); the quarantine VLAN is for endpoints that have failed testing. In this example, the test and the quarantine VLANs are identical and are together called the quarantine VLAN.

  Often a network can use a single quarantine VLAN. Sometimes, however, you want to apply different NAC policies to different endpoints. For example, you may want to apply a stricter policy to wireless endpoints or a less strict policy to guests who will receive limited access whether they are using a wired or wireless connection.

  A NAC 800 chooses the NAC policy it uses to test an endpoint based on the endpoint's IP address or domain name. To apply different NAC policies to different endpoints, you can divide the endpoints to be tested into different VLANs. For example, ProCurve University might accord faculty members more trust than students. Faculty endpoints are placed in one quarantine VLAN and student endpoints in another. The endpoints receive IP addresses in different subnets, which have been associated with different NAC policies.

  For guidelines on designing NAC policies, see the *ProCurve Access Control Security Design Guide*.

Note

To keep the division in the NAC policies for post-connect tests, the endpoints must be placed in different production (user) VLANs as well.

- **Infected VLAN**—for endpoints infected with malware (failed the Worms, Viruses, and Trojans test)

  You can place infected endpoints in the quarantine VLAN; however, because the infected endpoints pose a present rather than potential danger, you might want to place them in their own, even more restricted VLAN.

You can use Table 2-2 to record information about your organization's VLANs. You can then refer to this table as you read the instructions that follow.

Table 2-2. My VLANs

Type	Name	ID	Subnet
Management			
Server			
User			
Test			
Quarantine			
Infected			

Figure 2-1 shows a high-level network design.

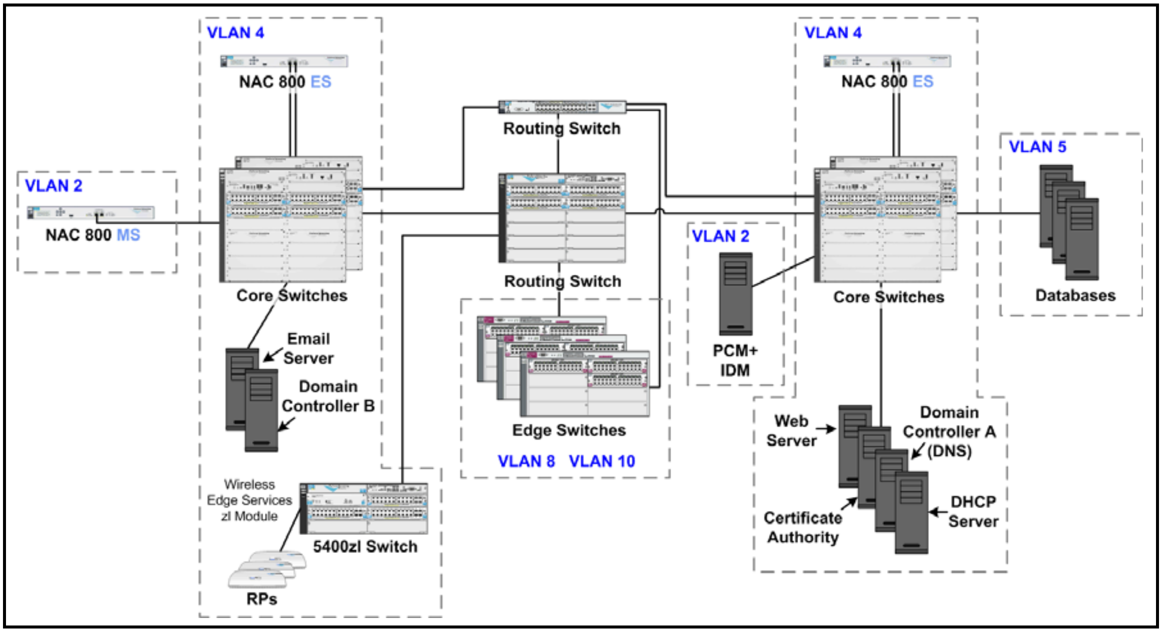


Figure 2-1. High-Level Network Design for ProCurve University

The instructions in this chapter sometimes call for typing a specific IP address. Table 2-3 lists IP addresses for the example network. Fill in your devices' IP addresses and VLANs in the rightmost columns. You can then easily replace the IP address given in the instructions with the correct address in your environment.

Table 2-3. Example IP Addresses

Device	Example IP Address	Example VLAN ID	Your Organization’s IP Address	Your Organization’s VLAN ID
Domain controller	10.4.4.15	4		
Backup domain controller	10.4.5.15	4		
DNS servers	10.4.4.15 10.4.5.15	4		
DHCP server	10.4.4.20	4		
CA server	10.4.4.25	4		
PCM+/IDM server	10.2.1.50	2		
University Web server	10.4.6.30	4		
Library Web server	10.4.6.35	4		
Email server	10.4.6.40	4		
Grade database	10.5.1.45	5		
Test database	10.5.2.50	5		
Other servers and databases				
Routing Switch A	• 10.2.0.1 • 10.4.0.1 • 10.5.0.1 • 10.8.0.1 • 10.10.0.1 • 10.32.0.1 • 10.33.0.1 • 10.34.0.1 • 10.35.0.1	• 2 • 4 • 5 • 8 • 10 • 32 • 33 • 34 • 25		
Routing Switch B	• 10.2.4.1 • 10.4.4.1 • 10.5.4.1 • 10.8.4.1 • 10.10.4.1 • 10.32.4.1 • 10.33.4.1 • 10.34.4.1 • 10.35.4.1	• 2 • 4 • 5 • 8 • 10 • 32 • 33 • 34 • 35		
Switch A	10.2.0.5	2		

Device	Example IP Address	Example VLAN ID	Your Organization's IP Address	Your Organization's VLAN ID
Other switches				
Wireless Edge Services Module	10.2.0.20	2		
Redundant Wireless Services Module	10.2.0.25	2		
NAC 800 Management Server (MS)	10.2.1.40	2		
NAC 800 Enforcement Server (ES) A	10.4.4.40	4		
NAC 800 ES B	10.4.5.50	4		

Note

In your network, some servers might run multiple services. For example, the domain controllers might run DNS as well as Active Directory.

Configuring the ProCurve Switches

This section provides example configurations for ProCurve switches in a network that implements 802.1X port authentication and endpoint integrity. You can configure all of the settings manually, or you create a minimal configuration (with IP, Simple Network Management Protocol [SNMP], and VLAN settings) and then use PCM+ to configure other settings.

The following sections show example configurations for:

- A routing switch, which connects only to other switches
- A server switch, which connects to VLAN 4 servers and VLAN 5 servers (faculty databases); uplink ports are A1 and B1
- An edge switch, which connects to endpoints (uplink ports are A1 and B1); the edge switch is also a wireless services-enabled switch

Refer to the following sample configurations as you set up your network. If you need step-by-step instructions, you should refer to the documentation for your switch.

Note

Users will receive dynamic VLAN assignments through IDM. However, if you are adding 802.1X authentication to an existing network, edge ports must, of course, retain their static assignment to a VLAN until you activate 802.1X authentication.

For reference, these configurations allow the core switches to authenticate the edge switches—the most secure option. However, take care when you enable 802.1X authentication on ports connecting switches. The path to the RADIUS server must be open for the authentication to complete. If you are certain that uplink ports are secure, youcan disable 802.1X authentication on switch-to-switch ports.

Routing Switches

The following is the startup-config for the routing switch used to test this network.

```
; J8692A Configuration Editor; Created on release #K.12.XX

hostname "Routing_Switch"
module 1 type J86xxA
ip routing
snmp-server community "procurvero" Operator
snmp-server community "procurverw" Manager Unrestricted
snmp-server host 10.2.1.50 "public"
vlan 1
   name "DEFAULT_VLAN"
   no untagged 1-20
   no ip address
   exit
vlan 2
   name "Management"
   untagged 1-20
   ip helper-address 10.4.4.20
   ip address 10.2.0.1 255.255.0.0
   exit
vlan 4
   name "Server"
   ip address 10.4.0.1 255.255.0.0
   tagged 1-5
   exit
vlan 5
   name "Faculty_databases"
   ip address 10.5.0.1 255.255.0.0
   tagged 1-5
   exit
vlan 10
   name "Students"
   ip helper-address 10.4.4.20
   ip address 10.10.0.1 255.255.0.0
   tagged 6-20
   exit
```

```
vlan 8
   name "Faculty"
   ip helper-address 10.4.4.20
   ip address 10.8.0.1 255.255.0.0
   tagged 6-20
   exit
vlan 32
   name "Quarantine_Faculty"
   ip helper-address 10.4.4.20
   ip address 10.32.0.1 255.255.0.0
   tagged 6-20
   exit
vlan 33
   name "Infected_Faculty"
   ip helper-address 10.4.4.20
   ip address 10.33.0.1 255.255.0.0
   tagged 6-20
   exit
vlan 34
   name "Quarantine_Students"
   ip helper-address 10.4.4.20
   ip address 10.34.0.1 255.255.0.0
   tagged 6-20
   exit
vlan 35
   name "Infected_Students"
   ip helper-address 10.4.4.20
   ip address 10.35.0.1 255.255.0.0
   tagged 6-20
   exit
vlan 2100
   name "Radio Port"
   tagged 1-20
   no ip address
   exit
ip authorized-managers 10.2.0.0 255.255.0.0
ip authorized-managers 10.4.4.40 255.255.255.255
ip authorized-managers 10.4.5.50 255.255.255.255
ip dns domain-name "procurveu.edu"
ip dns server-address 10.4.4.15
aaa authentication port-access eap-radius
radius-server host 10.4.4.40 key procurvenac
radius-server host 10.4.5.50 key procurvenac
```

```
aaa port-access authenticator 6-20 //These ports connect
to edge switches//
aaa port-access authenticator active //Do not enter this
command until you have completed setting up the entire
solution//
password manager
password operator
```

Server Switch startup-config

The following is the startup-config for the server switch used to test this network.

```
; J8697A Configuration Editor; Created on release #K.12.XX

hostname "Server_Switch"
web-management management-url ""
module 1 type J8702A
module 2 type J8702A
ip default-gateway 10.2.0.1
snmp-server community "procurvero" Operator
snmp-server community "procurverw" Manager Unrestricted
snmp-server host 10.2.1.50 "public"
vlan 1
   name "DEFAULT_VLAN"
   no untagged A1-A24, B1-B24
   no ip address
   exit
vlan 2100
   name "Radio Port"
   tagged A1,B1
   no ip address
   exit
vlan 2
   name "Management"
   untagged A1,B1
   ip address 10.2.0.3 255.255.0.0
   exit
vlan 4
   name "Server"
   untagged B2-B24
   tagged A1,B1
   no ip address
   exit
```

```
vlan 5
   name "Faculty_databases"
   untagged A2-A24
   tagged A1,B1
   no ip address
   exit
mirror 1 port B6 //Port 2 of a NAC 800 ES connects to port 
B6//
ip authorized-managers 10.2.0.0 255.255.0.0
ip authorized-managers 10.4.4.40 255.255.255.255
ip authorized-managers 10.4.5.50 255.255.255.255
ip dns domain-name "procurveu.edu"
ip dns server-address 10.4.4.15
interface B2 //A DHCP server connects to port B2//
   monitor all Both mirror 1
   exit
password manager
password operator
```

Edge Switches

Your network will probably include many edge switches. An example configuration for an edge switch that also includes a Wireless Edge Services Module follows. To improve readability, however, the encrypted Wireless Edge Services Module commands have been omitted.

Wireless Services-Enabled Switch startup-config

In addition to housing the Wireless Edge Services Module, this switch functions as an edge switch.

```
; J8697A Configuration Editor; Created on release #K.12.XX

hostname "Wireless Switch"
module 1 type J8702A
module 2 type J8702A
module 3 type J9051A
web-management management-url ""
ip default-gateway 10.2.0.1
snmp-server community "procurvero" Operator
snmp-server community "procurverw" Manager Unrestricted
snmp-server host 10.2.1.50 "public"
```

```
vlan 1
   name "DEFAULT_VLAN"
   no untagged A1-B24,B1-B24
   no ip address
   exit
vlan 8
   name "Faculty"
   tagged A1,B1,CUP
   exit
lldp auto-provision radio-ports auto-vlan 2100 auto
vlan 2100
   name "Radio Ports"
   tagged A1,B1,CDP
   exit
vlan 10
   name "Students"
   untagged A2-A24,B2-B24
   tagged A1,B1,CUP
   exit
vlan 32
   name "Quarantine_Faculty"
   tagged A1,B1,CUP
   exit
vlan 33
   name "Infected_Faculty"
   tagged A1,B1,CUP
   exit
vlan 34
   name "Quarantine_Students"
   tagged A1,B1,CUP
   exit
vlan 35
   name "Infected_Students"
   tagged A1,B1,CUP
   exit
vlan 2
   name "Management"
   untagged A1,B1
   ip address 10.2.0.5 255.255.0.0
   tagged CUP
   exit
ip authorized-managers 10.2.0.0 255.255.0.0
ip authorized-managers 10.4.4.40 255.255.255.255
ip authorized-managers 10.4.5.50 255.255.255.255
ip dns domain-name "procurveu.edu"
ip dns server-address 10.4.4.15
aaa authentication port-access eap-radius
radius-server host 10.4.4.40 key procurvenac
radius-server host 10.4.5.50 key procurvenac
aaa port-access authenticator A2-A24,B2-B24 //802.1X
authentication is enforced on edge ports, but not uplink
ports.//
aaa port-access authenticator active //Do not enter this
command until you have completed setting up the entire
solution//
aaa port-access supplicant A1,B1
aaa port-access supplicant A1 identity "switch"
aaa port-access supplicant B1 identity "switch"
password manager
password operator
```

Configuring the Windows Domain Controller

This section explains how to install Windows Server 2003 and set up the server as a domain controller. By the end of the section, you will have installed the Active Directory and DNS services. You will also have configured the groups and users necessary for your access control solution.

Groups and users for the sample solution are displayed in Table 2-4. Of course, a production network would include many more users and computers.

Table 2-4. Windows Domain Groups

Group	Member	Username	Password
Administrators (a default Windows group)	AD Administrator	Administrator	ProCurve0
Network_Admins	Switch Administrator	adminswitch	ProCurve1
Network_Admins	Wireless Administrator	adminwireless	ProCurve2
Faculty	Pauline Professor	professor	ProCurve3
Students	Sam Student	student	ProCurve4
Domain Computers (a default Windows group)	DHCP servers, DNS server, PCM+ server, and CA server	server	ProCurve5
RPs	All radio ports (RPs)	rp	ProCurve6
Infrastructure Devices	All switches	switch	ProCurve7
Printers and fax machines	All headless devices	printer	ProCurve8

Install Windows Server 2003

Install Windows Server 2003 with the default parameters. At this point, keep the device a standalone server without domain membership. You will learn how to install and configure various services later in this chapter.

During the installation, you will be prompted to type various parameters. Refer to Table 2-5 for help in configuring these parameters.

Table 2-5. Installation Parameters

Parameter	Description	Example
Server name	a name that describes the server	mycontroller. procurveu.edu
IP address	this server's IP address	10.4.4.15
Subnet mask	subnet mask for the server's subnet	255.255.0.0
Router	the server's default router	10.4.0.1

Note

Even if you intend this server to act as a CA, you must *not* install Certificate Services during the installation process because Certificate Services requires a server to have joined the domain first. (If you install Certificate Services now, you will have to uninstall the services before the server will be able to join a domain.)

Install Active Directory

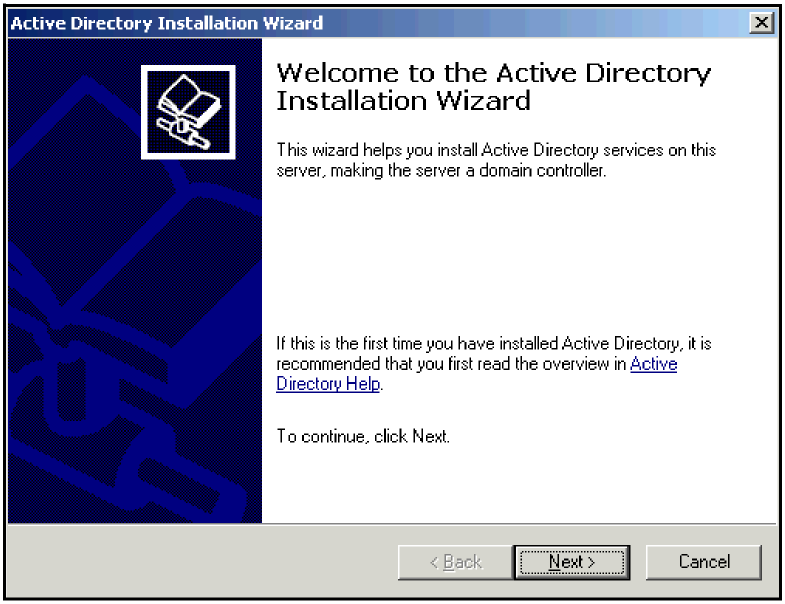
After you install Windows Server 2003, the server is a standalone server without membership in a domain. To make the server a domain controller, configure Active Directory on the new server:

1. Connect the server to the network infrastructure.

   For services to run properly, the server requires an active network connection.

   In the sample network, domain controllers connect to the5400zl switches. See Figure 2-1.

2. From the Windows **Start** menu, select **Run** and type **dcpromo** at the run prompt.



Welcome to the Active Directory Installation Wizard

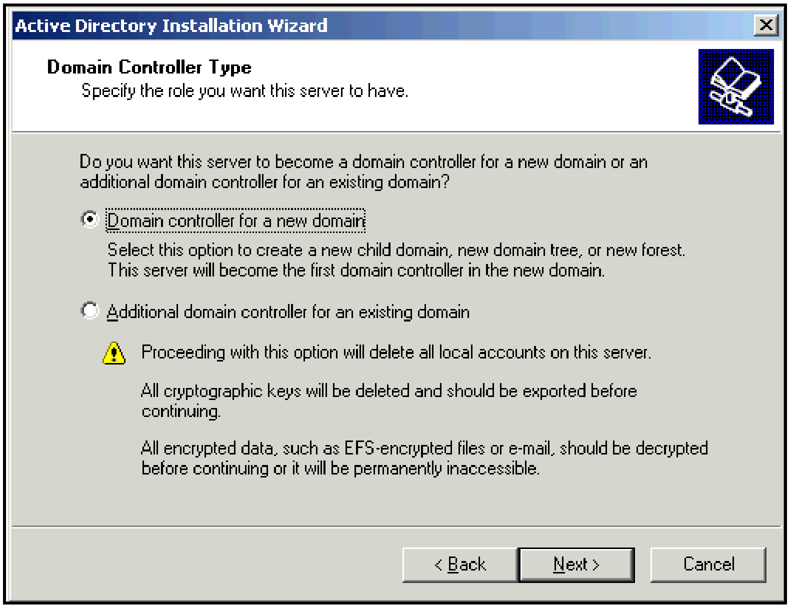
This wizard helps you install Active Directory services on this server, making the server a domain controller.

If this is the first time you have installed Active Directory, it is recommended that you first read the overview in Active Directory Help.

To continue, click Next.

Figure 2-2. Active Directory Installation Wizard—Welcome Page

3. Click **Next** on the **Welcome to the Active Directory Installation Wizard** page.
4. Click **Next** on the **Operating System Compatibility** page.



Domain Controller Type

Specify the role you want this server to have.

Do you want this server to become a domain controller for a new domain or an additional domain controller for an existing domain?

● Domain controller for a new domain

Select this option to create a new child domain, new domain tree, or new forest. This server will become the first domain controller in the new domain.

○ Additional domain controller for an existing domain

⚠ Proceeding with this option will delete all local accounts on this server.

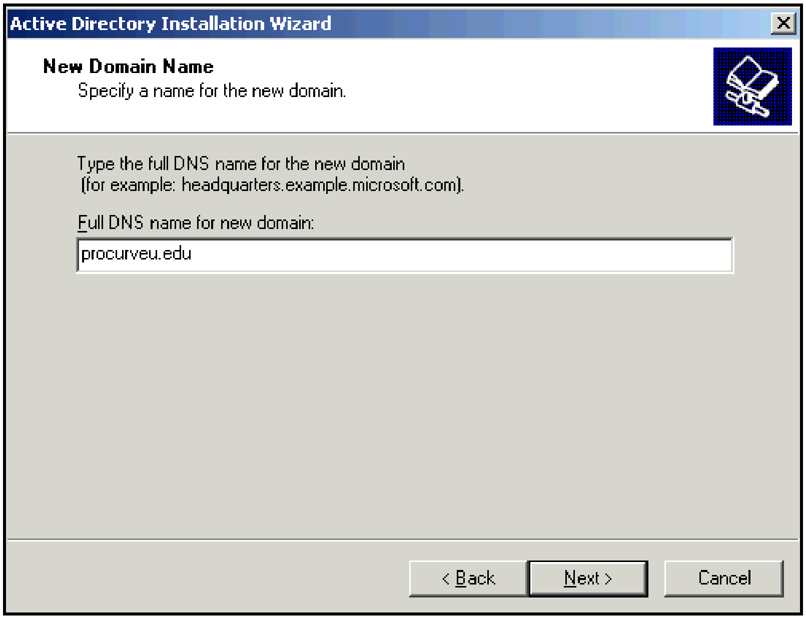
All cryptographic keys will be deleted and should be exported before continuing.

All encrypted data, such as EFS-encrypted files or e-mail, should be decrypted before continuing or it will be permanently inaccessible.

Figure 2-3. Active Directory Installation Wizard—Domain Controller Type Page

5. Select **Domain controller for a new domain** and click **Next**.
6. Select **Domain in a new forest** and click **Next**.
7. Select **No, just install and configure DNS on this computer** and click **Next**.

   Active Directory relies on DNS, so you often set up DNS on the same server.

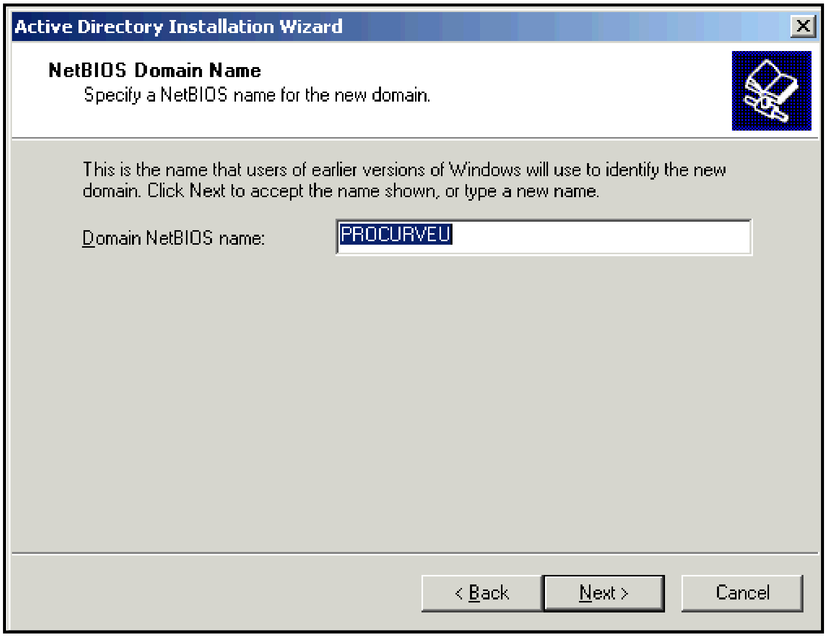

Active Directory Installation Wizard
New Domain Name
Specify a name for the new domain.
< Back
Next >
Cancel

Type the full DNS name for the new domain
(for example: headquarters.example.microsoft.com).

Full DNS name for new domain:
procurveu.edu

Figure 2-4. Active Directory Installation Wizard—New Domain Name Page

8. Type your organization's domain name in the **Full DNS name for new domain** box. As shown in Figure 2-4 for the sample network, type **procurveu.edu**. Click **Next**.



NetBIOS Domain Name
Specify a NetBIOS name for the new domain.

This is the name that users of earlier versions of Windows will use to identify the new domain. Click Next to accept the name shown, or type a new name.

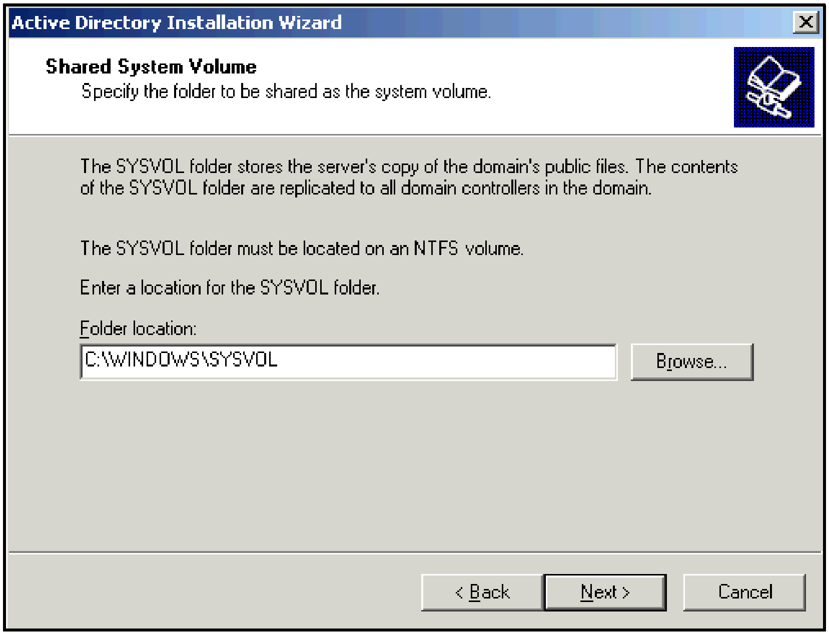
Domain NetBIOS name: PROCURVEU

Figure 2-5. Active Directory Installation Wizard—NetBIOS Domain Name Page

9. In the **Domain NetBIOS name** box, type the domain name, without the top-level domain, in all capital letters. Click **Next**.

   In this example, the NetBIOS name is **PROCURVEU**.

10. Accept the default locations for the database and log files and click **Next**.



Active Directory Installation Wizard

Shared System Volume
Specify the folder to be shared as the system volume.

The SYSVOL folder stores the server's copy of the domain's public files. The contents of the SYSVOL folder are replicated to all domain controllers in the domain.

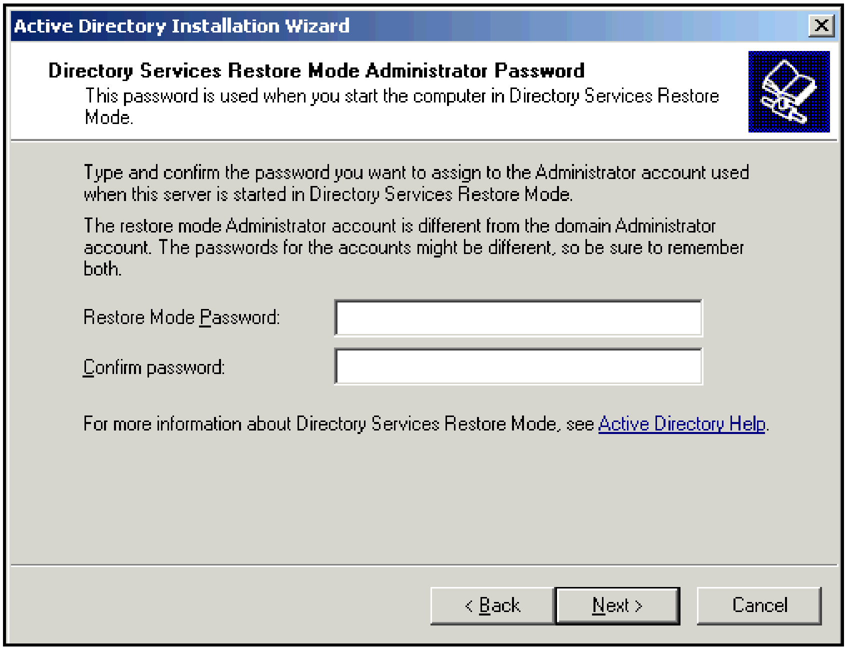
The SYSVOL folder must be located on an NTFS volume.

Enter a location for the SYSVOL folder.

Folder location:
C:\WINDOWS\SYSVOL

Figure 2-6. Active Directory Installation Wizard—Shared System Volume Page

11. Accept the default **Shared System Volume** folder location and click **Next**.
12. Select **Permissions compatible only with Windows 2000 or Windows Server 2003 operating systems** and click **Next**.



Active Directory Installation Wizard

Directory Services Restore Mode Administrator Password

This password is used when you start the computer in Directory Services Restore Mode.

Type and confirm the password you want to assign to the Administrator account used when this server is started in Directory Services Restore Mode.

The restore mode Administrator account is different from the domain Administrator account. The passwords for the accounts might be different, so be sure to remember both.

Restore Mode Password:

Confirm password:

For more information about Directory Services Restore Mode, see Active Directory Help.

Figure 2-7. Active Directory Installation Wizard—Directory Resources Restore Administrator Password Page

13. Leave the **Restore Passwords** boxes blank and click **Next**.
14. Click **Next** on the **Summary** page. The installation wizard begins installing Active Directory. This process may take a few minutes.
15. Click **Finish**.
16. Click **Restart Now**.

Raise the Domain Functional Level

Active Directory installs with Windows 2000 Server settings, which by default deny users remote access. (Although some settings refer to remote access as “dial-in” access, remote access is often through a virtual private network [VPN] or a wireless connection.) Because many users now commonly access the network remotely, you will probably want to raise the functionality to Windows Server 2003. In the resulting default policy, a user’s remote access is controlled by a server such as a RADIUS server.

If you do not raise the functional level of Active Directory, you must manually configure users’ accounts to allow remote access.

To raise the functional level, complete the following steps:

1. From the Windows **Start** menu, select **Administrative Tools** > **Active Directory Users and Computers**. The **Active Directory Users and Computers** window is displayed.
2. Right-click the domain name in the left panel and select **Raise Domain Functional Level** in the menu that is displayed.
3. Select **Windows Server 2003**, and then click **Raise** to change the domain functional level to Windows Server 2003.
4. Click **OK**.
5. Click **OK** again.

Configure Windows Domain Groups

You must create groups for the users who are authorized to access your network. When a RADIUS server authenticates a user, it can check the user's group membership and use that information to apply the correct policies to the user's network access.

By default, Active Directory includes a number of groups such as the Domain Admins and Domain Users groups. You can use these default groups and also create new groups for your specific network. For the example ProCurve University network, the network administrators have decided to create three additional groups for users:

- Network_Admins
- Faculty
- Students

Users can have more than one group membership. For example, all members of the groups listed above will also be members of the Domain Users group. The groups listed above, however, are the groups that IDM will use to determine which rights to grant users.

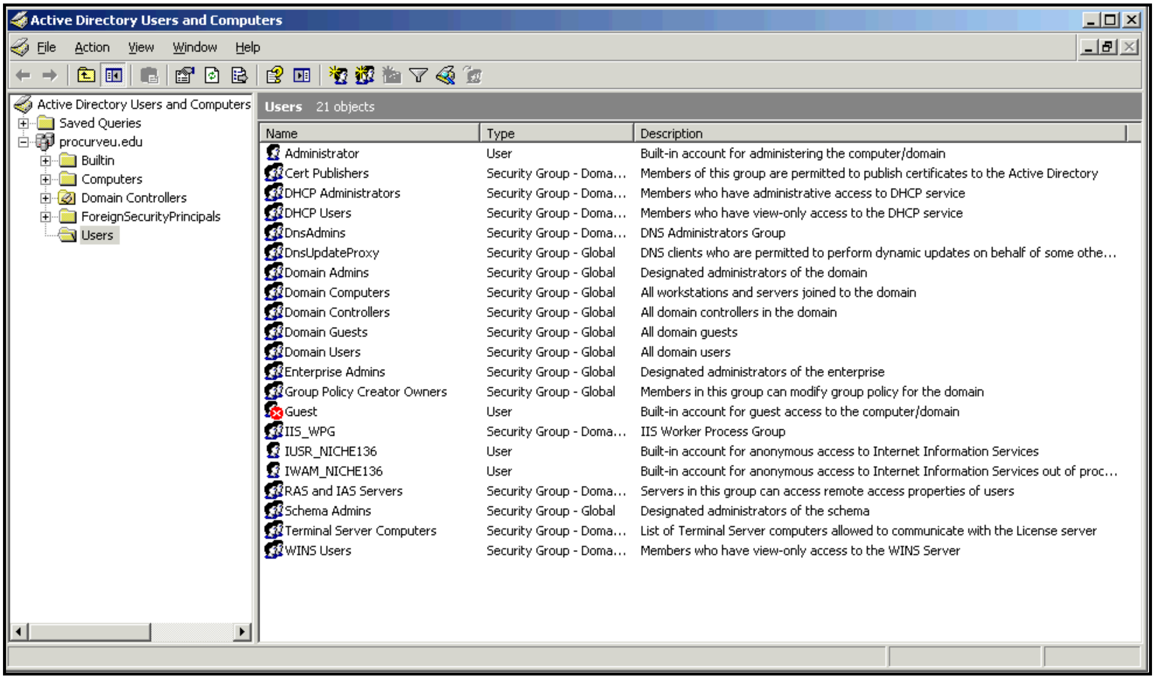
Because network devices also authenticate to the network, the network administrators want to add groups for the devices as well:

- Infrastructure devices
- RPs

Other devices such as servers are members of the Domain Computers group.

Complete these steps to configure the user groups:

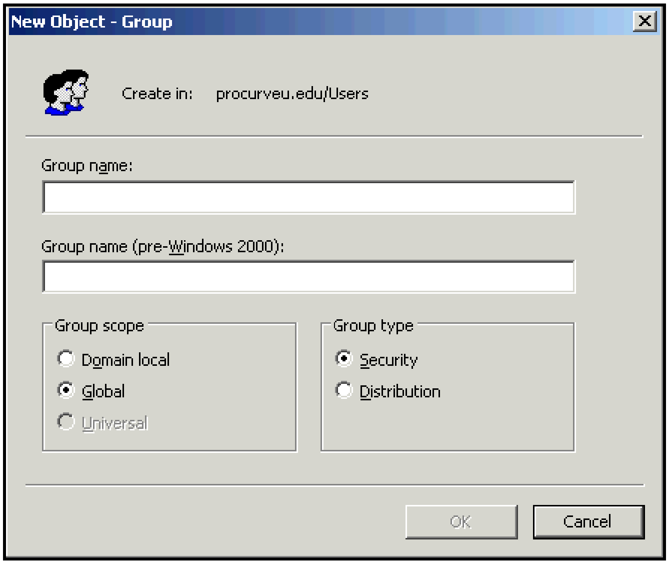
1. From the Windows **Start** menu, select **Administrative Tools** > **Active Directory Users and Computers**.
2. Expand the domain.



Name	Type	Description
Administrator	User	Built-in account for administering the computer/domain
Cert Publishers	Security Group - Doma...	Members of this group are permitted to publish certificates to the Active Directory
DHCP Administrators	Security Group - Doma...	Members who have administrative access to DHCP service
DHCP Users	Security Group - Doma...	Members who have view-only access to the DHCP service
DnsAdmins	Security Group - Doma...	DNS Administrators Group
DnsUpdateProxy	Security Group - Global	DNS clients who are permitted to perform dynamic updates on behalf of some othe...
Domain Admins	Security Group - Global	Designated administrators of the domain
Domain Computers	Security Group - Global	All workstations and servers joined to the domain
Domain Controllers	Security Group - Global	All domain controllers in the domain
Domain Guests	Security Group - Global	All domain guests
Domain Users	Security Group - Global	All domain users
Enterprise Admins	Security Group - Global	Designated administrators of the enterprise
Group Policy Creator Owners	Security Group - Global	Members in this group can modify group policy for the domain
Guest	User	Built-in account for guest access to the computer/domain
IIS_WPG	Security Group - Doma...	IIS Worker Process Group
IUSR_NICHE136	User	Built-in account for anonymous access to Internet Information Services
IWAM_NICHE136	User	Built-in account for anonymous access to Internet Information Services out of proc...
RAS and IAS Servers	Security Group - Doma...	Servers in this group can access remote access properties of users
Schema Admins	Security Group - Global	Designated administrators of the schema
Terminal Server Computers	Security Group - Doma...	List of Terminal Server computers allowed to communicate with the License server
WINS Users	Security Group - Doma...	Members who have view-only access to the WINS Server

Figure 2-8. Active Directory Users and Computers Window

3. In the left pane, right-click **Users** and select **New** > **Group**.



New Object - Group

Create in: procurveu.edu/Users

Group name:

Group name (pre-Windows 2000):

Group scope

○ Domain local
● Global
○ Universal

Group type

● Security
○ Distribution

Figure 2-9. New Object – Group Window

4. Type the group name in the **Group name** box.

   For example, you might type **Faculty**.

5. Accept the default setting of **Global** for the **Group scope** and **Security** for the **Group type**.

   The **Global** setting ensures that the groupapplies to the entire domain. The group can contain only members of its own domain, but it can be granted permissions to other domains in the same Microsoft forest.

   The **Security** setting allows you to create groups that will control privileges for users. Any group that affects network access should be a security group. (The **Distribution** setting, on the other hand, is used for email distribution lists.) Formore information about these settings, refer toyour Microsoft documentation.

6. Click **OK**.

7. Repeat steps 3 through 6 to create additional groups.

   For the example ProCurve University network, you would create these additional groups:

   - Network_Admins
   - Students
   - Infrastructure devices
   - RPs
   - Printers

Configure Windows Domain Users

Next, you should create users and assign the users to the appropriate groups. Table 2-6 shows several users for the example ProCurve University network. Of course, you would create many more users for a production network.

Table 2-6. Windows Domain Users

First Name	Last Name	Logon Name (Username)	Password	Group Membership
Administrator—a default user	Administrator	Administrator	ProCurve0	Domain Admins
Switch	Administrator	adminswitch	ProCurve1	Network_Admins
Wireless	Administrator	adminwireless	ProCurve2	Network_Admins
Pauline	Professor	professor	ProCurve3	Faculty
Sam	Student	student	ProCurve4	Students
Wireless	RP	rp	ProCurve6	RPs
Switch	Switch	switch	ProCurve7	Infrastructure Devices
Hewlett-Packard	Printers	printer	ProCurve8	Printers and fax machines

Note

The passwords listed in Table 2-6 are for a test network only. The passwords are easy to remember, but they do not meet the security requirements for a production network. For your network, you should create passwords that meet stringent security requirements. For example, passwords should not include dictionary words, you should always change default passwords, and you should include numerals and special characters.

You can enter information about your users in Table 2-7.

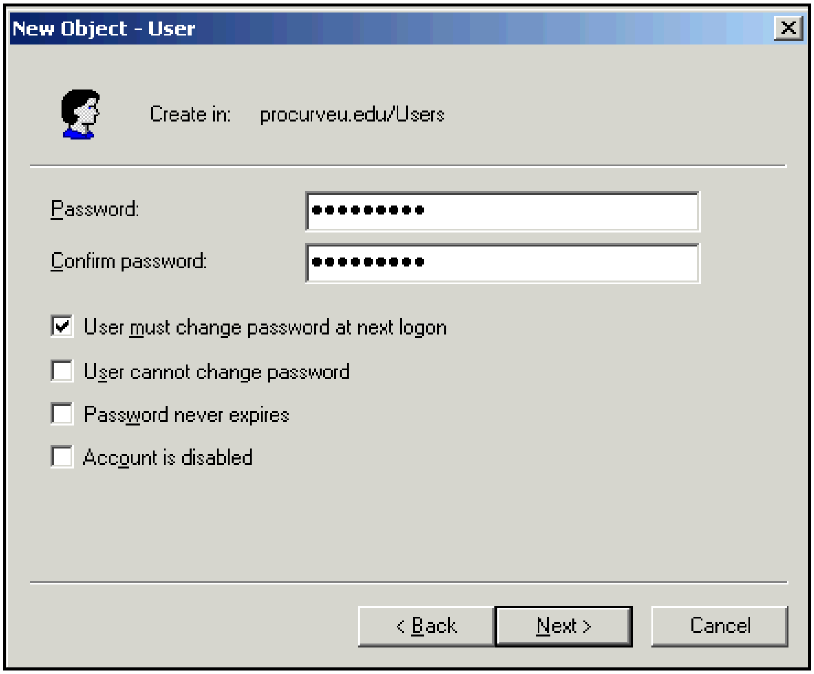
Table 2-7. My Windows Domain Users

First Name	Last Name	Logon Name (Username)	Password	Group Membership

Follow these steps to add a user:

1. From the Windows **Start** menu, select **Administrative Tools** > **Active Directory Users and Computers**.
2. Expand your domain.
3. In the left pane, right-click the **Users** folder and select **New** > **User**.
4. Type the user's first name in the **First name** box.
5. Type the user's last name in the **Last name** box.
6. Type the user's username in the **User logon name** box.

   This is the name that the user (or supplicant on a device) submits as part of 802.1X authentication.
7. Click **Next**.
8. In the **password** and **confirm password** boxes, type the user's (or device's) password.



New Object - User

Create in: procurveu.edu/Users

Password: ••••••••••

Confirm password: ••••••••••

☑ User must change password at next logon

□ User cannot change password

□ Password never expires

□ Account is disabled

Figure 2-10. New Object – User Window, Second Page

9. Select any password requirements.

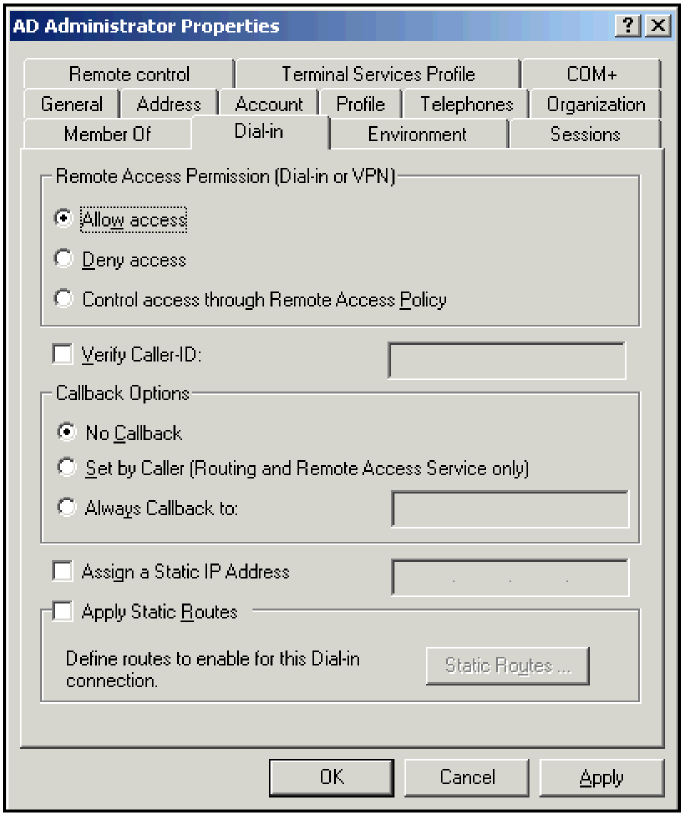
   Typically, a user should be forced to change the password the first time that he or she logs in (so that no one else knows the password) and every few weeks after that.

   If you are defining password requirements for a device instead of a user, do not select the **User must change password at next logon** check box, and select the **Password never expires** check box.

10. Click **Next**.

11. Click **Finish** on the **Summary** page.

12. In the right pane of the **Active Directory Users and Computers** window, right-click the newly created user and select **Properties**.



Remote Access Permission (Dial-in or VPN)

● Allow access

○ Deny access

○ Control access through Remote Access Policy

□ Verify Caller-ID:

Callback Options

● No Callback

○ Set by Caller (Routing and Remote Access Service only)

○ Always Callback to:

□ Assign a Static IP Address

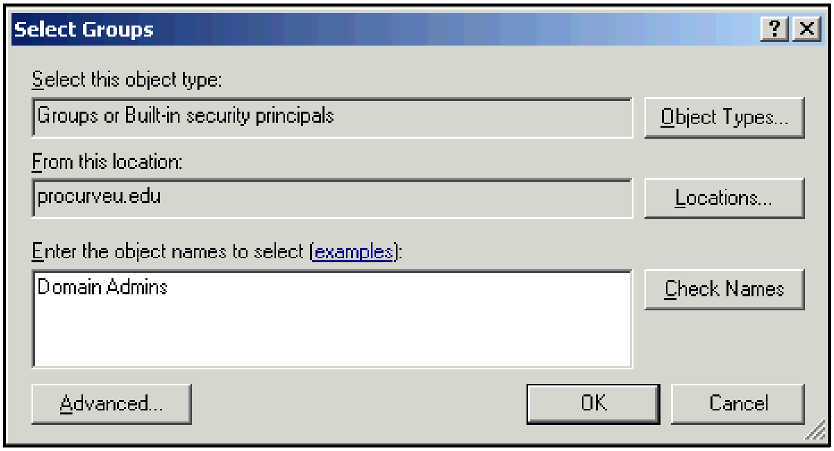
□ Apply Static Routes

Define routes to enable for this Dial-in connection.

Figure 2-11. *<username>* Properties Window—Dial-in Tab

13. If you did not raise the domain function level, click the **Dial-in** tab and select **Allow access** under **Remote Access Permission**.

14. Click the **Member Of** tab and click **Add**.



Select Groups

Select this object type: Groups or Built-in security principals

From this location: procurveu.edu

Enter the object names to select (examples): Domain Admins

Figure 2-12. *<username>* Properties—Select Groups Window

15. In the **Enter the object names to select** box, type the name of the appropriate group. For example, for Pauline Professor in the PCU network, you would type **Faculty**.

16. Click **Check Names**. If the group name is valid, it will be underlined. Click **OK**.

17. The group is displayed in the **Member Of** window. Click **OK** to apply the changes.

18. Press **[Alt]**+**[F4]** to close the **Active Directory Users and Computers** window.

Configure DNS Services

Active Directory relies on DNS for several services. For example, endpoints send DNS requests to locate the domain controllers. This section describes how to configure the DNS services necessary for Active Directory. Specifically, you will create reverse lookup zones for each subnet in your network. Table 2-8 displays the zones for the sample network.

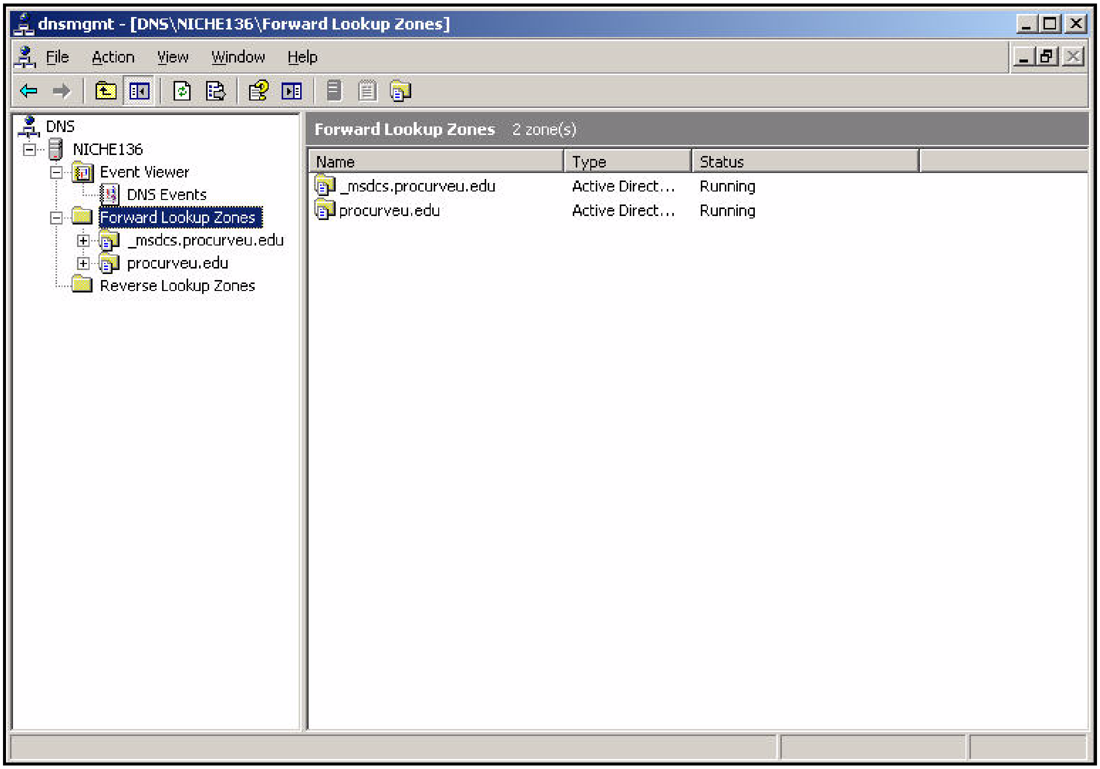
Note that when you type a reverse lookup zone in the Windows New Zone Wizard, you type it in non-reversed form. For example, for subnet 10.2.0.0/16, you type 10.2. The wizard automatically reverses the zone.

Table 2-8. Reverse Lookup Zones

VLAN	Subnet	Reverse Lookup Zone
2	10.2.0.0/16	10.2
4	10.4.0.0/16	10.4
5	10.5.0.0/16	10.5
8	10.8.0.0/16	10.8
10	10.10.0.0/16	10.10
32	10.32.0.0/16	10.32
33	10.33.0.0/16	10.33
34	10.34.0.0/16	10.34
35	10.35.0.0/16	10.35

Complete these steps on the Windows 2003 Server that acts as domain controller:

1. From the Windows **Start** menu, select **Administrative Tools** > **DNS**.
2. Select **Forward Lookup Zones**.
3. Check the right panel to verify that the DNS service is running.



Name	Type	Status
_msdcs.procurveu.edu	Active Direct...	Running
procurveu.edu	Active Direct...	Running

Figure 2-13. Ensuring That the Windows DNS Service Is Running

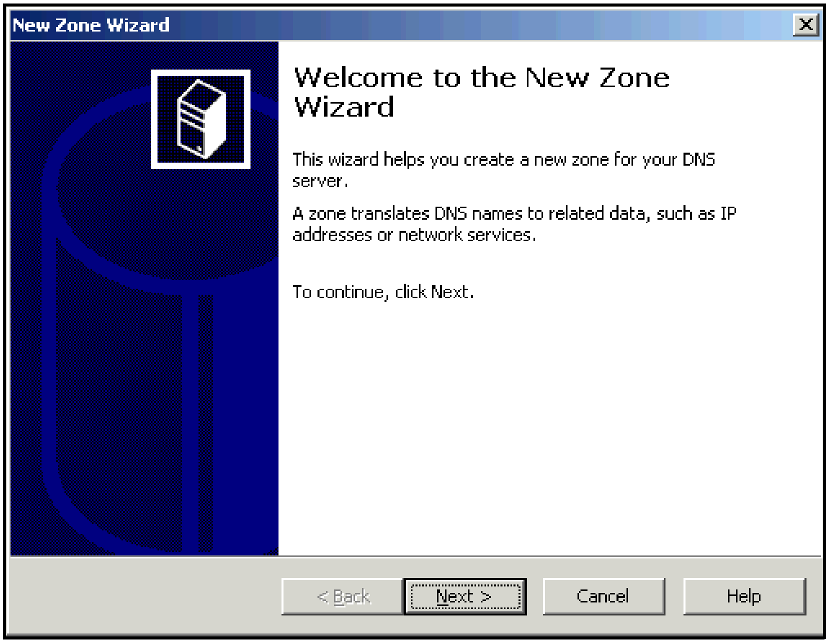
If the service is not running:

a. Right-click the domain name.

b. Select **All Tasks** > **Start**.

4. Double-click your domain (in this example, **procurveu.edu**).

5. Right-click **Reverse Lookup Zones** and select **New Zone**.



Welcome to the New Zone Wizard

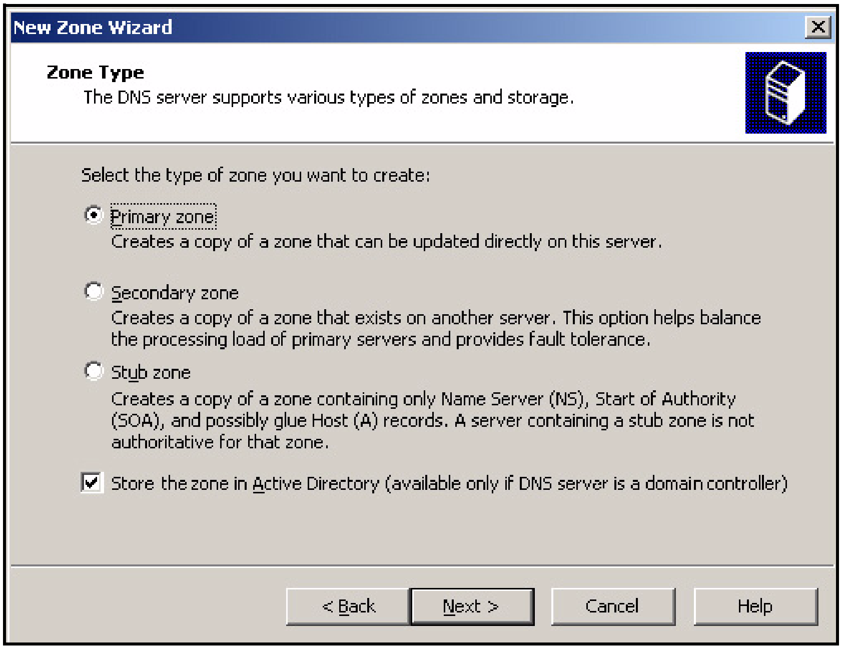
This wizard helps you create a new zone for your DNS server.

A zone translates DNS names to related data, such as IP addresses or network services.

To continue, click Next.

Figure 2-14. New Zone Wizard—Welcome Page

6. On the **Welcome to the New Zone Wizard** page, click **Next**.


New Zone Wizard

Zone Type

The DNS server supports various types of zones and storage.

Select the type of zone you want to create:

● Primary zone
Creates a copy of a zone that can be updated directly on this server.

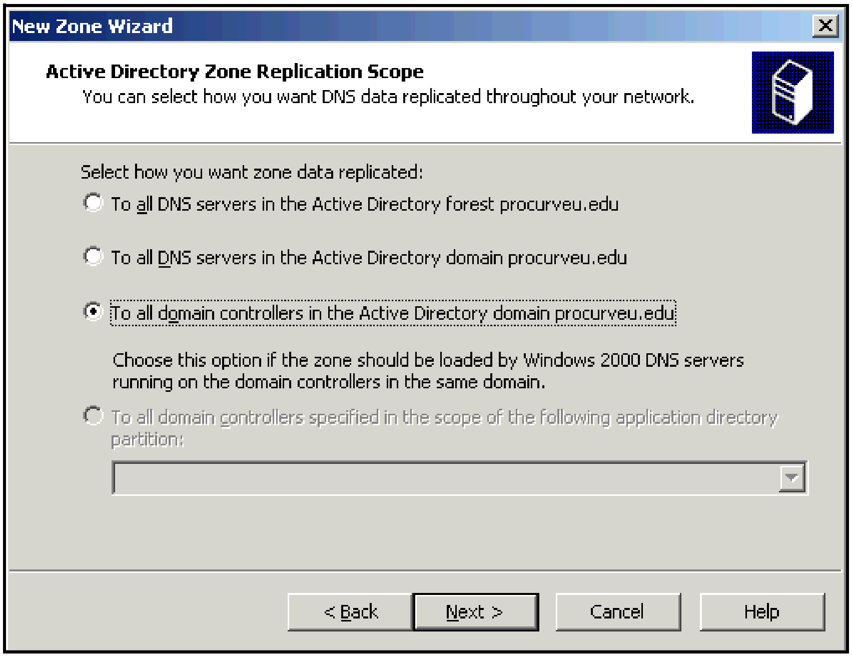
○ Secondary zone
Creates a copy of a zone that exists on another server. This option helps balance the processing load of primary servers and provides fault tolerance.

○ Stub zone
Creates a copy of a zone containing only Name Server (NS), Start of Authority (SOA), and possibly glue Host (A) records. A server containing a stub zone is not authoritative for that zone.

☑ Store the zone in Active Directory (available only if DNS server is a domain controller)

Figure 2-15. New Zone Wizard—Zone Type Page

7. Verify that **Primary zone** is selected and that the **Store the zone in Active Directory** check box is selected. Click **Next**.



New Zone Wizard

Active Directory Zone Replication Scope
You can select how you want DNS data replicated throughout your network.

Select how you want zone data replicated:

○ To all DNS servers in the Active Directory forest procurveu.edu

○ To all DNS servers in the Active Directory domain procurveu.edu

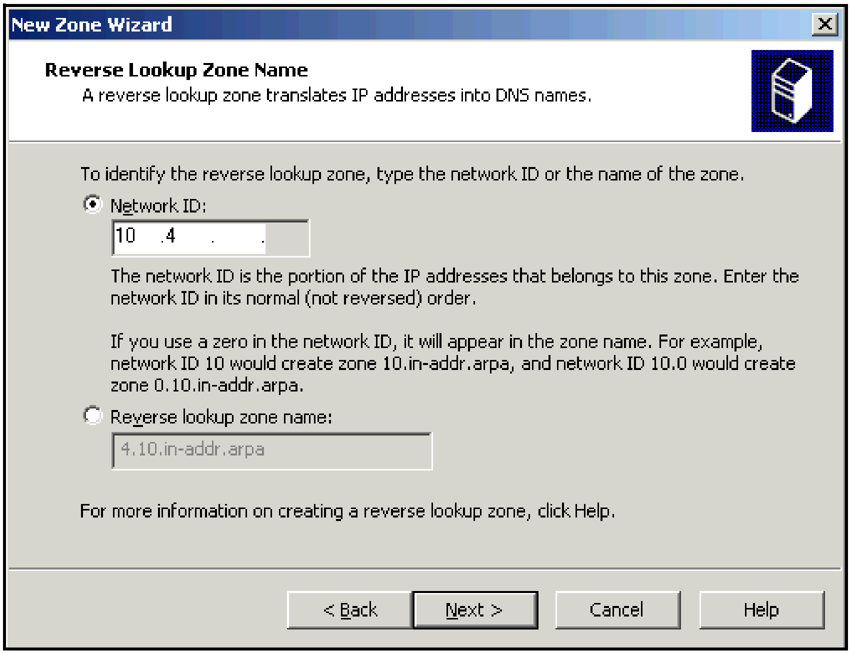
● To all domain controllers in the Active Directory domain procurveu.edu

Choose this option if the zone should be loaded by Windows 2000 DNS servers running on the domain controllers in the same domain.

○ To all domain controllers specified in the scope of the following application directory partition:

Figure 2-16. New Zone Wizard—Active Directory Zone Replication Scope Page

8. Select **To all domain controllers in the Active Directory domain <name>** and click **Next**.


New Zone Wizard
Reverse Lookup Zone Name
A reverse lookup zone translates IP addresses into DNS names.

To identify the reverse lookup zone, type the network ID or the name of the zone.

● Network ID:
10 .4 . .

The network ID is the portion of the IP addresses that belongs to this zone. Enter the network ID in its normal (not reversed) order.

If you use a zero in the network ID, it will appear in the zone name. For example, network ID 10 would create zone 10.in-addr.arpa, and network ID 10.0 would create zone 0.10.in-addr.arpa.

○ Reverse lookup zone name:
4.10.in-addr.arpa

For more information on creating a reverse lookup zone, click Help.

Figure 2-17. New Zone Wizard—Reverse Lookup Zone Name Page

9. Type the significant portion of the network address in the **Network ID** box.

   The significant portion of the address includes the non-zero octets. For example, the first two octets are significant in a /16 subnet (255.255.0.0). The first three octets are significant in a /24 (255.255.255.0) subnet.

   Leave the space for octets that are not significant blank. Do not enter 0s.

10. Click **Next**.
11. Select **Allow only secure dynamic updates** and click **Next**.
12. Click **Finish**.
13. Repeat steps 5 to 12 for each subnet in your domain.
14. Press [**Alt**]+[**F4**] to close the DNS windows.

Configuring the DHCP Server

Your DHCP server (or servers) must include scopes (also called pools) for each subnet for which devices request dynamic IP addresses. These subnets typically include:

- User VLANs
- Quarantine, test, and infected VLANs

Many devices in the management VLAN have static IP addresses. In the example network, however, the management VLAN still requires a DHCP scope because some network administrators connect with endpoints set up for DHCP. On the other hand, all servers in the sample network have static addresses, so VLANs 4 and 5 do not require DHCP scopes.

Table 2-9 displays settings for DHCP scopes in this network. Note that the range of IP addresses in each scope does not include all IP addresses available in the corresponding subnet. Some addresses are statically assigned to various network devices; others are reserved for future use.

Another important note: most scopes specify the network DNS servers (10.4.4.15 and 10.4.5.15). However, the scopes for the quarantine, test, and infected VLANs must specify the NAC 800s (10.4.4.40 and 10.4.5.50) as DNS servers. This setting allows the NAC 800s to properly redirect quarantined users who attempt to access Web sites.

Table 2-9. DHCP Scopes

Scope	VLAN	Subnet	Range	Default Gateway	DNS Server	Other Options
Management	2	10.2.0.0/16	10.2.16.1–10.2.20.254	10.2.0.1	• 10.4.4.15 • 10.4.5.15	domain name= procurveu.edu
Faculty	8	10.8.0.0/16	10.8.1.1–10.8.10.254	10.8.0.1	• 10.4.4.15 • 10.4.5.15	domain name= procurveu.edu
Students	10	10.10.0.0/16	10.10.1.1–10.10.10.254	10.10.0.1	• 10.4.4.15 • 10.4.5.15	domain name= procurveu.edu
Quarantine_Faculty	32	10.32.0.0/16	10.32.1.1–10.32.10.254	10.32.0.1	• 10.4.4.40 • 10.4.5.50	domain name= procurveu.edu
Infected_Faculty	33	10.33.0.0/16	10.33.1.1–10.33.10.254	10.33.0.1	• 10.4.4.40 • 10.4.5.50	domain name= procurveu.edu

Scope	VLAN	Subnet	Range	Default Gateway	DNS Server	Other Options
Quarantine_Students	34	10.34.0.0/16	10.34.1.1–10.34.10.254	10.34.0.1	• 10.4.4.40 • 10.4.5.50	domain name= procurveu.edu
Infected_Students	35	10.35.0.0/16	10.35.1.1–10.35.10.254	10.35.0.1	• 10.4.4.40 • 10.4.5.50	domain name= procurveu.edu

You can configure the scopes on any DHCP server. The following sections describe how to set up a Windows Server 2003 DHCP server.

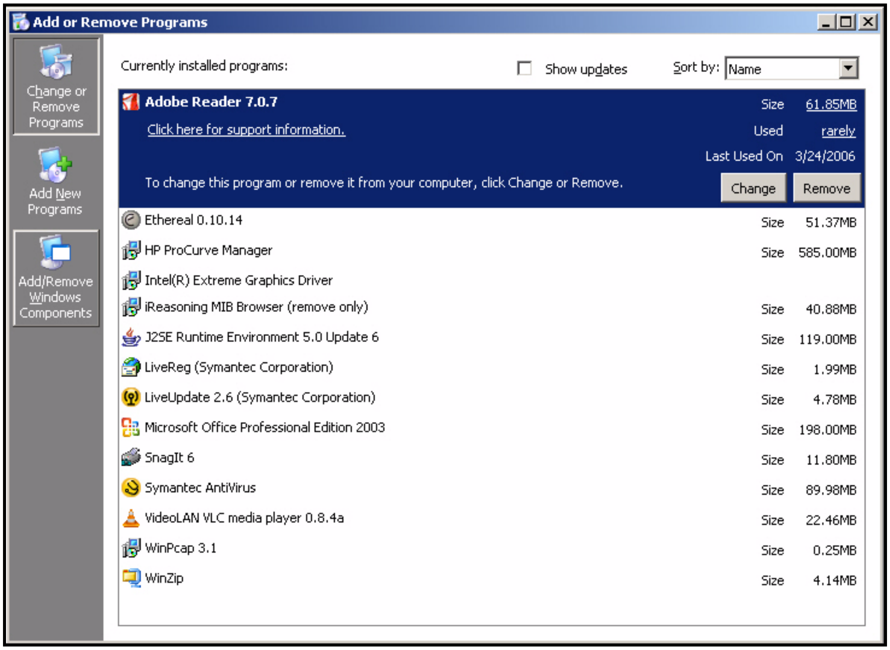
Note

Follow the instructions in “Install Windows Server 2003” on page 2-20 to begin setting up Windows Server 2003. However, instead of making the server a domain controller, join it to the domain.

Install the DHCP Service

Follow these steps to install the DHCP service on Windows Server 2003:

1. From the Windows **Start** menu, select **Control Panel** > **Add or Remove Programs**.



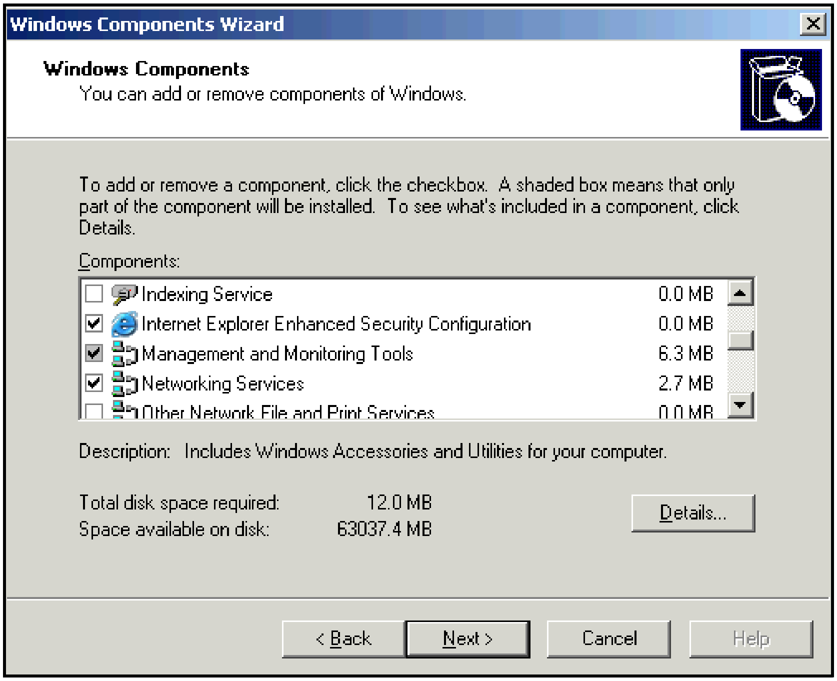
Add or Remove Programs
Change or Remove Programs
Add New Programs
Add/Remove Windows Components
Currently installed programs:
□ Show updates
Sort by: Name
Change
Remove

Adobe Reader 7.0.7 Size 61.85MB
Click here for support information. Used rarely
Last Used On 3/24/2006
To change this program or remove it from your computer, click Change or Remove.

Program		
Ethereal 0.10.14	Size	51.37MB
HP ProCurve Manager	Size	585.00MB
Intel(R) Extreme Graphics Driver		
iReasoning MIB Browser (remove only)	Size	40.88MB
J2SE Runtime Environment 5.0 Update 6	Size	119.00MB
LiveReg (Symantec Corporation)	Size	1.99MB
LiveUpdate 2.6 (Symantec Corporation)	Size	4.78MB
Microsoft Office Professional Edition 2003	Size	198.00MB
SnagIt 6	Size	11.80MB
Symantec AntiVirus	Size	89.98MB
VideoLAN VLC media player 0.8.4a	Size	22.46MB
WinPcap 3.1	Size	0.25MB
WinZip	Size	4.14MB

Figure 2-18. Windows Server 2003 Add or Remove Programs

2. Click the **Add/Remove Windows Components** button on the left of the window.



Windows Components Wizard

Windows Components
You can add or remove components of Windows.

To add or remove a component, click the checkbox. A shaded box means that only part of the component will be installed. To see what's included in a component, click Details.

Components:

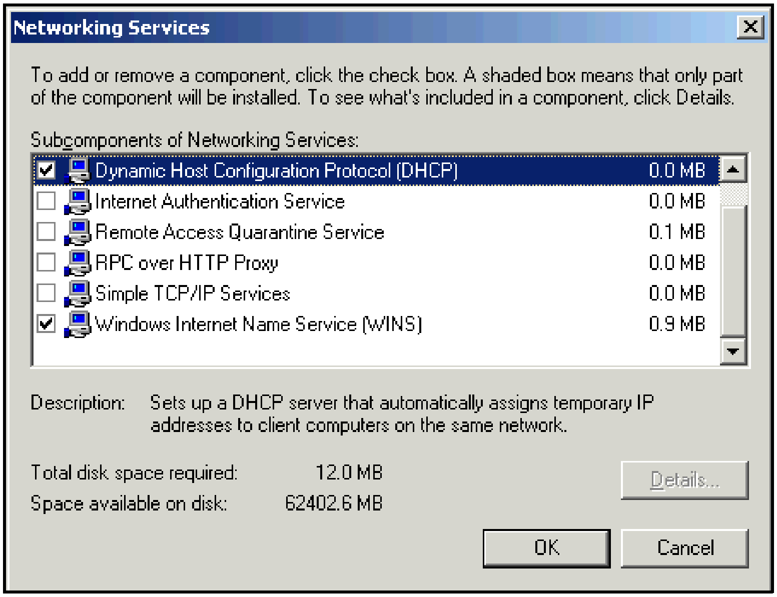
□	Indexing Service	0.0 MB
☑	Internet Explorer Enhanced Security Configuration	0.0 MB
☑	Management and Monitoring Tools	6.3 MB
☑	Networking Services	2.7 MB
□	Other Network File and Print Services	0.0 MB

Description: Includes Windows Accessories and Utilities for your computer.

Total disk space required: 12.0 MB
Space available on disk: 63037.4 MB

Figure 2-19. Windows Component Wizard—Windows Components Page

3. Select **Networking Services** and click **Details**.



To add or remove a component, click the check box. A shaded box means that only part of the component will be installed. To see what's included in a component, click Details.

Subcomponents of Networking Services:

☑	Dynamic Host Configuration Protocol (DHCP)	0.0 MB
□	Internet Authentication Service	0.0 MB
□	Remote Access Quarantine Service	0.1 MB
□	RPC over HTTP Proxy	0.0 MB
□	Simple TCP/IP Services	0.0 MB
☑	Windows Internet Name Service (WINS)	0.9 MB

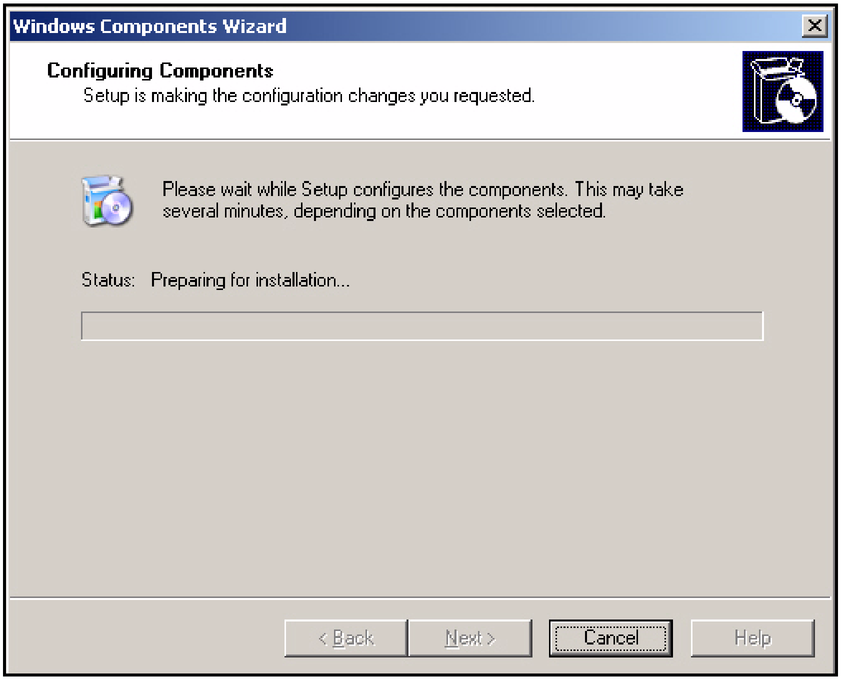
Description: Sets up a DHCP server that automatically assigns temporary IP addresses to client computers on the same network.

Total disk space required: 12.0 MB
Space available on disk: 62402.6 MB

Figure 2-20. Windows Component Wizard—Networking Services Window

4. Select the **Dynamic Host Configuration Protocol (DHCP)** and **Windows Internet Name Service (WINS)** check boxes and click **OK**.

5. Click **Next** on the **Windows Components** page. The **Configuring Components** page is displayed.



Windows Components Wizard

Configuring Components
Setup is making the configuration changes you requested.

Please wait while Setup configures the components. This may take several minutes, depending on the components selected.

Status: Preparing for installation...

Figure 2-21. Windows Components Wizard—Configuring Components Page

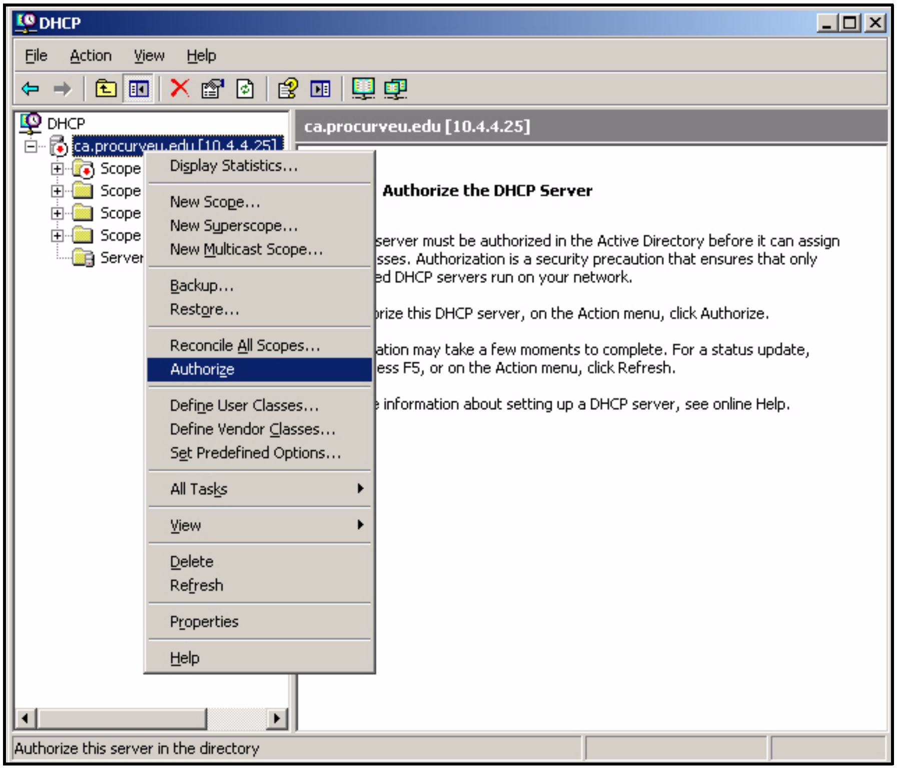
6. When the **Completing the Windows Components Wizard** page is displayed, click **Finish**.

7. Press [**Alt**]+[**F4**] to close the **Add or Remove Programs** window.

Configure the DHCP Server

Follow these steps to authorize the DHCP in Active Directory and create the DHCP scopes:

1. From the Windows **Start** menu, select **Administrative Tools** > **DHCP**.



Authorize the DHCP Server

server must be authorized in the Active Directory before it can assign sses. Authorization is a security precaution that ensures that only ed DHCP servers run on your network.

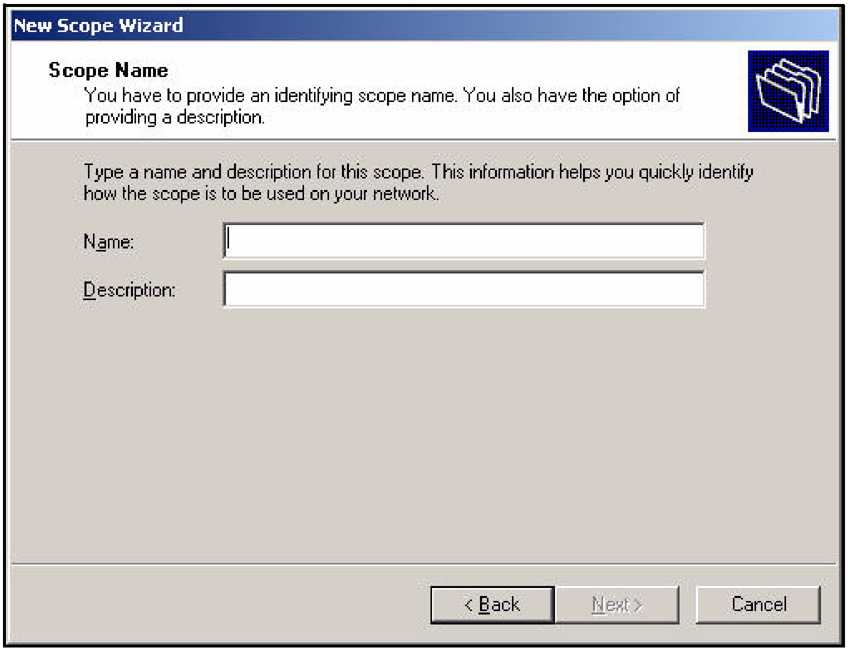
rize this DHCP server, on the Action menu, click Authorize.

ation may take a few moments to complete. For a status update, ess F5, or on the Action menu, click Refresh.

information about setting up a DHCP server, see online Help.

Figure 2-22. DHCP Manager

2. Right-click the server name and select **Authorize**.
3. With the server name still highlighted, select **Action** > **Refresh**.
4. Right-click the server name and select **New Scope**.
5. On the **New Scope Wizard — Welcome** page, click **Next**.



New Scope Wizard

Scope Name

You have to provide an identifying scope name. You also have the option of providing a description.

Type a name and description for this scope. This information helps you quickly identify how the scope is to be used on your network.

Name:

Description:

Figure 2-23. New Scope Wizard—Scope Name Page

6. Type a name in the **Name** box. For example, to configure the first scope shown above, type **Management**.

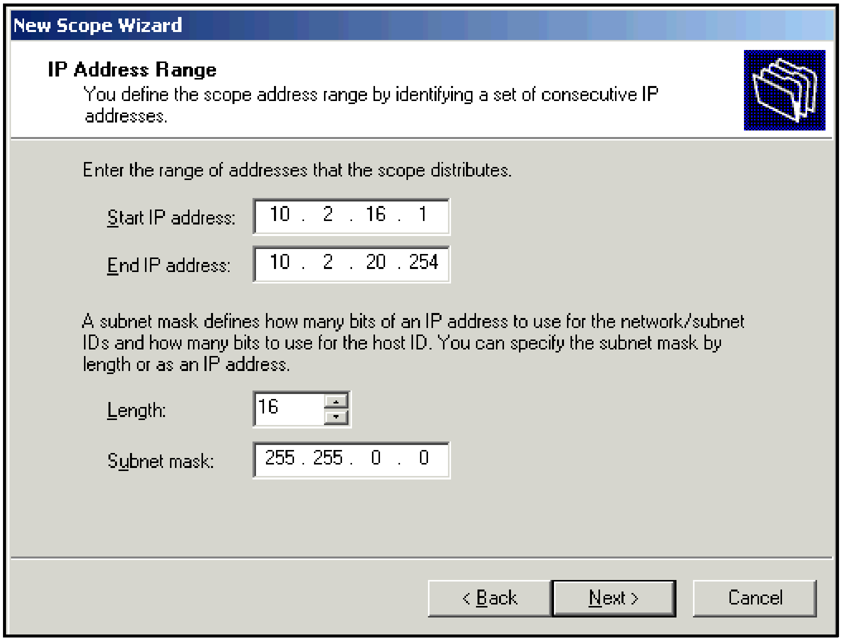
7. If desired, describe the function of this scope in the **Description** box. For example, you might type **For network administrators**.

8. Click **Next**.

9. Type the range of IP addresses in the **Start IP address** and **End IP address** boxes. For the example network, type **10.2.16.1** and **10.2.20.254**.

10. Type the subnet prefix length in the **Length** box. For this example, type **16**.

    The **Subnet mask** box automatically fills with the correct value (here, 255.255.0.0).



IP Address Range

You define the scope address range by identifying a set of consecutive IP addresses.

Enter the range of addresses that the scope distributes.

Start IP address: 10 . 2 . 16 . 1

End IP address: 10 . 2 . 20 . 254

A subnet mask defines how many bits of an IP address to use for the network/subnet IDs and how many bits to use for the host ID. You can specify the subnet mask by length or as an IP address.

Length: 16

Subnet mask: 255 . 255 . 0 . 0

Figure 2-24. New Scope Wizard—IP Address Range Page

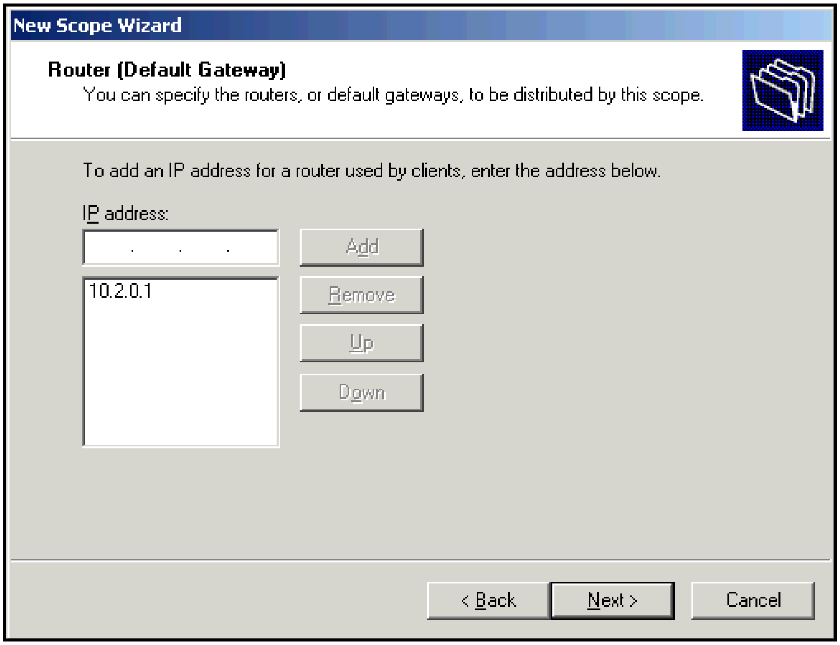
11. Click **Next**.
12. If the range you specified includes IP addresses that are assigned to devices statically, you must add exclusions in the **Add Exclusions** window.

    In this example scope, the range does not include the IP addresses assigned to network devices statically; therefore, you can click **Next**.
13. In the **Lease Duration** window, you can set how long a device can retain its IP address without renewing it. Click **Next** to accept the default of eight days.

Note

The 802.1X quarantine method for endpoint integrity does not impose any particular requirements on the lease duration.

14. Select **Yes, I want to configure these options now** and click **Next**.



New Scope Wizard

Router (Default Gateway)

You can specify the routers, or default gateways, to be distributed by this scope.

To add an IP address for a router used by clients, enter the address below.

IP address:

10.2.0.1

Figure 2-25. New Scope Wizard—Router (Default Gateway) Page

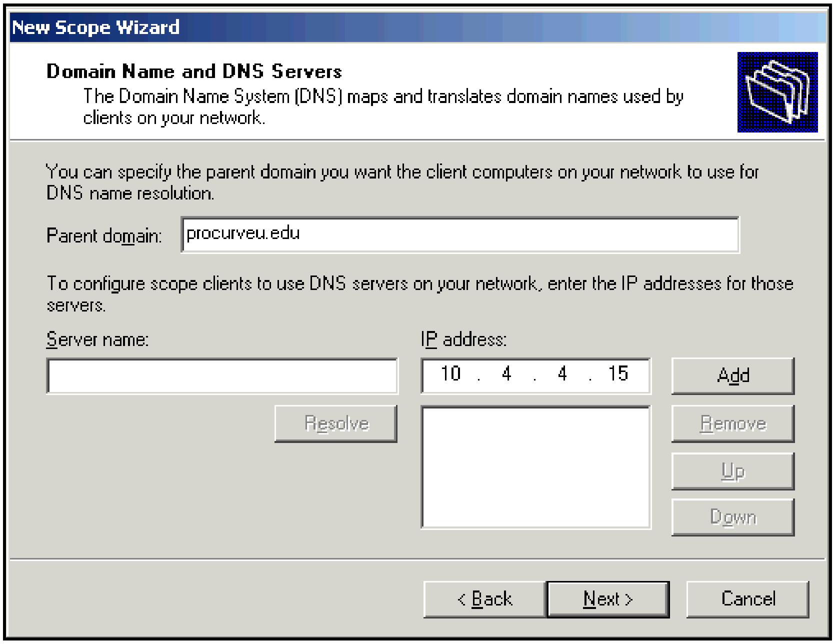
15. Type the IP address of the subnet's default router in the **IP address** box and click **Add**. For this example, type **10.2.0.1**.

16. Click **Next**.

17. Type your organization's domain name in the **Parent domain** box. For this example, type **procurveu.edu**.

18. Type the appropriate IP address in the **IP address** box and click **Add**. For this example, type **10.4.4.15**.

    For user VLANs, type the IP address of one of your domain's DNS servers (often a domain controller). For the quarantine, test, and infected VLANs, type the IP address of a NAC 800 ES.



New Scope Wizard

Domain Name and DNS Servers
The Domain Name System (DNS) maps and translates domain names used by clients on your network.

You can specify the parent domain you want the client computers on your network to use for DNS name resolution.

Parent domain: procurveu.edu

To configure scope clients to use DNS servers on your network, enter the IP addresses for those servers.

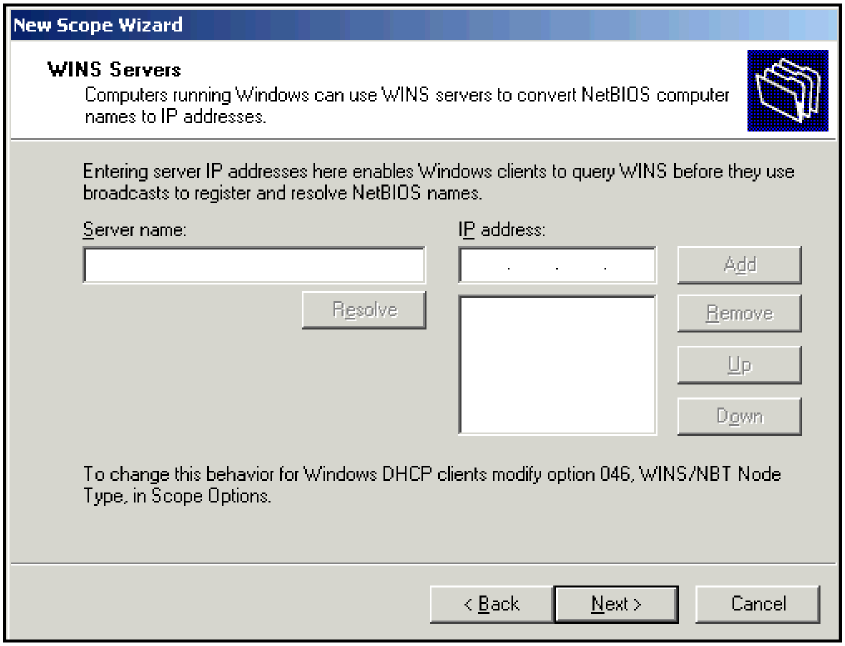
Server name:

IP address: 10 . 4 . 4 . 15

Figure 2-26. New Scope Wizard—Domain Name and DNS Servers Page

19. Repeat the step above to add a secondary DNS server.

20. Click **Next**.



New Scope Wizard

WINS Servers

Computers running Windows can use WINS servers to convert NetBIOS computer names to IP addresses.

Entering server IP addresses here enables Windows clients to query WINS before they use broadcasts to register and resolve NetBIOS names.

Server name:

IP address:

To change this behavior for Windows DHCP clients modify option 046, WINS/NBT Node Type, in Scope Options.

Figure 2-27. New Scope Wizard—WINS Servers Page

21. Type the IP address of your network's WINS server (if any) in the **WINS server** box. Click **Add** and then click **Next**.
22. Select **Yes, I want to activate this scope now** and click **Next**.
23. Click **Finish**.
24. Repeat steps 4 to 23 for each scope that your network requires.
25. Press [**Alt**]+[**F4**] to close the **DHCP Manager** window.

Configuring Certificate Services

This section describes how to establish a PKI, which issues digital certificates for your organization's servers and users. Users can then complete EAP-Transport Layer Security (TLS) authentication and establish secure communications with your private servers.

You have several options for your PKI:

- Three tier:
  - A root CA, which is the ultimate trusted entity, and for security is kept offline (standalone)
  - Multiple intermediate CAs, which receive certificates from the root CA and issue certificates to issuing CAs; typically kept offline as well
  - Multiple issuing CAs, which are online (enterprise) and which issue certificates to servers, endpoints, and end-users
- Two tier:
  - A standalone root CA
  - Multiple issuing enterprise CAs
- One tier:
  - A root CA, which also issues certificates to servers, endpoints, and end-users; must be kept online (enterprise root CA)

A multi-tiered approach offers higher security but requires a more complex deployment.

This guide provides the steps for deploying a PKI using theone-tier approach. Certificate services run on a Windows Server 2003 server that is an online member of the Windows domain but is *not* a domain controller.

This section provides steps for:

- Joining a server to a domain
- Installing Internet Information Services (IIS) on Windows Server 2003
- Installing certificate services on Windows Server 2003
- Setting up autoenrollment of computers and users through Active Directory
- Customizing certificate templates to meet the requirements of your network access solution
- Exporting the CA root certificate

Subsequent sections explain how to create certificate requests on the following non-Windows devices, which require server certificates:

- Wireless Edge Services Modules
- NAC 800s

At that point, the guide explains how to submit the requests to your domain CA and generate the servercertificates. See “Manually Issue and Install Server Certificates” on page 2-174.

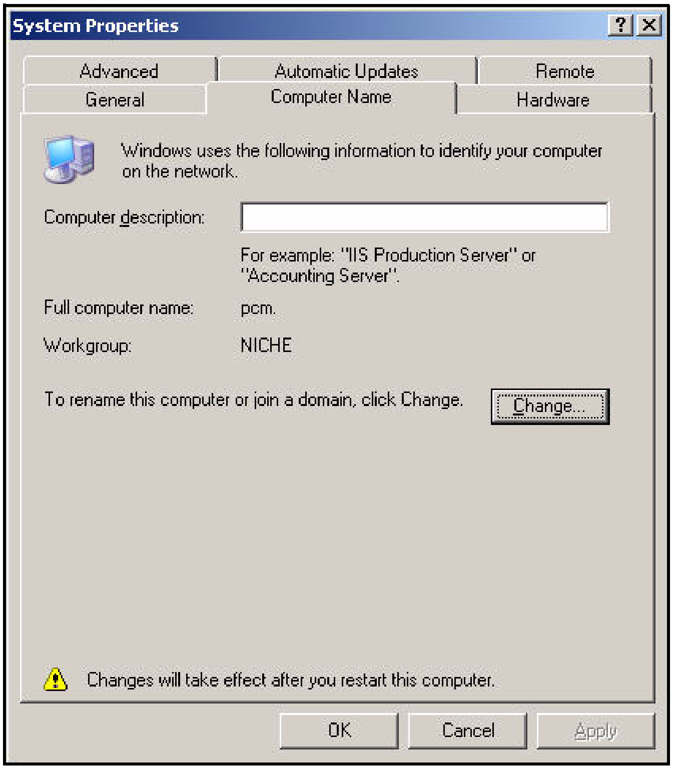
Note

On Web servers that members of the public contact, you should install a certificate signed by a third-party CA instead of your root CA.

Join the Windows Server 2003 Server to the Domain

This solution calls for an enterprise CA server, which must be a member of the domain. Follow these steps to join the server to the domain:

1. On the server that you selected to run CA services, click **Start** > **Control Panel** > **System**.
2. Click the **Computer Name** tab.



Windows uses the following information to identify your computer on the network.

Computer description:

For example: "IIS Production Server" or "Accounting Server".

Full computer name: pcm.

Workgroup: NICHE

To rename this computer or join a domain, click Change.

Changes will take effect after you restart this computer.

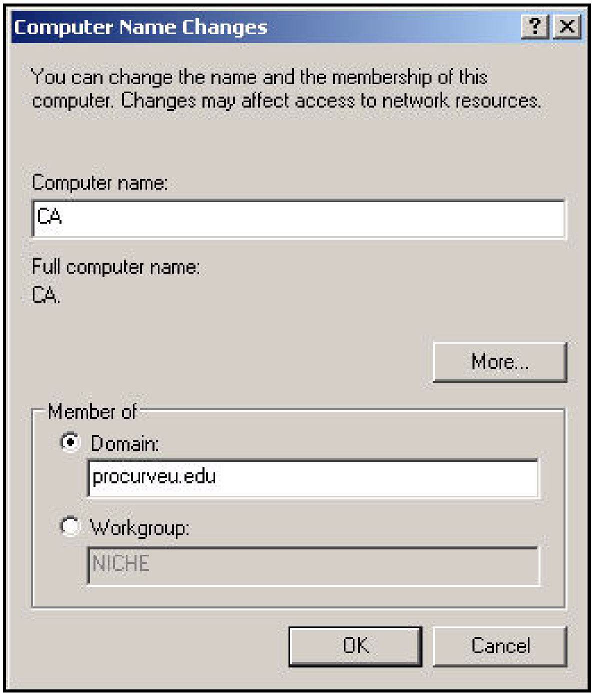
Figure 2-28. System Properties > Computer Name Tab

3. Click **Change**. The **Computer Name Changes** window is displayed. (See Figure 2-29.)

4. Type a meaningful name for the **Computer name**. In this example: **CA**.

5. In the **Member of** area, click **Domain**.

6. Enter your domain name in the box below. In this example: **procurveu.edu**.



Computer Name Changes

You can change the name and the membership of this computer. Changes may affect access to network resources.

Computer name: CA

Full computer name: CA.

Member of

● Domain: procurveu.edu

○ Workgroup: NICHE

Figure 2-29. Computer Name Changes Window

7. Click **OK**.

8. A window is displayed asking foryour credentials. Type the usernameand password of a domain administrator and click **OK**.

9. Restart the server.

Install IIS and the Certificate Services

If the CA server runs IIS and ASP, it can present users with Web pages to help them enroll for certificates. The Web enrollment pages are located at *<CA server IP address>/certsrv*. Note that ASP can open security vulnerabilities, so you might chose not to use this feature.

All IIS services are not necessary. You must install:

- Common Files
- Internet Information Services Manager

- World Wide Web Service:
  - Active Server Pages (ASP)
  - World Wide Web Service

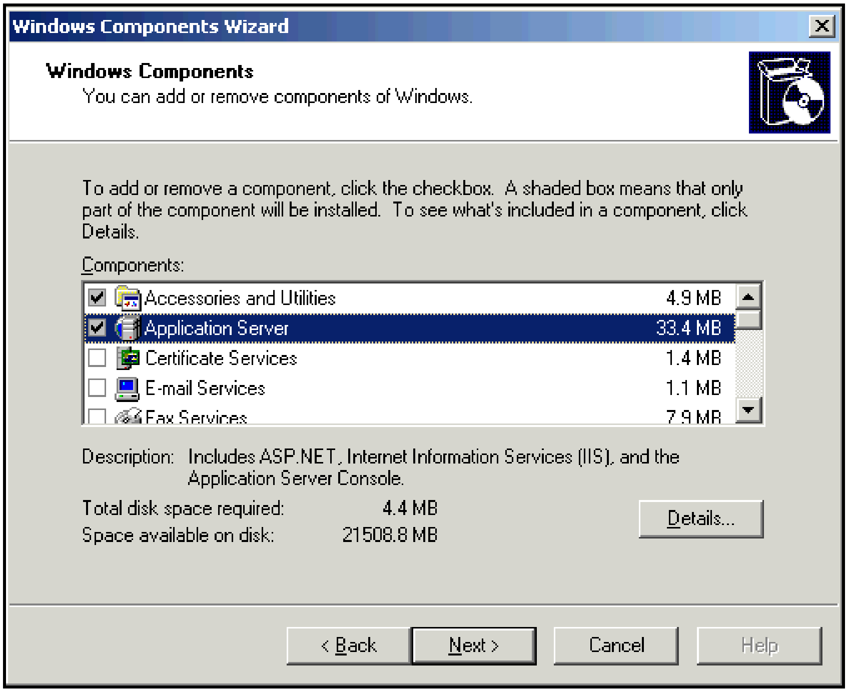
You will install the Certificate Services at the same time as you install IIS.

Note

Installing Certificate Services binds the server to its current name and domain. Before completing the steps below, you must join the server to the domain as described in the previous section.

Follow these steps to install the necessary services on the Windows Server 2003:

1. From the **Start** menu, select **Control Panel** > **Add or Remove Programs** > **Add/ Remove Windows Components**.



Windows Components
You can add or remove components of Windows.

To add or remove a component, click the checkbox. A shaded box means that only part of the component will be installed. To see what's included in a component, click Details.

Components:

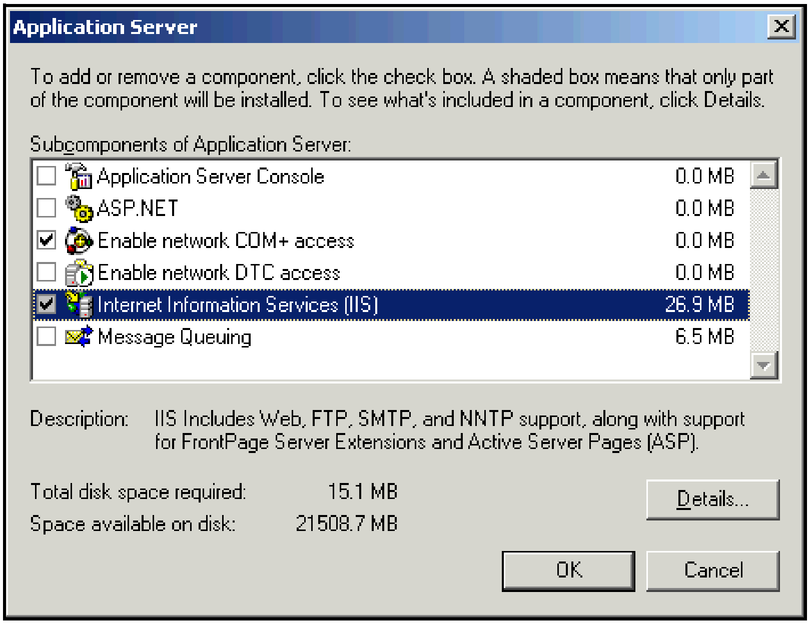
☑	Accessories and Utilities	4.9 MB
☑	Application Server	33.4 MB
☐	Certificate Services	1.4 MB
☐	E-mail Services	1.1 MB
☐	Fax Services	7.9 MB

Description: Includes ASP.NET, Internet Information Services (IIS), and the Application Server Console.

Total disk space required: 4.4 MB
Space available on disk: 21508.8 MB

Figure 2-30. Windows Components Wizard—Windows Components Page

2. Select the **Application Server** check box and click **Details**.



To add or remove a component, click the check box. A shaded box means that only part of the component will be installed. To see what's included in a component, click Details.

Subcomponents of Application Server:

☐	Application Server Console	0.0 MB
☐	ASP.NET	0.0 MB
☑	Enable network COM+ access	0.0 MB
☐	Enable network DTC access	0.0 MB
☑	Internet Information Services (IIS)	26.9 MB
☐	Message Queuing	6.5 MB

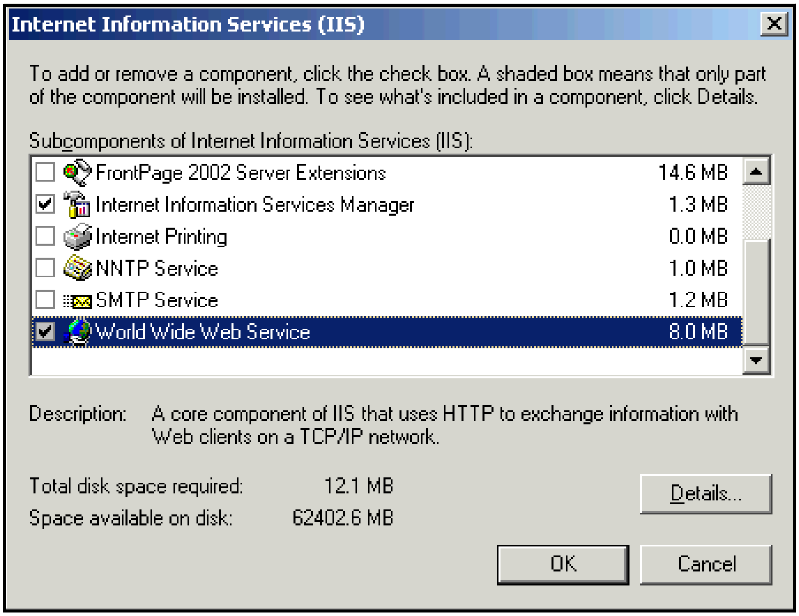
Description: IIS Includes Web, FTP, SMTP, and NNTP support, along with support for FrontPage Server Extensions and Active Server Pages (ASP).

Total disk space required: 15.1 MB

Space available on disk: 21508.7 MB

Figure 2-31. Windows Components Wizard—Application Server Page

3. Select the **Internet Information Services (IIS)** check box and click **Details**.



Internet Information Services (IIS)

To add or remove a component, click the check box. A shaded box means that only part of the component will be installed. To see what's included in a component, click Details.

Subcomponents of Internet Information Services (IIS):

□	FrontPage 2002 Server Extensions	14.6 MB
☑	Internet Information Services Manager	1.3 MB
□	Internet Printing	0.0 MB
□	NNTP Service	1.0 MB
□	SMTP Service	1.2 MB
☑	World Wide Web Service	8.0 MB

Description: A core component of IIS that uses HTTP to exchange information with Web clients on a TCP/IP network.

Total disk space required: 12.1 MB

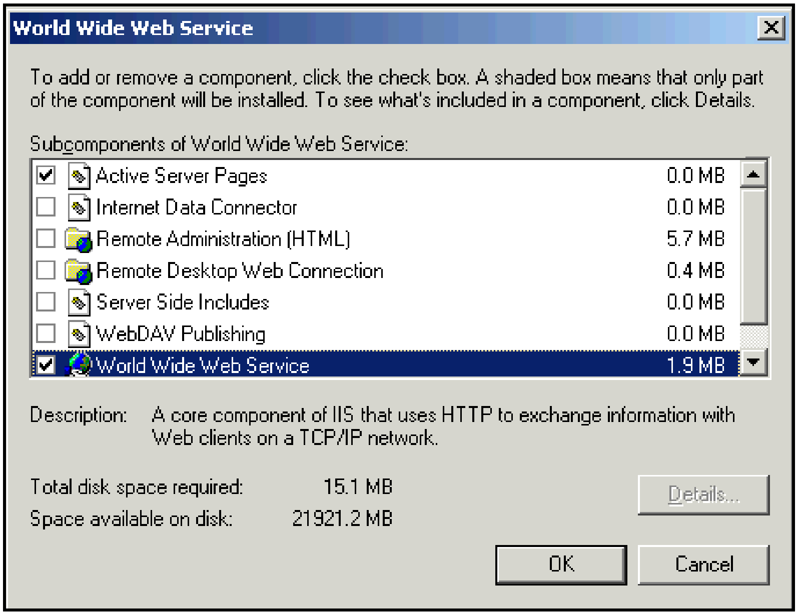
Space available on disk: 62402.6 MB

Figure 2-32. Windows Components Wizard—Internet Information Services (IIS) Page

4. Select the check boxes for:
   - **Common Files**
   - **Internet Information Services Manager**
   - **World Wide Web Service**

   Clear all other check boxes.

5. Click **World Wide Web Service** and click **Details**.



To add or remove a component, click the check box. A shaded box means that only part of the component will be installed. To see what's included in a component, click Details.

Subcomponents of World Wide Web Service:

☑	Active Server Pages	0.0 MB
□	Internet Data Connector	0.0 MB
□	Remote Administration (HTML)	5.7 MB
□	Remote Desktop Web Connection	0.4 MB
□	Server Side Includes	0.0 MB
□	WebDAV Publishing	0.0 MB
☑	World Wide Web Service	1.9 MB

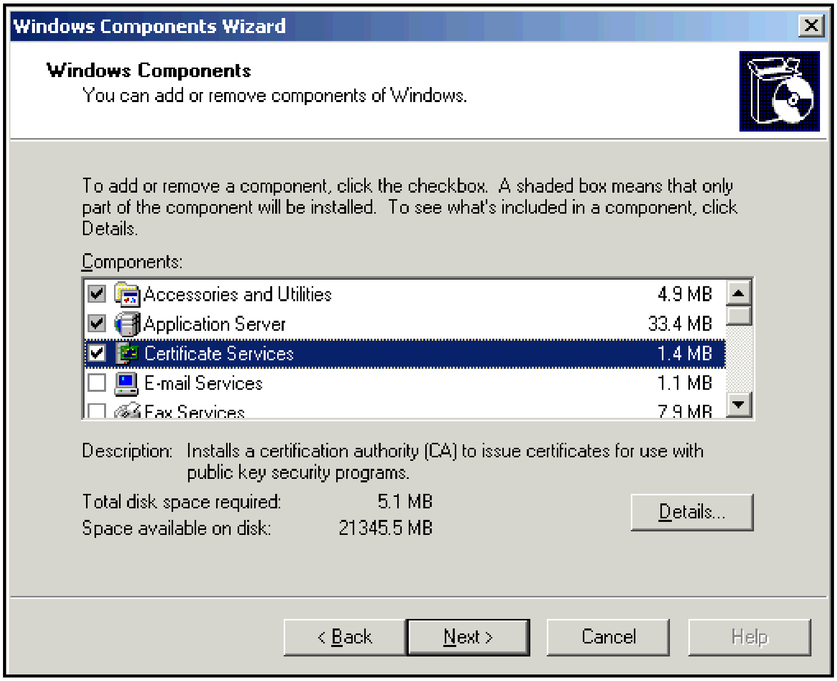
Description: A core component of IIS that uses HTTP to exchange information with Web clients on a TCP/IP network.

Total disk space required: 15.1 MB
Space available on disk: 21921.2 MB

Figure 2-33. Windows Components Wizard—World Wide Web Service Page

6. Select the check boxes for:
   - **Active Server Pages (ASP)**
   - **World Wide Web Service**

   Clear all other check boxes.
7. Click **OK** three times until you are in the **Windows Components** page.
8. Select **Certificate Services**.


Windows Components Wizard

Windows Components
You can add or remove components of Windows.

To add or remove a component, click the checkbox. A shaded box means that only part of the component will be installed. To see what's included in a component, click Details.

Components:

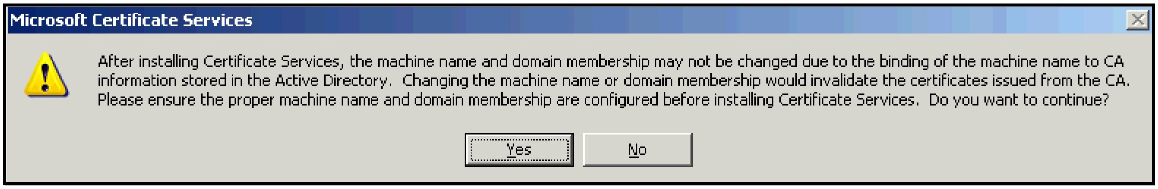
☑	Accessories and Utilities	4.9 MB
☑	Application Server	33.4 MB
☑	Certificate Services	1.4 MB
□	E-mail Services	1.1 MB
□	Fax Services	7.9 MB

Description: Installs a certification authority (CA) to issue certificates for use with public key security programs.

Total disk space required: 5.1 MB
Space available on disk: 21345.5 MB

Figure 2-34. Windows Components Wizard—Windows Components Page

9. The **Microsoft Certificate Services** window is displayed.


Microsoft Certificate Services

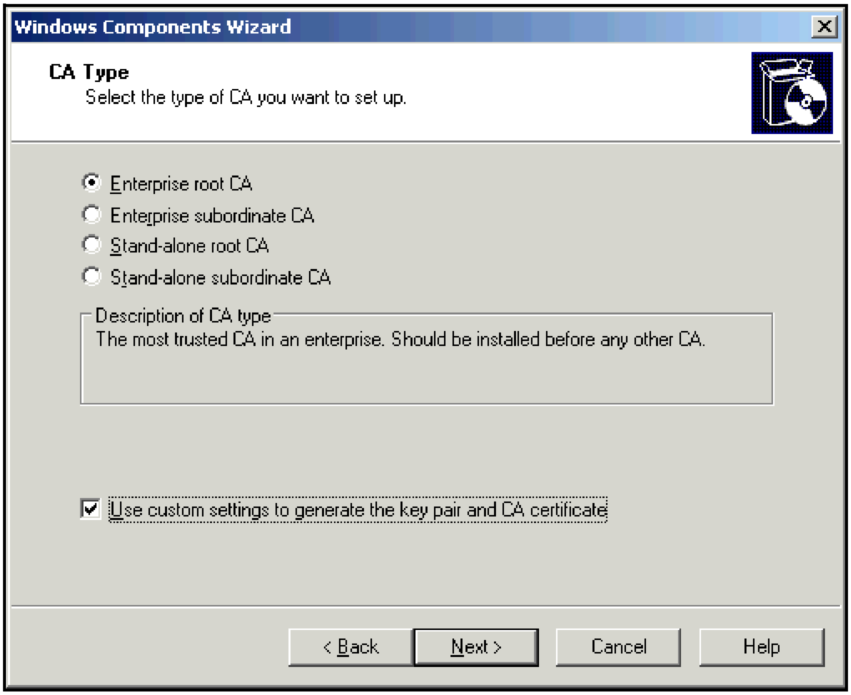
After installing Certificate Services, the machine name and domain membership may not be changed due to the binding of the machine name to CA information stored in the Active Directory. Changing the machine name or domain membership would invalidate the certificates issued from the CA. Please ensure the proper machine name and domain membership are configured before installing Certificate Services. Do you want to continue?

Figure 2-35. Microsoft Certificate Services Message

10. Click **Yes**.

11. Click **Next**.

    You are now presented with a series of pages in which you enter information about the CA.



Windows Components Wizard

CA Type

Select the type of CA you want to set up.

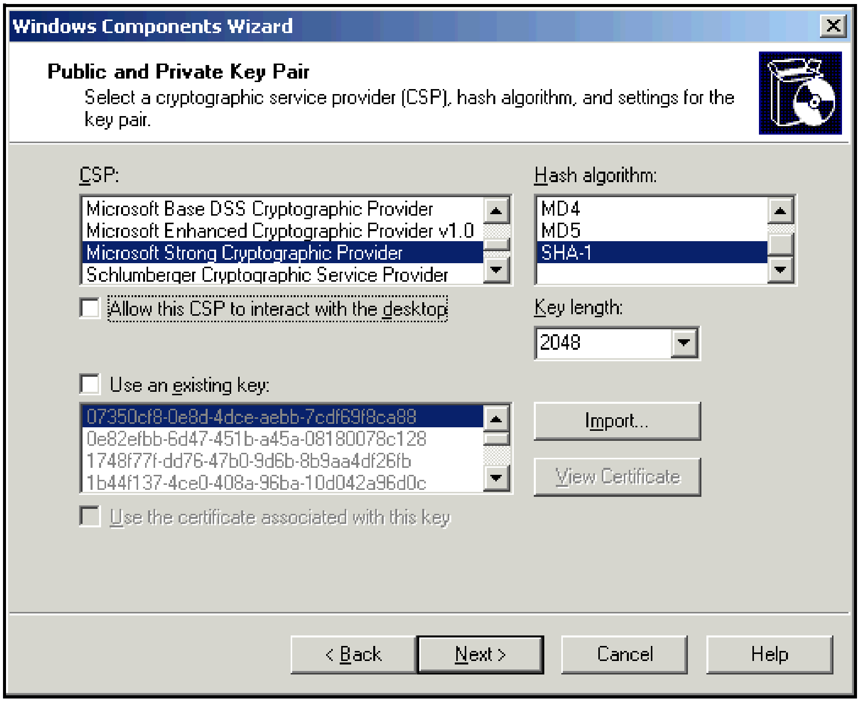
● Enterprise root CA
○ Enterprise subordinate CA
○ Stand-alone root CA
○ Stand-alone subordinate CA

Description of CA type
The most trusted CA in an enterprise. Should be installed before any other CA.

☑ Use custom settings to generate the key pair and CA certificate

Figure 2-36. Windows Components Wizard—CA Type Page

12. In the **CA Type**, click **Enterprise root CA**.
13. Select the **Use custom settings to generate the key pair and CA certificate** check box.
14. Click **Next**.



Windows Components Wizard

Public and Private Key Pair

Select a cryptographic service provider (CSP), hash algorithm, and settings for the key pair.

CSP:

Microsoft Base DSS Cryptographic Provider
Microsoft Enhanced Cryptographic Provider v1.0
Microsoft Strong Cryptographic Provider
Schlumberger Cryptographic Service Provider

Hash algorithm:

MD4
MD5
SHA-1

□ Allow this CSP to interact with the desktop

Key length: 2048

□ Use an existing key:

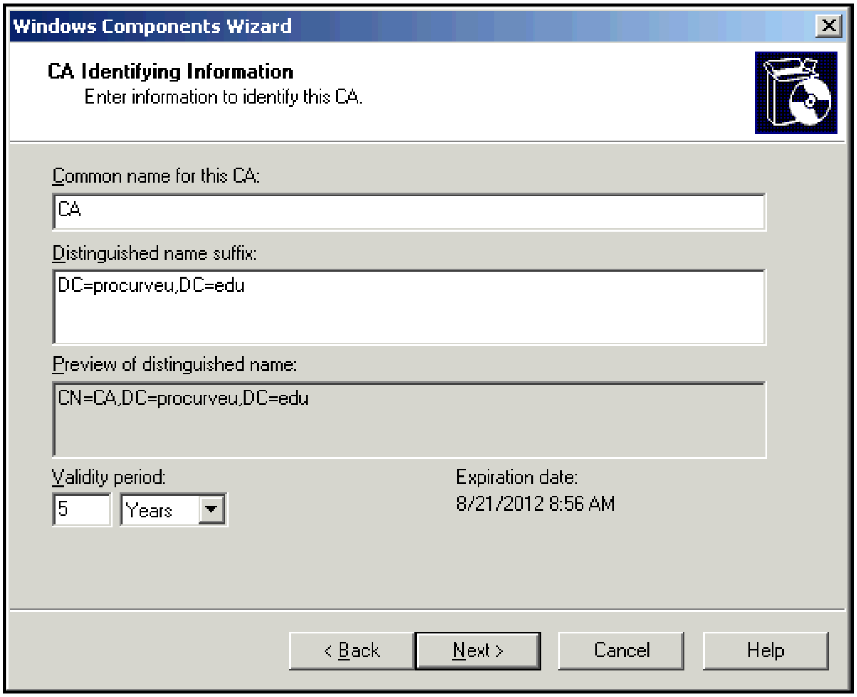
07350cf8-0e8d-4dce-aebb-7cdf69f8ca88
0e82efbb-6d47-451b-a45a-08180078c128
1748f77f-dd76-47b0-9d6b-8b9aa4df26fb
1b44f137-4ce0-408a-96ba-10d042a96d0c

□ Use the certificate associated with this key

Figure 2-37. Windows Components Wizard—Public and Private Key Pair Page

15. Choose the settings for the CA's private key. Generally, you can keep the defaults. However, you might need to change the key length. For example, some routers, including the ProCurve Secure Router 7000dl, require a key length smaller than 2048. Choose **1024** from the **Key length** box.

16. Click **Next**.



Windows Components Wizard
CA Identifying Information
Enter information to identify this CA.

Common name for this CA: CA

Distinguished name suffix: DC=procurveu,DC=edu

Preview of distinguished name: CN=CA,DC=procurveu,DC=edu

Validity period: 5 Years

Expiration date: 8/21/2012 8:56 AM

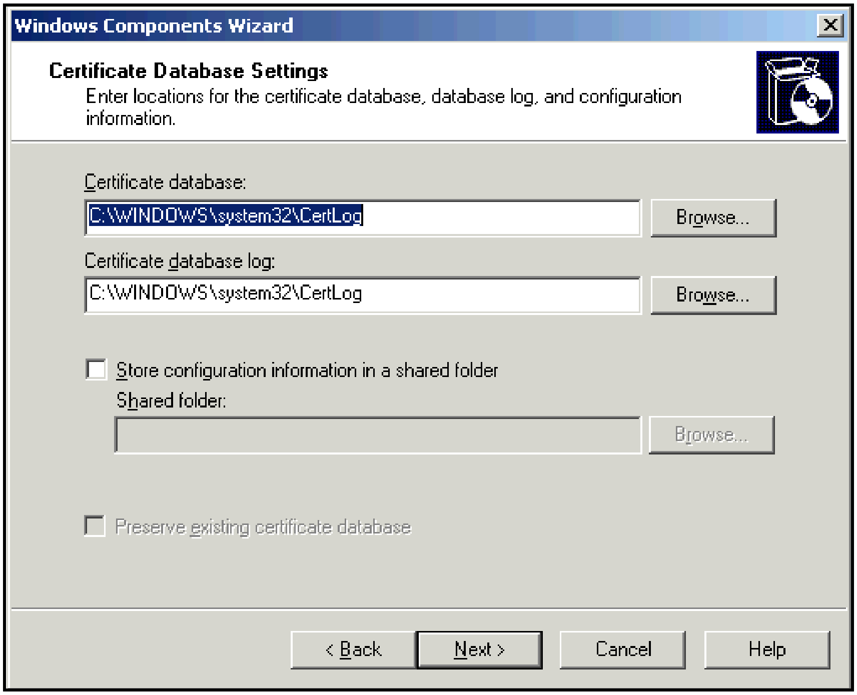
< Back
Next >
Cancel
Help

Figure 2-38. Windows Components Wizard—CA Identifying Information Page

17. In the **Common name for this CA** box, type the CA server's name. In this example: **CA**.

18. The **Distinguished name suffix** box shows your domain name in Lightweight Directory Access Protocol (LDAP) format. In this example: **DC=procurveu,DC=edu.**

19. Click **Next**.



Windows Components Wizard

Certificate Database Settings
Enter locations for the certificate database, database log, and configuration information.

Certificate database: C:\WINDOWS\system32\CertLog

Certificate database log: C:\WINDOWS\system32\CertLog

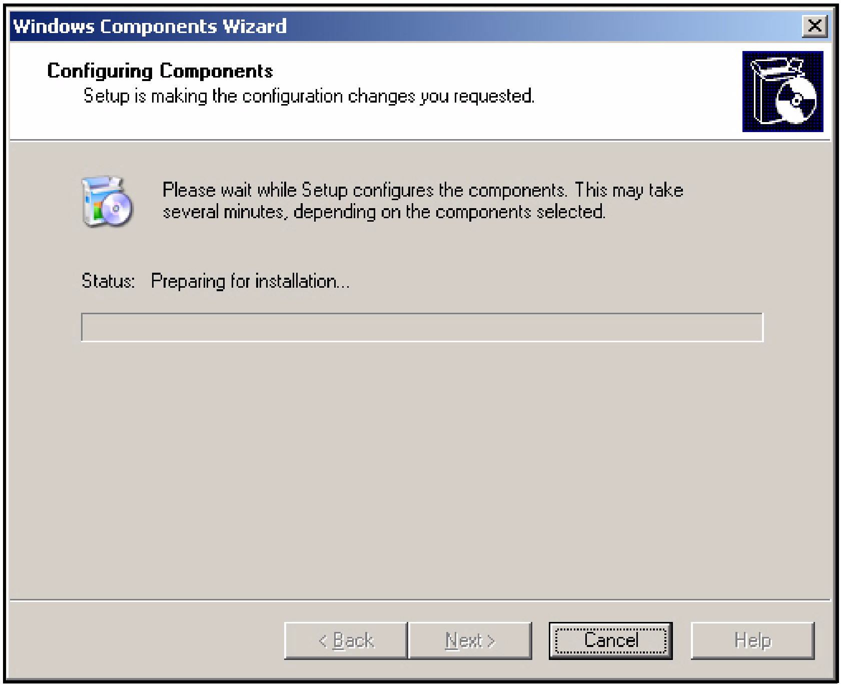
□ Store configuration information in a shared folder

Shared folder:

□ Preserve existing certificate database

Figure 2-39. Windows Components Wizard—Certificate Database Settings Page

20. Accept the default storage locations by clicking **Next**.
21. The **Configuring Components** page is displayed.



Windows Components Wizard

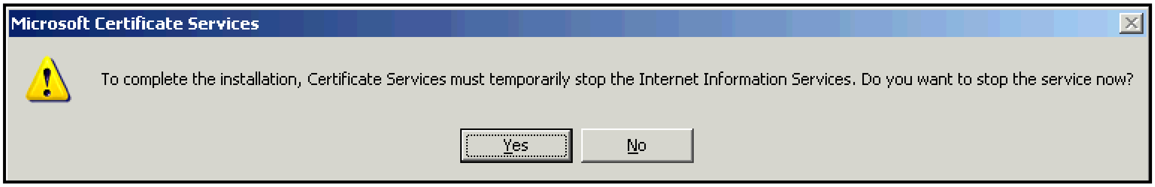
Configuring Components
Setup is making the configuration changes you requested.

Please wait while Setup configures the components. This may take several minutes, depending on the components selected.

Status: Preparing for installation...

Figure 2-40. Windows Components Wizard—Configuring Components Page

22. If your server was already running IIS, you will see the window in Figure 2-41. Click **Yes**.

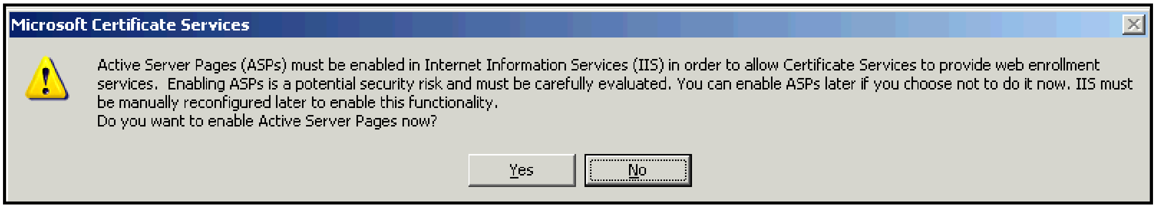


Microsoft Certificate Services

To complete the installation, Certificate Services must temporarily stop the Internet Information Services. Do you want to stop the service now?

Figure 2-41. Microsoft Certificate Services Message

23. You will see the window in Figure 2-42.

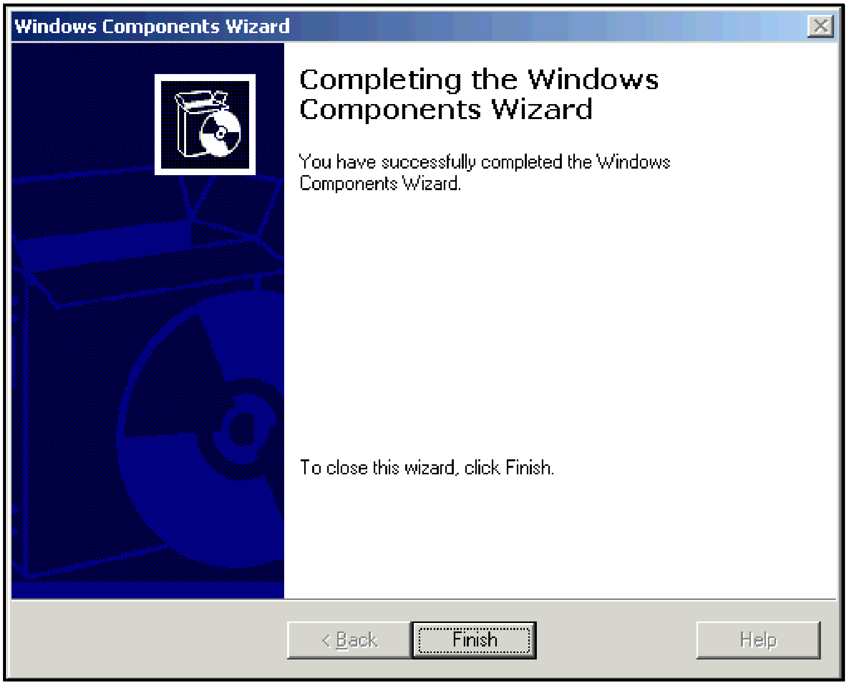


Microsoft Certificate Services

Active Server Pages (ASPs) must be enabled in Internet Information Services (IIS) in order to allow Certificate Services to provide web enrollment services. Enabling ASPs is a potential security risk and must be carefully evaluated. You can enable ASPs later if you choose not to do it now. IIS must be manually reconfigured later to enable this functionality.
Do you want to enable Active Server Pages now?

Figure 2-42. Microsoft Certificate Services Message

24. Click **Yes** if you want to use the web enrollment pages or **No** if you do not.



Windows Components Wizard

Completing the Windows Components Wizard

You have successfully completed the Windows Components Wizard.

To close this wizard, click Finish.

Figure 2-43. Completing the Windows Components Wizard

25. Click **Finish**.

26. Press [**Alt**]+[**F4**] to close the **Add/Remove Programs** window.

Set Up Autoenrollment of Computer and User Certificates

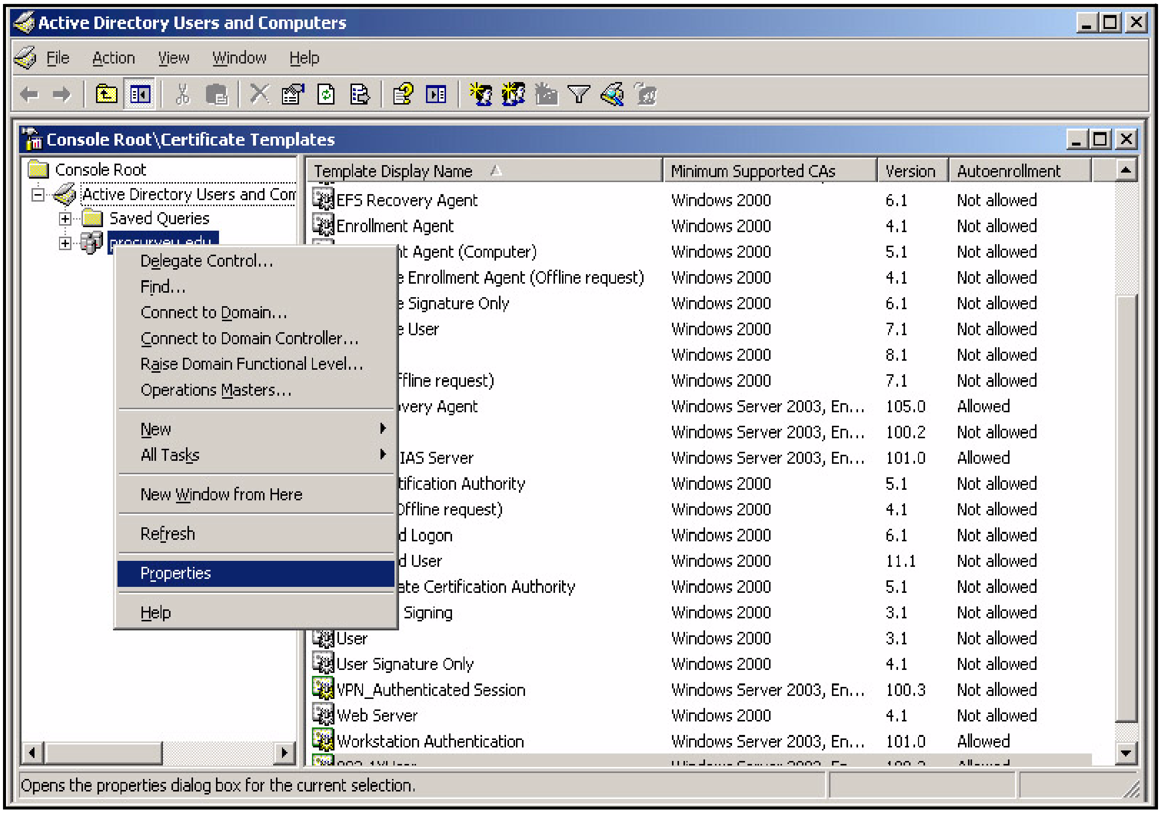
This section teaches you howto enable autoenrollment forboth computer and user certificates. It also explains how to configure the following certificate templates so that the CA issues certificates correctly for your environment:

- User template that allows autoenrollment of certificates
- NAC 800 template for the NAC 800's RADIUS server

Set Up Autoenrollment of Computer Certificates

When you enable autoenrollment for computer certificates, each computer automatically obtains a certificate the next time that it boots up andconnects to the domain. To configure computer certificate enrollment, follow these steps on a domain controller:

1. From the Windows **Start** menu, select **Administrative Tools** >**Active Directory Users and Computers**.



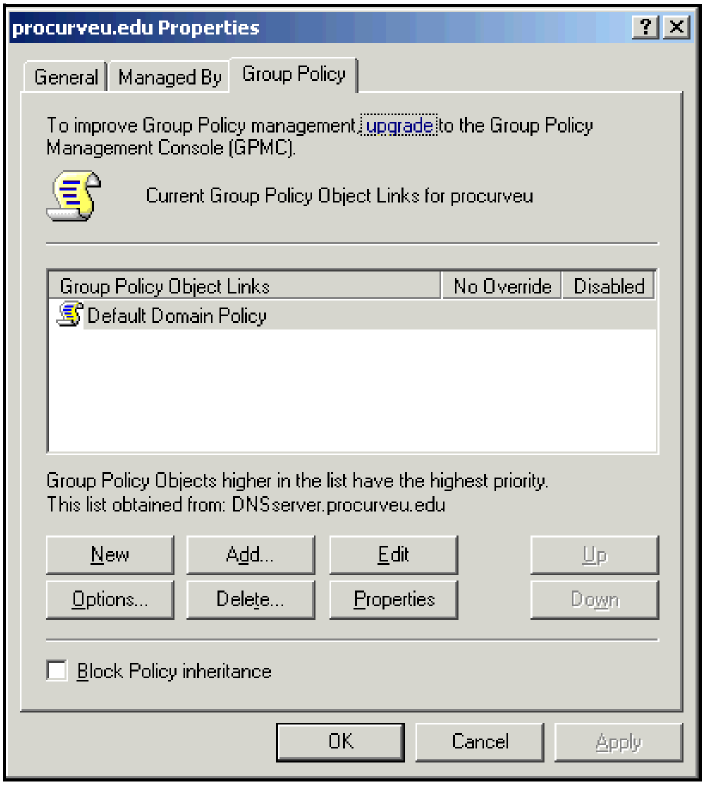
Template Display Name	Minimum Supported CAs	Version	Autoenrollment
EFS Recovery Agent	Windows 2000	6.1	Not allowed
Enrollment Agent	Windows 2000	4.1	Not allowed
t Agent (Computer)	Windows 2000	5.1	Not allowed
e Enrollment Agent (Offline request)	Windows 2000	4.1	Not allowed
e Signature Only	Windows 2000	6.1	Not allowed
e User	Windows 2000	7.1	Not allowed
	Windows 2000	8.1	Not allowed
ffline request)	Windows 2000	7.1	Not allowed
very Agent	Windows Server 2003, En...	105.0	Allowed
	Windows Server 2003, En...	100.2	Not allowed
IAS Server	Windows Server 2003, En...	101.0	Allowed
tification Authority	Windows 2000	5.1	Not allowed
Offline request)	Windows 2000	4.1	Not allowed
d Logon	Windows 2000	6.1	Not allowed
d User	Windows 2000	11.1	Not allowed
ate Certification Authority	Windows 2000	5.1	Not allowed
Signing	Windows 2000	3.1	Not allowed
User	Windows 2000	3.1	Not allowed
User Signature Only	Windows 2000	4.1	Not allowed
VPN_Authenticated Session	Windows Server 2003, En...	100.3	Not allowed
Web Server	Windows 2000	4.1	Not allowed
Workstation Authentication	Windows Server 2003, En...	101.0	Allowed

Opens the properties dialog box for the current selection.

Figure 2-44. Management Console Window

2. In the left pane, right-click your domain name and select **Properties**.

3. Click the **Group Policy** tab.



procurveu.edu Properties

To improve Group Policy management, upgrade to the Group Policy Management Console (GPMC).

Current Group Policy Object Links for procurveu

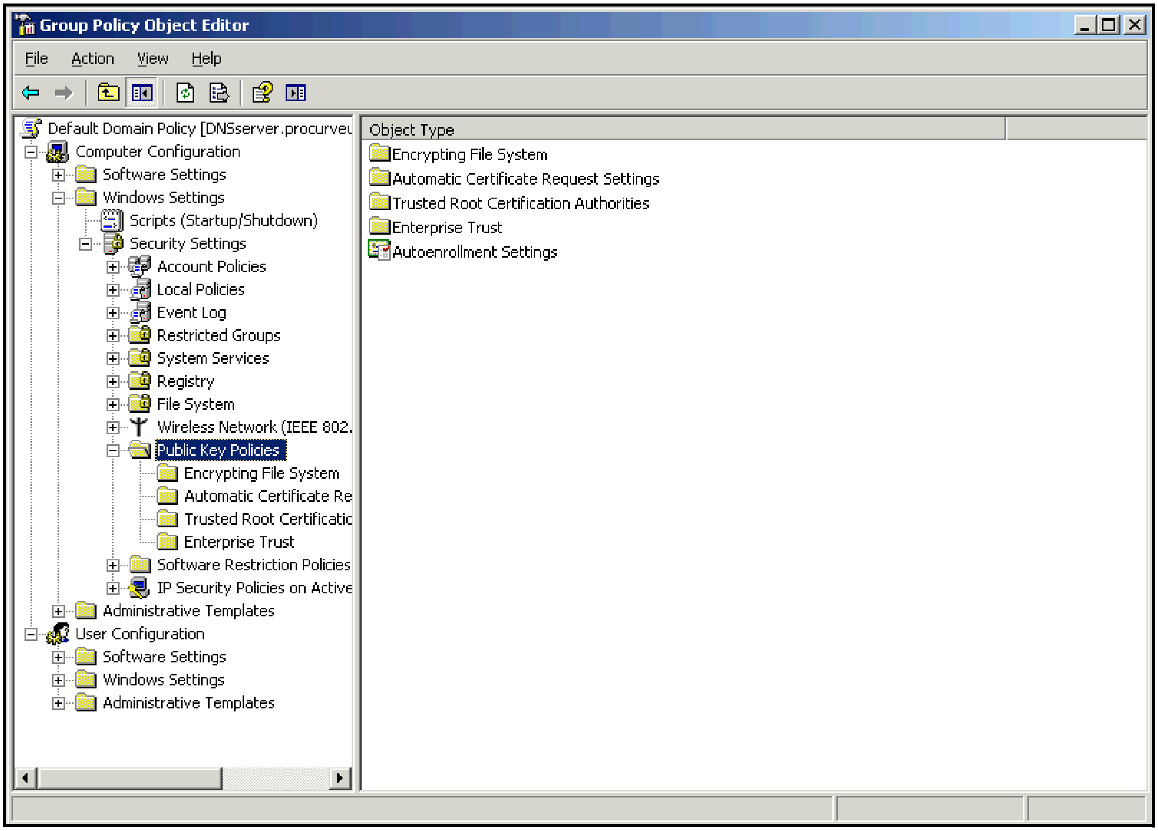
Group Policy Object Links	No Override	Disabled
Default Domain Policy		

Group Policy Objects higher in the list have the highest priority.
This list obtained from: DNSserver.procurveu.edu

□ Block Policy inheritance

Figure 2-45. Management Console—*<domain name>* Properties Window

4. Select **Default Domain Policy** and click **Edit**.



Group Policy Object Editor

File Action View Help

- Default Domain Policy [DNSserver.procurveu
  - Computer Configuration
    - Software Settings
    - Windows Settings
      - Scripts (Startup/Shutdown)
      - Security Settings
        - Account Policies
        - Local Policies
        - Event Log
        - Restricted Groups
        - System Services
        - Registry
        - File System
        - Wireless Network (IEEE 802.
        - Public Key Policies
          - Encrypting File System
          - Automatic Certificate Re
          - Trusted Root Certificatic
          - Enterprise Trust
        - Software Restriction Policies
        - IP Security Policies on Active
    - Administrative Templates
  - User Configuration
    - Software Settings
    - Windows Settings
    - Administrative Templates

Object Type
Encrypting File System
Automatic Certificate Request Settings
Trusted Root Certification Authorities
Enterprise Trust
Autoenrollment Settings

Figure 2-46. Management Console—Group Policy Object Editor Window

5. In the left pane, expand **Computer Configuration** > **Windows Settings** > **Security Settings** > **Public Key Policies**.

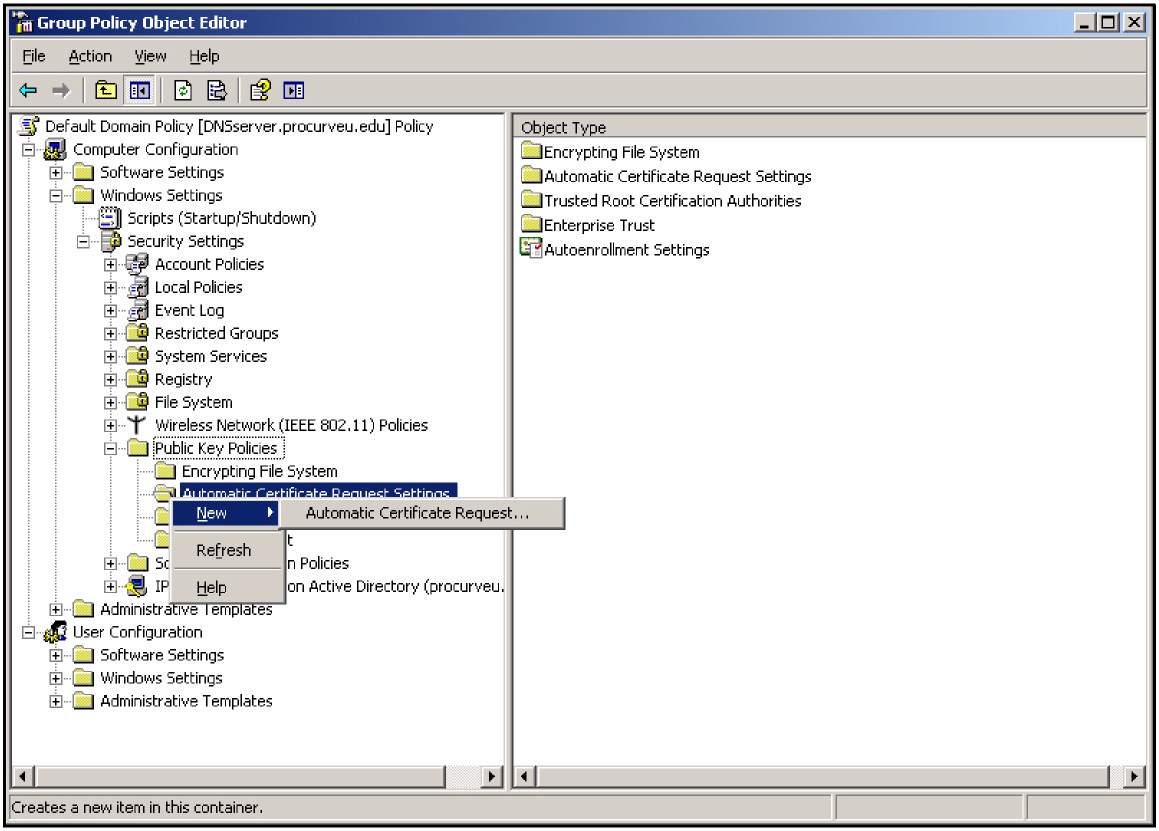
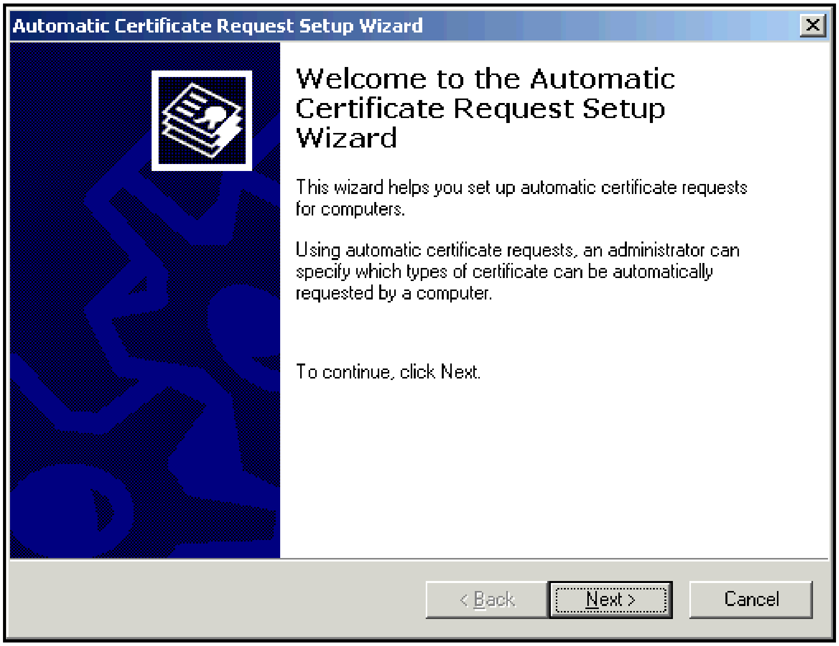


Figure 2-47. Management Console—Group Policy Object Editor—Automatic Certificate Request Settings

6. Right-click **Automatic Certificate Request Settings** and select **New** > **Automatic Certificate Request**.



Automatic Certificate Request Setup Wizard

Welcome to the Automatic Certificate Request Setup Wizard

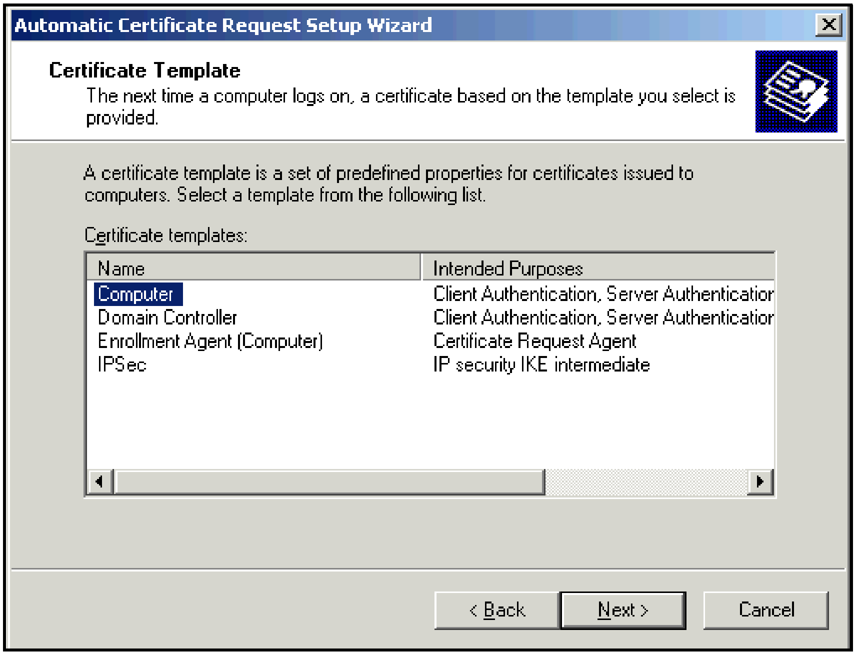
This wizard helps you set up automatic certificate requests for computers.

Using automatic certificate requests, an administrator can specify which types of certificate can be automatically requested by a computer.

To continue, click Next.

Figure 2-48. Welcome to the Automatic Certificate Request Setup Wizard

7. Click **Next** on the **Welcome** page of the Automatic Certificate Request Setup Wizard.



Automatic Certificate Request Setup Wizard

Certificate Template

The next time a computer logs on, a certificate based on the template you select is provided.

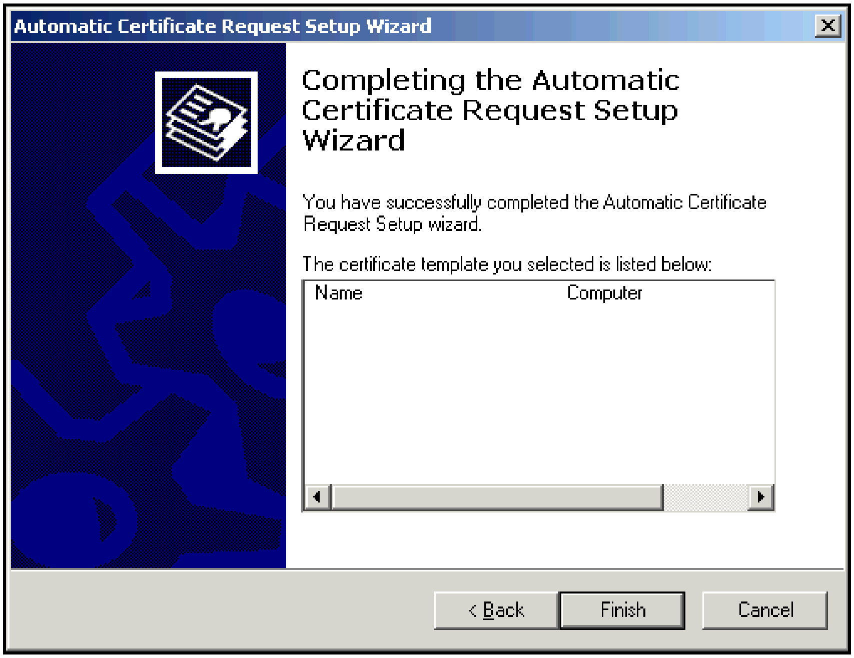
A certificate template is a set of predefined properties for certificates issued to computers. Select a template from the following list.

Certificate templates:

Name	Intended Purposes
Computer	Client Authentication, Server Authenticatior
Domain Controller	Client Authentication, Server Authenticatior
Enrollment Agent (Computer)	Certificate Request Agent
IPSec	IP security IKE intermediate

Figure 2-49. Automatic Certificate Request Setup Wizard—Certificate Template Page

8. Select **Computer** from the **Certificate templates** list and click **Next**.



Completing the Automatic Certificate Request Setup Wizard

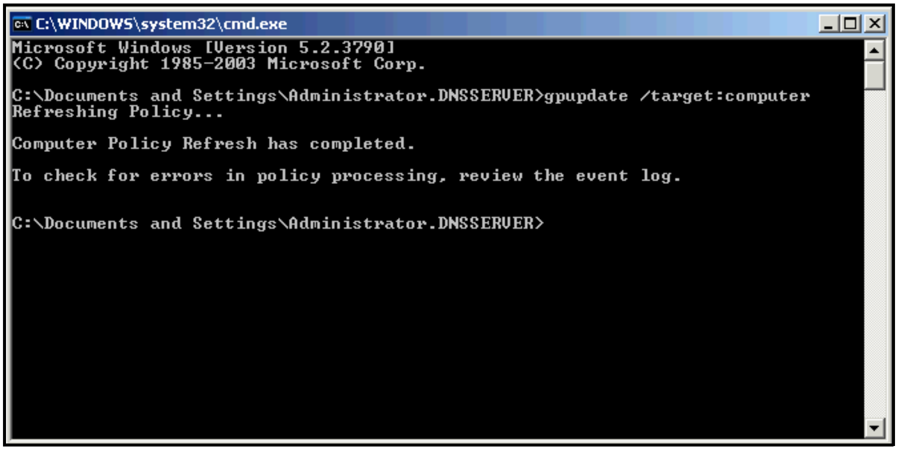
You have successfully completed the Automatic Certificate Request Setup wizard.

The certificate template you selected is listed below:

Name	Computer

Figure 2-50. Automatic Certificate Request Setup Wizard—Completing the Automatic Certificate Request Setup Wizard Page

9. Click **Finish**.
10. Select **File** > **Exit** to close the **Group Policy Object Editor** window.
11. Click **OK** in the **<domain name> Properties** window.
12. Press **[Alt]**+**[F4]** to close the **Active Directory Users and Computers** window.
13. To force a refresh of the computer Group Policy, access the command prompt:
    a. From the Windows **Start** menu, select **Run**.
    b. Type **cmd** at the prompt and click **OK**.



```
Microsoft Windows [Version 5.2.3790]
(C) Copyright 1985-2003 Microsoft Corp.

C:\Documents and Settings\Administrator.DNSSERVER>gpupdate /target:computer
Refreshing Policy...

Computer Policy Refresh has completed.

To check for errors in policy processing, review the event log.


C:\Documents and Settings\Administrator.DNSSERVER>
```

Figure 2-51. Command Interface—Force Group Update

c. At the command prompt, enter:

```
gpupdate /target:computer
```

Note

When instructed to "enter" a command, you should type the string and press **[Enter]**.

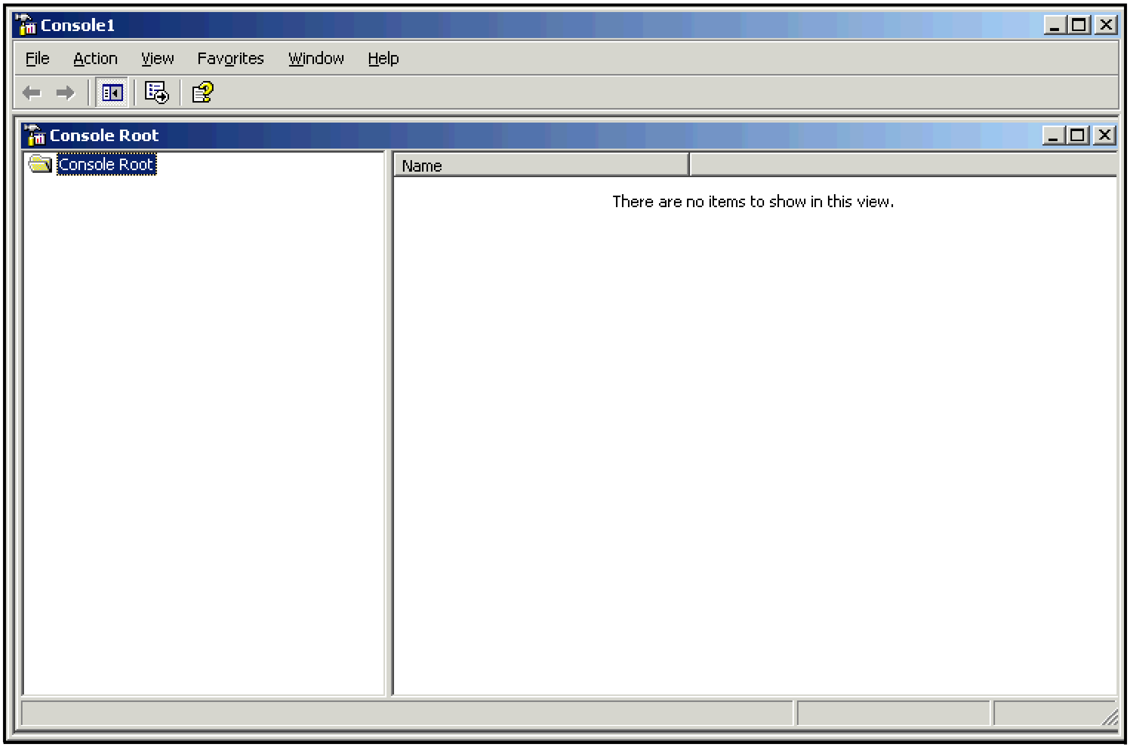
d. Enter this command to close the command line:

```
exit
```

Create a Management Console for the CA

This section describeshow to set up a Management Console. Throughout this guide, you will add snap-ins to the console to control various services—in particular those related to certificate services. You can configure the Management Console on any Windows Server 2003 server; however, you will need to log in as a user with rights to administer the CA. For example, you can log in to either a domain controller or the CA server with the default domain administrator account and complete the steps below:

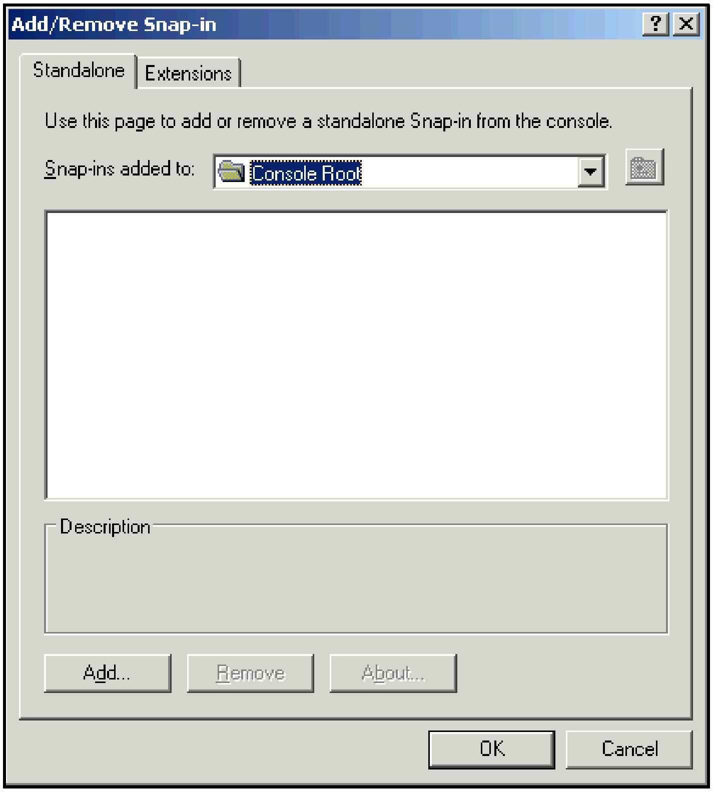
1. Open the Management Console:
   a. From the Windows **Start** menu, click **Run.**
   b. Type **mmc** at the prompt and click **OK**.



There are no items to show in this view.

Figure 2-52. Open Management Console

2. In the **File** menu, click **Add/Remove Snap-In**.

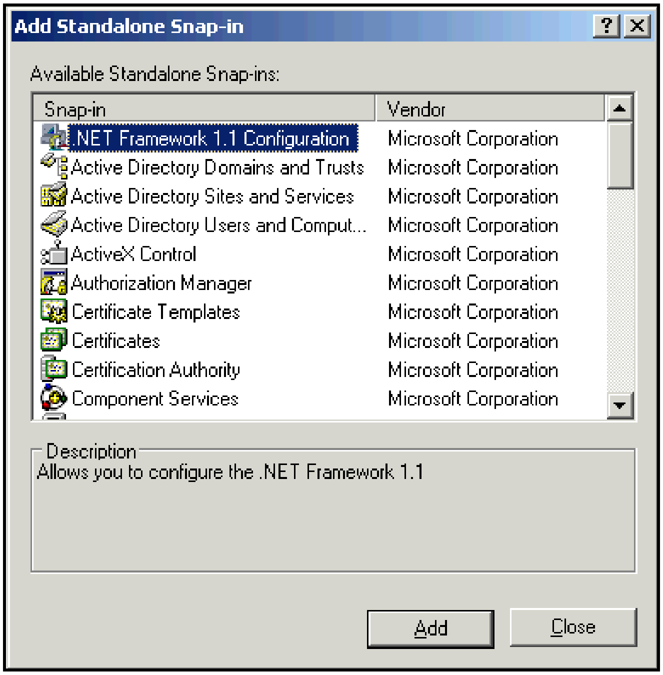


Use this page to add or remove a standalone Snap-in from the console.

Snap-ins added to: Console Root

Figure 2-53. Add/Remove Snap-in

3. Click **Add** in the **Add/Remove Snap-in** window.



Available Standalone Snap-ins:

Snap-in	Vendor
.NET Framework 1.1 Configuration	Microsoft Corporation
Active Directory Domains and Trusts	Microsoft Corporation
Active Directory Sites and Services	Microsoft Corporation
Active Directory Users and Comput...	Microsoft Corporation
ActiveX Control	Microsoft Corporation
Authorization Manager	Microsoft Corporation
Certificate Templates	Microsoft Corporation
Certificates	Microsoft Corporation
Certification Authority	Microsoft Corporation
Component Services	Microsoft Corporation

Description
Allows you to configure the .NET Framework 1.1

Figure 2-54. Add Standalone Snap-in

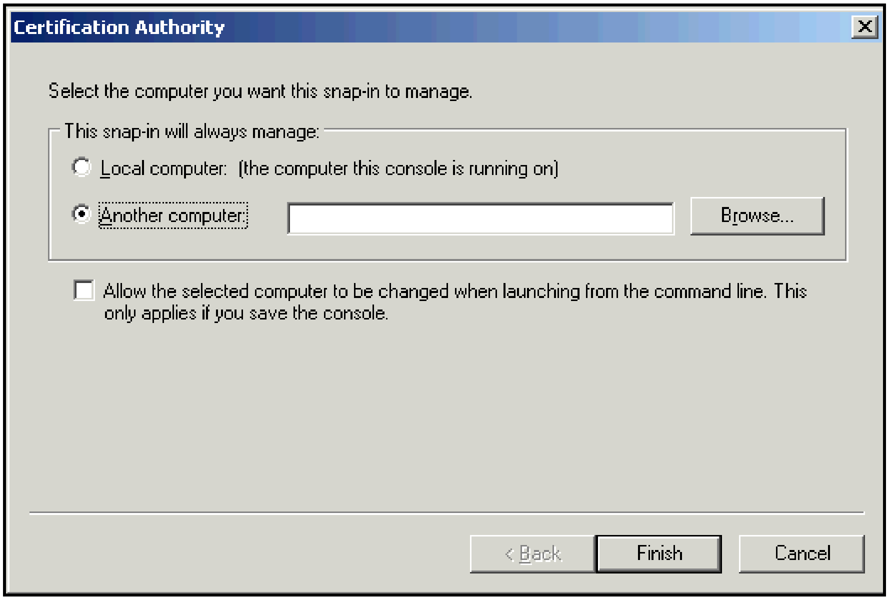
4. Select **Certificate Templates** from the **Available Standalone Snap-ins** window and click **Add**.

5. Select **Certification Authority** from the **Available Standalone Snap-in** list and click **Add**. The **Certificate Authority** window is displayed (see Figure 2-55).

6. Your next choice depends on where you have set up the Management Console:

   - **On the CA server**—Select **Local computer** and click **Finish**.

- **On another server**—Select **Another computer** and complete the following steps:



Certification Authority

Select the computer you want this snap-in to manage.

This snap-in will always manage:

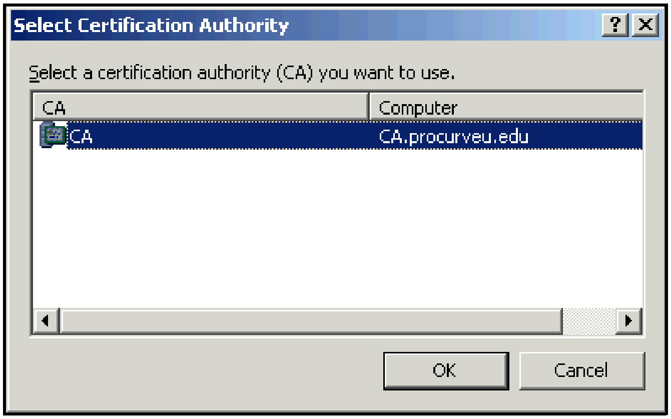
○ Local computer: (the computer this console is running on)

● Another computer:

□ Allow the selected computer to be changed when launching from the command line. This only applies if you save the console.

Figure 2-55. Certification Authority

i. Click **Browse**.



Select Certification Authority

Select a certification authority (CA) you want to use.

CA	Computer
CA	CA.procurveu.edu

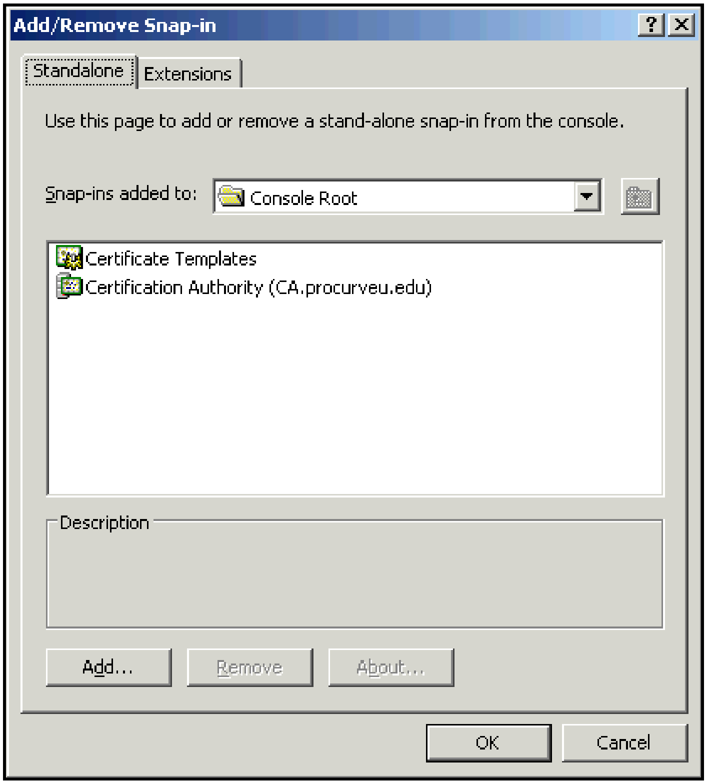
Figure 2-56. Certification Authority

ii. Select the CA server and click **OK**.

iii. Click **Finish**.

7. Click **Close** in the **Add Standalone Snap-in** window.

8. The **Add/Remove Snap-in** window should display the two snap-ins. Click **OK**.



Add/Remove Snap-in

Use this page to add or remove a stand-alone snap-in from the console.

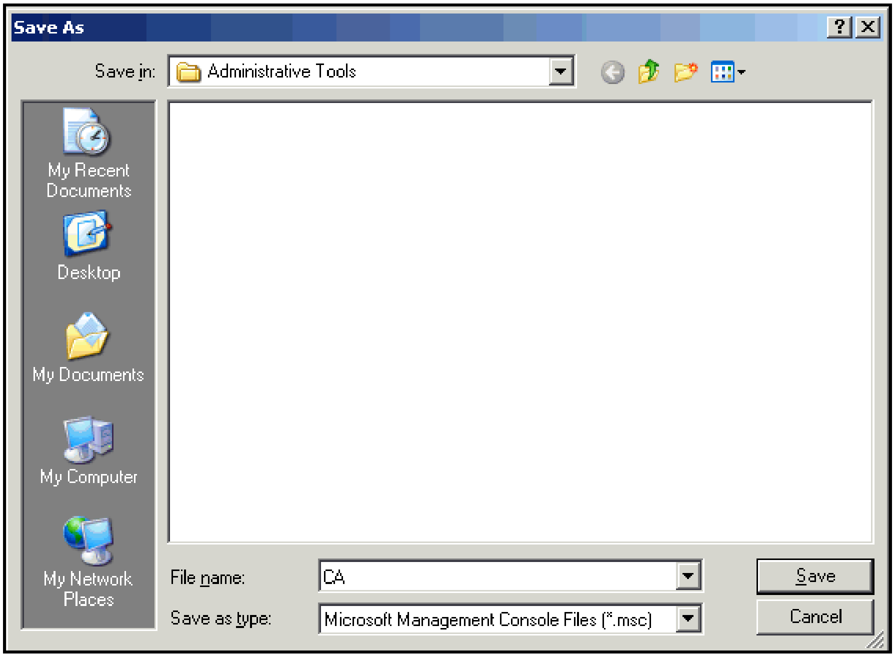
Snap-ins added to: Console Root

Certificate Templates
Certification Authority (CA.procurveu.edu)

Figure 2-57. Add/Remove Snap-in Window—Certificate Templates and Certification Authority

9. In the Management Console **File** menu, click **Save**.

10. Choose a name for the customized Management Console and type it in the **File name** box.


Save in: Administrative Tools

File name: CA

Save as type: Microsoft Management Console Files (*.msc)

Figure 2-58. Save as Window

11. Click **Save**.

Customize the User Certificate Template

To configure autoenrollment for user certificates, you must configure the certificate template to the CA.

In this solution, you will create a template based on the default User template. However, you will adjust some settings for the subject name, and you will enable autoenrollment.

Autoenrollment can occur automatically or with some user interaction (the latter if you select **Prompt the user during enrollment** in the **Request Handling** tab of the certificate template). The template also specifies whether the CA issues the certificate automatically or whether an administrator must first approve the request. Settings in th**Issuance Requirements** tab make this determination.

For this solution, you will accept default settings: autoenrollment proceeds without user interaction and the CA automatically issues certificates to domain members.

Follow these steps:

1. If necessary, re-open the Management Console.
   a. From the Windows **Start** menu, select **Run.**
   b. Type **mmc** at the prompt and click **OK**.
   c. In the **File** menu > **Open**.
   d. Select the console that you saved in the previous task.

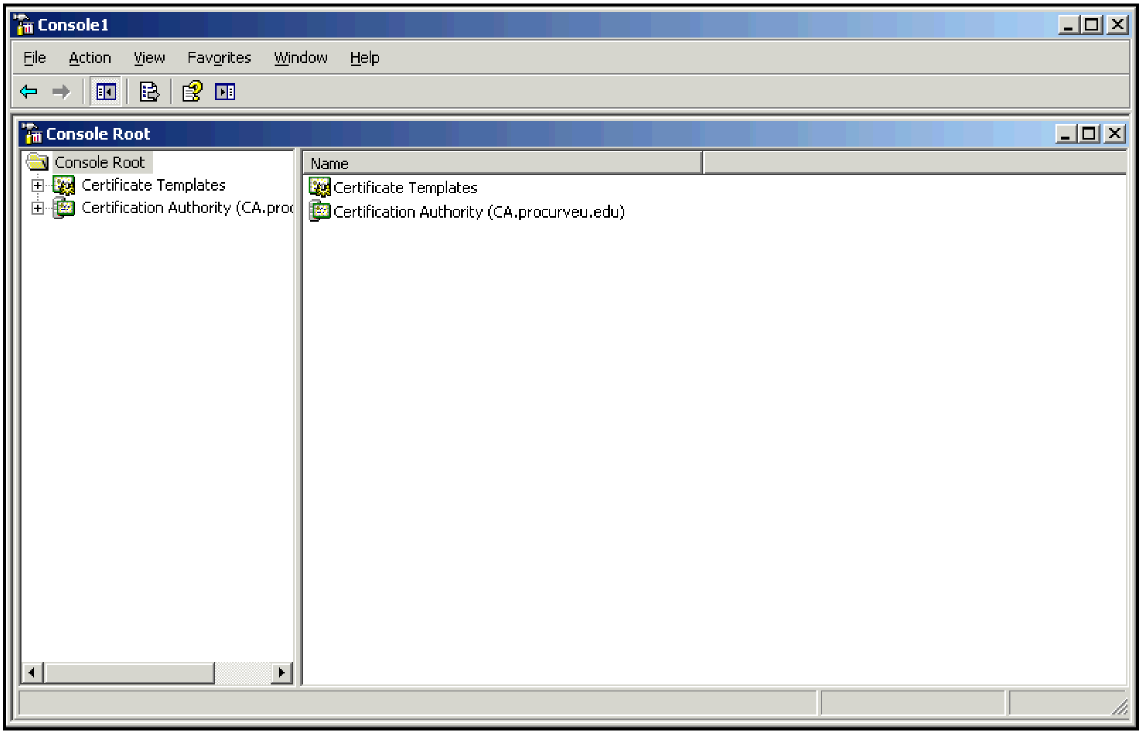
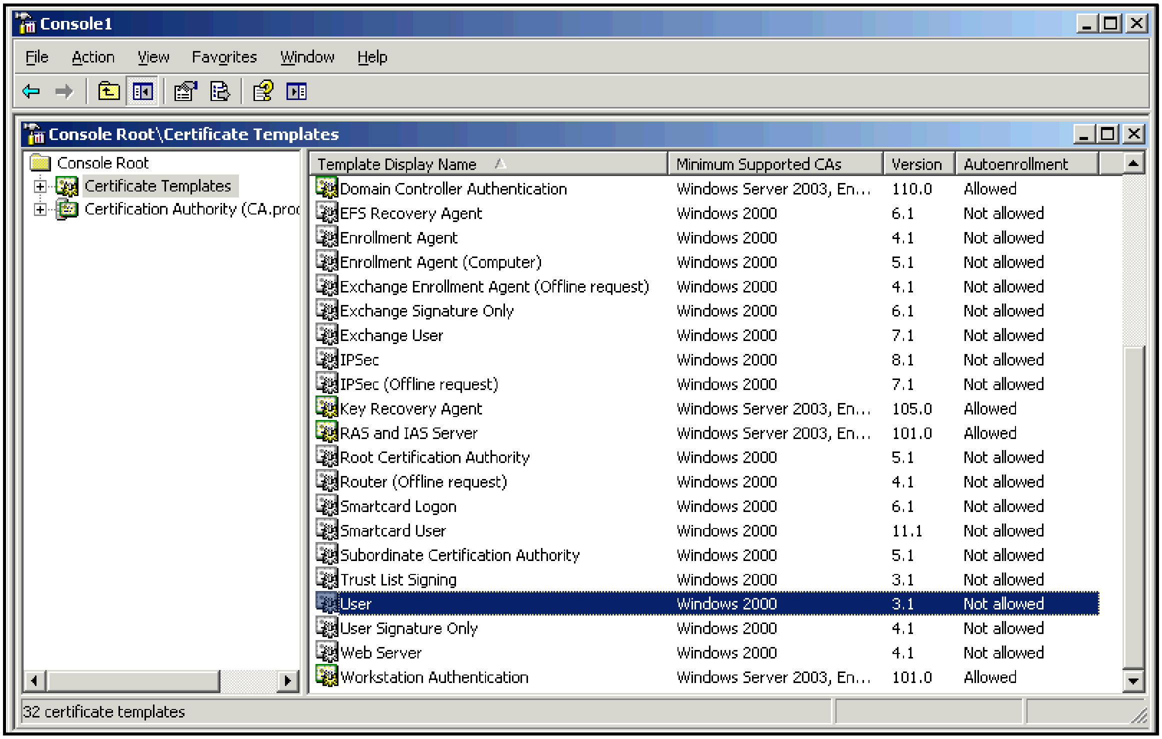


Figure 2-59. Management Console Window

2. Click **Certificate Templates** in the left pane of the console window.

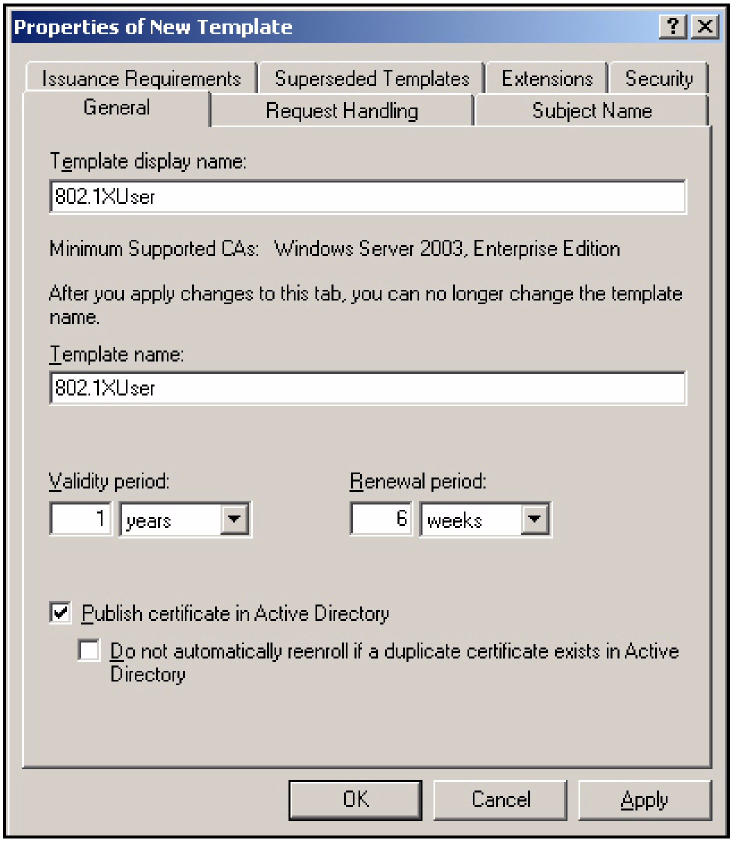

Console1
File Action View Favorites Window Help
Console Root\Certificate Templates
Console Root
Certificate Templates
Certification Authority (CA.proc

Template Display Name	Minimum Supported CAs	Version	Autoenrollment
Domain Controller Authentication	Windows Server 2003, En...	110.0	Allowed
EFS Recovery Agent	Windows 2000	6.1	Not allowed
Enrollment Agent	Windows 2000	4.1	Not allowed
Enrollment Agent (Computer)	Windows 2000	5.1	Not allowed
Exchange Enrollment Agent (Offline request)	Windows 2000	4.1	Not allowed
Exchange Signature Only	Windows 2000	6.1	Not allowed
Exchange User	Windows 2000	7.1	Not allowed
IPSec	Windows 2000	8.1	Not allowed
IPSec (Offline request)	Windows 2000	7.1	Not allowed
Key Recovery Agent	Windows Server 2003, En...	105.0	Allowed
RAS and IAS Server	Windows Server 2003, En...	101.0	Allowed
Root Certification Authority	Windows 2000	5.1	Not allowed
Router (Offline request)	Windows 2000	4.1	Not allowed
Smartcard Logon	Windows 2000	6.1	Not allowed
Smartcard User	Windows 2000	11.1	Not allowed
Subordinate Certification Authority	Windows 2000	5.1	Not allowed
Trust List Signing	Windows 2000	3.1	Not allowed
User	Windows 2000	3.1	Not allowed
User Signature Only	Windows 2000	4.1	Not allowed
Web Server	Windows 2000	4.1	Not allowed
Workstation Authentication	Windows Server 2003, En...	101.0	Allowed

32 certificate templates

Figure 2-60. Management Console—Certificate Templates

3. In the right pane, scroll down to **User**. Right-click **User** and select **Duplicate Template**.



Template display name: 802.1XUser

Minimum Supported CAs: Windows Server 2003, Enterprise Edition

After you apply changes to this tab, you can no longer change the template name.

Template name: 802.1XUser

Validity period: 1 years

Renewal period: 6 weeks

☑ Publish certificate in Active Directory

☐ Do not automatically reenroll if a duplicate certificate exists in Active Directory

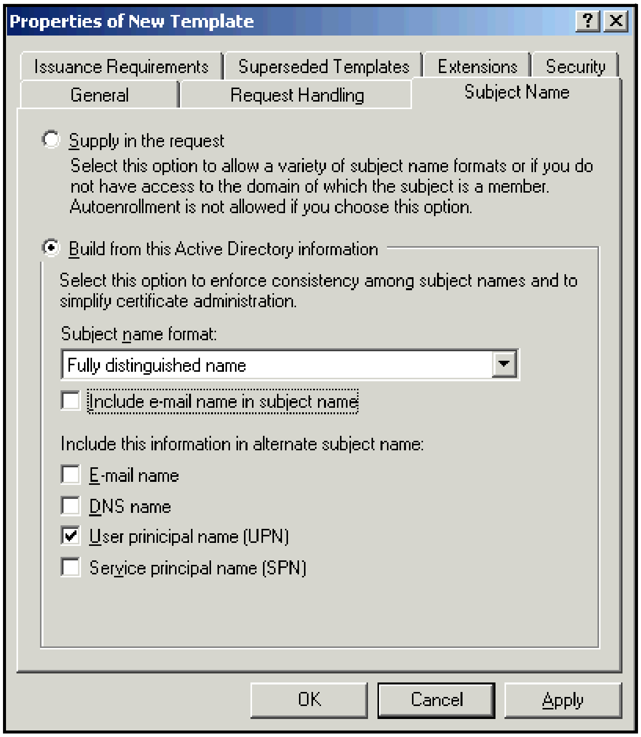
Figure 2-61. Properties of New Template Window—General Tab

4. At the **General** tab, type **802.1XUser** for the **Template display name**.

5. Make sure that the **Publish Certificate in Active Directory** check box is selected.

6. This step allows users to obtain their certificate even if their accounts do not include an email address. You do not need to complete this step if users always have an email address.

   a. Click the **Subject Name** tab.



○ Supply in the request

Select this option to allow a variety of subject name formats or if you do not have access to the domain of which the subject is a member. Autoenrollment is not allowed if you choose this option.

● Build from this Active Directory information

Select this option to enforce consistency among subject names and to simplify certificate administration.

Subject name format:

Fully distinguished name

□ Include e-mail name in subject name

Include this information in alternate subject name:

□ E-mail name

□ DNS name

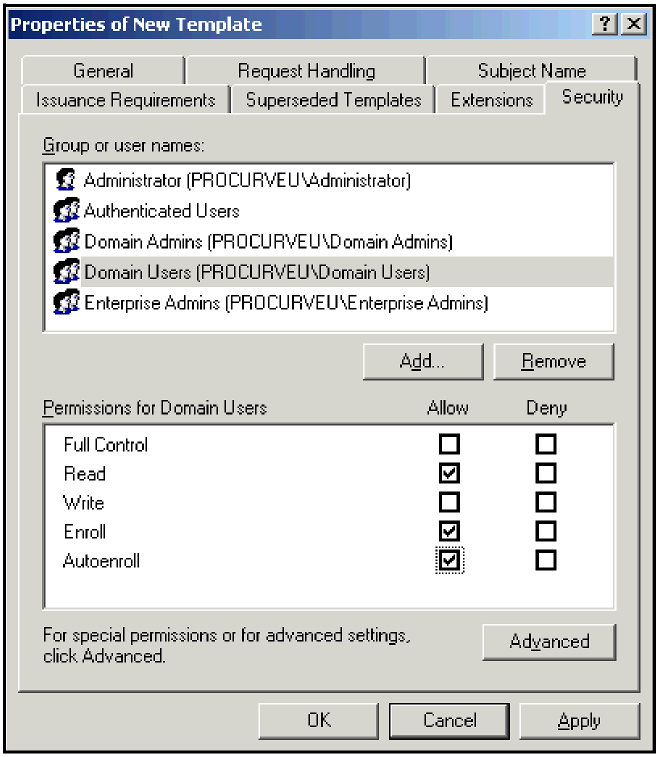
☑ User prinicipal name (UPN)

□ Service principal name (SPN)

Figure 2-62. Properties of New Template Window—Subject Name Tab

b. Clear the following check boxes:
   - **Include e-mail name in subject name**
   - **E-mail name** under **Include this information in alternate subject name**

7. Click the **Security** tab.



Group or user names:

- Administrator (PROCURVEU\Administrator)
- Authenticated Users
- Domain Admins (PROCURVEU\Domain Admins)
- Domain Users (PROCURVEU\Domain Users)
- Enterprise Admins (PROCURVEU\Enterprise Admins)

Permissions for Domain Users	Allow	Deny
Full Control	□	□
Read	☑	□
Write	□	□
Enroll	☑	□
Autoenroll	☑	□

For special permissions or for advanced settings, click Advanced.

Figure 2-63. Properties of New Template Window—Security Tab

8. Select **Domain Users** in the **Group or user names** area.

9. Select the **Read**, **Enroll**, and **Autoenroll** check boxes in the **Allow** column of the **Permissions for Domain Users** area.

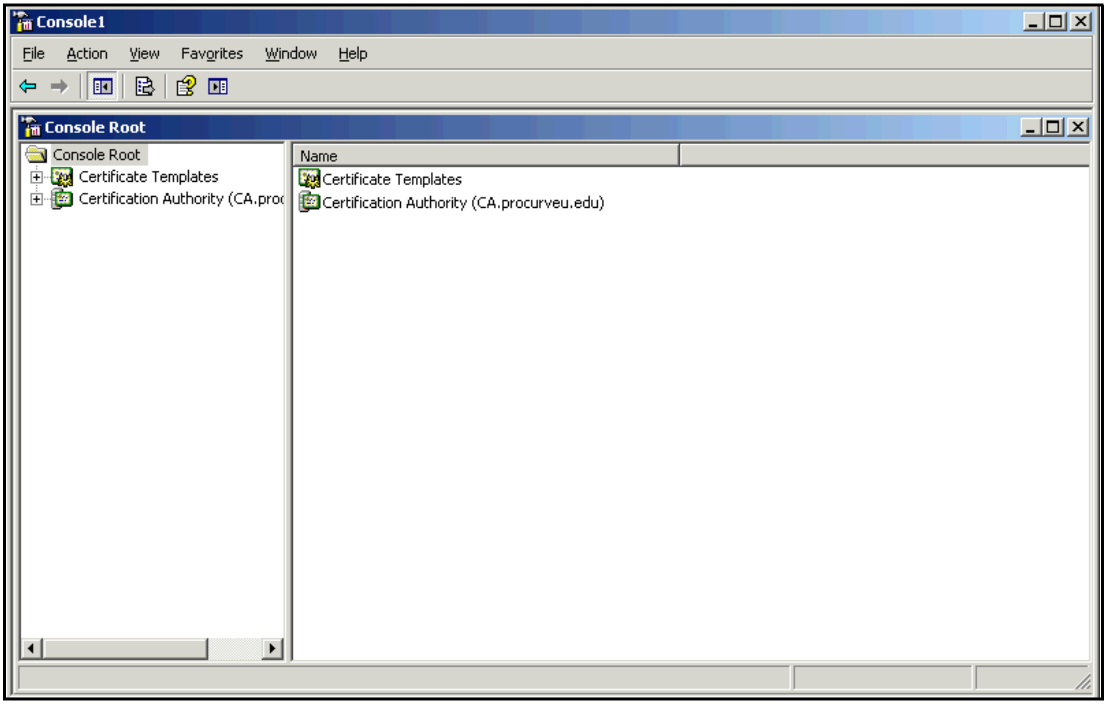
10. Click **OK**.

Create the NAC 800 Certificate Template

The NAC 800s, which act as RADIUS servers, require server certificates that allow them to perform client and server authentication. You must set up a template for such a certificate.

Follow these steps:

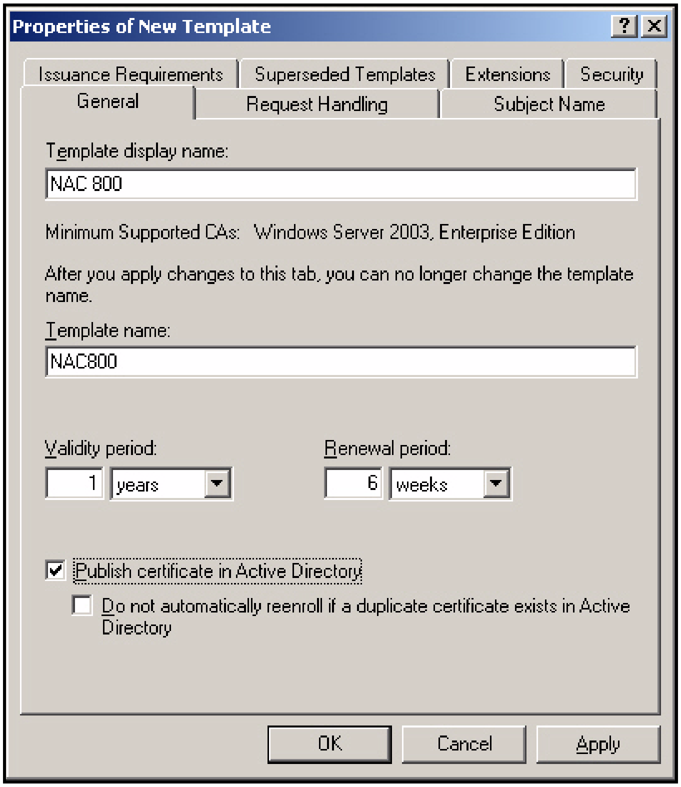
1. If necessary, re-open the Management Console in which you added the **Certificate Templates** snap-in.



Certificate Templates
Certification Authority (CA.procurveu.edu)

Figure 2-64. Management Console Window

2. Click **Certificate Templates** in the left pane of the console window.
3. Scroll to and right-click the **RAS and IAS Server** template. In the menu that is displayed, click **Duplicate Template**.
4. You should be at the **General** tab.
5. In the **Template display name** box, type **NAC 800**.



Template display name: NAC 800

Minimum Supported CAs: Windows Server 2003, Enterprise Edition

After you apply changes to this tab, you can no longer change the template name.

Template name: NAC800

Validity period: 1 years

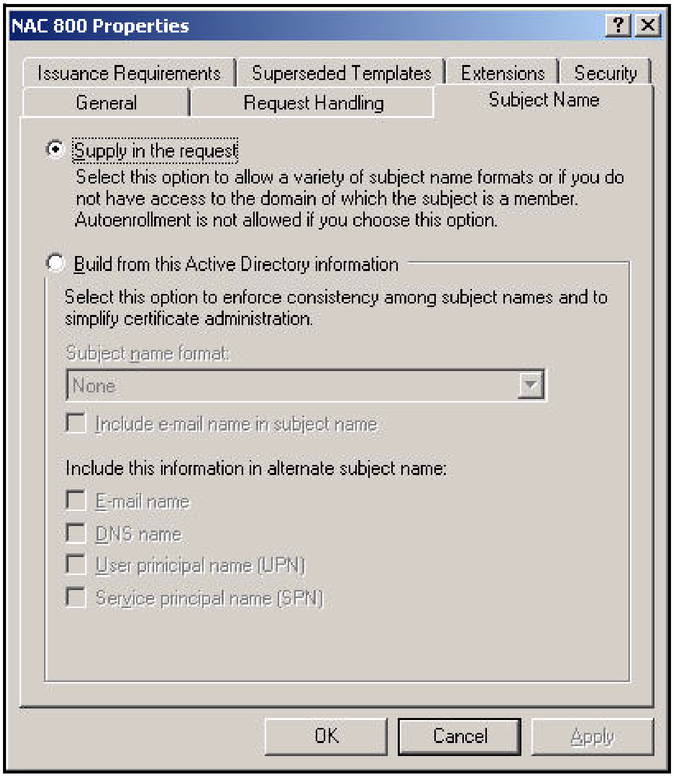
Renewal period: 6 weeks

☑ Publish certificate in Active Directory

□ Do not automatically reenroll if a duplicate certificate exists in Active Directory

Figure 2-65. Properties of New Template Window—General Tab

6. Make sure the **Publish certificate in Active Directory** check box is selected.
7. Click the **Subject Name** tab.



● Supply in the request

Select this option to allow a variety of subject name formats or if you do not have access to the domain of which the subject is a member. Autoenrollment is not allowed if you choose this option.

○ Build from this Active Directory information

Select this option to enforce consistency among subject names and to simplify certificate administration.

Subject name format: None

□ Include e-mail name in subject name

Include this information in alternate subject name:

□ E-mail name

□ DNS name

□ User principal name (UPN)

□ Service principal name (SPN)

Figure 2-66. NAC 800 Properties Window—Subject Name Tab

8. Select the **Supply in the request** option.

   You will create a request on the NAC 800, which will specify the NAC 800's subject name.

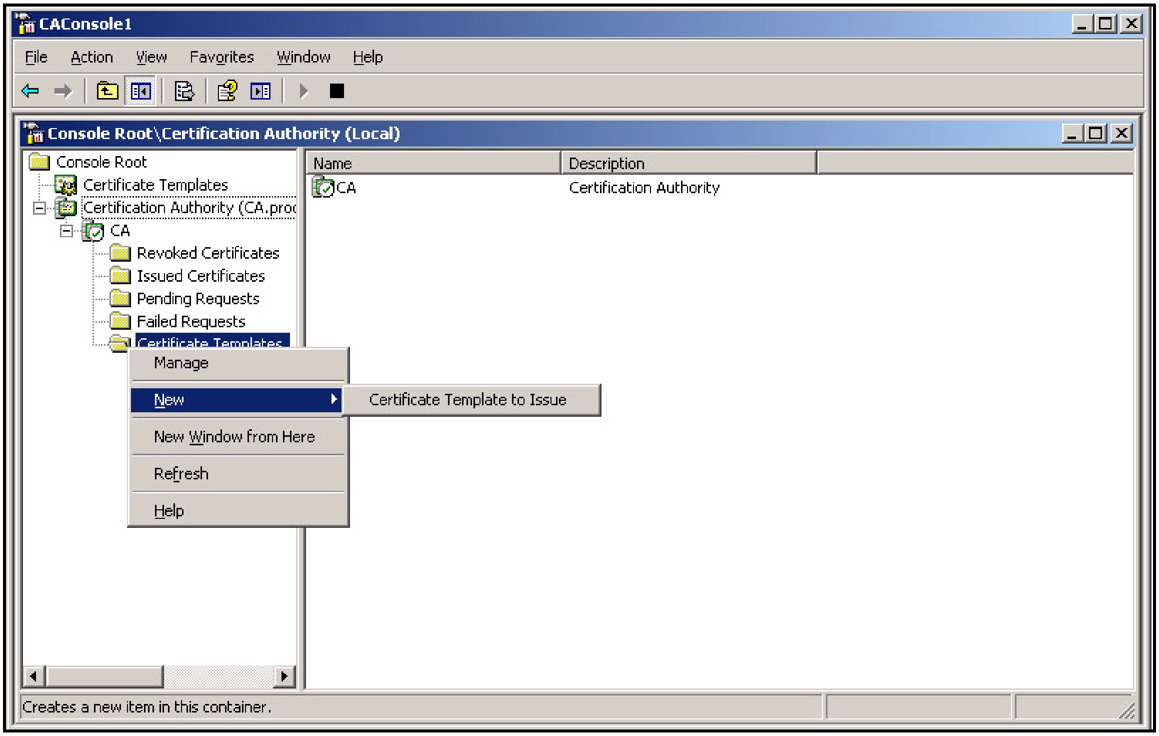
9. By default, Domain Admins and Enterprise Admins can enroll the NAC 800 for this certificate. Keep these default permissions.

10. Click **OK**.

Deploy the New Certificate Templates to the CA

You will now make the new certificate templates available to the CA:

1. If necessary, re-open the Management Console with the Certificate Authority snap-in:
   a. From the Windows **Start** menu, select **Run**.
   b. Type **mmc** at the prompt and click **OK**.
   c. In the **File** menu, click **Open** and select the console.
2. In the left pane of the console, expand **Certification Authority**.
3.
4. Expand the CA server's name. In this example, **CA**.

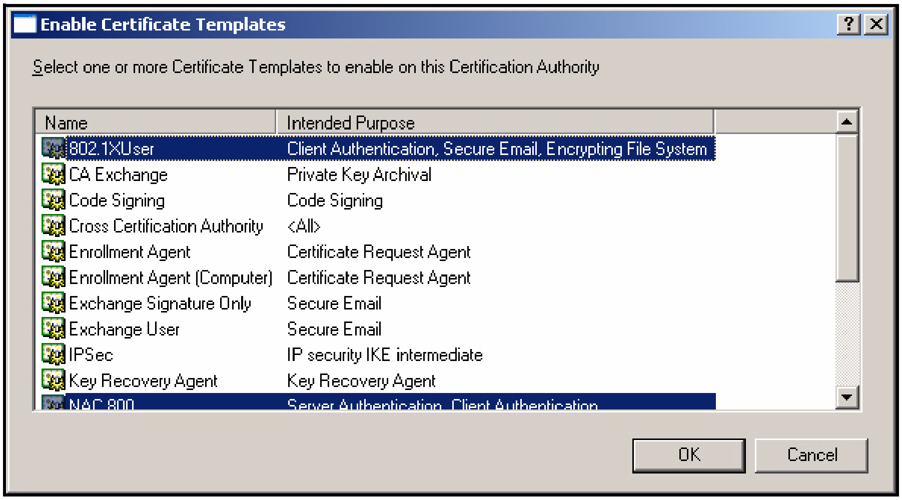


Name	Description
CA	Certification Authority

Creates a new item in this container.

Figure 2-67. Management Console—Certificate Templates

5. Right-click **Certificate Templates** and select **New** > **Certificate Template to Issue**.



Enable Certificate Templates

Select one or more Certificate Templates to enable on this Certification Authority

Name	Intended Purpose
802.1XUser	Client Authentication, Secure Email, Encrypting File System
CA Exchange	Private Key Archival
Code Signing	Code Signing
Cross Certification Authority	<All>
Enrollment Agent	Certificate Request Agent
Enrollment Agent (Computer)	Certificate Request Agent
Exchange Signature Only	Secure Email
Exchange User	Secure Email
IPSec	IP security IKE intermediate
Key Recovery Agent	Key Recovery Agent
NAC 800	Server Authentication, Client Authentication

Figure 2-68. Management Console—Enable Certificate Templates Window

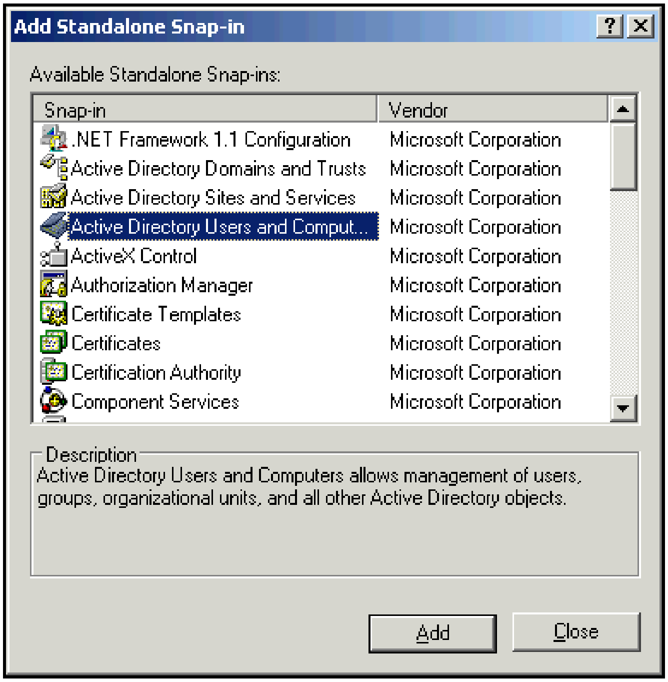
6. Click **802.1XUser**.
7. Hold down **[Ctrl]** and scroll to and click **NAC 800**.
8. Click **OK**.

Set Up Autoenrollment of User Certificates

The 802.1XUser template allows autoenrollment. The other part of enabling autoenrollment isallowing it in the domain Group Policy, which it is by default. However, you might want to customize options for autoenrollment.

You can complete the steps below by opening Active Directory on a domain controller asyou did in "Configuring the Windows Domain Controller" on page 2-20. You can also add a snap-in for Active Directory to your Management Console. The latter is the method described below:

1. If necessary, re-open your Management Console:
   a. From the Windows **Start** menu, select **Run**.
   b. Type **mmc** at the prompt and click **OK**.
   c. In the **File** menu, click **Open** and select the console.
2. Select **File** > **Add/Remove Snap-in**.
3. Click **Add**.



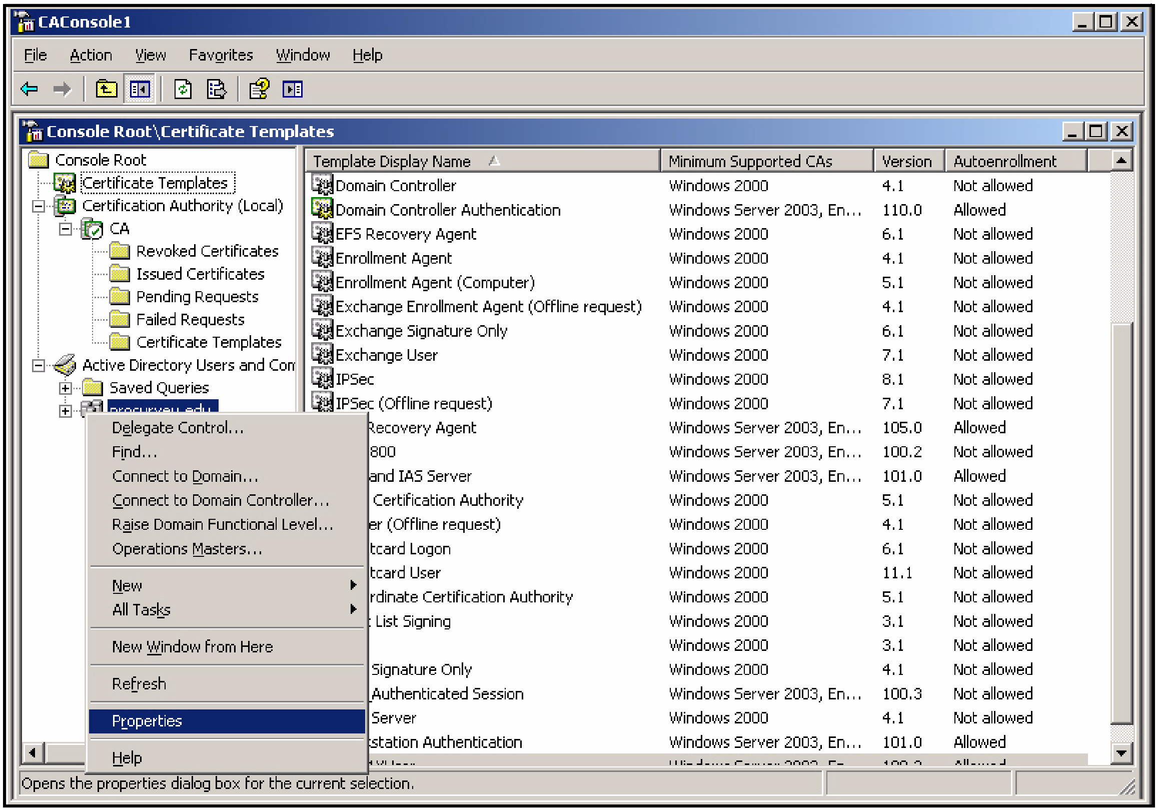
Available Standalone Snap-ins:

Snap-in	Vendor
.NET Framework 1.1 Configuration	Microsoft Corporation
Active Directory Domains and Trusts	Microsoft Corporation
Active Directory Sites and Services	Microsoft Corporation
Active Directory Users and Comput...	Microsoft Corporation
ActiveX Control	Microsoft Corporation
Authorization Manager	Microsoft Corporation
Certificate Templates	Microsoft Corporation
Certificates	Microsoft Corporation
Certification Authority	Microsoft Corporation
Component Services	Microsoft Corporation

Description
Active Directory Users and Computers allows management of users, groups, organizational units, and all other Active Directory objects.

Figure 2-69. Management Console—Add Standalone Snap-in Window

4. Select **Active Directory Users and Computers** from the **Available Standalone Snap-ins** list and click **Add**.
5. Click **Close**.
6. Click **OK** in the **Add/Remove Snap-in** window.
7. In the left pane of the Management Console, expand **Active Directory Users and Computers**.

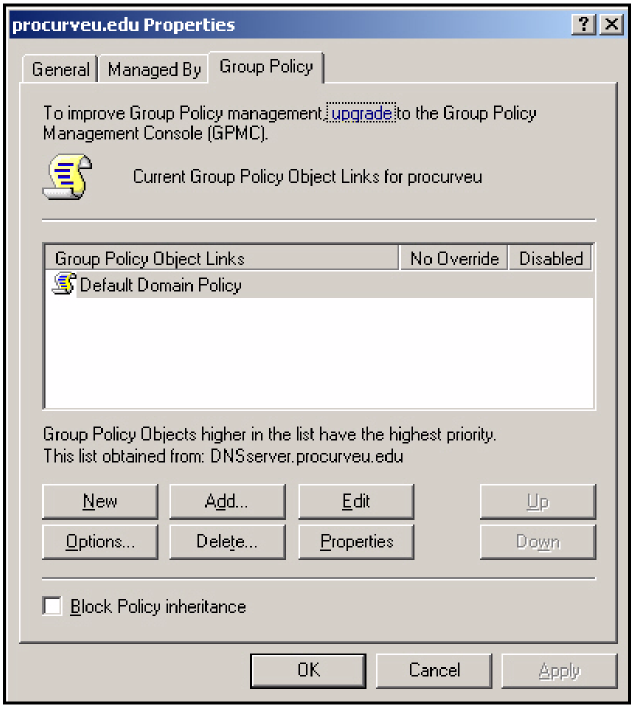


Template Display Name	Minimum Supported CAs	Version	Autoenrollment
Domain Controller	Windows 2000	4.1	Not allowed
Domain Controller Authentication	Windows Server 2003, En...	110.0	Allowed
EFS Recovery Agent	Windows 2000	6.1	Not allowed
Enrollment Agent	Windows 2000	4.1	Not allowed
Enrollment Agent (Computer)	Windows 2000	5.1	Not allowed
Exchange Enrollment Agent (Offline request)	Windows 2000	4.1	Not allowed
Exchange Signature Only	Windows 2000	6.1	Not allowed
Exchange User	Windows 2000	7.1	Not allowed
IPSec	Windows 2000	8.1	Not allowed
IPSec (Offline request)	Windows 2000	7.1	Not allowed
Recovery Agent	Windows Server 2003, En...	105.0	Allowed
800	Windows Server 2003, En...	100.2	Not allowed
and IAS Server	Windows Server 2003, En...	101.0	Allowed
Certification Authority	Windows 2000	5.1	Not allowed
er (Offline request)	Windows 2000	4.1	Not allowed
tcard Logon	Windows 2000	6.1	Not allowed
tcard User	Windows 2000	11.1	Not allowed
rdinate Certification Authority	Windows 2000	5.1	Not allowed
: List Signing	Windows 2000	3.1	Not allowed
	Windows 2000	3.1	Not allowed
Signature Only	Windows 2000	4.1	Not allowed
Authenticated Session	Windows Server 2003, En...	100.3	Not allowed
Server	Windows 2000	4.1	Not allowed
station Authentication	Windows Server 2003, En...	101.0	Allowed

Opens the properties dialog box for the current selection.

Figure 2-70. Management Console—*<mydomain>*

8. Right-click your domain name and select **Properties**.



procurveu.edu Properties

To improve Group Policy management, upgrade to the Group Policy Management Console (GPMC).

Current Group Policy Object Links for procurveu

Group Policy Object Links	No Override	Disabled
Default Domain Policy		

Group Policy Objects higher in the list have the highest priority.
This list obtained from: DNSserver.procurveu.edu

□ Block Policy inheritance

Figure 2-71. *<mydomain>* Properties Window

9. Click the **Group Policy** tab and click **Edit**.

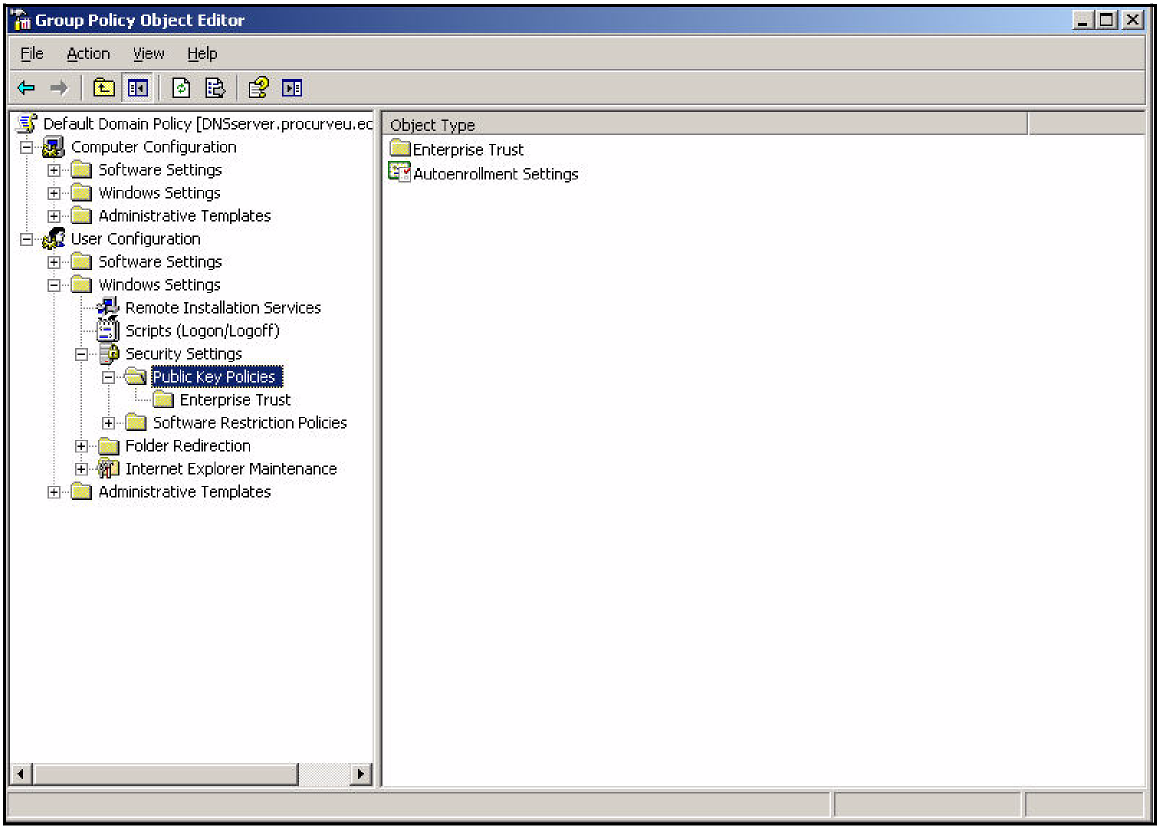


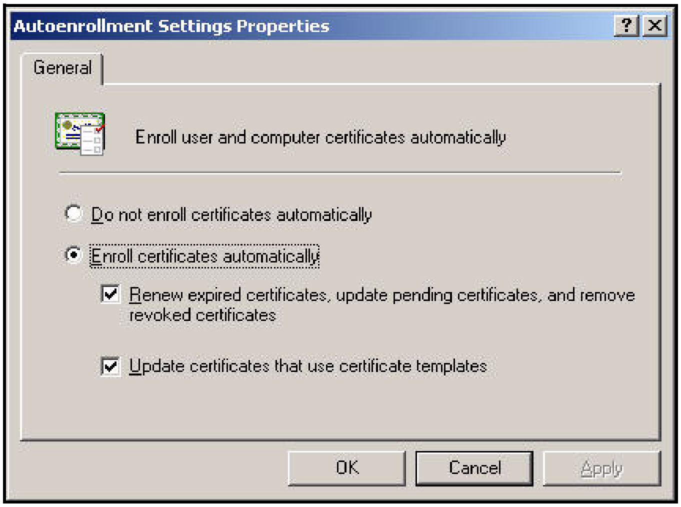
Figure 2-72. Group Policy Object Editor—Public Key Policies

10. Expand **User Configuration** > **Windows Settings** > **Security Settings** > **Public Key Policies**.

11. In the right pane, double-click **Autoenrollment settings**.

12. Click **Enroll certificates automatically** and select the following check boxes:

    - **Renew expired certificates, update pending certificates, and remove revoked certificates**
    - **Update certificates that use certificate templates**



Autoenrollment Settings Properties

General

Enroll user and computer certificates automatically

○ Do not enroll certificates automatically

● Enroll certificates automatically

☑ Renew expired certificates, update pending certificates, and remove revoked certificates

☑ Update certificates that use certificate templates

Figure 2-73. Management Console—Autoenrollment Settings Properties Window

13. Click **OK**.

14. In the **File** menu, click **Exit** to close the Group Policy Object Editor.

15. Click **OK** in the **Properties** window.

16. In the **File** menu, click **Save** to preserve you changes to the Management Console.

Export the CA Root Certificate

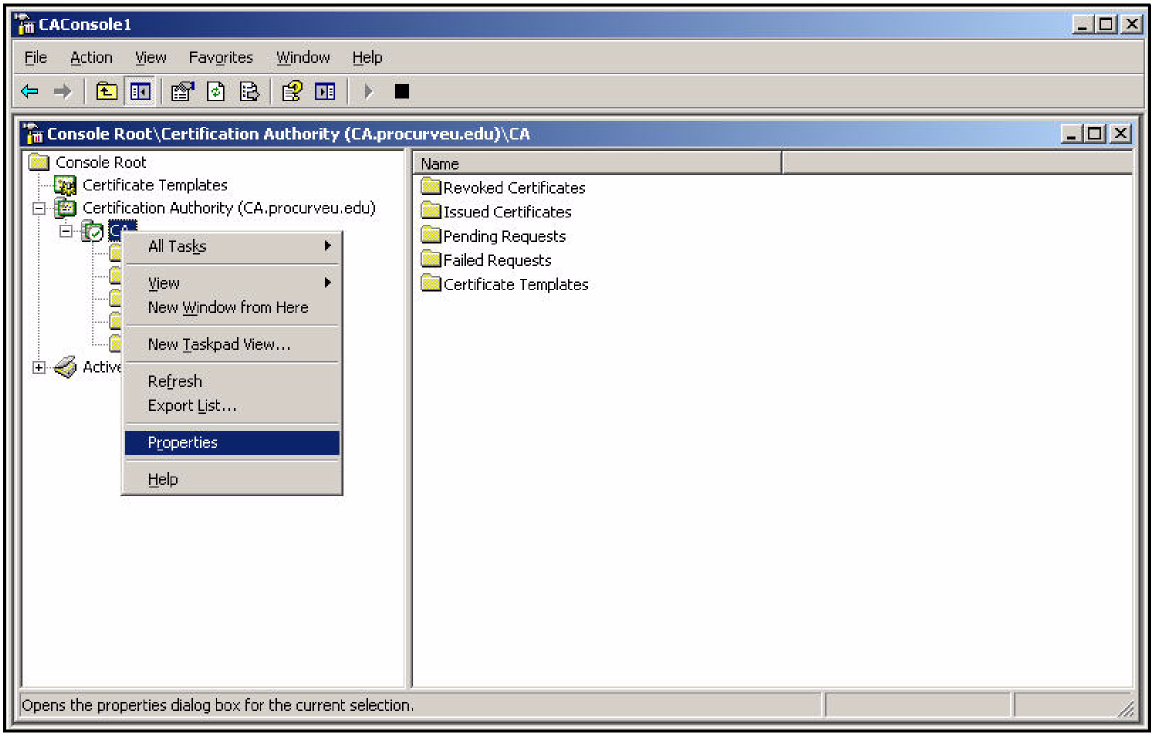
Users and computers receive the CA root certificate when they automatically enroll for their certificates. However, you will need to manually import this certificate to the NAC 800s and Wireless Edge Services Modules. The steps below explain how to export your CA root certificate to a file. See “Manually Issue and Install Server Certificates” on page 2-174 for instructions on importing the certificate to the NAC 800s and Wireless Edge Services Modules.

1. If necessary, re-open your Management Console with the Certificate Authority snap-in:

   a. From the Windows **Start** menu, select **Run**.

   b. Type **mmc** at the prompt and click **OK**.

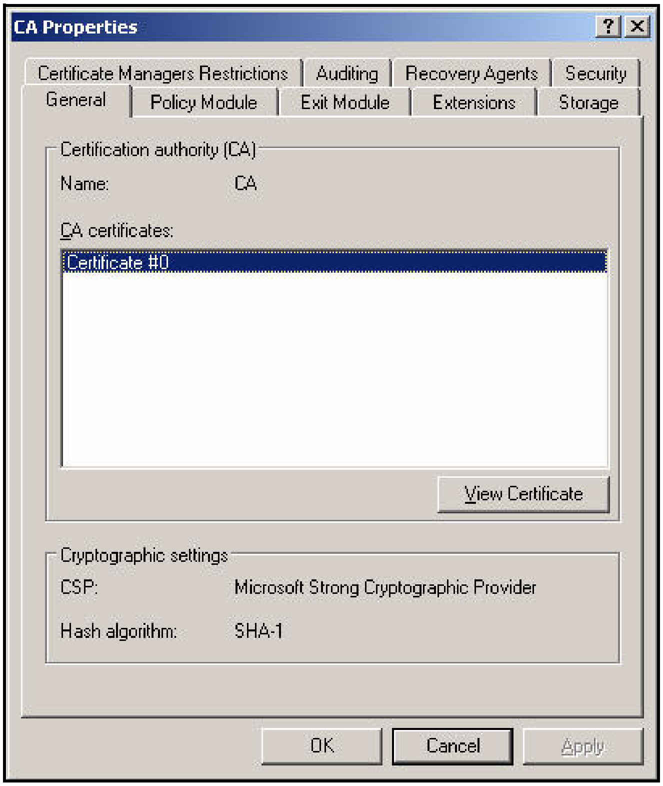
   c. In the **File** menu, click **Open** and select the console.



Opens the properties dialog box for the current selection.

Figure 2-74. Management Console—CA

2. Expand **Certification Authority**.
3. Right-click the CA server name and, in the menu, select **Properties**.



Certification authority (CA)

Name: CA

CA certificates:

Certificate #0

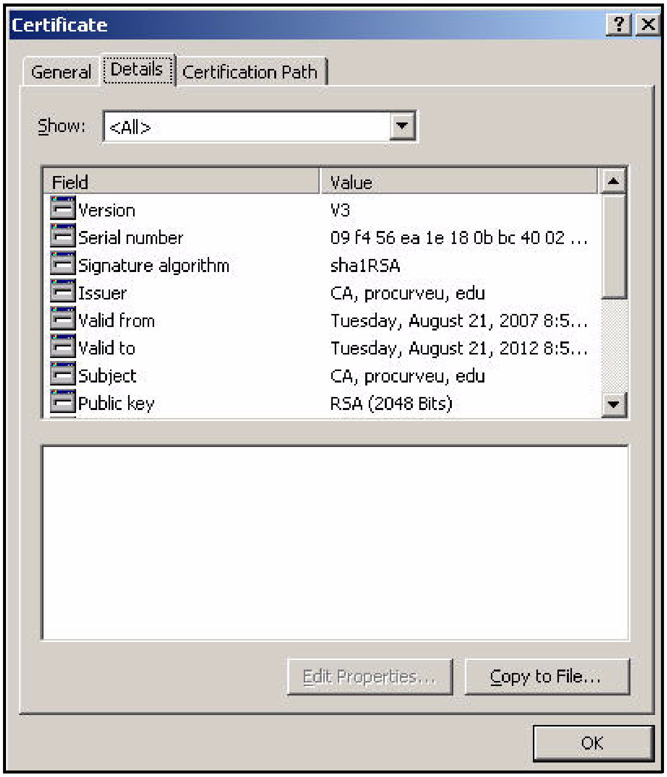
Cryptographic settings

CSP: Microsoft Strong Cryptographic Provider

Hash algorithm: SHA-1

Figure 2-75. Management Console—CA Properties Window

4. At the **General** tab, click **View Certificate**.
5. Click the **Details** tab.

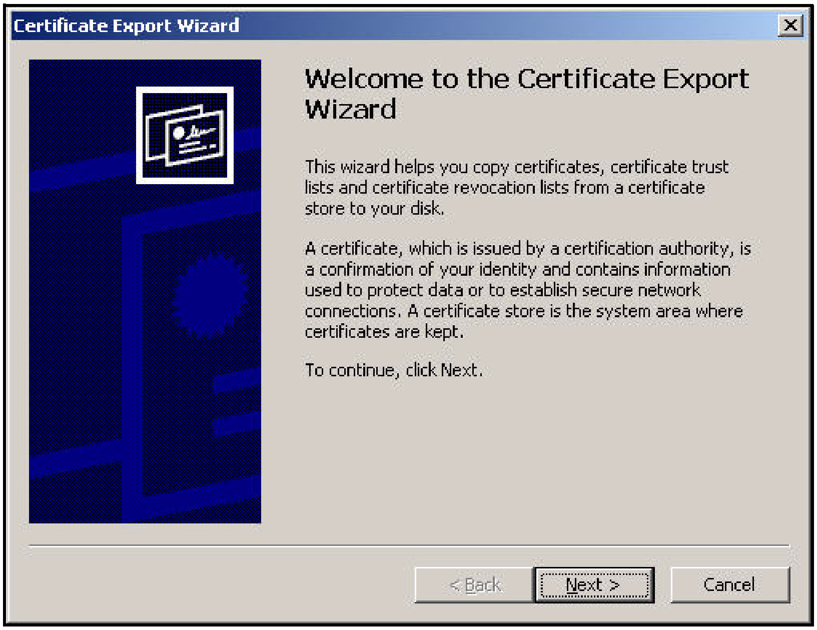


Show: <All>

Field	Value
Version	V3
Serial number	09 f4 56 ea 1e 18 0b bc 40 02 ...
Signature algorithm	sha1RSA
Issuer	CA, procurveu, edu
Valid from	Tuesday, August 21, 2007 8:5...
Valid to	Tuesday, August 21, 2012 8:5...
Subject	CA, procurveu, edu
Public key	RSA (2048 Bits)

Figure 2-76. Management Console—Certificate Window—Details Tab

6. Click **Copy to File**. The Certificate Export Wizard is displayed.


Certificate Export Wizard

Welcome to the Certificate Export Wizard

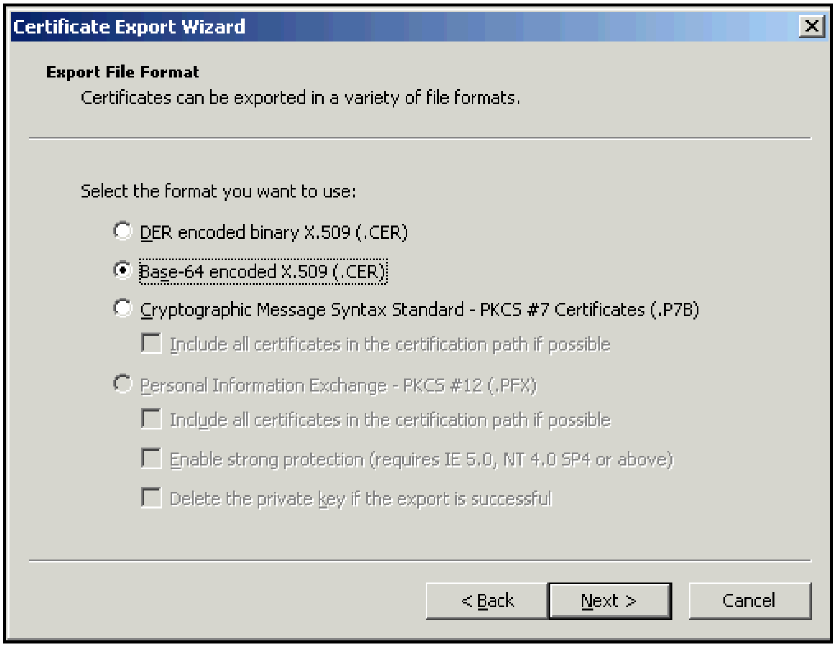
This wizard helps you copy certificates, certificate trust lists and certificate revocation lists from a certificate store to your disk.

A certificate, which is issued by a certification authority, is a confirmation of your identity and contains information used to protect data or to establish secure network connections. A certificate store is the system area where certificates are kept.

To continue, click Next.

Figure 2-77. Welcome to the Certificate Export Wizard

7. Click **Next**.



Certificate Export Wizard

Export File Format

Certificates can be exported in a variety of file formats.

Select the format you want to use:

○ DER encoded binary X.509 (.CER)

● Base-64 encoded X.509 (.CER)

○ Cryptographic Message Syntax Standard - PKCS #7 Certificates (.P7B)

□ Include all certificates in the certification path if possible

○ Personal Information Exchange - PKCS #12 (.PFX)

□ Include all certificates in the certification path if possible

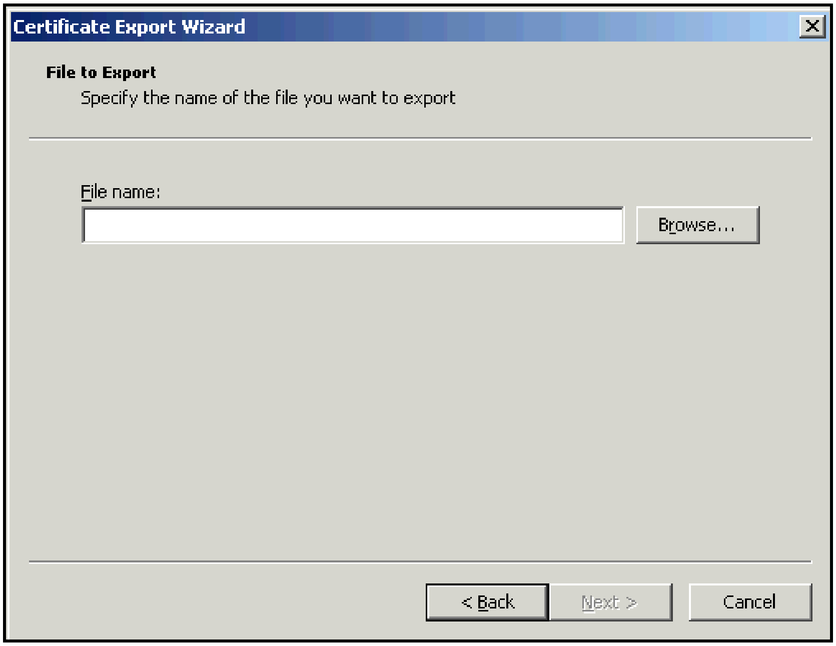
□ Enable strong protection (requires IE 5.0, NT 4.0 SP4 or above)

□ Delete the private key if the export is successful

Figure 2-78. Certificate Export Wizard—Export File Format Page

8. Select a format supported by your devices. For the example, select **Base-64 encoded X.509 (.CER)**.

9. Click **Next**. A window is displayed, prompting you to save the certificate.



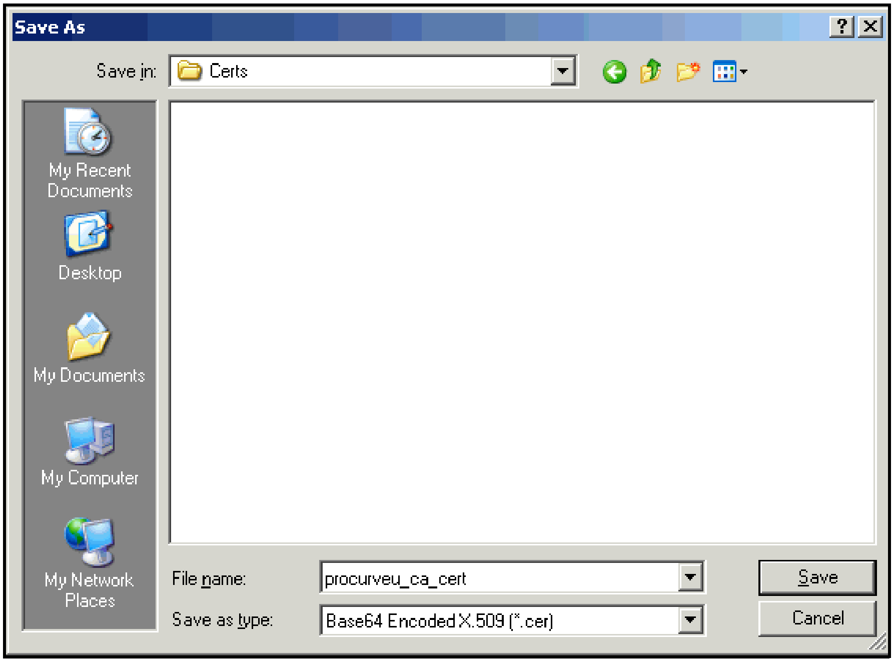
Certificate Export Wizard

File to Export
Specify the name of the file you want to export

File name:

Figure 2-79. Certificate Export Wizard—File to Export Page

10. Specify the filename. Either:
    - Type the name, including the path, in the **File name** box.
    - Browse for the folder in which the certificate should be saved:
      i. Click **Browse**.
      ii. Navigate to the desired folder.
      iii. Navigate to the location where you want to save the CA root certificate.
      iv. In the **File name** box, type a name for the certificate.

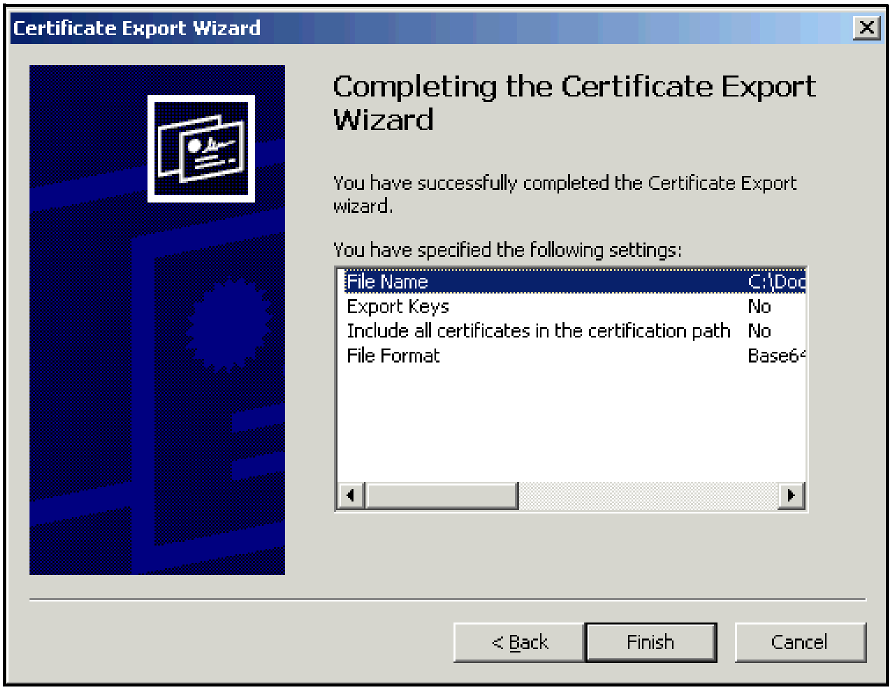


File name: procurveu_ca_cert

Save as type: Base64 Encoded X.509 (*.cer)

Figure 2-80. Certificate Export Wizard—Saving the CA Root Certificate

11. Click **Save**.
12. On the **File to Export** page, click **Next**.



Completing the Certificate Export Wizard

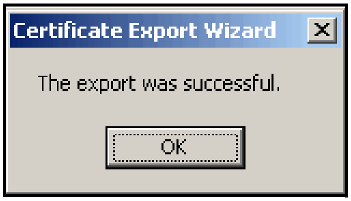
You have successfully completed the Certificate Export wizard.

You have specified the following settings:

File Name	C:\Doc
Export Keys	No
Include all certificates in the certification path	No
File Format	Base64

Figure 2-81. Certificate Export Wizard—Saving the CA Root Certificate

13. Check the information displayed in the **Completing the Certificate Export Wizard** window. If it is correct, click **Finish**.



The export was successful.

Figure 2-82. Certificate Export Wizard Window

14. Click **OK**.
15. Click **OK** in the **Certificate Details** and **<*CA server*> Properties** windows.
16. Press **[Alt]**+**[F4]** to close the Management Console.
17. When prompted, save the console.

Configuring the Wireless Edge Services Modules

The network in this access control solution provides wireless connectivity with these devices:

- ProCurve Wireless Edge Services Module
- ProCurve Redundant Wireless Services Module
- Twelve ProCurve RPs

This section explains how to configure these devices to implement the access control solution, beginning at installation. You must complete each task on both modules.

Install the Wireless Edge Services Modules

You must install a Wireless Edge Services zl Module in a ProCurve Switch 5400zl or 8200zl series. After the module is installed, the switch is then referred to as a *wireless services-enabled switch*. (For detailed instructions to install the module into the switch, see the *ProCurve Switch zl Module Installation Guide*.)

Note

Alternatively, you can purchase a Wireless Edge Services xl Module and install it in a ProCurve Switch 5300xl Series. Configuring an xl module is almost exactly the same as configuring a zl module; however, the xl module has less processing power and supports fewer RPs (up to 48 instead of up to 156).

The sample network for ProCurve University includes two 5400zl Switches. To provide redundancy for the wireless network, the university has installed one module in each switch.

Configure Initial Settings onthe Wireless Edge Services Modules

Before you can access the Web browser interface on a Wireless Edge Services Module, you must configure its IP settings through the wireless services-enabled switch.

Follow these steps:

1. Access the wireless services-enabled switch's command-line interface (CLI) (through a console, Telnet, or Secure Shell [SSH] session).
2. Move to the wireless-services context with this command:

Syntax: wireless-services <*slot letter*>

Moves to the wireless-services context on the wireless services-enabled switch.

Replace ***<slot letter>*** *with the letter for the chassis slot in which the module is installed.*

For example:

```
ProCurve# wireless-services c
```

Note

The following instructions assume that the Wireless Edge Services Module is at factory default settings. If it is not, return it to those settings by entering **erase startup-config**. After the module reboots, access the wireless-services context and continue following the instructions below.

3. Move to the global configuration mode context of the wireless-services context:

```
ProCurve(wireless-services-C)# configure terminal
```

4. Move to the configuration mode context for the VLAN that you chose for infrastructure devices:

Syntax: interface vlan<*ID*>

Moves to a VLAN configuration mode context.

Replace ***<ID>*** *with a number between 1 and 4094.*

In this example, the VLAN for infrastructure devices is 2. Enter:

```
ProCurve(wireless-services-C)(config)# interface
vlan2
```

5. Assign the VLAN an IP address.

Syntax: ip address <*A.B.C.D*>/<*prefix length*>

Assigns the interface an IP address.

Replace **<A.B.C.D>** *with the IP address and replace* **<prefix length>** *with the Classless Inter-Domain Routing (CIDR) notation for the subnet mask.*

For the example network, the Wireless Edge Services Module's IP address for VLAN 2 is 10.2.0.20 with a mask of 255.255.0.0. Enter:

```
ProCurve(wireless-services-C)(config-if)# ip address
10.2.0.20/16
```

6. Define this VLAN as the management VLAN.

```
ProCurve(wireless-services-C) (config-if)# management
```

7. Exit to the global configuration mode context:

```
ProCurve(wireless-services-C)(config-if)# exit
```

8. Specify the default router:

Syntax: ip default-gateway <*A.B.C.D*>

Specifies the IP address for the default router.

Replace **<A.B.C.D>** *with the IP address.*

For the example network, type:

```
ProCurve(wireless-services-C)(config)# ip default-
gateway 10.2.0.1
```

9. You can optionally enable secure management, which restricts the module to accepting management traffic that arrives on its management VLAN:

Syntax: management secure

Forces the module to accept management traffic only on the management VLAN.

However, in this example, the setting is not necessary because the Wireless Edge Services Module has only one IP address, the management address.

10. Save the configuration:

Syntax: write memory

Saves the configuration changes to the startup-config.

You can now access the module's Web browser interface, which you will use to complete all remaining settings.

Configure WLAN Settings

This section explains how to set up a wireless LAN (WLAN) on the Wireless Edge Services Module through its Web browser interface.

In a network that enforces 802.1X quarantining, you must set the WLAN authentication to 802.1X. You can choose either Wired Equivalent Privacy (WEP) or Wi-Fi Protected Access (WPA) for the encryption; however, WPA is the much preferred option, and the one used in this example. (For more information about the options for setting up WLAN security on the Wireless Edge Services Module, see the *ProCurve Access Control Security Design Guide*.)

Part of setting up the WLAN is specifying the RADIUS servers—in this case, the NAC 800s. To roughly load balance authentication requests, specify one NAC 800 as the primary server on one module and the other NAC 800 as the secondary server on the other. (To locate the IP addresses for the NAC 800s, which you will set up later, see Table 2-10. The ESs are the RADIUS servers.)

Table 2-10. Example NAC 800 IP Addresses

Device	Example IP Address	Example VLAN ID	Your Organization's IP Address	Your Organization's VLAN ID
NAC 800 ES A	10.4.4.40	4		
NAC 800 ES B	10.4.5.50	4		

To configure the WLANs on the Wireless Edge Services Module, complete these steps:

1. Open the Web browser interface on your management station. For the URL, type the IP address that you configured on the module. In this example: **10.2.0.20**.

   Your station must have the Java Runtime Environment (JRE).

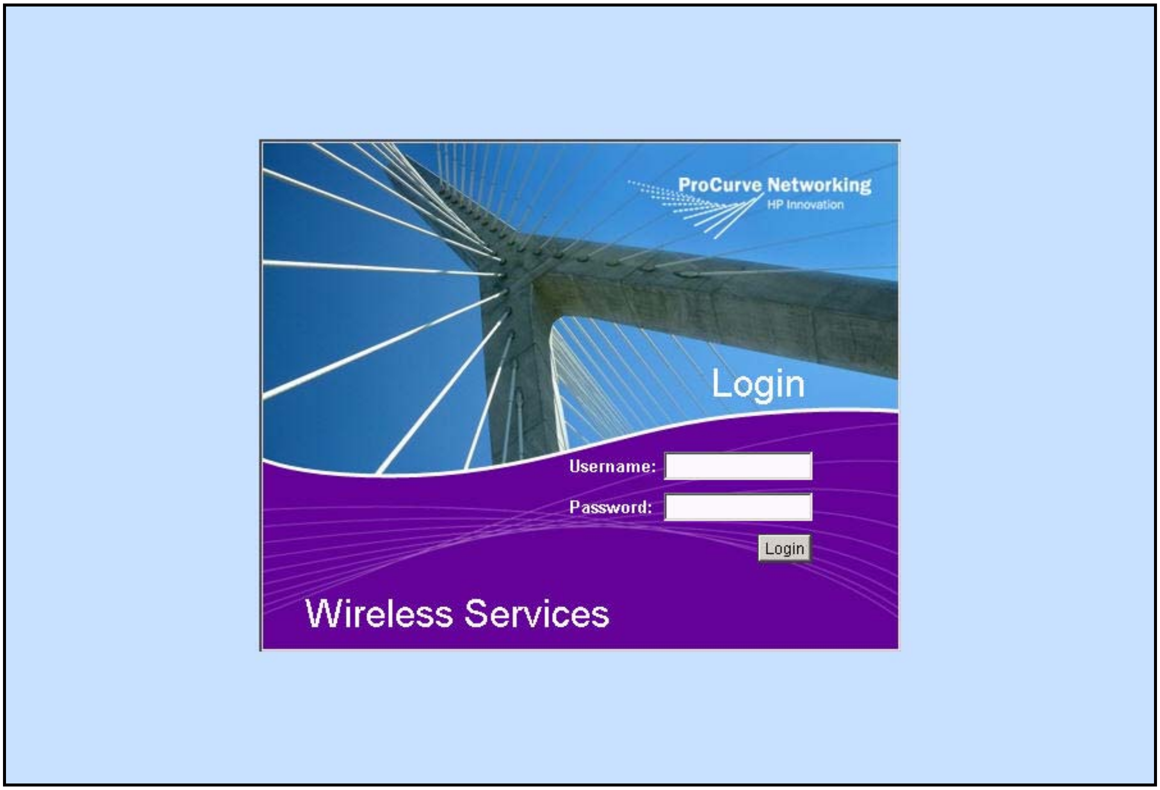
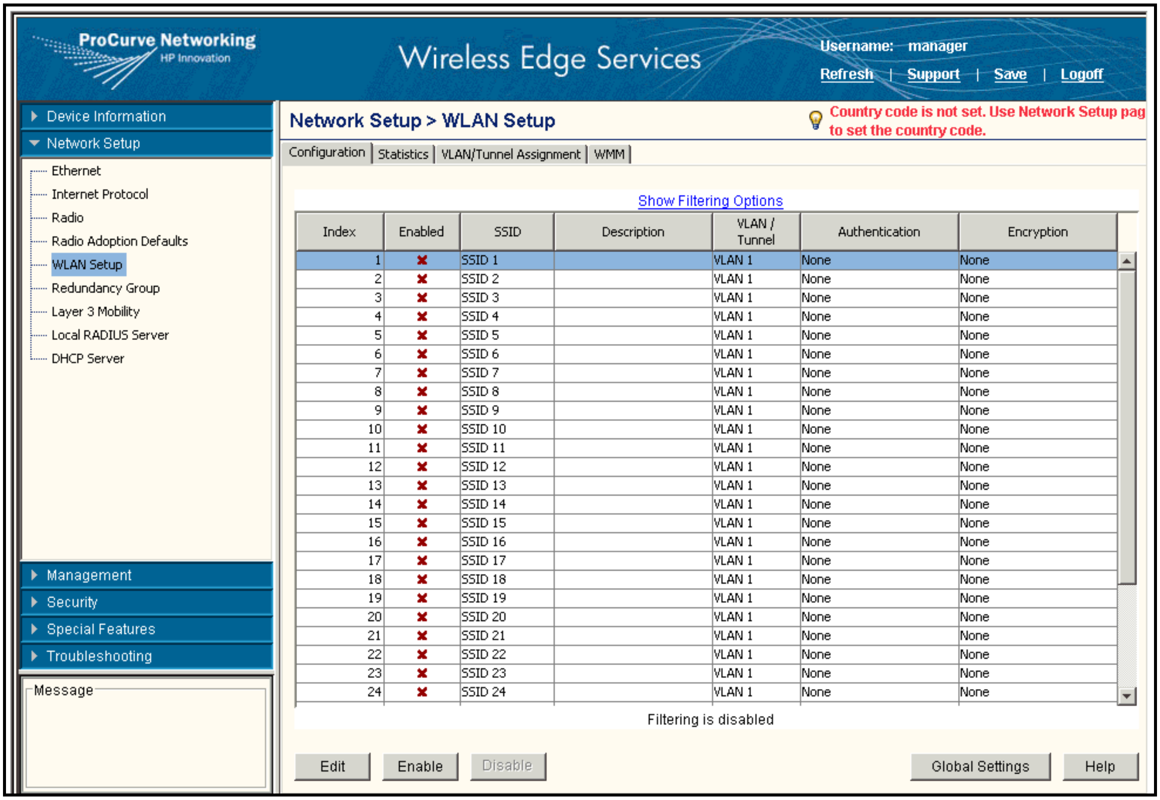


Figure 2-83. Wireless Services Login Page

2. Log in with the default manager credentials:
   - **Username** = **manager**
   - **Password** = **procurve**
3. Click **Network Setup** > **WLAN Setup**.



Network Setup > WLAN Setup

Country code is not set. Use Network Setup pag to set the country code.

Index	Enabled	SSID	Description	VLAN / Tunnel	Authentication	Encryption
1	✗	SSID 1		VLAN 1	None	None
2	✗	SSID 2		VLAN 1	None	None
3	✗	SSID 3		VLAN 1	None	None
4	✗	SSID 4		VLAN 1	None	None
5	✗	SSID 5		VLAN 1	None	None
6	✗	SSID 6		VLAN 1	None	None
7	✗	SSID 7		VLAN 1	None	None
8	✗	SSID 8		VLAN 1	None	None
9	✗	SSID 9		VLAN 1	None	None
10	✗	SSID 10		VLAN 1	None	None
11	✗	SSID 11		VLAN 1	None	None
12	✗	SSID 12		VLAN 1	None	None
13	✗	SSID 13		VLAN 1	None	None
14	✗	SSID 14		VLAN 1	None	None
15	✗	SSID 15		VLAN 1	None	None
16	✗	SSID 16		VLAN 1	None	None
17	✗	SSID 17		VLAN 1	None	None
18	✗	SSID 18		VLAN 1	None	None
19	✗	SSID 19		VLAN 1	None	None
20	✗	SSID 20		VLAN 1	None	None
21	✗	SSID 21		VLAN 1	None	None
22	✗	SSID 22		VLAN 1	None	None
23	✗	SSID 23		VLAN 1	None	None
24	✗	SSID 24		VLAN 1	None	None

Filtering is disabled

Figure 2-84. Wireless Edge Services Module Web Interface—Network Setup > WLAN Setup Window

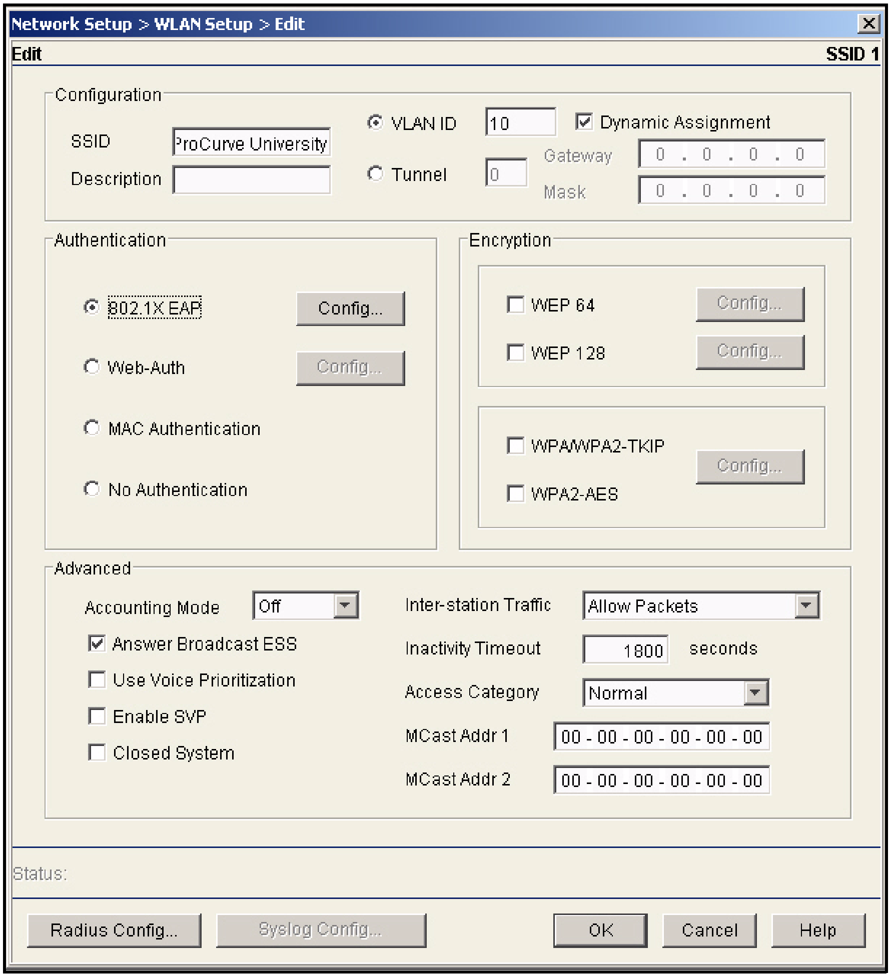
4. Select the first WLAN.

5. Click **Edit**.

6. Under **Configuration**, in the **SSID** box, type a namefor the wireless network (in this example, **ProCurve University**).

7. In the **VLAN ID** box, specify the VLAN for wireless traffic that is not assigned dynamically to a different VLAN.

   You might specify the VLAN for users with the fewest rights. In this example, type the Students VLAN: **10.**



Network Setup > WLAN Setup > Edit

Edit — SSID 1

Configuration

SSID: ProCurve University

Description:

● VLAN ID: 10 ☑ Dynamic Assignment

○ Tunnel: 0

Gateway: 0 . 0 . 0 . 0

Mask: 0 . 0 . 0 . 0

Authentication

● 802.1X EAP

○ Web-Auth

○ MAC Authentication

○ No Authentication

Encryption

□ WEP 64

□ WEP 128

□ WPA/WPA2-TKIP

□ WPA2-AES

Advanced

Accounting Mode: Off

☑ Answer Broadcast ESS

□ Use Voice Prioritization

□ Enable SVP

□ Closed System

Inter-station Traffic: Allow Packets

Inactivity Timeout: 1800 seconds

Access Category: Normal

MCast Addr 1: 00 - 00 - 00 - 00 - 00 - 00

MCast Addr 2: 00 - 00 - 00 - 00 - 00 - 00

Status:

Figure 2-85. Wireless Edge Services Module Web Interface—Network Setup > WLAN Setup > Edit Window

8. The **Dynamic Assignment** check box should be selected. This setting enables the Wireless Edge Services Module to apply dynamic VLAN assignments that it receives from the NAC 800.

9. Under **Encryption**, select the **WPA/WPA2-TKIP** and the **WPA2-AES** check boxes.

10. Under **Authentication**, select **802.1X EAP**.

11. Click **Radius Config** at the bottom of the window. The **Radius Configuration** window is displayed.

12. Under **Server**, specify your NAC 800 ESs:

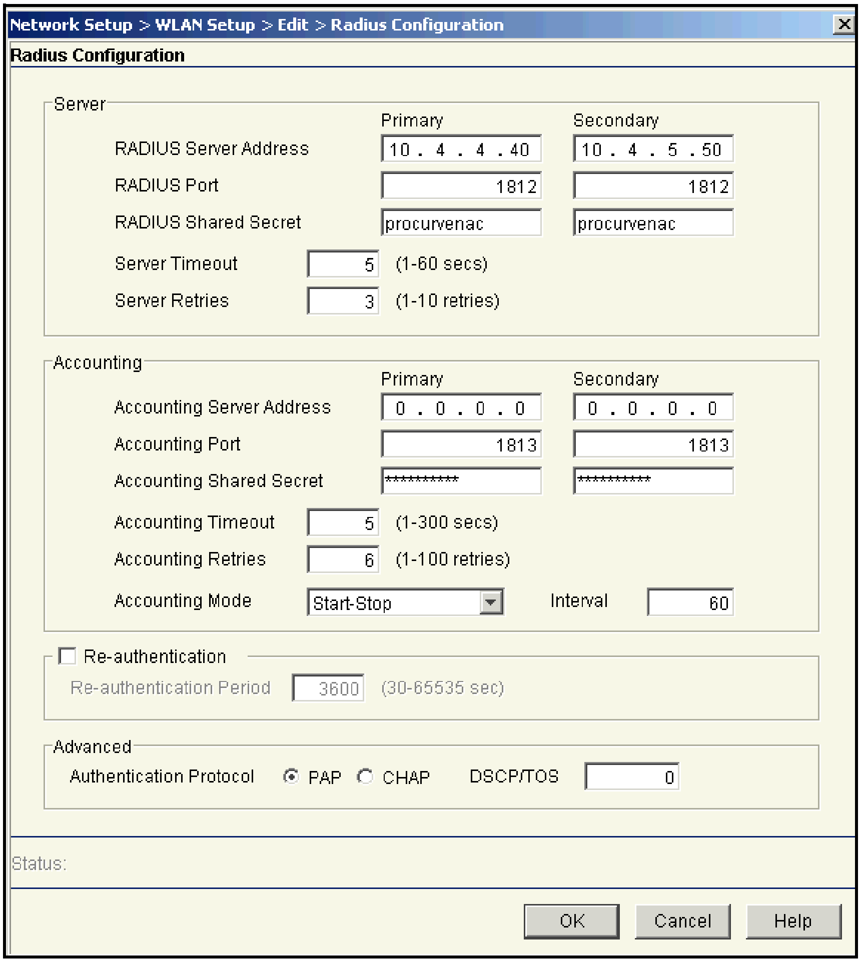
    Type the settings for one NAC 800 setting in the **Primary** column:

    a. In the **RADIUS Server Address** box, type the IP address of one NAC 800 ES: **10.4.4.40**

    b. Leave the **RADIUS Port** at the default value, **1812**.

    c. In the **RADIUS Shared Secret** box, type the secret that will be configured for the module on the NAC 800 (in this example, **procurvenac**).

    Type the settings for the other NAC 800 ES in the **Secondary** column (**10.4.5.50**). Use the same shared secret.


Network Setup > WLAN Setup > Edit > Radius Configuration

Radius Configuration

Server

	Primary	Secondary
RADIUS Server Address	10 . 4 . 4 . 40	10 . 4 . 5 . 50
RADIUS Port	1812	1812
RADIUS Shared Secret	procurvenac	procurvenac

Server Timeout 5 (1-60 secs)

Server Retries 3 (1-10 retries)

Accounting

	Primary	Secondary
Accounting Server Address	0 . 0 . 0 . 0	0 . 0 . 0 . 0
Accounting Port	1813	1813
Accounting Shared Secret	***********	***********

Accounting Timeout 5 (1-300 secs)

Accounting Retries 6 (1-100 retries)

Accounting Mode Start-Stop Interval 60

□ Re-authentication

Re-authentication Period 3600 (30-65535 sec)

Advanced

Authentication Protocol ● PAP ○ CHAP DSCP/TOS 0

Status:

Figure 2-86. Wireless Edge Services Module Web Interface—Radius Configuration Window

13. Click **OK**.
14. Click **OK** in the **Network Setup** > **WLAN Setup** > **Edit** window.
15. In the **Network Setup** > **WLAN Setup** window, verify that the WLAN you just configured is selected. Click **Enable**.

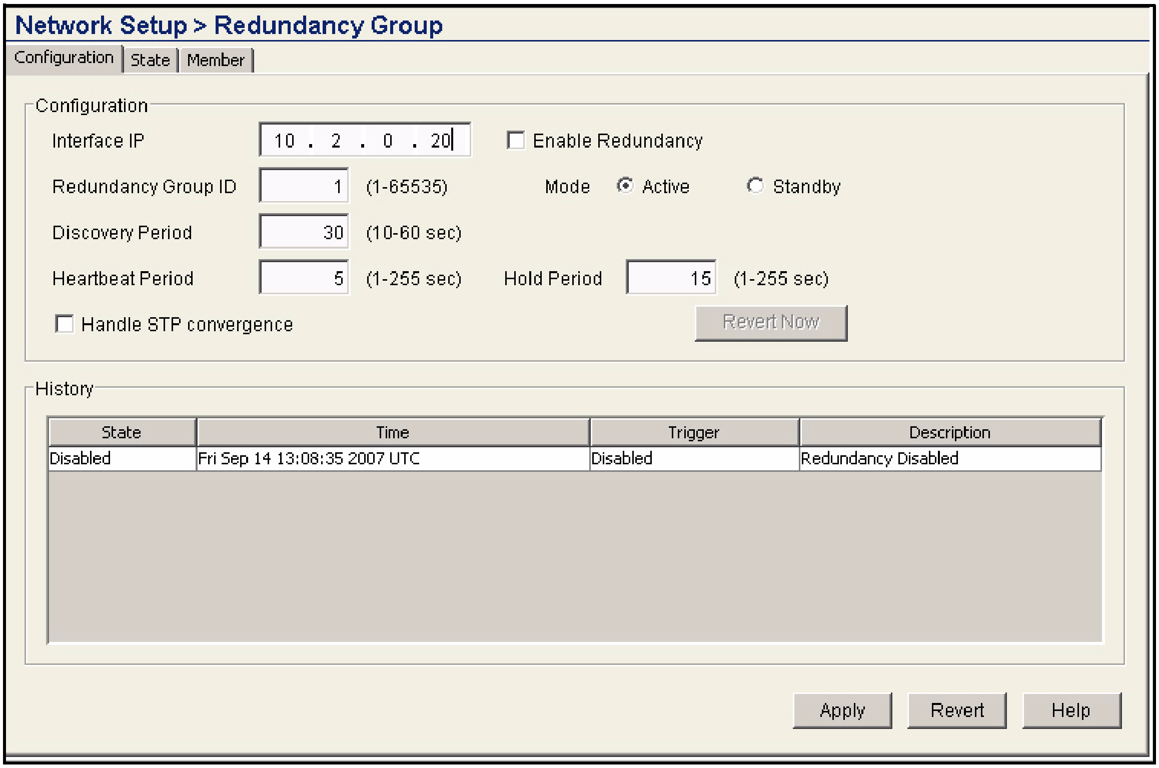
Configure the Redundancy Group

This example network includes two Wireless Edge Services Modules to provide redundancy.

You will place the modules in a redundancy group in which both devices function in active mode. In normal operation, both modules will adopt RPs and support traffic from wireless users. (However, only the primary module has the licenses that allow both modules to adopt RPs.) If one module fails, the other module will provide failover and adopt all RPs.

Follow these steps:

1. You should be in the Wireless Edge Services Module's Web browser interface.
2. Select **Network Setup** > **Redundancy Group**. You begin at the **Configuration** tab.



Network Setup > Redundancy Group

Configuration | State | Member

Configuration

Interface IP: 10 . 2 . 0 . 20

□ Enable Redundancy

Redundancy Group ID: 1 (1-65535)

Mode: ● Active ○ Standby

Discovery Period: 30 (10-60 sec)

Heartbeat Period: 5 (1-255 sec)

Hold Period: 15 (1-255 sec)

□ Handle STP convergence

History

State	Time	Trigger	Description
Disabled	Fri Sep 14 13:08:35 2007 UTC	Disabled	Redundancy Disabled

Figure 2-87. Wireless Edge Services Module Web Interface—Network Setup > Redundancy Group > Configuration Tab

3. Type the IP address of this module for the **Interface IP**. In this example: **10.2.0.20**.

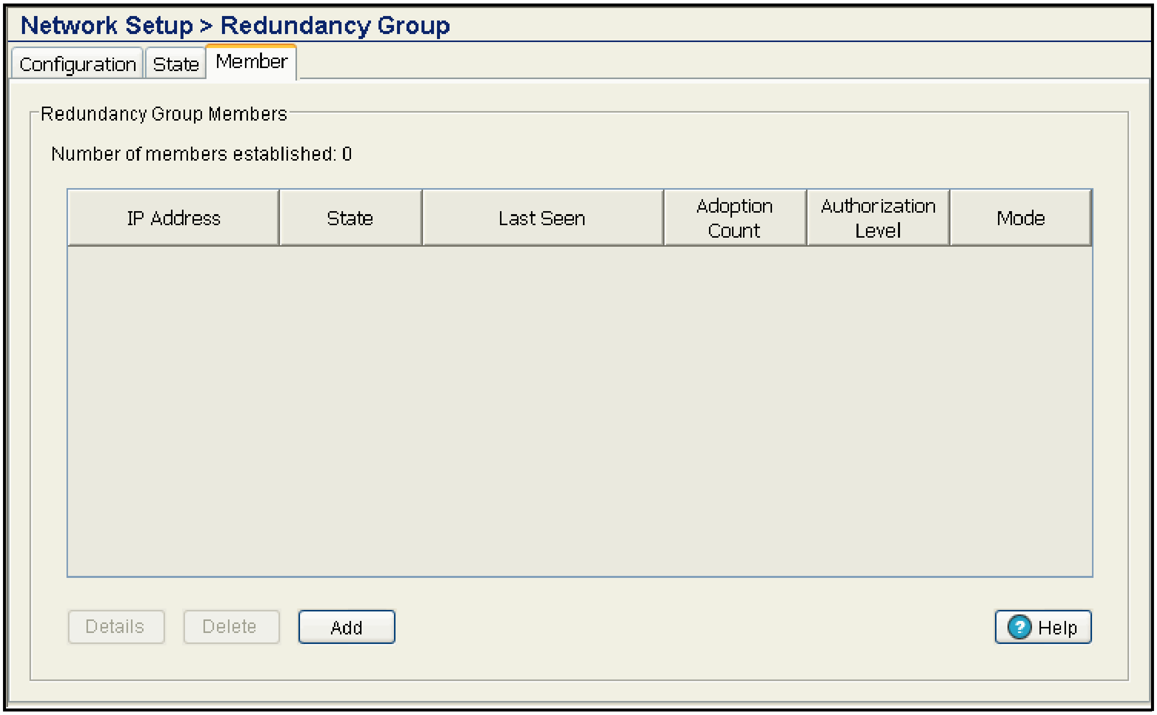
4. In the **Redundancy Group ID** box, leave the default: **1**.

5. Select **Active** for the **Mode**.

6. Accept the defaults for other settings.

7. Click **Apply**.

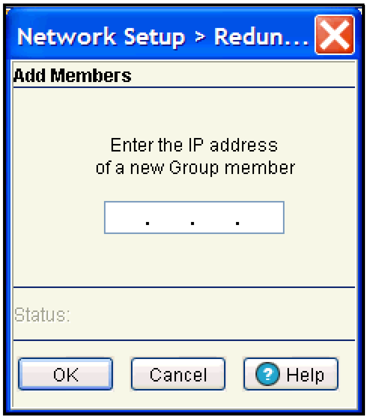
8. Click the **Member** tab.



Number of members established: 0

Figure 2-88. Wireless Edge Services Module Web Interface—Network Setup > Redundancy Group > Member Tab

9. Click **Add**. The **Add Members** window is displayed.



Enter the IP address of a new Group member

Figure 2-89. Wireless Edge Services Module Web Interface—Add Members Window

10. Type the IP address of the other module (in this example, **10.2.0.25**).
11. Click **OK**. The module is now listed on the **Network Setup** > **Redundancy Group** > **Member** window.
12. Repeat steps 2 to 11 on the Redundant Wireless Services Module. However, in step 3, enter the IP address of the redundant module and in step 10, enter the IP address of the primary module.

Note

It is very important to configure redundancy on all members of the group before enabling redundancy.

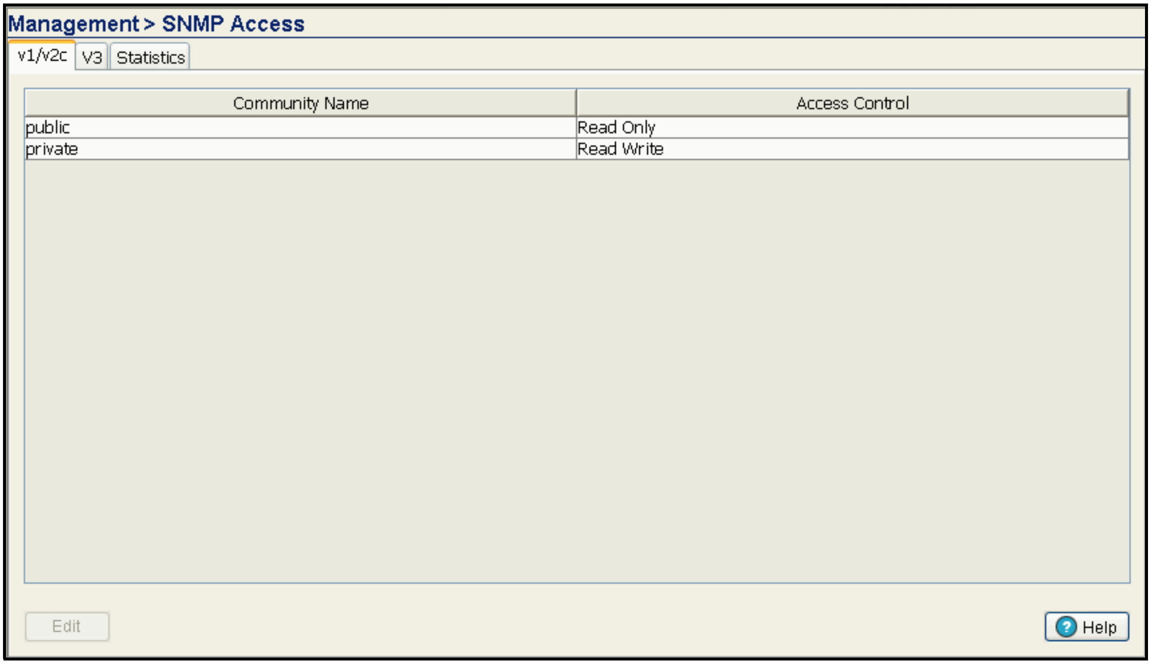
13. Click the **Configuration** tab.
14. Select the **Enable Redundancy** check box.
15. Click **Apply**.
16. Click **Save** at the top of the Web browser interface.
17. Click **Yes** and **OK** in the two windows that are displayed.
18. Repeat steps 13 to 16 on the redundant module.

Configure SNMP on the Wireless Edge Services Modules

You must configure the Wireless Edge Services Modules' SNMP settings to allow PCM+ to manage it. SNMPv3 also controls access to the Module's Web browser interface.

Follow these steps to configure SNMP:

1. You should be in the Wireless Edge Services Module's Web browser interface.
2. Click **Management** > **SNMP Access**. You begin at the **v1/v2c** tab.



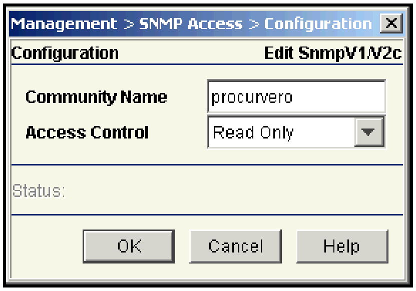
Management > SNMP Access

Community Name	Access Control
public	Read Only
private	Read Write

Figure 2-90. Wireless Edge Services Module Web Interface— Management > SNMP Access > V1/V2c Tab

3. Select **public** and click **Edit**. The **Edit SnmpV1/V2c** window is displayed.

4. For the **Community Name**, type the new name for the community (in this example, **procurvero**).



Management > SNMP Access > Configuration

Configuration Edit SnmpV1/V2c

Community Name: procurvero

Access Control: Read Only

Status:

Figure 2-91. Wireless Edge Services Module Web Interface— Edit SnmpV1/V2c Window

5. Keep the default setting, **Read Only**, in the **Access Control** box.

6. Click **OK**.

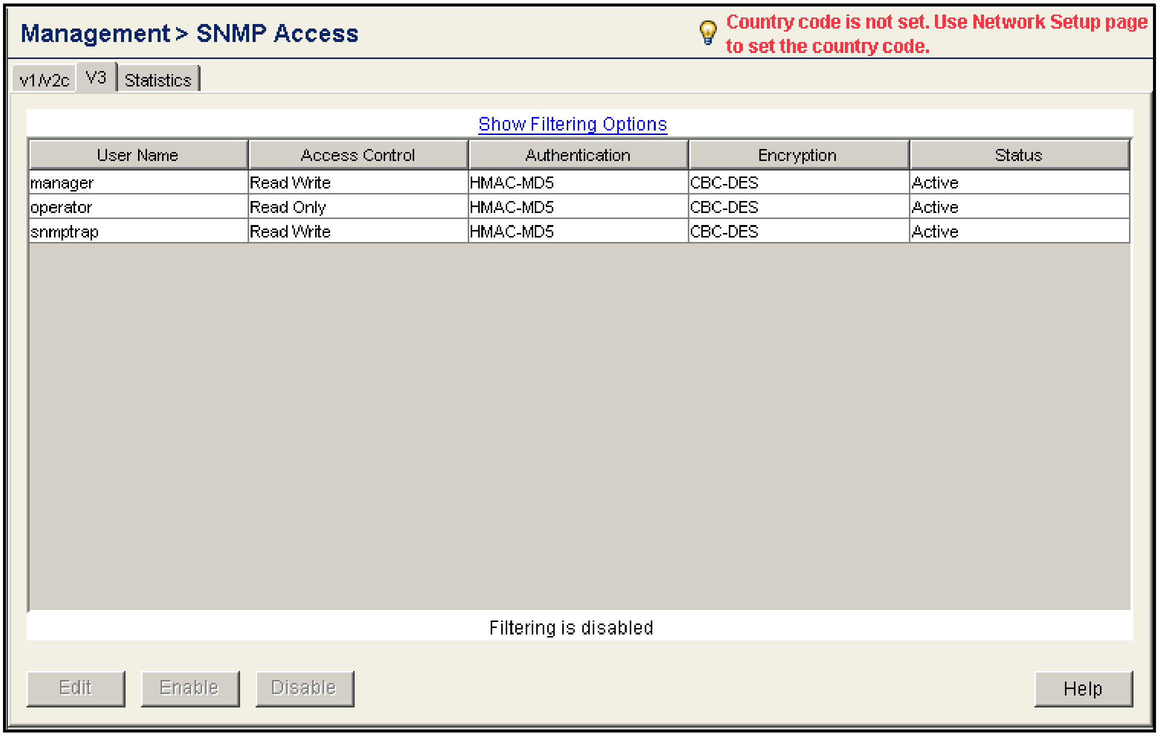
7. Select **private** and click **Edit**.

8. In the **Community Name** box, type the new name for the community. In this example: **procurverw**.

9. Keep the default setting, **Read Write**, in the **Access Control** box.

10. Click **OK**.

11. Click the **V3** tab.



Management > SNMP Access

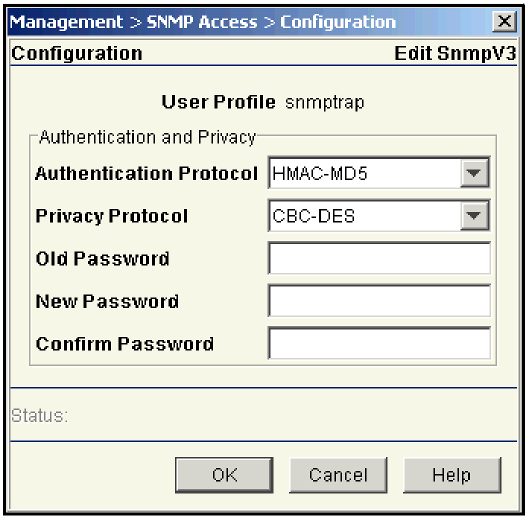
Country code is not set. Use Network Setup page to set the country code.

User Name	Access Control	Authentication	Encryption	Status
manager	Read Write	HMAC-MD5	CBC-DES	Active
operator	Read Only	HMAC-MD5	CBC-DES	Active
snmptrap	Read Write	HMAC-MD5	CBC-DES	Active

Filtering is disabled

Figure 2-92. Wireless Edge Services Module Web Interface—Management > SNMP Access > V3 Tab

12. Select **snmptrap** and click **Edit**. The **Edit SnmpV3** window is displayed.



Management > SNMP Access > Configuration

Configuration — Edit SnmpV3

User Profile snmptrap

Authentication and Privacy

Authentication Protocol: HMAC-MD5

Privacy Protocol: CBC-DES

Old Password

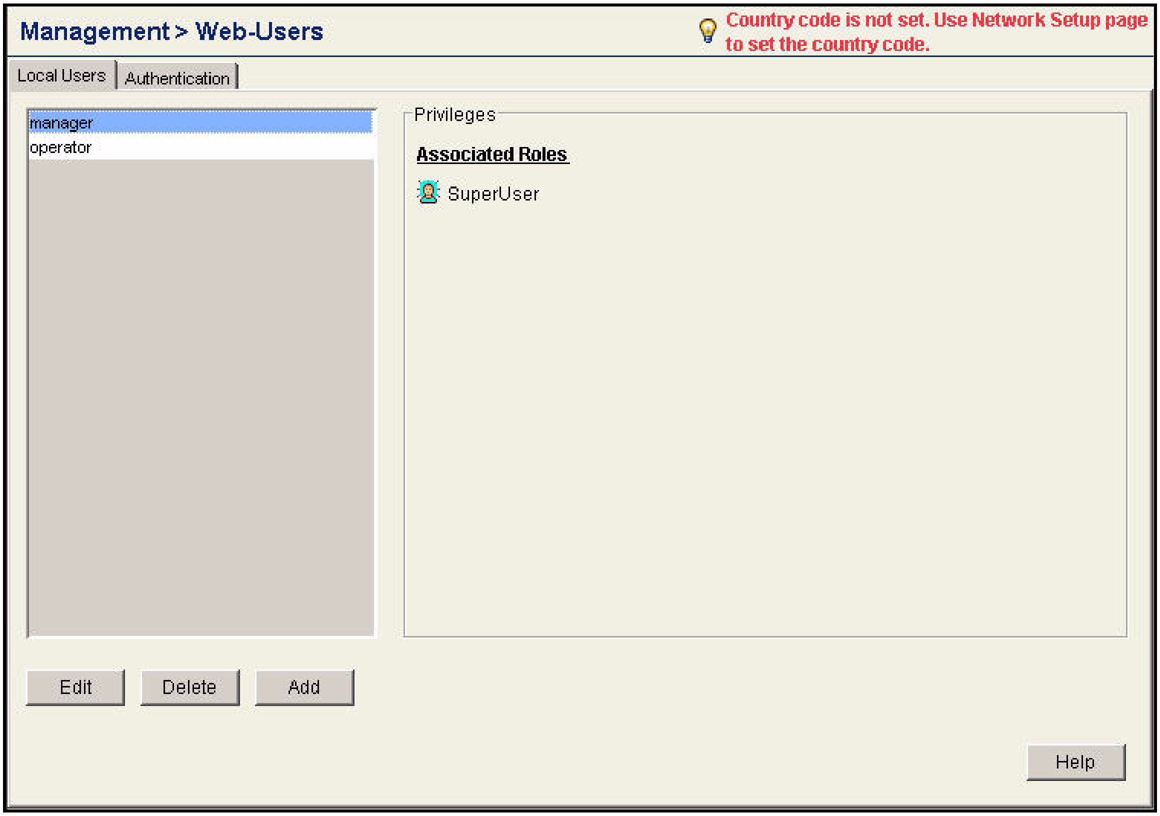
New Password

Confirm Password

Status:

Figure 2-93. Wireless Edge Services Module Web Interface—Edit SnmpV3 Window

13. In the **Old Password** box, type the current password: **trapuser**.
14. In the **New Password** and **Confirm Password** boxes, type the new password (in this example, **procurve**).
15. Click **OK**.
16. The other two default SNMPv3 users are also part of the Wireless Edge Services Module's Web-Users. You will control them on the window for those users. Click **Management** > **Web-Users**.

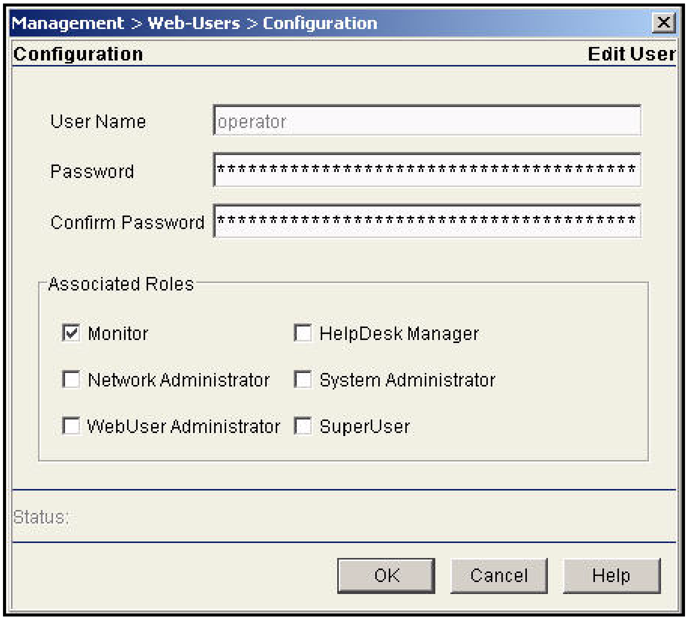


Management > Web-Users

Country code is not set. Use Network Setup page to set the country code.

Figure 2-94. Wireless Edge Services Module Web Interface—Management > Web-Users

17. Select **operator** and click **Edit**.



Management > Web-Users > Configuration

Configuration — Edit User

User Name: operator

Password: **

Confirm Password: **

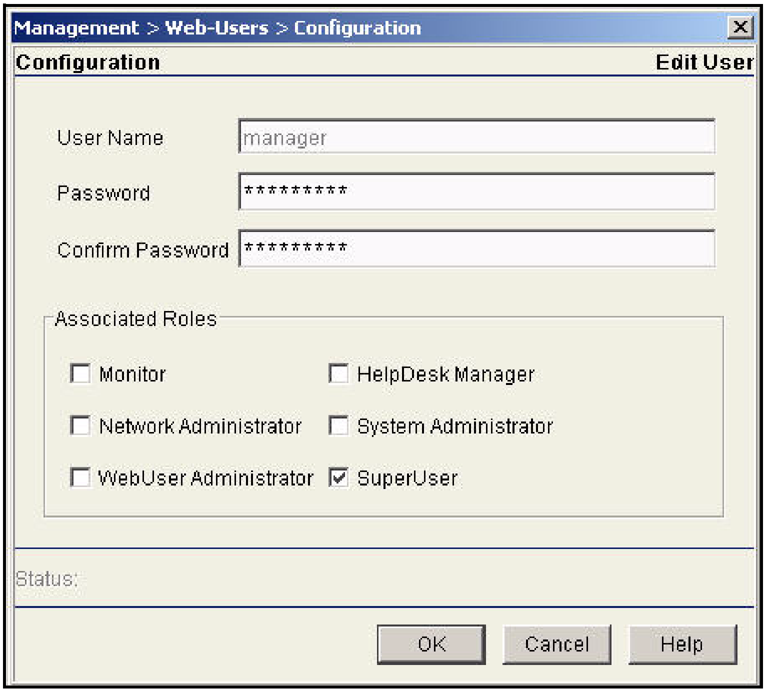
Associated Roles

☑ Monitor
☐ HelpDesk Manager
☐ Network Administrator
☐ System Administrator
☐ WebUser Administrator
☐ SuperUser

Status:

Figure 2-95. Wireless Edge Services Module Web Interface— Management > Web-Users > Configuration (operator)

18. In the **Password** and **Confirm Password** boxes, type the new password (in this example, **procurveoperator**).
19. Under **Associated Roles**, the **Monitor** check box is selected. Keep this default setting.
20. Click **OK**.
21. Select **manager** and click **Edit**.



Management > Web-Users > Configuration

Configuration — Edit User

User Name: manager

Password: *********

Confirm Password: *********

Associated Roles

□ Monitor　□ HelpDesk Manager

□ Network Administrator　□ System Administrator

□ WebUser Administrator　☑ SuperUser

Status:

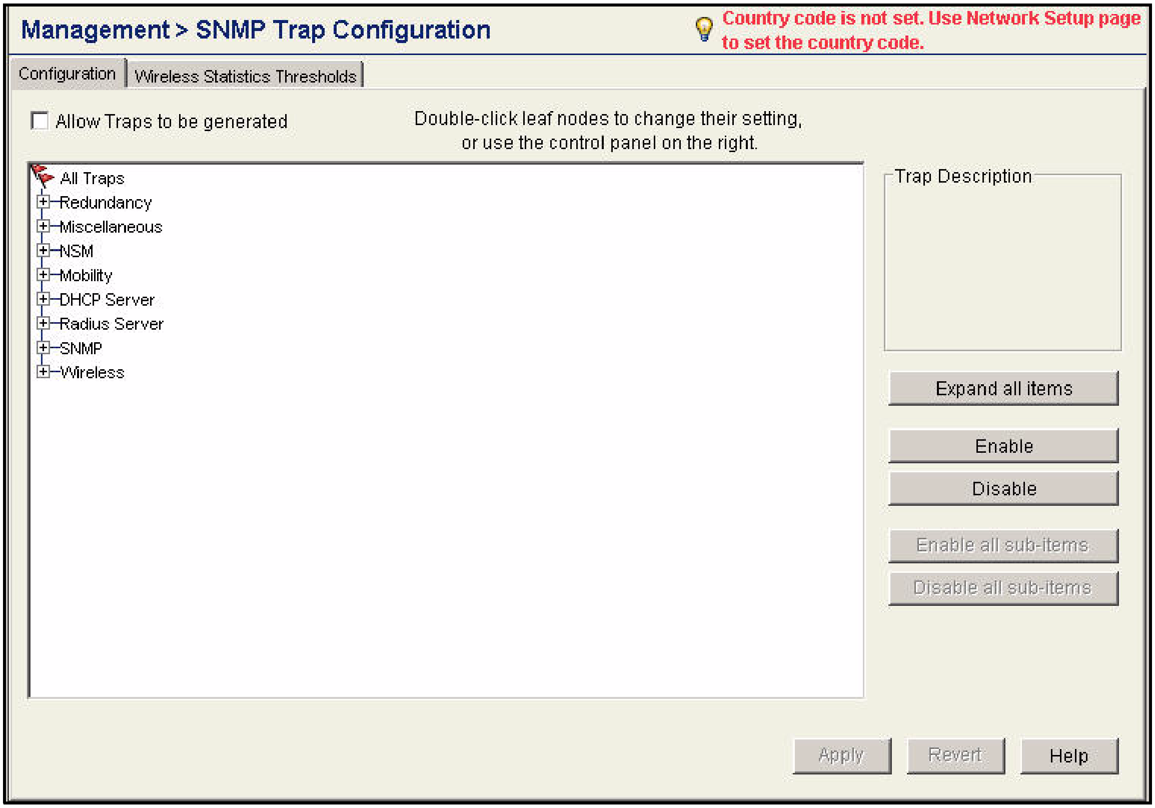
Figure 2-96. Wireless Edge Services Module Web Interface— Management > Web-Users > Configuration (manager)

22. In the **Password** and **Confirm Password** boxes, type the new password (in this example, **Procurve1**).
23. Under **Associated Roles**, the **SuperUser** check box is selected. Keep this default setting.
24. Click **OK**.

Note

You must enter this new password the next time you log in to the Web browser interface.

25. Select **Management** > **SNMP Trap Configuration**.



Management > SNMP Trap Configuration

Country code is not set. Use Network Setup page to set the country code.

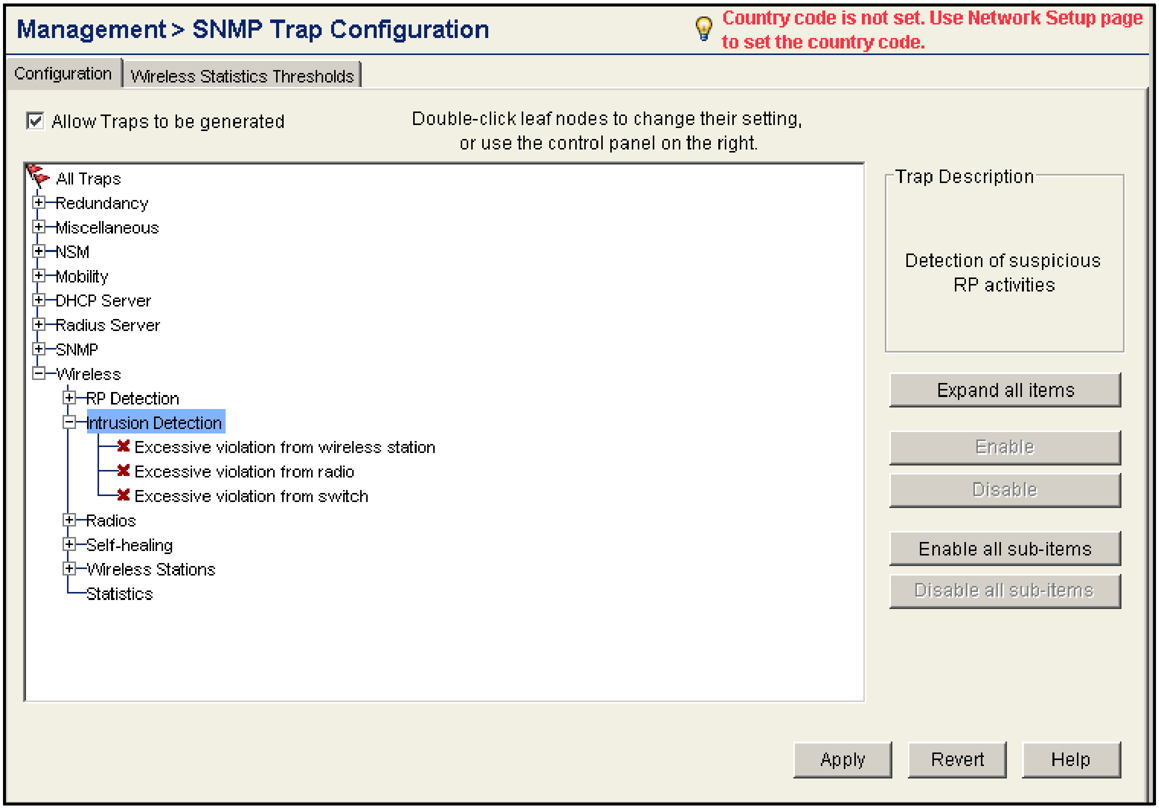
Figure 2-97. Wireless Edge Services Module Web Interface—Management > SNMP Trap Configuration > Configuration Tab

26. Select the **Allow Traps to be generated** check box.

27. To view the SNMP traps in a category, expand the category. To view the SNMP traps in all categories, click **Expand all items**.

28. To enable all the traps, select **All Traps** and click **Enable all sub-items**.

29. To enable all the SNMP traps in a category, select the category and click **Enable all sub-items**.



Management > SNMP Trap Configuration

Country code is not set. Use Network Setup page to set the country code.

Configuration | Wireless Statistics Thresholds

☑ Allow Traps to be generated

Double-click leaf nodes to change their setting, or use the control panel on the right.

- All Traps
  - Redundancy
  - Miscellaneous
  - NSM
  - Mobility
  - DHCP Server
  - Radius Server
  - SNMP
  - Wireless
    - RP Detection
    - Intrusion Detection
      - ✗ Excessive violation from wireless station
      - ✗ Excessive violation from radio
      - ✗ Excessive violation from switch
    - Radios
    - Self-healing
    - Wireless Stations
    - Statistics

Trap Description

Detection of suspicious RP activities

Figure 2-98. Wireless Edge Services Module Web Interface—Management > SNMP Trap Configuration > Configuration Tab

30. To enable a specific SNMP trap, select the trap and dick **Enable** or double-click the trap. A green check mark is displayed next to enabled traps. A red x is displayed next to disabled traps.

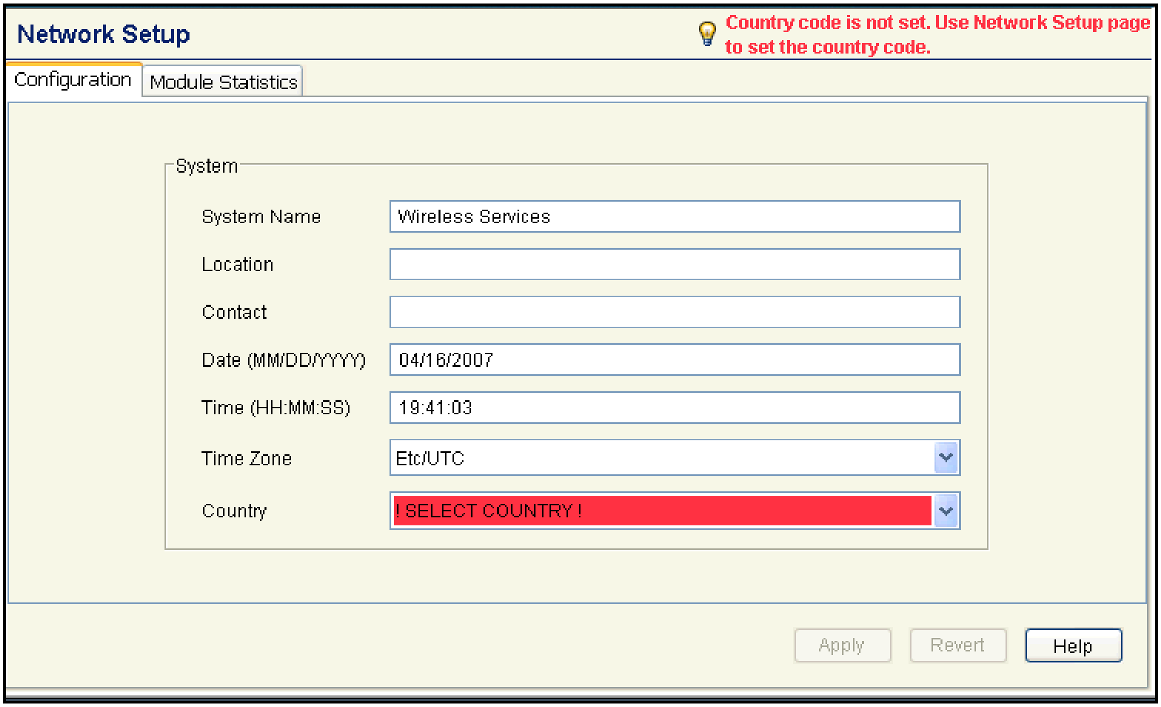
31. Click **Apply**.

Configure the Time

Network devices check timestamps as apart of the authentication process (as well as other processes). It is important that all your network devices keep the same clock. Follow these steps to configure the time on the Wireless Edge Services Module:

1. You should be in the module's Web browser interface.

2. Click **Network Setup**. You should be at the **Configuration** tab.



Network Setup

Country code is not set. Use Network Setup page to set the country code.

System Name: Wireless Services

Location:

Contact:

Date (MM/DD/YYYY): 04/16/2007

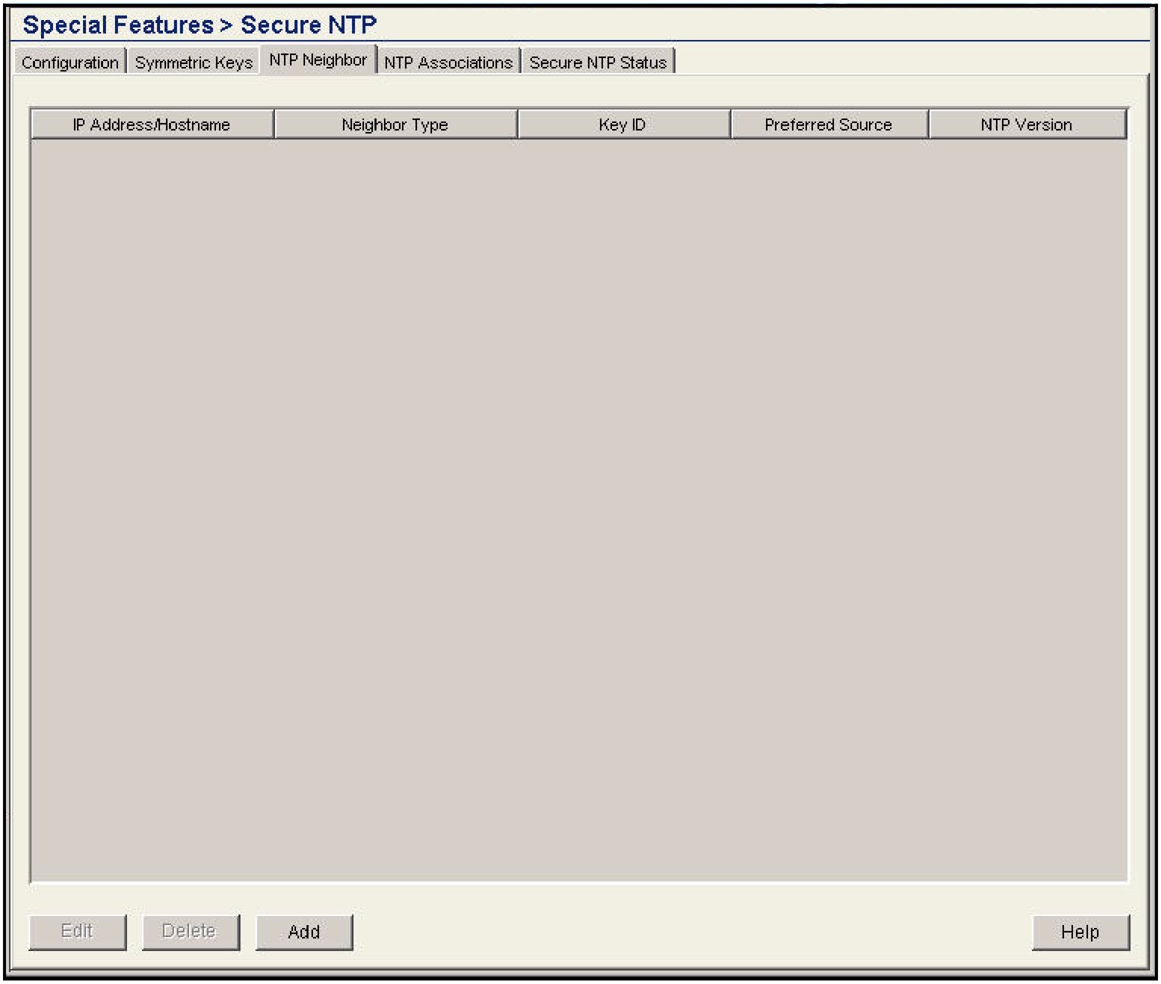
Time (HH:MM:SS): 19:41:03

Time Zone: Etc/UTC

Country: ! SELECT COUNTRY !

Figure 2-99. Wireless Edge Services Module Web Interface—Network Setup > Configuration Window

3. Select your time zone from the **Time Zone** box.
4. Click **Apply**.
5. Click **Special Features** > **Secure NTP**.
6. Click the **NTP Neighbor** tab.



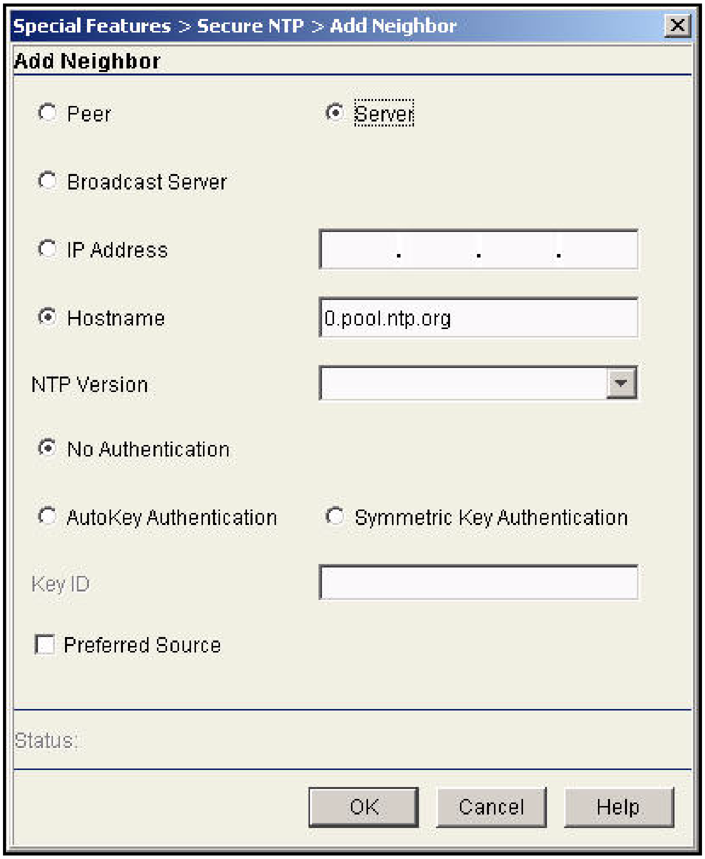
IP Address/Hostname	Neighbor Type	Key ID	Preferred Source	NTP Version

Figure 2-100. Wireless Edge Services Module Web Interface—Special Features > Secure NTP > NTP Neighbor Window

7. Click **Add**.

8. Click **Server**.

9. Select **IP Address** or **Hostname** and specify your NTP server. In this example, the domain is using a public NTP server.



Special Features > Secure NTP > Add Neighbor

Add Neighbor

○ Peer ● Server

○ Broadcast Server

○ IP Address . . .

● Hostname 0.pool.ntp.org

NTP Version

● No Authentication

○ AutoKey Authentication ○ Symmetric Key Authentication

Key ID

□ Preferred Source

Status:

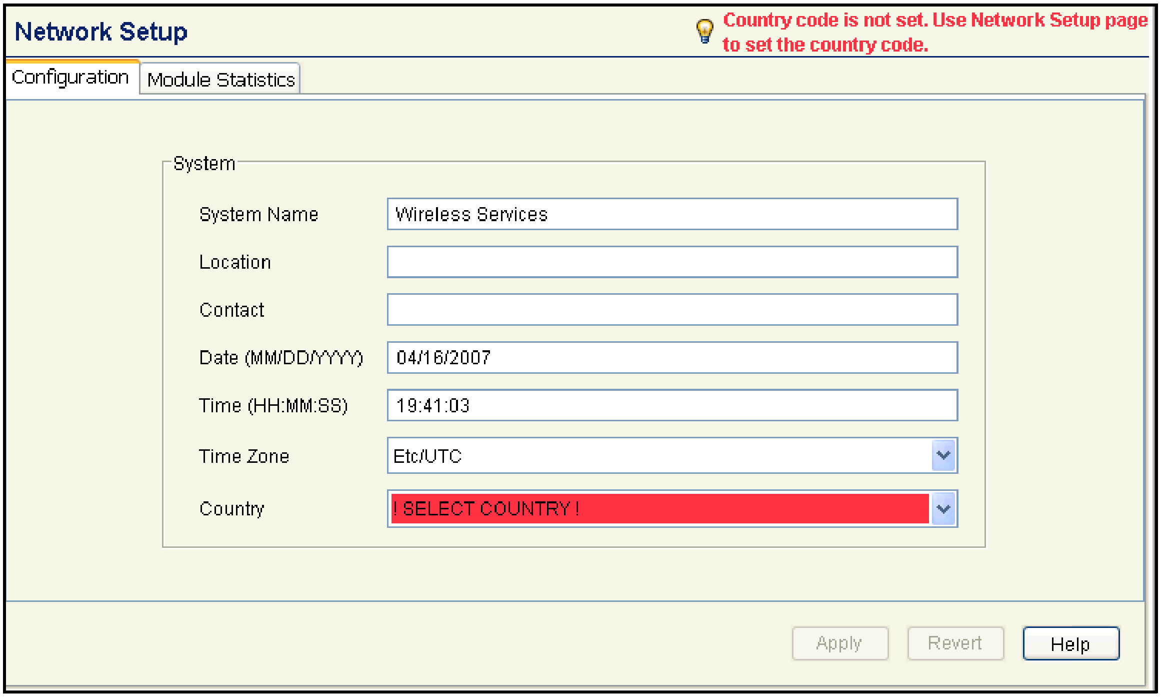
Figure 2-101. Wireless Edge Services Module Web Interface— Special Features > Secure NTP > Add Neighbor Window

10. Click **OK**.

Set the Country Code

You must set the country codeto enable the Wireless Edge Service Module to adopt RPs. Follow these steps:

1. Click **Network Setup**. You should be at the **Configuration** tab.



Network Setup

Country code is not set. Use Network Setup page to set the country code.

System

System Name: Wireless Services

Location:

Contact:

Date (MM/DD/YYYY): 04/16/2007

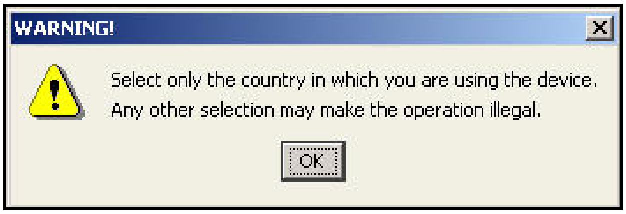
Time (HH:MM:SS): 19:41:03

Time Zone: Etc/UTC

Country: ! SELECT COUNTRY !

Figure 2-102. Wireless Edge Services Module Web Interface—Network Setup > Configuration Window

2. From the **Country** box, select your country. A **Warning** window is displayed.



WARNING!

Select only the country in which you are using the device. Any other selection may make the operation illegal.

Figure 2-103. Wireless Edge Services Module Web Interface—Warning Window

3. Click **OK**.
4. Click **Apply**.
5. Click **Save** at the top of the Web browser interface.
6. Click **Yes** and **OK** in the two windows that are displayed.

802.1X Authentication for RPs

To prevent users from disconnecting RPs and plugging rogue devices into the RPs' switch ports, you can enforce 802.1X authentication on these ports. The ProCurve RPs 210, 220, and 230 include an 802.1X client so that they can connect to ports that enforce such authentication. Using Message Digest 5 (MD5) authentication, the client automatically sends the RP's credentials when the RP connects to a network device. The switch to which the RP connects forwards the credentials to an authentication server, and if the credentials are correct, allows the RP to join the network.

The authentication server may store a VLAN setting for the RP, which it sends to the switch after the RP authenticates. Such dynamic configuration of the Radio Port VLAN can replace auto-provisioning on the wireless services-enabled switch or manual configuration on an infrastructure switch.

Note

When you implement 802.1X on a port, auto-provisioning is disabled on that port. You must either manually set the port to the correct VLAN for the RP or configure the VLAN assignment on the RADIUS server.

However, the wireless services-enabled switch can continue to implement auto-provisioning on ports that do not enforce 802.1X.

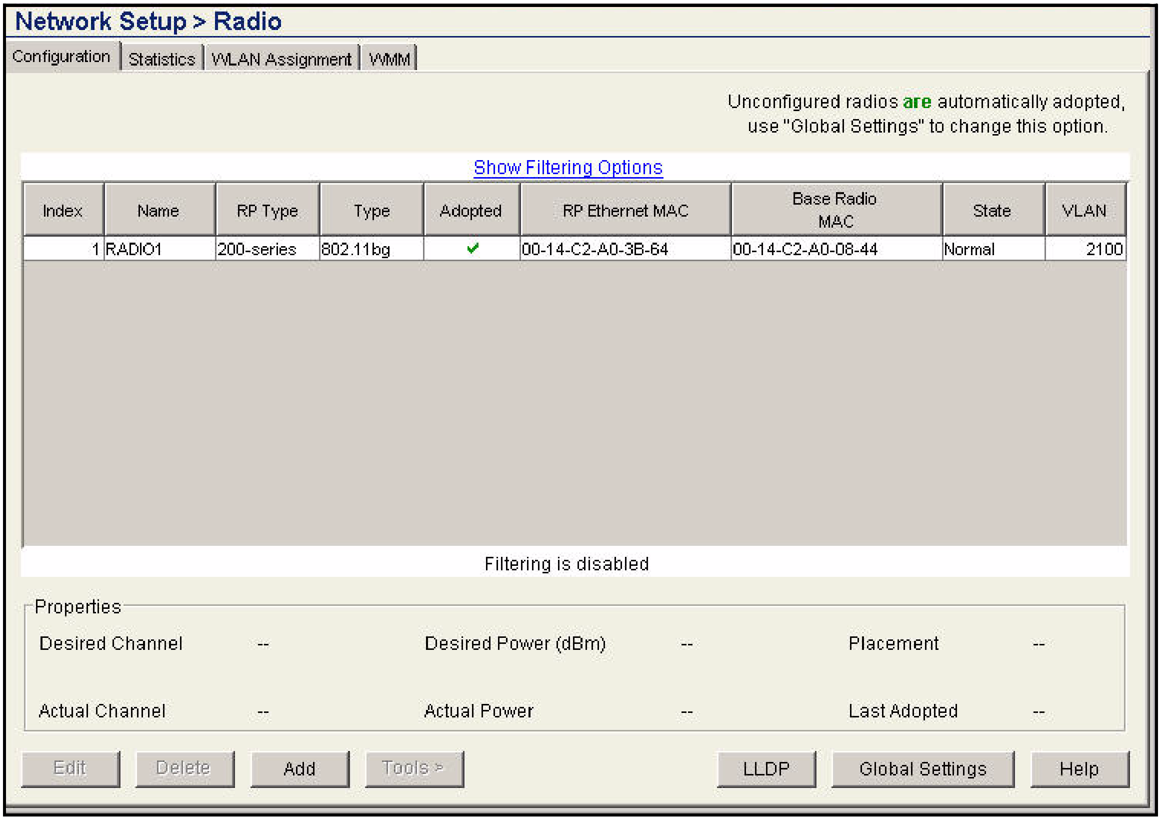
The default username and password on all ProCurve 200 series RPs are "admin" and "procurve."

You should use pre-adoption to change these settings. That is, connect your organization's RPs directly to the wireless-services enabled switch (or, if the switch does not support PoE, to a PoE switch that is configured to forward Radio Port traffic to the wireless-services enabled switch). Verify that the Wireless Edge Services Module adopts the RPs; then load new credentials on the RPs as explained in the following section. After you have finished setting up the access control solution, you can move the RPs to their final locations, where they will authenticate to the network.

Configuring 802.1X Authentication for RPs

To configure 802.1X authentication for RPs, complete these steps:

1. Select **Network Setup** > **Radio**. You begin at the **Configuration** tab.
2. Verify that all of your organization's RPs are listed in the window.



Unconfigured radios **are** automatically adopted, use "Global Settings" to change this option.

Index	Name	RP Type	Type	Adopted	RP Ethernet MAC	Base Radio MAC	State	VLAN
1	RADIO1	200-series	802.11bg	✓	00-14-C2-A0-3B-64	00-14-C2-A0-08-44	Normal	2100

Filtering is disabled

Properties

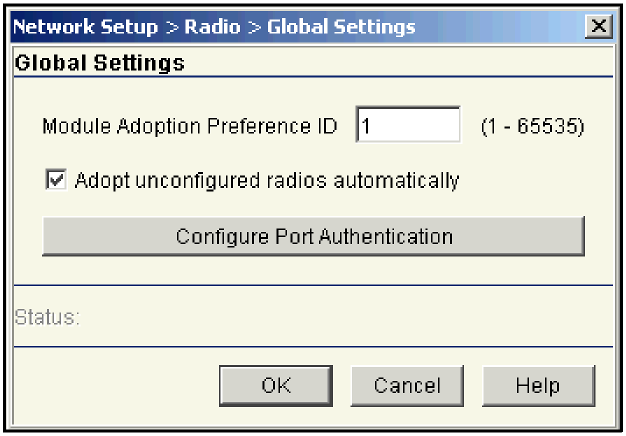
Desired Channel	--	Desired Power (dBm)	--	Placement	--
Actual Channel	--	Actual Power	--	Last Adopted	--

Figure 2-104. Wireless Edge Services Module Web Browser Interface—Network Setup > Radio Window

Note

It isimportant that all RPs be adopted at this time. When the Wireless Edge Services Module pushes the username and password to the RPs, as you are about to configure it to do, it does so as a one-time occurrence. Any RP not adopted at this time does not receive the credentials even if it is adopted later.

3. Click **Global Settings**.



Network Setup > Radio > Global Settings

Global Settings

Module Adoption Preference ID: 1 (1 - 65535)

☑ Adopt unconfigured radios automatically

Figure 2-105. Wireless Edge Services Module Web Browser Interface—Network Setup > Radio > Global Settings Window

4. Click **Configure Port Authentication**.

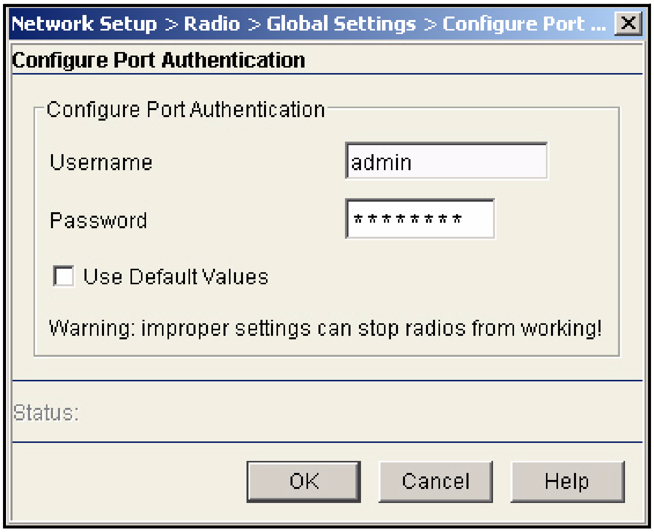

Network Setup > Radio > Global Settings > Configure Port ...
Configure Port Authentication
Configure Port Authentication
Username
admin
Password
****
□ Use Default Values
Warning: improper settings can stop radios from working!
Status:
OK
Cancel
Help

Figure 2-106. Wireless Edge Services Module Web Browser Interface—Configure Port Authentication Window

5. Configure a username and password. Do one of the following:
   - In hetUsername and **Password** boxes, type the username and password that you want to use. In this example: **rp** and **ProCurve6**.
   - Check the **Use Default Values** box to return to the default username and password:
     – username: **admin**
     – password: **procurve**
6. Click **OK**, and then click **OK** in the **Global Settings** window.
7. Click **Save**.
8. Click **Yes** and **OK** in the two windows that are displayed.

Configuring the NAC 800s

This solution includes three NAC 800s:

- One MS
- Two ESs

Install the NAC 800s

The NAC 800s in this solution enforce quarantining by issuing dynamic VLAN assignments as RADIUS servers. Install the devices in the network core with other servers.

As shown in Figure2-107, the NAC 800 MS is placed in the management VLAN (VLAN 2) to help control access to the Web browser interface. The NAC 800 ESs, which act as RADIUS servers, are placed in the server VLAN (VLAN 4). Each NAC 800 connects to its switch on its Ethernet port 1.

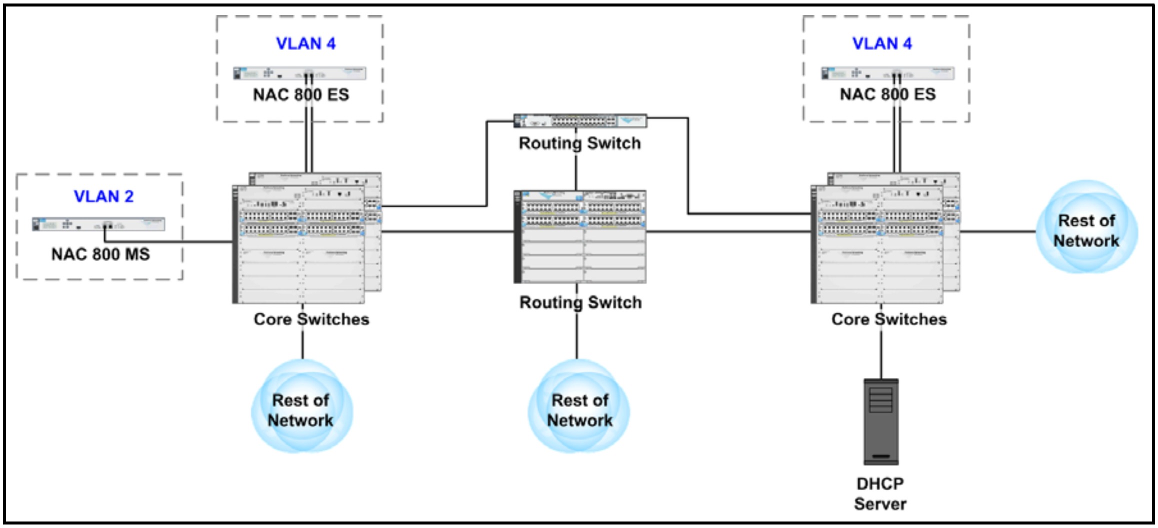


Figure 2-107. Placing the NAC 800s in the Core of the Example Network

Refer to the *Network Access Controller 800 Hardware Installation Guide* for detailed mounting and installation instructions.

Configure Basic Settings on the NAC 800s

Before you manage the NAC 800s through the MS's Web browser interface, you must configure some basic network settings on all the devices. This section explains how to configure these settings through a console session.

The next section describes configuring the remainder of the basic settings through the Web browser interface.

In this example, the NAC 800s will use the network settings in Table 2-11.

Table 2-11. NAC 800 Basic Settings

Device	Hostname	IP Address	Subnet Mask	Default Gateway	DNS Server	Time Settings
NAC 800 MS	MS.procurveu.edu	10.2.1.40	255.255.0.0	10.2.0.1	10.4.4.15	ntp.pool1.org
NAC 800 ES	ESa.procurveu.edu	10.4.4.40	255.255.0.0	10.4.0.1	10.4.4.15	from MS
NAC 800 ES	ESb.procurveu.edu	10.4.5.50	255.255.0.0	10.5.0.1	10.4.4.15	from MS

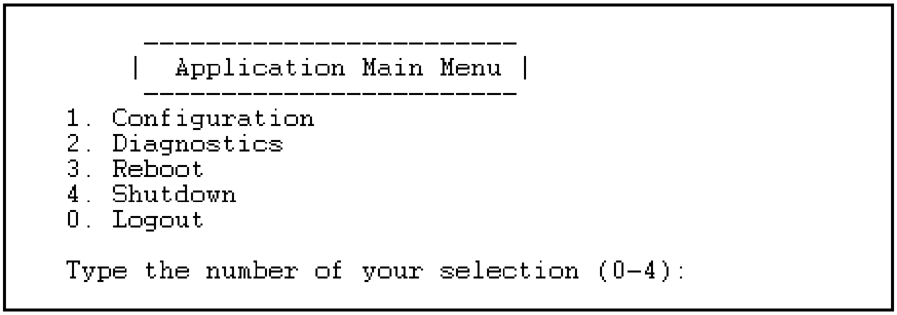
Configure Initial Settings Through a Console Session

The following steps guide you through initial configuration of one of your NAC 800s. You must repeat these steps on each of the devices. The only differences are the server type and the IP addresses.

1. Your NAC 800 ships with a console cable. Plug the cable's Ethernet (RJ-45) connector into the Console Ethernet port, which is located on the left front panel of the NAC 800.
2. Plug the cable's DB-9 connector into a console port on your management workstation.
3. Use terminal session software such as Tera Term to open a console session with the NAC 800. Use the following settings:
   - Baud rate = 9600
   - Bits 8=
   - Stop ate = 1
   - Parity = None
   - Flow control = None
   - For the Windows Terminal program, clear the **Use Function, Arrow, and Ctrl Keys for Windows** check box.
   - For the Hilgraeve HyperTerminal program, select the **Terminal keys** option for the **Function, arrow, and ctrl keys act as** parameter.
4. When prompted for your username, type **admin**.

5. When prompted, type your password (default, **procurve**).

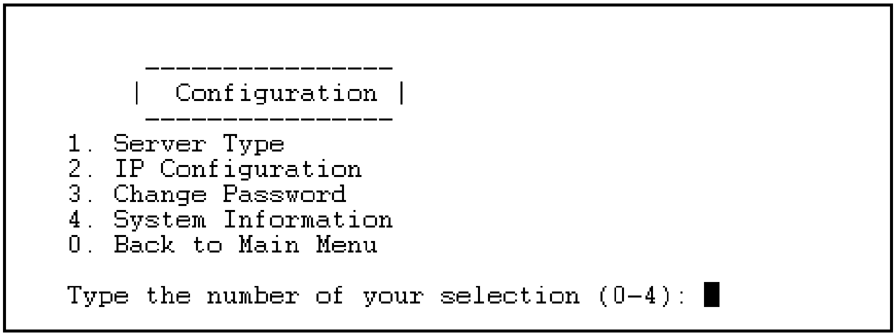
   You should now see the **Application Main Menu**.



```
         ------------------------
        |  Application Main Menu |
         ------------------------
   1. Configuration
   2. Diagnostics
   3. Reboot
   4. Shutdown
   0. Logout

   Type the number of your selection (0-4):
```

Figure 2-108. NAC 800 Menu Interface—Application Main Menu

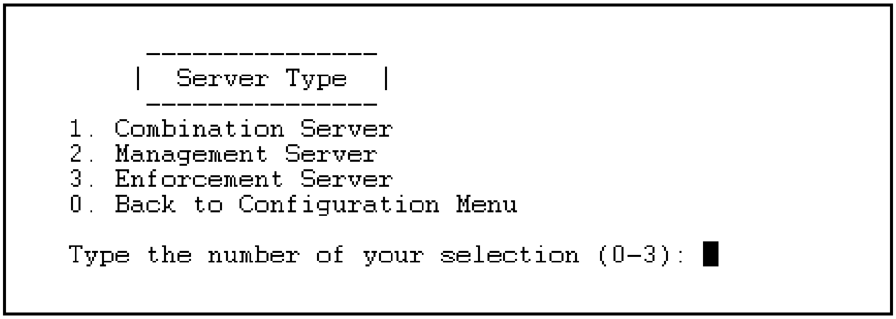
6. In the main menu, press **[1]** for **Configuration**.



```
         ----------------
        |  Configuration |
         ----------------
   1. Server Type
   2. IP Configuration
   3. Change Password
   4. System Information
   0. Back to Main Menu

   Type the number of your selection (0-4): █
```

Figure 2-109. NAC 800 Menu Interface—Main Menu > 1. Configuration

7. In the **Configuration** menu press **[1]** for **Server Type**.

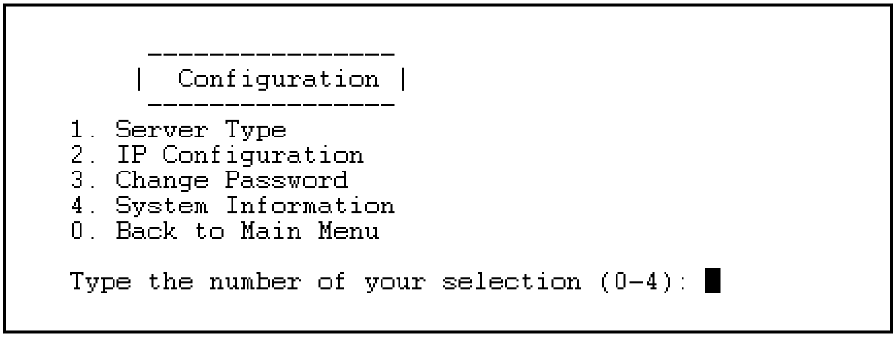


```
     ---------------
    |  Server Type  |
     ---------------
1. Combination Server
2. Management Server
3. Enforcement Server
0. Back to Configuration Menu

Type the number of your selection (0-3): █
```

Figure 2-110. NAC 800 Menu Interface—Application Main Menu > 1. Configuration > 1. Server Type

8. Press **[2]** for **Management Server**, or if you are configuring one of the ESs, press **[3]** for **Enforcement Server**.

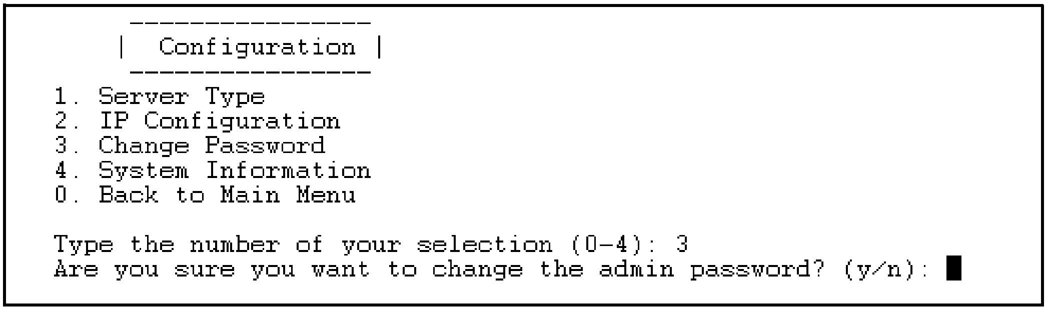
9. Press **[0]** to return to the **Configuration** menu.



```
     ----------------
    |  Configuration |
     ----------------
1. Server Type
2. IP Configuration
3. Change Password
4. System Information
0. Back to Main Menu

Type the number of your selection (0-4): █
```

Figure 2-111. NAC 800 Menu Interface—Application Main Menu > 1. Configuration

10. You should change the password to the menu interface. Press [**3**] for **Change Password**.



```
        ----------------
       |  Configuration |
        ----------------
   1. Server Type
   2. IP Configuration
   3. Change Password
   4. System Information
   0. Back to Main Menu

   Type the number of your selection (0-4): 3
   Are you sure you want to change the admin password? (y/n): █
```

Figure 2-112. NAC 800 Menu Interface — Main Menu > 1. Configuration > 3. Change Password

11. Type **y** to confirm that you want to change the password.

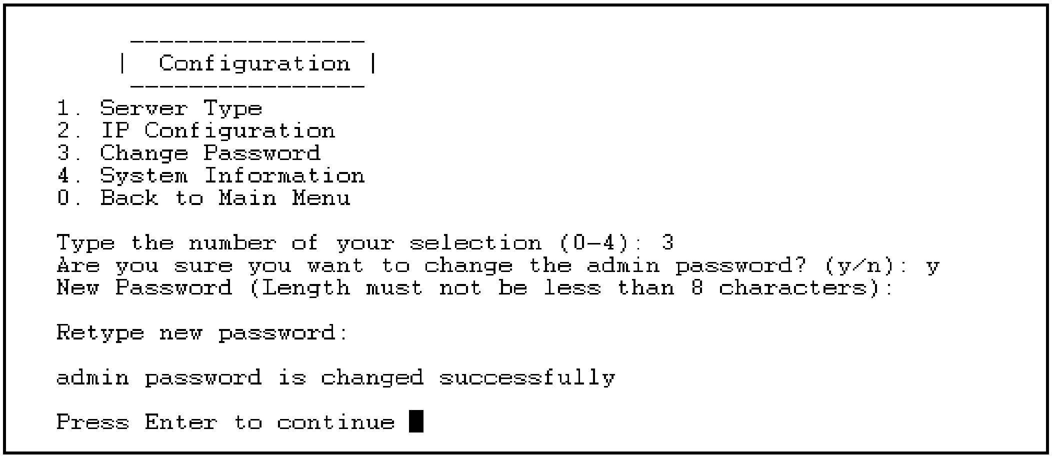
12. Type a password eight characters or longer. The password can include alphanumeric and special characters but does not have specific complexity requirements.

    In the example, management access to NAC 800s is protected with this password: **procurvenac9**.

Note

If you want the menu password to match the password that you will create for the Web browser interface, you must use a mix of letters and numbers.

13. When prompted, retype the same password.

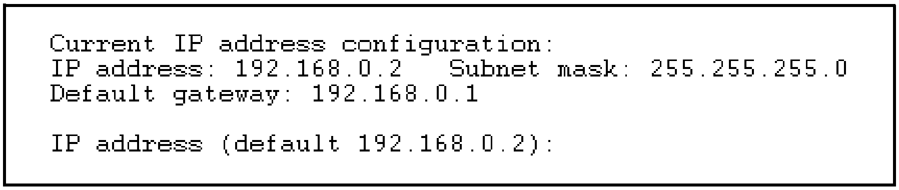


```
        ----------------
       |  Configuration |
        ----------------
   1. Server Type
   2. IP Configuration
   3. Change Password
   4. System Information
   0. Back to Main Menu

   Type the number of your selection (0-4): 3
   Are you sure you want to change the admin password? (y/n): y
   New Password (Length must not be less than 8 characters):

   Retype new password:

   admin password is changed successfully

   Press Enter to continue █
```

Figure 2-113. NAC 800 Menu Interface—Application Main Menu > 1. Configuration > 3. Change Password

14. Press **[Enter]**.

15. Press **[2]** for **IP Configuration**.



```
Current IP address configuration:
IP address: 192.168.0.2   Subnet mask: 255.255.255.0
Default gateway: 192.168.0.1

IP address (default 192.168.0.2):
```

Figure 2-114. NAC 800 Menu Interface—Application Main Menu > 1. Configuration > 2. IP Configuration

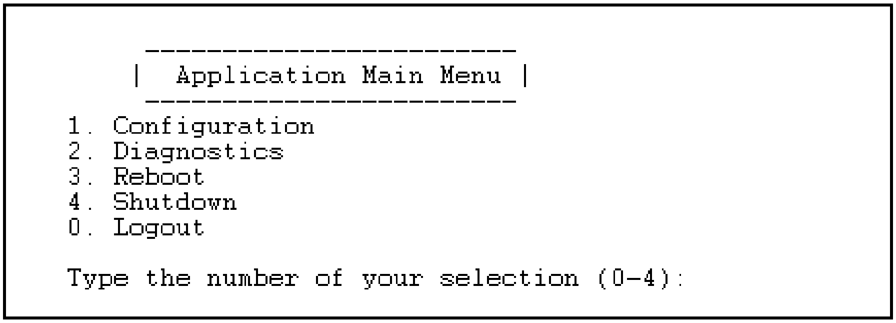
16. The window displays the NAC 800's default settings. Type the new IP address. In this example, type the following for the MS: **10.2.1.40**.

17. Type thesubnet mask forthe NAC 800's subnet.In thisexample: **255.255.0.0**.

18. Type the IP address of the default router on the NAC 800's subnet. In this example, type the following for the MS: **10.2.0.1**.

19. When asked to confirm the settings, check them and (if they are correct) type **y**.

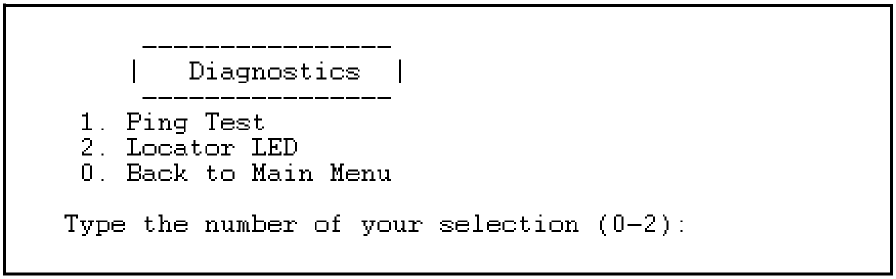
20. Press **[0]**.



```
      ------------------------
     |  Application Main Menu |
      ------------------------
 1. Configuration
 2. Diagnostics
 3. Reboot
 4. Shutdown
 0. Logout

 Type the number of your selection (0-4):
```

Figure 2-115. NAC 800 Menu Interface—Application Main Menu

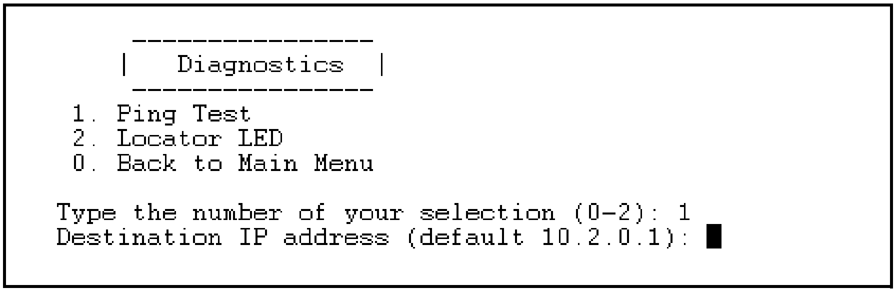
21. Press **[2]** for **Diagnostics**.



```
         ----------------
        |   Diagnostics  |
         ----------------
    1. Ping Test
    2. Locator LED
    0. Back to Main Menu

   Type the number of your selection (0-2):
```

Figure 2-116. NAC 800 Menu Interface—Application Main Menu > 2. Diagnostics

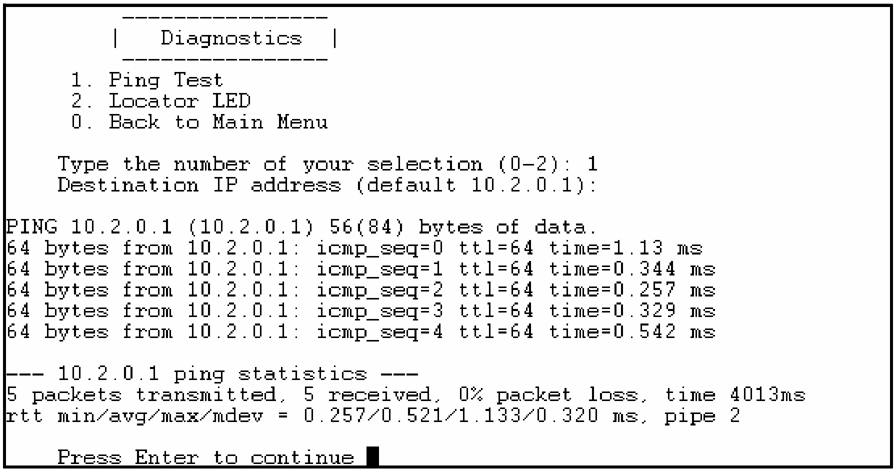
22. Press **[1]** for **Ping Test**.



```
         ----------------
        |   Diagnostics  |
         ----------------
    1. Ping Test
    2. Locator LED
    0. Back to Main Menu

   Type the number of your selection (0-2): 1
   Destination IP address (default 10.2.0.1): █
```

Figure 2-117. NAC 800 Menu Interface—Application Main Menu > 2. Diagnostics > 1. Ping Test

23. Press **[Enter]** to ping the default gateway.



```
        ----------------
       |   Diagnostics  |
        ----------------
     1. Ping Test
     2. Locator LED
     0. Back to Main Menu

    Type the number of your selection (0-2): 1
    Destination IP address (default 10.2.0.1):

PING 10.2.0.1 (10.2.0.1) 56(84) bytes of data.
64 bytes from 10.2.0.1: icmp_seq=0 ttl=64 time=1.13 ms
64 bytes from 10.2.0.1: icmp_seq=1 ttl=64 time=0.344 ms
64 bytes from 10.2.0.1: icmp_seq=2 ttl=64 time=0.257 ms
64 bytes from 10.2.0.1: icmp_seq=3 ttl=64 time=0.329 ms
64 bytes from 10.2.0.1: icmp_seq=4 ttl=64 time=0.542 ms

--- 10.2.0.1 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4013ms
rtt min/avg/max/mdev = 0.257/0.521/1.133/0.320 ms, pipe 2

    Press Enter to continue
```

Figure 2-118. NAC 800 Menu Interface—Application Main Menu > 2. Diagnostics > 1. Ping Test—Results

24. The results of the ping, including the times for the round trip, are displayed.

    If the ping is successful, repeat steps 1 through 24 for the other two NAC 800s.

Access the Web Browser Interface

The NAC 800s now have network connectivity. You will complete all remaining configuration through the NAC 800 MS's Web browser interface.

Follow these steps to access the Web browser interface:

1. Open the Web browser on your management station.
2. Type **https://<NAC 800 IP address>** (in this example, **https://10.1.2.40**).

Note The NAC 800 requires HTTPS (as opposed to HTTP) for stronger security.

3. Because the NAC 800 is using its self-signed certificate, your browser will probably display a prompt, asking you to verify if you want to trust this certificate. Answer yes.

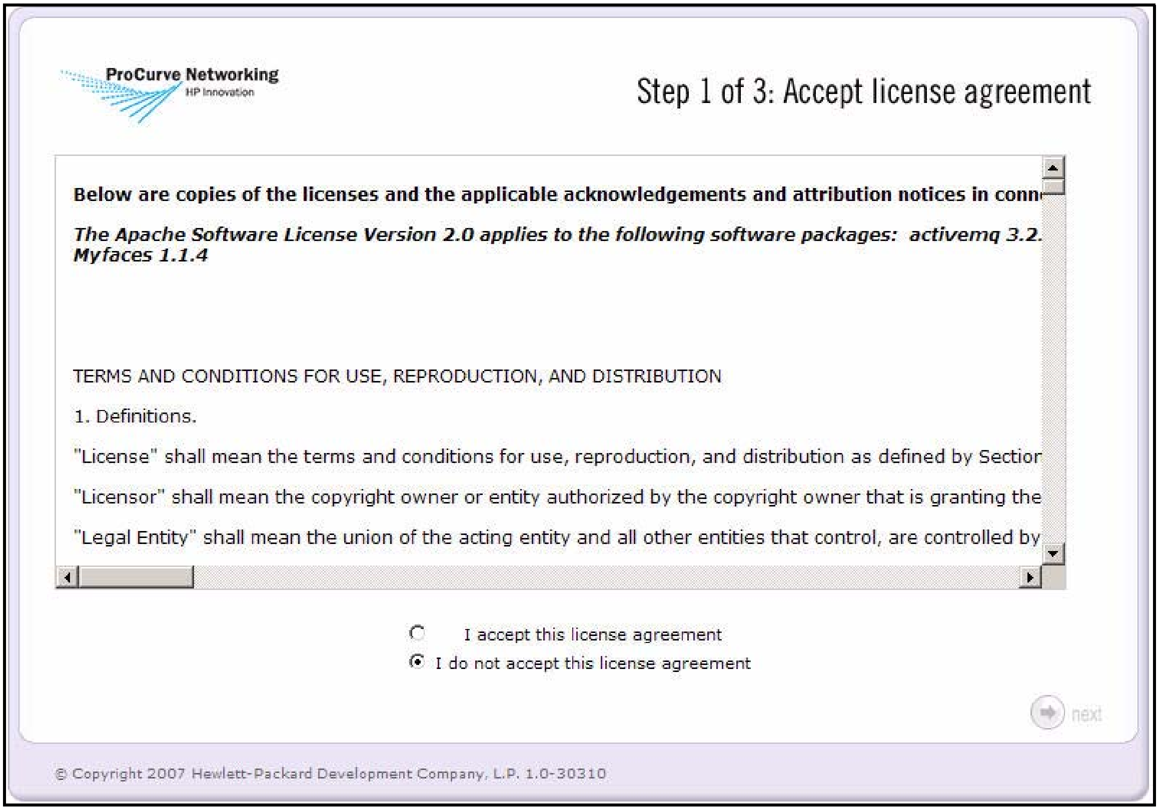
   You will install a new certificate on the NAC 800 when you complete the instructions outlined in "Install the Certificates for HTTPS on a NAC 800" on page 2-193.

4. The NAC 800's Web browser interface opens.

Configure More Basic Settings for the MS

The first time that you connect to the Web browser interface, you must complete this process:

1. When the **Step 1 of 3: Accept license agreement** window is displayed, read the license and select the **I accept this license agreement** option.



Step 1 of 3: Accept license agreement

Below are copies of the licenses and the applicable acknowledgements and attribution notices in conn

The Apache Software License Version 2.0 applies to the following software packages: activemq 3.2. Myfaces 1.1.4

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○ I accept this license agreement
● I do not accept this license agreement

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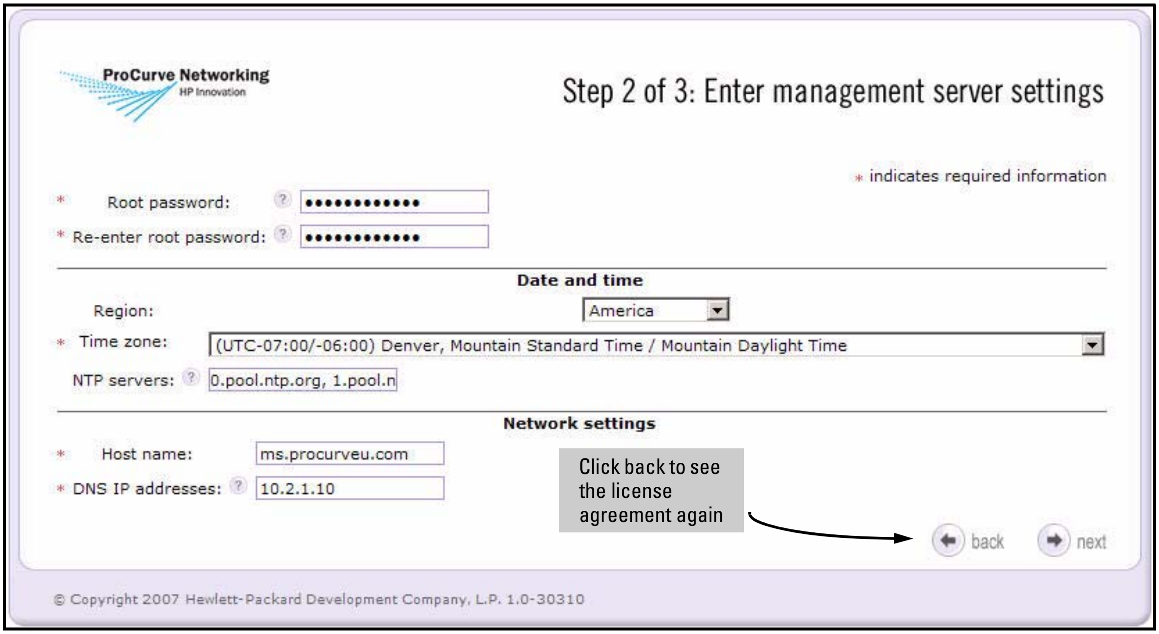
Figure 2-119. NAC 800 Web Interface—Step 1 of 3: Accept license agreement

2. Click **next**. The **Step 2 of 3: Enter management server settings** window is displayed.



Step 2 of 3: Enter management server settings

* indicates required information

* Root password: ●●●●●●●●●●●●

* Re-enter root password: ●●●●●●●●●●●●

Date and time

Region: America

* Time zone: (UTC-07:00/-06:00) Denver, Mountain Standard Time / Mountain Daylight Time

NTP servers: 0.pool.ntp.org, 1.pool.n

Network settings

* Host name: ms.procurveu.com

* DNS IP addresses: 10.2.1.10

Click back to see the license agreement again

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Figure 2-120. NAC 800 Web Interface—Step 2 of 3: Enter management server settings

3. Type a password in the **Root password** and **Re-enter root password** boxes.

   You use the root password to log in to the command line of the NAC 800s OS. The password can include alphanumeric and special characters but does not have specific complexity or length requirements.

   In this example, you type the same password as for the menu interface: **procurvenac9**.

4. Configure the NAC 800 to receive its date and time from a Network Time Protocol (NTP) server:

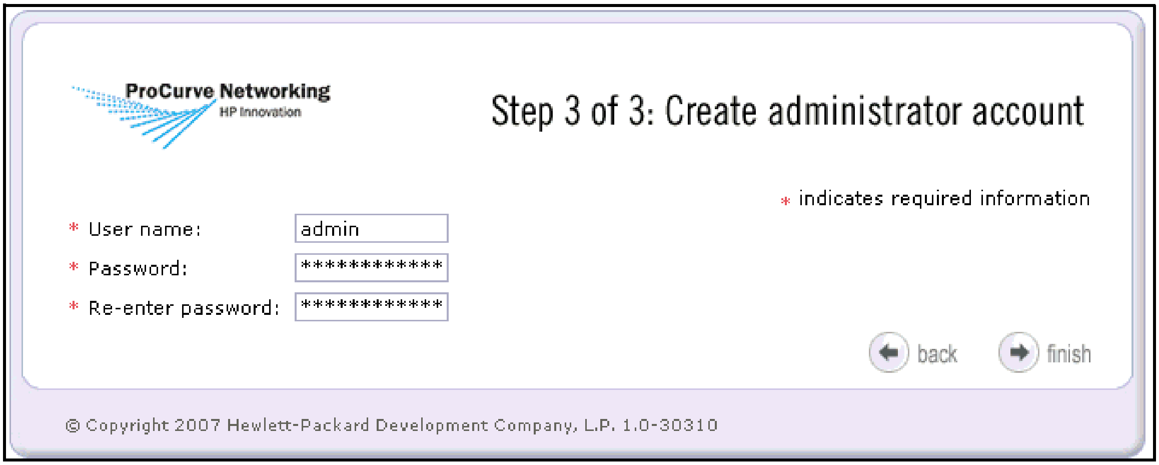
   a. Select your region from the **Region** list.

   b. Select the correct time zone from the **Time zone** list.

   c. In the **NTP servers** box, type the IP address or fully qualified domain name (FQDN) of your network's NTP server.

      In this example, you use the default public NTP servers already listed in the box.

5. Configure network settings.
   a. Type the NAC 800's FQDN in the **Host name** box. In this example: **ms.procurveu.edu**.
   b. Specify the IP address of at least one DNS server in the **DNS IP addresses** box (in this example, **10.2.1.10**).
6. Click **next**. The **Step 3 of 3: Create administrator account** window is displayed.



Step 3 of 3: Create administrator account

* indicates required information

* User name: admin

* Password: ************

* Re-enter password: ************

ProCurve Networking
HP Innovation
back
finish
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Figure 2-121. NAC 800 Web Interface—Step 3 of 3: Create administrator account

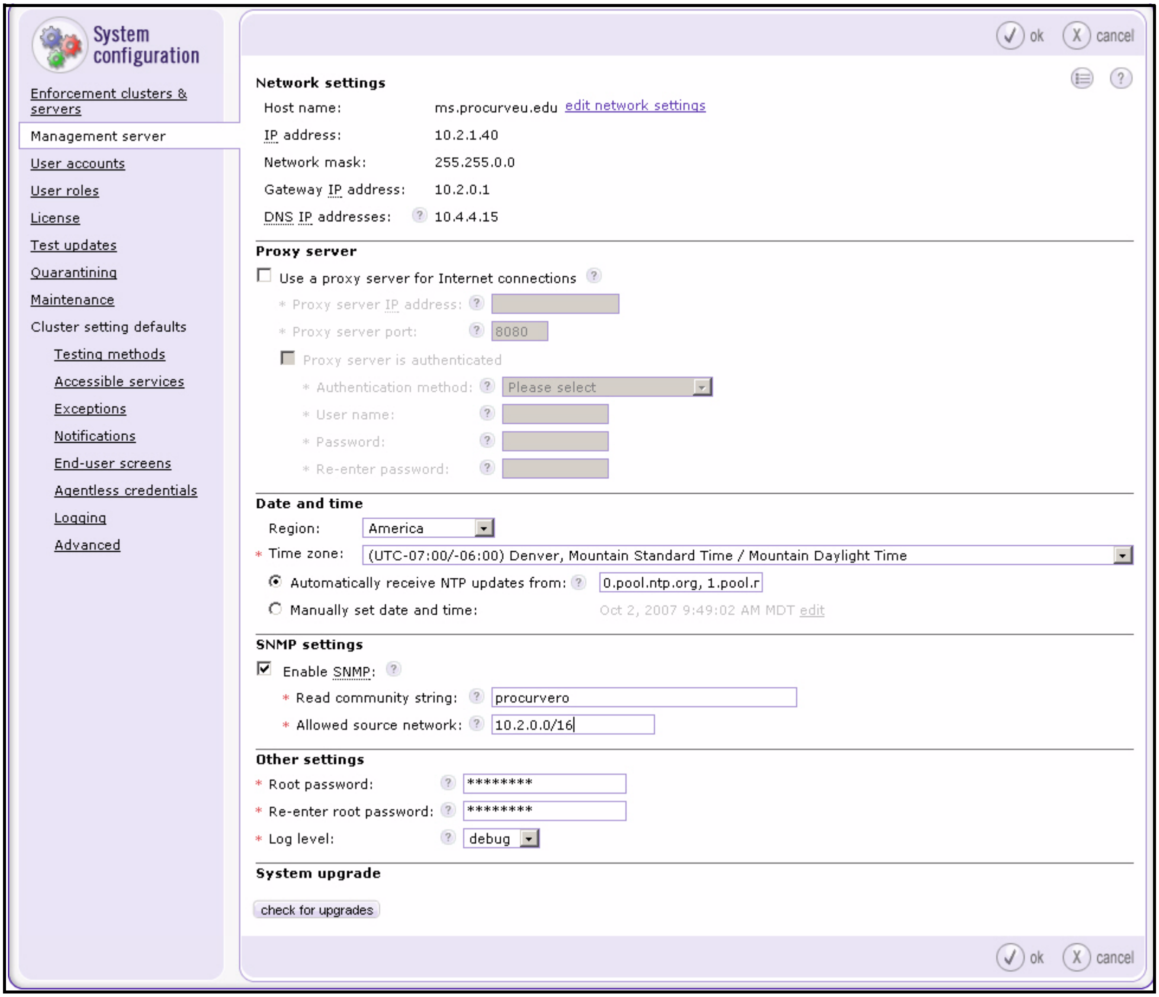
7. Create an account that grants access to the MS's Web browser interface.
   a. Type a name in the **User name** box (in this example, **admin**).
   b. Type a name in the **Password** and **Re-enter password** boxes.

      This password *must* include a mix of letters and numbers and be at least eight characters long. It can also include special characters and spaces.

      In this example, the password is the same as that for the menu interface and root access: **procurvenac9**.
8. Click **finish**.

You should see the NAC 800's **Home** window. Because PCM+ will manage the NAC 800s, you must set the correct SNMP community name:

1. Select **System configuration** > **Management server**.



Network settings

Host name: ms.procurveu.edu edit network settings
IP address: 10.2.1.40
Network mask: 255.255.0.0
Gateway IP address: 10.2.0.1
DNS IP addresses: 10.4.4.15

Proxy server

□ Use a proxy server for Internet connections
* Proxy server IP address:
* Proxy server port: 8080
□ Proxy server is authenticated
* Authentication method: Please select
* User name:
* Password:
* Re-enter password:

Date and time

Region: America
* Time zone: (UTC-07:00/-06:00) Denver, Mountain Standard Time / Mountain Daylight Time
● Automatically receive NTP updates from: 0.pool.ntp.org, 1.pool.r
○ Manually set date and time: Oct 2, 2007 9:49:02 AM MDT edit

SNMP settings

☑ Enable SNMP:
* Read community string: procurvero
* Allowed source network: 10.2.0.0/16

Other settings

* Root password: ********
* Re-enter root password: ********
* Log level: debug

System upgrade

check for upgrades

Figure 2-122. NAC 800 Web Interface—Home > System configuration > Management server—SNMP settings Area

2. Find the **SNMP settings** area.

3. Select the **Enable SNMP** check box.

4. Type a read-only community name that matches your SNMP server’s in the **Read community string** box (in this example, **procurvero**).

5. Type the network address for the PCM+ server in CIDR notation in the **Allowed source network** box.

   In this example, the correct subnet is the management VLAN: **10.2.0.0/16**.

6. Click **ok**.

Create an Enforcement Cluster and Add ESs

You can now add ESs and configure their basic settings. First, however, you must create an enforcement cluster for the ESs. In this example, the cluster will be called "802.1X."

1. Select **Home** > **System configuration** > **Enforcement clusters & servers**.

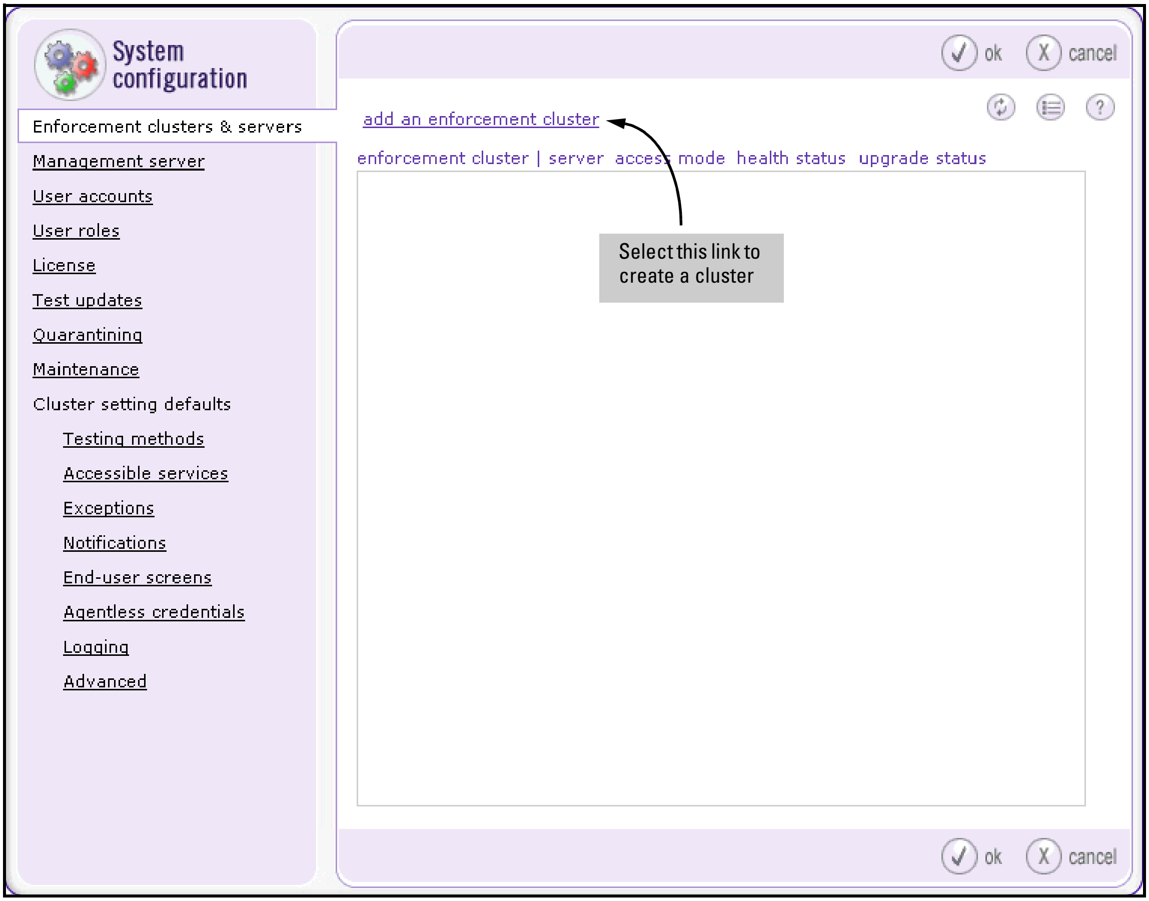
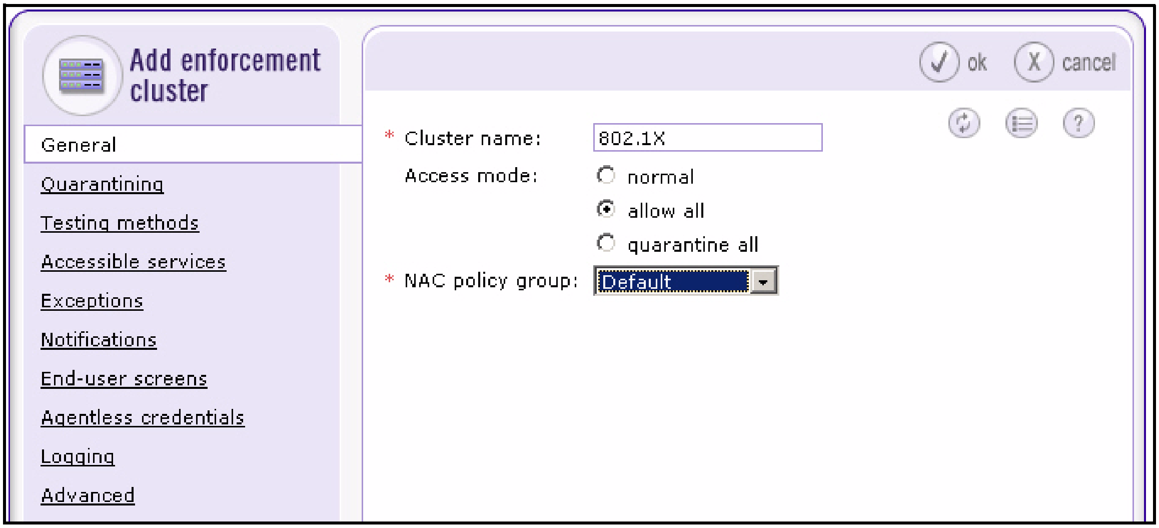


Figure 2-123. NAC 800 Web Interface—Home > System configuration > Enforcement clusters & servers—add an enforcement cluster

2. Click **add an enforcement cluster**.

The **Add enforcement cluster** window is displayed. The left navigation bar lists several menu options; for now, you can ignore all options except **General**, which is selected by default.



* Cluster name: 802.1X

Access mode: ○ normal ● allow all ○ quarantine all

* NAC policy group: Default

Figure 2-124. NAC 800 Web Interface—Home > System configuration > Enforcement clusters & servers > Add enforcement cluster > General

3. In the **Cluster name** box, type a name that describes this cluster (in this example, **802.1X**).

4. At this point, select **allow all** for the **Access mode**. Later, you will change the setting to **normal** to activate endpoint integrity.

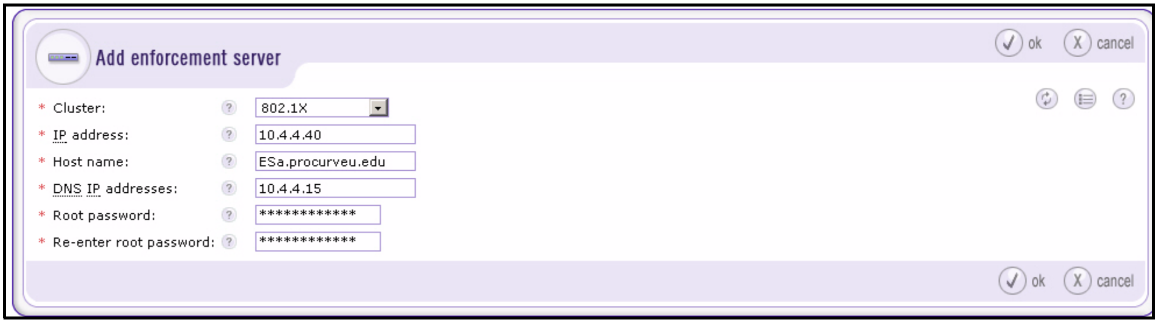
5. From the **NAC policy group** list, select **Default**.

   In a later section, you will create your own policies. For now, keep the defaults.

6. Click **ok**.

7. Click **add an enforcement server**.

8. The **Add enforcement server** window is displayed.


Add enforcement server

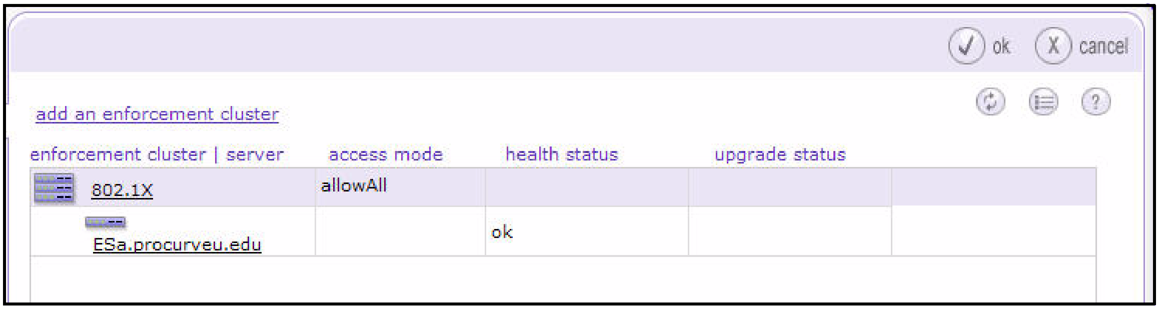
* Cluster:	802.1X
* IP address:	10.4.4.40
* Host name:	ESa.procurveu.edu
* DNS IP addresses:	10.4.4.15
* Root password:	************
* Re-enter root password:	************

Figure 2-125. NAC 800 Web Interface—Home > System configuration > Enforcement clusters & servers > Add enforcement server

9. From the **Cluster** list, select the cluster that you just configured.
10. Type an ES's IP address in the **IP address** box. In this example: **10.4.4.40**.

    You should have already set this IP address on the NAC 800 ES as described in "Configure Initial Settings Through a Console Session" on page 2-135.
11. Type the ES's hostname in the **Host name** box. In this example: **ESa.procurveu.edu**.
12. In the **DNS IP addresses** box, specify the IP address of at least one DNS server. In this example: **10.4.4.15**.
13. Type a password in the **Root password** and **Re-enter root password** boxes.

    In this example, the root password for ESs is the same as for the MS: **procurvenac9**.
14. Click **ok**.
15. You return to the **Home** > **System configuration** > **Enforcement clusters & servers** window, which now displays the new ES.



enforcement cluster | server	access mode	health status	upgrade status
802.1X	allowAll		
ESa.procurveu.edu		ok	

Figure 2-126. NAC 800 Web Interface—Home > System configuration > Enforcement clusters & servers

16. Repeat steps 7 through 14 to add other ESs.

Configure Quarantining

This section teaches you how to set up quarantining for this solution, which uses:

- 802.1X port authentication
- Active Directory
- IDM

Follow these steps:

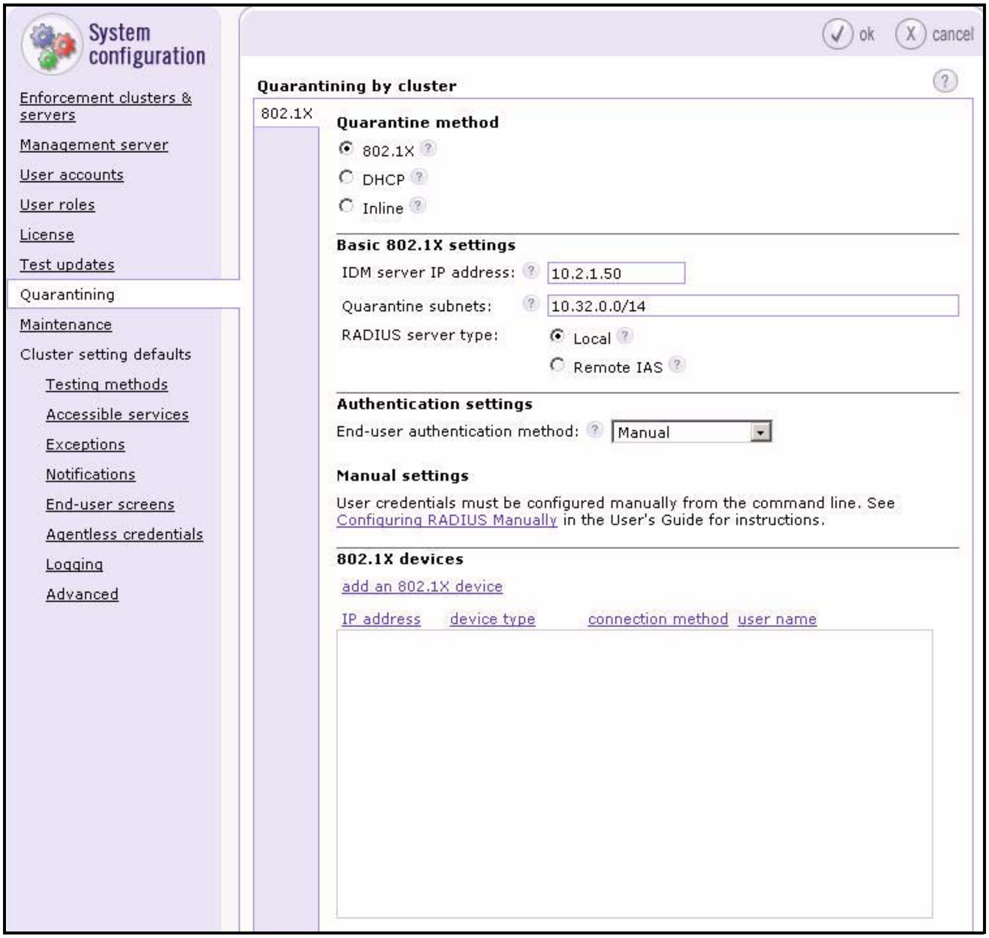
1. Select **Home** > **System configuration** > **Quarantining**.
2. The cluster that you just configured should be selected, as shown in Figure 2-127.
3. In the **Quarantine method** area, select **802.1X**.
4. Find the **Basic 802.1X settings** area. For the **IDM server IP address**, type the IP address of the server that runs PCM+ with IDM (in this example, **10.2.1.50**).
5. For the **Quarantine subnets**, type in CIDR format the subnet addresses associated with quarantine VLANs. Separate addresses with commas (in this example, **10.32.0.0/14**).

Note

The **Quarantine subnets** field does *not* configure the NAC 800s to place endpoints in the quarantine VLANs. (You will learn how to do that through IDM in "Configuring Network Access Control with IDM" on page 2-229.) Instead, this setting lets the NAC 800 reply to DNS requests from quarantined endpoints.

6. Select **Local** for the **RADIUS server type**.

   In this solution, the NAC 800 must draw on its local database rather than directly on Active Directory. This is because you are using EAP-TLS (rather than Protected EAP [PEAP] or Tunneled TLS [TTLS] with Microsoft Challenge Handshake Authentication Protocol version 2 [MS-CHAPv2]). But setting up thelocal database is easy; you will do it through IDM. (See "Configuring Network Access Control with IDM" on page 2-229.)



Quarantining by cluster

Quarantine method

● 802.1X

○ DHCP

○ Inline

Basic 802.1X settings

IDM server IP address: 10.2.1.50

Quarantine subnets: 10.32.0.0/14

RADIUS server type: ● Local ○ Remote IAS

Authentication settings

End-user authentication method: Manual

Manual settings

User credentials must be configured manually from the command line. See Configuring RADIUS Manually in the User's Guide for instructions.

802.1X devices

add an 802.1X device

IP address device type connection method user name

Figure 2-127. NAC 800 Web Interface—Home > System configuration > Quarantining

7. Click **ok**.

Add 802.1X Devices

The NAC 800’s list of802.1X devices must include every device inyour network that can act as an authenticator. In this example, these are:

- Edge switches (which authenticate end-users and RPs)
- Core switches (which authenticate other switches)
- Wireless Edge Services Modules (which authenticate wireless users)

When you add a device to the list you must specify:

- Device's IP address
- Shared secret for RADIUS requests
- Device type
- Connection settings (which allow the NAC 800 to force reauthentication of an endpoint after testing)

  The NAC 800 can issue the reauthentication command through SSH, Telnet, or SNMP (although some 802.1X devices do not support all of these options). The example network is already using SNMP with PCM+, so the NAC 800 will also use SNMP to communicate with the 802.1X devices.

Table 2-12 shows the settings for the example network. Of course, the actual list would include many more devices.

Table 2-12. 802.1X Devices

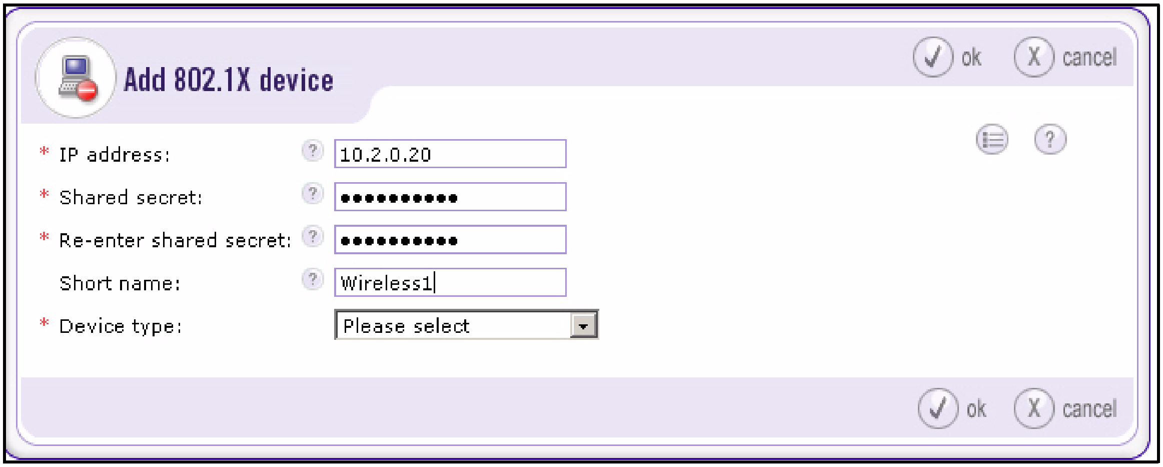
IP Address	Shared Secret	Friendly Name	Device Type	SNMP Community String	Other SNMP Settings
10.2.0.20	procurvenac	Primary Wireless Module	ProCurve WESM	procurverw	default settings
10.2.0.25	procurvenac	Redundant Wireless Module	ProCurve WESM	procurverw	default settings
10.2.0.3	procurvenac	Edge Switch A	ProCurve Switch	procurverw	default settings
10.2.0.5	procurvenac	Edge Switch B	ProCurve Switch	procurverw	default settings

Follow these steps to add the 802.1X devices:

1. Select **Home** > **System Configuration** > **Quarantining**.

   You should have already completed the steps in "Configure Quarantining" on page 2-149.

2. Click **add an 802.1X device**. The **Add 802.1X device** window is displayed.



Add 802.1X device

* IP address: 10.2.0.20

* Shared secret: ●●●●●●●●●●●

* Re-enter shared secret: ●●●●●●●●●●●

Short name: Wireless1

* Device type: Please select

Figure 2-128. NAC 800 Web Interface—Home > System configuration > Quarantining (802.1X quarantine method) > add an 802.1X device

3. Type the 802.1X device's IP address in the **IP address** box. In this example:

   10.2.0.20

4. Type a character string in the **Shared secret** and **Re-enter shared secret** boxes. In this example: **procurvenac**.

   The string can include alphanumeric and special characters.

   You will match this string when you set up port authentication on the switches. (See "Configuring the ProCurve Switches" on page 2-13.) You already configured this secret on the Wireless Edge Services Modules.

5. Optionally, type a descriptive name for the802.1X device in the**Short name** box.

6. From the **Device type** list, select the type of 802.1X device (that is, its manufacturer and OS). The types for this network include **ProCurve Switch** and **ProCurve WESM**.

7. When you select the device type, the window expands to include device-specific settings.

8. Select a **Connection method** from the list, if this field is provided. In this network, devices use **SMNPv2**.

   Skip this step if you have selected **ProCurve WESM**, **ProCurve 420 AP**, or **ProCurve 530 AP** for the **Device type**.

9. Type the name of the ProCurve device's read-write community in the **Community string** box (in this example, **procurverw**).
10. Typically, you can leave all other default settings unchanged.

    For more information about these settings, see Chapter 3: "System Configuration" of the *ProCurve Network Access Controller 800 Users' Guide*.
11. Click **ok**.
12. In the **System configuration > Quarantining** window, click **ok** to save the changes.

Enable EAP-MD5 (Optional)

In this solution, RPs authenticate to edge switches and edge switches authenticate to core switches. These ProCurve devices support EAP-MD5 authentication. The NAC 800 also supports EAP-MD5, but this method is not enabled by default.

If you want your infrastructure devices to authenticate ProCurve devices against a NAC 800 ES, you must follow these steps:

1. Log in as root to the NAC 800 ES:
   a. Open a console or SSH session with the NAC 800.
   b. For the username, enter **root**.
   c. For the password, enter the root password set when this ES joined the enforcement cluster. (See "Create an Enforcement Cluster and Add ESs" on page 2-146.)
2. Enter this command to move to the proper directory:

```
ProCurve NAC 800:/# cd /etc/raddb
```

3. Edit the **eap.conf** file:

```
ProCurve NAC 800:/etc/raddb# vi eap.conf
```

4. Use the arrow keys orother vi commands to move to the "Supported EAP-types" section.
5. Uncomment the "md5" section; that is, remove this character (#) in the "md5" line and the line below.

   The vi command for removing a single character is **[x]**.

```
# Supported EAP-types

      #
      #  We do NOT recommend using EAP-MD5 authentication
      #  for wireless connections.  It is insecure, and does
      #  not provide for dynamic WEP keys.
      #
          md5 {
      }
```

Figure 2-129. eap.conf File—Supported EAP-types Section

6. Save and exit by entering this command:

   ```
   :wq
   ```

7. Restart the RADIUS server with this command:

   ```
   ProCurve NAC 800:/etc/raddb# service radiusd restart
   ```

Configure Testing Methods

In this section, you will ensure thatyour network supports your chosen testing methods. Initially, the NAC 800 tries to test an endpoint in the background:

1. The NAC 800 tries to test the endpoint with the NAC EI agent.
2. If no agent is installed on the endpoint, the NAC 800 tries to install the ActiveX agent.
3. If the ActiveX installation fails and if credentials for the endpoint or domain exist, the NAC 800 tries to use agentless testing.

In the example network, you will attempt to pre-install the NAC EI agent on as many endpoints as possible. As a backup, you will configure agentless credentials for your domain (of which all users are members). As further backup, you will allow the NAC 800 to interact with users to download the NAC EI agent automatically.

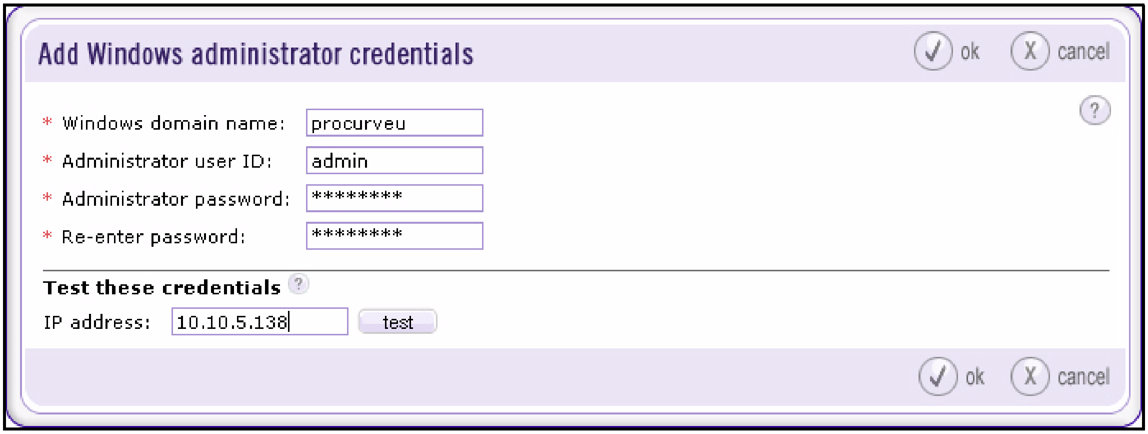
See “Pre-install the NAC EI Agent on Endpoints” on page 2-306 to learn how to complete this task. The sections below describe setting up the other testing methods.

Configure Agentless Credentials

Agentless testing works on endpoints that are members of your domain. You configure credentials for a member of the domain administrators group on the NAC 800. The NAC 800 can thenperform administrative tasks on the endpoint.

Follow these steps to configure the credentials:

1. Log in to the Web browser interface on the NAC 800 MS.
2. Select **Home** > **System configuration** > **Cluster settings defaults** > **Agentless credentials**.
3. Click **add administrator credentials**.



Add Windows administrator credentials

* Windows domain name: procurveu

* Administrator user ID: admin

* Administrator password: *********

* Re-enter password: *********

Test these credentials

IP address: 10.10.5.138

Figure 2-130. NAC 800 Web Interface—Home > System configuration > Cluster settings defaults > Agentless credentials > Add Windows administrator credentials

4. In the **Windows domain name** box, type the name of the domain. In this example: **procurveu**.
5. In the **Administrator user ID** box, type the username of a domain administrator for domain administrators group on the NAC 800.
6. In the **Administrator password** box, type the administrator password.
7. You can test the credentials on an endpoint to make sure that you typed them correctly:
   a. Under **Test these credentials**, type the IP address of the endpoint in the **IP address** box.
   b. Click **test**.

8. Click **ok**.
9. Click **ok** to save the credentials.

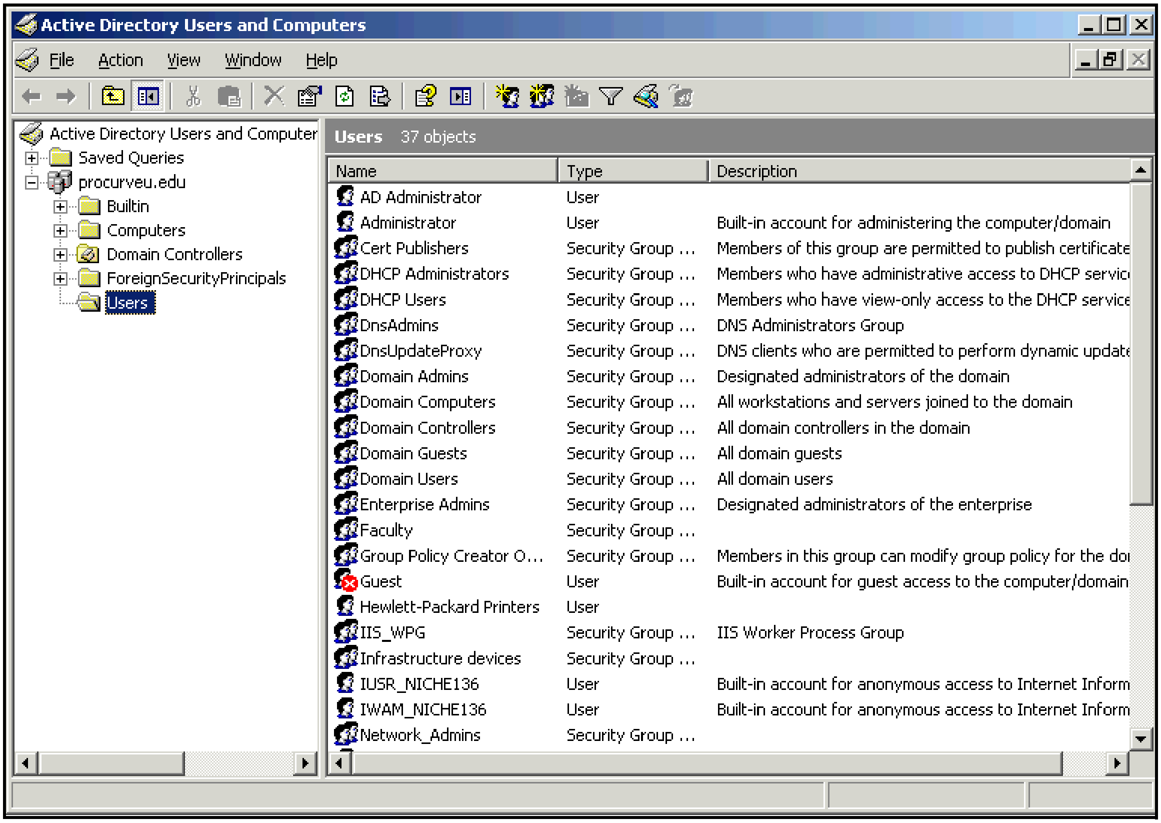
Note

It is possible to configure agentless credentials for an endpoint that is not part of a domain (although feasible only for small networks that expect few guests). Leave the Windows domain name box empty, and type ***<computer name>\<username>*** for **Administrator user ID**. The user specified must be an account with administrator privileges on the endpoint. Type the password as usual.

Enable the RPC Service on Endpoints

Agentless testing relies on Windows Remote Procedure Call (RPC). Endpoints must run this service, and their firewalls must allow print and file sharing traffic from the NAC 800s' IP addresses. This section teaches you how to edit your domain's group policy to specify the correct settings.

1. Do one of the following:
   - On a Windows 2003 server, open the Management Console to which you added the Active Directory snap-in.
   - From hetStart menu of the domain controller, click **Administrative Tools** > **Active Directory Users and Computers**.

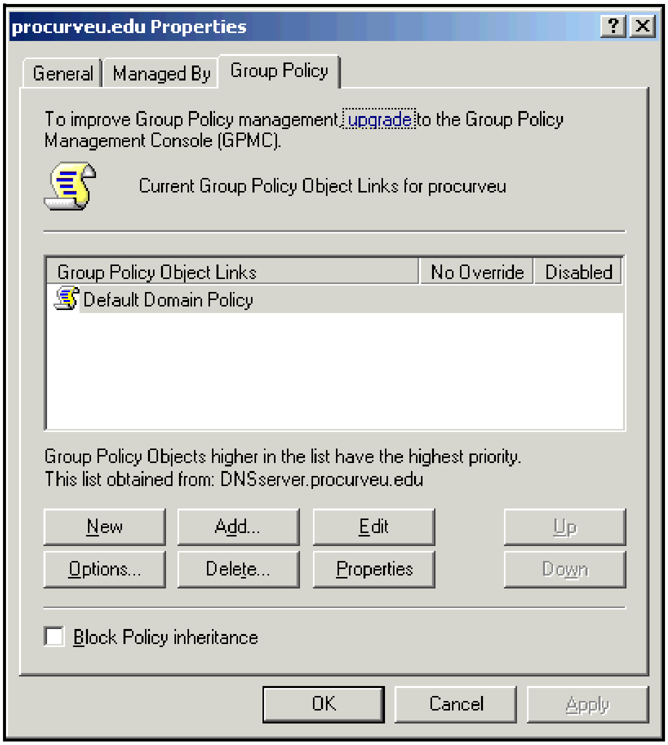


Name	Type	Description
AD Administrator	User	
Administrator	User	Built-in account for administering the computer/domain
Cert Publishers	Security Group ...	Members of this group are permitted to publish certificate
DHCP Administrators	Security Group ...	Members who have administrative access to DHCP servic
DHCP Users	Security Group ...	Members who have view-only access to the DHCP service
DnsAdmins	Security Group ...	DNS Administrators Group
DnsUpdateProxy	Security Group ...	DNS clients who are permitted to perform dynamic update
Domain Admins	Security Group ...	Designated administrators of the domain
Domain Computers	Security Group ...	All workstations and servers joined to the domain
Domain Controllers	Security Group ...	All domain controllers in the domain
Domain Guests	Security Group ...	All domain guests
Domain Users	Security Group ...	All domain users
Enterprise Admins	Security Group ...	Designated administrators of the enterprise
Faculty	Security Group ...	
Group Policy Creator O...	Security Group ...	Members in this group can modify group policy for the do
Guest	User	Built-in account for guest access to the computer/domain
Hewlett-Packard Printers	User	
IIS_WPG	Security Group ...	IIS Worker Process Group
Infrastructure devices	Security Group ...	
IUSR_NICHE136	User	Built-in account for anonymous access to Internet Inform
IWAM_NICHE136	User	Built-in account for anonymous access to Internet Inform
Network_Admins	Security Group ...	

Figure 2-131. Active Directory Users and Computers Window

2. Right-click your domain name and select **Properties**.

3. Click the **Group Policy** tab.



procurveu.edu Properties

General | Managed By | Group Policy

To improve Group Policy management, upgrade to the Group Policy Management Console (GPMC).

Current Group Policy Object Links for procurveu

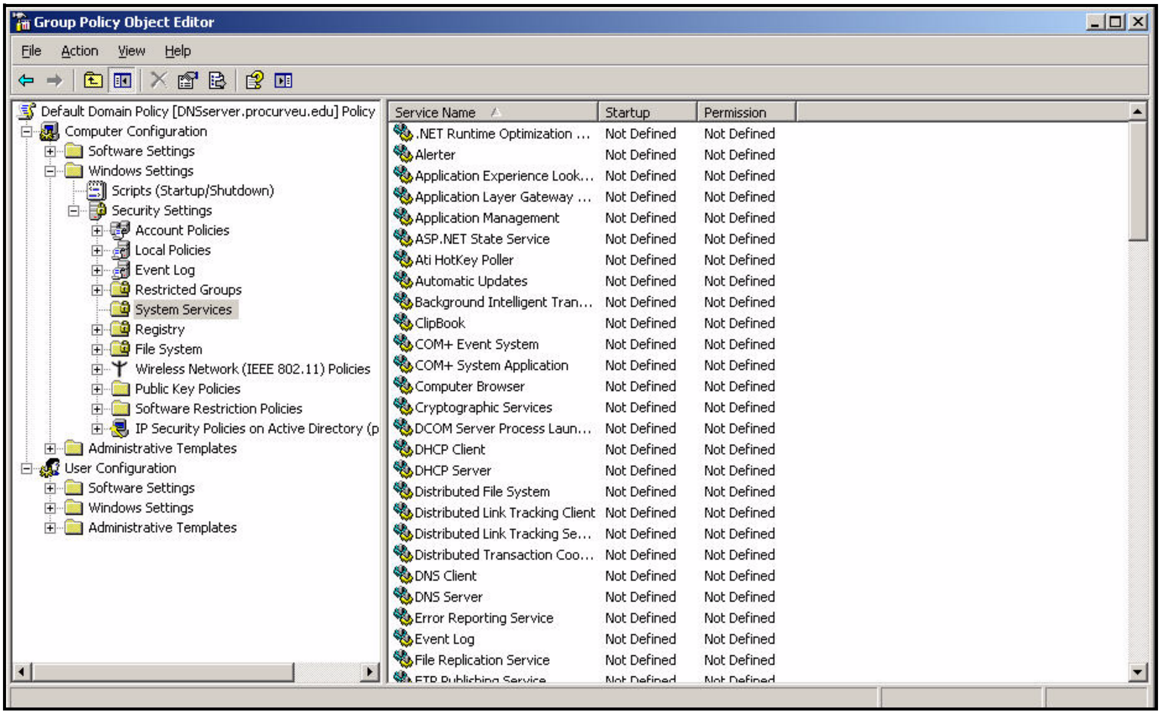
Group Policy Object Links	No Override	Disabled
Default Domain Policy		

Group Policy Objects higher in the list have the highest priority.
This list obtained from: DNSserver.procurveu.edu

□ Block Policy inheritance

Figure 2-132. ***<mydomain>*** **Properties Window**

4. Select **Default Domain Policy** and click **Edit**.

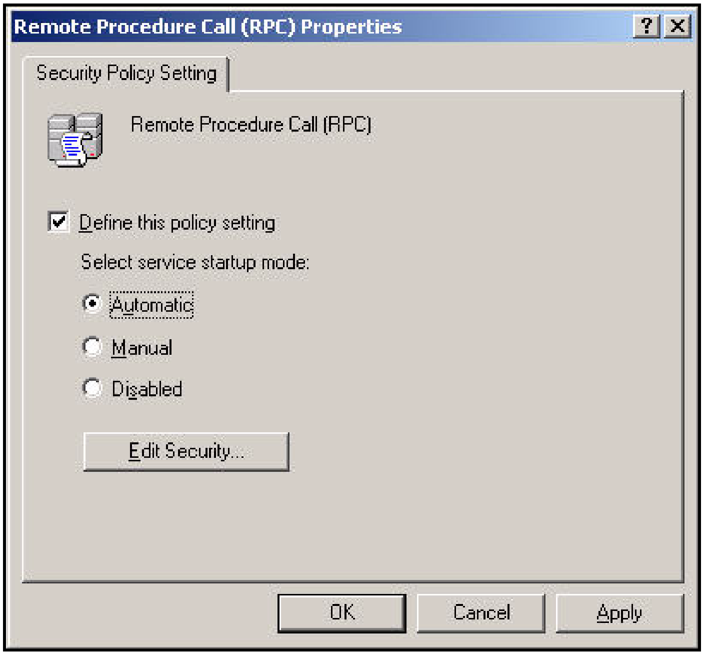


Service Name	Startup	Permission
.NET Runtime Optimization ...	Not Defined	Not Defined
Alerter	Not Defined	Not Defined
Application Experience Look...	Not Defined	Not Defined
Application Layer Gateway ...	Not Defined	Not Defined
Application Management	Not Defined	Not Defined
ASP.NET State Service	Not Defined	Not Defined
Ati HotKey Poller	Not Defined	Not Defined
Automatic Updates	Not Defined	Not Defined
Background Intelligent Tran...	Not Defined	Not Defined
ClipBook	Not Defined	Not Defined
COM+ Event System	Not Defined	Not Defined
COM+ System Application	Not Defined	Not Defined
Computer Browser	Not Defined	Not Defined
Cryptographic Services	Not Defined	Not Defined
DCOM Server Process Laun...	Not Defined	Not Defined
DHCP Client	Not Defined	Not Defined
DHCP Server	Not Defined	Not Defined
Distributed File System	Not Defined	Not Defined
Distributed Link Tracking Client	Not Defined	Not Defined
Distributed Link Tracking Se...	Not Defined	Not Defined
Distributed Transaction Coo...	Not Defined	Not Defined
DNS Client	Not Defined	Not Defined
DNS Server	Not Defined	Not Defined
Error Reporting Service	Not Defined	Not Defined
Event Log	Not Defined	Not Defined
File Replication Service	Not Defined	Not Defined
FTP Publishing Service	Not Defined	Not Defined

Figure 2-133. Group Policy Object Editor Window—System Services

5. Expand **Computer Configuration** > **Windows Settings** > **Security Settings** and select **System Services**.

6. In the right pane, scroll to and double-click **Remote Procedure Call (RPC)**.



Remote Procedure Call (RPC) Properties

Security Policy Setting

Remote Procedure Call (RPC)

☑ Define this policy setting

Select service startup mode:

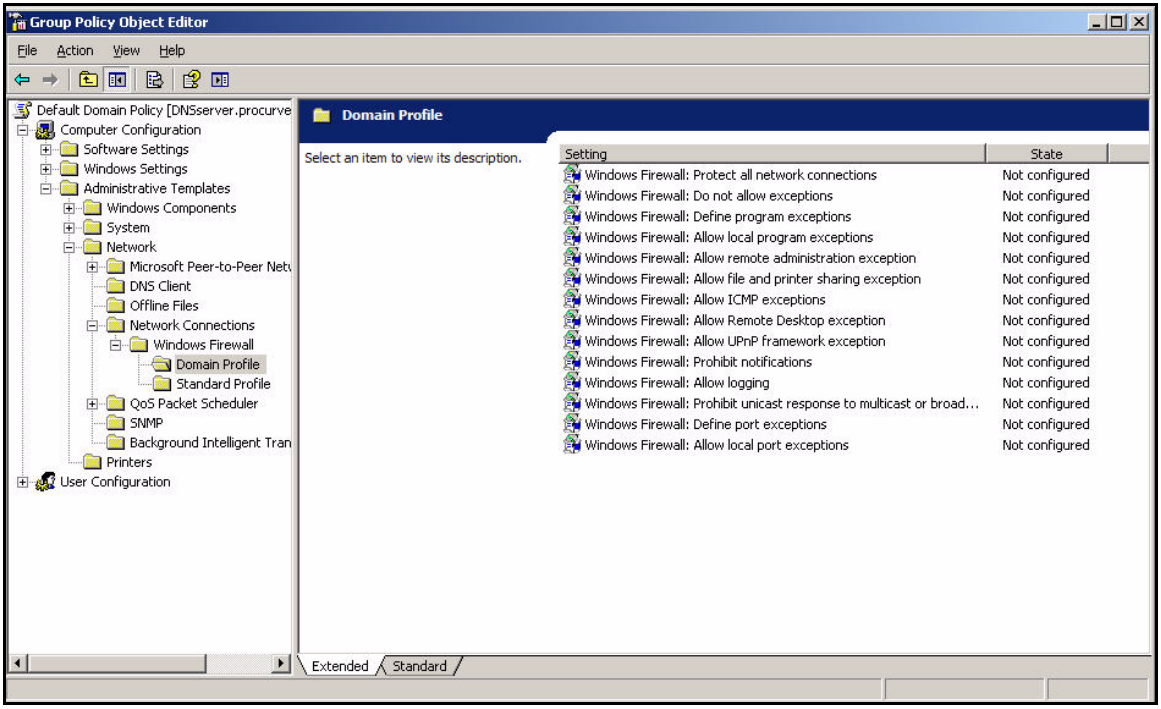
● Automatic
○ Manual
○ Disabled

Figure 2-134. Remote Procedure Call (RPC) Properties Window

7. Select **Define this policy setting**.
8. Select **Automatic** for the **Select service startup mode**.

Note Click **Edit Security** if you want to change who is allowed to change these settings.

9. Click **OK**.



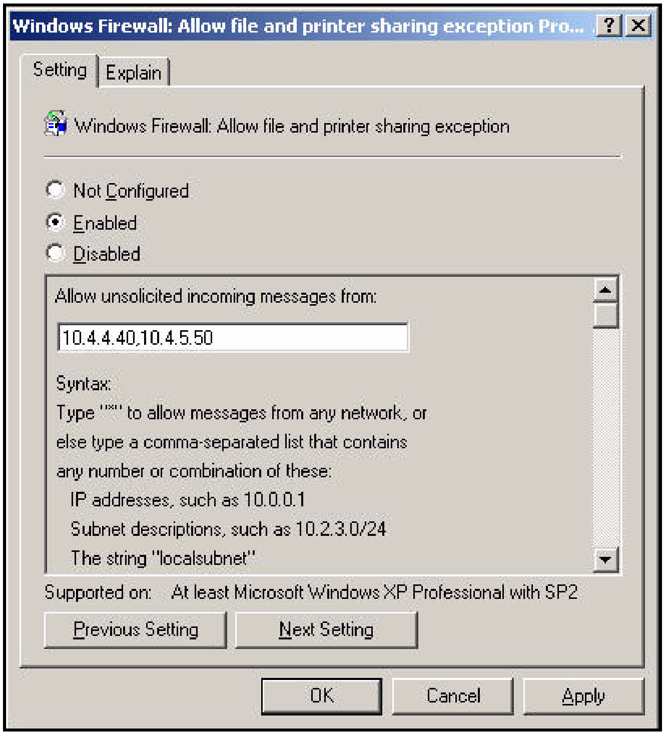
Setting	State
Windows Firewall: Protect all network connections	Not configured
Windows Firewall: Do not allow exceptions	Not configured
Windows Firewall: Define program exceptions	Not configured
Windows Firewall: Allow local program exceptions	Not configured
Windows Firewall: Allow remote administration exception	Not configured
Windows Firewall: Allow file and printer sharing exception	Not configured
Windows Firewall: Allow ICMP exceptions	Not configured
Windows Firewall: Allow Remote Desktop exception	Not configured
Windows Firewall: Allow UPnP framework exception	Not configured
Windows Firewall: Prohibit notifications	Not configured
Windows Firewall: Allow logging	Not configured
Windows Firewall: Prohibit unicast response to multicast or broad...	Not configured
Windows Firewall: Define port exceptions	Not configured
Windows Firewall: Allow local port exceptions	Not configured

Figure 2-135. Group Policy Object Editor Window—Windows Firewall Domain Profile

10. In the left pane, expand **Computer Configuration** > **Administrative Templates** > **Network** > **Network Connections** > **Windows Firewall**.

11. Click **Domain Profile**.

12. In the right pane, double-click **Windows Firewall: Allow file and printer sharing exception**.


Windows Firewall: Allow file and printer sharing exception Pro...
Setting
Explain
Previous Setting
Next Setting
OK
Cancel
Apply

Windows Firewall: Allow file and printer sharing exception

○ Not Configured
● Enabled
○ Disabled

Allow unsolicited incoming messages from:

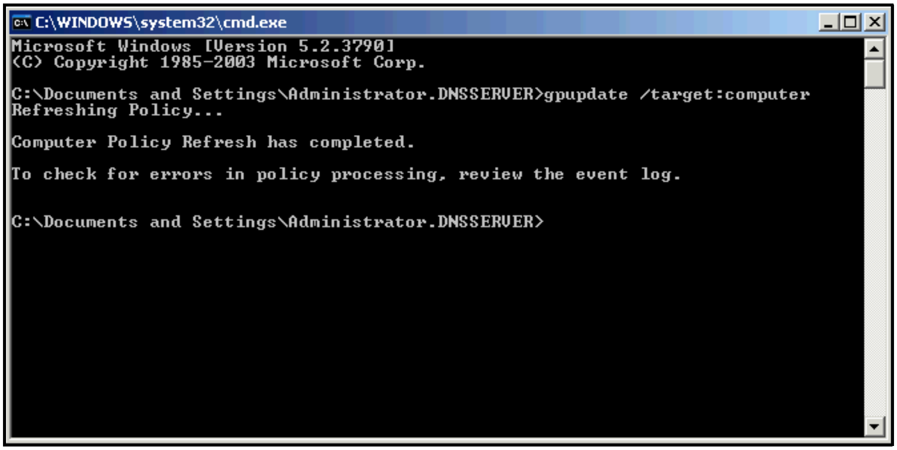
10.4.4.40,10.4.5.50

Syntax:
Type "*" to allow messages from any network, or
else type a comma-separated list that contains
any number or combination of these:
IP addresses, such as 10.0.0.1
Subnet descriptions, such as 10.2.3.0/24
The string "localsubnet"

Supported on: At least Microsoft Windows XP Professional with SP2

Figure 2-136. Windows Firewall: Allow file and print sharing exception Properties Window

13. In the **Setting** tab click **Enabled**.
14. In the **Allow unsolicited incoming messages from** box, type the IP addresses of your NAC 800 ESs, separated by a comma (in this example, **10.4.4.40,10.4.5.50**).
15. Click **OK**.
16. Select **File** > **Exit** to close the **Group Policy Object Editor**.
17. Click **OK** in the **<domain name> Properties** window.
18. Press **[Alt]**+**[F4]** to close the Active Directory Users and Computerswindow.
19. Force a refresh of the computer Group Policy:
    a. From the Windows **Start** menu, select **Run**.
    b. Type **cmd** at the prompt and click **OK**.



```
Microsoft Windows [Version 5.2.3790]
(C) Copyright 1985-2003 Microsoft Corp.

C:\Documents and Settings\Administrator.DNSSERVER>gpupdate /target:computer
Refreshing Policy...

Computer Policy Refresh has completed.

To check for errors in policy processing, review the event log.


C:\Documents and Settings\Administrator.DNSSERVER>
```

Figure 2-137. Command Window—Force Group Update

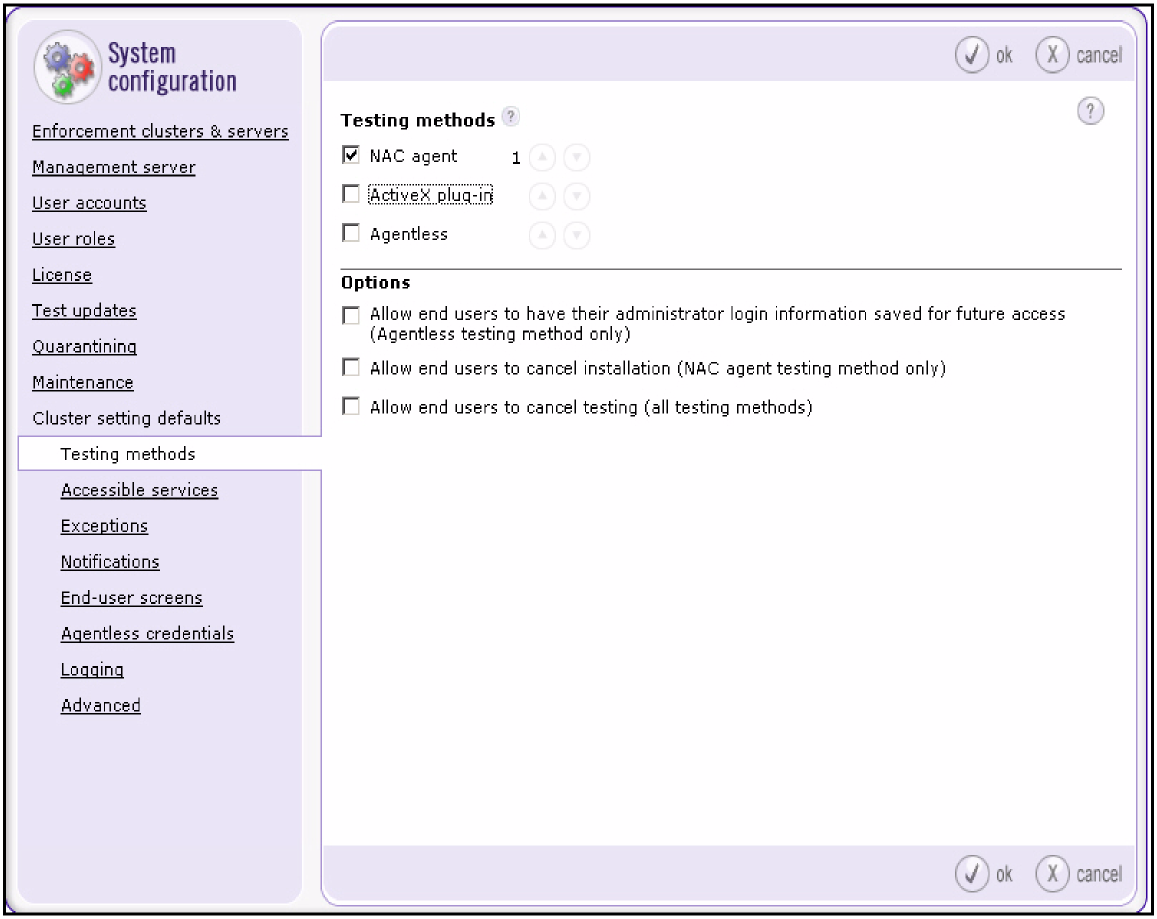
c. At the command prompt, type **gpupdate /target:computer** and press **[Enter]**.

d. Type **exit** and press **[Enter]** to close the command line.

Select the Backup Testing Methods Suggested by the NAC 800

If the background testing fails, the NAC 800 can display end-user access windows that instruct the user how to allow the testing to succeed. Follow these steps to allow the NAC 800 to automatically download the NAC EI agent to an end-user's endpoint:

1. Log in to the Web browser interface on the NAC 800 MS.
2. Select **System configuration** > **Cluster settings defaults** > **Testing methods**.
3. Select the **NAC agent** check box.
4. Clear the **ActiveX plug-in** and **Agentless** check boxes.
5. Clear the **Allow end users to cancel installation (NAC agent testing method only)** and **Allow end users to cancel testing (all testing methods)**.



Testing methods

☑ NAC agent 1

□ ActiveX plug-in

□ Agentless

Options

□ Allow end users to have their administrator login information saved for future access (Agentless testing method only)

□ Allow end users to cancel installation (NAC agent testing method only)

□ Allow end users to cancel testing (all testing methods)

Figure 2-138. NAC 800 Web Interface—Home > System configuration > Cluster setting defaults > Testing methods

6. Click **ok**.

Configure NAC Policies

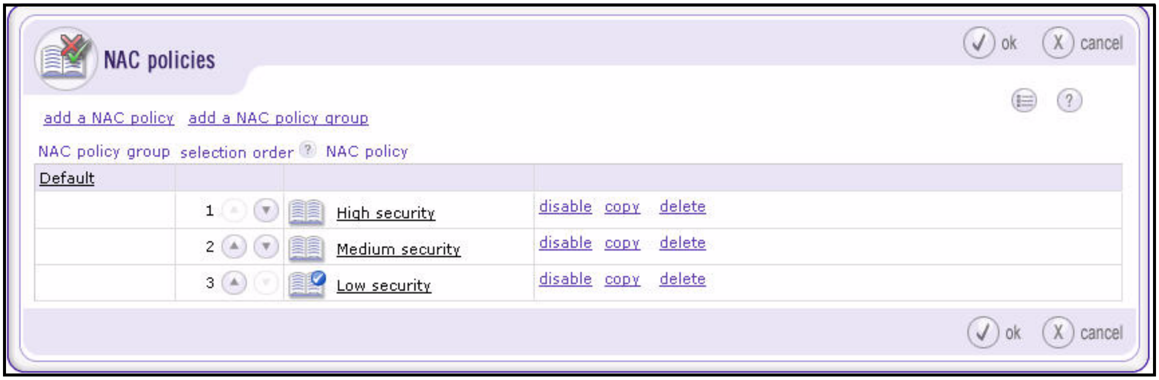
The NAC 800 has three default policies for testing endpoint integrity. By default, the Low security NAC policy applies to all endpoints. This section teaches you how to:

- create new NAC policies for your environment
- assign the policies to the correct endpoints

Follow these steps:

1. Open your Web browser and log on to the MS.

2. Select **NAC policies**.

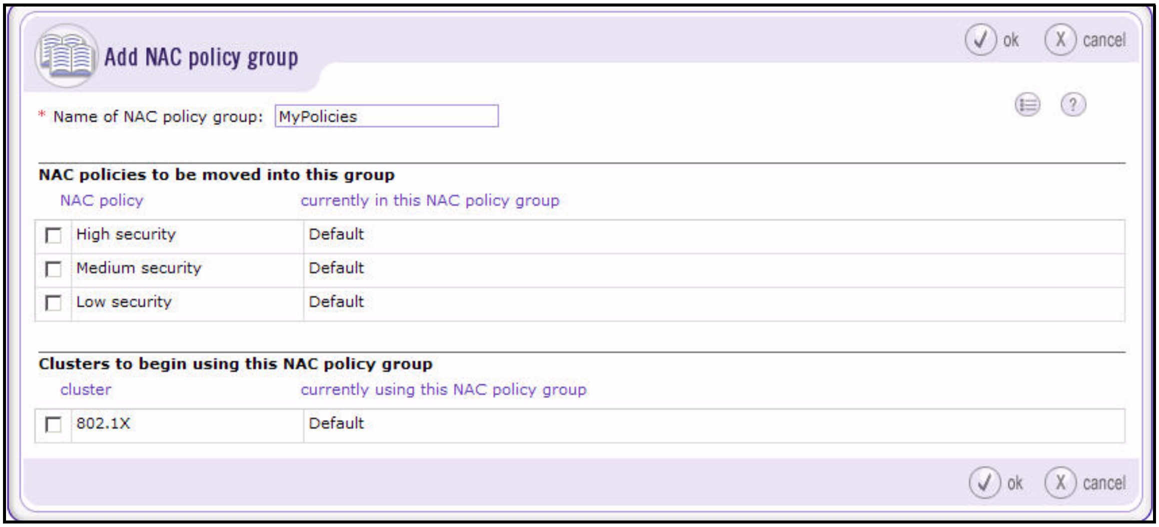


NAC policies

NAC policy group	selection order	NAC policy	
Default			
	1	High security	disable copy delete
	2	Medium security	disable copy delete
	3	Low security	disable copy delete

Figure 2-139. NAC 800 Web Interface—Home > NAC policies Window

3. Click **add a NAC policy group**.



Add NAC policy group

* Name of NAC policy group: MyPolicies

NAC policies to be moved into this group

	NAC policy	currently in this NAC policy group
□	High security	Default
□	Medium security	Default
□	Low security	Default

Clusters to begin using this NAC policy group

	cluster	currently using this NAC policy group
□	802.1X	Default

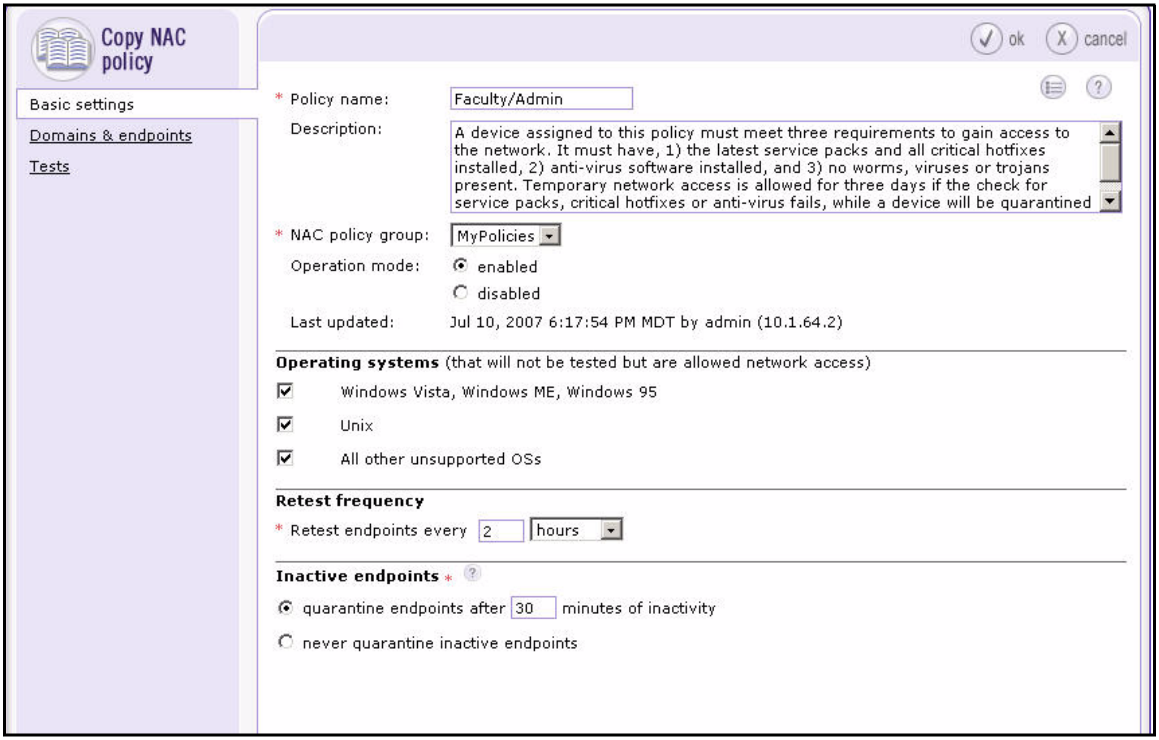
Figure 2-140. NAC 800 Web Interface—Home > NAC policies > Add NAC policy group Window

4. For **Name of NAC policy group**, type the name (in this example, **MyPolicies**).

5. Select the **802.1X** cluster.

6. Click **ok**.

7. Next, you will create a NAC policy for testing the endpoints of faculty members and network administrators. This policy will be based on the Medium security policy. Begin by clicking the **copy** link next to **Medium security**.



* Policy name: Faculty/Admin

Description: A device assigned to this policy must meet three requirements to gain access to the network. It must have, 1) the latest service packs and all critical hotfixes installed, 2) anti-virus software installed, and 3) no worms, viruses or trojans present. Temporary network access is allowed for three days if the check for service packs, critical hotfixes or anti-virus fails, while a device will be quarantined

* NAC policy group: MyPolicies

Operation mode: ● enabled ○ disabled

Last updated: Jul 10, 2007 6:17:54 PM MDT by admin (10.1.64.2)

Operating systems (that will not be tested but are allowed network access)

☑ Windows Vista, Windows ME, Windows 95

☑ Unix

☑ All other unsupported OSs

Retest frequency

* Retest endpoints every 2 hours

Inactive endpoints *

● quarantine endpoints after 30 minutes of inactivity

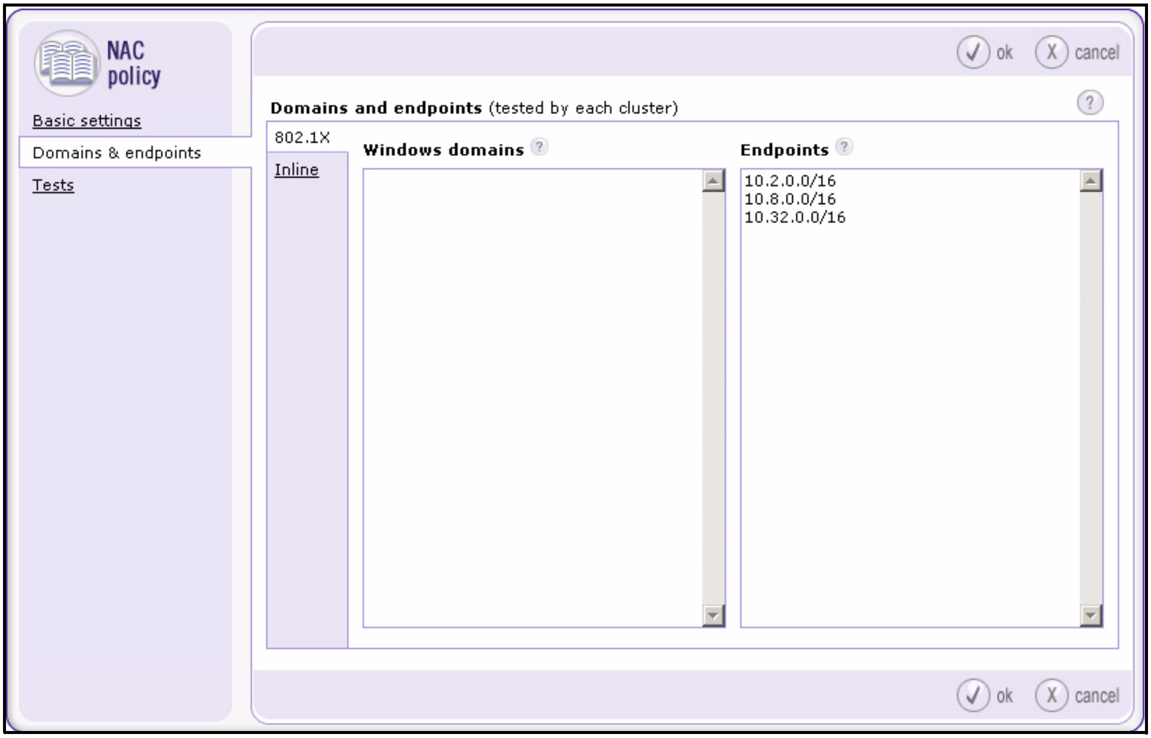
○ never quarantine inactive endpoints

Figure 2-141. NAC 800 Web Interface—Home > NAC policies > Copy NAC policy Window—Basic settings tab.

8. For the **Policy name**, type the name (in this example, **Faculty/Admin**).

9. From the **NAC policy group** list, select **MyPolicies**.

10. Click **Domains & endpoints**.



10.2.0.0/16
10.8.0.0/16
10.32.0.0/16

Figure 2-142. NAC 800 Web Interface—Home > NAC policies > *<NAC policy>* > Domains & endpoints Window

11. In the **Endpoints** box, type the subnets for faculty members and network administrators—both the quarantine VLANs (and, if different, the test and infected VLANs) and the production VLANs (for post-connect testing). In this example:

    10.2.0.0/16
    10.8.0.0/16
    10.32.0.0/16
    10.33.0.0/16

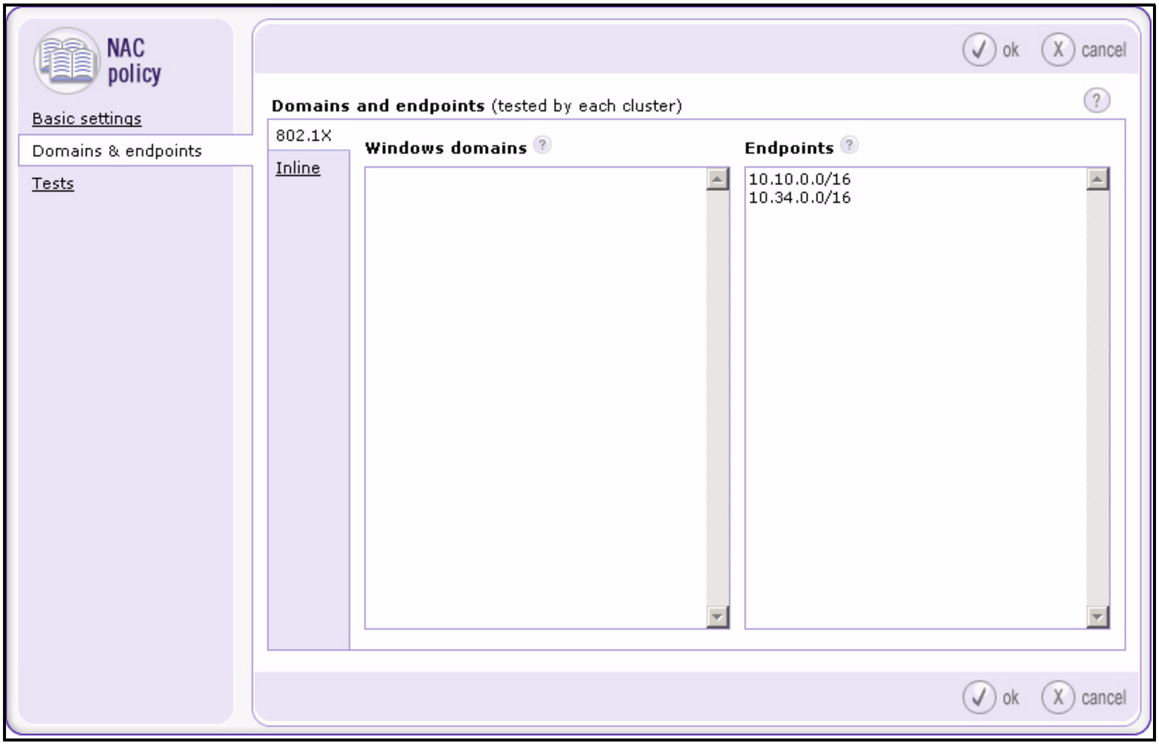
12. Click **ok**.

13. Now, create the NAC policy for student endpoints. This policy will also be based on the Medium security policy, but the Students policy will include several more tests. Again, click the **copy** link next to **Medium security** in the **Home** > **NAC policies** window.

14. In the **Policy name** box, type **Students**.

15. From the **NAC policy group** list, select **MyPolicies**.

16. Click **Domains & endpoints**.



Domains and endpoints (tested by each cluster)

Endpoints:

```
10.10.0.0/16
10.34.0.0/16
```

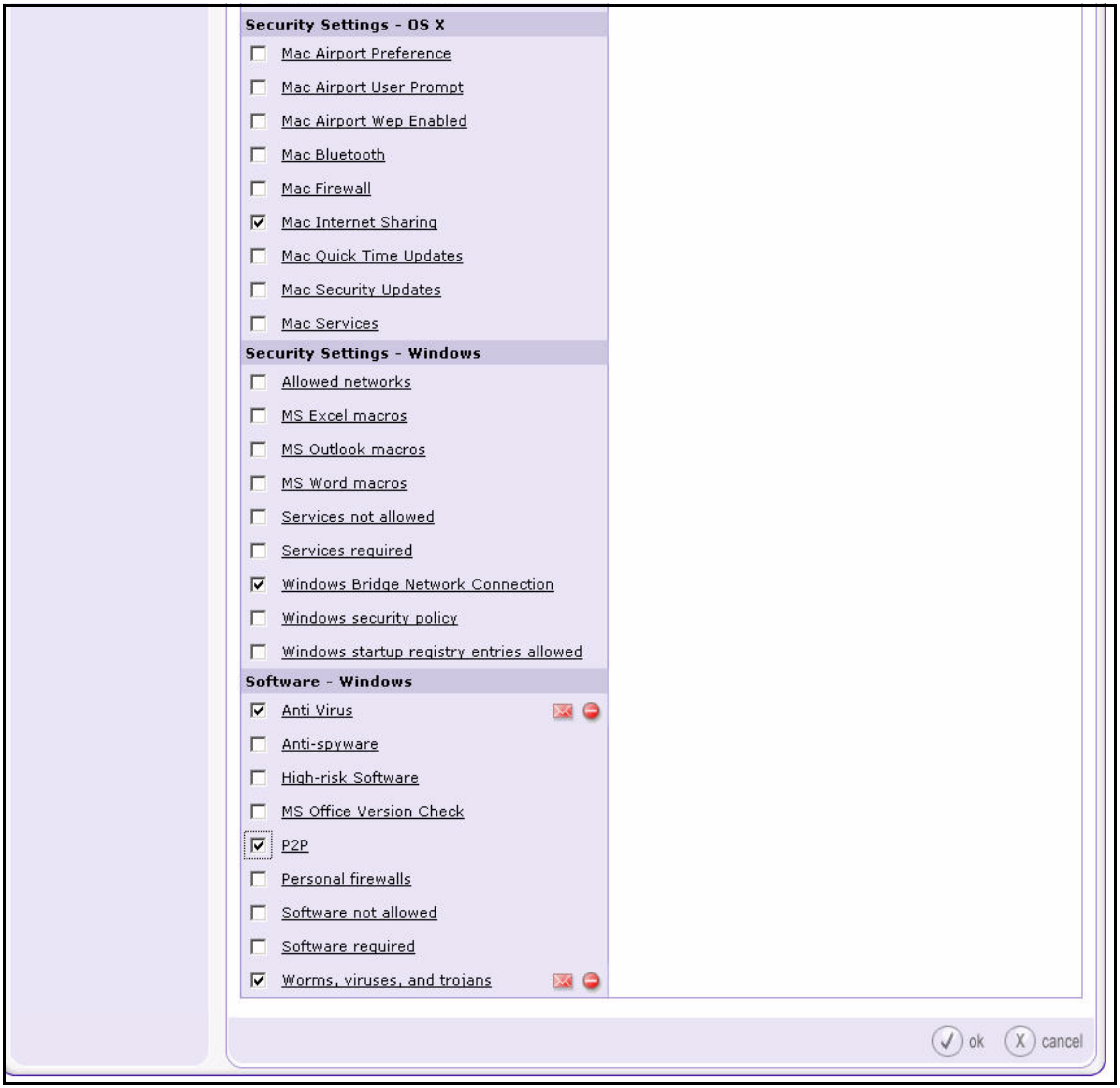
Figure 2-143. NAC 800 Web Interface—Home > NAC policies > *<NAC policy>* > Domains & endpoints Window

17. In the **Endpoints** box, type the subnets for students—both the quarantine VLAN (and, if different, the test and infected VLANs) and the production VLAN (for post-connect testing). In this example:

    10.10.0.0/16
    10.34.0.0/16
    10.35.0.0/16

18. Click **Tests** in the left pane.

    The steps below show you how to set up several tests that are designed to ensure that students do not set up rogue wireless networks. They also prohibit all peer-to-peer software except AOL Instant Messenger (AIM). These tests are just examples. Refer to the *ProCurve Access Control Design Guide* for help in designing your policy.



Security Settings - OS X

- □ Mac Airport Preference
- □ Mac Airport User Prompt
- □ Mac Airport Wep Enabled
- □ Mac Bluetooth
- □ Mac Firewall
- ☑ Mac Internet Sharing
- □ Mac Quick Time Updates
- □ Mac Security Updates
- □ Mac Services

Security Settings - Windows

- □ Allowed networks
- □ MS Excel macros
- □ MS Outlook macros
- □ MS Word macros
- □ Services not allowed
- □ Services required
- ☑ Windows Bridge Network Connection
- □ Windows security policy
- □ Windows startup registry entries allowed

Software - Windows

- ☑ Anti Virus
- □ Anti-spyware
- □ High-risk Software
- □ MS Office Version Check
- ☑ P2P
- □ Personal firewalls
- □ Software not allowed
- □ Software required
- ☑ Worms, viruses, and trojans

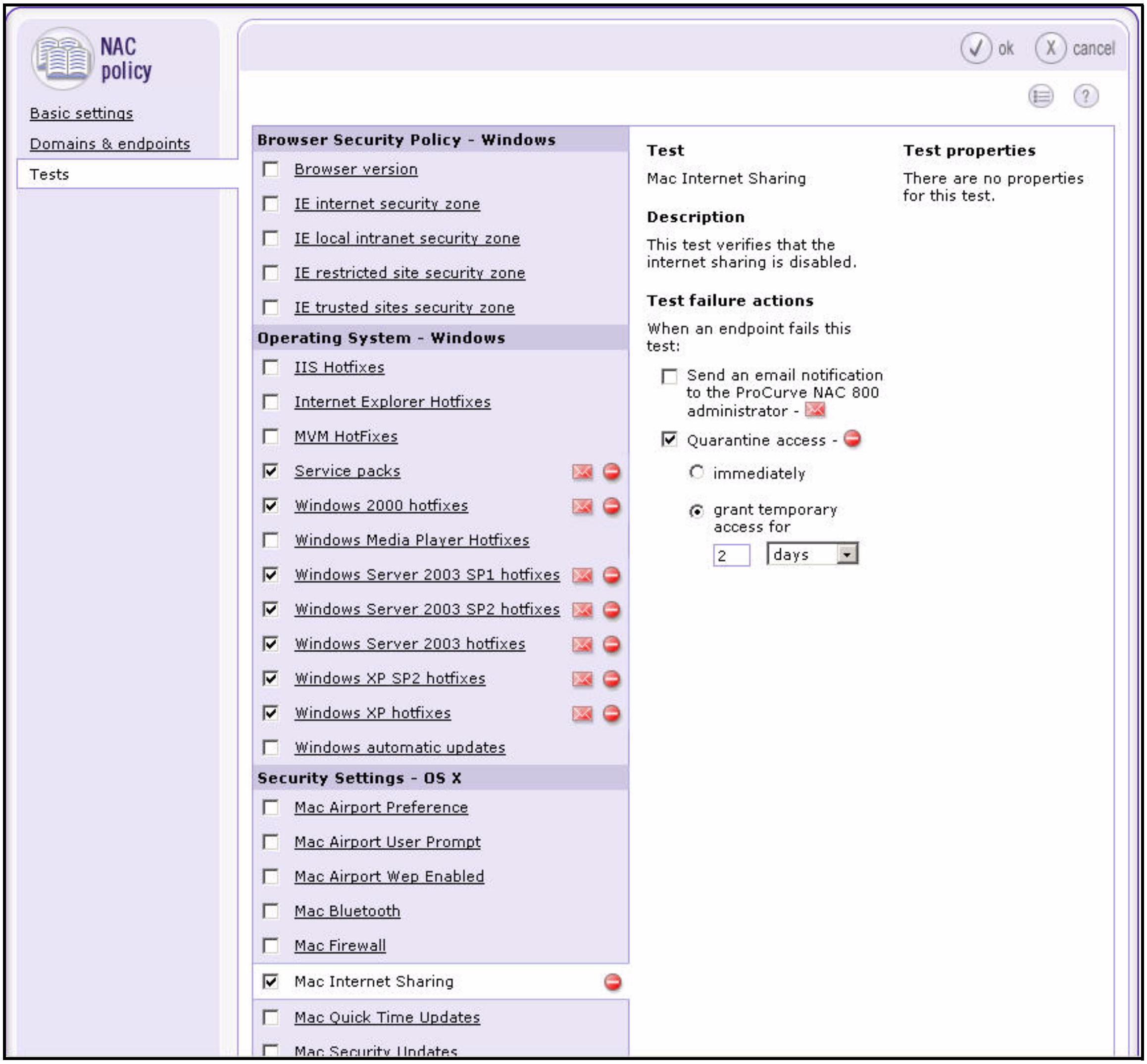
Figure 2-144. NAC 800 Web Interface—Home > NAC policies > *<NAC policy>* > Tests Window

19. Scroll to the **Security Settings – OS X** section and select the **Mac Internet Sharing** check box.

20. Under **Security Settings –Windows**, select the **Windows Bridge Network Connection** check box.

21. Under **Software – Windows**, select the **P2P** check box. Leave the **Anti Virus** and **Worms, viruses and trojans** check boxes selected.

22. Click the **Mac Internet Sharing** link.



Browser Security Policy - Windows

- □ Browser version
- □ IE internet security zone
- □ IE local intranet security zone
- □ IE restricted site security zone
- □ IE trusted sites security zone

Operating System - Windows

- □ IIS Hotfixes
- □ Internet Explorer Hotfixes
- □ MVM HotFixes
- ☑ Service packs
- ☑ Windows 2000 hotfixes
- □ Windows Media Player Hotfixes
- ☑ Windows Server 2003 SP1 hotfixes
- ☑ Windows Server 2003 SP2 hotfixes
- ☑ Windows Server 2003 hotfixes
- ☑ Windows XP SP2 hotfixes
- ☑ Windows XP hotfixes
- □ Windows automatic updates

Security Settings - OS X

- □ Mac Airport Preference
- □ Mac Airport User Prompt
- □ Mac Airport Wep Enabled
- □ Mac Bluetooth
- □ Mac Firewall
- ☑ Mac Internet Sharing
- □ Mac Quick Time Updates
- □ Mac Security Updates

Test

Mac Internet Sharing

Description

This test verifies that the internet sharing is disabled.

Test failure actions

When an endpoint fails this test:

□ Send an email notification to the ProCurve NAC 800 administrator -

☑ Quarantine access -

○ immediately

● grant temporary access for

2 days

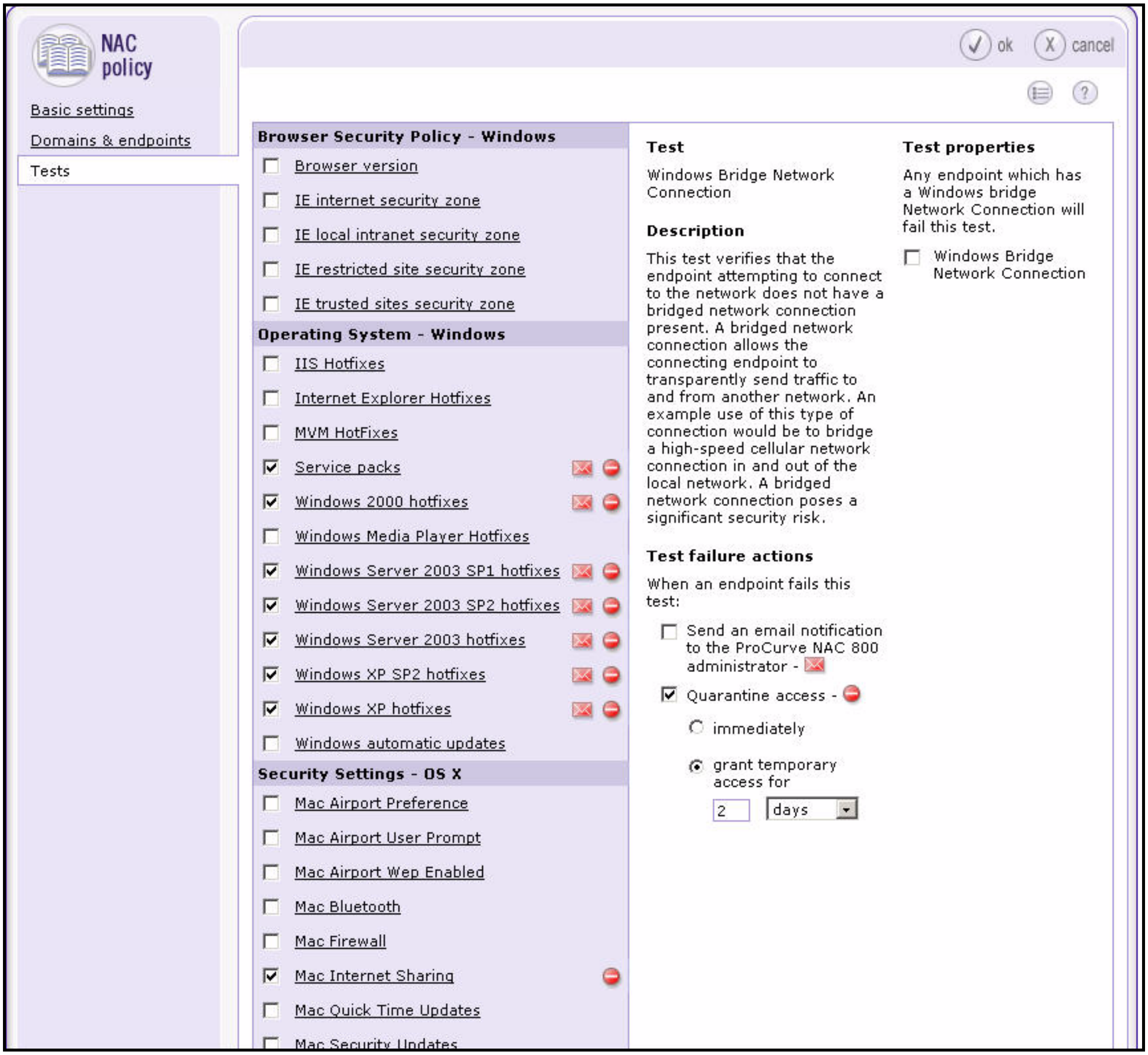
Test properties

There are no properties for this test.

Figure 2-145. NAC 800 Web Interface—Home > NAC policies > *<NAC policy>* > Tests Window

23. Under **Test failure actions**, select the **Quarantine access** check box, then select **grant temporary access for**.

24. Set a period of 2 days.



NAC policy

Basic settings

Domains & endpoints

Tests

Browser Security Policy - Windows

- ☐ Browser version
- ☐ IE internet security zone
- ☐ IE local intranet security zone
- ☐ IE restricted site security zone
- ☐ IE trusted sites security zone

Operating System - Windows

- ☐ IIS Hotfixes
- ☐ Internet Explorer Hotfixes
- ☐ MVM HotFixes
- ☑ Service packs ✉ ⛔
- ☑ Windows 2000 hotfixes ✉ ⛔
- ☐ Windows Media Player Hotfixes
- ☑ Windows Server 2003 SP1 hotfixes ✉ ⛔
- ☑ Windows Server 2003 SP2 hotfixes ✉ ⛔
- ☑ Windows Server 2003 hotfixes ✉ ⛔
- ☑ Windows XP SP2 hotfixes ✉ ⛔
- ☑ Windows XP hotfixes ✉ ⛔
- ☐ Windows automatic updates

Security Settings - OS X

- ☐ Mac Airport Preference
- ☐ Mac Airport User Prompt
- ☐ Mac Airport Wep Enabled
- ☐ Mac Bluetooth
- ☐ Mac Firewall
- ☑ Mac Internet Sharing ⛔
- ☐ Mac Quick Time Updates
- ☐ Mac Security Updates

Test

Windows Bridge Network Connection

Description

This test verifies that the endpoint attempting to connect to the network does not have a bridged network connection present. A bridged network connection allows the connecting endpoint to transparently send traffic to and from another network. An example use of this type of connection would be to bridge a high-speed cellular network connection in and out of the local network. A bridged network connection poses a significant security risk.

Test failure actions

When an endpoint fails this test:

- ☐ Send an email notification to the ProCurve NAC 800 administrator - ✉
- ☑ Quarantine access - ⛔
  - ○ immediately
  - ● grant temporary access for
  - 2 days ▾

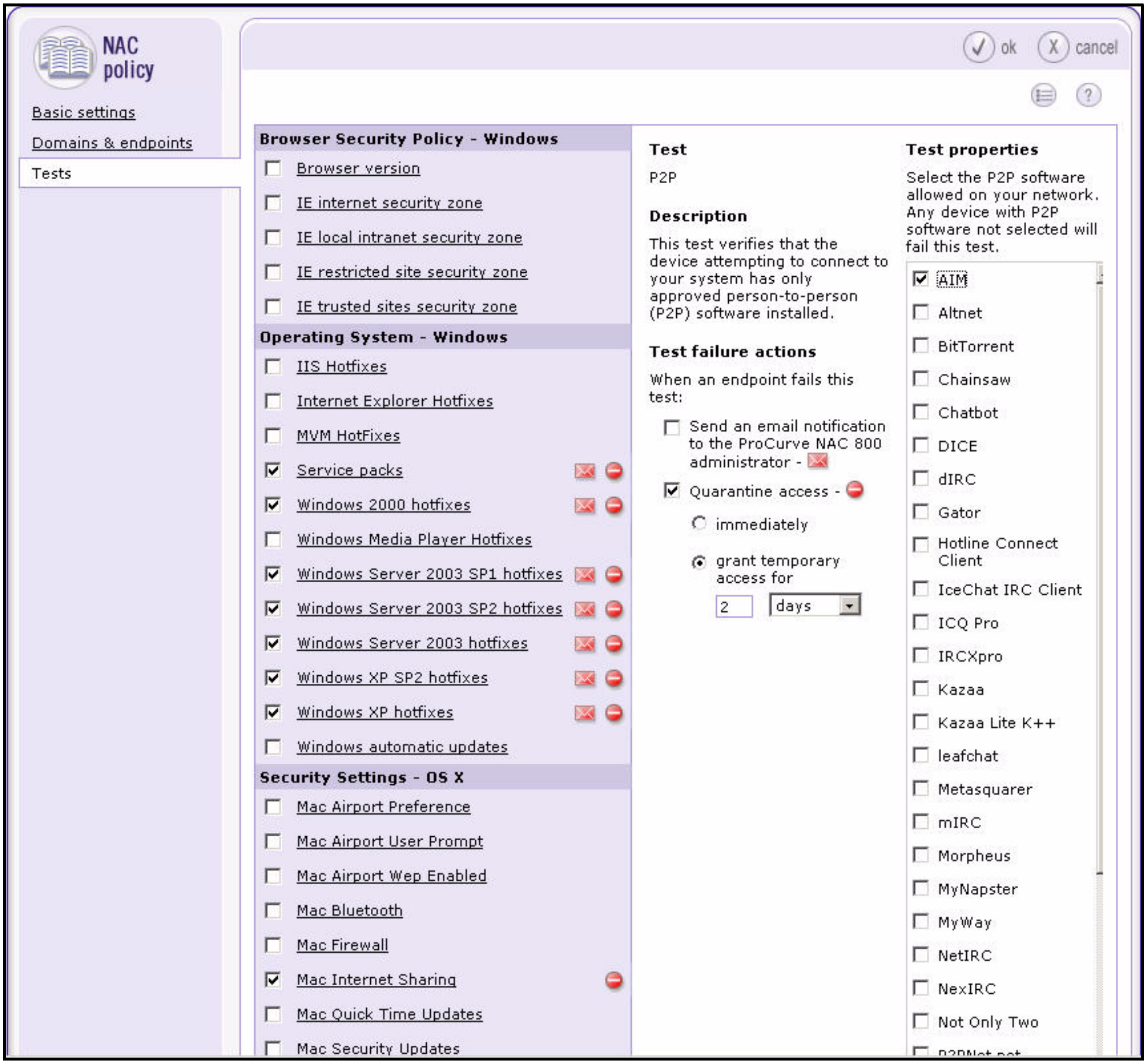
Test properties

Any endpoint which has a Windows bridge Network Connection will fail this test.

☐ Windows Bridge Network Connection

Figure 2-146. NAC 800 Web Interface—Home > NAC policies > *<NAC policy>* > Tests Window

25. Select **Windows Bridge Network Connection** and set the **Quarantine access** for 2 days.



Browser Security Policy - Windows

- □ Browser version
- □ IE internet security zone
- □ IE local intranet security zone
- □ IE restricted site security zone
- □ IE trusted sites security zone

Operating System - Windows

- □ IIS Hotfixes
- □ Internet Explorer Hotfixes
- □ MVM HotFixes
- ☑ Service packs
- ☑ Windows 2000 hotfixes
- □ Windows Media Player Hotfixes
- ☑ Windows Server 2003 SP1 hotfixes
- ☑ Windows Server 2003 SP2 hotfixes
- ☑ Windows Server 2003 hotfixes
- ☑ Windows XP SP2 hotfixes
- ☑ Windows XP hotfixes
- □ Windows automatic updates

Security Settings - OS X

- □ Mac Airport Preference
- □ Mac Airport User Prompt
- □ Mac Airport Wep Enabled
- □ Mac Bluetooth
- □ Mac Firewall
- ☑ Mac Internet Sharing
- □ Mac Quick Time Updates
- □ Mac Security Updates

Test

P2P

Description

This test verifies that the device attempting to connect to your system has only approved person-to-person (P2P) software installed.

Test failure actions

When an endpoint fails this test:

- □ Send an email notification to the ProCurve NAC 800 administrator -
- ☑ Quarantine access -
  - ○ immediately
  - ● grant temporary access for 2 days

Test properties

Select the P2P software allowed on your network. Any device with P2P software not selected will fail this test.

- ☑ AIM
- □ Altnet
- □ BitTorrent
- □ Chainsaw
- □ Chatbot
- □ DICE
- □ dIRC
- □ Gator
- □ Hotline Connect Client
- □ IceChat IRC Client
- □ ICQ Pro
- □ IRCXpro
- □ Kazaa
- □ Kazaa Lite K++
- □ leafchat
- □ Metasquarer
- □ mIRC
- □ Morpheus
- □ MyNapster
- □ MyWay
- □ NetIRC
- □ NexIRC
- □ Not Only Two
- □ P2PNet.net

Figure 2-147. NAC 800 Web Interface—Home > NAC policies > *<NAC policy>* > Tests Window

26. Select **P2P** and set the temporary access to 2 days.
27. Under **Test properties**, select the **AIM** check box.
28. Click **ok**.

Manually Issue and Install Server Certificates

This network includes several non-Windows devices that require server certificates:

- Wireless Edge Services Modules' internal HTTPS server
- The internal HTTPS servers on all the NAC 800s
- The internal RADIUS server on the NAC 800 ESs

This section describes how to create these certificates manually, using theCA you configured in "Configuring Certificate Services" on page 2-53. For each certificate, you will:

- Create a certificate request on the device that requires the certificate
- Submit the request to the CA and generate the server certificate
- Install the CA root certificate on the device
- Install the server certificate on the device

Create and Install a Certificate for the Wireless Edge Services Module's HTTPS Server

The Wireless EdgeServices Module requires aWeb Server (or SSL)certificate, which enables itto authenticate itself andgenerate keys forencrypting traffic. The following sections teach you how to install such a certificate.

Create a Certificate Request on the Wireless Edge Services Module

Follow these steps to create a certificate request using the Wireless Edge Services Module's Certificates Wizard:

1. On your management workstation, open a Web browser.
2. Type the module's IP address or DNS name for the URL. In this example: **10.2.0.20**.

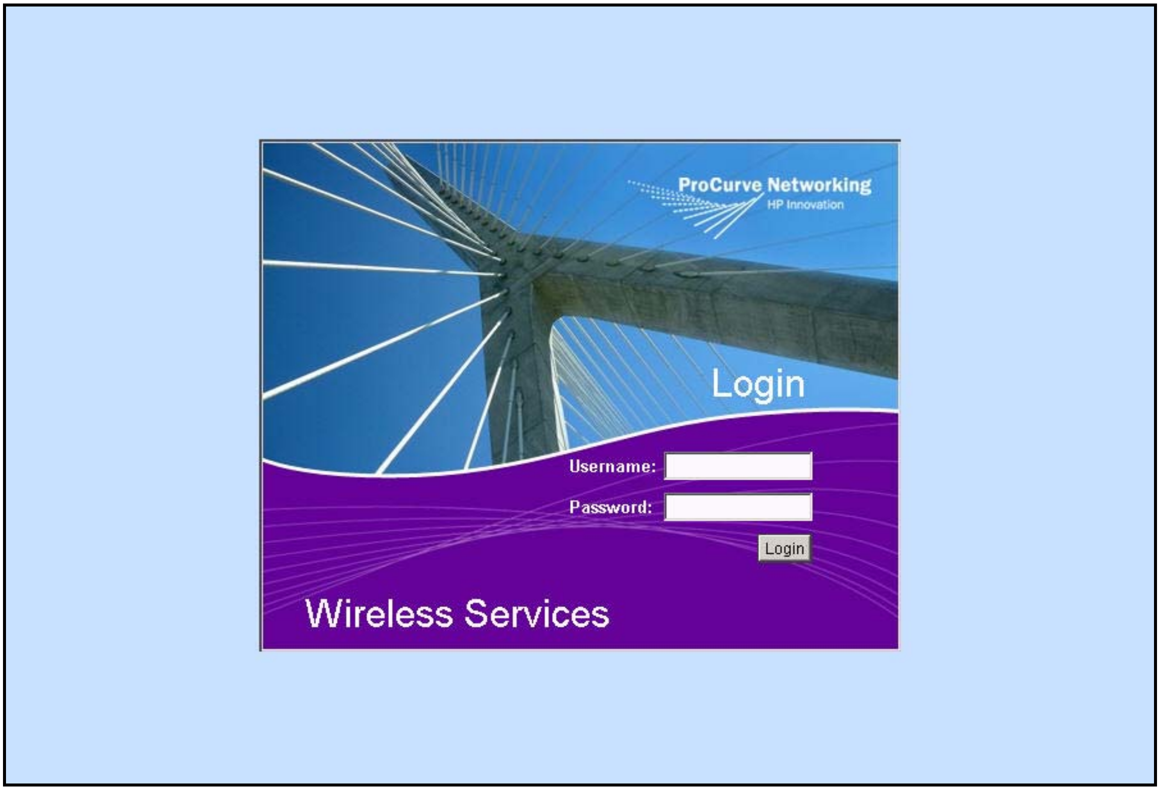
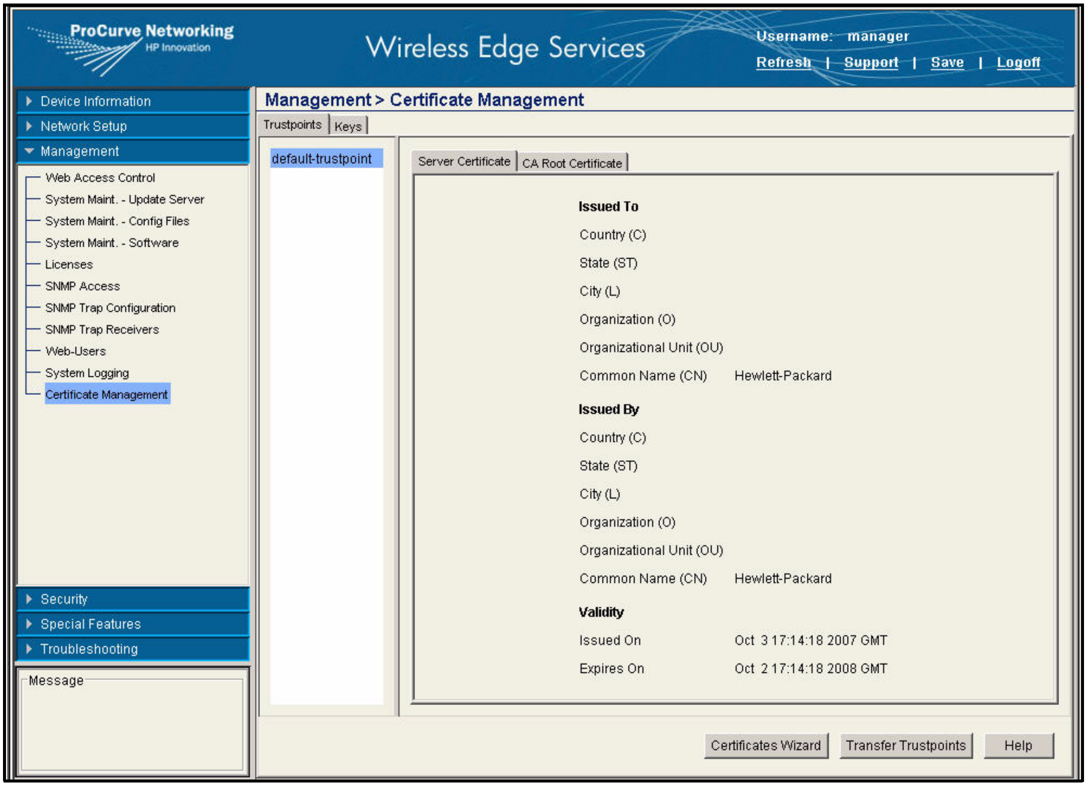


Figure 2-148. Wireless Services Login Page

3. Log in the Web browser interface with the manager password that you set earlier. (See step 22 on page 2-123.)

4. Select **Management** > **Certificate Management**.



Issued To

Country (C)

State (ST)

City (L)

Organization (O)

Organizational Unit (OU)

Common Name (CN) Hewlett-Packard

Issued By

Country (C)

State (ST)

City (L)

Organization (O)

Organizational Unit (OU)

Common Name (CN) Hewlett-Packard

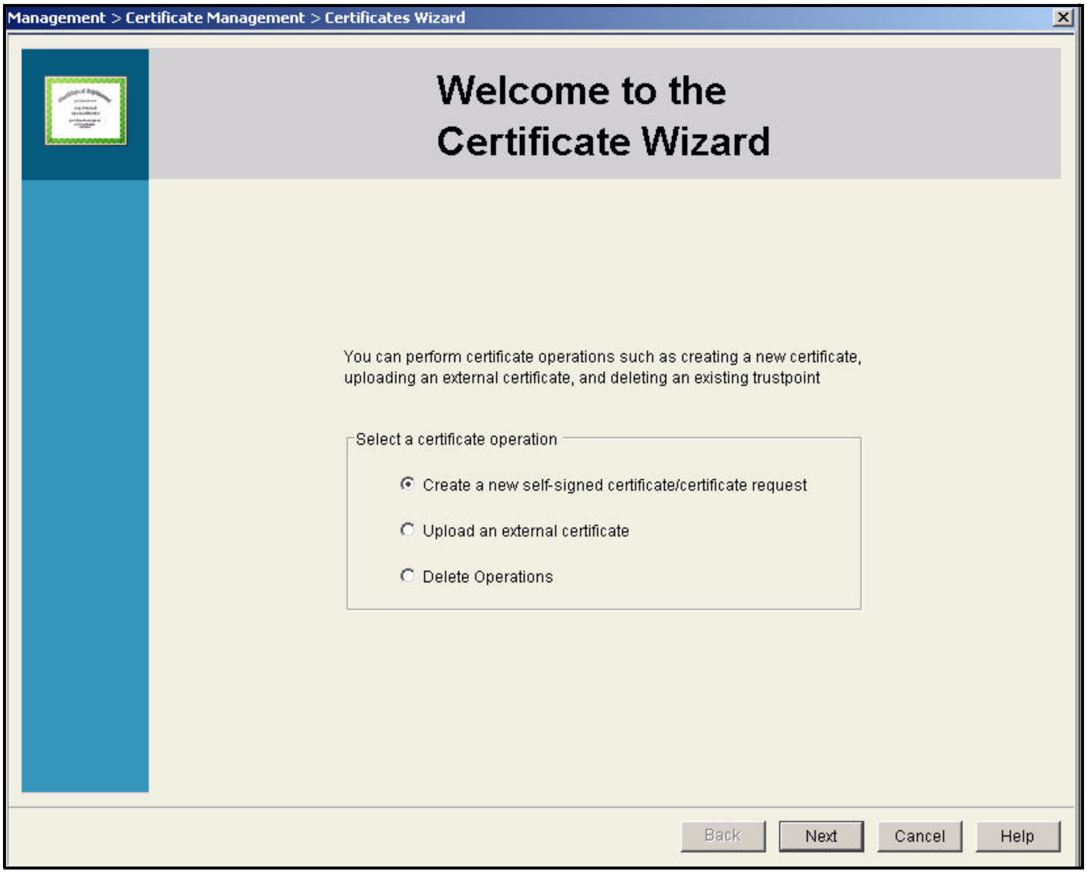
Validity

Issued On Oct 3 17:14:18 2007 GMT

Expires On Oct 2 17:14:18 2008 GMT

Figure 2-149. Wireless Edge Services Module Web Browser Interface— Management > Certificate Management Window

5. Click **Certificates Wizard**.


Management > Certificate Management > Certificates Wizard
Welcome to the Certificate Wizard

You can perform certificate operations such as creating a new certificate, uploading an external certificate, and deleting an existing trustpoint

Select a certificate operation

● Create a new self-signed certificate/certificate request

○ Upload an external certificate

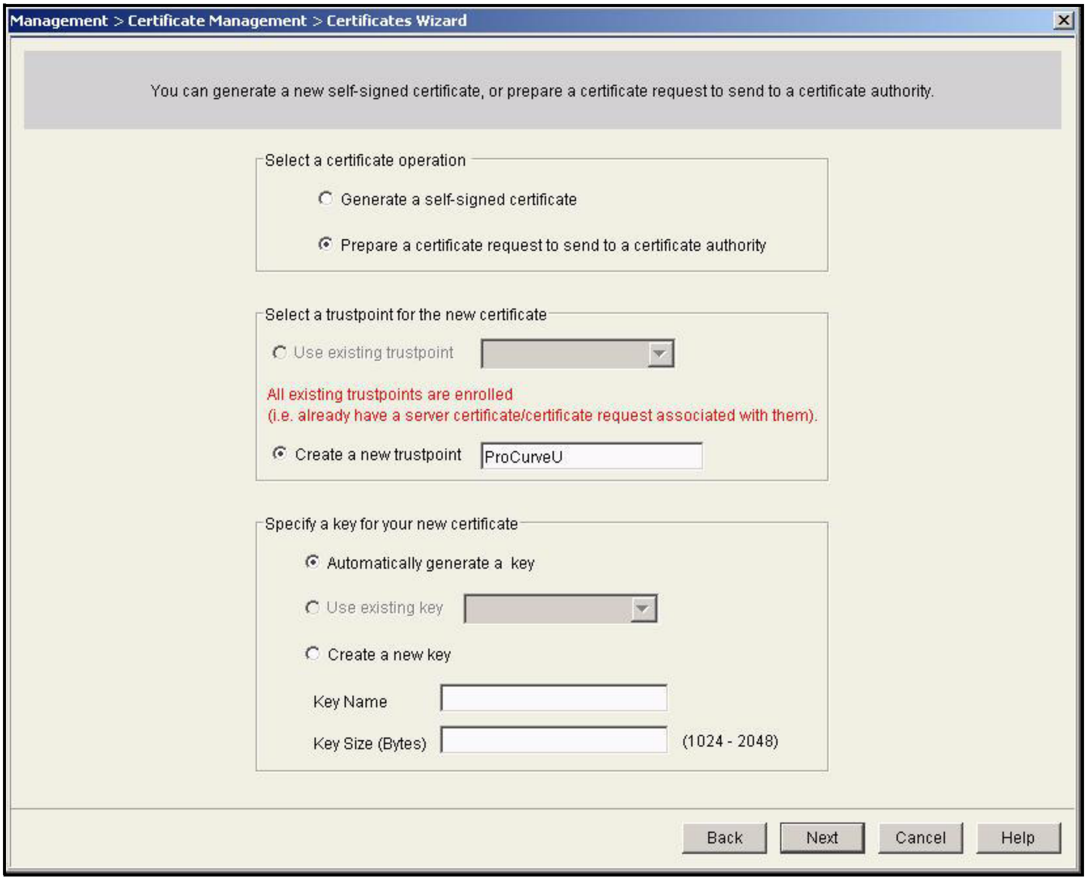
○ Delete Operations

Figure 2-150. Wireless Edge Services Module Web Browser Interface—Welcome to the Certificate Wizard

6. On the **Welcome to the Certificate Wizard** window, select **Create a new self-signed certificate/certificate request**.
7. Click **Next**. The window shown in Figure 2-151 is displayed.
8. In the **Select a certificate operation** section, select **Prepare a certificate request to send to a certificate authority**.

9. In the **Select a trustpoint for the new certificate** section, select **Create a new trustpoint**.

10. Type a descriptive name for trustpoint name in the box on the right—typically, a name that identifies the CA. In this example: **ProCurveU**.



Management > Certificate Management > Certificates Wizard

You can generate a new self-signed certificate, or prepare a certificate request to send to a certificate authority.

Select a certificate operation

○ Generate a self-signed certificate

● Prepare a certificate request to send to a certificate authority

Select a trustpoint for the new certificate

○ Use existing trustpoint

All existing trustpoints are enrolled
(i.e. already have a server certificate/certificate request associated with them).

● Create a new trustpoint: ProCurveU

Specify a key for your new certificate

● Automatically generate a key

○ Use existing key

○ Create a new key

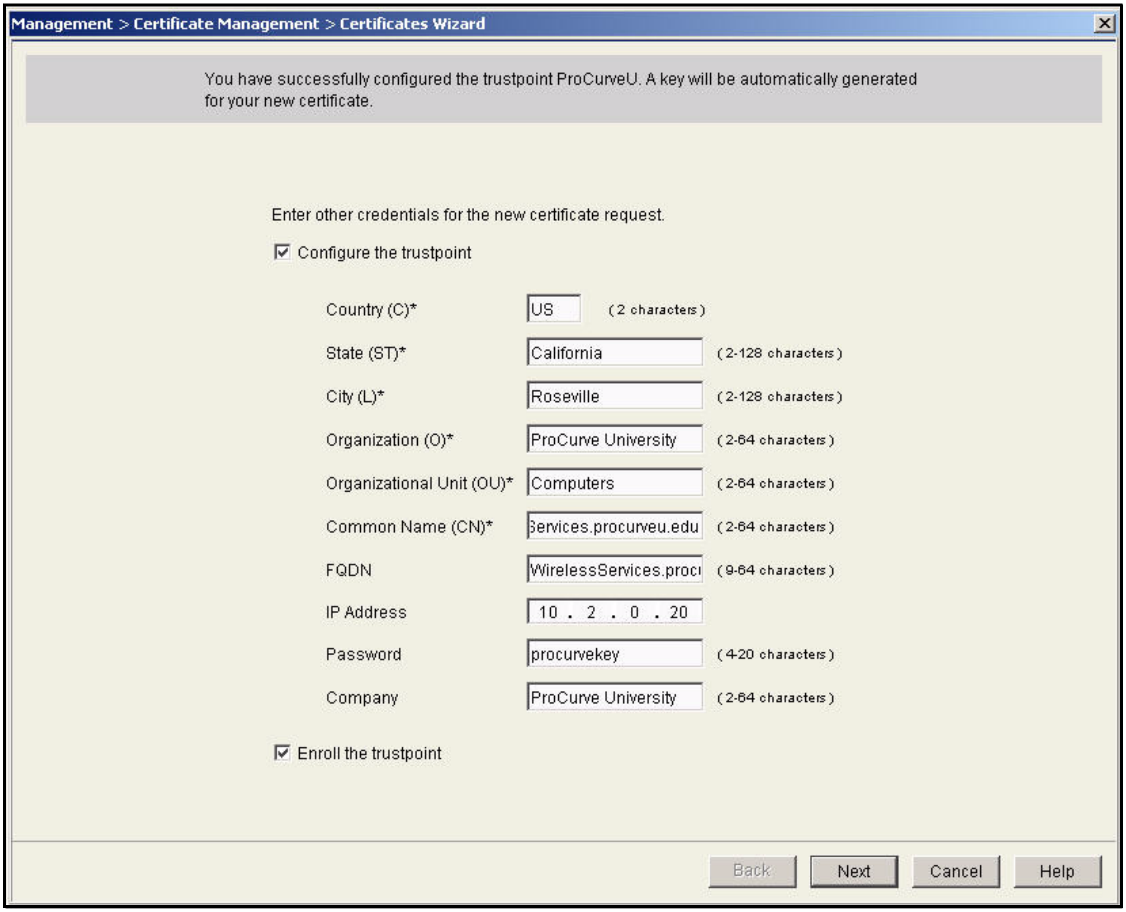
Key Name

Key Size (Bytes) (1024 - 2048)

Figure 2-151. Wireless Edge Services Module Web Browser Interface—Certificates Wizard—Select Certificate Operation

11. Leave the **Automatically generate a key** option selected.

12. Click **Next**.



Management > Certificate Management > Certificates Wizard

You have successfully configured the trustpoint ProCurveU. A key will be automatically generated for your new certificate.

Enter other credentials for the new certificate request.

☑ Configure the trustpoint

Country (C)*	US	(2 characters)
State (ST)*	California	(2-128 characters)
City (L)*	Roseville	(2-128 characters)
Organization (O)*	ProCurve University	(2-64 characters)
Organizational Unit (OU)*	Computers	(2-64 characters)
Common Name (CN)*	3ervices.procurveu.edu	(2-64 characters)
FQDN	WirelessServices.proci	(9-64 characters)
IP Address	10 . 2 . 0 . 20	
Password	procurvekey	(4-20 characters)
Company	ProCurve University	(2-64 characters)

☑ Enroll the trustpoint

Figure 2-152. Wireless Edge Services Module Web Browser Interface—Certificates Wizard—Configure Trustpoint

13. Select the **Configure the trustpoint** check box and type the following credentials for the certificate:

    - **Country**—the two-character country code (abbreviation) for your country
    - **State**—the state or province in which the module operates
    - **City**—the city in which the module operates
    - **Organization**—your organization (typically your company name)
    - **Organizational Unit**—the module's organizational unit

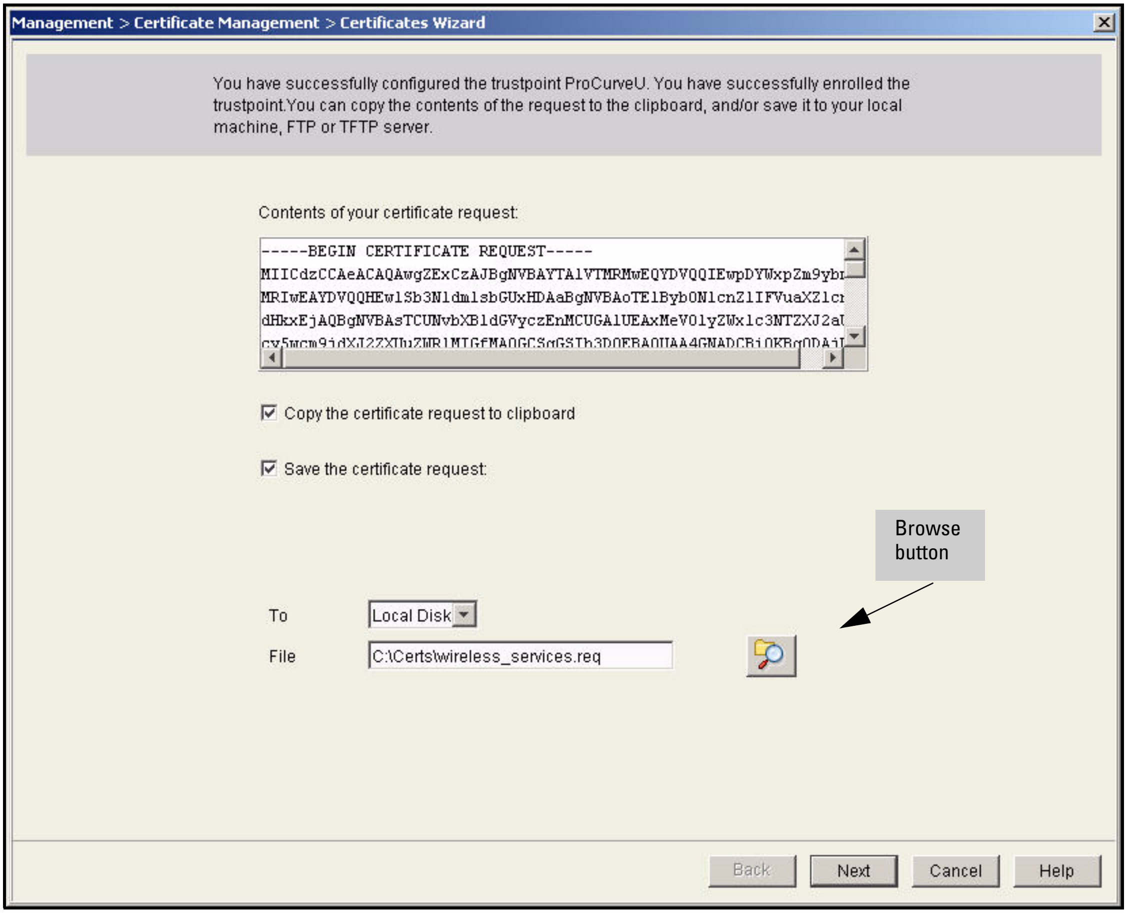
- **Common Name**—the module's exact FQDN, the URL at which the module's Web browser interface is accessed. The common name cannot include spaces or special characters other than periods (.) and hyphens (-). In this example, the Common Name is **WirelessServices.procurveu.edu**.

Note

Alternatively, type the Wireless Edge Services Module's IP address.

- **FQDN**—the module's FQDN. This field is optional.
- **IP Address**—the IP address for the wireless module or for the device that wants the certificate. This field is optional but recommended.
- **Password**—a password that must be entered to install the certificate. This field is optional.
- **Company**—the name of the company. It can be the same as the organization.

14. Select the **Enroll the trustpoint** check box.
15. Click **Next**. The window shown in Figure 2-153 is displayed.
16. The window shows the certificate request, which is in Base 64-encoded Public Key Cryptography Standard #10 (PKCS#10) format. You have several options for saving the certificate request. In this example, you will save it to the hard disk on the management station.
    a. Select the **Save the certificate request** check box. From the **To** list, select **Local Disk**.
    b. For the **File**, type a name for the request, including a valid path. For example: **C:\Certs\wireless_services.req**. Alternatively, click the browse button and browse for the directory in which to save the request.



You have successfully configured the trustpoint ProCurveU. You have successfully enrolled the trustpoint.You can copy the contents of the request to the clipboard, and/or save it to your local machine, FTP or TFTP server.

Contents of your certificate request:

```
-----BEGIN CERTIFICATE REQUEST-----
MIICdzCCAeACAQAwgZExCzAJBgNVBAYTAlVTMRMwEQYDVQQIEwpDYWxpZm9ybı
MRIwEAYDVQQHEwlSb3NldmlsbGUxHDAaBgNVBAoTElBybONlcnZlIFVuaXZlcı
dHkxEjAQBgNVBAsTCUNvbXBldGVyczEnMCUGA1UEAxMeV0lyZWxlc3NTZXJ2aU
cy5wcm9idXJ2ZXIuZWRlMIGfMA0GCSqGSIb3DQEBAQUAA4GNADCBiQKBgQDAjI
```

☑ Copy the certificate request to clipboard

☑ Save the certificate request:

To: Local Disk

File: C:\Certs\wireless_services.req

Browse button

Figure 2-153. Wireless Edge Services Module Web Browser Interface—Certificates Wizard—Copy Request

17. Click **Next**. A completion window summarizes the certificate request operation that you have performed.

18. Click **Finish**.

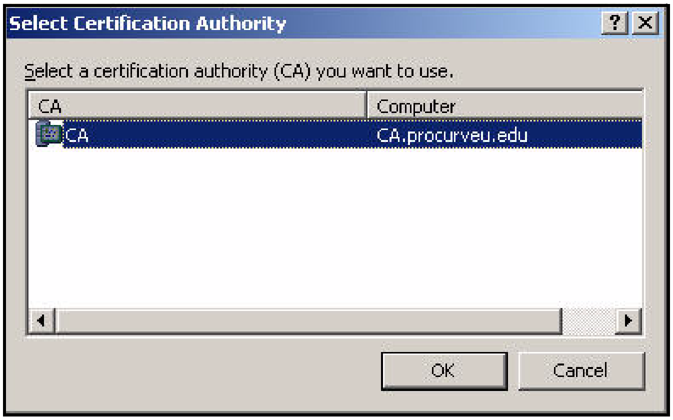
Submit the Request to the CA and Create the Certificate

Follow these steps to submit the request to the CA and create the certificate using the Web Server template:

1. In the previous section, you saved the certificate request from the Wireless Edge Services Module to the management station. Now copy the request to the CA server.
2. Access the command line on the CA server:
   a. From the Windows **Start** menu, select **Run.**
   b. Type **cmd** at the prompt and click **OK**.
3. Move to the directory in which you saved the certificate request.
4. Enter this command:

Syntax: certreq -submit -attrib “CertificateTemplate:WebServer” <*request_filename*>

Replace ***<request_filename>*** *with the name of the certificate request that you transferred to the CA server.*

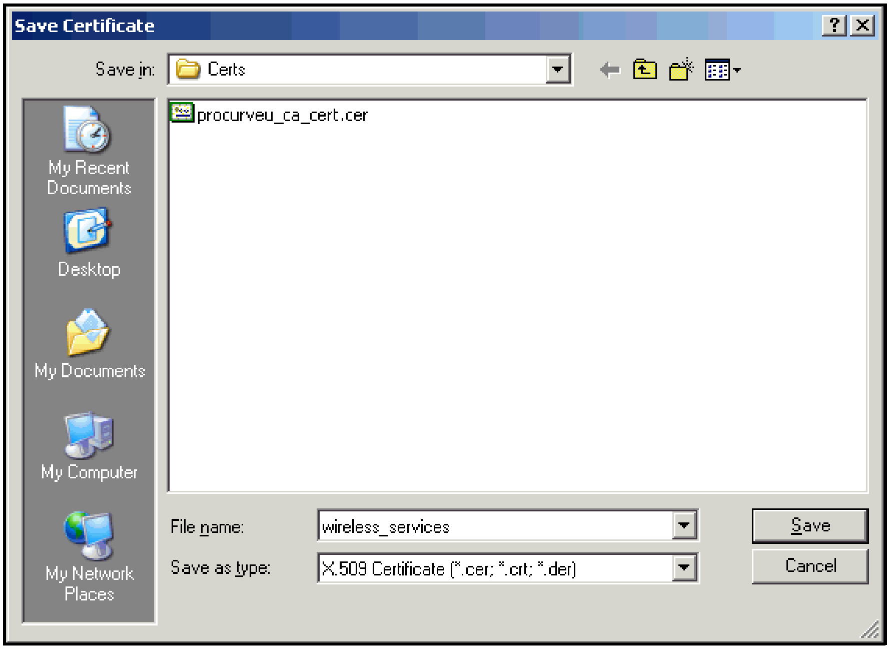

Select Certification Authority

Select a certification authority (CA) you want to use.

CA	Computer
CA	CA.procurveu.edu

Figure 2-154. Select Certification Authority Window

5. In the window that is displayed, select the name of your CA and click **OK**.
6. In the **Save Certificate** window navigate to the location where you want to save the certificate. Type a name for the certificate file.



File name: wireless_services

Save as type: X.509 Certificate (*.cer; *.crt; *.der)

Figure 2-155. Save Certificate Window

7. Click **Save**.

Install the Certificate on a Wireless Edge Services Module

In the last task, you saved the Wireless Edge Services Module's certificate as a file on the hard drive of the CA server. In "Export the CA Root Certificate" on page 2-97, you exported the CA root certificate to a file. Copy both certificates to one of these locations:

- File Transfer Protocol (FTP) server
- Trivial FTP (TFTP) server
- Management station's hard drive

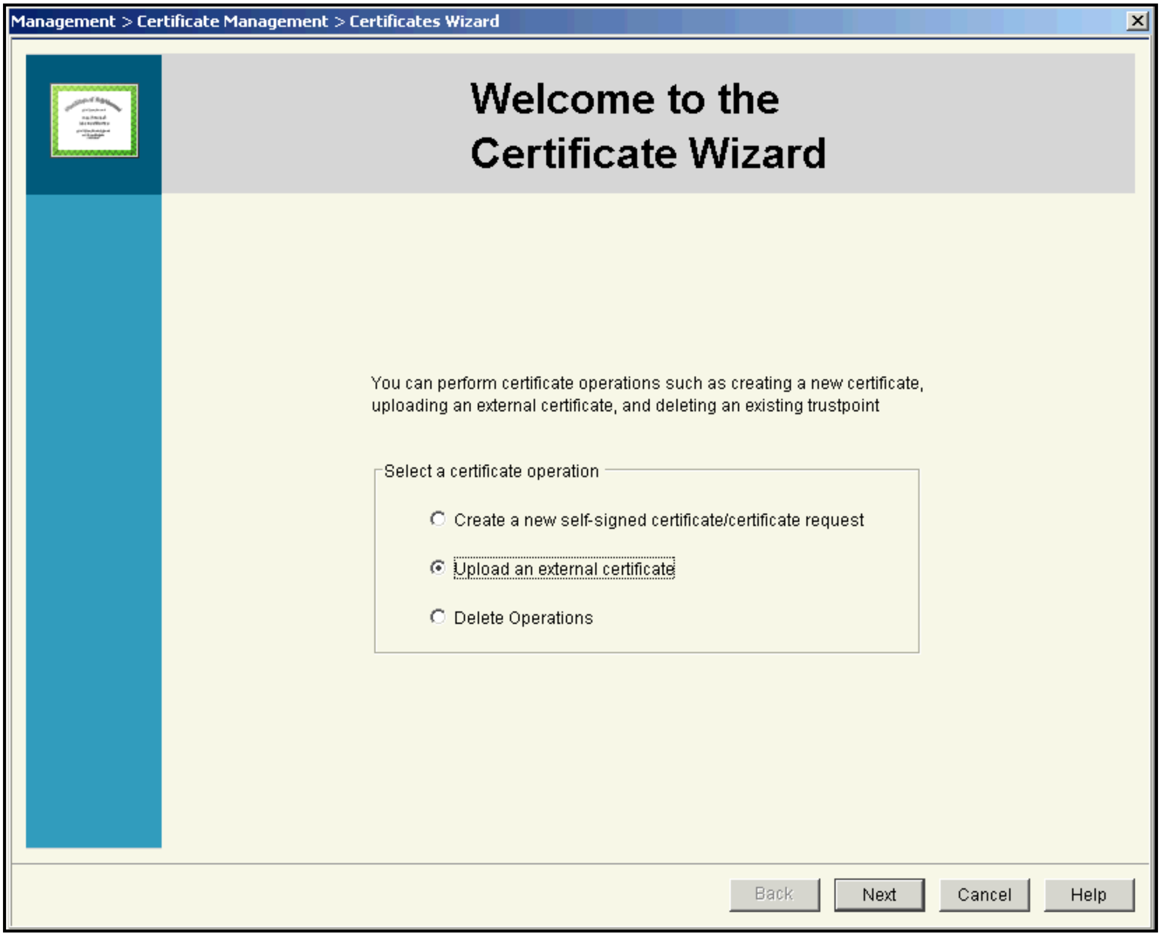
Follow these steps to install the certificate:

1. Open the Web browser on your management station and navigate to the Wireless Edge Services Module's IP address.
2. Log in with a manager username and password.
3. Select **Management** > **Certificate Management.**

4. Click the **Trustpoints** tab.

5. Click **Certificates Wizard**.

6. In the **Welcome to the Certificate Wizard** window, select **Upload an external certificate**.


Management > Certificate Management > Certificates Wizard
Welcome to the Certificate Wizard

You can perform certificate operations such as creating a new certificate, uploading an external certificate, and deleting an existing trustpoint

Select a certificate operation

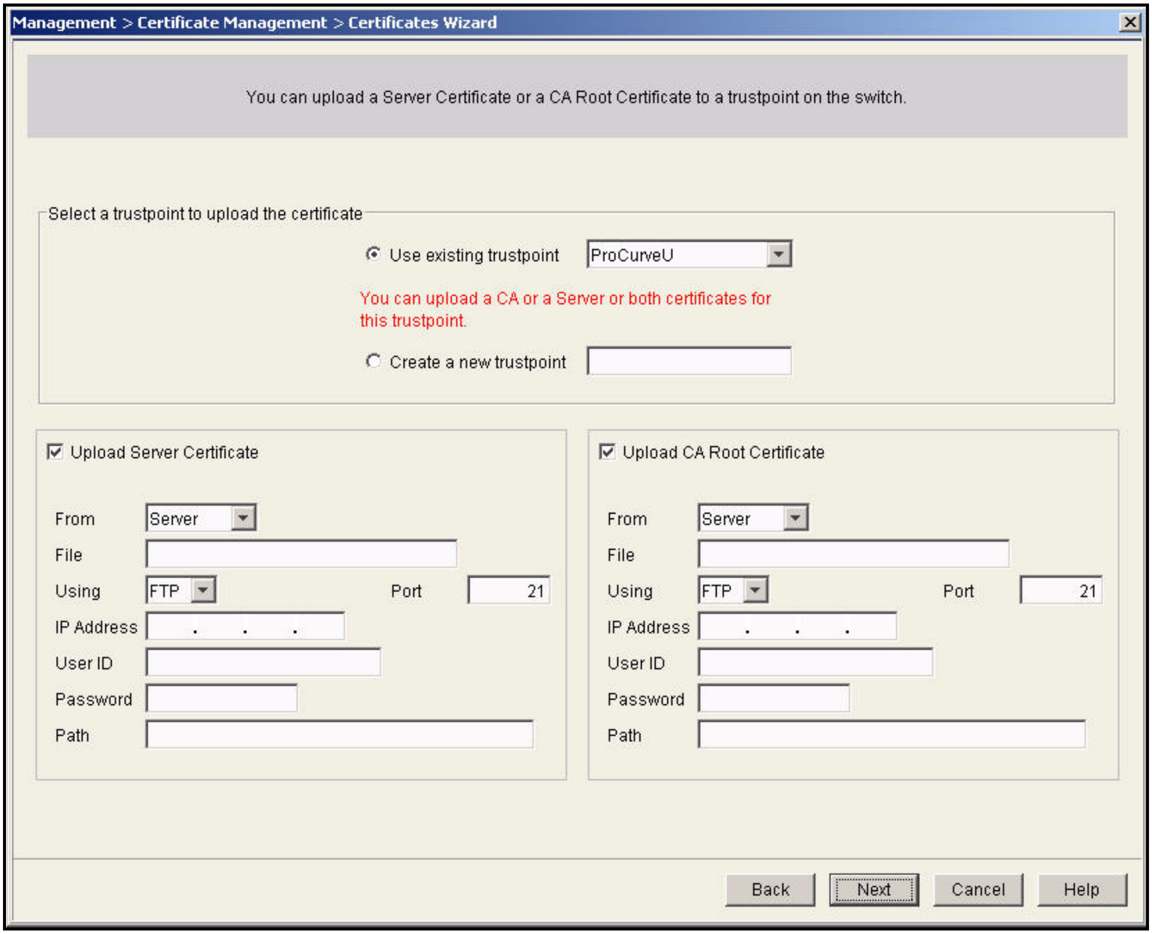
○ Create a new self-signed certificate/certificate request

● Upload an external certificate

○ Delete Operations

Figure 2-156. Wireless Edge Services Module Web Browser Interface—Welcome to the Certificate Wizard

7. Click **Next**.



Management > Certificate Management > Certificates Wizard

You can upload a Server Certificate or a CA Root Certificate to a trustpoint on the switch.

Select a trustpoint to upload the certificate

● Use existing trustpoint: ProCurveU

You can upload a CA or a Server or both certificates for this trustpoint.

○ Create a new trustpoint

☑ Upload Server Certificate

From: Server
File:
Using: FTP
Port: 21
IP Address: . . .
User ID:
Password:
Path:

☑ Upload CA Root Certificate

From: Server
File:
Using: FTP
Port: 21
IP Address: . . .
User ID:
Password:
Path:

Figure 2-157. Wireless Edge Services Module Web Browser Interface—Certificates Wizard—Upload Certificates

8. From the **Use existing trustpoint** list, select the trustpoint you created in “Create a Certificate Request on the Wireless Edge Services Module” on page 2-174. In this example: **ProCurveU**.

9. Clear the **Upload Server Certificate** check box.

10. Select the **Upload CA Root Certificate** check box.

11. Specify the file source for the certificate:

    To upload the certificate from the workstation running the Web browser, follow these steps:

    a. From the **From** list, select **Local Disk**.

    b. In the **File** box, type the certificate filename with a valid path (for example, **C:\Certs\procurveu_ca_cert.cer**).

       Alternatively, click the browse button and browse for the certificate. (See Figure 2-158.) Click the certificate name and click **Open**.

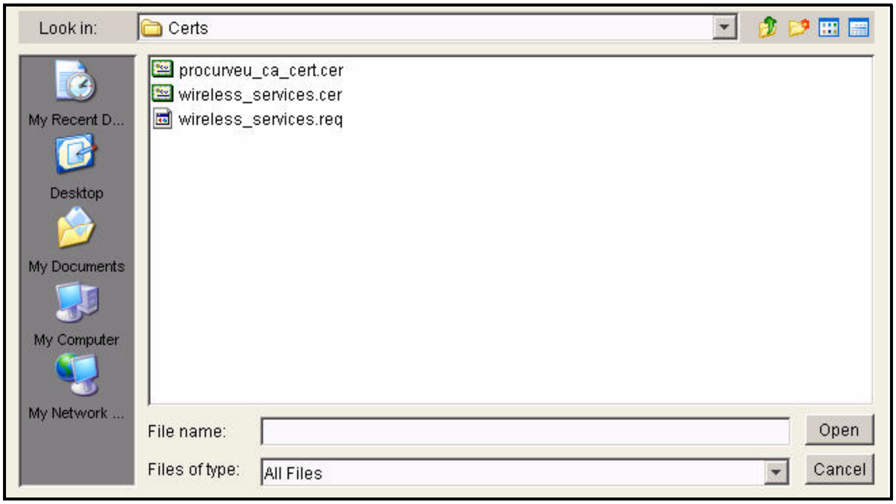
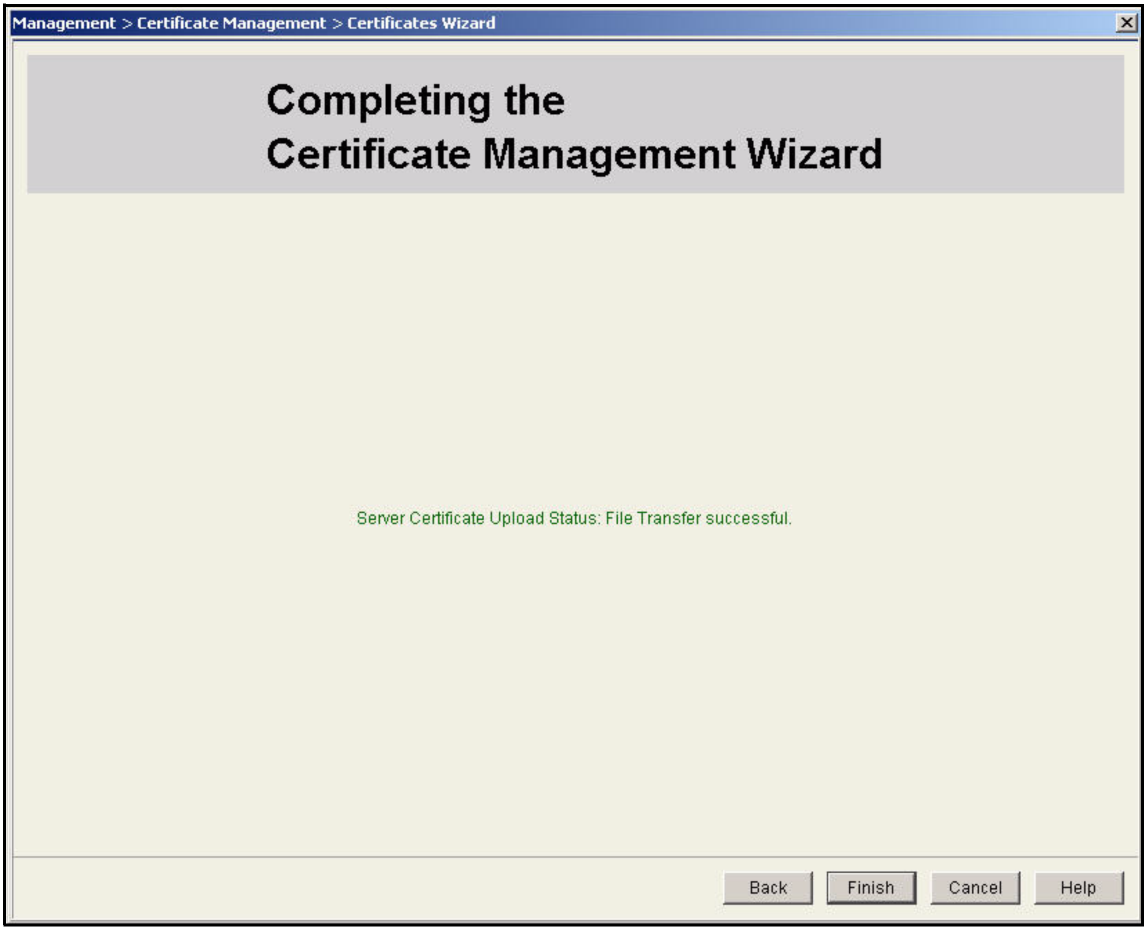


Figure 2-158. Wireless Edge Services Module Web Browser Interface—Browse for the Certificate

12. Click **Next**. The completion window summarizes the certificate upload operation that you have performed.

13. Click **Finish**.

14. Repeat steps 5 to 13, this time selecting the **Upload Server Certificate** box in step 10.



Completing the Certificate Management Wizard

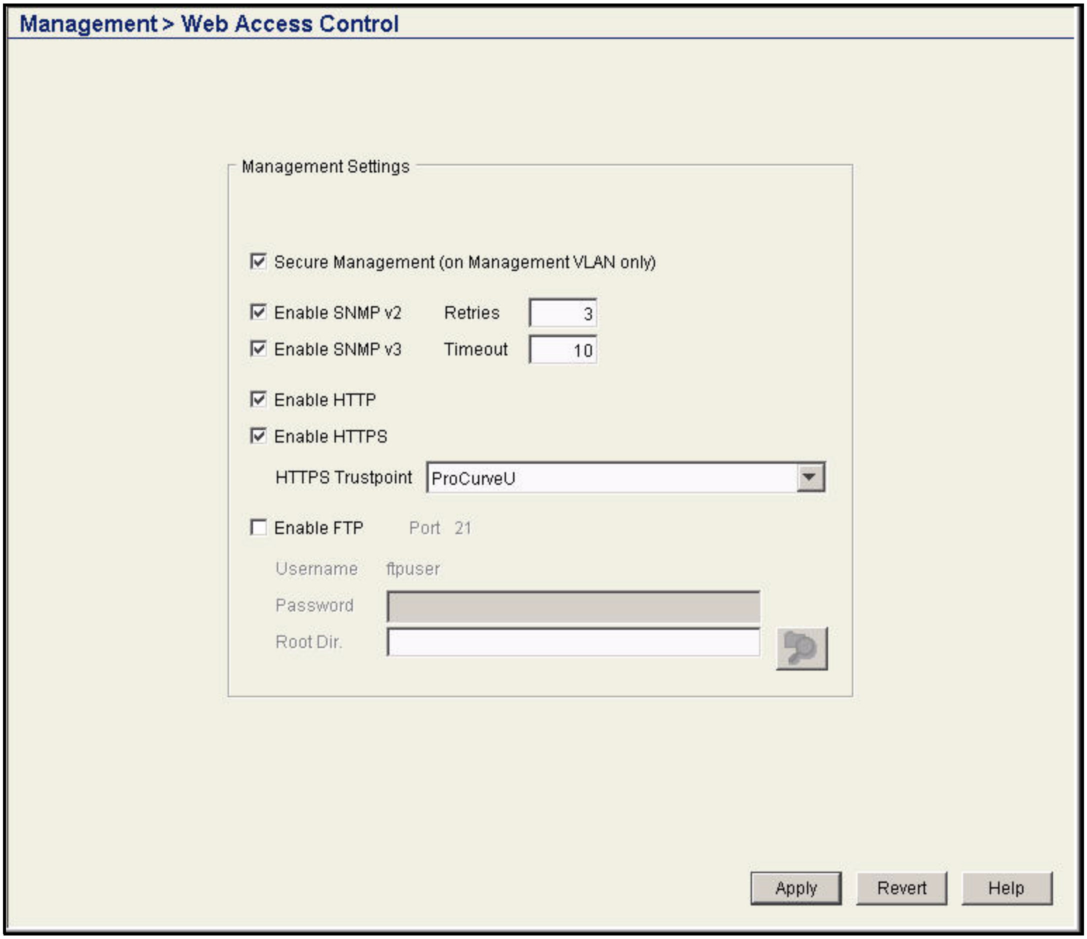
Server Certificate Upload Status: File Transfer successful.

Figure 2-159. Wireless Edge Services Module Web Browser Interface—Completing the Certificate Management Wizard

Enable the Certificate on the Wireless Edge Services Module's HTTPS Server

To have the Wireless Edge Services Module use the new certificate for its HTTPS server, follow these steps

1. Access the module's Web browser interface.
2. Select **Management** > **Web Access Control**.
3. Make sure that the **Enable HTTPS** check box is selected. From the **HTTPS Trustpoint** list, select the trustpoint you just created.



Management > Web Access Control

Management Settings

☑ Secure Management (on Management VLAN only)

☑ Enable SNMP v2 Retries 3

☑ Enable SNMP v3 Timeout 10

☑ Enable HTTP

☑ Enable HTTPS

HTTPS Trustpoint ProCurveU

□ Enable FTP Port 21

Username ftpuser

Password

Root Dir.

Figure 2-160. Wireless Edge Services Module Web Browser Interface—Management > Web Access Control Window

4. Click **Apply**.
5. Click **Save**.
6. Click **Yes** and **OK** in the two windows that are displayed.

Create and Install a Certificate for HTTPS on a NAC 800

All NAC 800s (both MSs and ESs) require a certificate for HTTPS. The sections below guide you through requesting, creating, and installing these certificates. Remember to repeat the tasks on each NAC 800 in your network.

Create a Certificate Request for HTTPS on a NAC 800

Follow these steps on your NAC 800 to create a request for a new certificate for HTTPS:

1. Log in as root to the NAC 800 OS:
   a. Open an SSH session with the NAC 800.
   b. Log in:
      – username **root**
      – password = ***<root password>***

Note

You set the MS's root password when you first accessed the Web browser interface (see step 3 on page 2-143). You set the ES's root password when you added it to the enforcement cluster (see step 13 on page 2-148). In this example, both passwords are **procurvenac9**.

2. Move to the **/usr/local/nac/keystore** directory:

```
ProCurve NAC 800:# cd /usr/local/nac/keystore
```

3. Remove the current keystore:

```
ProCurve NAC 800:/usr/local/nac/keystore# rm -f com-
pliance.keystore
```

4. Type this command:

Syntax: keytool -genkey -alias <*keyname*> -keyalg [rsa | dsa] -keystore compliance.keystore

Creates a new private/public keypair in the compliance.keystore.

Replace **<keyname>** *with a name that you choose for the key.*

Replace **[rsa | dsa]** *with either* **rsa** *or* **dsa**.

For example:

```
ProCurve NAC 800:/usr/local/nac/keystore# keytool
-genkey -alias procurveu_esa -keyalg rsa -keystore
compliance.keystore
```

5. When prompted, type this password for the keystore: **changeit**. (Always use this password.)

   Next, you are prompted to type information that will be included in the certificate that uses this key. For the first and last name, type the NAC 800's *exact IP address.*

You are prompted for other information for the subject name such as your organization name. However, the first and last name is the most important setting.

6. The command line displays the information that you typed. If it is correct, enter **yes**. If you need to edit the information, press [**Enter**] only.
7. The keytool utility prompts you to enter a password to protect the key or press **[Enter]** to use the keystore's password. You must press **[Enter]**.

   At this point, the keystore contains a private key and a public key wrapped in a self-signed certificate. Next, generate a certificate request so that you can replace the self-signed certificate with a CA-signed certificate.
8. Type this command to generate the certificate request:

Syntax: keytool -certreq -alias <*keyname*> -file <*filename*> -keystore compliance.keystore

Creates a certificate request that includes the public key and LDAP information created for the specified alias.

Replace ***<keyname>*** *with the name you specified in step 4.*

Replace ***<filename>*** *with the name you want to give to the certificate request file.*

For example:

```
ProCurve NAC 800:/usr/local/nac/keystore# keytool
-certreq -alias procurveu_esa -file esa_https.req
-keystore compliance.keystore
```

9. When prompted, type the password for the keystore.
10. Transfer the certificate request from the NAC 800.

    You can transfer the certificate request to a Secure Copy (SCP) server.

    PuTTY SCP (PSCP) is an SCP server that you can install on a Windows server to communicate with a Linux device such as the NAC 800. On your management server, follow these steps:

    a. Access the command prompt on your management station. (From the Windows **Start** menu, select **Run**. Type **cmd** at the prompt and click **OK**.)
    b. Move to the directory in which PSCP is stored.

c. Type this command:

Syntax: pscp root@<*IP address*>://usr/local/nac/keystore/<*filename*> <*path\filename*>

Transfers a file from the NAC 800 to the local management station.

Replace **<IP address>** *with the NAC 800's IP address.*

Replace **<filename>** *with the name that you gave the certificate request in step 4.*

Replace **<path\filename>** *with the path and filename where you want to save the request on your server.*

For example:

```
pscp root@10.2.1.40://usr/local/nac/keystore/
esa_https.req C:\Certs\esa_https.req
```

d. When prompted, type the NAC 800's root password.

Submit the Request for the HTTPS Certificate to the CA

Follow these steps to submit the request to the CA and create the certificate using the Web Server template:

1. In the previous section, you transferred the certificate request off the NAC 800. Now save the request to the CA server.
2. Access the command line on the CA server.
   a. From the Windows **Start** menu, select **Run.**
   b. Type **cmd** at the prompt and click **OK**.
3. Move to the directory in which you saved the certificate request.
4. Enter this command:

Syntax: certreq -submit -attrib "CertificateTemplate:WebServer" <*request_filename*>

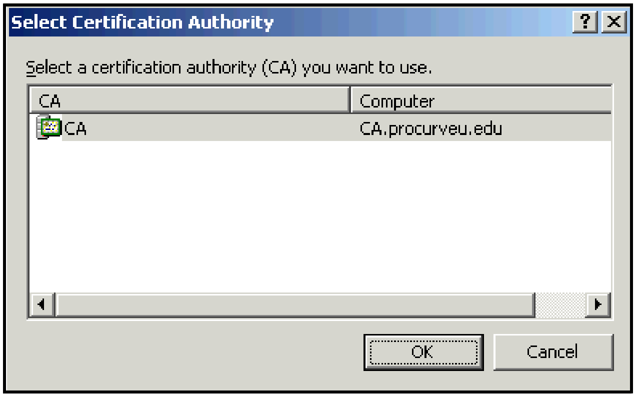
Submits the certificate request to a CA.

Replace **<request_filename>** *with the name of the certificate request that you transferred to the CA server.*

5. For example:

```
C:\Certs> certreq -submit -attrib "CertificateTem-
plate:WebServer" esa_https.req
```

6. The **Select Certification Authority** window is displayed.



Select Certification Authority

Select a certification authority (CA) you want to use.

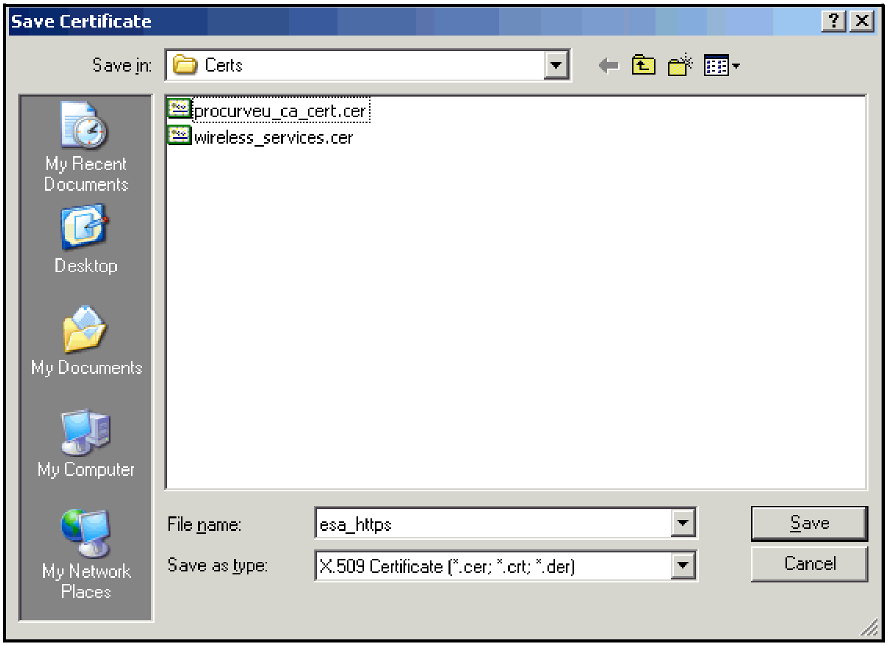
CA	Computer
CA	CA.procurveu.edu

Figure 2-161. Select Certification Authority Window

7. Select the name of the CA server.

8. Click **OK**.

9. Navigate to the location in which you want to save the certificate. Type the name for the certificate file in the **File name** box.



File name: esa_https

Save as type: X.509 Certificate (*.cer; *.crt; *.der)

Figure 2-162. Save Certificate Window

10. Click **Save**.

Install the Certificates for HTTPS on a NAC 800

In the last task, you savedthe NAC 800's HTTPS certificate as afile on thehard drive of the CA server. In "Export the CA Root Certificate" on page 2-97, you exported the CA root certificate to a file. Copy the certificates to your management station's hard drive. Then follow these steps:

1. Access the command-line prompt on your management workstation. (Select **Start** > **Run** and type **cmd**.)

2. Move to the directory in which PSCP is stored.

3. To save the CA root certificate to the NAC 800, type this command:

Syntax: pscp <*path\filename*> root@<*IP address*>://usr/local/nac/keystore/<*ca_cert_filename*>

Replace **<path\filename>** *with the location and filename of the CA root certificate file.*

Replace **<IP address>** *with the IP address of the NAC 800.*

Replace **<ca_cert_filename>** *with a string of your choice, naming the CA root certificate file on the NAC 800.*

For example:

```
pscp C:\Certs\procurveu_ca.cer root@10.4.4.40://usr/
local/nac/keystore/procurveu_ca.cer
```

4. When prompted, enter the NAC 800's root password.
5. Enter the command again, now saving the certificate for the HTTPS server to the NAC 800:

Syntax: pscp <*path\filename*> root@<*IP address*>://usr/local/nac/keystore/<*cert_filename*>

Replace **<path\filename>** *with the location and filename of the CA root certificate file.*

Replace **<IP address>** *with the IP address of the NAC 800.*

Replace **<cert_filename>** *with a string of your choice, naming the certificate file on the NAC 800.*

For example:

```
pscp C:\certs\esa_https.cer root@10.4.4.40://usr/
local/nac/keystore/procurveu_esa.cer
```

6. When prompted, type the NAC 800's root password.
7. Log in as root to the NAC 800's OS.
8. Type this command:

```
ProCurve NAC 800:# cd /usr/local/nac/keystore
```

9. Type this command:

Syntax: keytool -import -alias <*CA_name*> -file <*ca_cert_filename*> -keystore /usr/local/java/jre/lib/security/cacerts

Replace ***<CA_name>*** *with the name of your CA.*

Replace ***<ca_cert_filename>*** *with the filename that you gave to the CA certificate in step 3 on page 2-194.*

For example:

```
ProCurve NAC 800:/usr/local/nac/keystore# keytool
-import -alias ca.procurveu.edu -file procurveu_ca.cer
-keystore /usr/local/java/jre/lib/security/cacerts
```

10. When prompted, type the password for the **cacerts** keystore (default: **changeit**).
11. When prompted to trust the certificate, enter **yes**.
12. You should see this message:

```
Certificate was added to keystore.
```

13. Enter this command:

Syntax: keytool -import -alias <*keyname*> -trustcacerts -file <*cert_filename*> -keystore compliance.keystore

Replace ***<keyname>*** *with the name you specified in step 4 on page 2-189.*

Replace ***<cert_filename>*** *with the filename that you gave the server certificate in step 5 on page 2-194.*

For example:

```
ProCurve NAC 800:/usr/local/nac/keystore# keytool
-import -alias procurveu_esa -trustcacerts -file
procurveu_esa.cer -keystore compliance.keystore
```

14. When prompted, enter the password: **changeit**.
15. You should see this message:

```
Certificate reply was added in keystore.
```

16. Restart the HTTPS server:
    - On the MS—`service nac-ms restart`
    - On the ES—`service nac-es restart`

    If the service fails to restart, you might have set the wrong password for the **compliance.keystore**. Use **changeit**.

Create and Install a Certificate for the NAC 800 RADIUS Service

The NAC 800 ESs act as RADIUS servers. As such, they require server certificates that have these key extensions:

- Server authentication
- Client authentication

You already set up such a certificate template for the NAC 800, basing the template on the one for RAS and IAS servers (see “Create the NAC 800 Certificate Template” on page 2-87). Now you must have the NAC 800s request their certificates. You will then submit the request to the CA using the NAC 800 template.

Create a Certificate Request for the RADIUS Service

Follow these steps to create a certificate request for a NAC 800’s internal RADIUS server:

1. Log in to the NAC 800 as root.
2. Enter this command:

```
ProCurve NAC 800:/# cd /etc/raddb/certs
```

3. Enter this command to generate the certificate request:

Syntax: openssl req -new -newkey [rsa | dsa]:[512 | 1024 | 2048 | 4096] [-nodes] -keyout <*key_filename*> -out <*request_filename*> {-outform [DER | PEM]}

The **-newkey** *option generates a private/public keypair for this certificate. Choose* **rsa** *or* **dsa** *for the algorithm and then choose the key length (***4096** *is not a valid option for* **dsa***).*

The private key for the certificate is saved with the name you enter for the ***<key filename>****. The certificate request is saved with the name you enter for the* ***<request filename>****. You can choose the format (***DER** *or* **PEM***) for the request (default:* **PEM***).*

The **-nodes** *option creates the private key without password protection. For stronger security, omit this option when you type the command. You will then be prompted to type the password. In step 10 on page 2-201, you will edit the* **/etc/raddb/eap.conf** *file and specify this password.*

For example:

```
ProCurve NAC 800:/etc/raddb/certs# openssl req -new
-newkey rsa:1024 -keyout procurveu_radkey.pem -out
nac_esa_rad.req
```

4. If you omitted the **-nodes** option, type and confirm a password (PEM passphrase). In this example: **mykey**.

5. You will be prompted to enter information about the NAC 800. When prompted for the Common Name (CN), type the NAC 800's IP address (in this example, **10.4.4.40**).

   The email and challenge password are optional.

6. Transfer the certificate request to an SCP server.

   If you have installed PSCP on your management station, you can follow these steps:

   a. Access the command prompt on your management station and move to the directory in which PSCP is installed.

b. Enter this command:

Syntax: pscp root@<*NAC 800 IP address*>://etc/raddb/certs/<*request filename*> <*path\filename*>

Replace **<path\filename>** *with the directory path and filename for the server certificate. The certificate is saved with the name that you specify for* **<certificate filename>**.

For example:

```
pscp root@10.4.4.40://etc/raddb/certs/
nac_esa_rad.req C:\Certs\nac_esa_rad.req
```

c. When prompted, type the NAC 800's root password.

Submit the Request for the RADIUS Server Certificate to the CA

Follow these steps to submit the request to the CA and create the certificate using the NAC 800 template:

1. In the previous section, you saved the certificate request off the NAC800. Transfer the request to the CA server.
2. Access the command line on the CA server. (Select **Start** > **Run**, type **cmd** at the prompt and click **OK**.)
3. Move to the directory in which you saved the certificate request.
4. Enter this command:

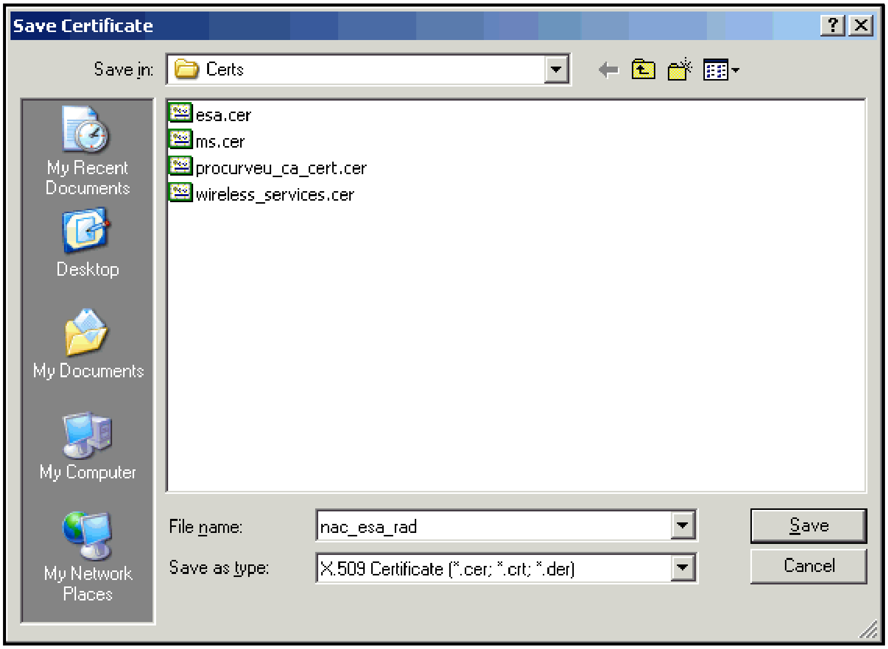
Syntax: certreq -submit -attrib "CertificateTemplate:NAC800" <*request_filename*>

Replace **<request_filename>** *with the name of the certificate request that you transfered to the CA server.*

For example:

```
C:\Certs> certreq -submit -attrib "CertificateTem-
plate:NAC800" nac_esa_rad.req
```

5. Select the name of the CA server.
6. Click **OK**.
7. Navigate to the location in which you want to save the certificate. Type the name for the certificate file.



File name: nac_esa_rad

Save as type: X.509 Certificate (*.cer; *.crt; *.der)

Figure 2-163. Save Certificate Window

8. Click **Save**.

Install the Certificate for RADIUS Services on a NAC 800

In the last task, you saved the NAC 800's RADIUS certificate as a file on the hard drive of the CA server. Now you must copy it to the NAC 800. The steps below show you how to do so from your management station, which has the PSCP application.

Then follow these steps:

1. Transfer the certificate file to the management station's hard drive.
2. Access the command-line prompt on your management workstation. (Select **Start** > **Run** and type **cmd**.)
3. Move to the directory in which PSCP is stored.

4. To save the RADIUS certificate to the NAC 800, type this command:

Syntax: *Syntax:* pscp <*path\filename*> root@<*IP address*>://etc/raddb/certs/<*cert_filename*>

> *Replace* ***<path\filename>*** *with the location and name of file on the current station that stores the NAC 800's RADIUS server certificate.*
>
> *Replace* ***<IP address>*** *with the NAC 800's IP address.*
>
> *Replace* ***<cert_filename>*** *with a string of your choice, naming the RADIUS server certificate on the NAC 800.*

For example:

```
pscp C:\Certs\nac_esa_rad.cer root@10.4.4.40://etc/
raddb/certs/procurveu_rad.cer
```

5. When prompted, type the NAC 800's root password.
6. Log in as root to the NAC 800 OS.
7. Type this command:

```
ProCurve NAC 800:/# cd /etc/raddb/certs
```

8. In "Install the Certificates for HTTPS on a NAC 800" on page 2-193, you saved your domain CA root certificate to the NAC 800. Now copy this certificate to the **/etc/raddb/certs** directory:

Syntax: cp /usr/local/nac/keystore/<ca_*cert_filename*> <ca_*cert_filename*>

> *You chose the* ***<ca_cert_filename>*** *in step 3 on page 2-194.*

9. If the CA root certificate is not in Privacy Enhanced Mail (PEM) format, convert it.

Convert from Distinguished Encoding Rules (DER) with this command:

Syntax: openssl x509 -in <*ca_cert_filename*> [-inform DER] -out <*ca_cert_filename*> -outform PEM

> *You should change the filename extension to reflect the changed format.*

For example, type:

```
ProCurve NAC 800:/etc/raddb/certs# openssl x509 -in
procurveu_ca.cer -inform DER -out procurveu_ca.pem
-outform PEM
```

Note

If you attempt to convert a certificate with the .cer extension, and you receive an error message, the certificate might already be in PEM format. You can skip this step.

Convert from Personal Information Exchange (PFX) format with this command:

Syntax: openssl pkcs7 -in <*certificate filename*>.pfx -out <*certificate filename*>.pem

You should change the filename extension to reflect the changed format.

10. Alter the **/etc/raddb/eap.conf** file to specify the new private key and certificate files.
    a. Type this command:

    ```
    ProCurve NAC 800:/etc/raddb/certs# vi /etc/raddb/
    eap.conf
    ```

    b. Use the arrow keys or other vi commands to reach the “tls” section of the configuration file. (See Figure 2-164.)

```
tls {
            private_key_password = whatever
            private_key_file = ${raddbdir}/certs/cert-srv.pem

            #  If Private key & Certificate are located in
            #  the same file, then private_key_file &
            #  certificate_file must contain the same file
            #  name.
            certificate_file = ${raddbdir}/certs/cert-srv.pem

            #  Trusted Root CA list
            CA_file = ${raddbdir}/certs/demoCA/cacert.pem

            dh_file = ${raddbdir}/certs/dh
            random_file = ${raddbdir}/certs/random
```

Figure 2-164. Example radiusd.conf File——tls Section

    c. Press **[i]**.

    d. If you created a password for the private key, set **private_key_password** to the same key that you chose earlier. For example:

    ```
    private_key_password = mykey
    ```

e. Set **private_key_file** to the same as the ***<key_filename>*** that you specified in step 3 on page 2-197. Keep the default path already included in the configuration file (which works as long as you saved the key in the proper directory). For example:

```
private_key_file = ${raddbdir}/certs/
procurveu_radkey.pem
```

f. Set **certificate_file** to the same as the ***<cert_filename>*** that you specified in step 4 on page 2-200. Keep the default path already included in the configuration file (which works as long as you saved the certificate in the proper directory). For example:

```
certificate_file = ${raddbdir}/certs/
procurveu_rad.cer
```

g. Set **CA_file** to the same as the ***<ca_cert_filename>*** that you specified in step 4 on page 2-200 or (if you converted the file to different format) 9 on page 2-200. Make sure to specfy the **certs** directory (not the **certs/demoCA**) because this is the location to which you saved the certificate. For example:

```
CA_file = ${raddbdir}/certs/procurveu_ca.pem
```

h. Press **[Esc]**.

i. Type this command:

```
:wq
```

11. Restart the RADIUS server.

```
ProCurve NAC 800:/# service radiusd restart
```

If the RADIUS server fails to restart, you have probably mistyped the filenames or private key password in step 10. Carefully recheck the configuration. Also check the **/etc/raddb/certs** directory (**dir**) and verify it contains the correct files.

Configuring Network Access Control with PCM+

This section describes how to install PCM+ 2.2 and IDM 2.2 on a Windows Server 2003. The update occurs in two steps: first, you install PCM+ 2.2 with IDM 2.15; then, you upgrade to IDM 2.2.

You can complete a variety of tasks with PCM+. In addition to explaining how to install PCM+, this section describes how to configure both local and remote mirroring, which is necessary for endpoint integrity as implemented in this solution.

You will also implement port authentication with the Secure Access Wizard—activating your network access control solution.

The next section, "Configuring Network Access Control with IDM" on page 2-229, explains how to control network access with IDM.

Note

Version 2.2 auto-update 2 is required for managing the NAC 800 with PCM+ and IDM.

Install PCM+

You can obtain the installation CD, which includes a 30-day trial version of PCM+, with new ProCurve switches. You can also purchase PCM+ from a ProCurve solutions provider.

The first step in installing PCM+ 2.2 is to ensure that your system meets the system requirements for PCM+. The following OSs support PCM+:

- Windows 2000:
  - Server
  - Advanced Server
  - Pro with Service Pack 4 (SP4) or later
- Windows Server 2003
- Windows XP Pro SP2 or later

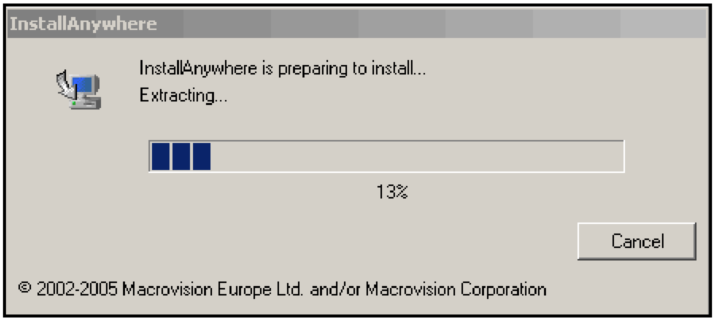
Table 2-13 shows the minimum and recommended hardware capabilities of the server, which depend largely on the size of your network. These recommendations apply to a server dedicated to running PCM+ and add-ons such as IDM. (If you are using add-ons, plan for the recommended rather than the minimum capabilities.)

Table 2-13. Recommended Hardware Capabilities of PCM+ Server

Network Size	Processor		RAM		Free Disk Space		NIC	
	Minimum	Recommend	Minimum	Recommend	Minimum	Recommend	Minimum	Recommend
Small to medium 50 to 250 managed devices	2 GHz Pentium IV or equivalent	3 GHz Pentium IV or equivalent	1 GB	2 GB	10 GB	40 GB	1 Gbps	1 Gbps
Medium to large 250 to 2000 managed devices	3 GHz Pentium IV or equivalent	Intel Xeon or equivalent	3 GB	4 GB	40 GB	80 GB	1 Gbps	1 Gbps

Follow these steps to install PCM+ version 2.2:

1. Launch the PCM install executable. The **InstallAnywhere** window is displayed.

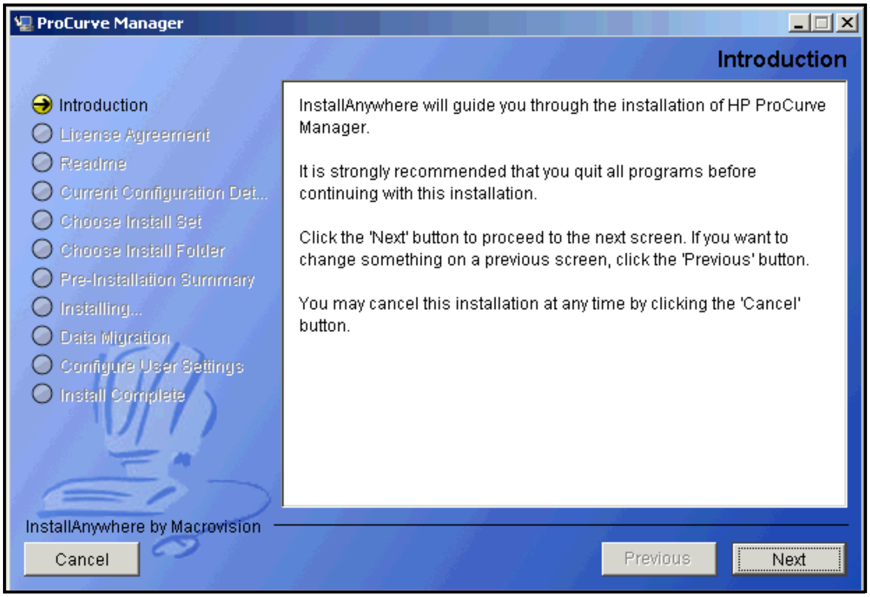


InstallAnywhere is preparing to install...
Extracting...

© 2002-2005 Macrovision Europe Ltd. and/or Macrovision Corporation

Figure 2-165. PCM InstallAnywhere Window

2. Wait for the install wizard to open.



InstallAnywhere will guide you through the installation of HP ProCurve Manager.

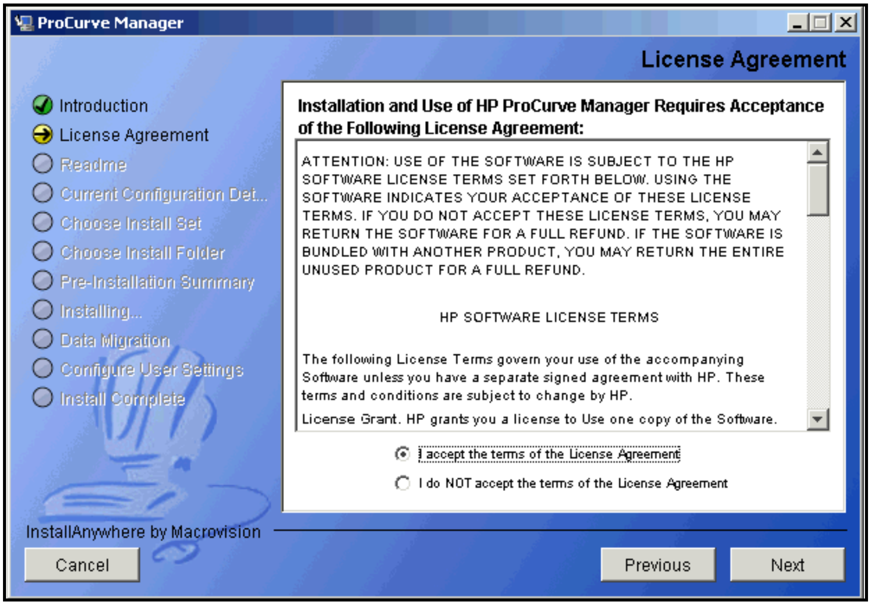
It is strongly recommended that you quit all programs before continuing with this installation.

Click the 'Next' button to proceed to the next screen. If you want to change something on a previous screen, click the 'Previous' button.

You may cancel this installation at any time by clicking the 'Cancel' button.

Figure 2-166. ProCurve Manager Install Wizard—Introduction Page

3. Click **Next**.



Installation and Use of HP ProCurve Manager Requires Acceptance of the Following License Agreement:

ATTENTION: USE OF THE SOFTWARE IS SUBJECT TO THE HP SOFTWARE LICENSE TERMS SET FORTH BELOW. USING THE SOFTWARE INDICATES YOUR ACCEPTANCE OF THESE LICENSE TERMS. IF YOU DO NOT ACCEPT THESE LICENSE TERMS, YOU MAY RETURN THE SOFTWARE FOR A FULL REFUND. IF THE SOFTWARE IS BUNDLED WITH ANOTHER PRODUCT, YOU MAY RETURN THE ENTIRE UNUSED PRODUCT FOR A FULL REFUND.

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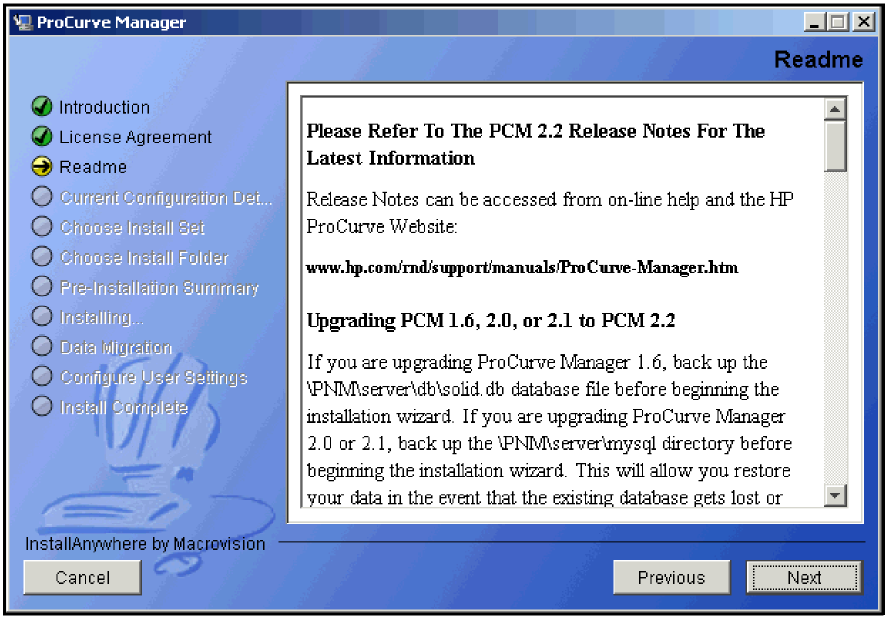
License Grant. HP grants you a license to Use one copy of the Software.

● I accept the terms of the License Agreement

○ I do NOT accept the terms of the License Agreement

Figure 2-167. ProCurve Manager Install Wizard—License Agreement Page

4. Select **I accept the terms of the License Agreement** and click **Next**.



Please Refer To The PCM 2.2 Release Notes For The Latest Information

Release Notes can be accessed from on-line help and the HP ProCurve Website:

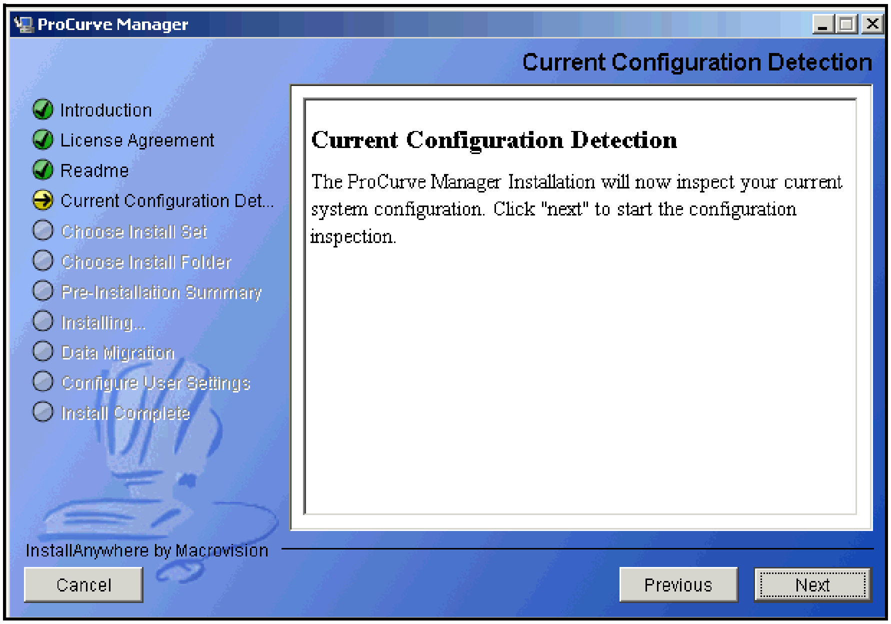
www.hp.com/rnd/support/manuals/ProCurve-Manager.htm

Upgrading PCM 1.6, 2.0, or 2.1 to PCM 2.2

If you are upgrading ProCurve Manager 1.6, back up the \PNM\server\db\solid.db database file before beginning the installation wizard. If you are upgrading ProCurve Manager 2.0 or 2.1, back up the \PNM\server\mysql directory before beginning the installation wizard. This will allow you restore your data in the event that the existing database gets lost or

Figure 2-168. ProCurve Manager Install Wizard—Readme Page

5. Scroll through the **Readme** page if desired and then click **Next**.

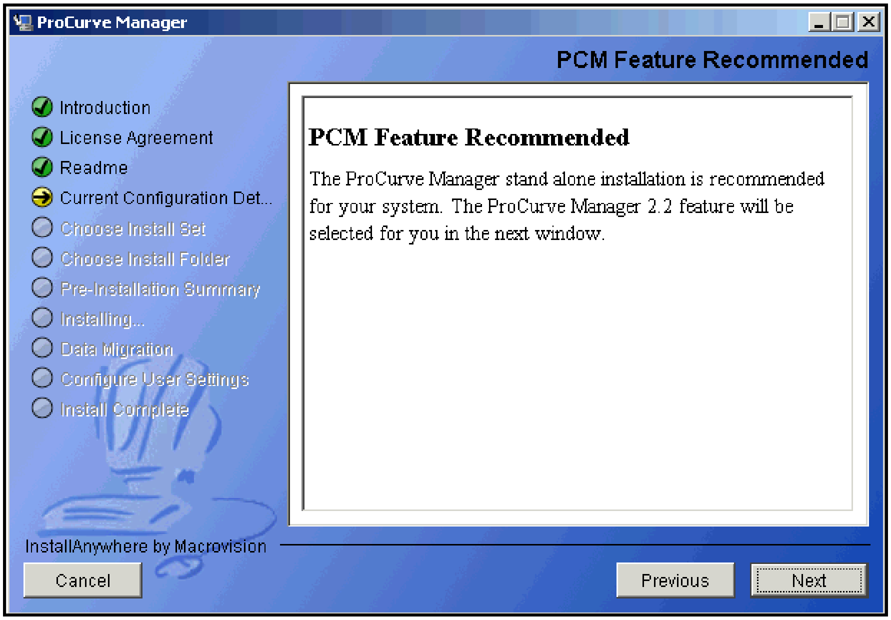


Current Configuration Detection

The ProCurve Manager Installation will now inspect your current system configuration. Click "next" to start the configuration inspection.

Figure 2-169. ProCurve Manager Install Wizard—Current Configuration Detection Page

6. Click **Next**.

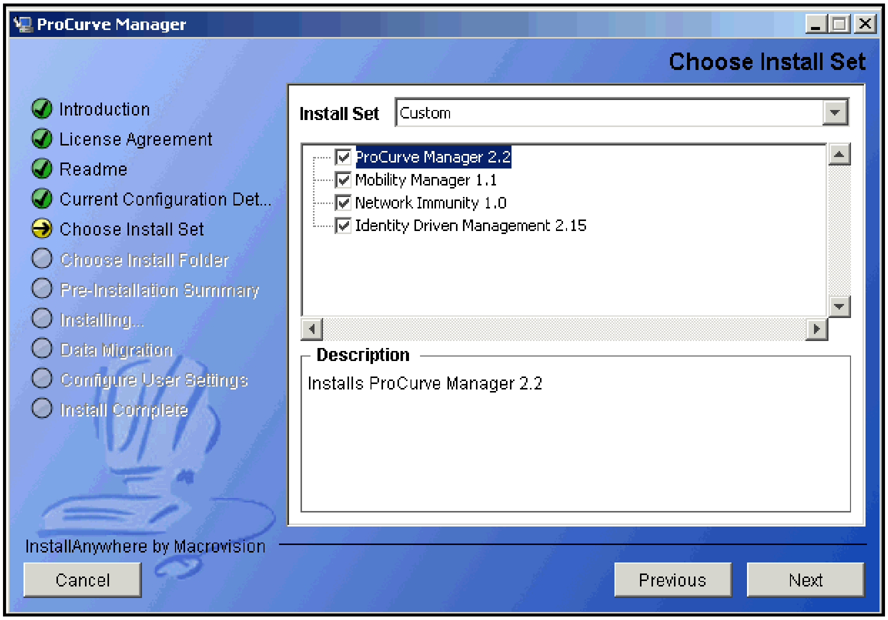


PCM Feature Recommended

The ProCurve Manager stand alone installation is recommended for your system. The ProCurve Manager 2.2 feature will be selected for you in the next window.

Figure 2-170. ProCurve Manager Install Wizard—PCM Feature Recommended Page

7. Click **Next**.



Install Set: Custom

- ☑ ProCurve Manager 2.2
- ☑ Mobility Manager 1.1
- ☑ Network Immunity 1.0
- ☑ Identity Driven Management 2.15

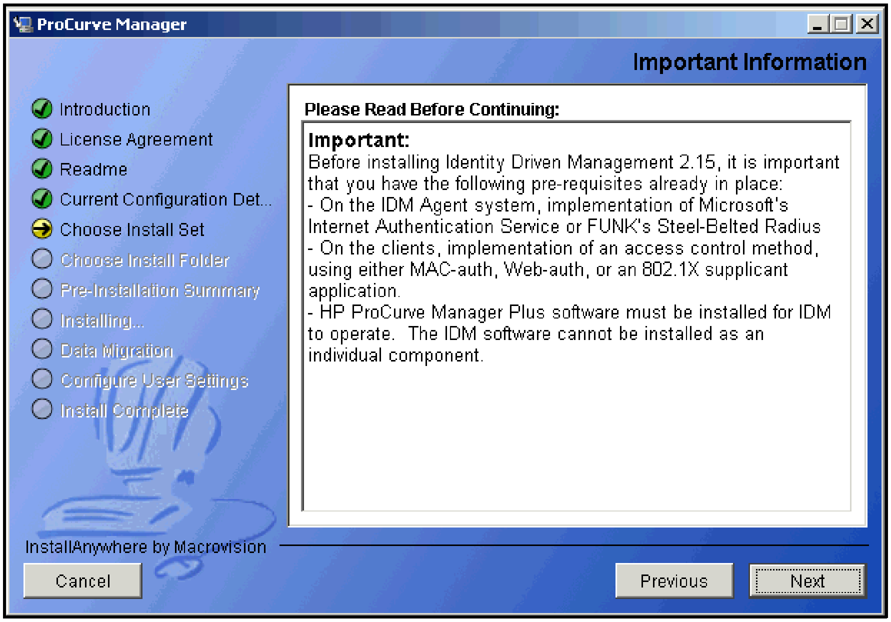
Description

Installs ProCurve Manager 2.2

Figure 2-171. ProCurve Manager Install Wizard—Choose Install Set Page

8. Select the **ProCurve Manager 2.2** and **Identity Driven Management 2.15** check boxes. If desired, also select the **Mobility Manager** and **Network Immunity** check boxes. (Configuring those options is beyond the scope of this document.)

9. Click **Next**.

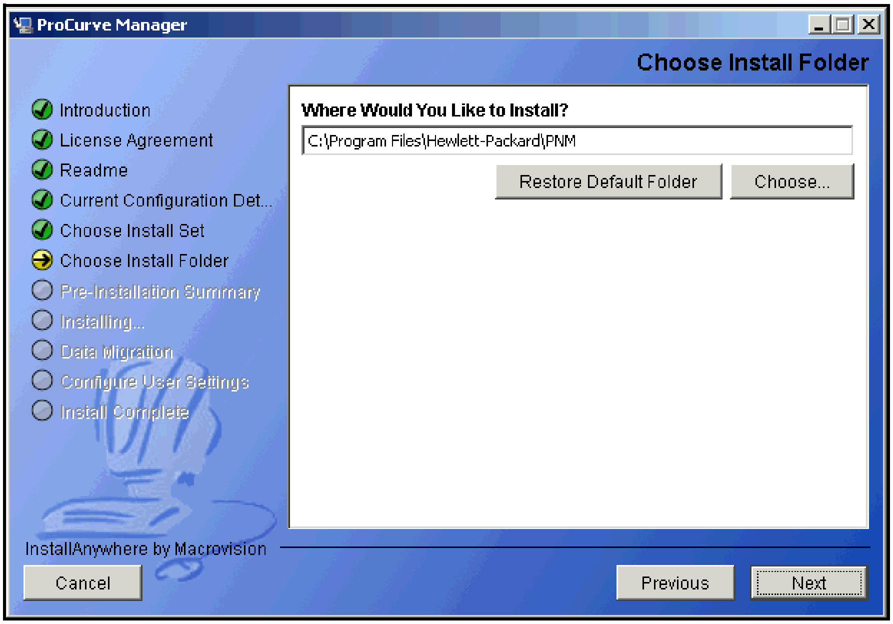


Please Read Before Continuing:

Important:
Before installing Identity Driven Management 2.15, it is important that you have the following pre-requisites already in place:
- On the IDM Agent system, implementation of Microsoft's Internet Authentication Service or FUNK's Steel-Belted Radius
- On the clients, implementation of an access control method, using either MAC-auth, Web-auth, or an 802.1X supplicant application.
- HP ProCurve Manager Plus software must be installed for IDM to operate. The IDM software cannot be installed as an individual component.

Figure 2-172. ProCurve Manager Install Wizard—Important Information Page

10. Read the information displayed in the window in Figure 2-172. Click **Next**.



ProCurve Manager

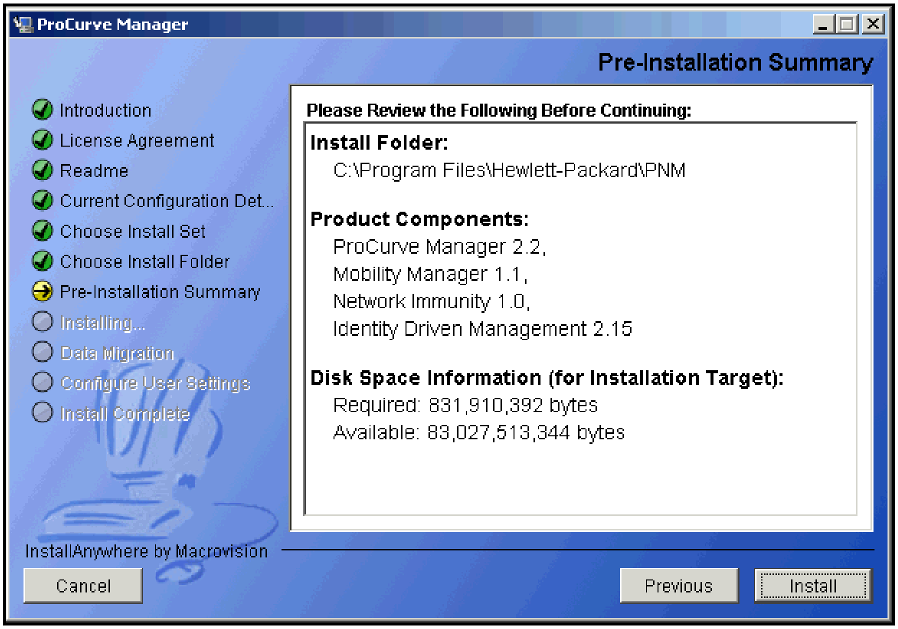
Choose Install Folder

Where Would You Like to Install?

C:\Program Files\Hewlett-Packard\PNM

Figure 2-173. ProCurve Manager Install Wizard—Choose Install Folder Page

11. Accept the default install folder or click **Choose** to select another install folder.
12. Click **Next**.



Please Review the Following Before Continuing:

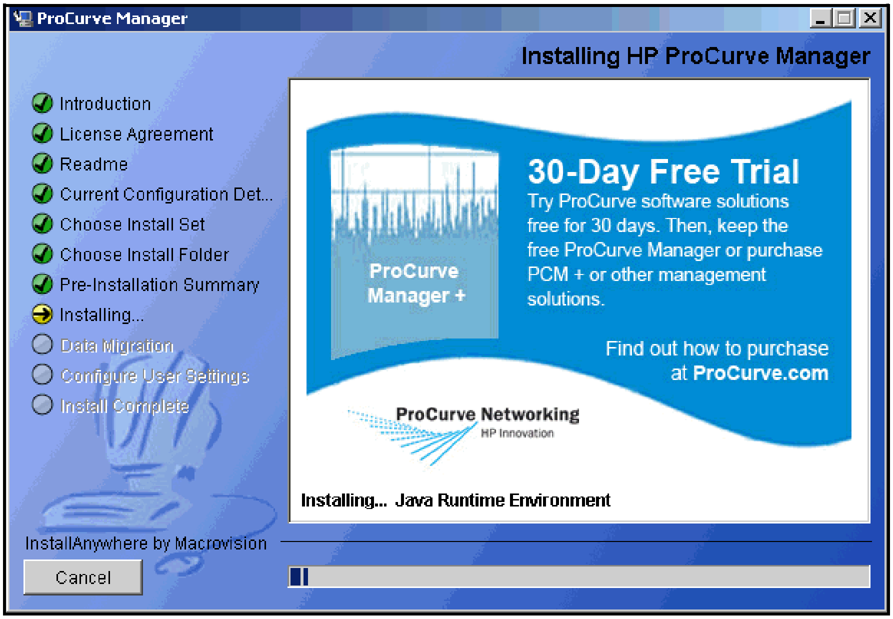
Install Folder:
C:\Program Files\Hewlett-Packard\PNM

Product Components:
ProCurve Manager 2.2,
Mobility Manager 1.1,
Network Immunity 1.0,
Identity Driven Management 2.15

Disk Space Information (for Installation Target):
Required: 831,910,392 bytes
Available: 83,027,513,344 bytes

Figure 2-174. ProCurve Manager Install Wizard—Pre-Installation Summary Page

13. Review the pre-installation summary and click **Install**.



ProCurve Manager

Installing HP ProCurve Manager

- ✓ Introduction
- ✓ License Agreement
- ✓ Readme
- ✓ Current Configuration Det...
- ✓ Choose Install Set
- ✓ Choose Install Folder
- ✓ Pre-Installation Summary
- ➔ Installing...
- ○ Data Migration
- ○ Configure User Settings
- ○ Install Complete

30-Day Free Trial

Try ProCurve software solutions free for 30 days. Then, keep the free ProCurve Manager or purchase PCM + or other management solutions.

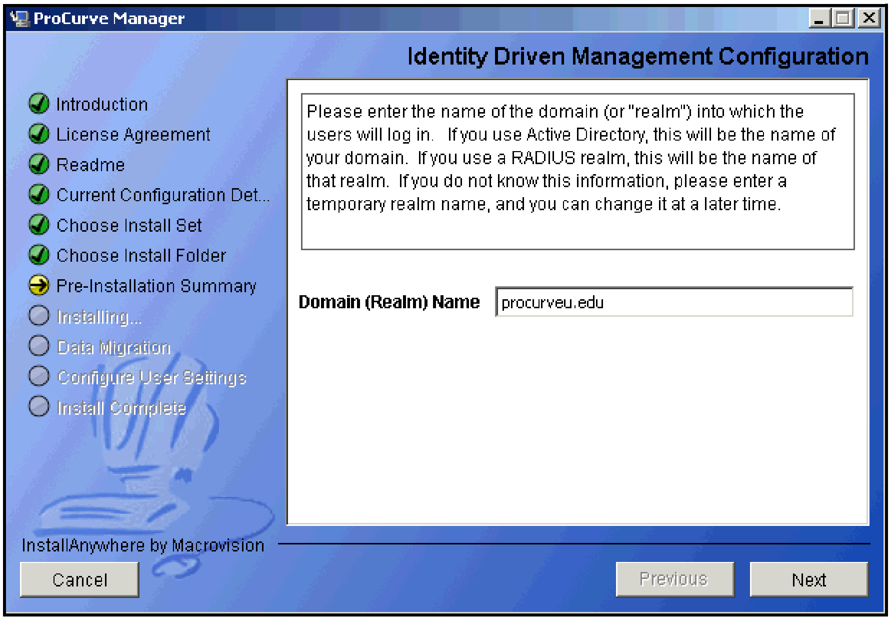
Find out how to purchase at ProCurve.com

Installing... Java Runtime Environment

InstallAnywhere by Macrovision

Figure 2-175. ProCurve Manager Install Wizard—Installing HP ProCurve Manager Page

14. The window shown in Figure 2-175 is displayed while PCM+ installs.



Please enter the name of the domain (or "realm") into which the users will log in. If you use Active Directory, this will be the name of your domain. If you use a RADIUS realm, this will be the name of that realm. If you do not know this information, please enter a temporary realm name, and you can change it at a later time.

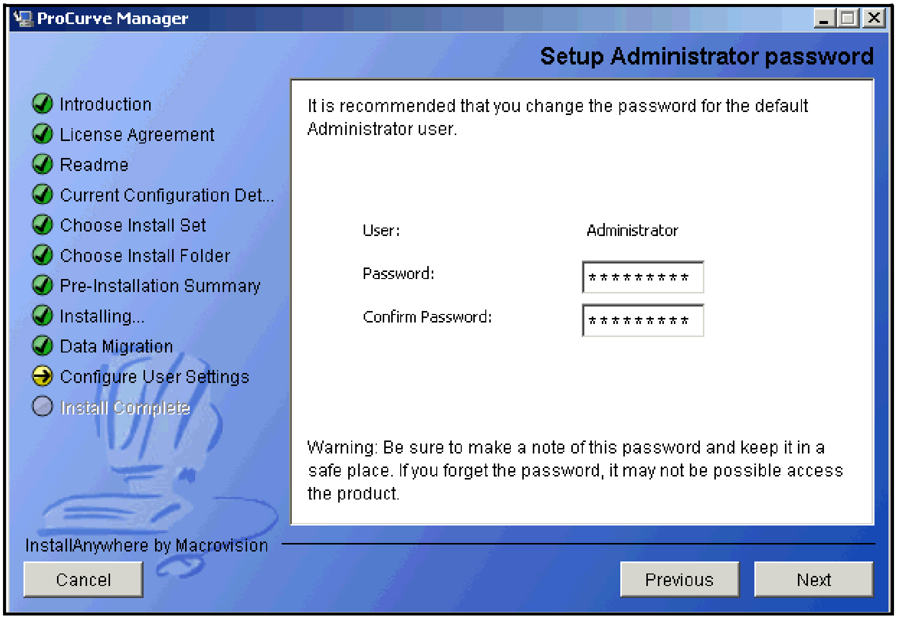
Domain (Realm) Name procurveu.edu

Figure 2-176. ProCurve Manager Install Wizard — Identity Driven Management Configuration Page

15. Type your domain name for the **Domain (Realm) Name**. This becomes IDM's default realm (in this example: **procurveu.edu**).

    If the PCM+ server has already joined the domain, the realm is automatically filled in.

16. Click **Next**.



It is recommended that you change the password for the default Administrator user.

User: Administrator

Password: *********

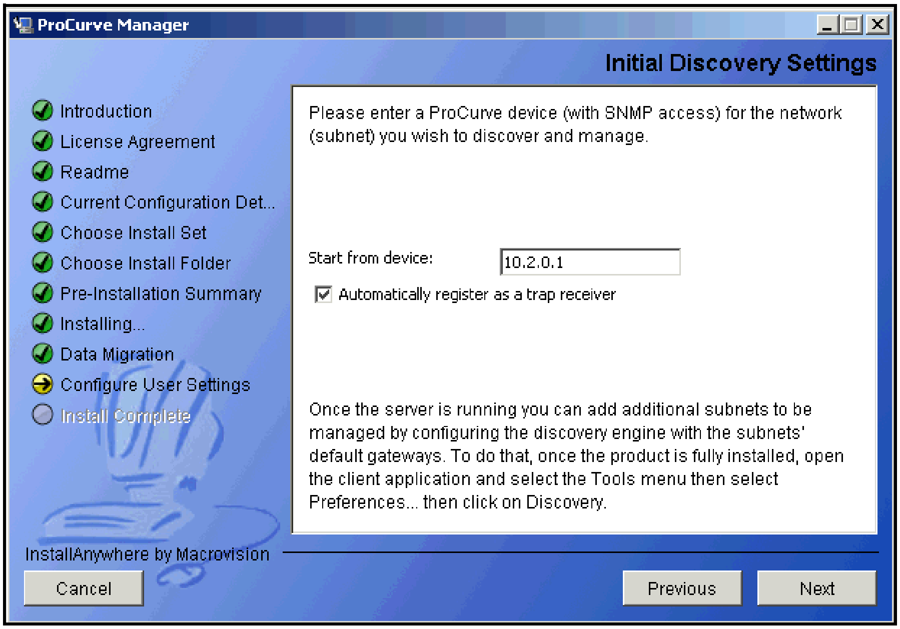
Confirm Password: *********

Warning: Be sure to make a note of this password and keep it in a safe place. If you forget the password, it may not be possible access the product.

Figure 2-177. ProCurve Manager Install Wizard—Setup Administrator password Page

17. Type the **Password** for the PCM+ Administrator.
18. Retype the password in the **Confirm Password** box.
19. Take careful note of the password. You must enter it to access PCM+.
20. Click **Next**.

21. In the **Start from device** box, type the IP address of a switch in the Management VLAN. In this example, the address of the routing switch: **10.2.0.1**.



Please enter a ProCurve device (with SNMP access) for the network (subnet) you wish to discover and manage.

Start from device: 10.2.0.1

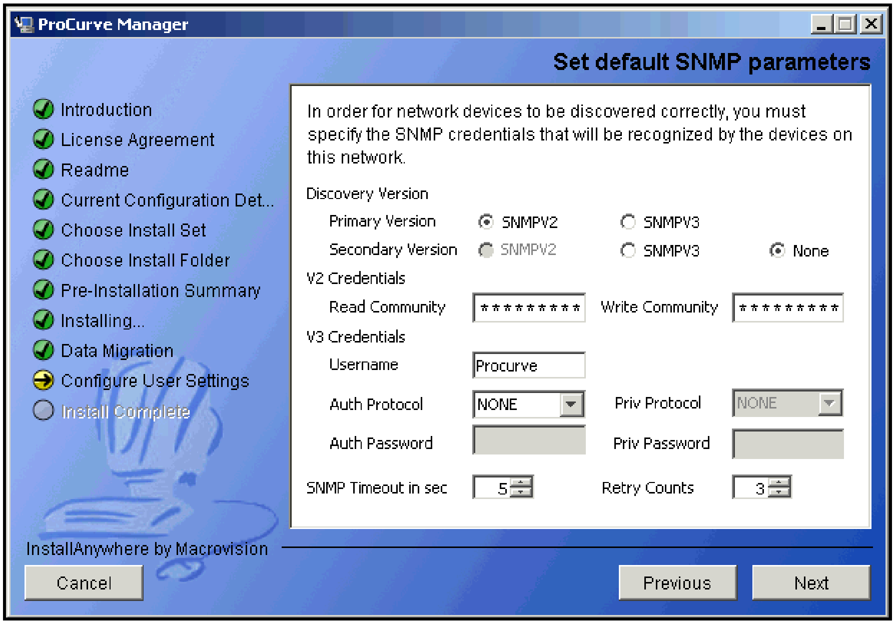
☑ Automatically register as a trap receiver

Once the server is running you can add additional subnets to be managed by configuring the discovery engine with the subnets' default gateways. To do that, once the product is fully installed, open the client application and select the Tools menu then select Preferences... then click on Discovery.

Figure 2-178. ProCurve Manager Install Wizard—Initial Discovery Settings Page

22. The **Automatically register as a trap receiver** check box should be selected.

23. Click **Next**.



ProCurve Manager

Set default SNMP parameters

- ✓ Introduction
- ✓ License Agreement
- ✓ Readme
- ✓ Current Configuration Det...
- ✓ Choose Install Set
- ✓ Choose Install Folder
- ✓ Pre-Installation Summary
- ✓ Installing...
- ✓ Data Migration
- ➔ Configure User Settings
- ○ Install Complete

In order for network devices to be discovered correctly, you must specify the SNMP credentials that will be recognized by the devices on this network.

Discovery Version

Primary Version ● SNMPV2 ○ SNMPV3

Secondary Version ○ SNMPV2 ○ SNMPV3 ● None

V2 Credentials

Read Community ********* Write Community *********

V3 Credentials

Username Procurve

Auth Protocol NONE Priv Protocol NONE

Auth Password Priv Password

SNMP Timeout in sec 5 Retry Counts 3

InstallAnywhere by Macrovision

Figure 2-179. ProCurve Manager Install Wizard—Set default SNMP parameters Page

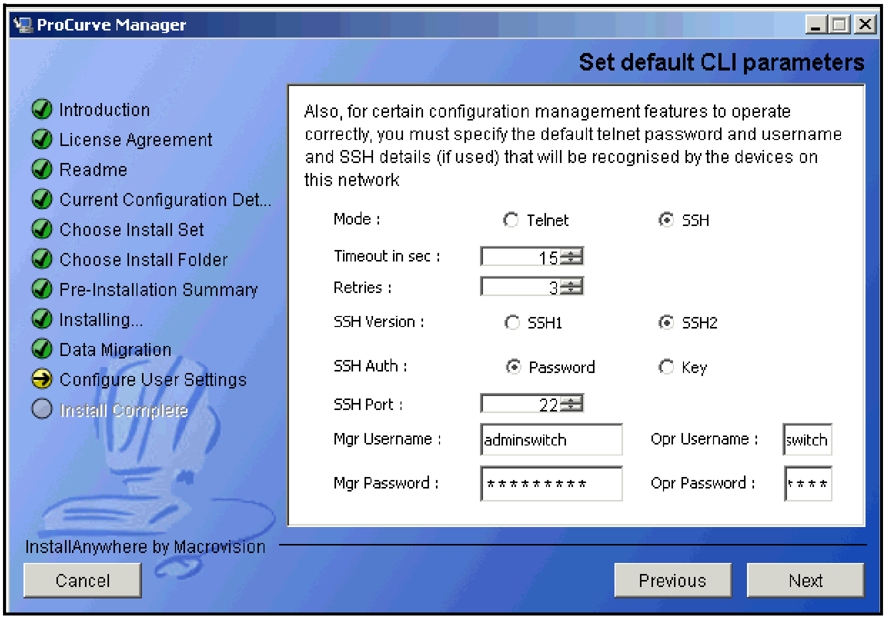
24. Configure SNMP settings to match those specified for network devices. (You set up these settings in “Configuring the ProCurve Switches” on page 2-13, “Configure SNMP on the Wireless Edge Services Modules” on page 2-117, and “Configure More Basic Settings for the MS” on page 2-142.)

    a. In this example, thenetwork uses SNMPv2. Select the **SNMPV2** option for the **Primary Version** and **None** for the **Secondary Version**.

    b. For the **Read Community**, type the string you selected for the read-only community (in this example, **procurvero**).

    c. For the **Write Community**, type the string you selected forthe read-write community (in this example, **procurverw**).

25. Click **Next**.



ProCurve Manager

Set default CLI parameters

Also, for certain configuration management features to operate correctly, you must specify the default telnet password and username and SSH details (if used) that will be recognised by the devices on this network

Mode : ○ Telnet ● SSH

Timeout in sec : 15

Retries : 3

SSH Version : ○ SSH1 ● SSH2

SSH Auth : ● Password ○ Key

SSH Port : 22

Mgr Username : adminswitch

Opr Username : switch

Mgr Password : *********

Opr Password : ****

Figure 2-180. ProCurve Manager Install Wizard—Set default CLI parameters Page

26. Configure CLI access from PCM+ to ProCurve devices. The default configuration uses Telnet.

    a. Select **Telnet** or **SSH** (secure).

    a. In the **Timeout in sec** box, type a number between **1** and **60**.

    b. In the **Retries** box, type a number between **1** and **5**.

    c. If you have selected SSH, configure some settings:
       i. For **SSH Version**, select **SSH1** or **SSH2**.
       ii. For **SSH Auth**, select **Password** or **Key.**

    d. For **Mgr Username**, typethe management username for devices in your network. In this example: **adminswitch**.

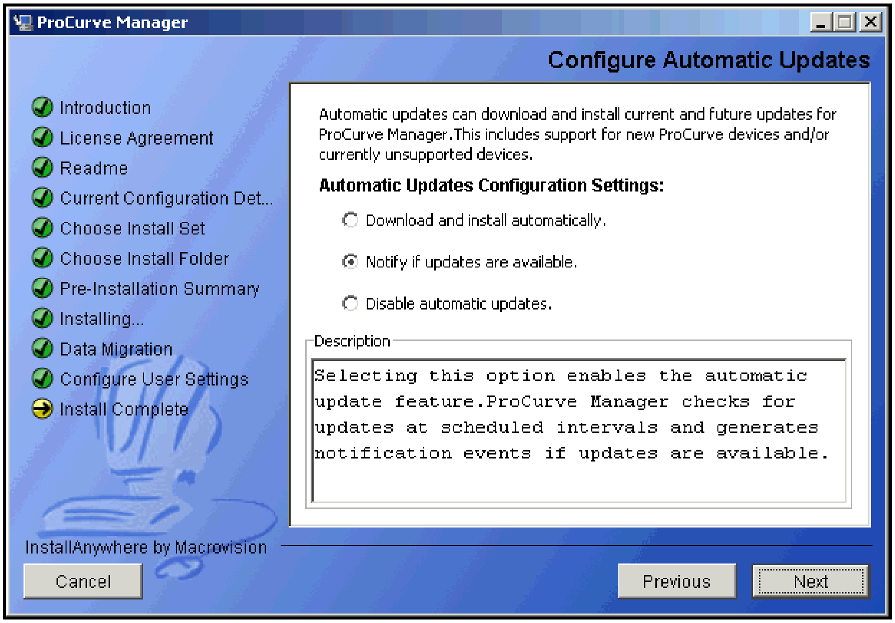
    e. For **Mgr Password**, type the associated password.

    f. For **Opr Username**, type the username for operators in your network. In this example: **operatorswitch**.

    g. Type the associated password for the **Opr Password**.

    h. Click **Next.**

27. Configure settings for an HTTP proxy if your network uses one. The example network does not. Click **Next**.



Automatic updates can download and install current and future updates for ProCurve Manager.This includes support for new ProCurve devices and/or currently unsupported devices.

Automatic Updates Configuration Settings:

○ Download and install automatically.

● Notify if updates are available.

○ Disable automatic updates.

Description

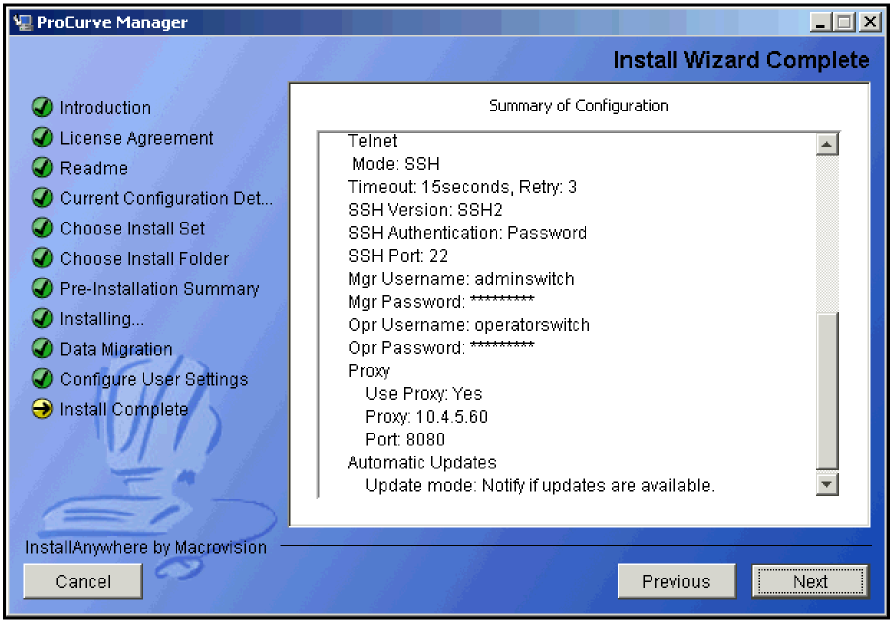
```
Selecting this option enables the automatic
update feature.ProCurve Manager checks for
updates at scheduled intervals and generates
notification events if updates are available.
```

Figure 2-181. ProCurve Manager Install Wizard—Configure Automatic Updates Page

28. Configure settings for updates to PCM+. Select one of the following options:

    - **Download and install automatically**—PCM+ checks the ProCurve Web site for updates and downloads them, without interaction from you or another network administrator.
    - **Notify if updates are available**—PCM+ checks the ProCurve Web site for updates and logs an event message for every update available for download. You can then review the PCM+ event log to identify updates and install them manually.
    - **Disable automatic updates**—PCM+ will not check for updates. You must manually install updates.

    After you make your selection, click **Next**. The **Install Wizard Complete** page is displayed.

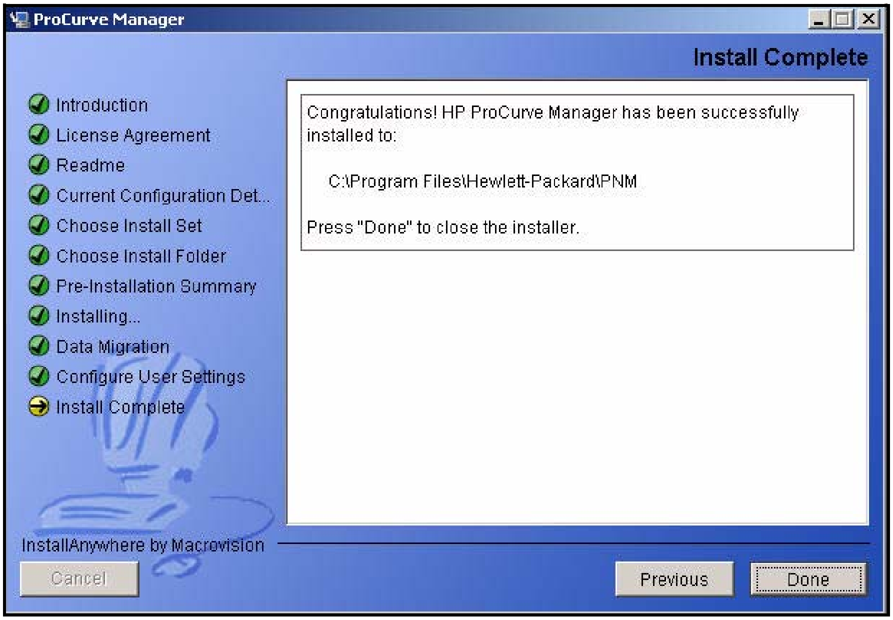


Summary of Configuration

```
Telnet
 Mode: SSH
Timeout: 15seconds, Retry: 3
SSH Version: SSH2
SSH Authentication: Password
SSH Port: 22
Mgr Username: adminswitch
Mgr Password: *********
Opr Username: operatorswitch
Opr Password: *********
Proxy
   Use Proxy: Yes
   Proxy: 10.4.5.60
   Port: 8080
Automatic Updates
   Update mode: Notify if updates are available.
```

Figure 2-182. ProCurve Manager Install Wizard—Install Wizard Complete Page

29. Click **Next**.



Congratulations! HP ProCurve Manager has been successfully installed to:

C:\Program Files\Hewlett-Packard\PNM

Press "Done" to close the installer.

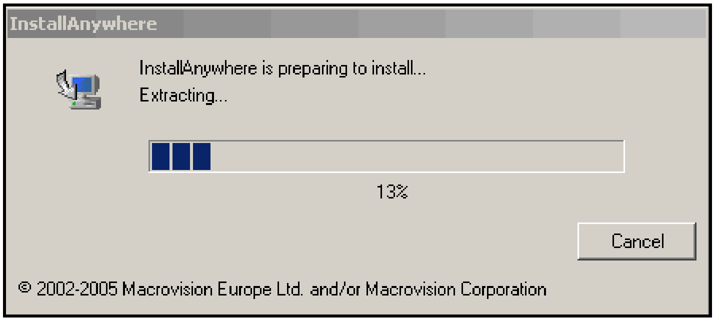
Figure 2-183. ProCurve Manager Install Wizard—Install Wizard Complete Page

30. Click **Done.**

Install IDM 2.2

After you install or upgrade to PCM+ version 2.2, the IDM version is 2.15. Next you must upgrade IDM to version 2.2. (You must install PCM+ 2.2 *before* IDM 2.2.) Follow these steps:

1. Launch the IDM 2.2 executable. The **InstallAnywhere** window is displayed.

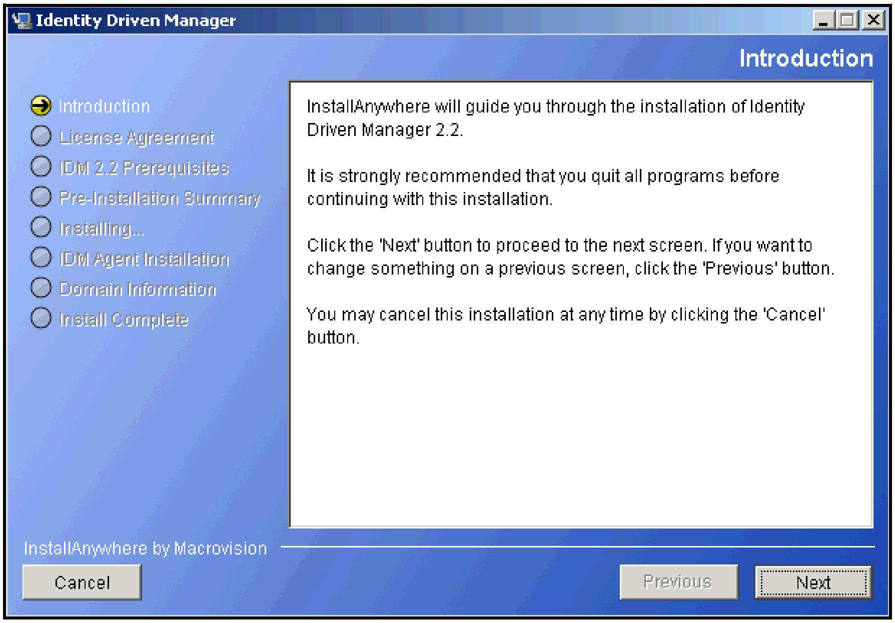


InstallAnywhere is preparing to install...
Extracting...

© 2002-2005 Macrovision Europe Ltd. and/or Macrovision Corporation

Figure 2-184. IDM InstallAnywhere Window

2. Wait for the install wizard to open.



InstallAnywhere will guide you through the installation of Identity Driven Manager 2.2.

It is strongly recommended that you quit all programs before continuing with this installation.

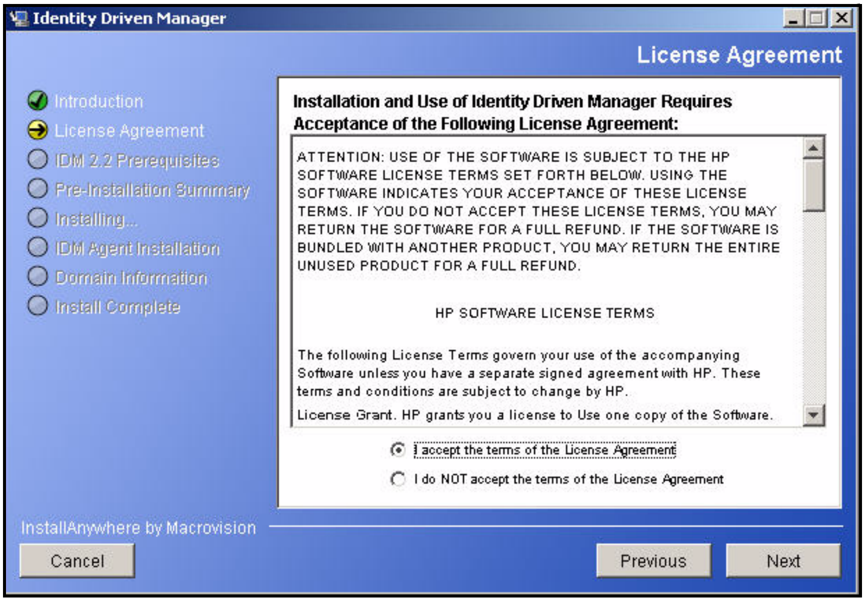
Click the 'Next' button to proceed to the next screen. If you want to change something on a previous screen, click the 'Previous' button.

You may cancel this installation at any time by clicking the 'Cancel' button.

Figure 2-185. Identity Driven Manager Install Wizard—Introduction Page

3. Click **Next**.

4. Click **I accept the terms of the License Agreement**.



Installation and Use of Identity Driven Manager Requires Acceptance of the Following License Agreement:

ATTENTION: USE OF THE SOFTWARE IS SUBJECT TO THE HP SOFTWARE LICENSE TERMS SET FORTH BELOW. USING THE SOFTWARE INDICATES YOUR ACCEPTANCE OF THESE LICENSE TERMS. IF YOU DO NOT ACCEPT THESE LICENSE TERMS, YOU MAY RETURN THE SOFTWARE FOR A FULL REFUND. IF THE SOFTWARE IS BUNDLED WITH ANOTHER PRODUCT, YOU MAY RETURN THE ENTIRE UNUSED PRODUCT FOR A FULL REFUND.

HP SOFTWARE LICENSE TERMS

The following License Terms govern your use of the accompanying Software unless you have a separate signed agreement with HP. These terms and conditions are subject to change by HP.

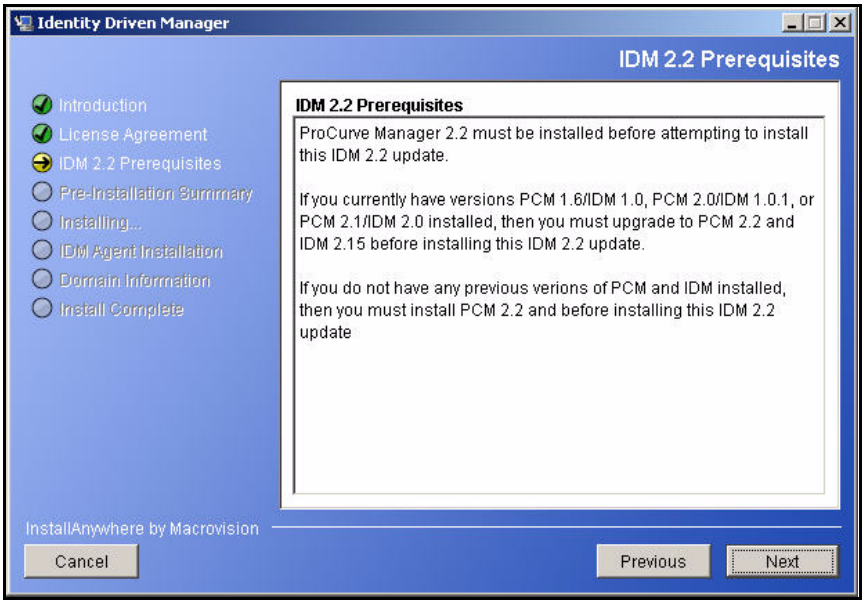
License Grant. HP grants you a license to Use one copy of the Software.

● I accept the terms of the License Agreement

○ I do NOT accept the terms of the License Agreement

Figure 2-186. Identity Driven Manager Install Wizard—License Agreement Page

5. Click **Next**.



IDM 2.2 Prerequisites

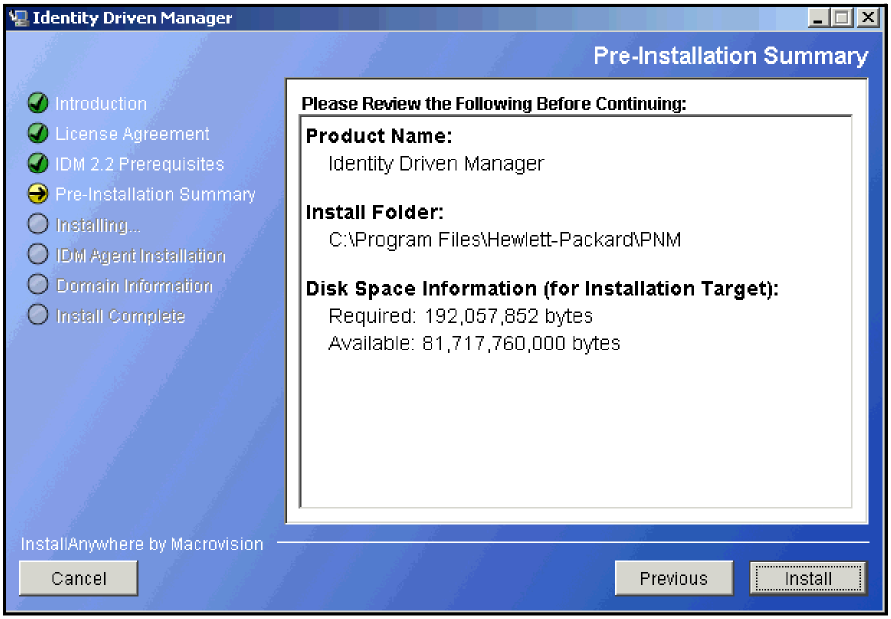
ProCurve Manager 2.2 must be installed before attempting to install this IDM 2.2 update.

If you currently have versions PCM 1.6/IDM 1.0, PCM 2.0/IDM 1.0.1, or PCM 2.1/IDM 2.0 installed, then you must upgrade to PCM 2.2 and IDM 2.15 before installing this IDM 2.2 update.

If you do not have any previous verions of PCM and IDM installed, then you must install PCM 2.2 and before installing this IDM 2.2 update

Figure 2-187. ProCurve Manager Install Wizard—IDM 2.2 Prerequisites Page

6. Click **Next**.



Please Review the Following Before Continuing:

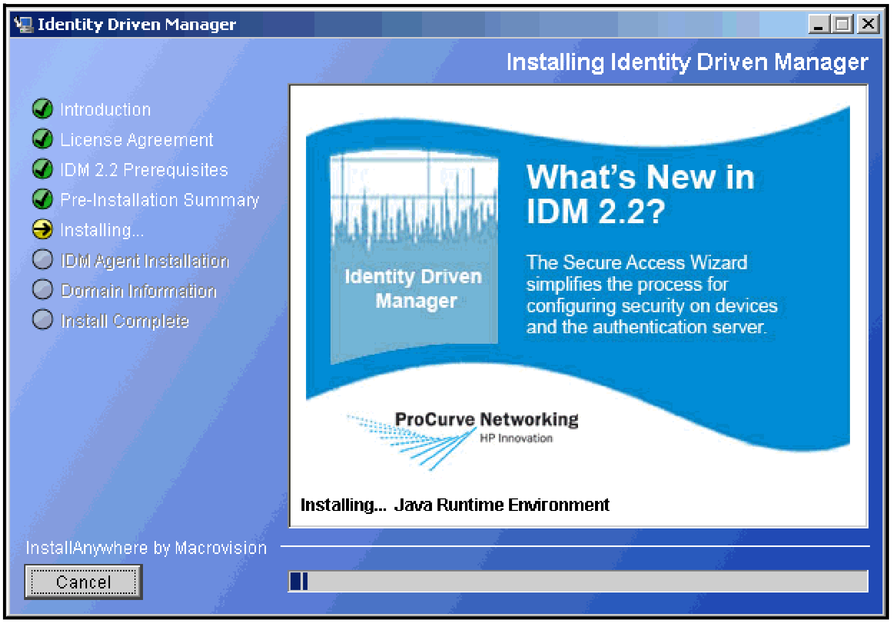
Product Name:
Identity Driven Manager

Install Folder:
C:\Program Files\Hewlett-Packard\PNM

Disk Space Information (for Installation Target):
Required: 192,057,852 bytes
Available: 81,717,760,000 bytes

Figure 2-188. Identity Driven Manager Install Wizard—Pre-Installation Summary Page

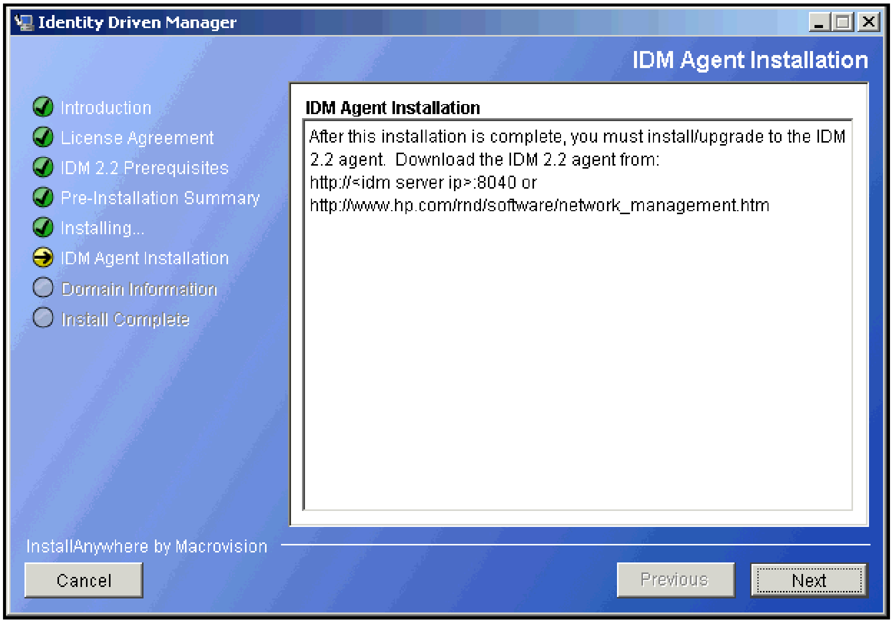
7. Click **Install**. Wait several minutes while IDM installs.



Installing... Java Runtime Environment

Figure 2-189. Identity Driven Manager Install Wizard—Installing Page

8. The **IDM Agent Installation** page reminds you to download the new IDM agents and install them on your RADIUS servers.



IDM Agent Installation

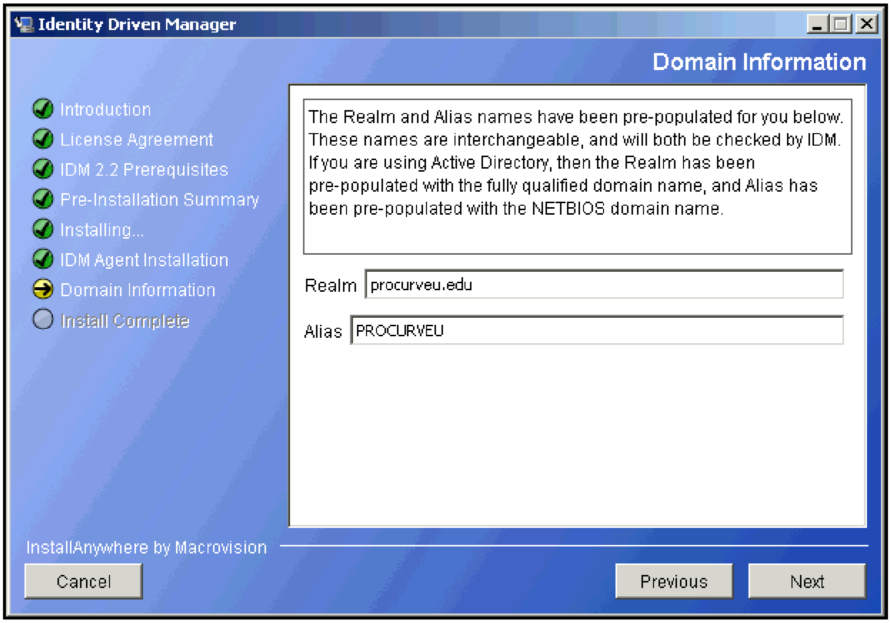
After this installation is complete, you must install/upgrade to the IDM 2.2 agent. Download the IDM 2.2 agent from:
http://<idm server ip>:8040 or
http://www.hp.com/rnd/software/network_management.htm

Figure 2-190. Identity Driven Manager Install Wizard—IDM Agent Installation Page

Note

This solution uses NAC 800s as the RADIUS servers, which include the agent by default. You can check the version of a NAC 800's agent by logging in to the device as root and entering **more /root/version**. Check the release notes for the NAC 800 for instructions on updating the IDM agent, if necessary.

9. Click **Next**.



The Realm and Alias names have been pre-populated for you below. These names are interchangeable, and will both be checked by IDM. If you are using Active Directory, then the Realm has been pre-populated with the fully qualified domain name, and Alias has been pre-populated with the NETBIOS domain name.

Realm procurveu.edu

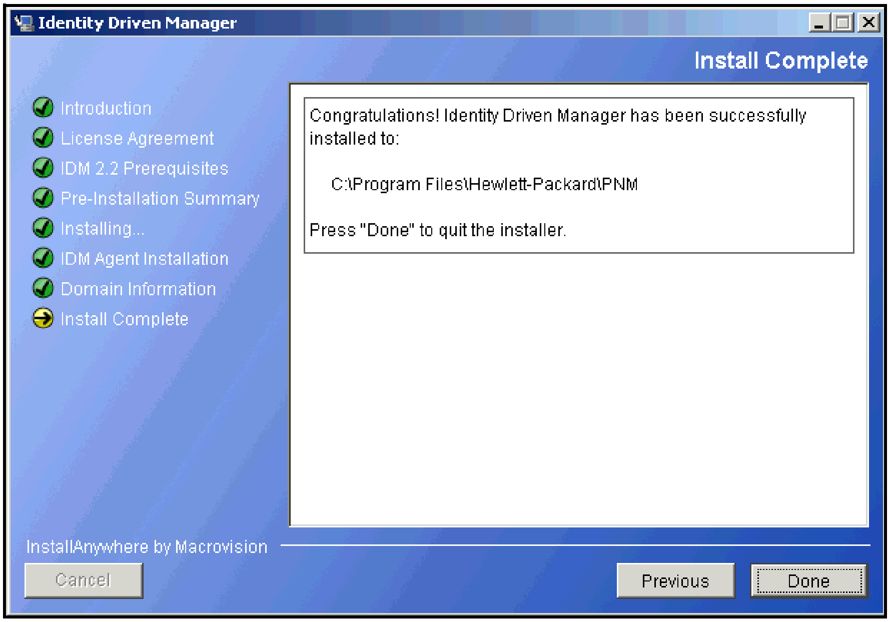
Alias PROCURVEU

Figure 2-191. Identity Driven Manager Install Wizard—Domain Information Page

10. On the **Domain Information** page, view the **Realm** and **Alias** boxes. Verify that the **Realm** box includes your domain's fully-qualified name and that the **Alias** box includes the associated NetBIOS (workgroup) name.

    If the PCM+/IDM server has not yet joined the domain, you must type the correct values into the boxes yourself. It is important to specify both the realm and the alias. Otherwise, IDM, which automatically creates realms based on information in authentication requests, may create two separate realms for the same domain.

11. Click **Next**.



Congratulations! Identity Driven Manager has been successfully installed to:

C:\Program Files\Hewlett-Packard\PNM

Press "Done" to quit the installer.

Figure 2-192. Identity Driven Manager Install Wizard—Install Complete Page

12. Click **Done** on the **Install Complete** page.

Configuring Network Access Control with IDM

IDM enables you to implement granular, user-based network access control more easily than ever before. In this chapter, you learn how to configure IDM to:

- Assign rights to successfully authenticated users
- Quarantine endpoints that fail to comply with security standards specified in NAC policies
- Isolate endpoints that are infected with malware

You must:

1. Add the NAC 800s to the list of devices allowed to access the PCM+/IDM server.
2. Enable endpoint integrity.
3. Add access policy groups and users.
4. Define resources to be controlled.
5. Create profiles (sets of rights).
6. Configure access policy group rules to assign profiles to users based on various conditions.
7. Deploy the access policies to the NAC 800s.

Note

In the following sections, the server that runs PCM+ with IDM is called the IDM server.

Add NAC 800s to the Access.txt File

IDM will not add a NAC 800 to its managed devices unless the NAC 800's IP address is listed in the server's **access.txt** file.

Follow these steps:

1. On the IDM server, open ***<PCM+ installation folder>*\server\config\access.txt.**

   You chose the installation folder in step 11 on page 2-211. The default location is: **C:\Program Files\Hewlett-Packard\PNM\server\config\access.txt**.

   Open the file in a text-based editor such as Notepad or Wordpad.

2. Add each NAC 800's IP address or hostname on its own line. You need to add only the ESs. In this example:

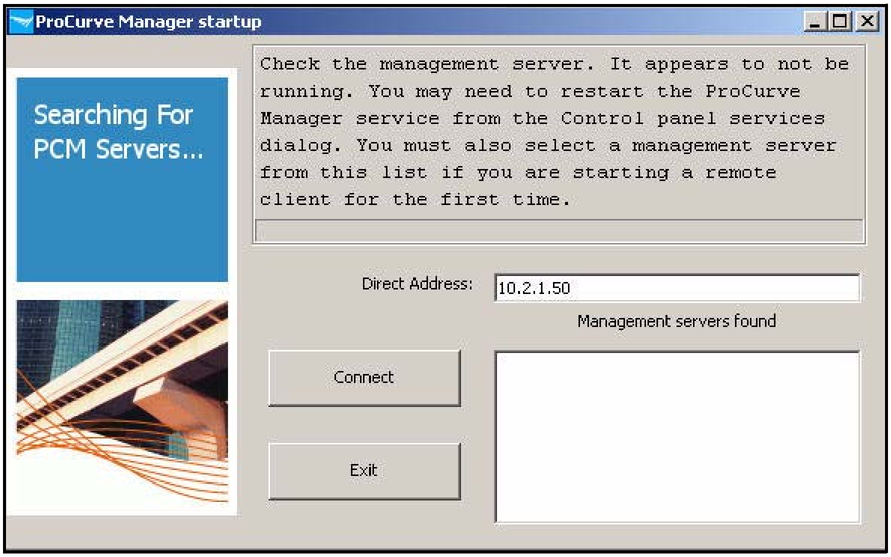
   10.4.4.40

   10.4.5.50

3. Save and close the file.

4. Open the PCM+ client, which automatically installed on the PCM+/IDM server.

   The first time that you access the client, you must choose the server.



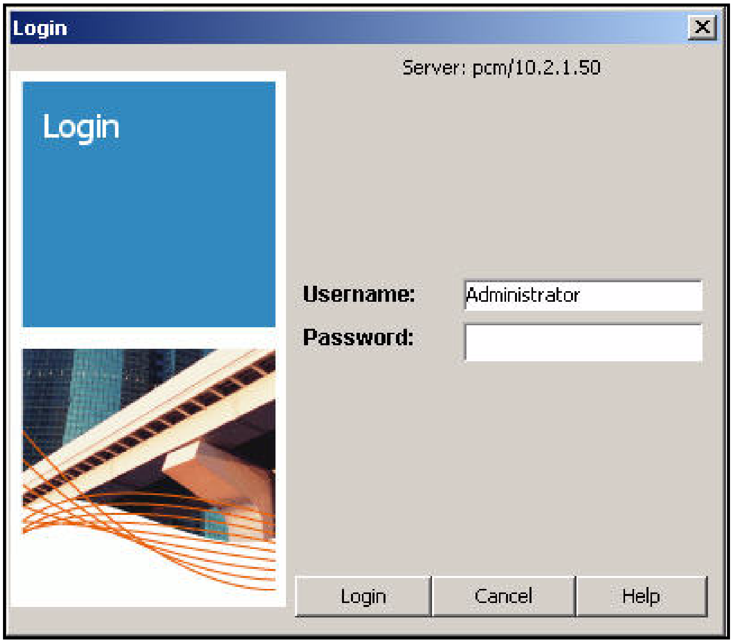
Check the management server. It appears to not be running. You may need to restart the ProCurve Manager service from the Control panel services dialog. You must also select a management server from this list if you are starting a remote client for the first time.

Direct Address: 10.2.1.50

Figure 2-193. ProCurve Manager startup Window

5. Click the server displayed in the **Management servers found** box and click **Connect**.

   Or enter the IP address of the PCM+ server in the **Direct Address** box.

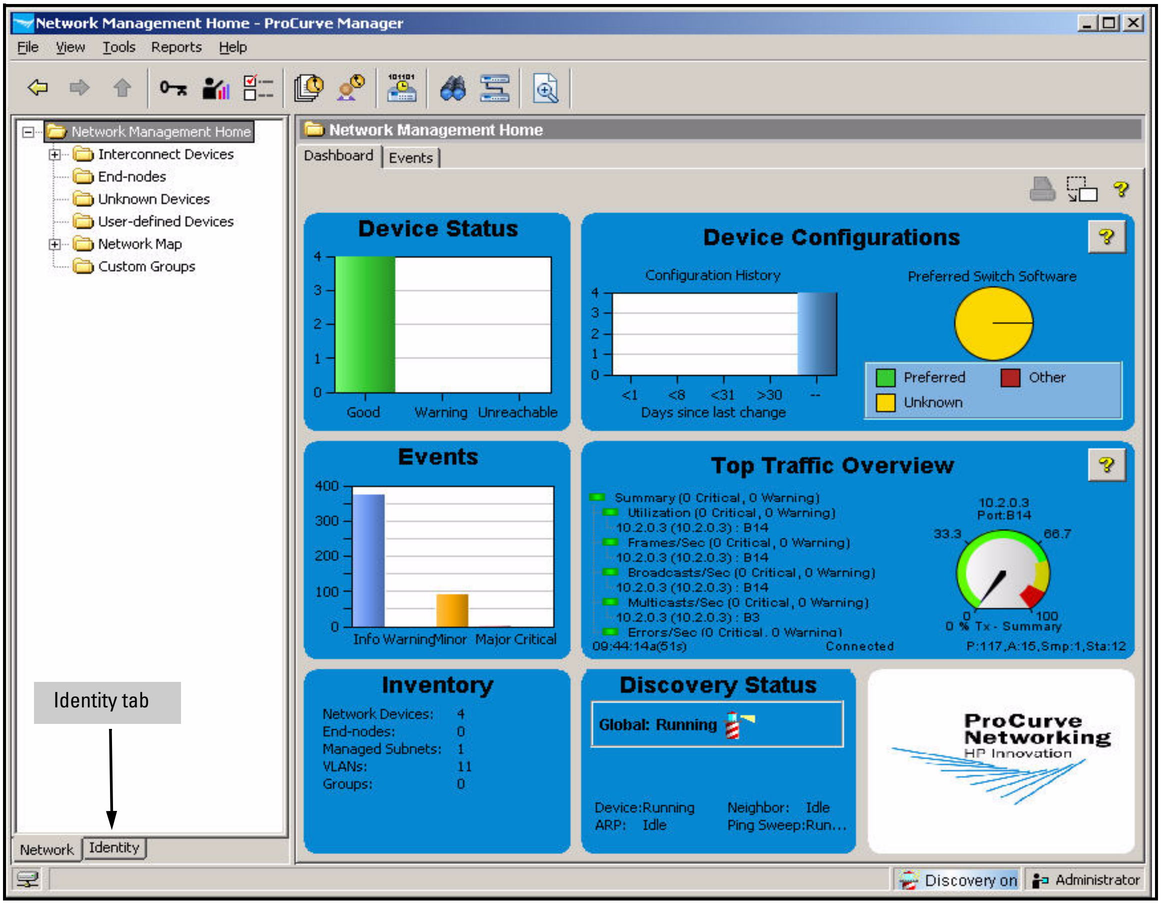


Username: Administrator

Password:

Figure 2-194. ProCurve Manager Login Window

6. In the **Login** window, enter the Administrator credentials that you set up in step 17 on page 2-215:
   a. Type **Administrator** for the **Username**.
   b. Type the password that you chose for the **Password**.



Summary (0 Critical, 0 Warning)
Utilization (0 Critical, 0 Warning)
10.2.0.3 (10.2.0.3) : B14
Frames/Sec (0 Critical, 0 Warning)
10.2.0.3 (10.2.0.3) : B14
Broadcasts/Sec (0 Critical, 0 Warning)
10.2.0.3 (10.2.0.3) : B14
Multicasts/Sec (0 Critical, 0 Warning)
10.2.0.3 (10.2.0.3) : B3
Errors/Sec (0 Critical, 0 Warning)
09:44:14a(51s) Connected

10.2.0.3
Port:B14
% Tx - Summary
P:117,A:15,Smp:1,Sta:12

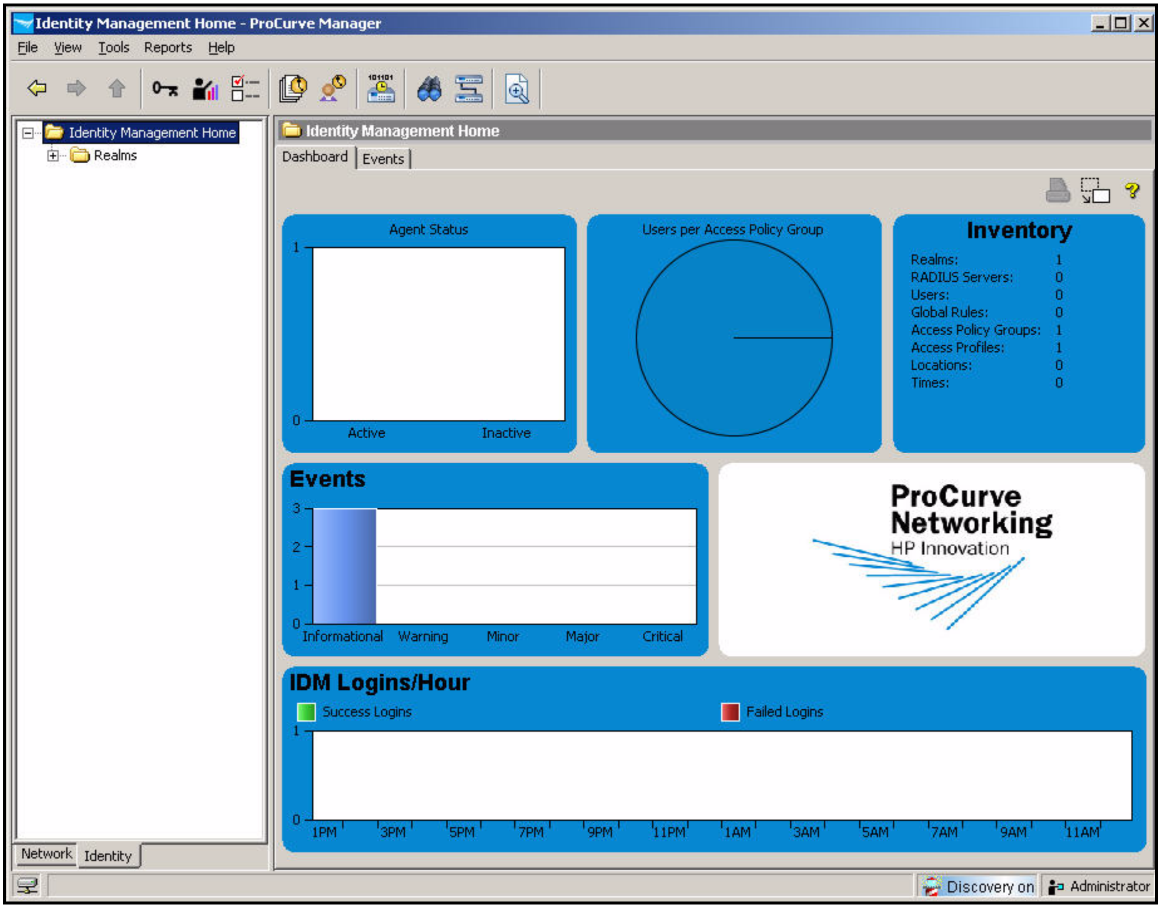
Network Devices: 4
End-nodes: 0
Managed Subnets: 1
VLANs: 11
Groups: 0

Global: Running

Device:Running Neighbor: Idle
ARP: Idle Ping Sweep:Run...

Figure 2-195. ProCurve Manager—Network Management Home Window

7. To open the **Identity Management Home** window, select the **Identity** tab at the bottom of the left pane.



Realms:	1
RADIUS Servers:	0
Users:	0
Global Rules:	0
Access Policy Groups:	1
Access Profiles:	1
Locations:	0
Times:	0

Figure 2-196. ProCurve Manager—Identity Management Home Window

8. In the left pane, expand **Realms**.
9. Expand your realm (in this example: **procurveu.edu**).
10. Expand the **ProCurve Network Access Controllers** folder.

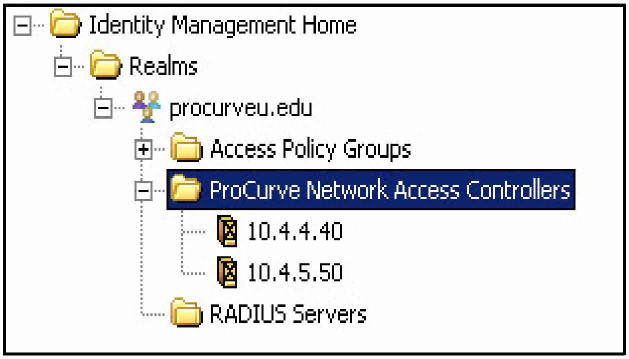


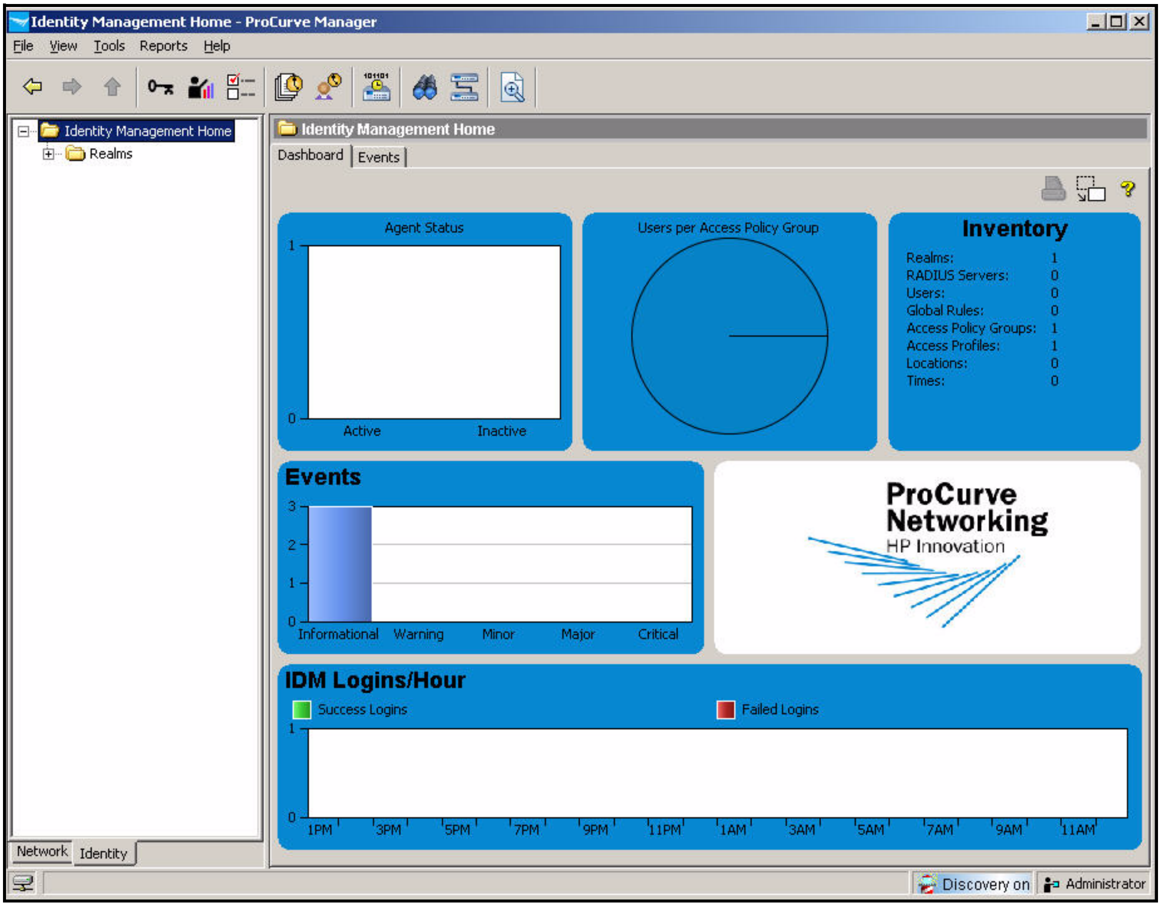
Figure 2-197. PCM+ Console, IDM Interface—Realms > *<myrealm>* > ProCurve Network Access Controllers

11. Verify that the NAC 800s appear below.

Enable Endpoint Integrity

A bit later, you will set up access policy rules to quarantine endpoints that do not comply with your security policies. First you must enable endpoint integrity in IDM. Follow these steps:

1. You should be in the **Identity Management Home** window of PCM+.

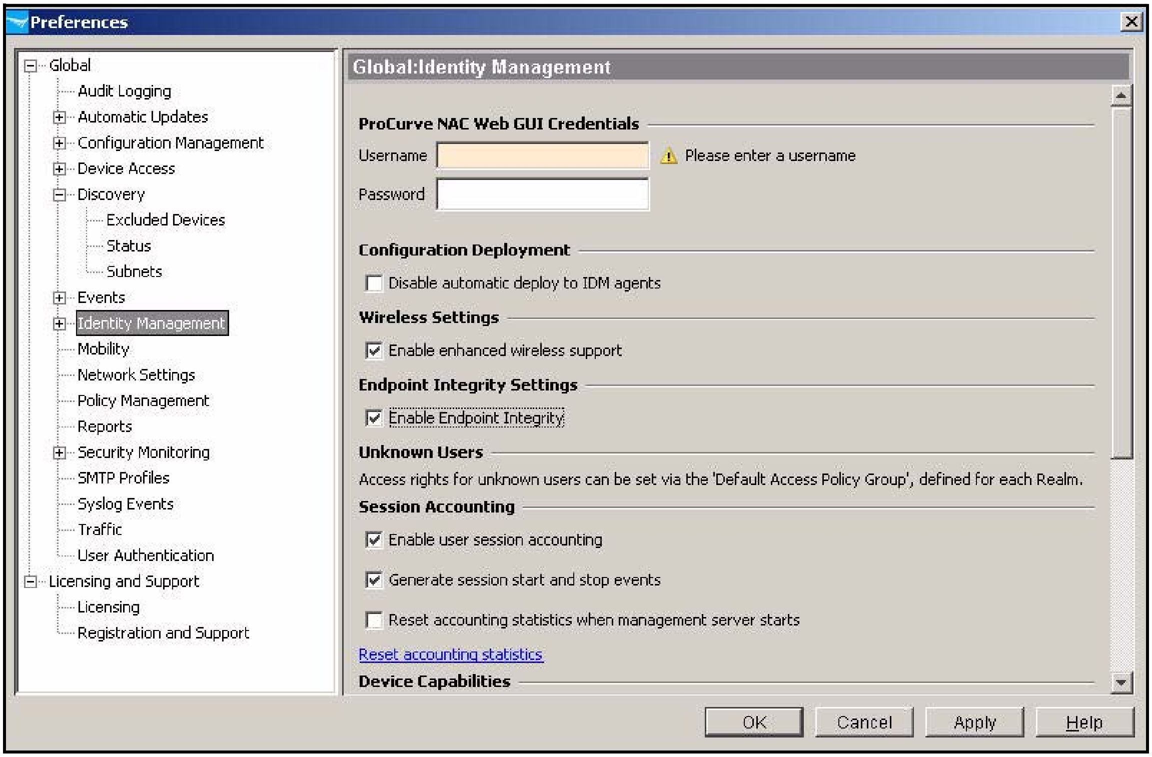


Inventory

Realms:	1
RADIUS Servers:	0
Users:	0
Global Rules:	0
Access Policy Groups:	1
Access Profiles:	1
Locations:	0
Times:	0

Figure 2-198. ProCurve Manager—Identity Management Home Window

2. In the **Tools** menu, click **Preferences**. (Or click the **Preferences** button.)
3. Select **Identity Management**.



Global:Identity Management

ProCurve NAC Web GUI Credentials

Username ⚠ Please enter a username

Password

Configuration Deployment

□ Disable automatic deploy to IDM agents

Wireless Settings

☑ Enable enhanced wireless support

Endpoint Integrity Settings

☑ Enable Endpoint Integrity

Unknown Users

Access rights for unknown users can be set via the 'Default Access Policy Group', defined for each Realm.

Session Accounting

☑ Enable user session accounting

☑ Generate session start and stop events

□ Reset accounting statistics when management server starts

Reset accounting statistics

Device Capabilities

Figure 2-199. ProCurve Manager—Preferences > Global > Identity Management Window

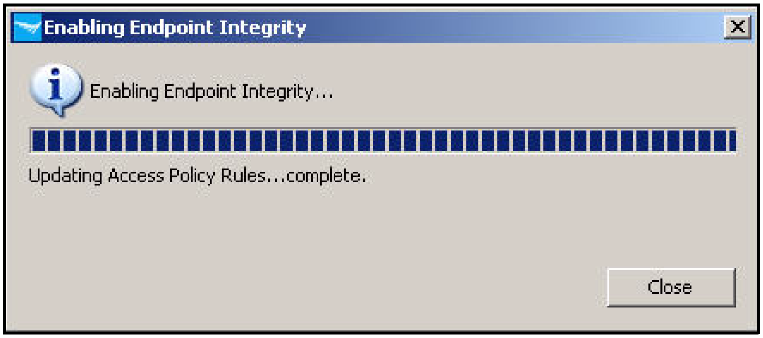
4. Select the **Enable Endpoint Integrity** check box.

5. Optionally, specify settings in the **ProCurve NAC Web GUI Credentials** so that you can access the MS's Web browser interface from IDM:

   a. For **Username**, type the administrator username for Web access to the NAC 800 MS. In this example: **admin**.

   b. For **Password**, type the associated password. In this example: **procurvenac9**.

6. Click **OK**.



Enabling Endpoint Integrity...

Updating Access Policy Rules...complete.

Figure 2-200. ProCurve Manager—Enabling Endpoint Integrity Window

7. Click **Close** in the **Enabling Endpoint Integrity** window.

Add Access Policy Groups and Users

In this solution, Active Directory stores credentials. IDM can synchronize with Active Directory and add domain security groups as access policy groups. When IDM synchronizes with a group, it automatically adds group members as users in the corresponding policy group.

The NAC 800s, which are the network's RADIUS servers, can query Active Directory to authenticate users; however, the EAP type must be compatible with NT LAN Manager (NTLM) authentication (for example, PEAP with MS-CHAPv2). Because in this example you are using EAP-TLS, the NAC 800s authenticate users against their local databases. You already configured the NAC 800s for this option (see "Configuring the NAC 800s" on page 2-134). Now you must configure the local databases using IDM.

Follow these steps to synchronize IDM with Active Directory and add users to the NAC 800s' local databases:

1. You should be in the **Identity Management Home** window of PCM+.

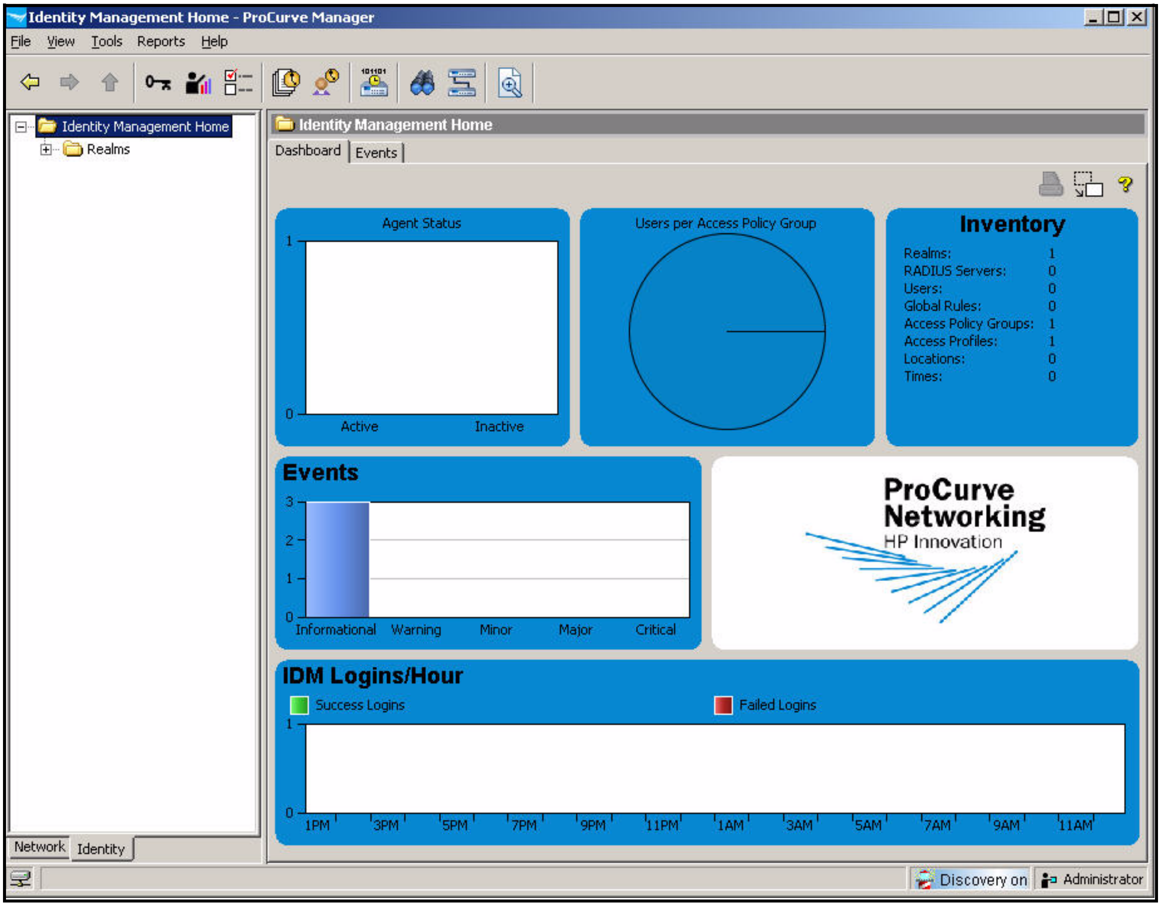


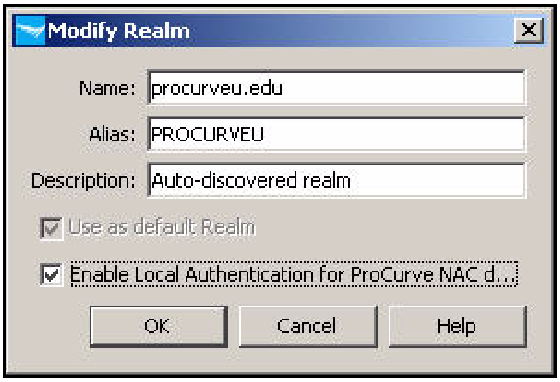
Figure 2-201. ProCurve Manager—Identity Management Home Window

2. In the left pane, right-click your domain's realm name and select **Modify Realm**.

3. For **Alias**, if not already specified, type the NetBIOS (workgroup) name of your domain. In this example: **PROCURVEU**.

   Some users may log in with the "procurve.edu" domain name and some with the "PROCURVEU" NetBIOS name. Setting the alias ensures that IDM does not create a separate realm for PROCURVEU the first time that a user logs in with that name.

4. Select the **Enable Local Authentication for ProCurve NAC d...** check box.



Name: procurveu.edu

Alias: PROCURVEU

Description: Auto-discovered realm

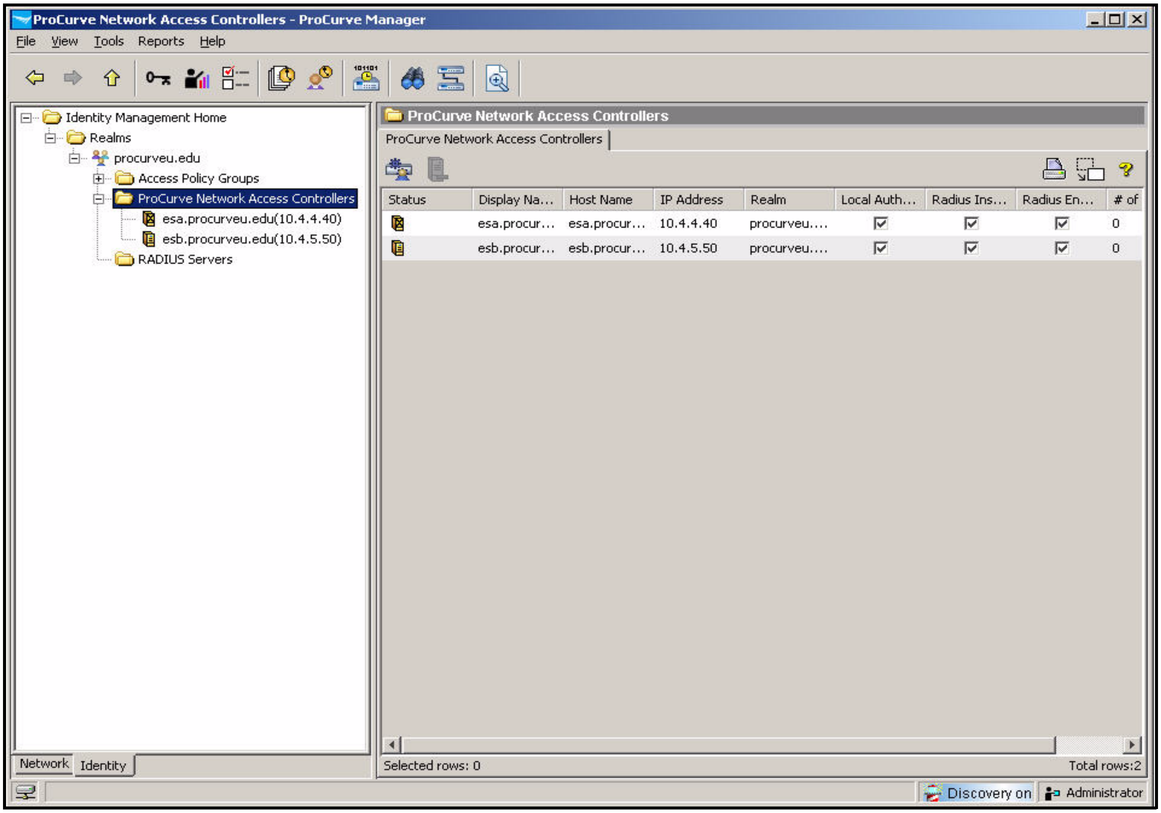
☑ Use as default Realm

☑ Enable Local Authentication for ProCurve NAC d...

Figure 2-202. ProCurve Manager—Modify Realm Window

5. Click **OK**.

6. Verify the your NAC 800s are now using their local databases. In the left pane, expand your realm and click **ProCurve Network Access Controllers**.


ProCurve Network Access Controllers - ProCurve Manager
File
View
Tools
Reports
Help
Identity Management Home
Realms
procurveu.edu
Access Policy Groups
ProCurve Network Access Controllers
esa.procurveu.edu(10.4.4.40)
esb.procurveu.edu(10.4.5.50)
RADIUS Servers
Network
Identity
ProCurve Network Access Controllers
ProCurve Network Access Controllers
Discovery on
Administrator

Status	Display Na...	Host Name	IP Address	Realm	Local Auth...	Radius Ins...	Radius En...	# of
	esa.procur...	esa.procur...	10.4.4.40	procurveu....	☑	☑	☑	0
	esb.procur...	esb.procur...	10.4.5.50	procurveu....	☑	☑	☑	0

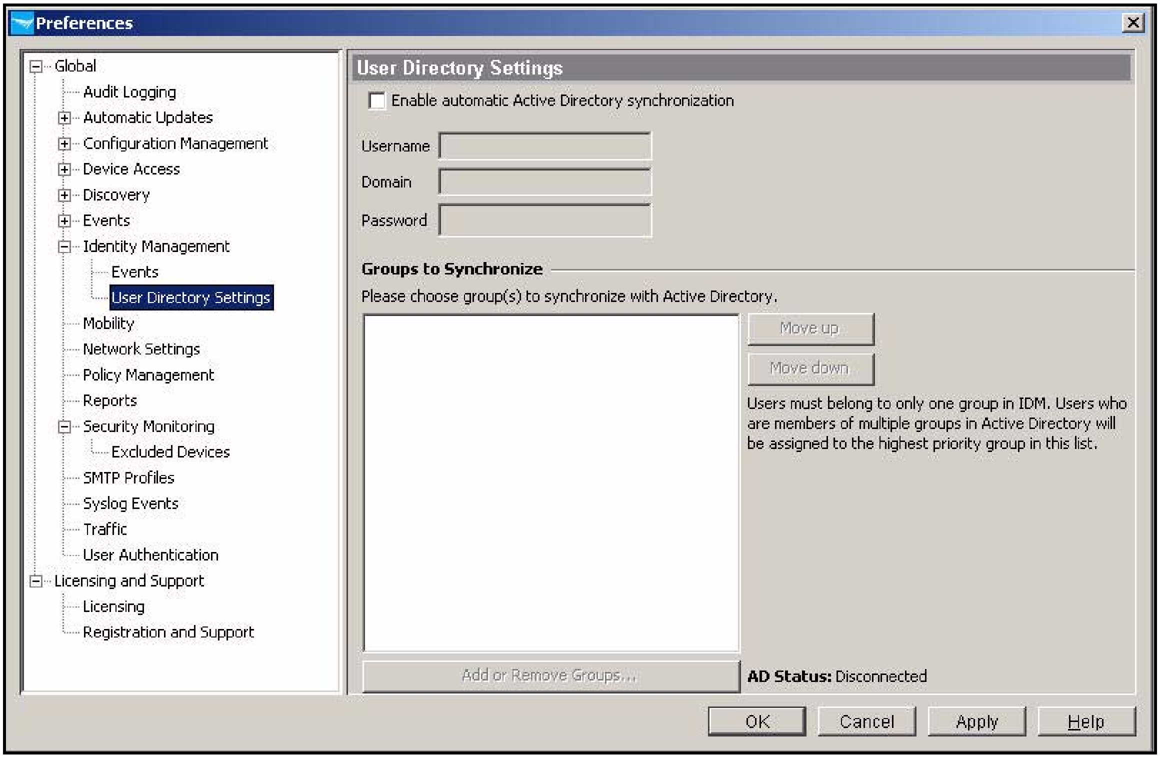
Selected rows: 0

Total rows:2

Figure 2-203. ProCurve Manager—ProCurve Network Access Controllers Window

7. In the next steps, you configure IDM to synchronize with Active Directory, which adds your domain's users and groups to IDM. In the **Tools** menu, click **Preferences**. (Or click the **Preferences** button.)

8. Expand **Identity Management** and select **User Directory Settings**.



□ Enable automatic Active Directory synchronization

Username

Domain

Password

Groups to Synchronize

Please choose group(s) to synchronize with Active Directory.

Users must belong to only one group in IDM. Users who are members of multiple groups in Active Directory will be assigned to the highest priority group in this list.

AD Status: Disconnected

Figure 2-204. ProCurve Manager—Preferences > Global > Identity Management > User Directory

9. Select the **Enable automatic Active Directory synchronization** check box.

10. In the **Username** and **Password** boxes, type credentials for an administrator of the domain controller server. In this example: **Administrator** and **ProCurve0**.

11. For **Domain** box, type your domain name. In this example: **procurveu.edu**.

12. Click **Apply**. Check the **AD Status** (above the **OK** button) for error messages.

    If IDM successfully connects to the domain controller, you should see a message such as: **Listening for updates**.

13. Click **Add or Remove Groups**.

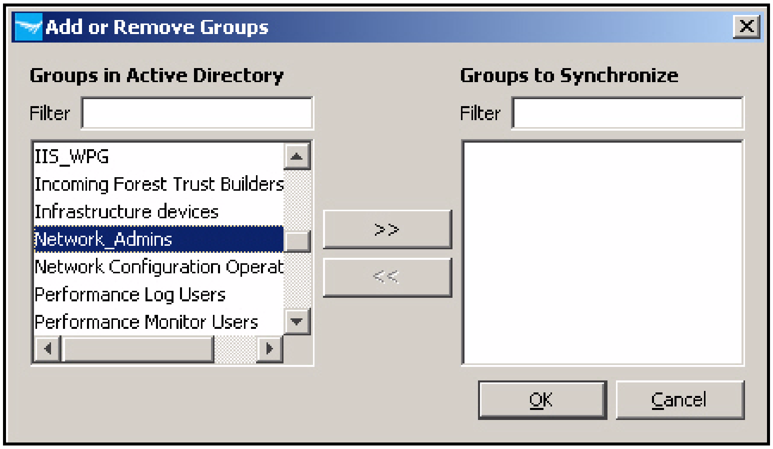


Figure 2-205. ProCurve Manager—Add or Remove Groups Window

14. The **Add or Remove Groups** window displays all Active Directory groups. Select the name of a group and click the **>>** button so that IDM will synchronize with it. Select all the groups that you set up for access rights. In this example, these groups are:
    - Network_Admins
    - Faculty
    - Students
    - RPs
    - Infrastructure devices

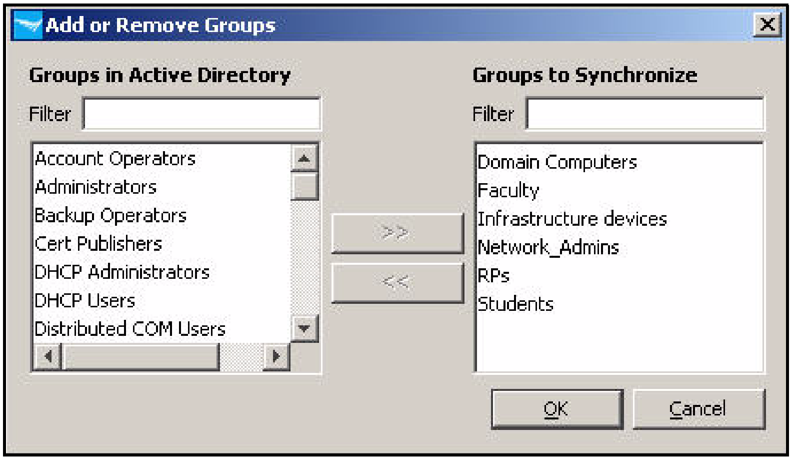


Figure 2-206. PCM+ Console—Add or Remove Groups Window

Note

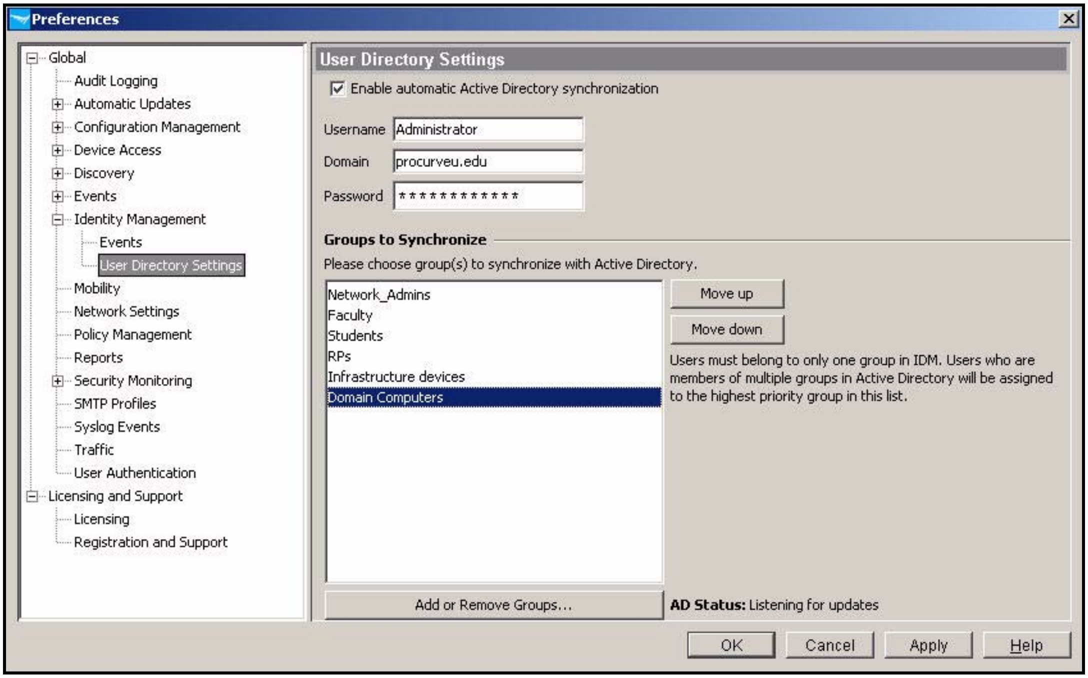
By default in many Windows systems, an endpoint can log in as a computer before the user logs in. Then, when the user logs in, the user reauthenticates and that authentication takes precedence. To allow computers to log in, you can add Domain Computers to the **Groups to Synchronize** area.

It is important that the endpoint be set up to use computer with user *reauthentication*. Otherwise, the user will not be controlled properly.

Note

Although a user can be a member of multiple Active Directory groups, he or she should be a member of only one group that is synchronized in IDM.

15. Click **OK** to save the settings and close the window.
16. If any users belong to more than one group, you must decide which group will take precedence in IDM, because each user can belong to only one group in IDM. In this example, the user groups are mutually exclusive, but if you needed to move a group to a different position, you would select the group name and click the **Move up** or **Move down** button to change its position.



User Directory Settings

☑ Enable automatic Active Directory synchronization

Username: Administrator
Domain: procurveu.edu
Password: ************

Groups to Synchronize

Please choose group(s) to synchronize with Active Directory.

Network_Admins
Faculty
Students
RPs
Infrastructure devices
Domain Computers

Users must belong to only one group in IDM. Users who are members of multiple groups in Active Directory will be assigned to the highest priority group in this list.

AD Status: Listening for updates

Figure 2-207. ProCurve Manager—Preferences > Identity Management > User Directory Settings

17. Click **OK**.

18. A window is displayed, telling you that the groups are being synchronized. Click **OK**.

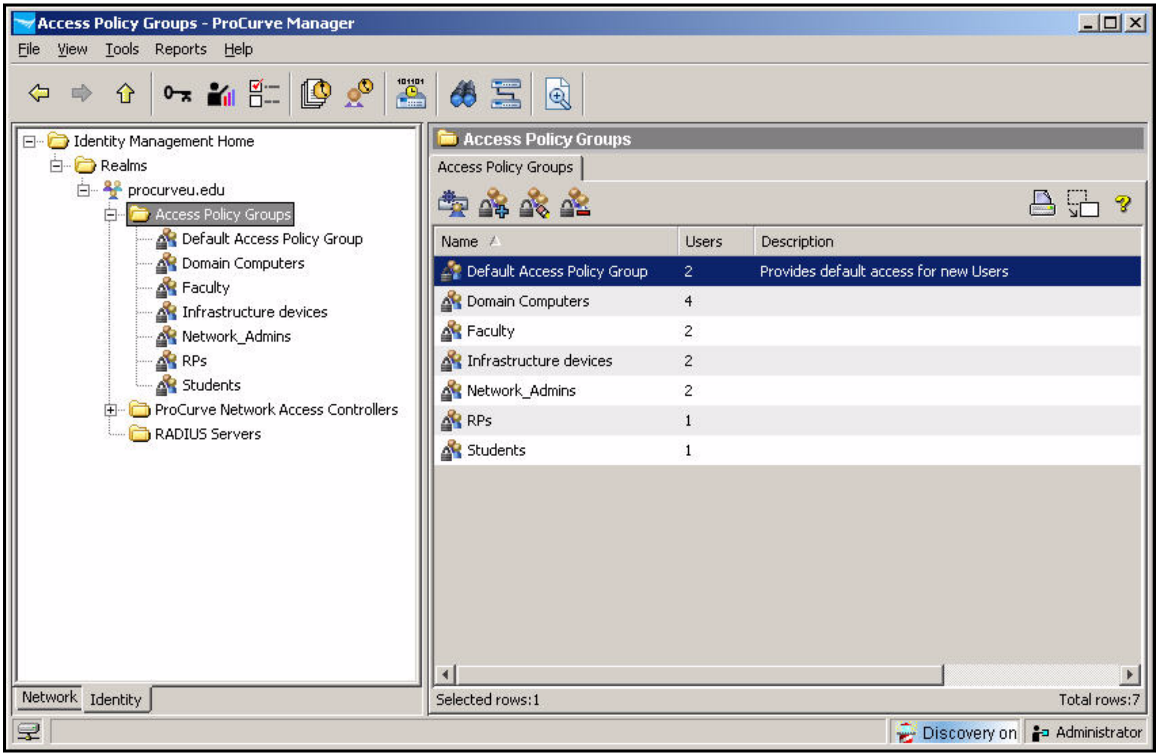
    Each group is added to IDM as an access policy group. All users that belong to the selected groups are imported with the current Windows user login credentials.

Note

IDM can import about 8 to 10 users per second.

19. In the left pane, select **Access Policy Groups**. The **Users** column now shows how many users from Active Directory were imported into each group.

20. Click **OK**.



Name	Users	Description
Default Access Policy Group	2	Provides default access for new Users
Domain Computers	4	
Faculty	2	
Infrastructure devices	2	
Network_Admins	2	
RPs	1	
Students	1	

Selected rows:1

Total rows:7

Figure 2-208. ProCurve Manager—Access Policy Groups

21. Because the NAC 800’s local database requires a password for every user (even when they authenticate with certificates), you must add these passwords if not present.

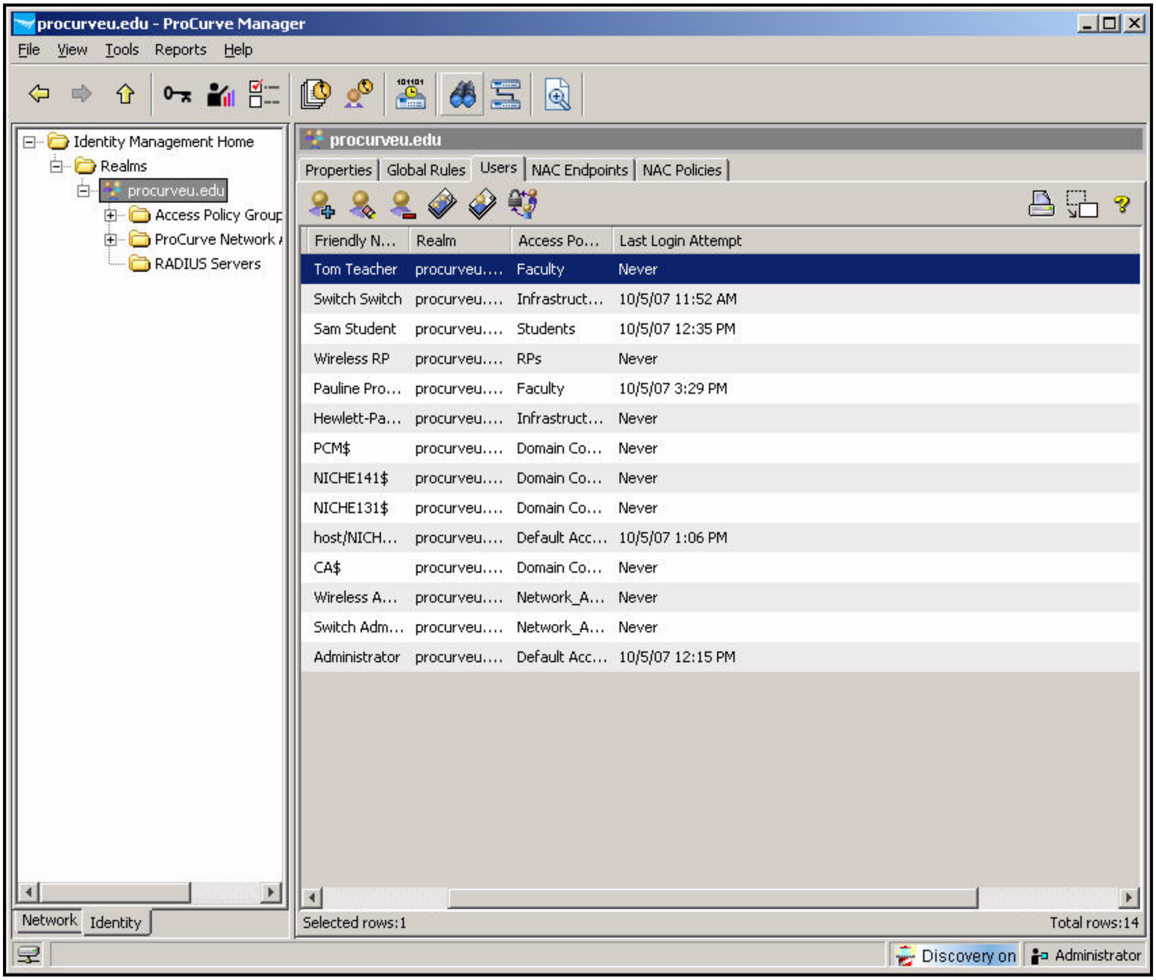
In this example, you already set up passwords for users in Active Directory.

If you had not, you would follow these steps to add a password:

a. In the left pane, expand **Access Policy Groups**.

b. Select the name of the user's group.

c. Click the **Users** tab.



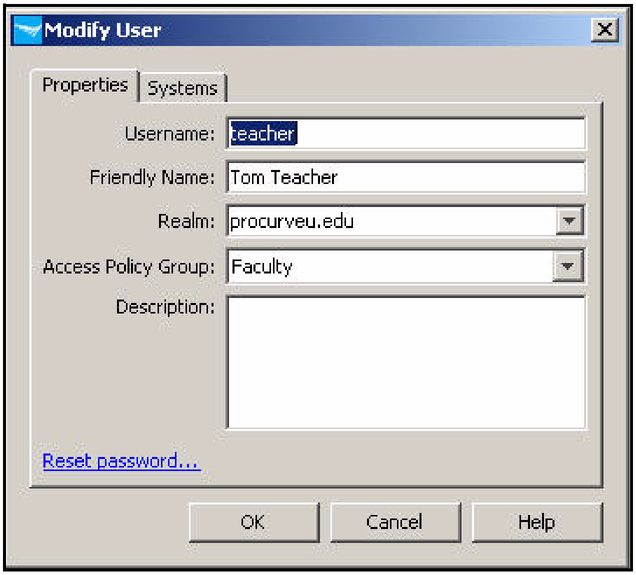
Friendly N...	Realm	Access Po...	Last Login Attempt
Tom Teacher	procurveu....	Faculty	Never
Switch Switch	procurveu....	Infrastruct...	10/5/07 11:52 AM
Sam Student	procurveu....	Students	10/5/07 12:35 PM
Wireless RP	procurveu....	RPs	Never
Pauline Pro...	procurveu....	Faculty	10/5/07 3:29 PM
Hewlett-Pa...	procurveu....	Infrastruct...	Never
PCM$	procurveu....	Domain Co...	Never
NICHE141$	procurveu....	Domain Co...	Never
NICHE131$	procurveu....	Domain Co...	Never
host/NICH...	procurveu....	Default Acc...	10/5/07 1:06 PM
CA$	procurveu....	Domain Co...	Never
Wireless A...	procurveu....	Network_A...	Never
Switch Adm...	procurveu....	Network_A...	Never
Administrator	procurveu....	Default Acc...	10/5/07 12:15 PM

Selected rows:1

Total rows:14

Figure 2-209. ProCurve Manager—Access Policy Groups

d. Right-click the user's name in the right pane and click **Modify User**.



Username: teacher

Friendly Name: Tom Teacher

Realm: procurveu.edu

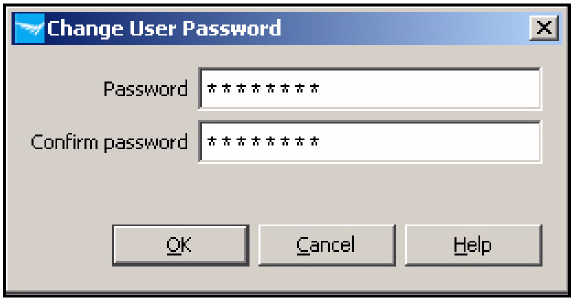
Access Policy Group: Faculty

Description:

Figure 2-210. ProCurve Manager—Modify User Window

e. Click **Reset password**.

f. Type a string for the **Password**. Then retype it in the **Confirm password** box.



Password ********

Confirm password ********

Figure 2-211. ProCurve Manager—Change User Password Window

g. Click **OK** and then **OK** again.

Define Resources

You must define every resource that you want to control. These can include:

- **A single device**—an IP address
- **Applications (such as DHCP, DNS, and HTTP)**—TCP or UDP ports (or other protocols)
- **Applications on a single device**—an IP address and TCP or UDP ports
- **A VLAN**—a subnet network address

Table 2-14 shows resources for the example network.

Table 2-14. PCU Resources

Resource	IP Address	Protocol	Port or Ports
NAC 800 A	10.4.4.40	IP	Any
NAC 800 B	10.4.5.50	IP	Any
DHCP	Any	UDP	67
DNS (UDP)	Any	UDP	53
DNS (TCP)	Any	TCP	53
Email	10.4.6.40	TCP	25, 143, 110
Other network services	10.4.0.0/16	IP	Any
Faculty databases	10.5.0.0/16	IP	Any
Management VLAN	10.2.0.0/16	IP	Any
Faculty VLAN	10.8.0.0/16	IP	Any
Students VLAN	10.10.0.0/16	IP	Any
Private network	10.0.0.0/8	IP	Any
Internet	Any	TCP	21, 80, 443

To define resources, follow these steps:

1. In the ProCurve Manager console, click the **Identity** tab.

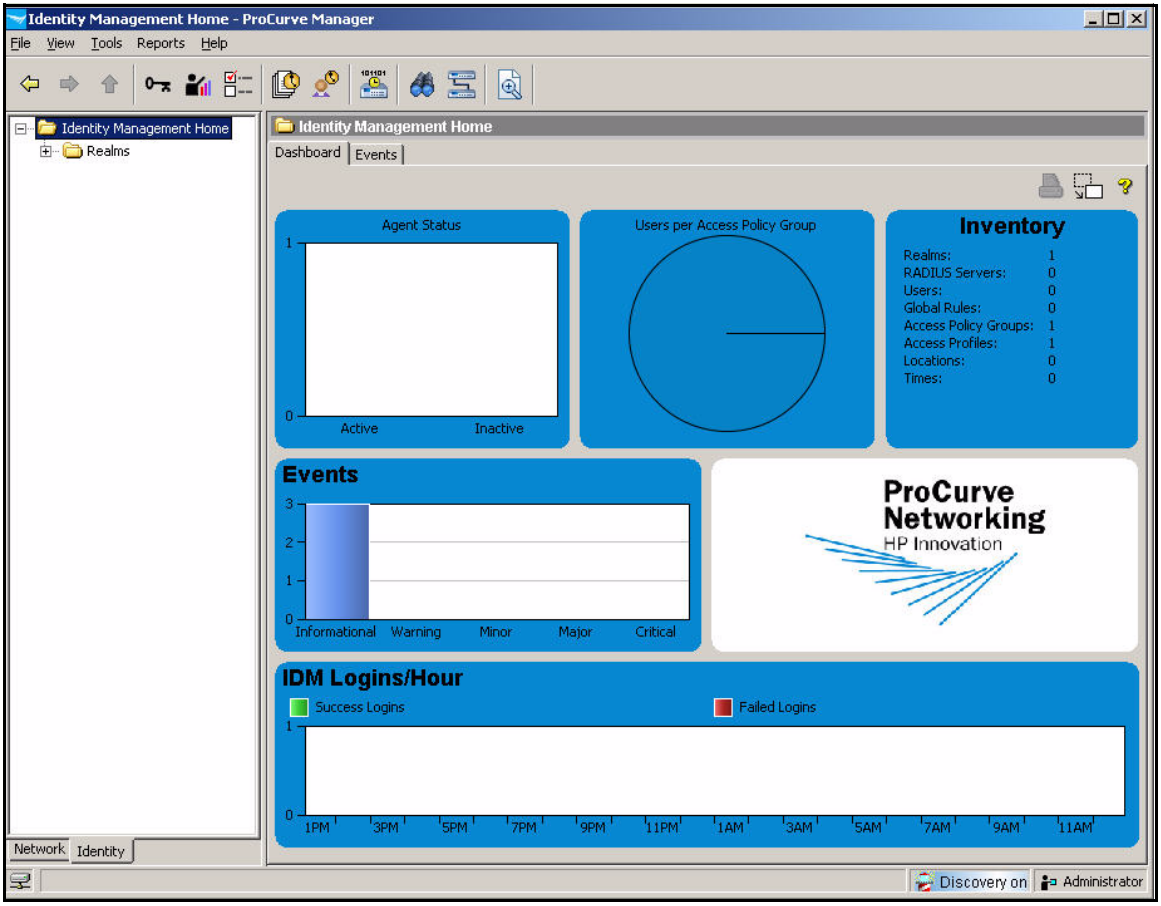
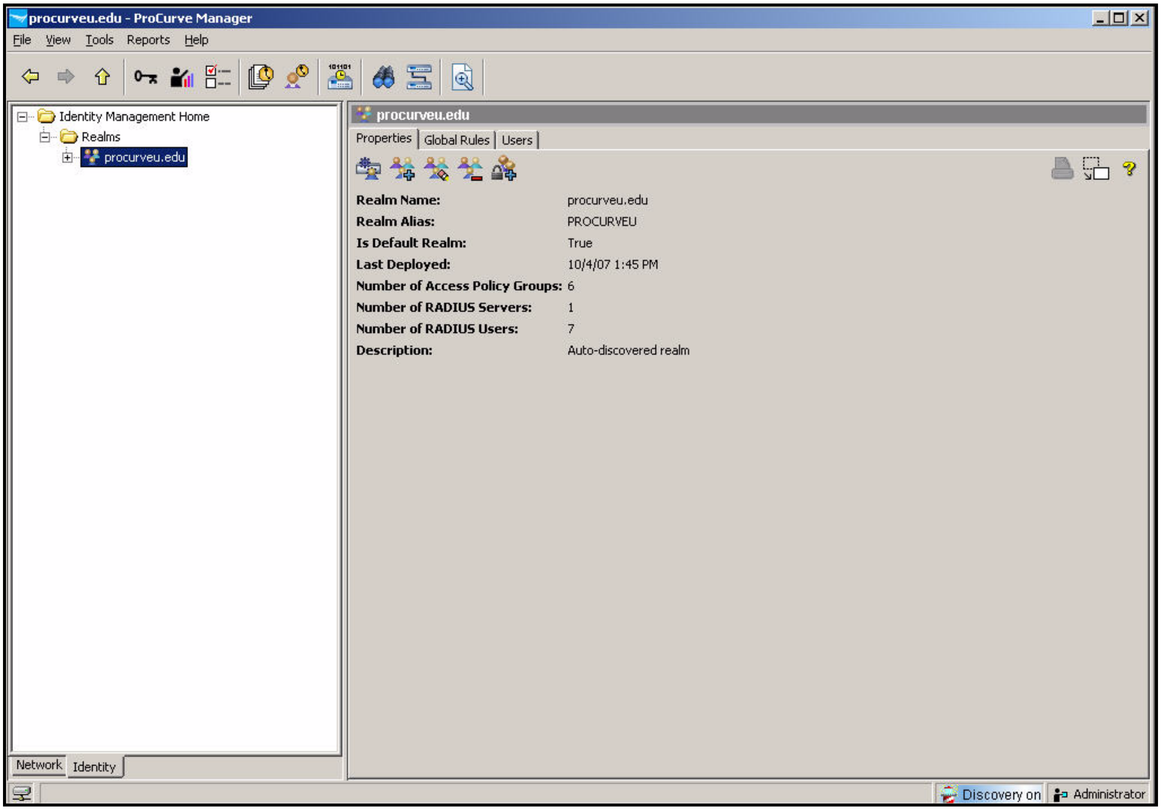


Figure 2-212. ProCurve Manager—Identity Management Home Window

2. Select your realm. In this example: **procurveu.edu**.



Realm Name: procurveu.edu
Realm Alias: PROCURVEU
Is Default Realm: True
Last Deployed: 10/4/07 1:45 PM
Number of Access Policy Groups: 6
Number of RADIUS Servers: 1
Number of RADIUS Users: 7
Description: Auto-discovered realm

Figure 2-213. ProCurve Manager—<*my realm*>

3. In the right pane, make sure that the **Properties** tab is selected. Click the **Configure Identity Management** button.

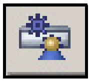


Figure 2-214. Identity Management—Configure Identity Management Button

4. Select **Network Resources** in the left pane of the **Identity Management Configuration** window.

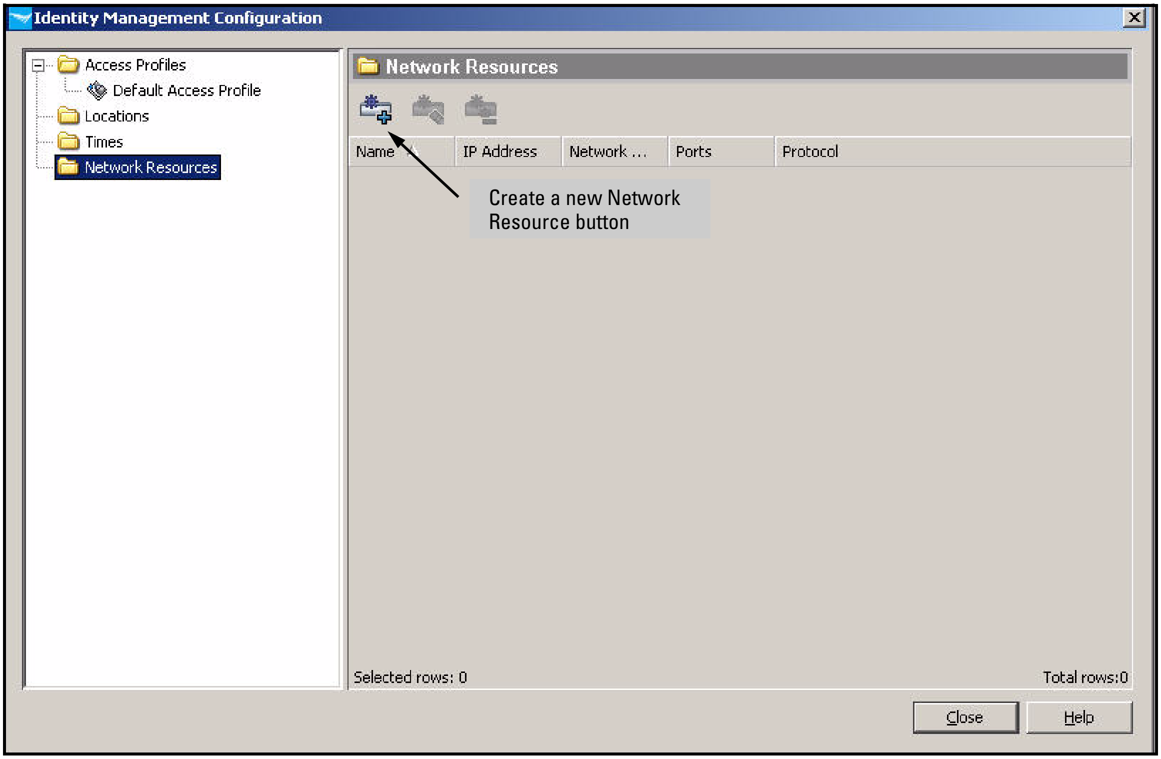
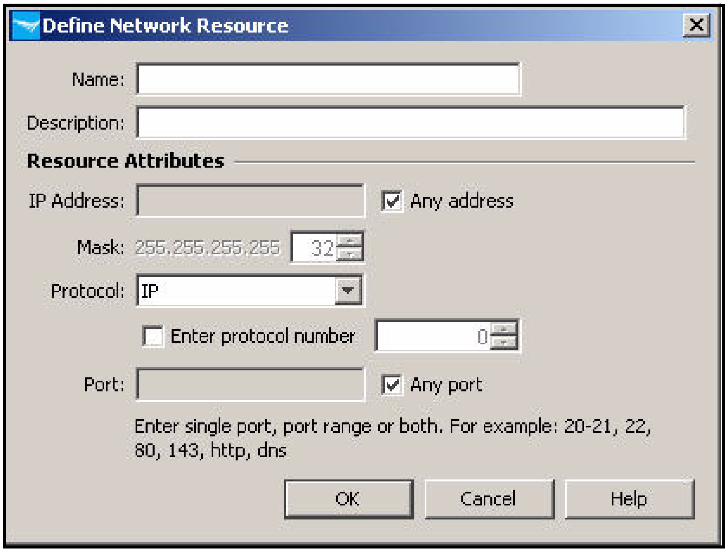


Figure 2-215. Identity Management Configuration Window

5. Click the **Create a new Network Resource** button in the right pane.



Define Network Resource

Name:

Description:

Resource Attributes

IP Address: ☑ Any address

Mask: 255.255.255.255 32

Protocol: IP

☐ Enter protocol number 0

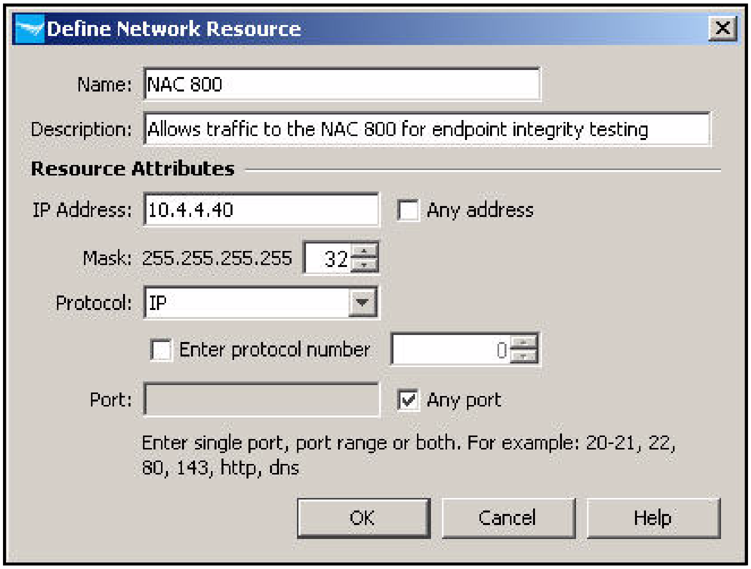
Port: ☑ Any port

Enter single port, port range or both. For example: 20-21, 22, 80, 143, http, dns

Figure 2-216. ProCurve Manager—Define Network Resource Window

6. Follow these steps to set up a resource that is a single device:
   a. In the **Define Network Resource** window, type a string in the **Name** box to identify the device (in this example, **NAC 800 A**).
   b. In the **Description** box, type a description, if desired.
   c. Clear the **Any address** check box.
   d. For the **IP Address**, type the device's IP address (in this example, **10.4.4.40**).
   e. For the **Mask**, keep the default: **32**.
   f. From the **Protocol** list, select the protocol (**IP** is the default andallows all IP traffic). In this example, keep **IP**.
   g. Set up the ports:
      i. To allow any traffic to this device, select the **Any port** check box.

         In this example, you should select the **Any port** check box. Quarantined and unknown devices need to reach the NAC 800 to be tested.
      ii. If you want to restrict access to one or several single applications, clear the **Any port** check box and type the appropriate values for the **Port**.
   h. Click **OK**.



Define Network Resource

Name: NAC 800

Description: Allows traffic to the NAC 800 for endpoint integrity testing

Resource Attributes

IP Address: 10.4.4.40 □ Any address

Mask: 255.255.255.255 32

Protocol: IP

□ Enter protocol number 0

Port: ☑ Any port

Enter single port, port range or both. For example: 20-21, 22, 80, 143, http, dns

Figure 2-217. ProCurve Manager—Define Network Resource Window—NAC 800

7. Follow these steps to set up a resource that is an application type such as DHCP:

   a. In the **Define Network Resource** window, type a string in the **Name** box to identify the application or applications. In this example: **DHCP**.

   b. In the **Description** box, type a description, if desired.

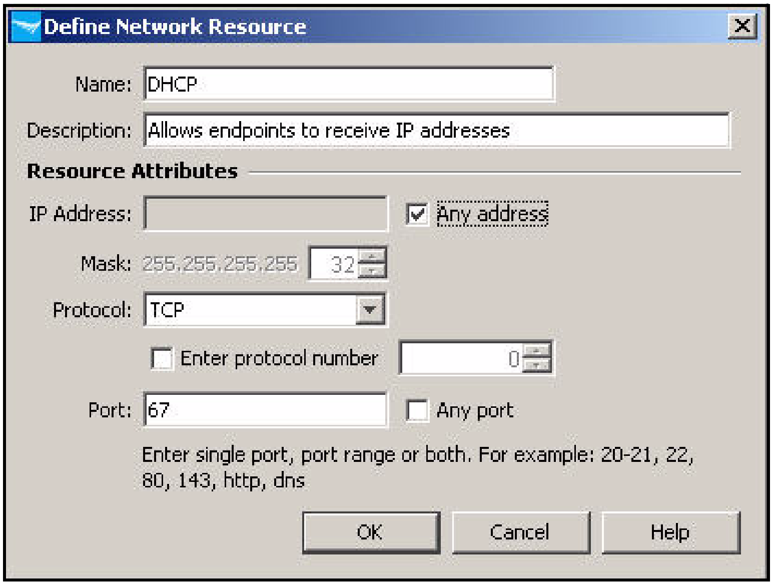
   c. Select the **Any address** check box.

      If desired, you could clear the check box and restrict users to accessing this application on a particular device or subnet. Type the appropriate IP address for the **IP Address and Mask.**

   d. From the **Protocol** list, select the protocol. In this example, **UDP**.

   e. Clear the **Any port** check box and type the appropriate values for the **Port**. You can type one port, ranges of ports, or multiple, non-consecutive ports, separated by a comma. In this example: **67**.

   f. Click **OK**.



Define Network Resource

Name: DHCP

Description: Allows endpoints to receive IP addresses

Resource Attributes

IP Address: ☑ Any address

Mask: 255.255.255.255 32

Protocol: TCP

□ Enter protocol number 0

Port: 67 □ Any port

Enter single port, port range or both. For example: 20-21, 22, 80, 143, http, dns

Figure 2-218. ProCurve Manager—Define Network Resource Window—DHCP

8. To set up a resource that is an entire VLAN, follow these steps:

   a. In the **Define Network Resource** window, type a string in the **Name** box to identify the VLAN (in this example, **Faculty databases**).

   b. In the **Description** box, type a description, if desired.

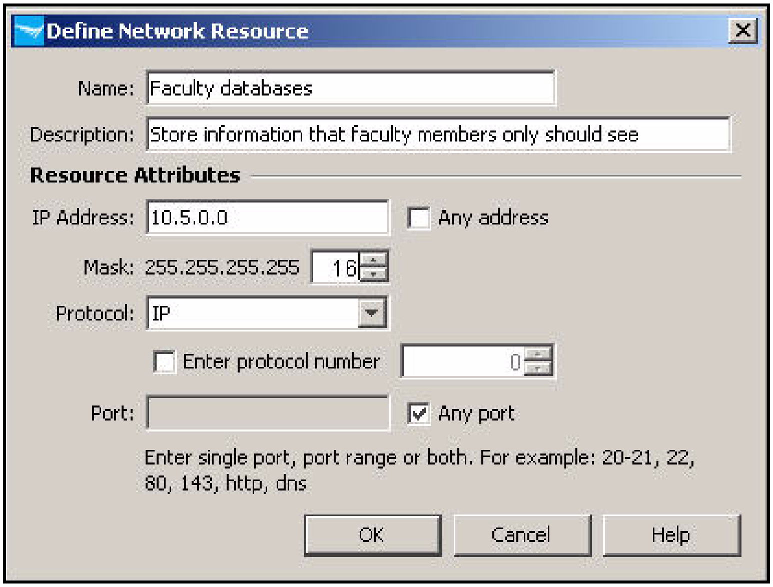
   c. Clear the **Any address** check box.

   d. For the **IP Address**, type the network address of the subnet associated with the VLAN (in this example, **10.5.0.0**).

   e. For the **Mask**, type or select the prefix length for the subnet (in this example, **16**).

   f. Leave **IP** for the **Protocol**.

   g. Click **OK**.



Name: Faculty databases

Description: Store information that faculty members only should see

Resource Attributes

IP Address: 10.5.0.0 □ Any address

Mask: 255.255.255.255 16

Protocol: IP

□ Enter protocol number 0

Port: ☑ Any port

Enter single port, port range or both. For example: 20-21, 22, 80, 143, http, dns

Figure 2-219. ProCurve Manager—Define Network Resource Window—Faculty databases

9. Repeat step 5, 6, 7, or 8 to set up each resource for your network.
10. When you are finished, click **Close**.

Create Access Profiles

A profile defines a set of rights including:

- VLAN assignment
- Quality-of-service (QoS) settings
- Rate limit
- Resources allowed and resources denied

Note

For each profile, you can also choose whether, by default, all resources not specifically defined are denied or whether they are allowed. This is called the default access option. In this example, you will allow specific resources and deny all others; the default access option is deny.

While you can create several profiles for a single group of users—and then assign those profiles under various circumstances—in this example, each user group requires at most three:

- One profile for normal access
- One profile for quarantined access
- One profile for access if the endpoint is infected

Quarantined endpoints and infected endpoints can send DHCP traffic, as well as traffic to the NAC 800. They are allowed no other traffic. However, the NAC 800 can act as a proxy for the endpoints, allowing them access to remediation resources.

Note

The quarantined and infected endpoints receive access to the same, very limited, resources. However, they are placed in separate VLANs so that malware on the infected endpoints does not spread to the potentially vulnerable, but not-yet-infected endpoints.

The example profiles that you will learn how to create in this section are displayed in Table 2-15.

Table 2-15. Network Resource Assignments per Access Profile

Access Profile	VLAN ID	QoS	Ingress Rate-Limit	Allowed Resources	Denied Resources	Default Access
Network_Admins	2	Don't override	Don't override	All	None	Allow
Faculty	8	Don't override	Don't override	• DHCP • DNS (TCP) • DNS (UDP) • Email • Other network services • Faculty VLAN • Faculty databases • Internet	Private network	Deny
Students	10	Don't override	Don't override	• DHCP • DNS (TCP) • DNS (UDP) • Email • Other network services • Students VLAN • Internet	Private network	Deny
Quarantine_Faculty	32	Don't override	1000 Kbps	• DHCP • NAC 800 A • NAC 800 B	None	Deny
Infected_Faculty	33	Don't override	1000 Kbps	• DHCP • NAC 800 A • NAC 800 B	None	Deny
Quarantine_Students	34	Don't override	1000 Kbps	• DHCP • NAC 800 A • NAC 800 B	None	Deny
Infected_Students	35	Don't override	1000 Kbps	• DHCP • NAC 800 A • NAC 800 B	None	Deny
RPs	2100	Don't override	Don't override	All	All	Allow
Domain Computers (if desired)	Don't override	Don't override	Don't override	• DHCP • DNS (TCP) • DNS (UDP) • Other network services • Student VLAN	None	Deny

Follow these steps to create the profiles:

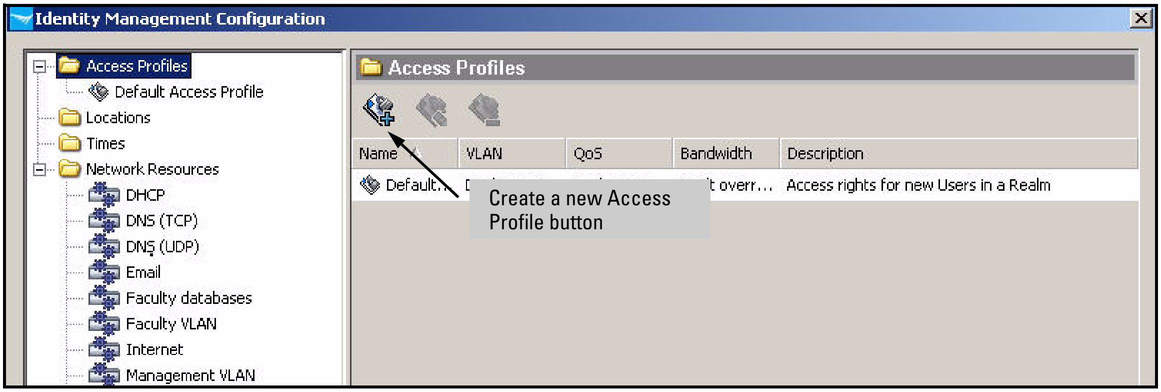
1. You should be at the Identity **Management Home** window. (In the ProCurve Manager console, click the **Identity** tab.

2. Expand **Realms**.

3. Click your realm (in this example: procurveu.edu) in the left pane.

4. At the **Properties** tab in the right pane, click the **Configure Identity Management** button.

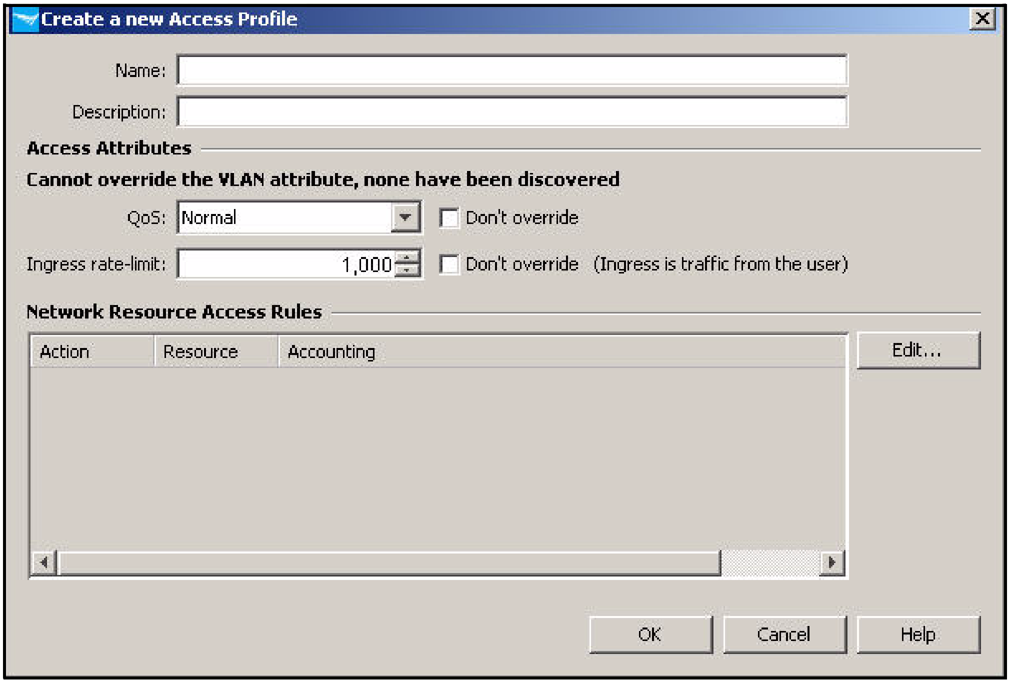
5. Select the **Access Profiles** folder.



Create a new Access Profile button

Figure 2-220. Identity Management Configuration—Access Profiles

6. Click the **Create a new Access Profile** button.



Create a new Access Profile

Name:

Description:

Access Attributes

Cannot override the VLAN attribute, none have been discovered

QoS: Normal □ Don't override

Ingress rate-limit: 1,000 □ Don't override (Ingress is traffic from the user)

Network Resource Access Rules

Action	Resource	Accounting

Figure 2-221. ProCurve Manager—Create a new Access Profile

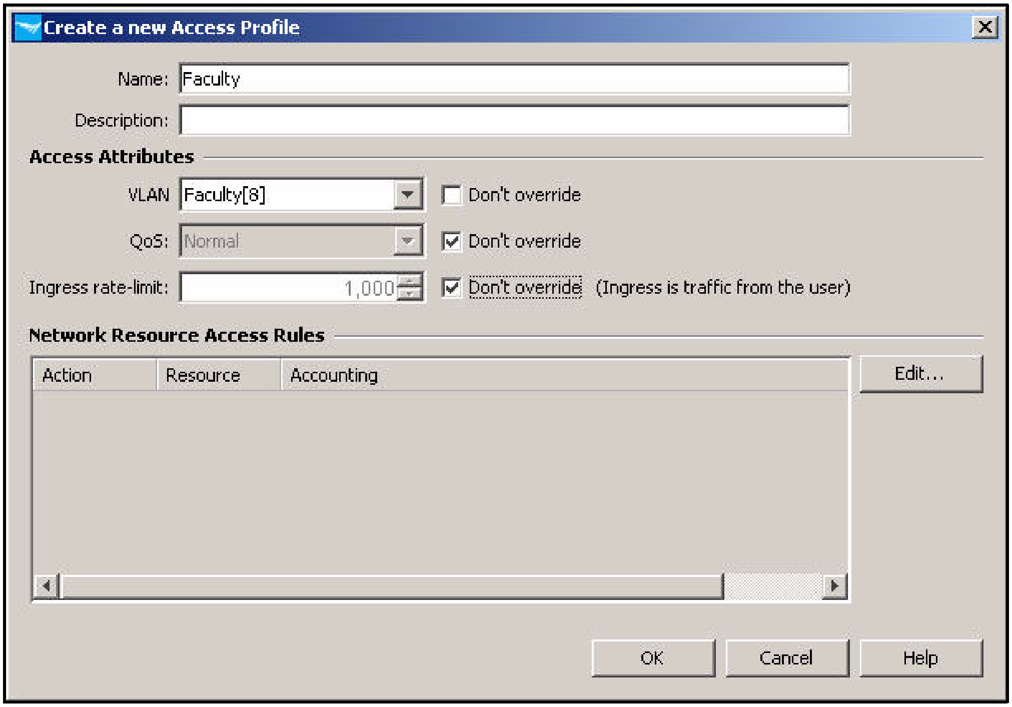
7. In the **Name** box, type the name of the access profile. In this example, you are creating the profile for the Faculty group under normal circumstances. You name the profile **Faculty**.

8. In the **Description** box, type a description, if desired.

9. From the **VLAN** list, select the proper VLAN (in this example, **8**).

10. For the **QoS**, either select the QoS level from the box or select the **Don't override** check box.

11. For the **Ingress rate-limit**, either type the rate limit in Kbps or select the **Don't override** check box.



Create a new Access Profile

Name: Faculty

Description:

Access Attributes

VLAN: Faculty[8] □ Don't override

QoS: Normal ☑ Don't override

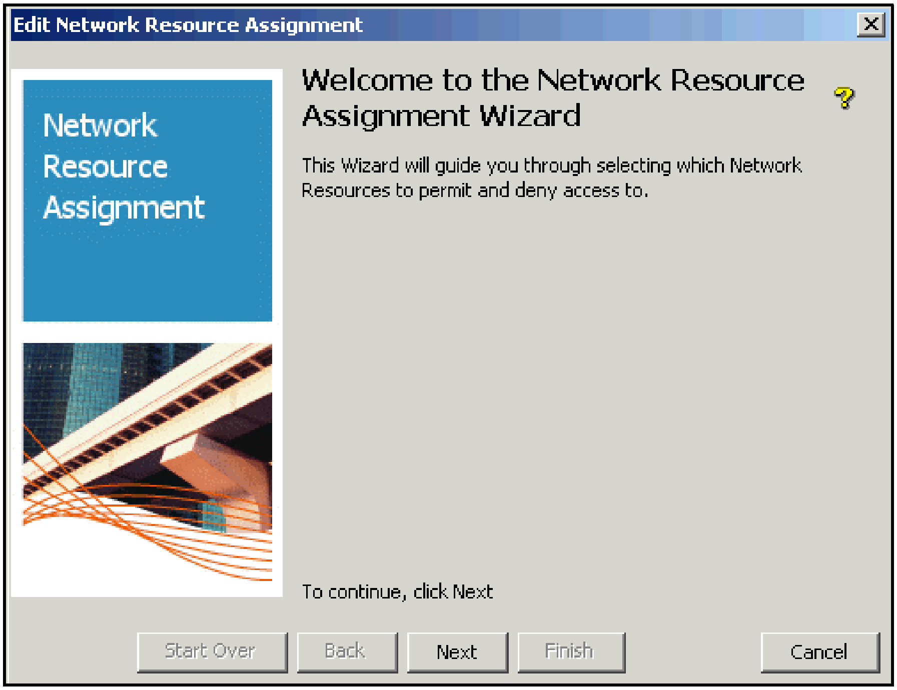
Ingress rate-limit: 1,000 ☑ Don't override (Ingress is traffic from the user)

Network Resource Access Rules

Action	Resource	Accounting

Figure 2-222. ProCurve Manager—Create a new Access Profile

12. In the **Network Resource Access Rules** area, click **Edit**.



Welcome to the Network Resource Assignment Wizard

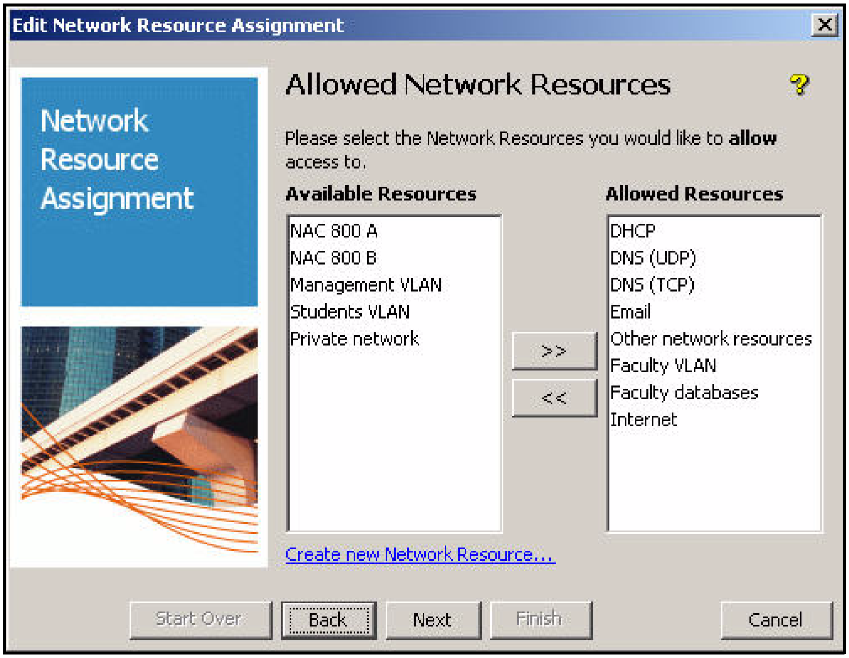
This Wizard will guide you through selecting which Network Resources to permit and deny access to.

To continue, click Next

Figure 2-223. Edit Network Resource Assignment Wizard—Welcome Page

13. In the **Welcome to the Network Resource Assignment Wizard** page, click **Next**.

14. From the **Available Resources** pane, select a resource and click the **>>** button. Repeat for each network resource that you want to assign to this profile.



Allowed Network Resources

Please select the Network Resources you would like to **allow** access to.

Available Resources	Allowed Resources
NAC 800 A	DHCP
NAC 800 B	DNS (UDP)
Management VLAN	DNS (TCP)
Students VLAN	Email
Private network	Other network resources
	Faculty VLAN
	Faculty databases
	Internet

Create new Network Resource...

Figure 2-224. Edit Network Resource Assignment Wizard—Allowed Network Resources Page

15. When all of the desired resources are in the **Allowed Resources** pane, click **Next**.

16. If you would like to deny this group access to any of the remaining resources, repeat the previous step for resources that you want to *deny*.

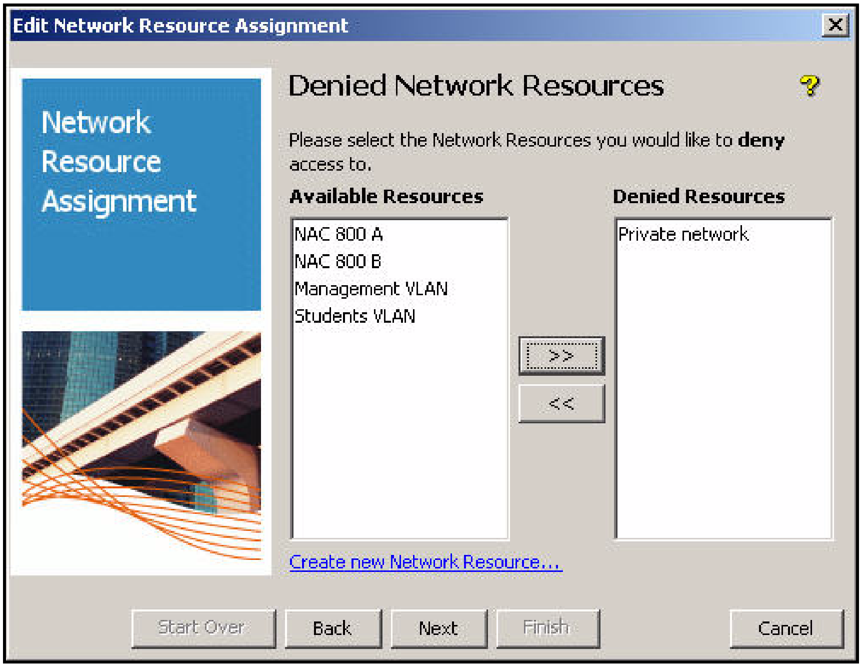
    You might need to deny resources when:

    - A resource is a subset of an allowed resource

      For example, you can grant users access to an entire VLAN, but deny them access to a single server in that VLAN.

      In this example, you have granted users access to the Internet by allowing them to send *any* FTP, HTTP, or HTTPS traffic. Now you will deny access to a subset of that traffic: the entire private network. Users, of course, can access the private resources to which you have specifically granted them rights.

    - You use the strategy of allowing all resources, by default



Edit Network Resource Assignment

Denied Network Resources

Please select the Network Resources you would like to **deny** access to.

Available Resources

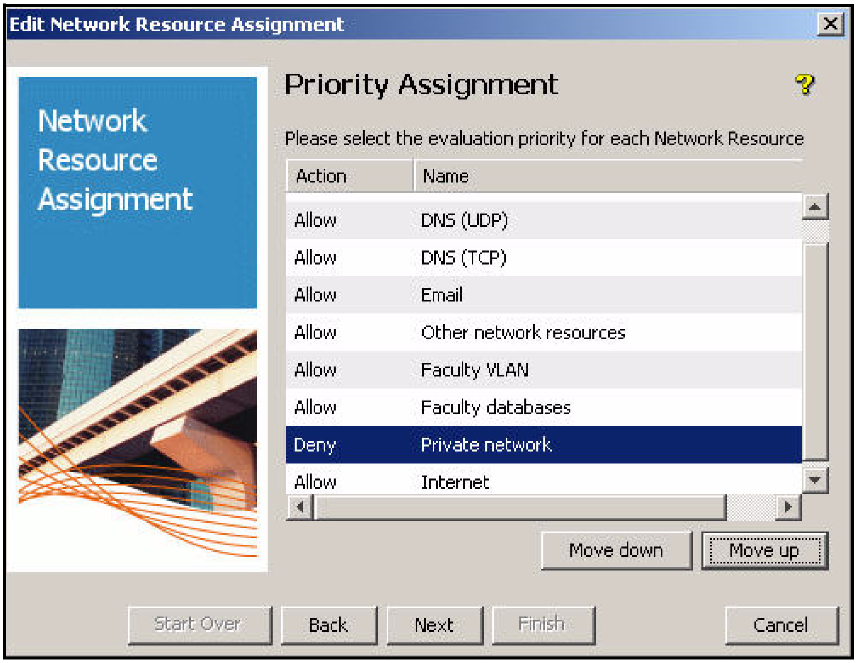
NAC 800 A
NAC 800 B
Management VLAN
Students VLAN

Denied Resources

Private network

Figure 2-225. Edit Network Resource Assignment Wizard—Denied Network Resources Page

17. When you are finished, click **Next**.



Please select the evaluation priority for each Network Resource

Action	Name
Allow	DNS (UDP)
Allow	DNS (TCP)
Allow	Email
Allow	Other network resources
Allow	Faculty VLAN
Allow	Faculty databases
Deny	Private network
Allow	Internet

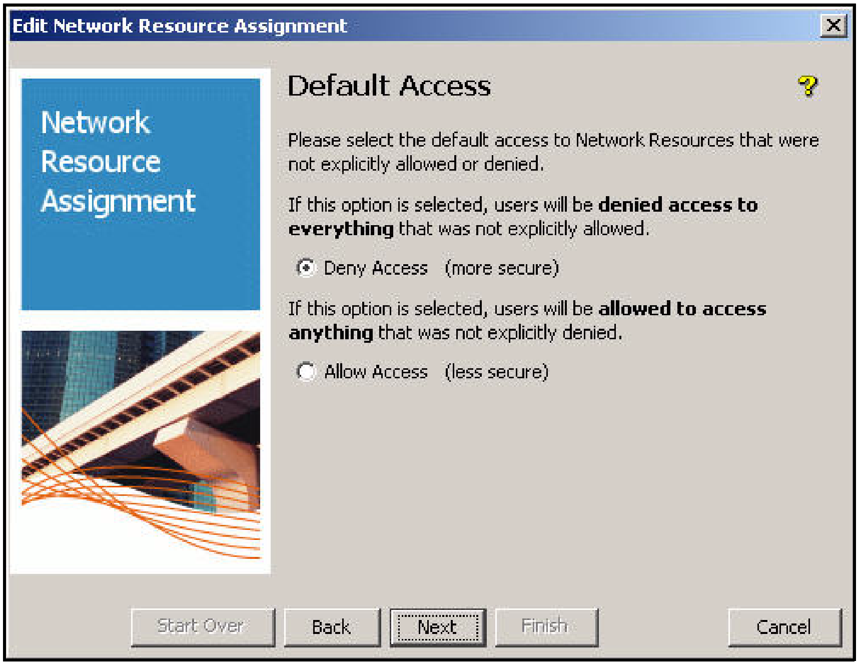
Figure 2-226. Edit Network Resource Assignment Wizard—Priority Assignment Page

18. If you would like to assign any of the allow or deny actions a priority, select the resource whose order you would like to modify. Then click either the **Move down** or **Move up** button until it is in the desired order.

    You only need to complete this step if the defined resources include overlapping resources. Generally, the more-specific rule should have a higher priority.

    In this example, you must place the rules that allow specific private resources first. Next is the rule that denies access to the rest of the private network. Place the rule that allows access to the Internet at the end of the list.

19. When you are finished, click **Next**.



Edit Network Resource Assignment

Default Access

Please select the default access to Network Resources that were not explicitly allowed or denied.

If this option is selected, users will be **denied access to everything** that was not explicitly allowed.

● Deny Access (more secure)

If this option is selected, users will be **allowed to access anything** that was not explicitly denied.

○ Allow Access (less secure)

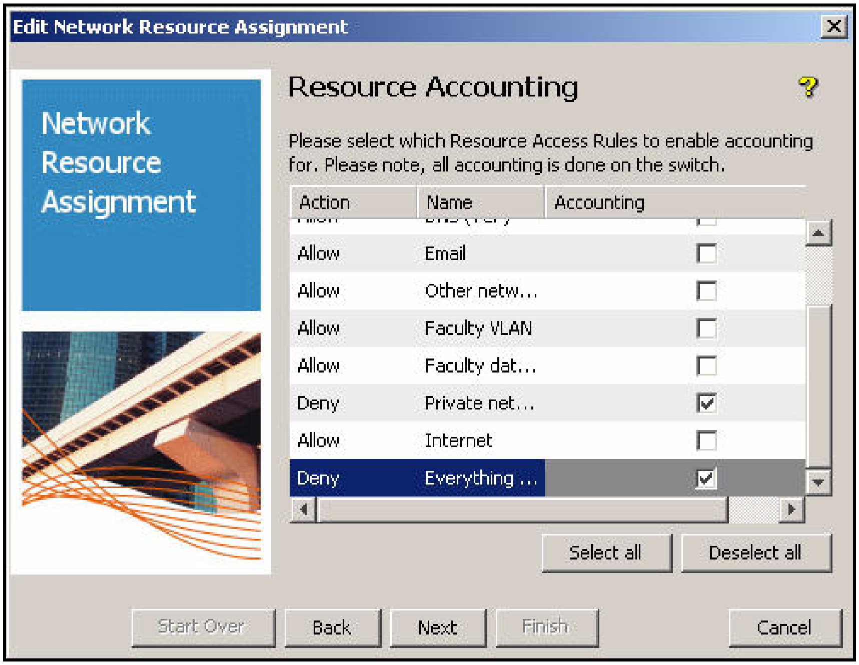
Figure 2-227. Edit Network Resource Assignment Wizard—Default Access Page

20. In the **Default Access** window, select **Deny Access** or **Allow Access** for any resources that were not explicitly allowed or denied. The more secure option is **Deny Access**.

21. Click **Next**.

22. In the **Resource Accounting** window, select the check box next to resources for which you would like to enable accounting. Typically, you should select only the check boxes for *denied* resources.

    Logging every time traffic is allowed quickly fills logs with relatively unimportant information.



Edit Network Resource Assignment

Resource Accounting

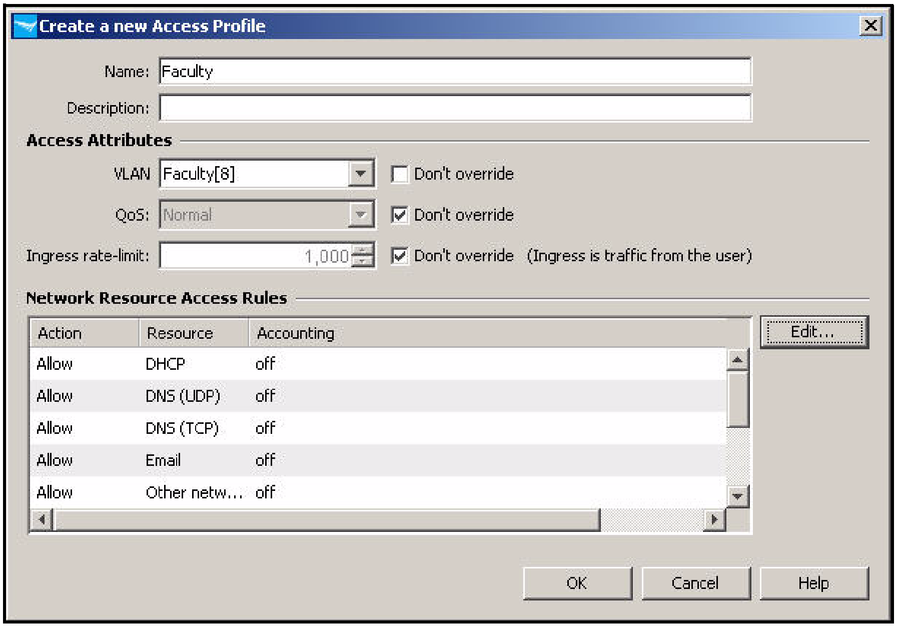
Please select which Resource Access Rules to enable accounting for. Please note, all accounting is done on the switch.

Action	Name	Accounting
Allow	Email	□
Allow	Other netw...	□
Allow	Faculty VLAN	□
Allow	Faculty dat...	□
Deny	Private net...	☑
Allow	Internet	□
Deny	Everything ...	☑

Figure 2-228. Edit Network Resource Assignment Wizard—Resource Accounting Page

23. Click **Next**.

24. Click **Finish**.



Create a new Access Profile

Name: Faculty

Description:

Access Attributes

VLAN Faculty[8] ☐ Don't override

QoS: Normal ☑ Don't override

Ingress rate-limit: 1,000 ☑ Don't override (Ingress is traffic from the user)

Network Resource Access Rules

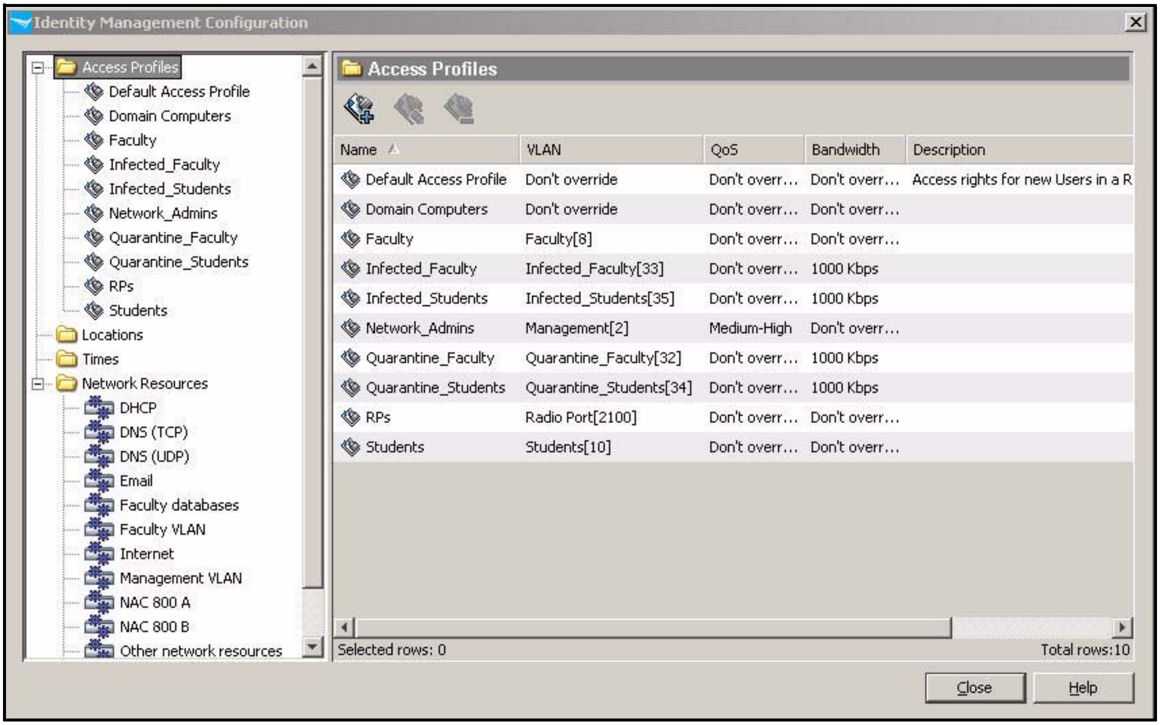
Action	Resource	Accounting
Allow	DHCP	off
Allow	DNS (UDP)	off
Allow	DNS (TCP)	off
Allow	Email	off
Allow	Other netw...	off

Figure 2-229. Edit Network Resource Assignment Wizard—Create a new Access Profile Window

25. Click **OK** in the **Create a new Access Profile** window.

26. Repeat steps 6 through 24 for each profile that you designed for your network.

    Figure 2-230 shows the completed profiles planned in Table 2-15.



Name	VLAN	QoS	Bandwidth	Description
Default Access Profile	Don't override	Don't overr...	Don't overr...	Access rights for new Users in a R
Domain Computers	Don't override	Don't overr...	Don't overr...	
Faculty	Faculty[8]	Don't overr...	Don't overr...	
Infected_Faculty	Infected_Faculty[33]	Don't overr...	1000 Kbps	
Infected_Students	Infected_Students[35]	Don't overr...	1000 Kbps	
Network_Admins	Management[2]	Medium-High	Don't overr...	
Quarantine_Faculty	Quarantine_Faculty[32]	Don't overr...	1000 Kbps	
Quarantine_Students	Quarantine_Students[34]	Don't overr...	1000 Kbps	
RPs	Radio Port[2100]	Don't overr...	Don't overr...	
Students	Students[10]	Don't overr...	Don't overr...	

Selected rows: 0 Total rows:10

Figure 2-230. Identity Management Configuration > Access Profiles

Configure Access Policy Groups

An access policy group rule specifies the profile that an authenticated user in that group receives, given a particular set of criteria, including:

- Time
- Location
- System (whether the endpoint is one that has been marked as belonging to the user)
- WLAN
- Endpoint integrity status

In this example, network access will not be restricted based on location or time: users are quite mobile, many students live on campus and access the network at any time, and many faculty members keep irregular hours. In addition, users sometimes log in on university equipment and sometimes on their own equipment. Their access will not be affected by the system they use to log in. Finally, users will receive the same type of access whether they connect via Ethernet or wirelessly. (The WLAN uses WPA encryption, so this policy does not open a security vulnerability).

In summary, the example network controls network access based on user group and endpoint integrity status. Table 2-16 shows the example rules.

Table 2-16. Access Policy Group Rules

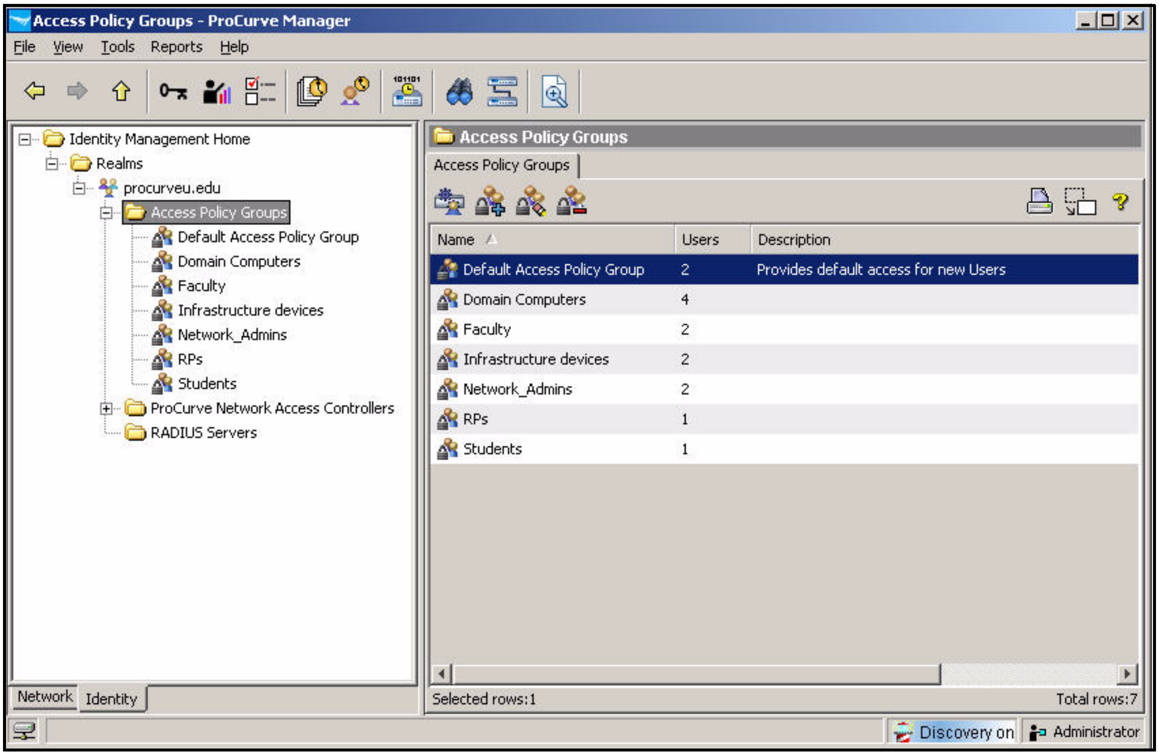
Group	Endpoint Integrity	Profile
Network_Admins	Pass	Network_Admins
	Unknown	Quarantine_Faculty
	Fail	Quarantine_Faculty
	Infected	Infected_Faculty
Faculty	Pass	Faculty
	Unknown	Quarantine_Faculty
	Fail	Quarantine_Faculty
	Infected	Infected_Faculty
Students	Pass	Students
	Unknown	Quarantine_Students
	Fail	Quarantine_Students
	Infected	Infected_Students
RPs	Any	RPs
Infrastructure devices	Any	Default access profile
Domain Computers (if desired)	Any	Domain Computers profile

Note

See the *ProCurve Identity Driven Manager User's Guide* for more information on settings up rules—for example, rules based on access time and location.

Follow these steps to configure access policy group rules:

1. In the ProCurve Management console, click the **Identity** tab.
2. Expand your realm.
3. Expand **Access Policy Groups** in the left pane.



- Identity Management Home
  - Realms
    - procurveu.edu
      - Access Policy Groups
        - Default Access Policy Group
        - Domain Computers
        - Faculty
        - Infrastructure devices
        - Network_Admins
        - RPs
        - Students
      - ProCurve Network Access Controllers
      - RADIUS Servers

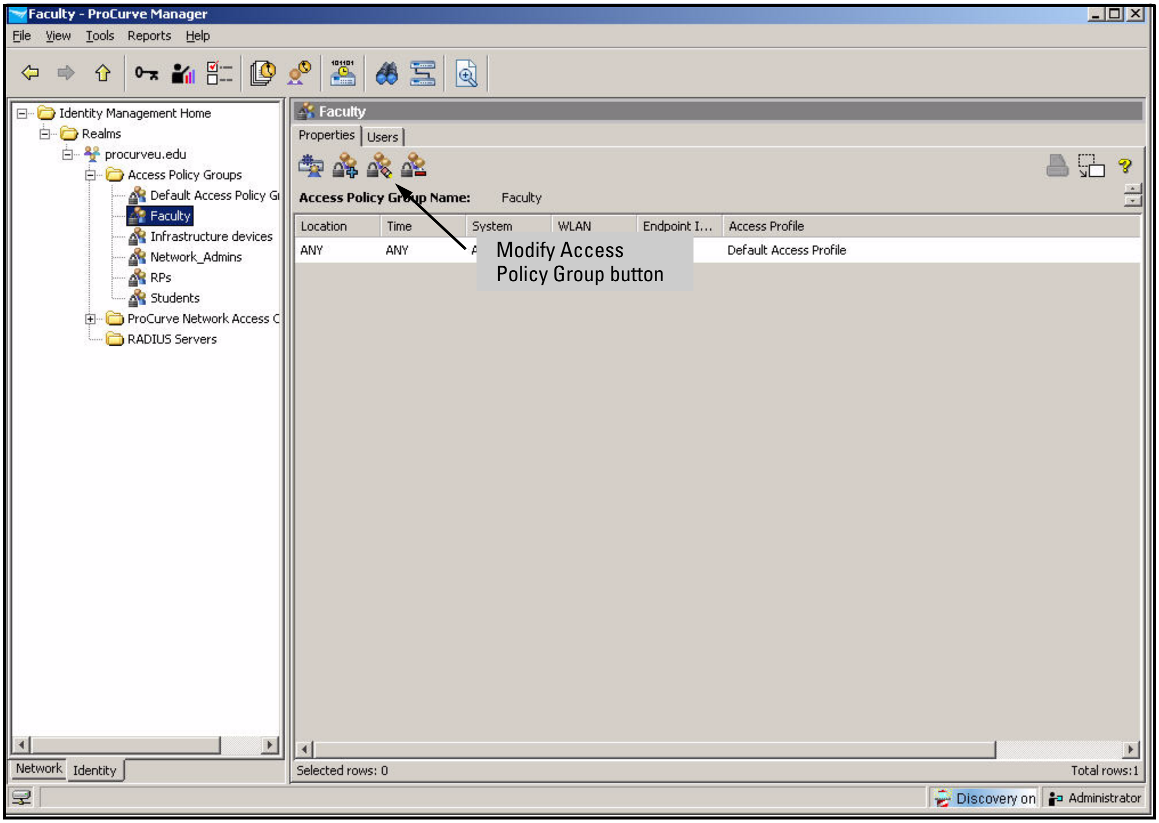
Name	Users	Description
Default Access Policy Group	2	Provides default access for new Users
Domain Computers	4	
Faculty	2	
Infrastructure devices	2	
Network_Admins	2	
RPs	1	
Students	1	

Selected rows:1

Total rows:7

Figure 2-231. ProCurve Manager—Access Policy Groups

4. Under **Access Policy Groups**, the groups synchronized with Active Directory are displayed. Select the group for which you want to set up access policy rules.



Access Policy Group Name: Faculty

Location	Time	System	WLAN	Endpoint I...	Access Profile
ANY	ANY	A			Default Access Profile

Figure 2-232. ProCurve Manager—<*my access policy group*>

5. Click the **Modify Access Policy Group** button.

6. By default, the access policy group includes a rule that grants default access under all conditions. You must change this rule to specify the access profile that you set up for this group. Select the rule and click **Edit**.

7. Set your criteria for users in this group that pass endpoint integrity tests:

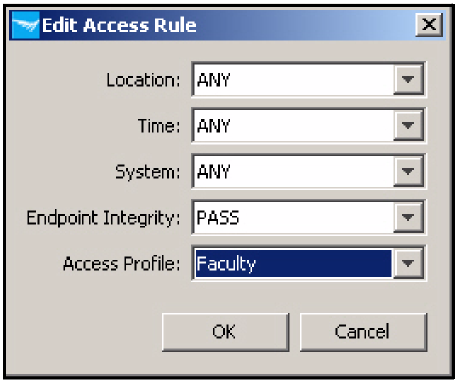
   a. For the **Location**, select a location or **ANY**.

   b. For the **Time**, select a time or **ANY**.

   c. For the **System**, select **OWN** (the endpoint associated with the user) or **ANY** (any endpoint).

   d. For the **Endpoint Integrity**, select **PASS**.

   e. For the **Access Profile**, select the access profile that you created for this group. For example, if you are configuring the Faculty access policy group, select the Faculty access profile.



Edit Access Rule

Location: ANY

Time: ANY

System: ANY

Endpoint Integrity: PASS

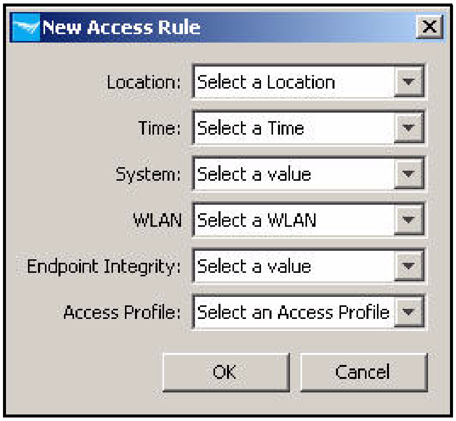
Access Profile: Faculty

Figure 2-233. ProCurve Manager—Edit Access Rule Window

Note

In this example, criteria such as location and time do not affect access. If you want to designate a location or time other than **ANY**, you must configure that location or time prior to editing the access rules. Refer to the *ProCurve Identity Driven Manager User's Guide* for more instructions.

8. Click **OK**.
9. Now, add rules for users with endpoints that have not passed endpoint integrity tests and must be quarantined.
10. Click **New**.



New Access Rule

Location: Select a Location

Time: Select a Time

System: Select a value

WLAN Select a WLAN

Endpoint Integrity: Select a value

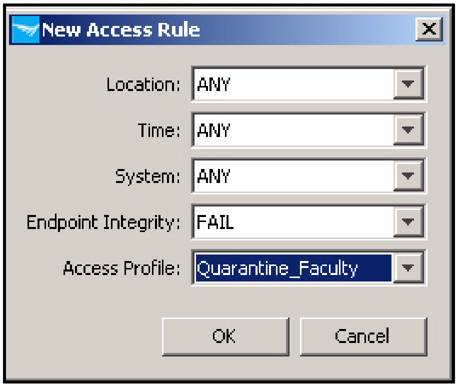
Access Profile: Select an Access Profile

Figure 2-234. ProCurve Manager—New Access Rule Window

11. Set the **Location**, **Time**, **System**, and **WLAN** values to **ANY**.

12. For **Endpoint Integrity**, select **FAIL**.

13. For the **Access Profile**, select the access profile that you created for quarantined users in this group. For example, if you are configuring the Faculty access policy group, select the Quarantine_Faculty access profile.



New Access Rule

Location: ANY

Time: ANY

System: ANY

Endpoint Integrity: FAIL

Access Profile: Quarantine_Faculty

Figure 2-235. ProCurve Manager—New Access Rule Window

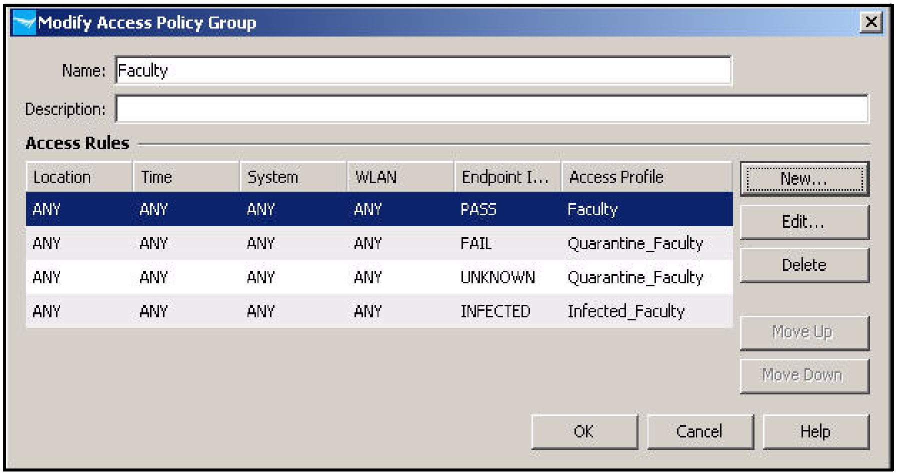
14. Click **OK**.

15. Repeat steps 10 through 13 for endpoints with the Unknown endpoint integrity status, assigning them to the appropriate quarantine profile.

    In this example, unknown endpoints receive the same profile as failed endpoints, but you could create a different profile for these endpoints if you wanted.

16. Repeat steps 10 through 13 for endpoints with the Infected endpoint integrity status. However, this time choose the profile that you created for infected endpoints—in this example, **Infected_Faculty**.

    Figure 2-236 shows the final rules for the Faculty access policy group.



Name: Faculty

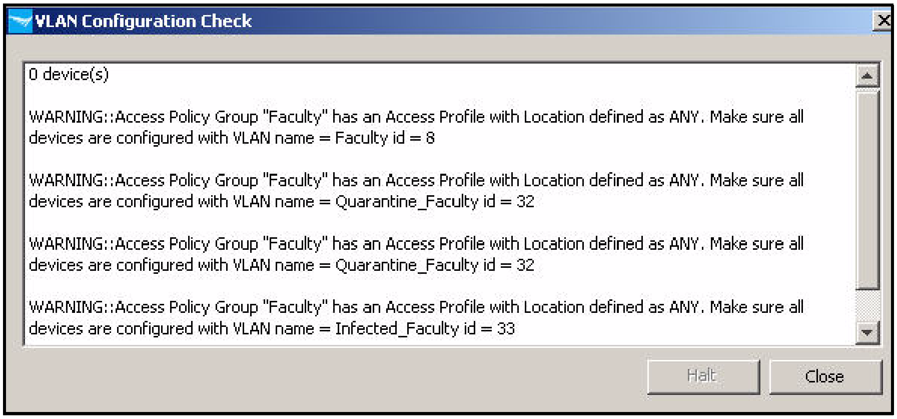
Description:

Access Rules

Location	Time	System	WLAN	Endpoint I...	Access Profile
ANY	ANY	ANY	ANY	PASS	Faculty
ANY	ANY	ANY	ANY	FAIL	Quarantine_Faculty
ANY	ANY	ANY	ANY	UNKNOWN	Quarantine_Faculty
ANY	ANY	ANY	ANY	INFECTED	Infected_Faculty

Figure 2-236. ProCurve Manager—Modify Access Policy Group Window

17. Click **OK**.



```
0 device(s)

WARNING::Access Policy Group "Faculty" has an Access Profile with Location defined as ANY. Make sure all
devices are configured with VLAN name = Faculty id = 8

WARNING::Access Policy Group "Faculty" has an Access Profile with Location defined as ANY. Make sure all
devices are configured with VLAN name = Quarantine_Faculty id = 32

WARNING::Access Policy Group "Faculty" has an Access Profile with Location defined as ANY. Make sure all
devices are configured with VLAN name = Quarantine_Faculty id = 32

WARNING::Access Policy Group "Faculty" has an Access Profile with Location defined as ANY. Make sure all
devices are configured with VLAN name = Infected_Faculty id = 33
```

Figure 2-237. PCM+ Console, IDM Interface—VLAN Configuration Check Window

18. IDM warns you to check that your infrastructure devices support the dynamic VLANs. Click **Close**.

    If necessary, add VLAN tags to uplink ports on switches (or the uplink port of a Wireless Edge Services Module).

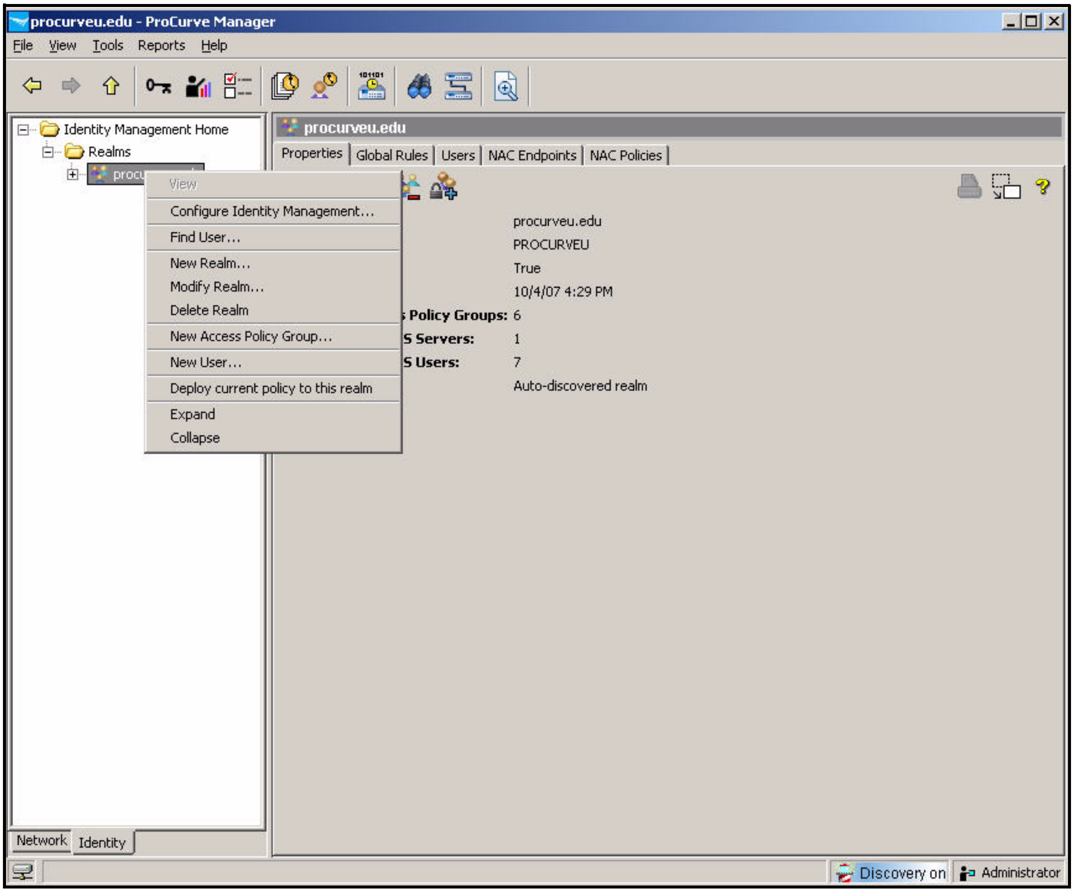
19. Repeat steps 4 to 16 for each access policy group in your environment.

Deploy Policies to the NAC 800s

The policies you have configured take effect after you deploy them to the RADIUS servers—in this case, the NAC 800s. Once deployed, the policies are stored by the IDM agent on the NAC 800, and the NAC 800 enforces the policies whether IDM is running or not.

Follow these steps:

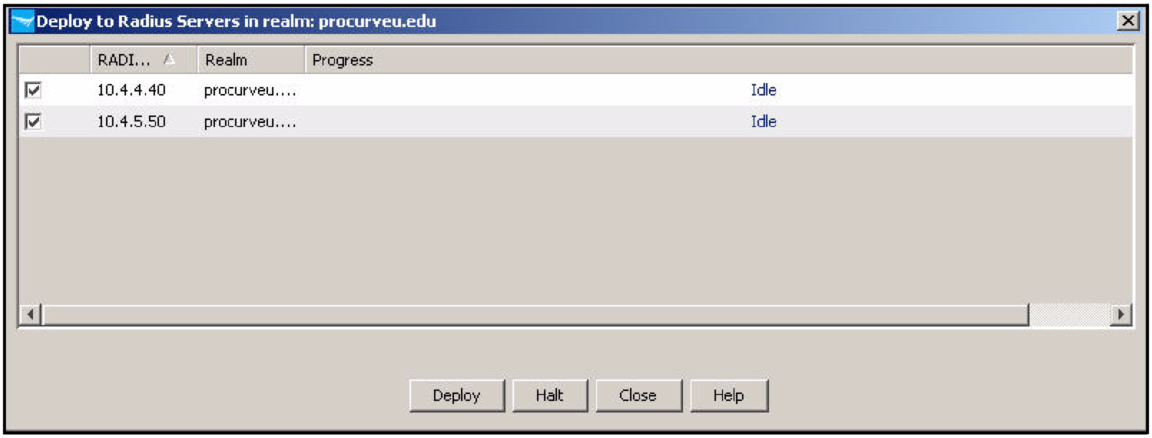
1. You should be in the **Identity Management Home** window of PCM+.
2. In the left pane, expand **Realms**.
3. Right-click your domain's realm name and select **Deploy current policy to this realm**.



procurveu.edu
PROCURVEU
True
10/4/07 4:29 PM
Policy Groups: 6
S Servers: 1
S Users: 7
Auto-discovered realm

Figure 2-238. ProCurve Manager—Identity Management Home Window

4. The **Deploy to Radius Servers in realm: <*myrealm*> window** is displayed.



	RADI...	Realm	Progress
☑	10.4.4.40	procurveu....	Idle
☑	10.4.5.50	procurveu....	Idle

Figure 2-239. Deploy to Radius Servers in realm: <*myrealm*> window

5. By default, the check boxes for every RADIUS server (including NAC 800s) are selected. You can clear a check box if you do not want to deploy the policy to a particular server. In this example, leave all check boxes selected.

6. Click **Deploy**.

7. When the **Progress** bar reaches 100 percent, click **Close**.

Setting Up Endpoints

By now, you have set up your network infrastructure and servers to support your access control solution. Before enabling port authentication, however, you must set up the endpoints as well. To function in this solution, endpoints require:

- User certificates for EAP-TLS authentication
- 802.1X supplicants
- NAC EI agents

Install Certificates

Before you implement portauthentication, you shouldinstall user certificates on the endpoints. The endpoints will submit the certificates to complete EAP-TLS authentication when a user connects to the network.

The following section explains how users autoenroll for certificates.

Autoenroll for Certificates

You already set up templates on your CA to allow autoenrollment (see “Set Up Autoenrollment of Computer and User Certificates” on page 2-68).

You accepted default autoenrollment settings in “Set Up Autoenrollment of Computer and User Certificates” on page 2-68. Autoenrollment proceeds without user interaction and the CA automatically issues certificates to domain members.

In short, when a user logs in to the Windows domain, his or her endpoint automatically enrolls for a user certificate and automatically installs it when the CA server (also automatically) issues it. The endpoint also automatically obtains and installs the root CA certificate.

Note

The user must connect to the Windows domain in order to autoenroll for the certificate. Set up autoenrollment several days before you begin to enforce 802.1X.

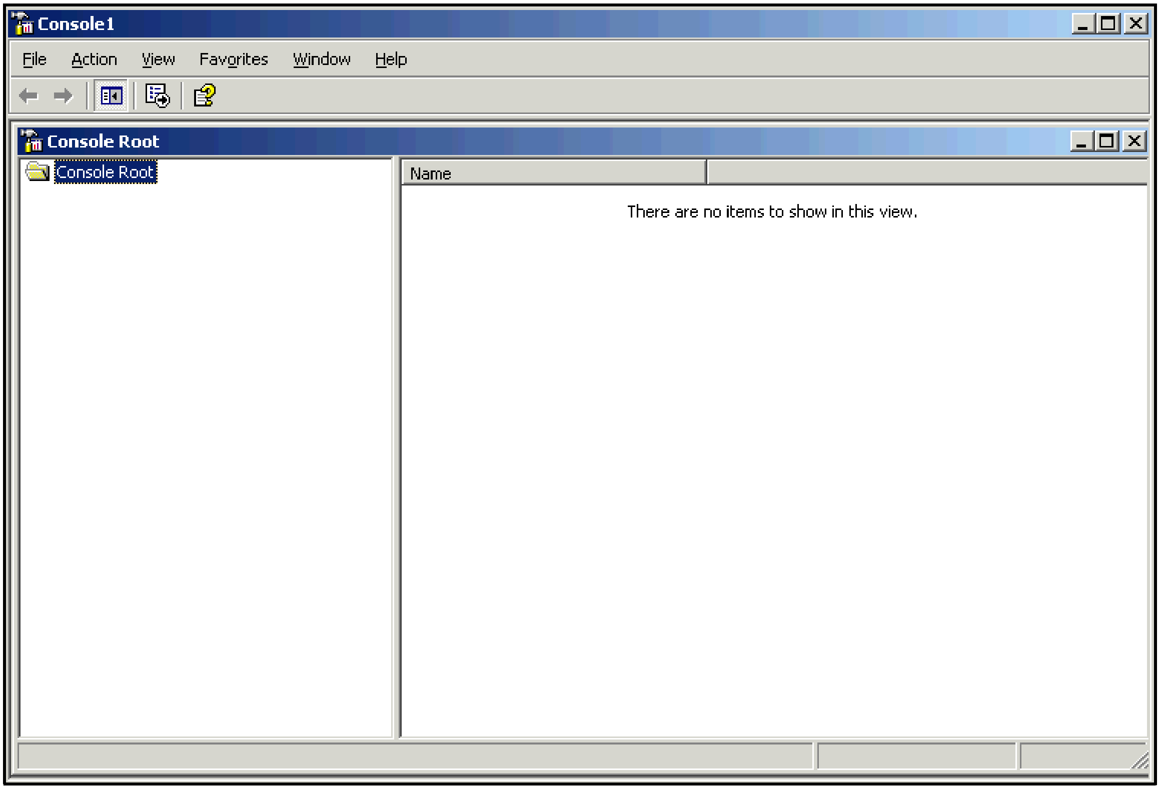
You should test the autoenrollment process.

Note

To complete the following steps, a user must be a local administrator on his or her endpoint. Otherwise, the usercan manage his or her user certificate but not the computer certificate.

On your endpoint, log in to the domain (if you were already logged in before autoenrollment was enabled, log out and then back in). Then follow these steps to verify that the user certificate has installed on your endpoint:

1. Open a Management Console. (Select **Start** > **Run**; type **mmc** at the prompt and click **OK**).



There are no items to show in this view.

Figure 2-240. Management Console Window

2. Select **File** > **Add/Remove Snap-in**.

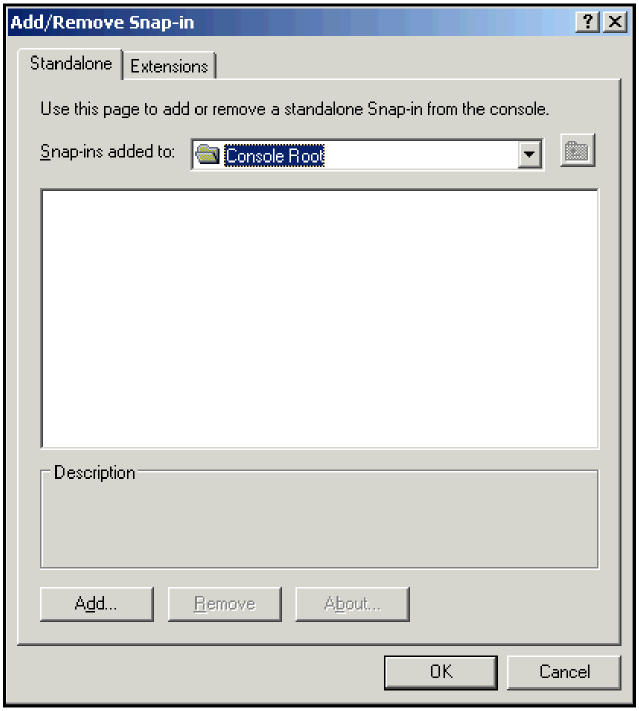
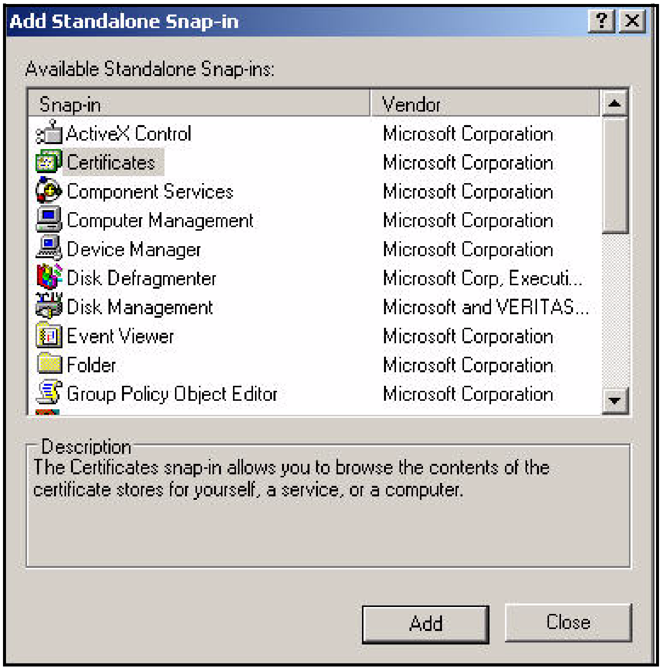


Figure 2-241. Management Console—Add/Remove Snap-in Window

3. Click **Add** in the **Add/Remove Snap-in** window.



Snap-in	Vendor
ActiveX Control	Microsoft Corporation
Certificates	Microsoft Corporation
Component Services	Microsoft Corporation
Computer Management	Microsoft Corporation
Device Manager	Microsoft Corporation
Disk Defragmenter	Microsoft Corp, Executi...
Disk Management	Microsoft and VERITAS...
Event Viewer	Microsoft Corporation
Folder	Microsoft Corporation
Group Policy Object Editor	Microsoft Corporation

Description
The Certificates snap-in allows you to browse the contents of the certificate stores for yourself, a service, or a computer.

Figure 2-242. Management Console—Add/Remove Snap-in Window

4. Click **Certificates** in the **Available Standalone Snap-ins** window.

5. Click **Add**.

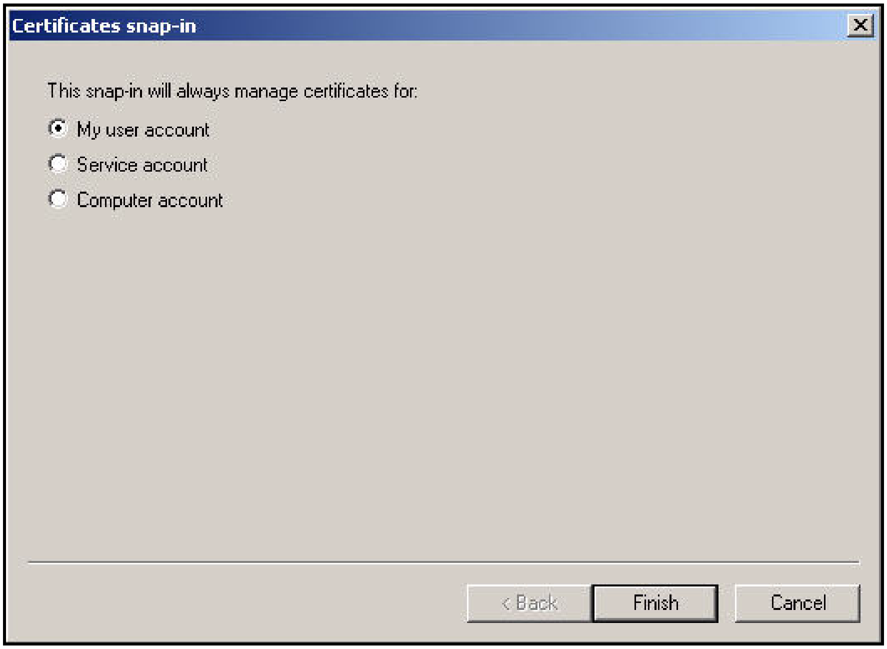
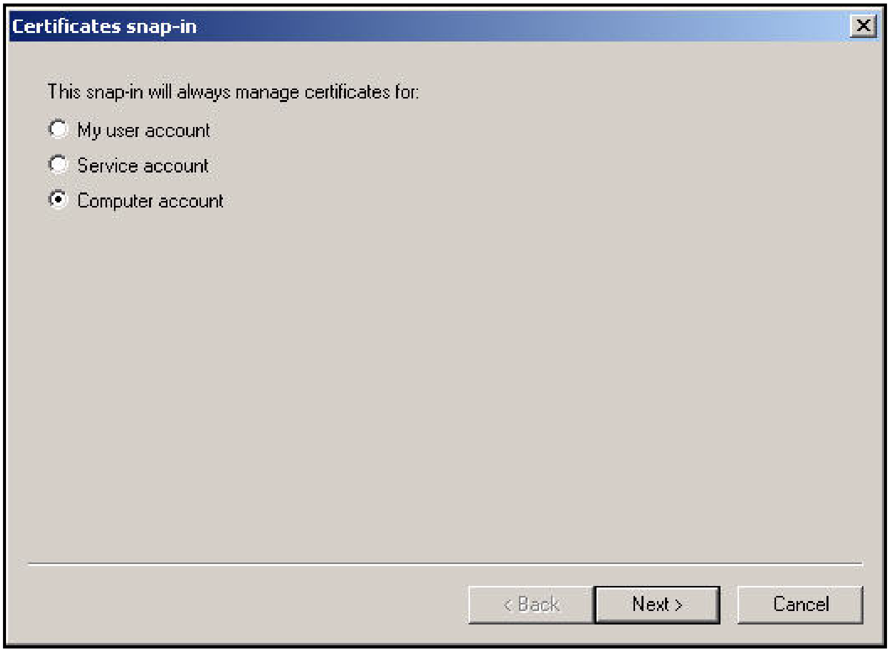


Figure 2-243. Management Console—Certificates snap-in Window

6. Select **My user account**.
7. Click **Finish**.
8. You can add another snap-in to manage computer certificates:
   a. **Certificates** should still be selected in the **Available Standalone Snap-ins** window.
   b. Click **Add**.
   c. Click **Computer account**.



Certificates snap-in

This snap-in will always manage certificates for:

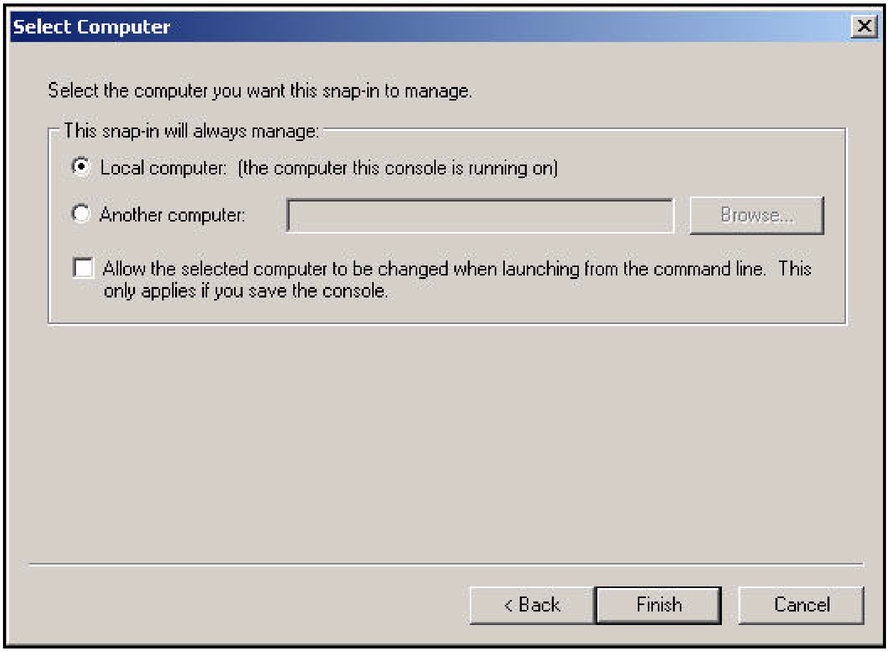
○ My user account

○ Service account

● Computer account

Figure 2-244. Management Console—Certificates snap-in Window

d. Click **Next**.



Select the computer you want this snap-in to manage.

This snap-in will always manage:

● Local computer: (the computer this console is running on)

○ Another computer:

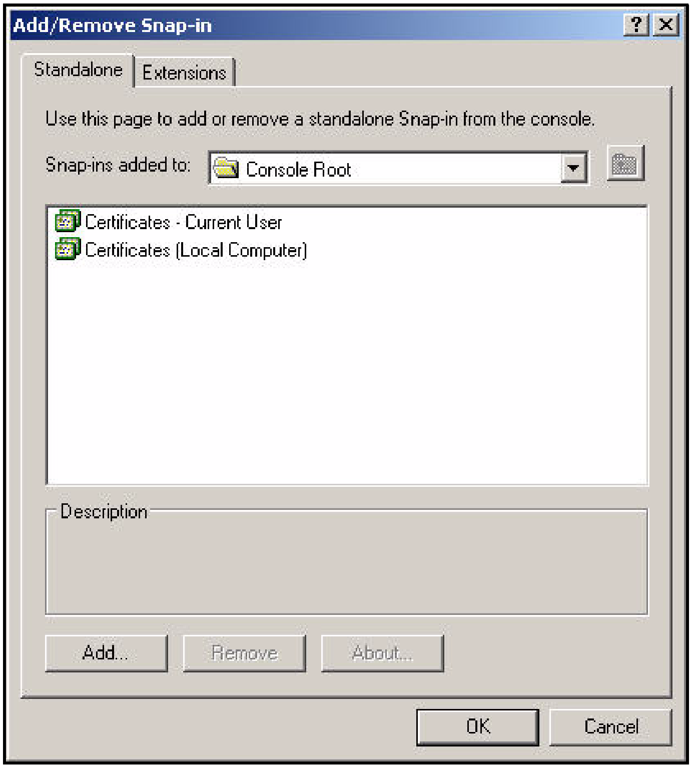
□ Allow the selected computer to be changed when launching from the command line. This only applies if you save the console.

Figure 2-245. Management Console—Select Computer Window

e. Leave **Local computer** selected.

f. Click **Finish**.

9. The snap-ins are displayed in the **Add/Remove Snap-in** window. Click **Close** in the **Add Standalone Snap-in** window.



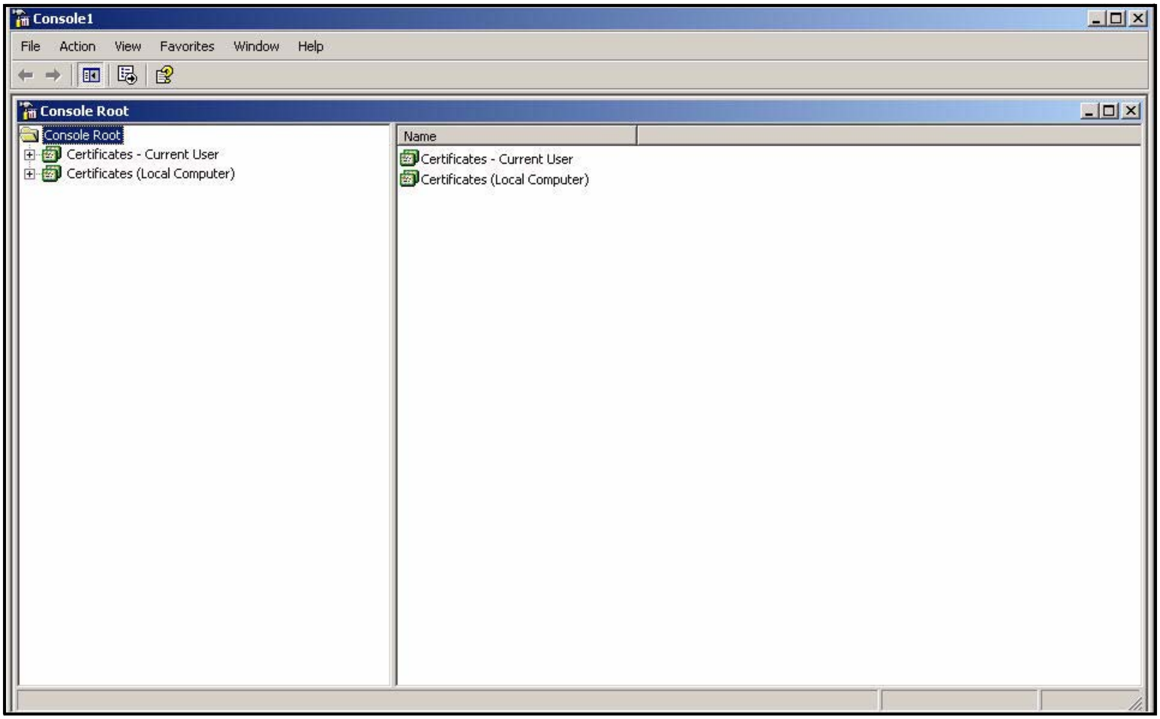
Use this page to add or remove a standalone Snap-in from the console.

Snap-ins added to: Console Root

Certificates - Current User
Certificates (Local Computer)

Figure 2-246. Management Console—Add/Remove Snap-in Window—Standalone Tab

10. Click **OK** in the **Add/Remove Snap-in** window.



Console1

File Action View Favorites Window Help

Console Root

- Console Root
  - Certificates - Current User
  - Certificates (Local Computer)

Name
Certificates - Current User
Certificates (Local Computer)

Figure 2-247. Management Console—Certificates Snap-ins

11. In the left pane, expand **Certificates – Current User > Personal**.
12. Click **Certificates**.

    Your user certificate should be displayed in the right pane.

13. If the user certificate is not present, you can manually start autoenrollment:
    a. Right-click **Certificates – Current User**.
    b. Select **All Tasks** > **Automatically Enroll Certificates**.
    c. The certificate should install in about one minute.
14. Check the computer certificate in the same way:
    a. Expand **Certificates (Local Computer) > Personal**.
    b. Click **Certificates**.

15. If necessary, manually start autoenrollment for the computer certificate:
    a. Right-click **Certificates (Local Computer)**.
    b. Select **All Tasks** > **Automatically Enroll Certificates**.
    c. The certificate should install in about one minute.
16. Press **[Alt]**+**[F4]** to close the Management Console.
17. Save the Management Console.

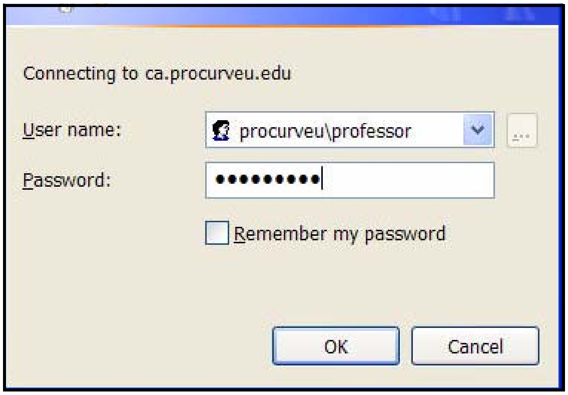
Manually Enroll for Certificates

This solution uses autoenrollment; however, you might choose to have users enroll for certificates manually. They can do so in two ways:

- Web enrollment pages
- MMC

Web Enrollment Pages. Follow these steps to enroll for a user certificate using the Windows CA Web enrollment pages:

1. Open a Web browser and type this URL: *http://<CA server hostname>/certsrv*. In this example: *http://ca.procurveu.edu/certsrv*.
2. When prompted, type your domain username and password:
    a. Type the **User name** in this format: ***<domain>\<username>***. In this example: **procurveu\professor**.
    b. For the **Password**, type the user's domain password. In this example: **ProCurve3**.


Connecting to ca.procurveu.edu

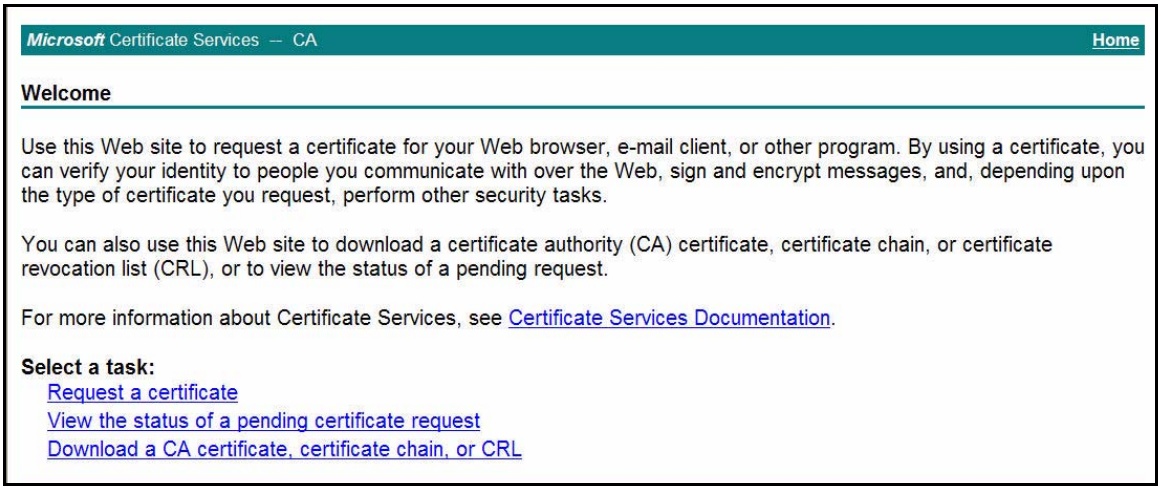
User name: procurveu\professor

Password: ••••••••••

□ Remember my password

Figure 2-248. Connect to <*CA server*>

3. Click **OK**.



Microsoft Certificate Services -- CA

Home

Welcome

Use this Web site to request a certificate for your Web browser, e-mail client, or other program. By using a certificate, you can verify your identity to people you communicate with over the Web, sign and encrypt messages, and, depending upon the type of certificate you request, perform other security tasks.

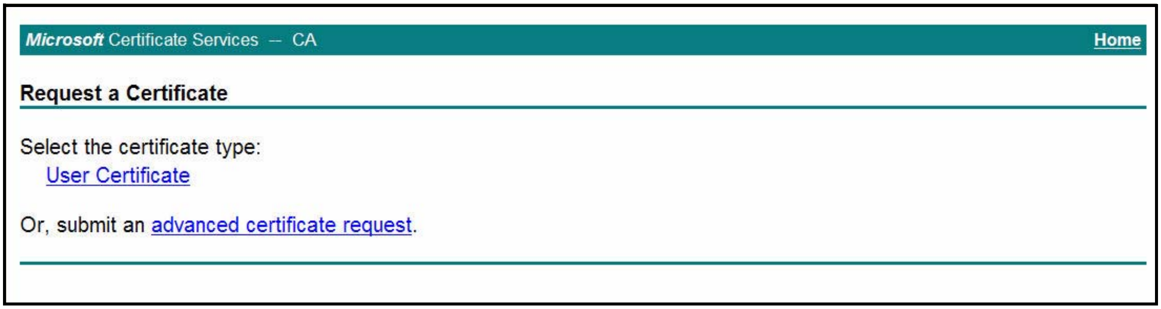
You can also use this Web site to download a certificate authority (CA) certificate, certificate chain, or certificate revocation list (CRL), or to view the status of a pending request.

For more information about Certificate Services, see Certificate Services Documentation.

Select a task:
- Request a certificate
- View the status of a pending certificate request
- Download a CA certificate, certificate chain, or CRL

Figure 2-249. Certificate Services—Welcome Page

4. Click **Request a certificate**.



Microsoft Certificate Services -- CA

Home

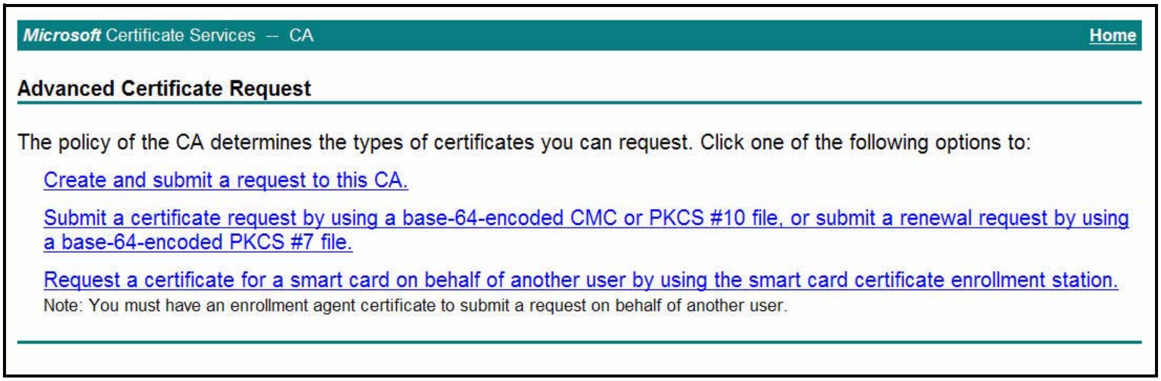
Request a Certificate

Select the certificate type:
- User Certificate

Or, submit an advanced certificate request.

Figure 2-250. Certificate Services—Request a Certificate Page

5. Click **advanced certificate request**.



Microsoft Certificate Services -- CA

Home

Advanced Certificate Request

The policy of the CA determines the types of certificates you can request. Click one of the following options to:

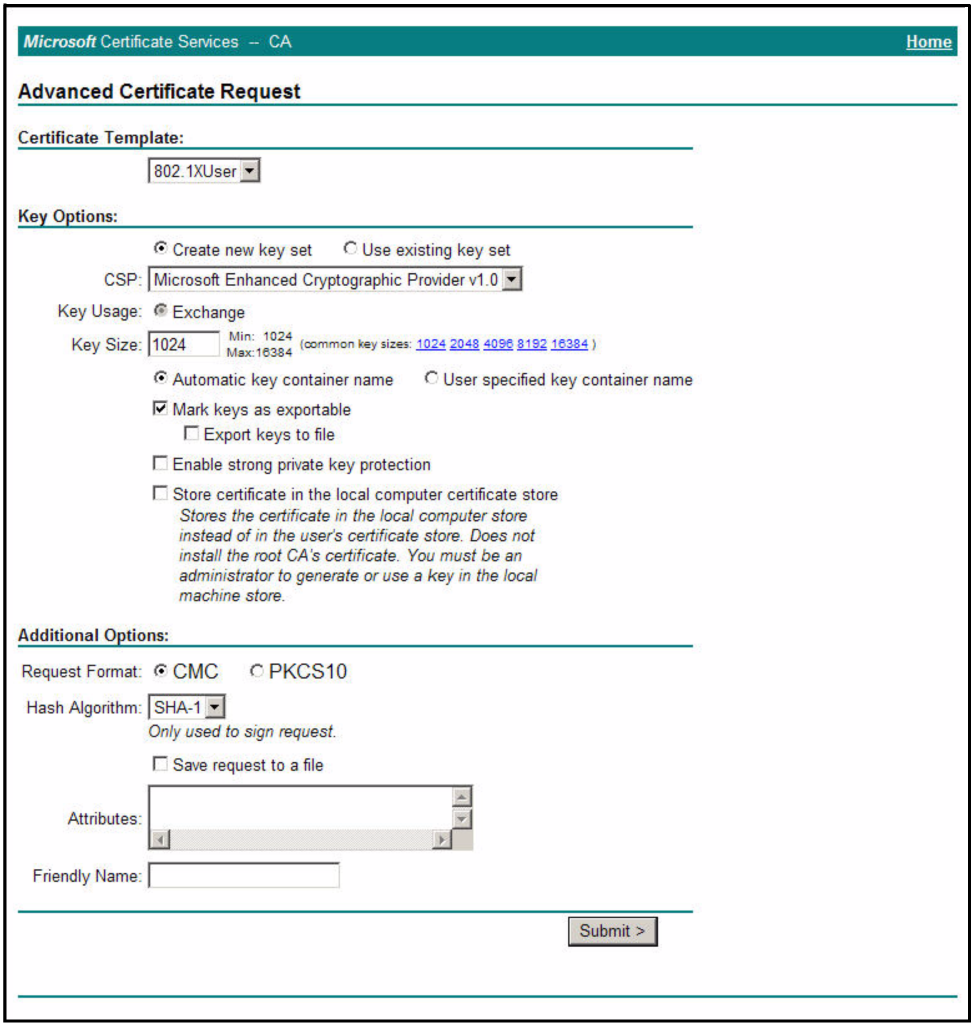
Create and submit a request to this CA.

Submit a certificate request by using a base-64-encoded CMC or PKCS #10 file, or submit a renewal request by using a base-64-encoded PKCS #7 file.

Request a certificate for a smart card on behalf of another user by using the smart card certificate enrollment station.
Note: You must have an enrollment agent certificate to submit a request on behalf of another user.

Figure 2-251. Certificate Services—Advanced Certificate Request Page

6. Click **Create and submit a request to this CA.**



Advanced Certificate Request

Certificate Template:

802.1XUser

Key Options:

● Create new key set ○ Use existing key set

CSP: Microsoft Enhanced Cryptographic Provider v1.0

Key Usage: ● Exchange

Key Size: 1024 Min: 1024 Max: 16384 (common key sizes: 1024 2048 4096 8192 16384)

● Automatic key container name ○ User specified key container name

☑ Mark keys as exportable

☐ Export keys to file

☐ Enable strong private key protection

☐ Store certificate in the local computer certificate store
Stores the certificate in the local computer store instead of in the user's certificate store. Does not install the root CA's certificate. You must be an administrator to generate or use a key in the local machine store.

Additional Options:

Request Format: ● CMC ○ PKCS10

Hash Algorithm: SHA-1
Only used to sign request.

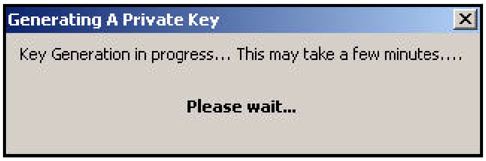
☐ Save request to a file

Attributes:

Friendly Name:

Figure 2-252. Certificate Services—Advanced Certificate Request Page

7. For the **Certificate Template**, select the template you customized for 802.1X authentication. In this example: **802.1XUser**.
8. You can leave all other settings at the defaults.
9. Click **Submit**.



Generating A Private Key

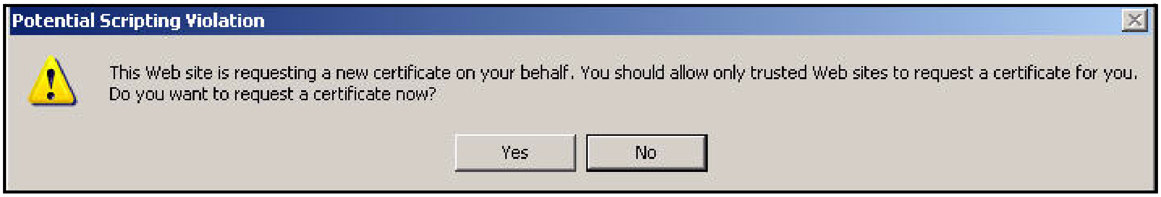
Key Generation in progress... This may take a few minutes....

Please wait...

Figure 2-253. Generating a Private Key Window

10. Wait while the private key generates. After a minute or so, you should see the page shown in Figure 2-255.

    Depending on your security settings, you might first see the window in Figure 2-254.

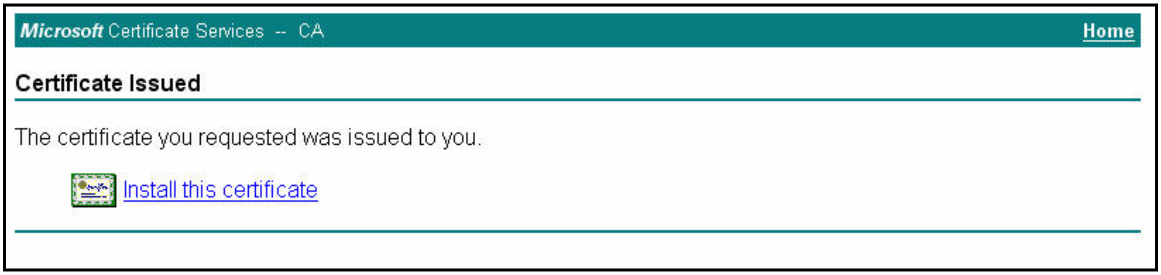


Potential Scripting Violation

This Web site is requesting a new certificate on your behalf. You should allow only trusted Web sites to request a certificate for you. Do you want to request a certificate now?

Figure 2-254. Potential Scripting Violation Window

If so, click **Yes**.



Microsoft Certificate Services -- CA

Certificate Issued

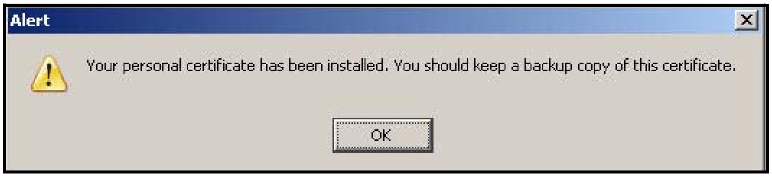
The certificate you requested was issued to you.

Install this certificate

Figure 2-255. Certificate Services—Certificate Issued Page

11. Click **Install this certificate**.
12. You should see an **Alert** window when the certificate is installed. See Figure 2-256.

    Again, the **Potential Scripting Violation** window might be displayed. If so, click **Yes**.



Alert

Your personal certificate has been installed. You should keep a backup copy of this certificate.

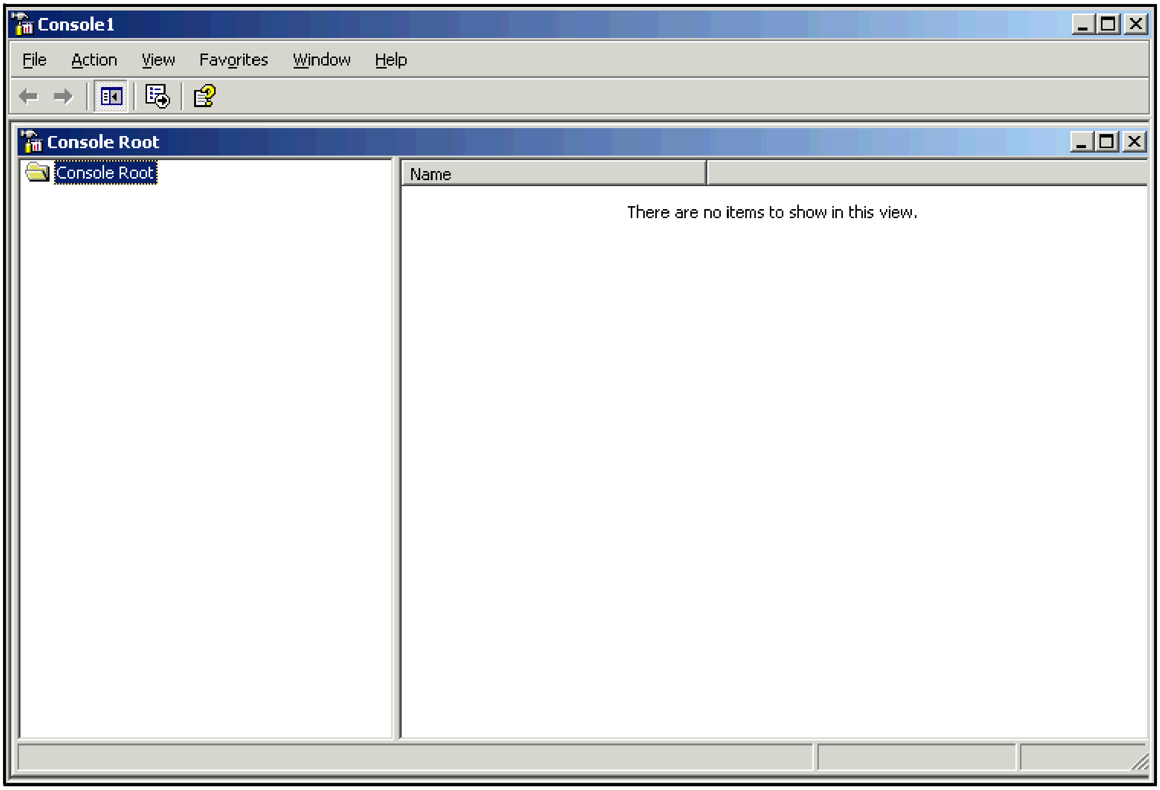
Figure 2-256. Alert Window

13. Click **OK**.

MMC. Users can manually enroll for a certificate through a Management Console such as the one created in "Autoenroll for Certificates" on page 2-276. (Note that to manually enroll for a computer certificate, the user must be an administrator of the computer.)

Follow these steps:

1. Open the Management Console. (Select **Start** > **Run**; type **mmc** at the prompt and click **OK**).



There are no items to show in this view.

Figure 2-257. Management Console Window

2. From the **File** menu, select the console that you created in “Autoenroll for Certificates” on page 2-276.

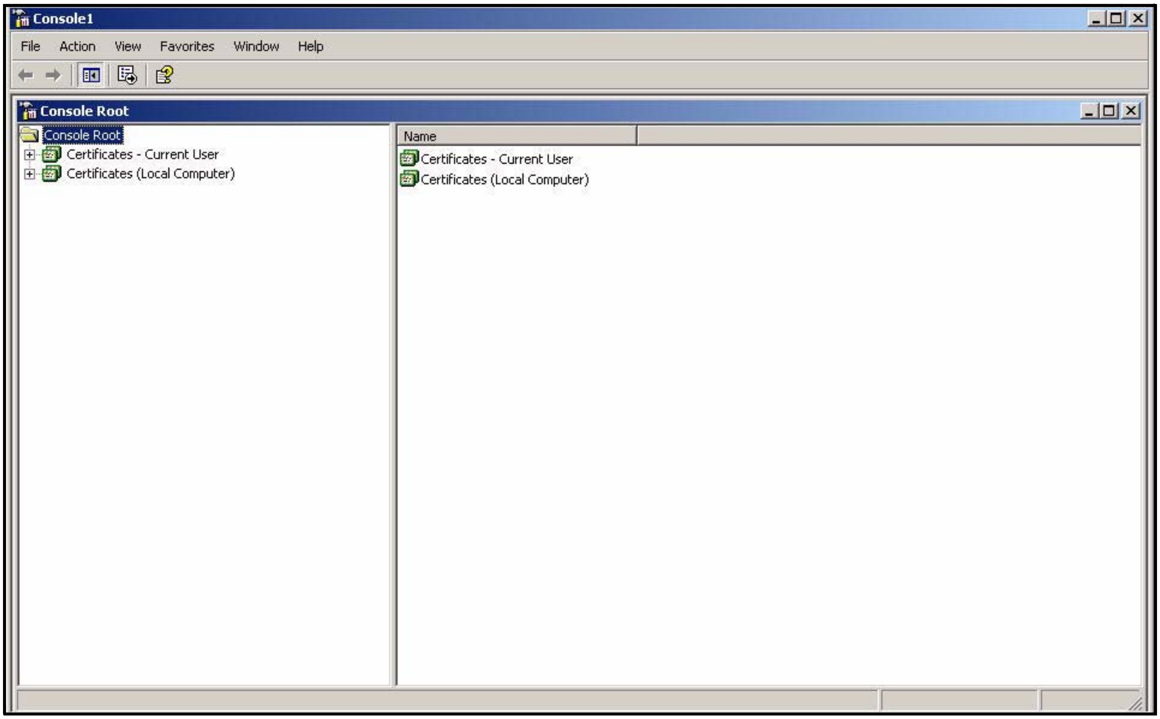
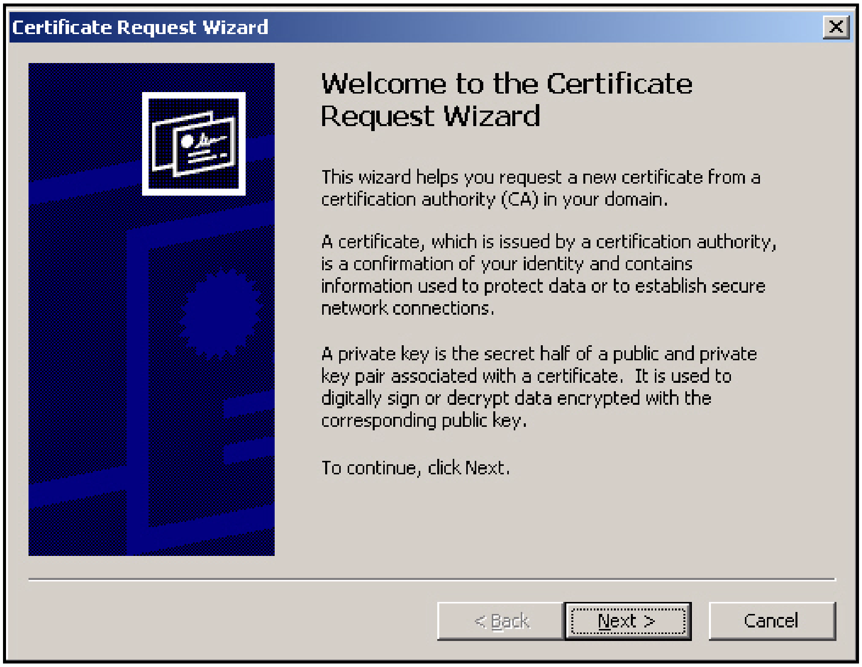

Console1
File
Action
View
Favorites
Window
Help
Console Root
Console Root
Certificates - Current User
Certificates (Local Computer)
Name
Certificates - Current User
Certificates (Local Computer)

Figure 2-258. Management Console—Certificates Snap-ins

3. In the left pane, expand **Certificates – Current User > Personal**.

4. Right-click **Certificates**.

5. Select **All Tasks** > **Request New Certificate**. The Certificate Request Wizard is displayed.



Welcome to the Certificate Request Wizard

This wizard helps you request a new certificate from a certification authority (CA) in your domain.

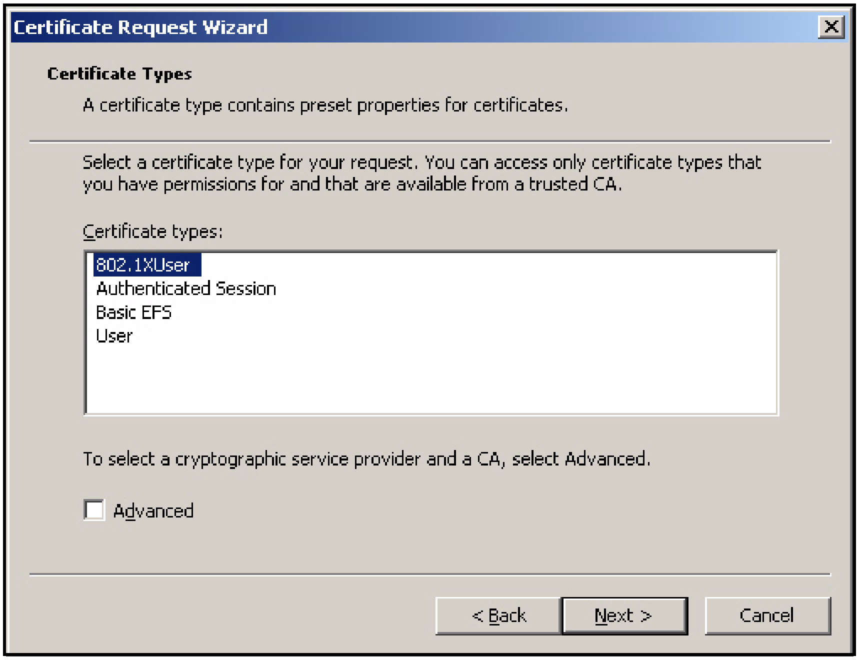
A certificate, which is issued by a certification authority, is a confirmation of your identity and contains information used to protect data or to establish secure network connections.

A private key is the secret half of a public and private key pair associated with a certificate. It is used to digitally sign or decrypt data encrypted with the corresponding public key.

To continue, click Next.

Figure 2-259. Certificate Request Wizard—Welcome Page

6. Click **Next**.



Certificate Request Wizard

Certificate Types

A certificate type contains preset properties for certificates.

Select a certificate type for your request. You can access only certificate types that you have permissions for and that are available from a trusted CA.

Certificate types:

- 802.1XUser
- Authenticated Session
- Basic EFS
- User

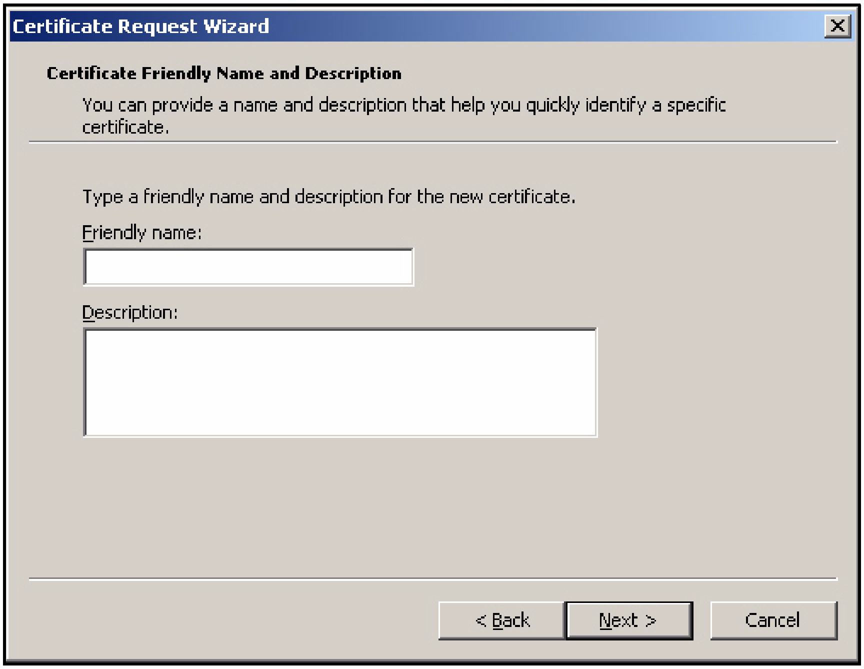
To select a cryptographic service provider and a CA, select Advanced.

☐ Advanced

Figure 2-260. Certificate Request Wizard—Certificate Types Page

7. The **Certificate types** box lists the certificate templates for which this user has Enroll privileges. Select the template created for users to authenticate using 802.1X. In this example: **802.1XUser**.

8. Click **Next**.


Certificate Request Wizard

Certificate Friendly Name and Description

You can provide a name and description that help you quickly identify a specific certificate.

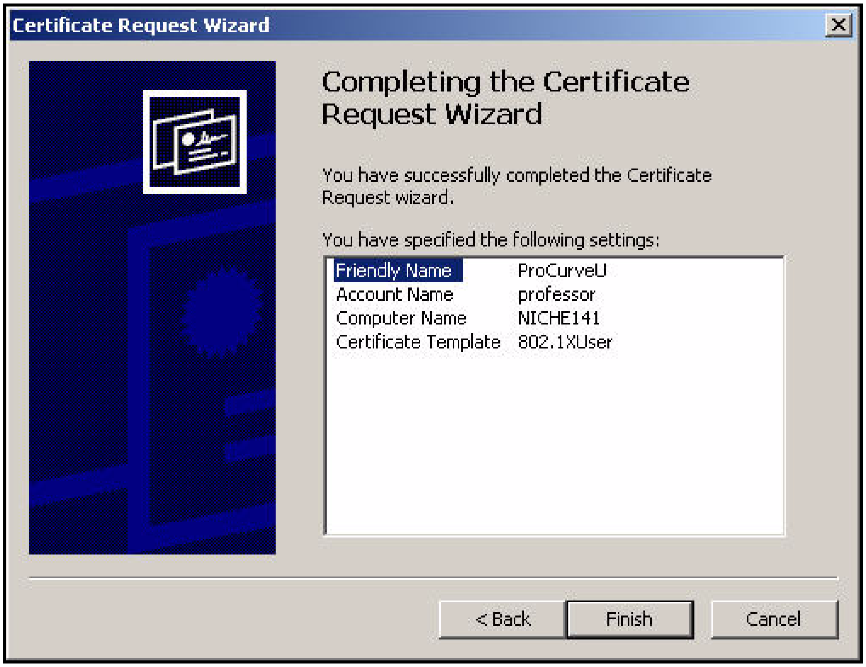
Type a friendly name and description for the new certificate.

Friendly name:

Description:

Figure 2-261. Certificate Request Wizard—Certificate Friendly Name and Description Page

9. For the **Friendly name**, type a name toidentify this certificate. For example, you could identity the certificate by the CA. In this example: **ProCurveU**.
10. Optionally, type a longer description of the certificate and its purpose in the **Description** box.
11. Click **Next**.



Completing the Certificate Request Wizard

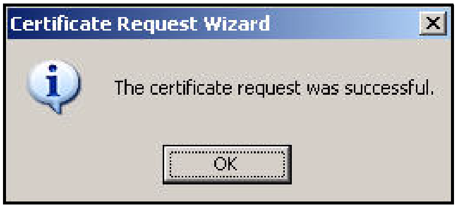
You have successfully completed the Certificate Request wizard.

You have specified the following settings:

Friendly Name	ProCurveU
Account Name	professor
Computer Name	NICHE141
Certificate Template	802.1XUser

Figure 2-262. Certificate Request Wizard—Completing the Certificate Request Wizard Page

12. Check the settings on the **Completing the Certificate Request Wizard** page and click **Finish**.



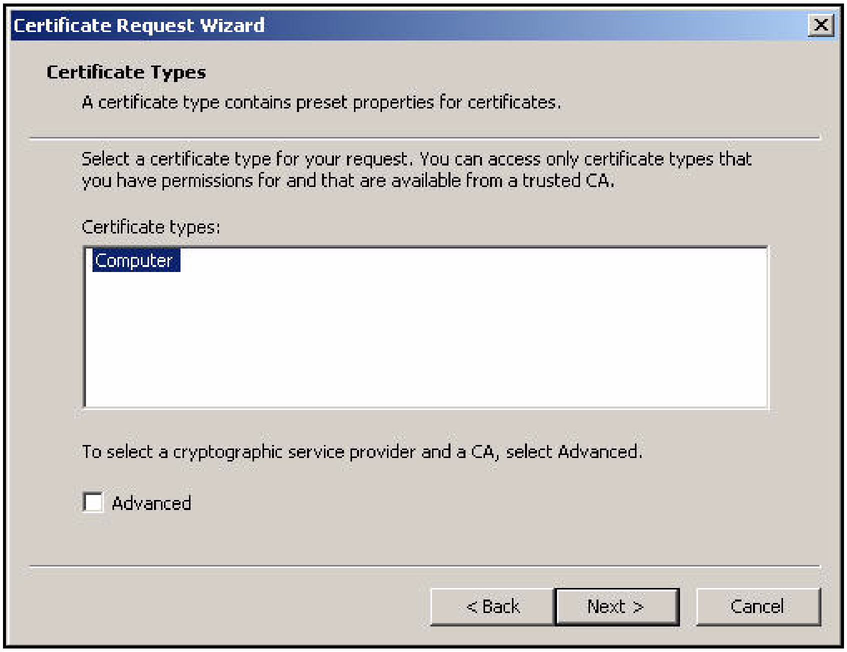
The certificate request was successful.

Figure 2-263. Certificate Request Wizard Window

13. You should see the window in Figure 2-263. Click **OK**.
14. To manually enroll for a computer certificate, follow the same process:
    a. Expand **Certificates (Local Computer)** > **Personal**.
    b. Right-click **Certificates**.

c. Select **All Tasks** > **Request New Certificate**. The Certificate Request Wizard is displayed.

d. Complete the same steps as those for requesting a user certificate (step 6 on page 2-293 to step 13 on page 2-296). The only difference is that you select **Computer** for the certificate type. See Figure 2-264.


Certificate Request Wizard

Certificate Types

A certificate type contains preset properties for certificates.

Select a certificate type for your request. You can access only certificate types that you have permissions for and that are available from a trusted CA.

Certificate types: Computer

To select a cryptographic service provider and a CA, select Advanced.

□ Advanced

Figure 2-264. Certificate Request Wizard—Certificate Types Page

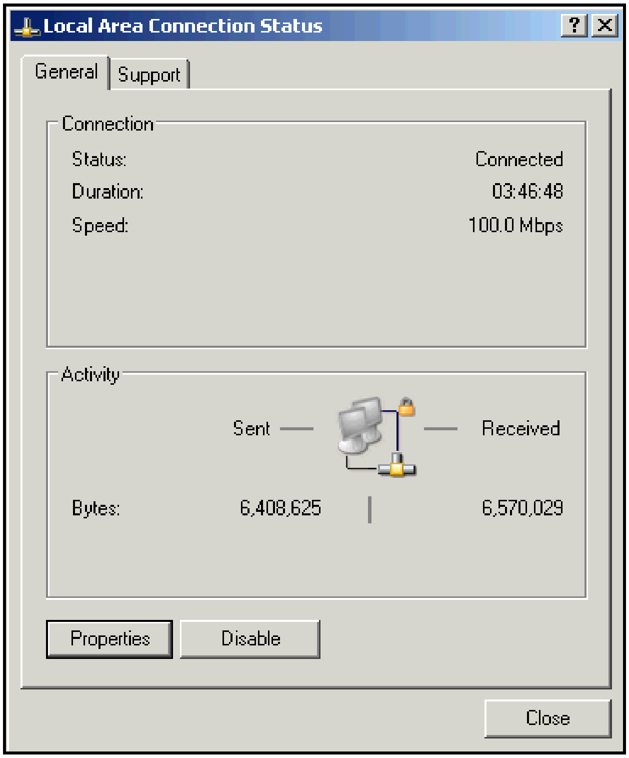
Configure the 802.1X Supplicant

This section teaches you how to set up the native Windows 802.1X supplicant to authenticate with EAP-TLS. The steps differ slightly depending on whether you are configuring 802.1X for an Ethernet connection or a wireless connection.

Configure the 802.1X Supplicant for EAP-TLS on an Ethernet Connection

Follow these steps:

1. On the endpoint, select **Start** > **Settings** > **Network Connections** > **Local Area Connection**.



Local Area Connection Status

Status: Connected
Duration: 03:46:48
Speed: 100.0 Mbps

Bytes: 6,408,625 | 6,570,029

Figure 2-265. Start > **Settings** > **Network Connections** > **Local Area Connection > Local Area Connection Status Window—General Tab**

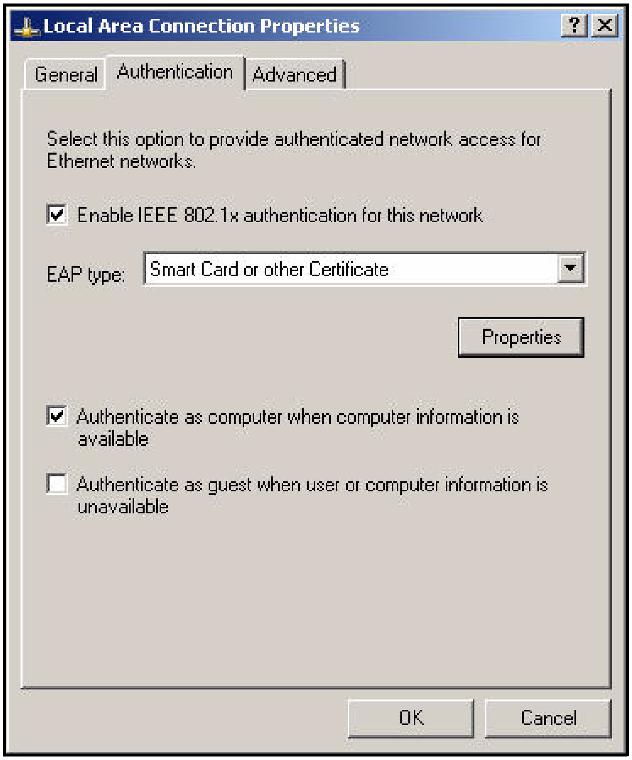
2. Click **Properties**.

3. Click the **Authentication** tab.

Note

If the **Authentication** tab is not displayed, you may have one of two problems:

- The endpoint does not support 802.1X. Download the most recent Windows SP.
- Wireless Zero Configuration (WZC) is not running. (This service enables 802.1X for both wired and wireless connections.) See “Enable WZC” on page 2-305 to fix the problem.



Select this option to provide authenticated network access for Ethernet networks.

☑ Enable IEEE 802.1x authentication for this network

EAP type: Smart Card or other Certificate

☑ Authenticate as computer when computer information is available

☐ Authenticate as guest when user or computer information is unavailable

Figure 2-266. Local Area Connection Status—Local Area Connection Properties—Authentication Tab

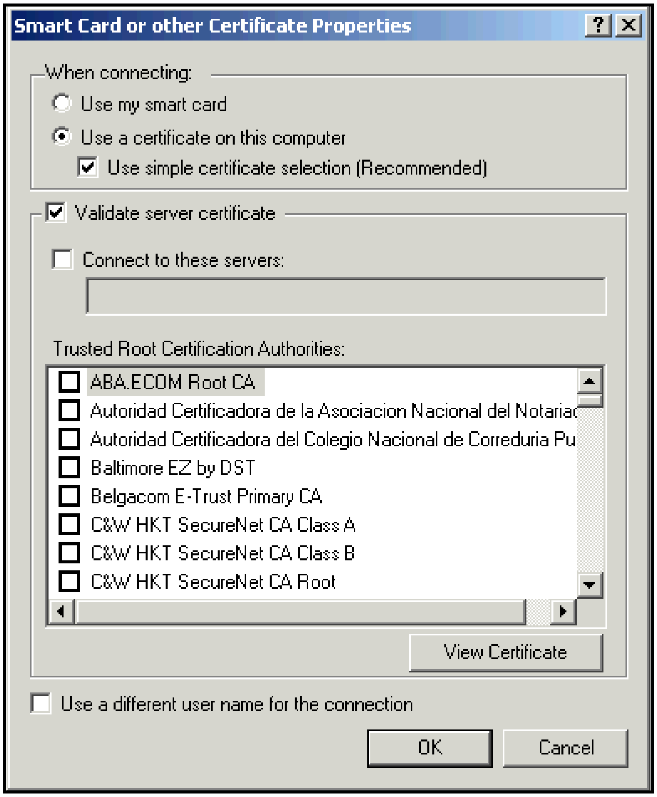
4. The **Enable IEEE 802.1X authentication for this network** check box should be selected.

5. Select **Smart Card or other Certificate** from the **EAP type** list.

Note

Clear the **Authenticate as computer when computer information is available** check box if you do not want computers to be able to authenticate when a user is not logged in.

6. Click **Properties**.



Smart Card or other Certificate Properties

When connecting:

○ Use my smart card

● Use a certificate on this computer

☑ Use simple certificate selection (Recommended)

☑ Validate server certificate

□ Connect to these servers:

Trusted Root Certification Authorities:

□ ABA.ECOM Root CA
□ Autoridad Certificadora de la Asociacion Nacional del Notariac
□ Autoridad Certificadora del Colegio Nacional de Correduria Pu
□ Baltimore EZ by DST
□ Belgacom E-Trust Primary CA
□ C&W HKT SecureNet CA Class A
□ C&W HKT SecureNet CA Class B
□ C&W HKT SecureNet CA Root

□ Use a different user name for the connection

Figure 2-267. Local Area Connection Status—<*EAP type*> Properties Window

7. The **Validate server certificate** check box should be selected.

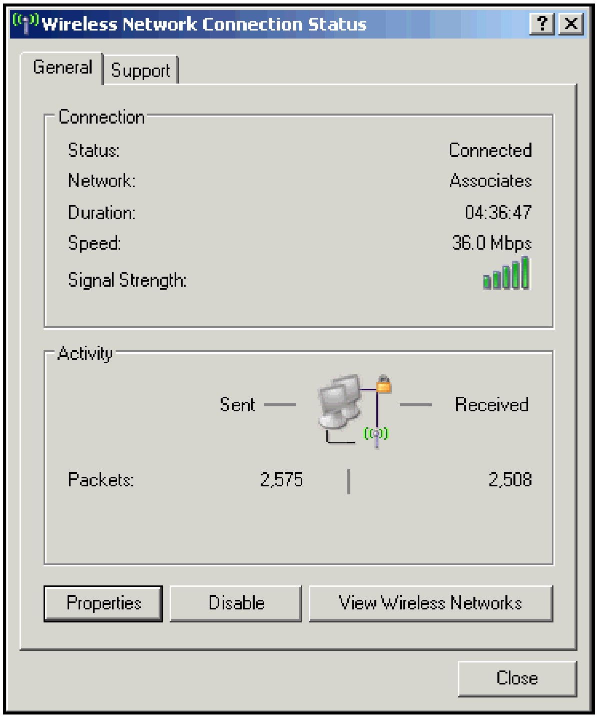
8. From the **Trusted Root Certification Authorities** list, select the check box of your CA.

9. Click **OK** to close all open windows.

Configure the 802.1X Supplicant for EAP-TLS on a Wireless Connection

The Microsoft Wireless Zero Configuration client can complete much of the configuration in this section automatically. However, you might want to check or configure some settings manually. Follow these steps:

1. Select **Start** > **Settings** > **Network Connections** > **Wireless Network Connection**.

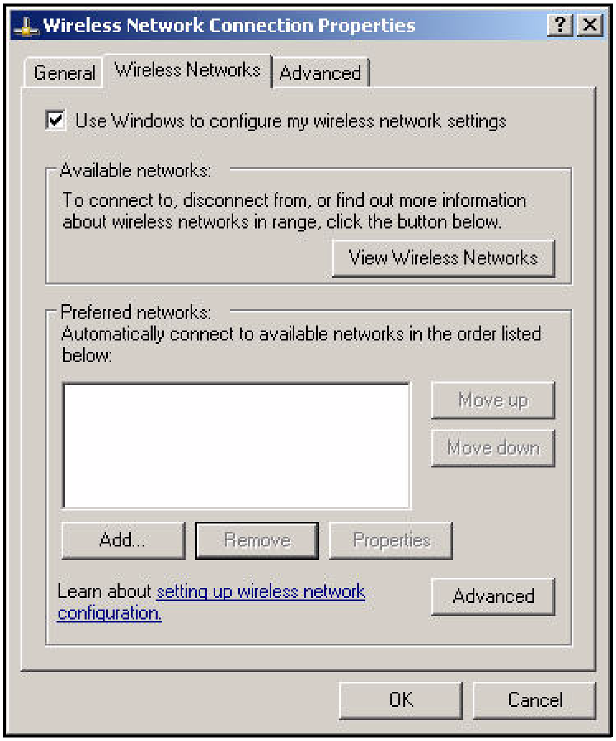


Status: Connected
Network: Associates
Duration: 04:36:47
Speed: 36.0 Mbps
Signal Strength:

Packets: 2,575 | 2,508

Figure 2-268. Start > **Settings** > **Network Connections** > **Local Area Connection > Wireless Network Connection Status Window—General Tab**

2. Click **Properties**.
3. Click the **Wireless Networks** tab.



☑ Use Windows to configure my wireless network settings

Available networks:

To connect to, disconnect from, or find out more information about wireless networks in range, click the button below.

Preferred networks:

Automatically connect to available networks in the order listed below:

Learn about setting up wireless network configuration.

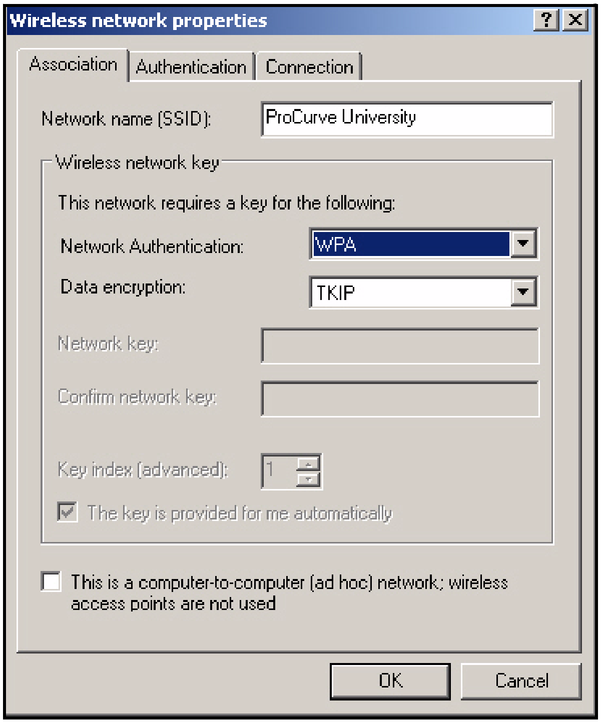
Figure 2-269. Wireless Network Connection Status— Wireless Network Connection Properties—Wireless Networks Tab

4. If not already selected, select the **Use Windows to configure my wireless network settings** check box.

Note

If the check box is not available, WZC is not running. See “Enable WZC” on page 2-305 to fix the problem.

5. Click **Add**.



Network name (SSID): ProCurve University

Wireless network key

This network requires a key for the following:

Network Authentication: WPA

Data encryption: TKIP

Network key:

Confirm network key:

Key index (advanced): 1

☑ The key is provided for me automatically

□ This is a computer-to-computer (ad hoc) network; wireless access points are not used

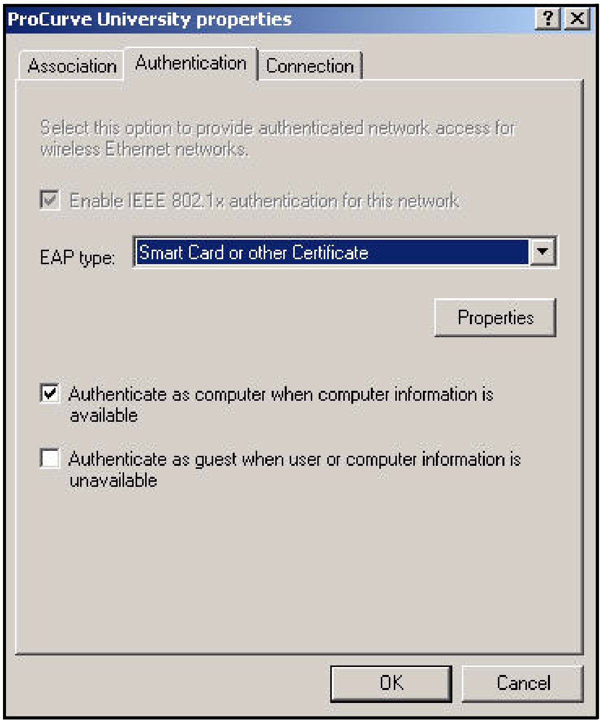
Figure 2-270. Wireless Network Connection Status—Wireless network properties Window—Association Tab

6. In the **Network name (SSID)** box, type the Service Set Identifier (SSID) for your WLAN (in this example, **ProCurve University**).

7. For **Network Authentication**, select **WPA**.

8. For **Data Encryption**, select **TKIP** or **AES** (both are supported in the WLAN in this example).

9. Click the **Authentication** tab.



ProCurve University properties

Select this option to provide authenticated network access for wireless Ethernet networks.

☑ Enable IEEE 802.1x authentication for this network

EAP type: Smart Card or other Certificate

☑ Authenticate as computer when computer information is available

☐ Authenticate as guest when user or computer information is unavailable

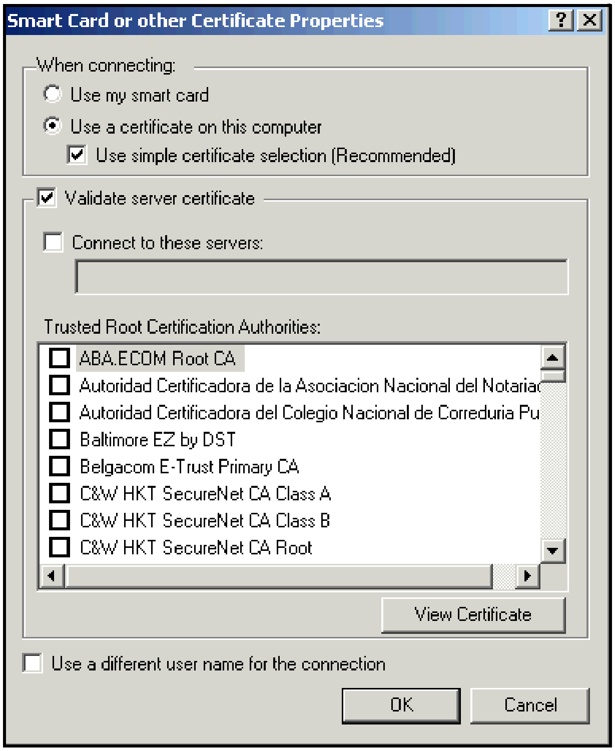
Figure 2-271. Wireless Network Connection Status—<*SSID*> properties Window—Authentication Tab

10. Select **Smart Card or other Certificate** from the **EAP type** list.

Note

Clear the **Authenticate as computer when computer information is available** check box if you do not want computers to be able to authenticate when a user is not logged in.

11. Click **Properties**.



Smart Card or other Certificate Properties

When connecting:

○ Use my smart card

● Use a certificate on this computer

☑ Use simple certificate selection (Recommended)

☑ Validate server certificate

□ Connect to these servers:

Trusted Root Certification Authorities:

□ ABA.ECOM Root CA
□ Autoridad Certificadora de la Asociacion Nacional del Notariac
□ Autoridad Certificadora del Colegio Nacional de Correduria Pu
□ Baltimore EZ by DST
□ Belgacom E-Trust Primary CA
□ C&W HKT SecureNet CA Class A
□ C&W HKT SecureNet CA Class B
□ C&W HKT SecureNet CA Root

□ Use a different user name for the connection

Figure 2-272. Wireless Network Connection Status—<*EAP type*> Properties Window

12. The **Validate server certificate** check box should be selected.
13. From the **Trusted Root Certification Authorities** list, select the check box of your CA.
14. Click **OK** to close all open windows.

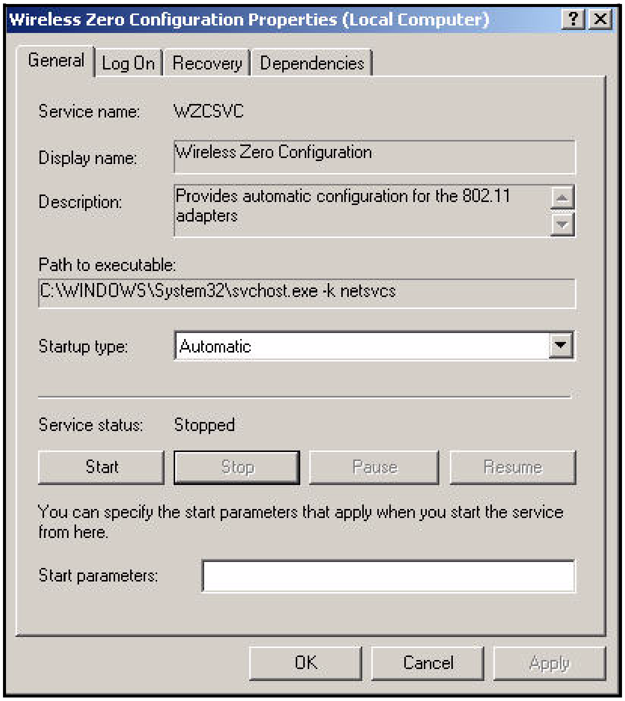
Enable WZC

Typically, the WZC service starts automatically. However, sometimes a wireless card comes with a vendor client that disables WZC. You can use the vendor client or re-enable WZC.

If you choose to re-enable WZC, follow these steps:

1. In the **Start** menu, select **Control Panel**.
2. Select **Administrative Tools** > **Services**.

3. Scroll to and double-click the WZC service.



Wireless Zero Configuration Properties (Local Computer)

Service name: WZCSVC

Display name: Wireless Zero Configuration

Description: Provides automatic configuration for the 802.11 adapters

Path to executable:
C:\WINDOWS\System32\svchost.exe -k netsvcs

Startup type: Automatic

Service status: Stopped

You can specify the start parameters that apply when you start the service from here.

Start parameters:

Figure 2-273. Wireless Zero Configuration Properties Window— General Tab

4. For the **Startup type**, select **Automatic**.
5. Click **Start**.
6. Click **OK**.

Pre-install the NAC EI Agent on Endpoints

In this solution, network administrators want to pre-install the NAC EI agent on endpoints before the NAC 800s begin to enforce endpoint integrity. They can install the agent manually, but, in a large network, deploying the agent automatically via Active Directory is much more efficient.

Deploy the NAC EI Agent Automatically—Active Directory Group Policy Object Software Installation

This section explains how to use Active Directory's software installation feature to depby theNAC EI agent. You will assign the NACEI agent to domain computers by editing a group policy object (GPO) in Active Directory. The next time an endpoint such as a laptop or workstation connects to the domain, it automatically downloads the agent. The agent also automatically installs on the endpoint, typically at the next reboot.

Note There are other ways to deploy software using Active Directory. You can, for example, assign thesoftware to users rather thanto computers.The advantage of this latter option is that the agent downloads to a user's endpoint nomatter what endpoint that happens to be. However, the user must trigger the actual installation.

For this solution, because network administrators want the agent to install with as little user interaction as possible, the software is assigned to computers. For more information on other options, search for information on "Group Policy Software Installation" at *http://www.microsoft.com*.

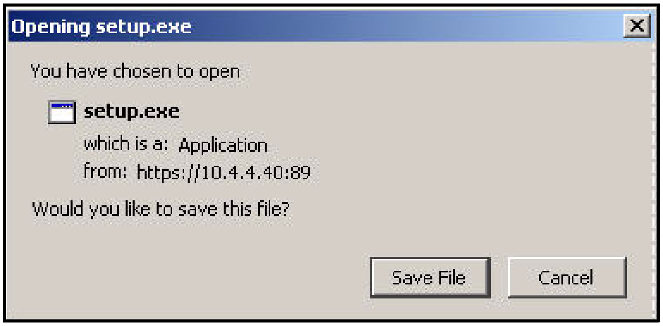
Complete these steps to deploy the NAC EI agent with Active Directory:

1. Create the .msi file for the NAC EI agent.
2. Set up the folder with the .msi file as a network share.
3. In Active Directory, configure the GPO software installation settings.

Note You should complete these steps *after* setting up the NAC 800s and verifying that they have network connectivity but *before* activating quarantining (for example, by setting the cluster's access mode to normal).

Create the .msi File. Active Directory's software installation feature works with .msi files. Complete the following steps to convert the NAC EI agent to the correct format. Note that you must have access to the NAC 800 although the device should not yet be enforcing quarantining.

1. Open a Web browser on the server youhave selected to store the .msi file Type the following for the URL: **https://<NAC IP address>:89/setup.exe**.



Opening setup.exe

You have chosen to open

setup.exe

which is a: Application

from: https://10.4.4.40:89

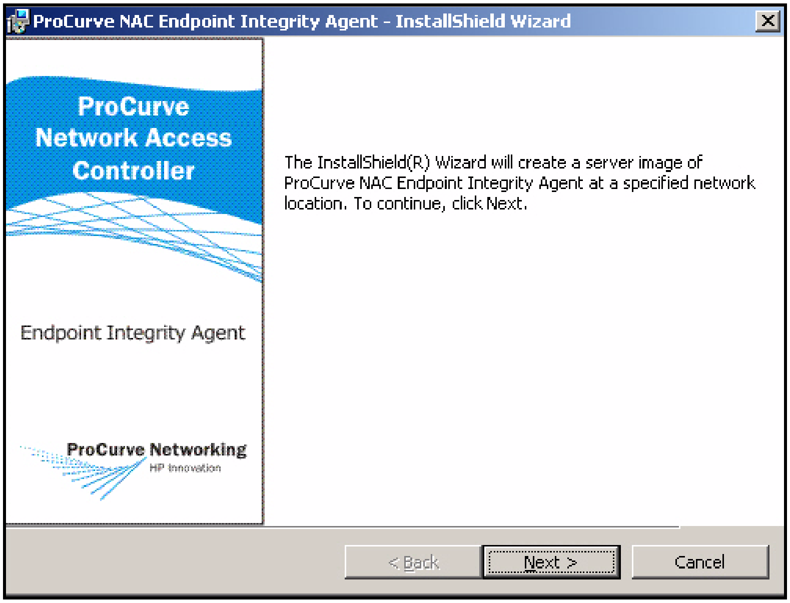
Would you like to save this file?

Figure 2-274. Opening setup.exe Window

2. A window such as the one in Figure 2-274 is displayed. Click **Save File**.
3. If prompted, choose the directory for the file.
4. Access the command line on your management station (From the Windows **Start** menu, select **Run.** Type **cmd** at the prompt and click **OK**.)
5. Move to the directory to which the setup.exe file saved. Then enter this command:

   ```
   setup.exe /a
   ```

6. The InstallShield Wizard for creating the NAC EI agent .msi file is launched.

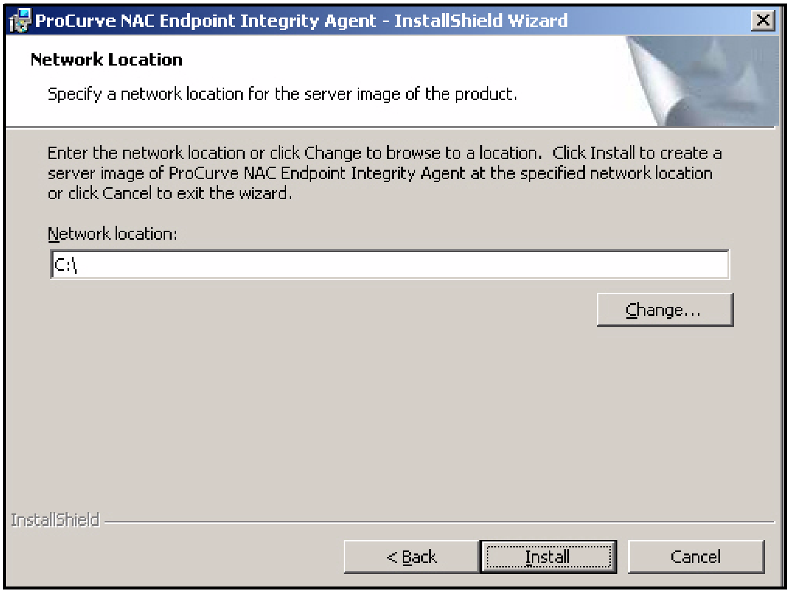


ProCurve NAC Endpoint Integrity Agent - InstallShield Wizard

The InstallShield(R) Wizard will create a server image of ProCurve NAC Endpoint Integrity Agent at a specified network location. To continue, click Next.

Figure 2-275. ProCurve NAC Endpoint Integrity Agent—InstallShield Wizard

7. Click **Next**.



ProCurve NAC Endpoint Integrity Agent - InstallShield Wizard

Network Location

Specify a network location for the server image of the product.

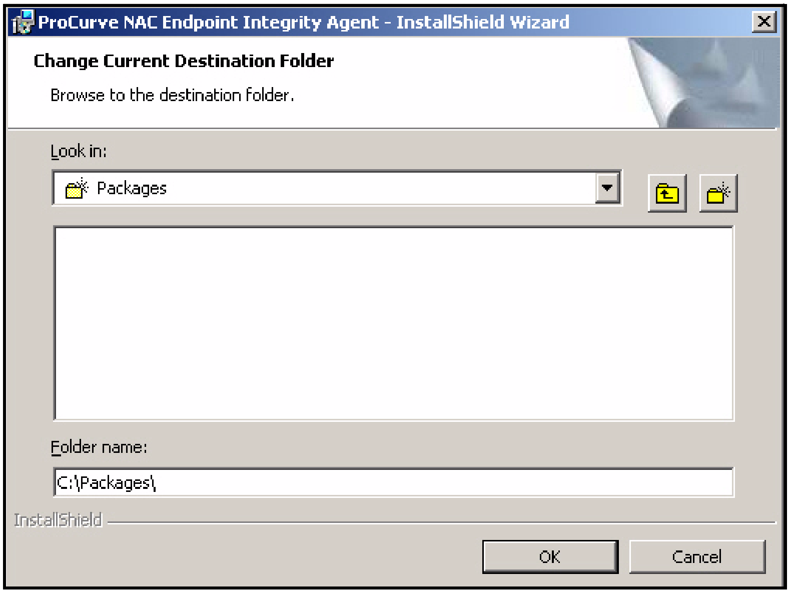
Enter the network location or click Change to browse to a location. Click Install to create a server image of ProCurve NAC Endpoint Integrity Agent at the specified network location or click Cancel to exit the wizard.

Network location:

C:\

Figure 2-276. InstallShield Wizard—Network Location Page

8. On the **Network Location** page, specify the folder, either on this computer or another server, for the .msi package:
   - Type the path to the folder in the **Network location** box.
   - Or browse for the folder:
     i. Click **Change**.
     ii. On the **Change Current Destination Folder** page, use the **Look in** box to navigate to the correct folder.



ProCurve NAC Endpoint Integrity Agent - InstallShield Wizard

Change Current Destination Folder

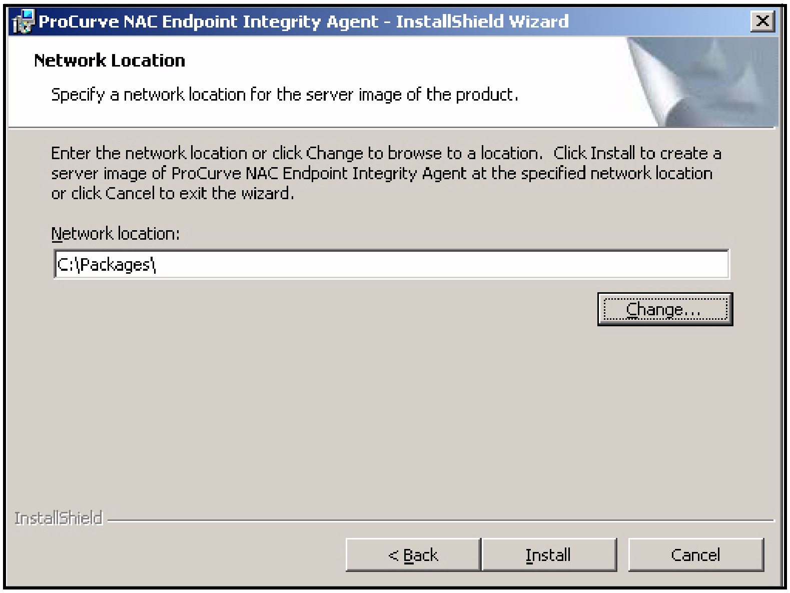
Browse to the destination folder.

Look in: Packages

Folder name: C:\Packages\

Figure 2-277. InstallShield Wizard—Change Current Destination Folder Page

iii. Click **OK**.



ProCurve NAC Endpoint Integrity Agent - InstallShield Wizard

Network Location

Specify a network location for the server image of the product.

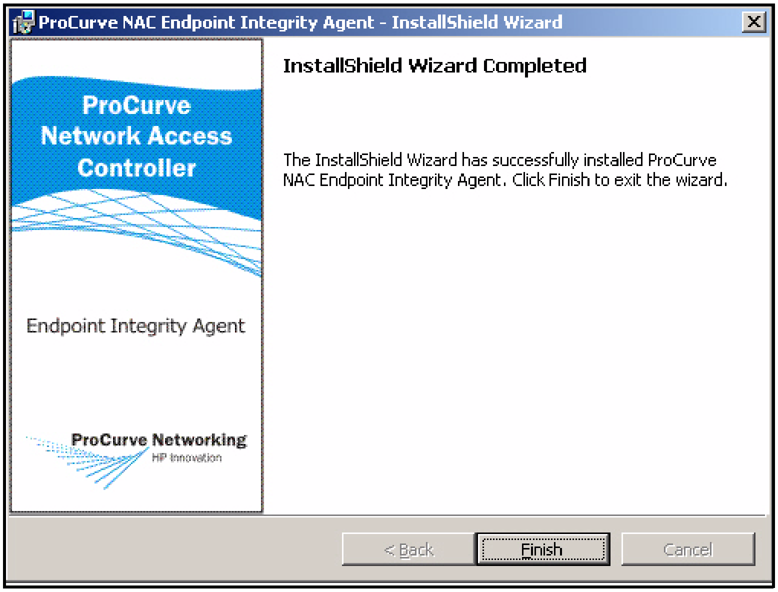
Enter the network location or click Change to browse to a location. Click Install to create a server image of ProCurve NAC Endpoint Integrity Agent at the specified network location or click Cancel to exit the wizard.

Network location:

C:\Packages\

Figure 2-278. InstallShield Wizard—Network Location Page

9. Click **Install**.



ProCurve NAC Endpoint Integrity Agent - InstallShield Wizard

InstallShield Wizard Completed

The InstallShield Wizard has successfully installed ProCurve NAC Endpoint Integrity Agent. Click Finish to exit the wizard.

Figure 2-279. InstallShield Wizard—Completed

10. Click **Finish**.
11. The **ProCurve NAC Endpoint Integrity Agent.msi** file is saved to the specified folder.

Note

The **setup.exe /a** command also created two directories, **Program Files** and **System32** and placed them in the same folder as the **ProCurve NAC Endpoint Integrity Agent.msi** file. You can delete these directories, but take care that you are deleting the correct directories (not ones that already exist on the server).

12. If you want the NAC EI agent to install without user interaction, return to the command prompt and enter this command:

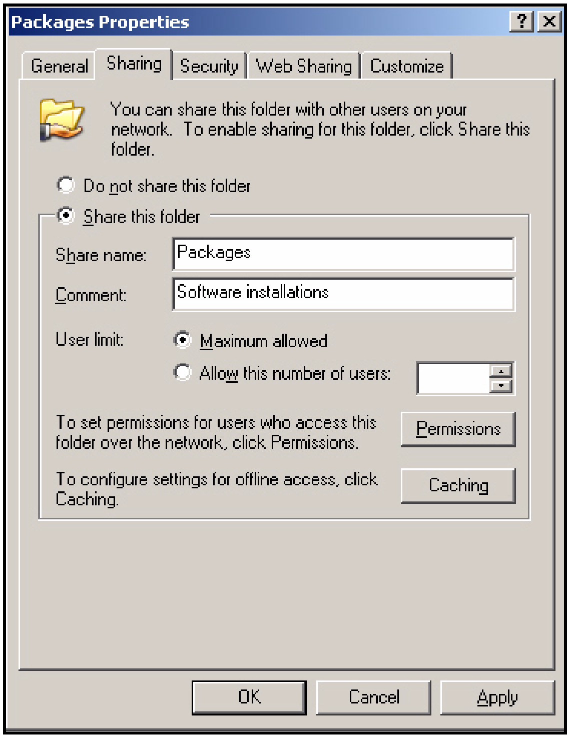
Syntax:
```
msiexec /package "<path>/ProCurve NAC Endpoint Integrity Agent.msi"
/quiet
```

*Replace **<path>** with the path to the folder to which you saved the .msi file.*

Enable Sharing on the Folder with the .msi File. All domain users—and, depending on your preferences, guests as well—need access to the server and the folder to which you saved the .msi file.

Follow these steps on a Windows server:

1. In the **Start** menu, click **Programs** > **Accessories** > **Windows Explorer**.
2. Navigate to the folder in which you created the .msi file in the previous task.
3. Right-click the folder and click **Sharing and Security**.



You can share this folder with other users on your network. To enable sharing for this folder, click Share this folder.

○ Do not share this folder

● Share this folder

Share name: Packages

Comment: Software installations

User limit: ● Maximum allowed

○ Allow this number of users:

To set permissions for users who access this folder over the network, click Permissions.

To configure settings for offline access, click Caching.

Figure 2-280. <*Folder*> Properties

4. Click **Share this folder**.

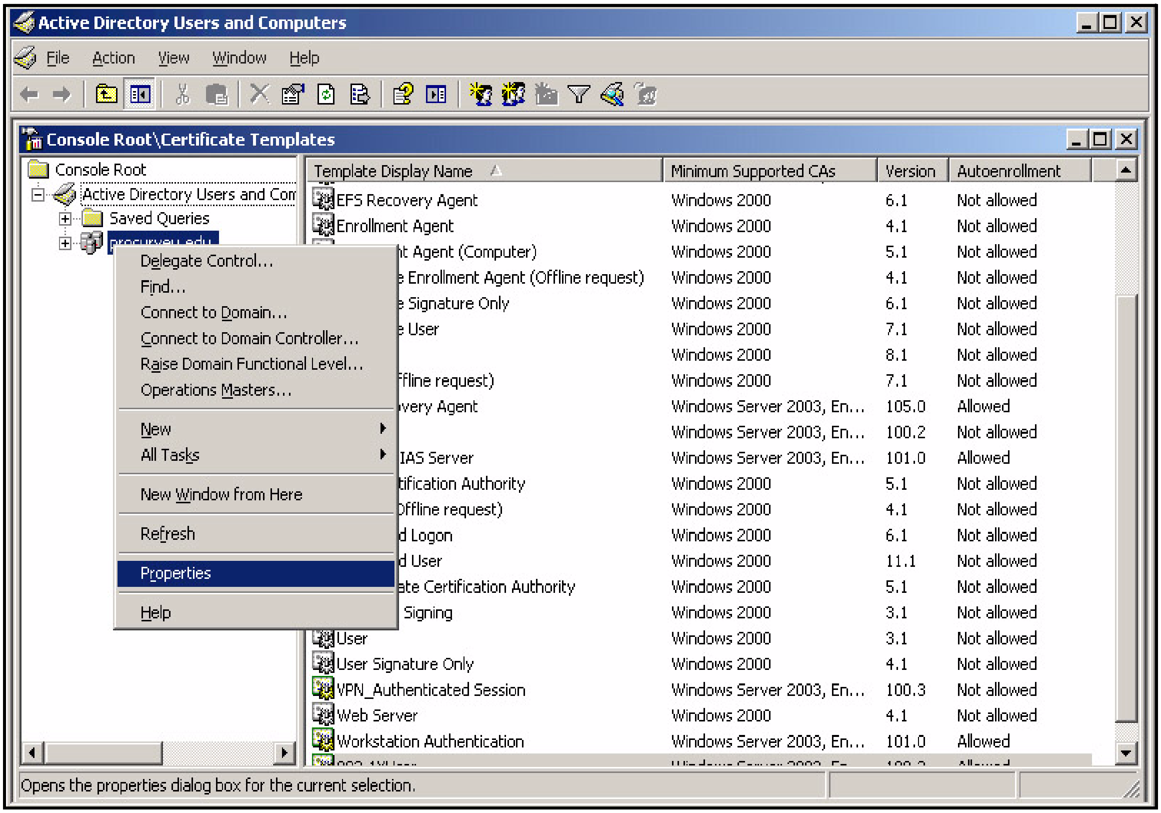
5. Leave the **Share name** the same as the folder name.

6. If you want to restrict who can access the folder, click **Permissions**. In this example, you want everyone to be able to install the NAC EI agent, so you leave the default permissions.

7. Click **OK**.

Configure the Group Policy Software Installation Settings. Complete the following steps to assign the NAC EI agent installation package to computers in your domain:

1. On a domain controller, from the Windows **Start** menu, select **Administrative Tools** > **Active Directory Users and Computers**.



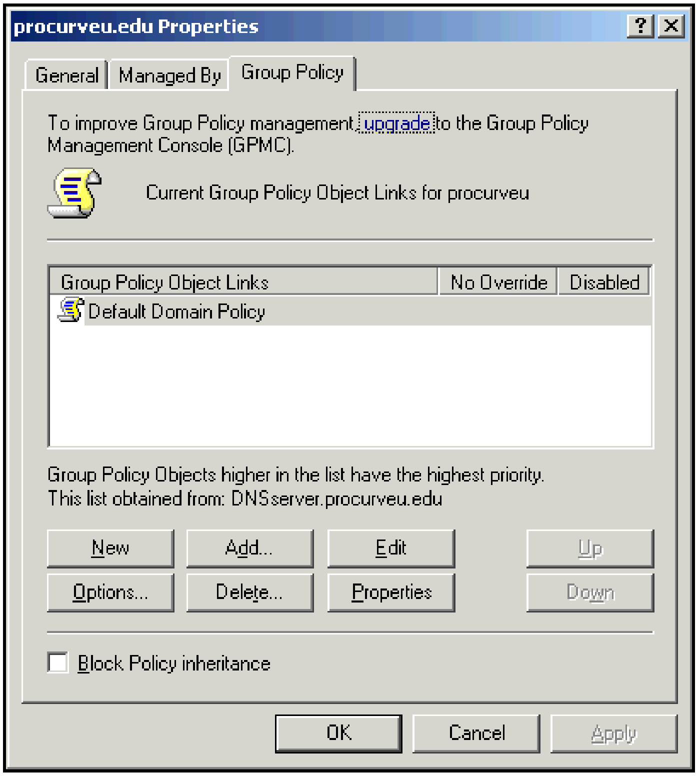
Template Display Name	Minimum Supported CAs	Version	Autoenrollment
EFS Recovery Agent	Windows 2000	6.1	Not allowed
Enrollment Agent	Windows 2000	4.1	Not allowed
nt Agent (Computer)	Windows 2000	5.1	Not allowed
e Enrollment Agent (Offline request)	Windows 2000	4.1	Not allowed
e Signature Only	Windows 2000	6.1	Not allowed
e User	Windows 2000	7.1	Not allowed
	Windows 2000	8.1	Not allowed
ffline request)	Windows 2000	7.1	Not allowed
very Agent	Windows Server 2003, En...	105.0	Allowed
	Windows Server 2003, En...	100.2	Not allowed
IAS Server	Windows Server 2003, En...	101.0	Allowed
tification Authority	Windows 2000	5.1	Not allowed
Offline request)	Windows 2000	4.1	Not allowed
d Logon	Windows 2000	6.1	Not allowed
d User	Windows 2000	11.1	Not allowed
ate Certification Authority	Windows 2000	5.1	Not allowed
Signing	Windows 2000	3.1	Not allowed
User	Windows 2000	3.1	Not allowed
User Signature Only	Windows 2000	4.1	Not allowed
VPN_Authenticated Session	Windows Server 2003, En...	100.3	Not allowed
Web Server	Windows 2000	4.1	Not allowed
Workstation Authentication	Windows Server 2003, En...	101.0	Allowed

Opens the properties dialog box for the current selection.

Figure 2-281. Management Console Window

2. In the left pane, right-click your domain name and select **Properties**.

3. Click the **Group Policy** tab.



To improve Group Policy management upgrade to the Group Policy Management Console (GPMC).

Current Group Policy Object Links for procurveu

Group Policy Object Links	No Override	Disabled
Default Domain Policy		

Group Policy Objects higher in the list have the highest priority.
This list obtained from: DNSserver.procurveu.edu

□ Block Policy inheritance

Figure 2-282. *<domain name>* Properties Window

4. Select **Default Domain Policy** and click **Edit**.

   In this example, you want to assign the software to all computers. If you wanted to assign the software to a particular group, you could create a new Group Policy Object (GPO) by clicking **New**.

5. In the left pane of the **Group Policy Object Editor**, expand **Computer Configuration** > **Software Settings**.

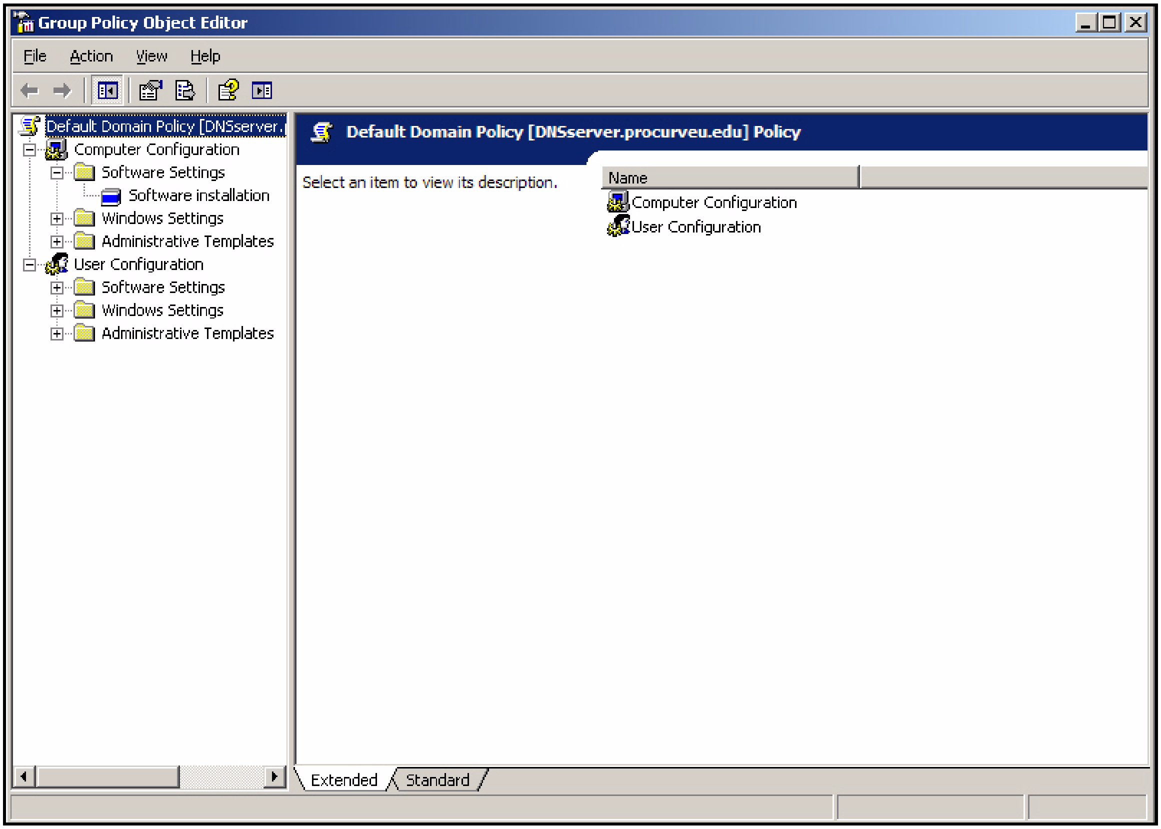


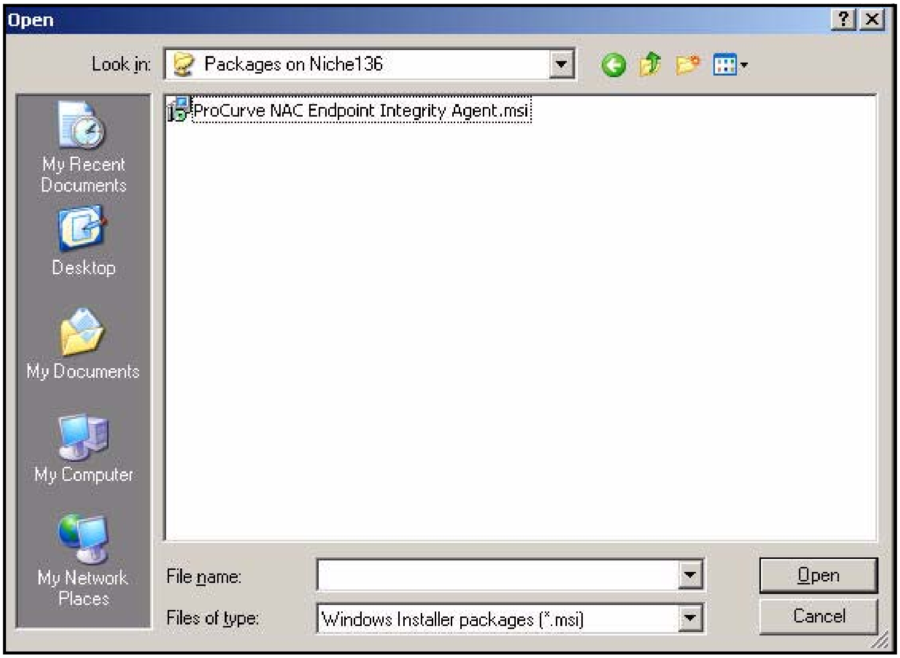
Figure 2-283. Group Policy Object Editor Window

6. Right-click **Software installation**; in the menu that is displayed, click **New** > **Package**.

7. Navigate to the location of the NAC EI agent .msi file.

Note

You must specify the location with the *full* Universal Naming Convention (UNC) path. That is, the path must include the name of the file server. For example: **\\MyServer\Packages\**. If you browse for the location, browse through Network Places even if the file is stored on the server on which you are configuring the group policy.



Look in: Packages on Niche136

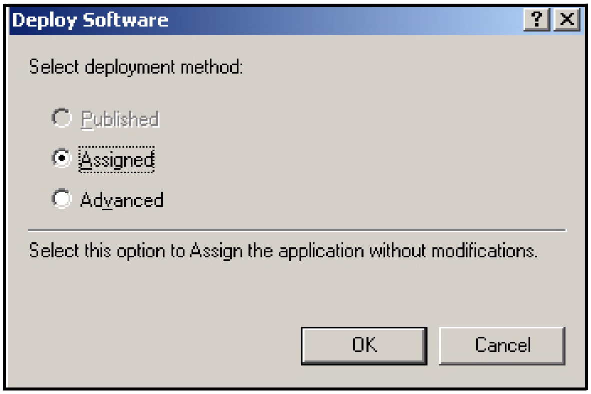
ProCurve NAC Endpoint Integrity Agent.msi

File name:

Files of type: Windows Installer packages (*.msi)

Figure 2-284. Open Window

8. Click the **ProCurve NAC Endpoint Integrity Agent.msi** file and click **Open**.



Select deployment method:

○ Published
● Assigned
○ Advanced

Select this option to Assign the application without modifications.

Figure 2-285. Deploy Software Window

9. In the **Deploy Software** window, click **Assigned**.
10. Click **OK**.

Activating Network Access Control

It is recommended that, until you have completely configured and tested your network access control solution, you do not activate:

- Port authentication
- Quarantining

Otherwise, you can inadvertently lock users—and even yourself—out of the network. And, as explained in "Setting Up Endpoints" on page 2-276, endpoints, just as much as the network infrastructure and servers, must support the solution. Whether the IT staff or users themselves will ready the endpoints, you must allow sufficient time before enforcing network access control. For example, after you install the NAC 800, you might wait several days before activating endpoint integrity to give users time to download the NAC EI agent from the NAC 800.

You should always test the solution before activating it throughout the network. At a minimum, you should activate port authentication on a single unused port, plug in your management station, and verify that you can log in to the network. Log in as a user in each of your user groups and check the resources you areallowed. As a next step for more rigorous testing, you might implement port authentication on one or two switches for a trial period. Guide users in the trial group through the process of connecting to the network and note any problems that they encounter.

Once you are confident that the network infrastructure, endpoints, and users are ready, activate your solution.

Activate Port Authentication

As suggested in "Configuring the ProCurve Switches" on page 2-13, wait to activate portauthentication until you have finished deploying and testing your solution. Then type this command from the global configuration mode context on all switches:

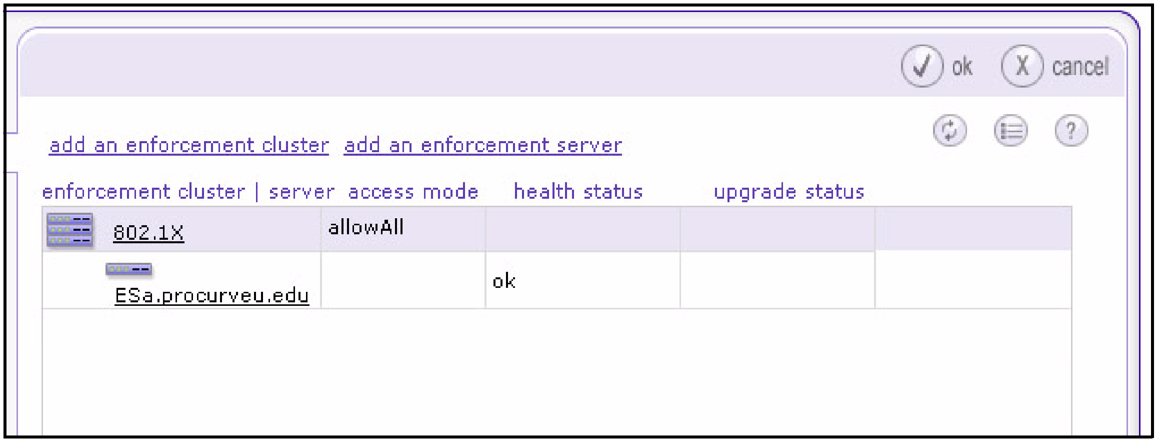
```
ProCurve Switch(config)# aaa port-access authenticator
active
```

Activate Quarantining

Throughout this chapter, you learned about deploying NAC 800s, setting up quarantining with 802.1X, and configuring NAC policies and tests. As soon as the NAC 800 ES (or Combination Server [CS]) detects an endpoint, it tests it. However, in “Create anEnforcement Cluster and AddESs” on page 2-146, you set the access mode to **allow all**, which means that the testing does not affect users’ access. To allow the NAC 800 to treat endpoints differently based on test results, you must change the access mode.

Follow these steps:

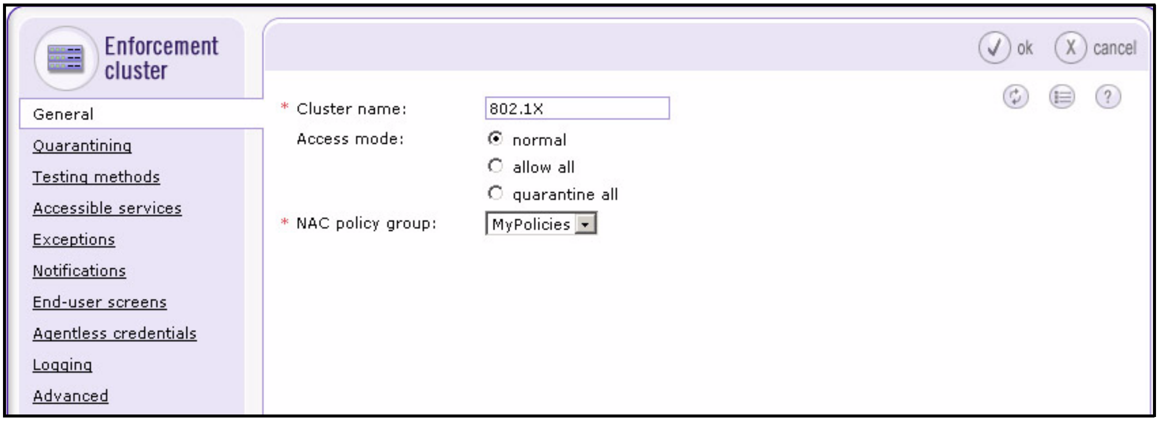
1. Log in to the Web browser interface of the NAC 800 MS.
2. Select **Home** > **System configuration** > **Enforcement clusters & servers**.



enforcement cluster | server	access mode	health status	upgrade status
802.1X	allowAll		
ESa.procurveu.edu		ok	

Figure 2-286. NAC 800 Web Interface—Home > System configuration > Enforcement clusters & servers

3. Select the name of your enforcement cluster (in this example, **802.1X**).



* Cluster name: 802.1X

Access mode: ● normal ○ allow all ○ quarantine all

* NAC policy group: MyPolicies

Figure 2-287. NAC 800 Web Interface — Home > System configuration > Enforcement clusters & servers > Add enforcement cluster > General Tab

4. The **General** tab should be selected.
5. Select **normal** for the **Access mode**.
6. Click **ok** and then **ok** again.

3

Implementing 802.1X with Endpoint Integrity but without IDM

Contents

Introduction

This chapter teaches you how to build a network that implements network access control using:

- 802.1X
- Endpoint integrity

For this access control solution, the network has a Microsoft Windows domain and uses the Windows Server 2003 Internet Authentication Service (IAS) for its Remote Authentication Dial-In User Service (RADIUS) server. You will learn how to configure these components—as well as how to deploy ProCurve Network Access Controller (NAC) 800s to provide endpoint integrity for such an environment.

To meet the needs of most organizations, this solution is designed to control access for both wired and wireless zones. (For more information about wired and wireless zones, see the *ProCurve Access Control Security Design Guide*.) Although this solution uses ProCurve Wireless Edge Services zl Modules to provide the wireless zones and control wireless users' access, you could alternatively use an access point (AP) such as ProCurve AP 530 or ProCurve AP 420.

It is assumed that the Windows domain implements a full public key infrastructure (PKI), which allows end-users to authenticate with digital certificates.

Note

If you do not intend to implement a PKI, when you select authentication methods on IAS, choose PEAP MS-CHAPv2. (See "Configure the Remote Access Policies" on page 3-34.)

In this chapter, you will learn how to configure all of the components of such a network:

- Basic configurations for routing switches and edge switches
- Step-by-step instructions for:
  - Wireless Edge Services zl Modules
  - Domain controller, which runs:
    - Microsoft Active Directory
    - Domain Name System (DNS) services
  - Dynamic Host Configuration Protocol (DHCP) services
  - Certificate Authority (CA) services
  - IAS
  - NAC 800s

Although your network environment is probably not identical to this environment, the instructions should help you understand the processes involved, and you can then modify the instructions as needed to meet your organization's unique requirements. To help you, the instructions include examples, which will be based on a sample network designed for a site called ProCurve University. The instructions also include tables and worksheets that you can use to record information for your own network.

ProCurve University includes three user groups:

- Network administrators
- Faculty members
- Students

The network is divided into virtual LANs (VLANs) that allow users to access the resources that they require. Table 3-1 shows one approach to designing the VLANs.

Table 3-1. Example VLANs

VLAN Category	Name	ID	Subnet
Management VLAN	Management	2	10.2.0.0/16
Server VLAN	Servers	4	10.4.0.0/16
	Faculty_Databases	5	10.5.0.0/16
User VLAN	Faculty	8	10.8.0.0/16
	Students	10	10.10.0.0/16
Test VLAN (for endpoint integrity)	Test	32	10.32.0.0/16
Quarantine VLAN (for endpoint integrity)	Quarantine	34	10.34.0.0/16
Infected VLAN (for endpoint integrity)	Infected	36	10.36.0.0/16

As you can see, the VLANs comprise these general categories:

- **Management VLAN**—for infrastructure devices and the network administrators that manage them

Note

This solution does not use the securemanagement VLAN feature. Instead, switches are configured with the **ip authorized-managers** command to allow management traffic only from sources within the management VLAN or from the NAC 800s.

- **Server VLANs**—for servers

  In this example, servers are placed in different VLANs according to which users need to access them. All users need the services in VLAN 4, which includes DHCP servers and DNS servers. However, only the faculty should be able to reach the servers in VLAN 5.

- **User VLANs**—one for each user group

  You could create more VLANs and place users into different VLANs according to when and how they connect to the network. For example, you could create a Faculty_Wireless VLAN.

- **Test VLAN**—a single VLAN for endpoints that have not yet been tested (Unknown status)
- **Quarantine VLAN**—a single VLAN for endpoints that have failed at least one test for which the penalty is quarantine
- **Infected VLAN**—a single VLAN for endpoints that are infected with malware (failed the Worms, Viruses, and Trojans test)

  You can place infected endpoints in the quarantine VLAN; however, the infected endpoints can infect the vulnerable, non-compliant endpoints, so you should place them in separate VLANs.

You can use Table 3-2 to record information about your organization’s VLANs. You can then refer to this table as you read the instructions that follow.

Table 3-2. My VLANs

Type	Name	ID	Subnet
Management			
Server			
User			
Test			
Quarantine			
Infected			

Figure 3-1 shows a high-level network design.

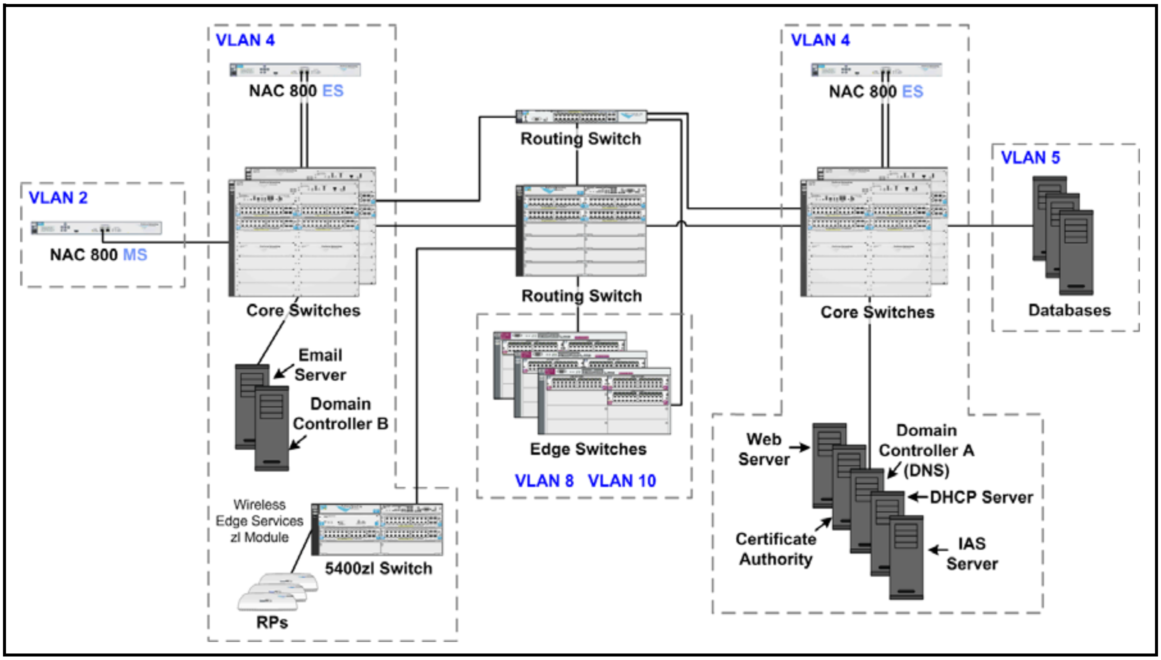


Figure 3-1. High-Level Network Design for ProCurve University

The instructions in this chapter sometimes call for entering a specific IP address. Table 3-3 lists IP addresses for the example network. Fill in your devices' IP addresses and VLANs in the rightmost columns. You can then easily replace the IP address given in the instructions with the correct address in your environment.

Table 3-3. Example IP Addresses

Device	Example IP Address	Example VLAN ID	Your Organization's IP Address	Your Organization's VLAN ID
Domain controller	10.4.4.15	4		
Backup domain controller	10.4.5.15	4		
DNS servers	10.4.4.15 10.4.5.15	4		
DHCP server	10.4.4.20	4		
CA server	10.4.4.25	4		
IAS server	10.4.4.30	4		

Device	Example IP Address	Example VLAN ID	Your Organization's IP Address	Your Organization's VLAN ID
University Web server	10.4.6.30	4		
Library Web server	10.4.6.35	4		
Email server	10.4.6.40	4		
Grade database	10.5.1.45	5		
Faculty file server	10.5.2.50	5		
Other servers and databases	10.4.x.x 10.5.x.x	4 5		
Routing Switch A	• 10.2.0.1 • 10.4.0.1 • 10.5.0.1 • 10.8.0.1 • 10.10.0.1 • 10.32.0.1 • 10.34.0.1 • 10.36.0.1	• 2 • 4 • 5 • 8 • 10 • 32 • 34 • 36		
Routing Switch B	• 10.2.4.1 • 10.4.4.1 • 10.5.4.1 • 10.8.4.1 • 10.10.4.1 • 10.32.4.1 • 10.34.4.1 • 10.36.4.1	• 2 • 4 • 5 • 8 • 10 • 32 • 34 • 36		
Switch A	10.2.0.5	2		
Other switches				
Wireless Edge Services zl Module	10.2.0.20	2		
Redundant Wireless Services zl Module	10.2.0.25	2		
NAC 800 MS	10.2.1.40	2		
NAC 800 ES A	10.4.4.40	4		
NAC 800 ES B	10.4.5.50	4		

Note

In your network, some servers might run multiple services. For example, the domain controllers might run DNS as well as Active Directory.

Configure the ProCurve Switches

This section provides example configurations for ProCurve switches in a network that implements 802.1X port authentication and endpoint integrity.

The following sections show example configurations for:

- A routing switch, which connects only to other switches.
- A server switch, which connects to VLAN 4 servers and VLAN 5 servers. Its uplink ports are A1 and B1.
- An edge switch, which connects to endpoints. Its uplink ports are A1 and B1. The edge switch is also a wireless services-enabled switch.

This solution controls users by granting them dynamic VLAN assignments. The configuration for the routing switch shows an ACL that controls traffic on one of those VLANs. This ACL is simply an example; refer to your switch documentation for instructions on setting up your own ACLs.

Refer to the following sample configurations as you set up your network. If you need step-by-step instructions, you should refer to the documentation for your switch.

Note

Users will receive dynamic VLAN assignments through IDM. However, if you are adding 802.1X authentication to an existing network, edge ports must, of course, retain their static assignment to a VLAN until you activate 802.1X authentication.

For reference, these configurations allow the core switches to authenticate the edge switches—the most secure option. However, take care when you enable 802.1X authentication on ports connecting switches. The path to the RADIUS server must be open for the authentication to complete. If you are certain that uplink ports are secure, youcan disable 802.1X authentication on switch-to-switch ports.

Routing Switches

The following is the startup-config for the routing switch used to test this network.

```
; J8692A Configuration Editor; Created on release #K.12.XX

hostname "Routing_Switch"
module 1 type J86xxA
ip access-list extended "Students"
10 deny 10.10.0.0 0.0.255.255 10.5.0.0 0.0.255.255
20 permit 0.0.0.0 255.255.255.255 0.0.0.0 255.255.255.255
exit
ip routing
snmp-server community "procurvero" Operator
snmp-server community "procurverw" Manager Unrestricted
vlan 1
   name "DEFAULT_VLAN"
   no untagged 1-20
   no ip address
   exit
vlan 2
   name "Management"
   untagged 1-20
   ip helper-address 10.4.4.20
   ip address 10.2.0.1 255.255.0.0
   exit
vlan 4
   name "Server"
   ip address 10.4.0.1 255.255.0.0
   tagged 1-5
   exit
vlan 5
   name "Faculty_databases"
   ip address 10.5.0.1 255.255.0.0
   tagged 1-5
   exit
vlan 10
   name "Students"
   ip helper-address 10.4.4.20
   ip address 10.10.0.1 255.255.0.0
   tagged 6-20
   ip access-group "Students" vlan
   exit
```

```
vlan 8
   name "Faculty"
   ip helper-address 10.4.4.20
   ip address 10.8.0.1 255.255.0.0
   tagged 6-20
   exit
vlan 32
   name "Test"
   ip helper-address 10.4.4.20
   ip address 10.32.0.1 255.255.0.0
   tagged 6-20
   exit
vlan 34
   name "Quarantine"
   ip helper-address 10.4.4.20
   ip address 10.34.0.1 255.255.0.0
   tagged 6-20
   exit
vlan 36
   name "Infected"
   ip helper-address 10.4.4.20
   ip address 10.36.0.1 255.255.0.0
   tagged 6-20
   exit
vlan 2100
   name "Radio Port"
   tagged 1-20
   no ip address
   exit
ip authorized-managers 10.2.0.0 255.255.0.0
ip authorized-managers 10.4.4.40 255.255.255.255
ip authorized-managers 10.4.5.50 255.255.255.255
aaa authentication login privilege-mode //The RADIUS
server that authenticates the user logging in to the switch
also assigns the user rights.//
aaa authentication telnet login radius local //This
command allows managers to use their Windows credentials
to log in to the switch via Telnet.//
aaa authentication port-access eap-radius
aaa authentication web login radius local //This command
allows managers to log in to the switch’s Web browser
interface with their Windows credentials.//
radius-server host 10.4.4.30 key procurve12
ip dns domain-name "procurveu.edu"
ip dns server-address 10.4.4.15
aaa port-access authenticator 6-20 //These ports connect
to edge switches.//
aaa port-access authenticator active //Do not enter this
command until you have completed setting up the entire
solution//
password manager
password operator
```

Server Switch startup-config

The following is the startup-config for the server switch used to test this network.

```
; J8697A Configuration Editor; Created on release #K.12.XX

hostname "Server_Switch"
web-management management-url ""
module 1 type J8702A
module 2 type J8702A
ip default-gateway 10.2.0.1
snmp-server community "procurvero" Operator
snmp-server community "procurverw" Manager Unrestricted
vlan 1
   name "DEFAULT_VLAN"
   no untagged A1-A24, B1-B24
   no ip address
   exit
vlan 2100
   name "Radio Port"
   tagged A1,B1
   no ip address
   exit
vlan 2
   name "Management"
   untagged A1,B1
   ip address 10.2.0.3 255.255.0.0
   exit
vlan 4
   name "Server"
   untagged B2-B24
   tagged A1,B1
   no ip address
   exit
```

```
vlan 5
   name "Faculty_databases"
   untagged A2-A24
   tagged A1,B1
   no ip address
   exit
mirror 1 port B6 //Port 2 of a NAC 800 ES connects to port
B6//
mirror 1 port B7 //Port 2 of a NAC 800 ES connects to port
B7//
ip authorized-managers 10.2.0.0 255.255.0.0
ip authorized-managers 10.4.4.40 255.255.255.255
ip authorized-managers 10.4.5.50 255.255.255.255
aaa authentication login privilege-mode
aaa authentication telnet login radius local
aaa authentication port-access eap-radius
aaa authentication web login radius local
radius-server host 10.4.4.30 key procurve12
ip dns domain-name "procurveu.edu"
ip dns server-address 10.4.4.15
interface B2 //A DHCP server connects to port B2//
   monitor all Both mirror 1
   exit
password manager
password operator
```

Edge Switches

Your network will probably include many edge switches. An example configuration for an edge switch that also includes a Wireless Edge Services Module follows.

Wireless Services-Enabled Switch startup-config

In addition to housing the Wireless Edge Services zl Module, this switch functions as an edge switch. To improve readability, however, the encrypted Wireless Edge Services Module commands have been omitted.

```
; J8697A Configuration Editor; Created on release #K.12.XX

hostname "Wireless Switch"
module 1 type J8702A
module 2 type J8702A
module 3 type J9051A
```

```
web-management management-url ""
ip default-gateway 10.2.0.1
snmp-server community "procurvero" Operator
snmp-server community "procurverw" Manager Unrestricted
vlan 1
   name "DEFAULT_VLAN"
   no untagged A1,B1
   untagged A2-A24,B2-B24
   no ip address
   exit
vlan 8
   name "Faculty"
   tagged A1,B1,CUP
   exit
lldp auto-provision radio-ports auto-vlan 2100 auto
vlan 2100
   name "Radio Port"
   tagged A1,B1,CDP
   exit
vlan 10
   name "Students"
   tagged A1,B1,CUP
   exit
vlan 32
   name "Test"
   tagged A1,B1,CUP
   exit
vlan 34
   name "Quarantine"
   tagged A1,B1,CUP
   exit
vlan 36
   name "Infected"
   tagged A1,B1,CUP
   exit
vlan 2
   name "Management"
   untagged A1,B1
   ip address 10.2.0.5 255.255.0.0
   tagged CUP
   exit
ip authorized-managers 10.2.0.0 255.255.0.0
ip authorized-managers 10.4.4.40 255.255.255.255
ip authorized-managers 10.4.5.50 255.255.255.255
```

```
aaa authentication login privilege-mode
aaa authentication telnet login radius local
aaa authentication port-access eap-radius
aaa authentication web login radius local
radius-server host 10.4.4.30 key procurve12
ip dns domain-name "procurveu.edu"
ip dns server-address 10.4.4.15
aaa port-access authenticator A2-A24,B2-B24 //802.1X
authentication is enforced on edge ports, but not uplink
ports.//
aaa port-access authenticator active //Do not enter this
command until you have completed setting up the entire
solution//
aaa port-access supplicant A1,B1
aaa port-access supplicant A1 identity "switch"
aaa port-access supplicant B1 identity "switch"
password manager
password operator
```

Configure Windows 2003 Services

Before you install IAS, you must have Windows 2003, Active Directory, DNS, DHCP, and certificate services running. Please refer to Chapter 2: “Implementing 802.1X with ProCurve IDM and Endpoint Integrity” for instructions on the following:

1. Install the Windows 2003 server (page 2-20).
2. Install Active Directory (page 2-21).
3. Configure Windows domain groups (page 2-28).
4. Configure Windows domain users (page 2-31).
5. Configure DNS services with reverse lookup zones (page 2-35).
6. Install DHCP services (page 2-43).
7. Configure DHCP services (page 2-46).
8. Install and configure certificate services (page 2-53).

Configure IAS

This section explains how to configure IAS, the RADIUS server for this solution. You must:

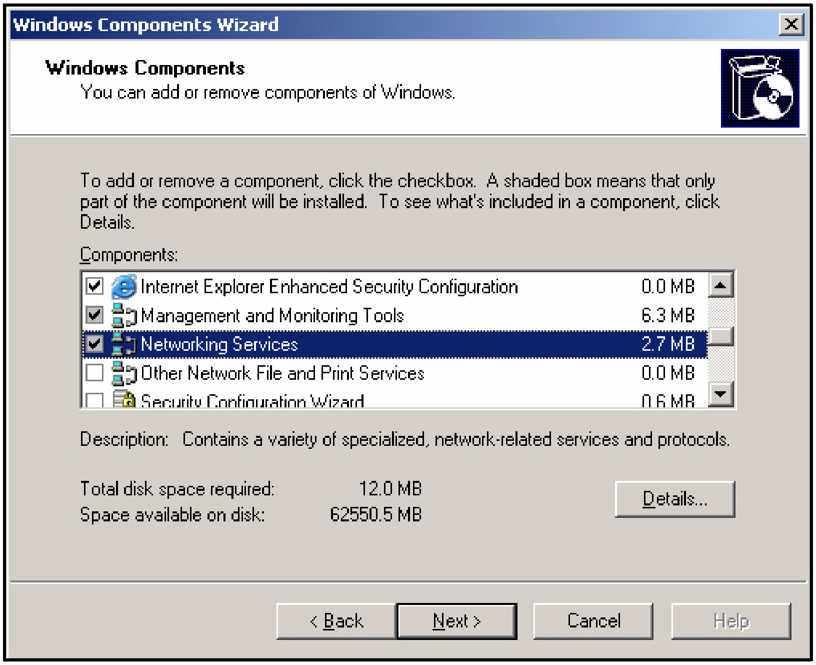
1. Install IAS.
2. Register IAS with Active Directory.
3. Install a certificate on the IAS server.
4. Configure basic properties.
5. Configure remote access policies.
6. Add RADIUS clients.
7. Enable remote logging.
8. Install and configure the SAIASConnector for the NAC 800.

Later, you will learn about an optional final step: installing a trusted root CA certificate. The IAS server must trust the CA that signed the NAC 800's SSL certificate—most often a concern when the NAC 800 uses a self-signed certificate.

Install IAS

Complete these steps on the Windows 2003 server that you have selected to run IAS:

1. Open **Add or Remove Programs**. (In the **Start** menu, select **Control Panel** > **Add or Remove Programs**.)
2. Click **Add/Remove Windows Components** in the left pane.



Windows Components Wizard

Windows Components

You can add or remove components of Windows.

To add or remove a component, click the checkbox. A shaded box means that only part of the component will be installed. To see what's included in a component, click Details.

Components:

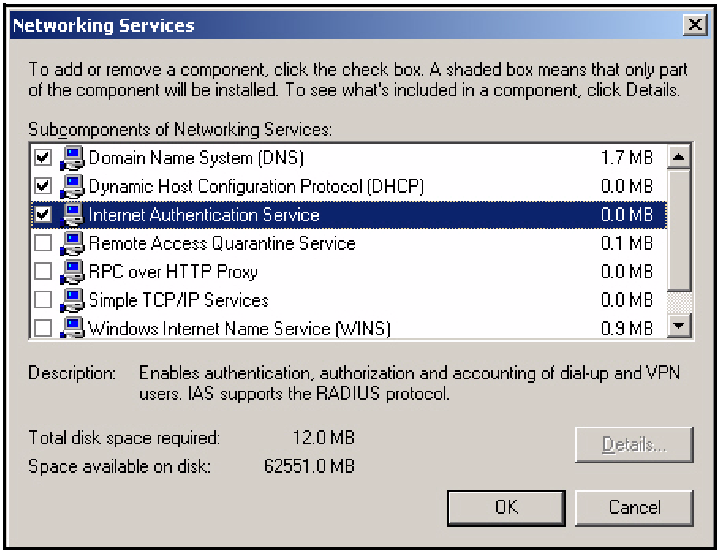
☑ Internet Explorer Enhanced Security Configuration 0.0 MB
☑ Management and Monitoring Tools 6.3 MB
☑ Networking Services 2.7 MB
☐ Other Network File and Print Services 0.0 MB
☐ Security Configuration Wizard 0.6 MB

Description: Contains a variety of specialized, network-related services and protocols.

Total disk space required: 12.0 MB
Space available on disk: 62550.5 MB

Figure 3-2. Windows Components Wizard—Windows Components Page

3. On the **Windows Components** page, select **Network Services** and click **Details**.


Networking Services

To add or remove a component, click the check box. A shaded box means that only part of the component will be installed. To see what's included in a component, click Details.

Subcomponents of Networking Services:

☑	Domain Name System (DNS)	1.7 MB
☑	Dynamic Host Configuration Protocol (DHCP)	0.0 MB
☑	Internet Authentication Service	0.0 MB
□	Remote Access Quarantine Service	0.1 MB
□	RPC over HTTP Proxy	0.0 MB
□	Simple TCP/IP Services	0.0 MB
□	Windows Internet Name Service (WINS)	0.9 MB

Description: Enables authentication, authorization and accounting of dial-up and VPN users. IAS supports the RADIUS protocol.

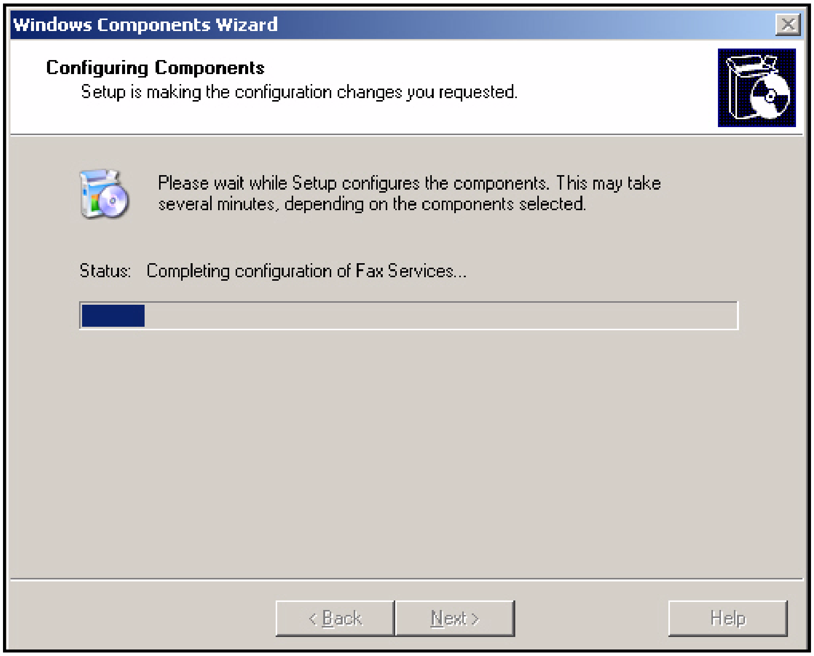
Total disk space required: 12.0 MB

Space available on disk: 62551.0 MB

Figure 3-3. Windows Components Wizard—Networking Services Page

4. Select the **Internet Authentication Service** check box and click **OK**.

5. Click **Next** in the **Windows Components** page.



Windows Components Wizard

Configuring Components

Setup is making the configuration changes you requested.

Please wait while Setup configures the components. This may take several minutes, depending on the components selected.

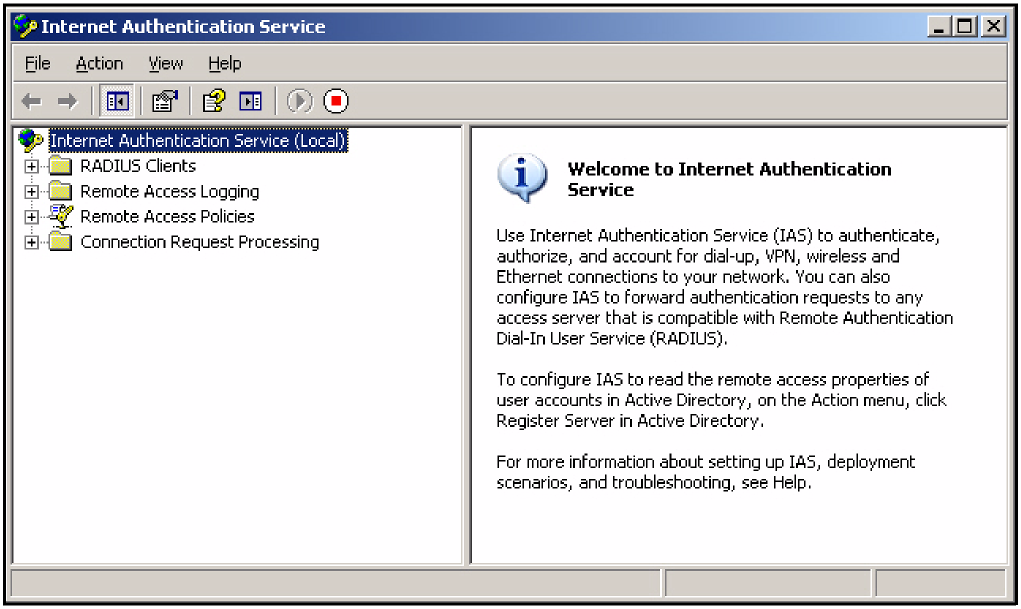
Status: Completing configuration of Fax Services...

Figure 3-4. Windows Components Wizard—Configure Components Page

6. Wait several minutes while the components are configured.
7. Click **Finish**.
8. Close **Add or Remove Programs**. (Press **[Alt]+[F4]**.)

Register IAS with Active Directory

1. In the **Start** menu, select **Administrative Tools** > **Internet Authentication Service**.


Internet Authentication Service
File
Action
View
Help
Internet Authentication Service (Local)
RADIUS Clients
Remote Access Logging
Remote Access Policies
Connection Request Processing

Welcome to Internet Authentication Service

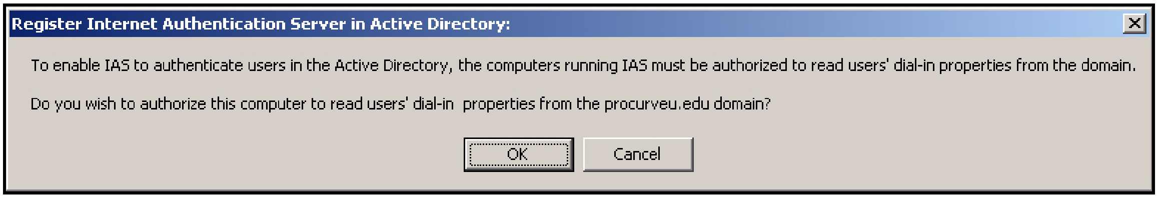
Use Internet Authentication Service (IAS) to authenticate, authorize, and account for dial-up, VPN, wireless and Ethernet connections to your network. You can also configure IAS to forward authentication requests to any access server that is compatible with Remote Authentication Dial-In User Service (RADIUS).

To configure IAS to read the remote access properties of user accounts in Active Directory, on the Action menu, click Register Server in Active Directory.

For more information about setting up IAS, deployment scenarios, and troubleshooting, see Help.

Figure 3-5. Internet Authentication Service Window

2. Right-click **Internet Authentication Service (Local)** and select **Register Server in Active Directory**.

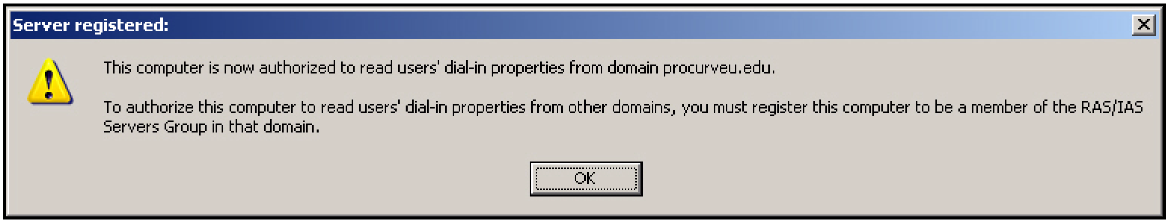

Register Internet Authentication Server in Active Directory:
OK
Cancel

To enable IAS to authenticate users in the Active Directory, the computers running IAS must be authorized to read users' dial-in properties from the domain.

Do you wish to authorize this computer to read users' dial-in properties from the procurveu.edu domain?

Figure 3-6. Register Internet Authentication Server in Active Directory Message

3. Click **OK** in the **Register Internet Authentication Server in Active Directory** window.



This computer is now authorized to read users' dial-in properties from domain procurveu.edu.

To authorize this computer to read users' dial-in properties from other domains, you must register this computer to be a member of the RAS/IAS Servers Group in that domain.

Figure 3-7. Server registered Message

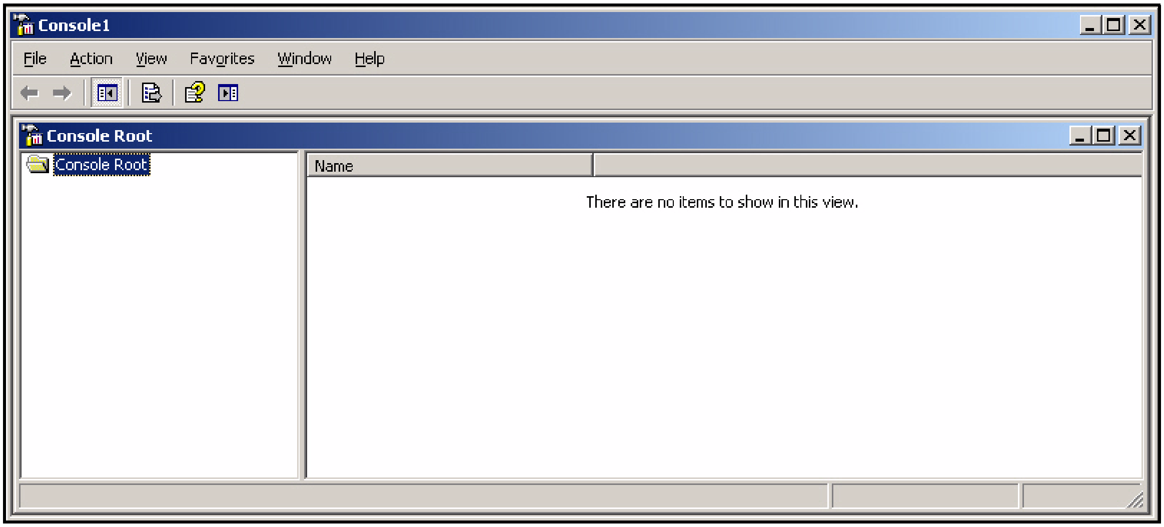
4. Click **OK** in the **Server registered** window.

Install a Certificate on the IAS Server

A RADIUS server such as IAS requires a certificate for authenticating itself (server authentication) and for authenticating endpoints (client authentication).

In this solution, the organization has a complete PKI with a domain CA that will issue the certificates to IAS. Follow these steps to request and install the certificate:

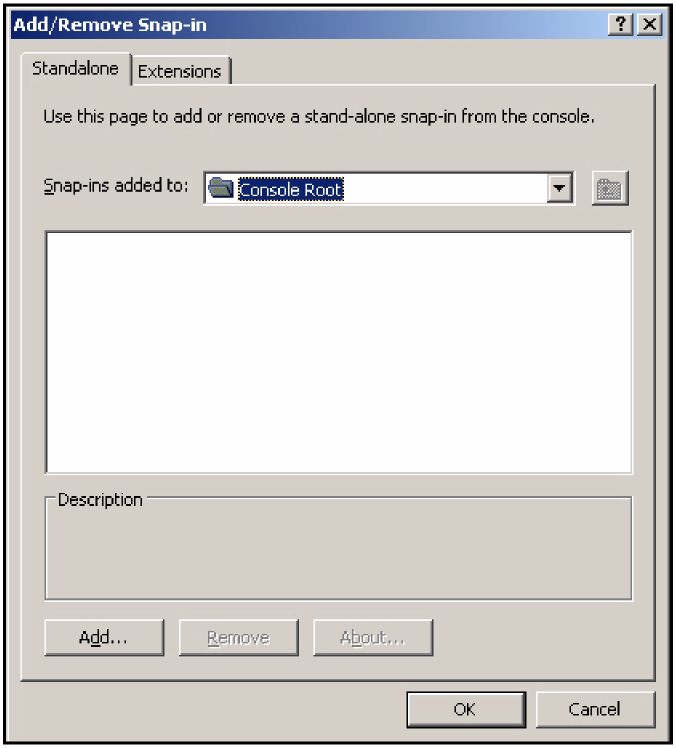
1. Open the Microsoft Management Console on the IAS server:
   a. In the **Start** menu, select **Run**.
   b. Type **mmc** and click **OK**.



There are no items to show in this view.

Figure 3-8. Management Console

2. From the **File** menu, select **Add/Remove Snap-in**.

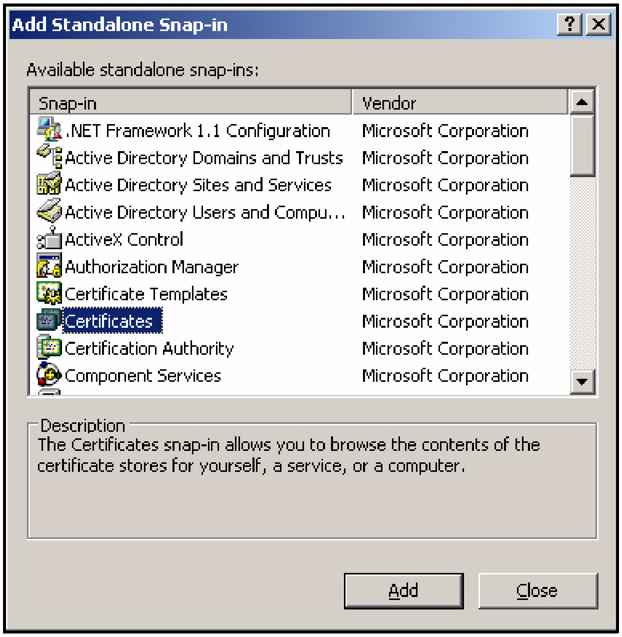


Use this page to add or remove a stand-alone snap-in from the console.

Snap-ins added to: Console Root

Figure 3-9. Add/Remove Snap-in Window

3. Click **Add**.


Add Standalone Snap-in

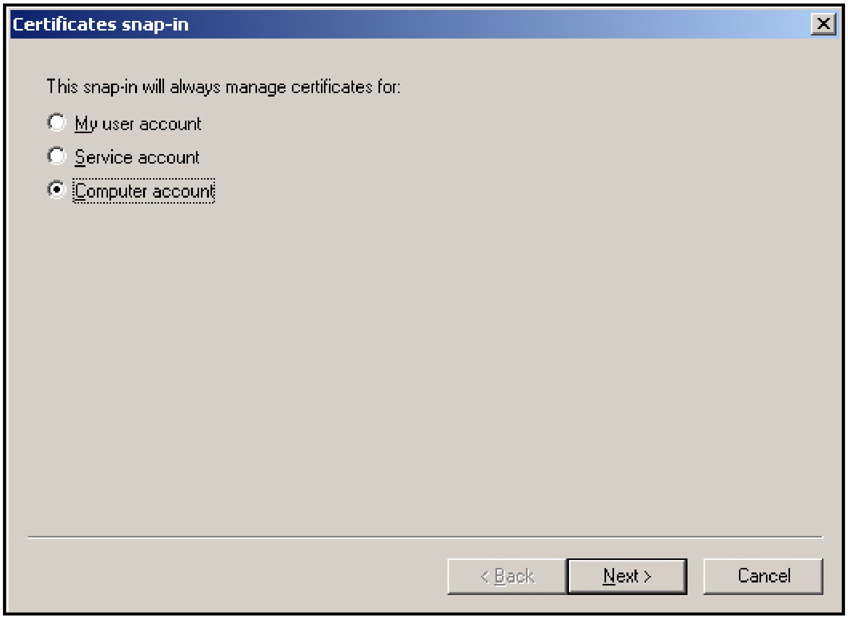
Available standalone snap-ins:

Snap-in	Vendor
.NET Framework 1.1 Configuration	Microsoft Corporation
Active Directory Domains and Trusts	Microsoft Corporation
Active Directory Sites and Services	Microsoft Corporation
Active Directory Users and Compu...	Microsoft Corporation
ActiveX Control	Microsoft Corporation
Authorization Manager	Microsoft Corporation
Certificate Templates	Microsoft Corporation
Certificates	Microsoft Corporation
Certification Authority	Microsoft Corporation
Component Services	Microsoft Corporation

Description
The Certificates snap-in allows you to browse the contents of the certificate stores for yourself, a service, or a computer.

Figure 3-10. Add Standalone Snap-in Window

4. Select the **Certificates** snap-in and click **Add**.



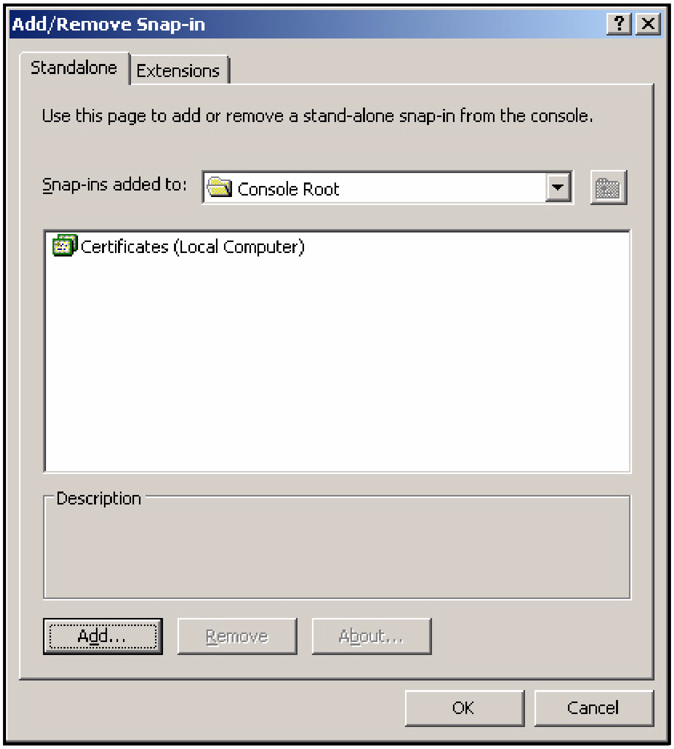
Certificates snap-in

This snap-in will always manage certificates for:

○ My user account
○ Service account
● Computer account

Figure 3-11. Certificates snap-in Window

5. Select **Computer account** and click **Next**.
6. Select **Local Computer** and click **Finish**.
7. Click **Close**.



Use this page to add or remove a stand-alone snap-in from the console.

Snap-ins added to: Console Root

Certificates (Local Computer)

Figure 3-12. Add/Remove Snap-in Window

8. Click **OK** to exit.

9. Expand **Certificates (Local Computer)** under Console Root.

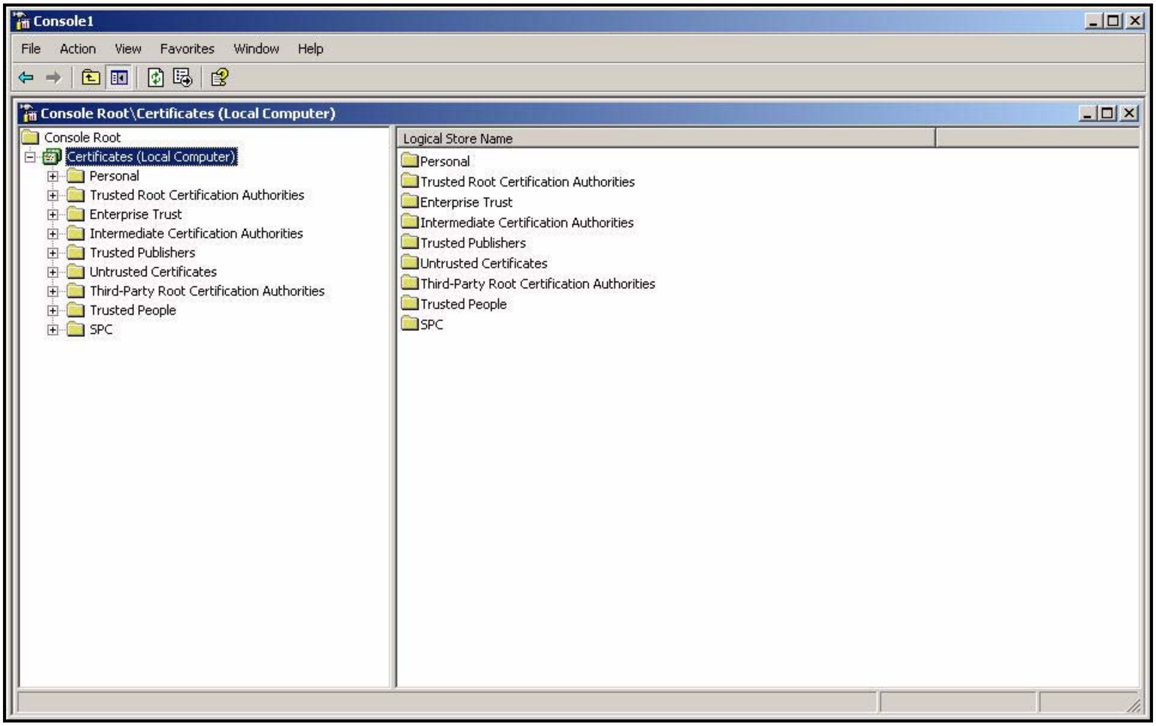
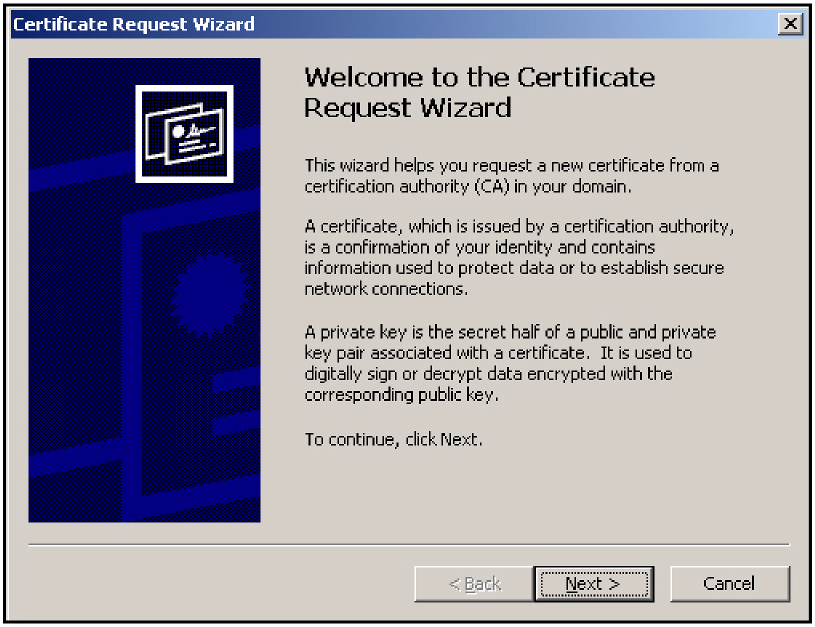

Console1
File Action View Favorites Window Help
Console Root\Certificates (Local Computer)
Console Root
Certificates (Local Computer)
Personal
Trusted Root Certification Authorities
Enterprise Trust
Intermediate Certification Authorities
Trusted Publishers
Untrusted Certificates
Third-Party Root Certification Authorities
Trusted People
SPC
Logical Store Name
Personal
Trusted Root Certification Authorities
Enterprise Trust
Intermediate Certification Authorities
Trusted Publishers
Untrusted Certificates
Third-Party Root Certification Authorities
Trusted People
SPC

Figure 3-13. Management Console > Certificates (Local Computer)

10. Right-click the **Personal** folder and select **All Tasks** > **Request New Certificate**.



Certificate Request Wizard

Welcome to the Certificate Request Wizard

This wizard helps you request a new certificate from a certification authority (CA) in your domain.

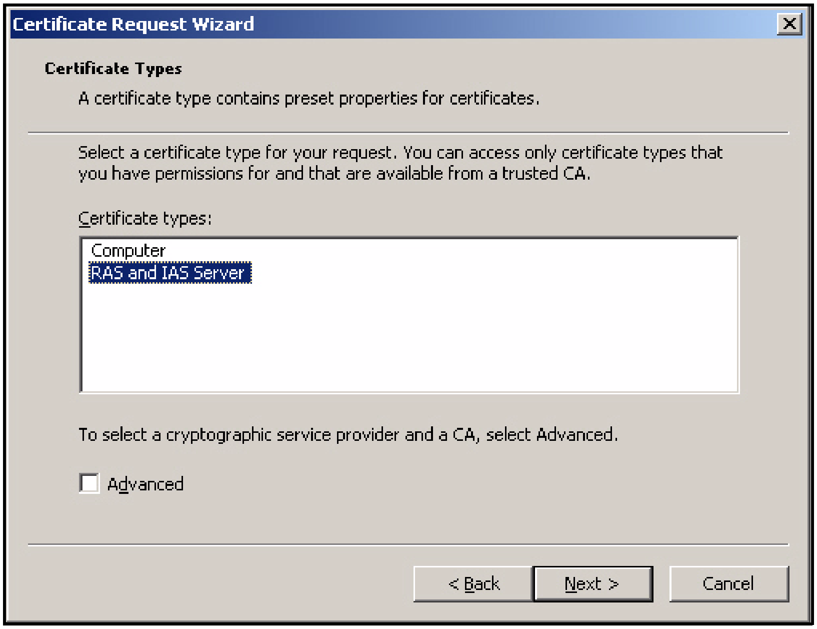
A certificate, which is issued by a certification authority, is a confirmation of your identity and contains information used to protect data or to establish secure network connections.

A private key is the secret half of a public and private key pair associated with a certificate. It is used to digitally sign or decrypt data encrypted with the corresponding public key.

To continue, click Next.

Figure 3-14. Certificate Request Wizard—Welcome Page

11. On the **Certificate Request Wizard Welcome** page, click **Next**.



Certificate Request Wizard

Certificate Types

A certificate type contains preset properties for certificates.

Select a certificate type for your request. You can access only certificate types that you have permissions for and that are available from a trusted CA.

Certificate types:

Computer
RAS and IAS Server

To select a cryptographic service provider and a CA, select Advanced.

□ Advanced

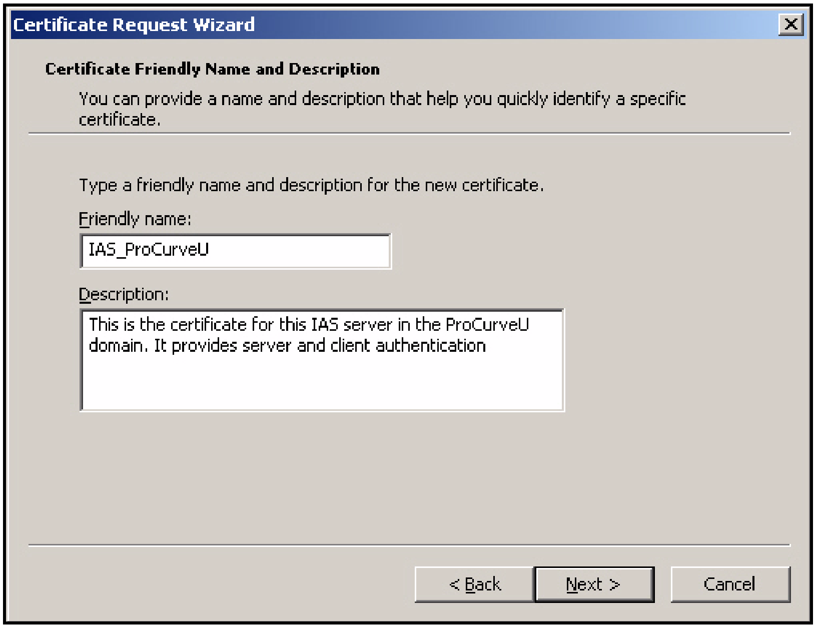
Figure 3-15. Certificate Request Wizard—Certificate Types Page

12. In the **Certificate types** box, select **RAS and IAS Server**.

Note

If the **RAS and IAS Server** option does not appear, restart the server.

13. Click **Next**.



Certificate Friendly Name and Description

You can provide a name and description that help you quickly identify a specific certificate.

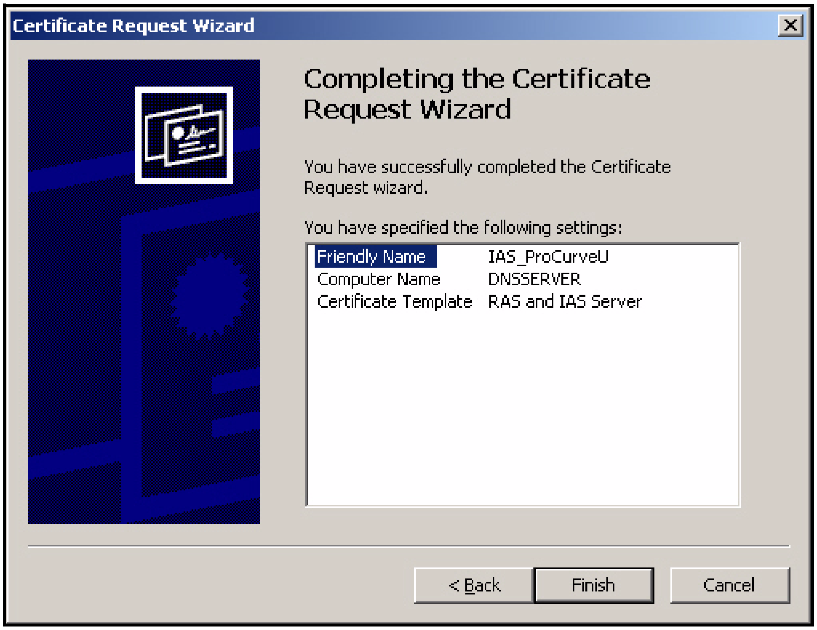
Type a friendly name and description for the new certificate.

Friendly name: IAS_ProCurveU

Description: This is the certificate for this IAS server in the ProCurveU domain. It provides server and client authentication

Figure 3-16. Certificate Request Wizard—Certificate Friendly Name and Description Page

14. For the **Friendly name**, type a meaningful name for the certificate. In this example, the name identifies the device that is requesting the certificate (the IAS server) and the CA (ProCurveU CA): **IAS_ProCurveU**.
15. If you want, describe the certificate's purpose in the **Description** box.
16. Click **Next**.



Completing the Certificate Request Wizard

You have successfully completed the Certificate Request wizard.

You have specified the following settings:

Friendly Name	IAS_ProCurveU
Computer Name	DNSSERVER
Certificate Template	RAS and IAS Server

Figure 3-17. Certificate Request Wizard—Completing the Certificate Request Wizard Page

17. Click **Finish** on the **Completing the Certificate Request Wizard** page. A message is displayed, telling you the request was successful.
18. Press [**Alt**]+[**F4**] to close the Management Console.
19. Click **Yes** to save the console for later use.
20. Click **Save** to save the console. The default name is **Console1.msc**, but you can give it any name you choose.

Configure IAS Properties

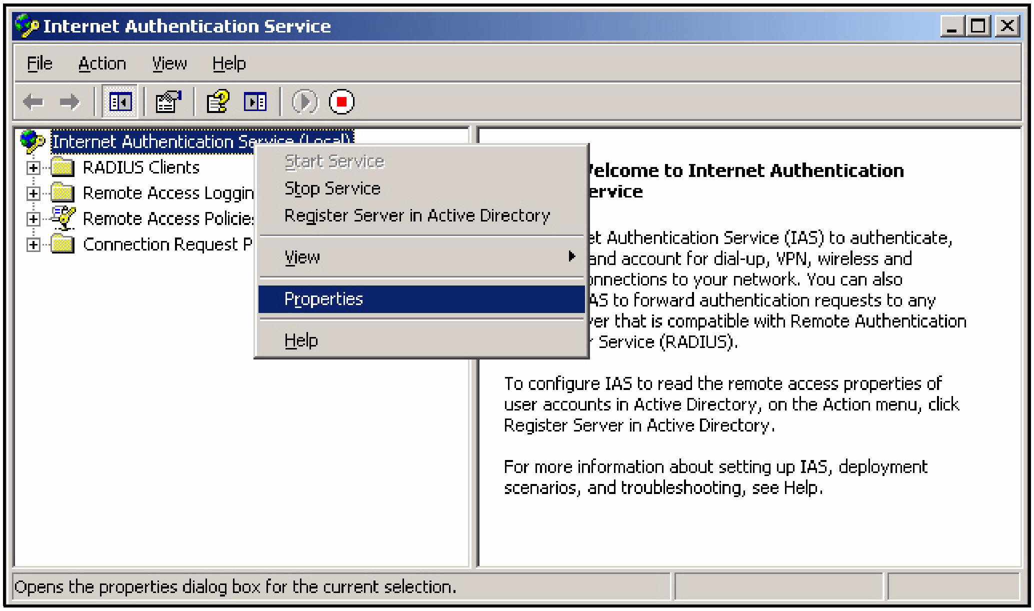
Basic IAS properties include the requests that IAS logs and the ports on which IAS listens for authentication and accounting requests. Often, you can leave the default properties, which are displayed in Table 3-4. However, if you want change any of these settings, follow the steps below.

Table 3-4. Default IAS Settings

Parameter	Default Setting
Server description	IAS
Log	• Rejected requests • Accepted requests
Authentication port	1812, 1645
Accounting port	1813, 1646

1. In the **Start** menu, click **Administrative Tools** > **Internet Authentication Service**.

2. Right-click **Internet Authentication Service (Local)** and select **Properties**.



/elcome to Internet Authentication ervice

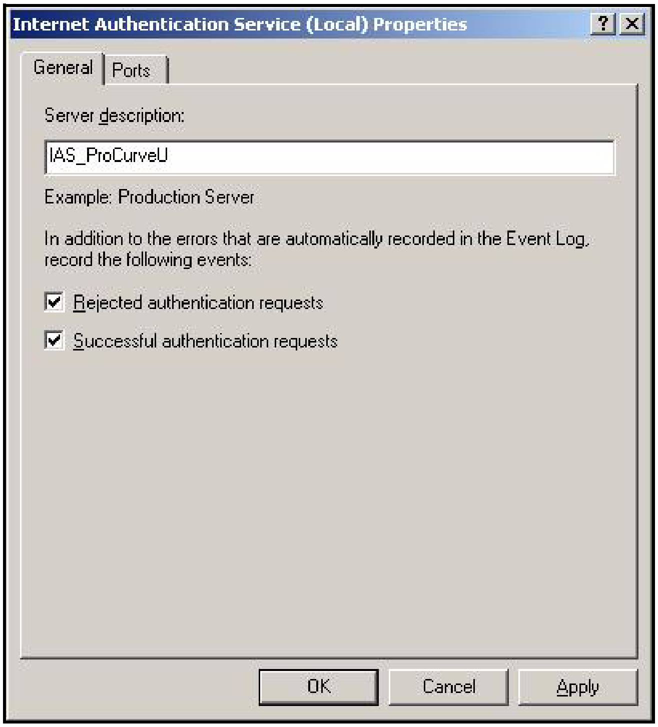
:t Authentication Service (IAS) to authenticate, and account for dial-up, VPN, wireless and onnections to your network. You can also AS to forward authentication requests to any ver that is compatible with Remote Authentication Service (RADIUS).

To configure IAS to read the remote access properties of user accounts in Active Directory, on the Action menu, click Register Server in Active Directory.

For more information about setting up IAS, deployment scenarios, and troubleshooting, see Help.

Opens the properties dialog box for the current selection.

Figure 3-18. Internet Authentication Service Window



Server description:

IAS_ProCurveU

Example: Production Server

In addition to the errors that are automatically recorded in the Event Log, record the following events:

☑ Rejected authentication requests

☑ Successful authentication requests

Figure 3-19. Internet Authentication Service (Local) Properties Window—General Tab

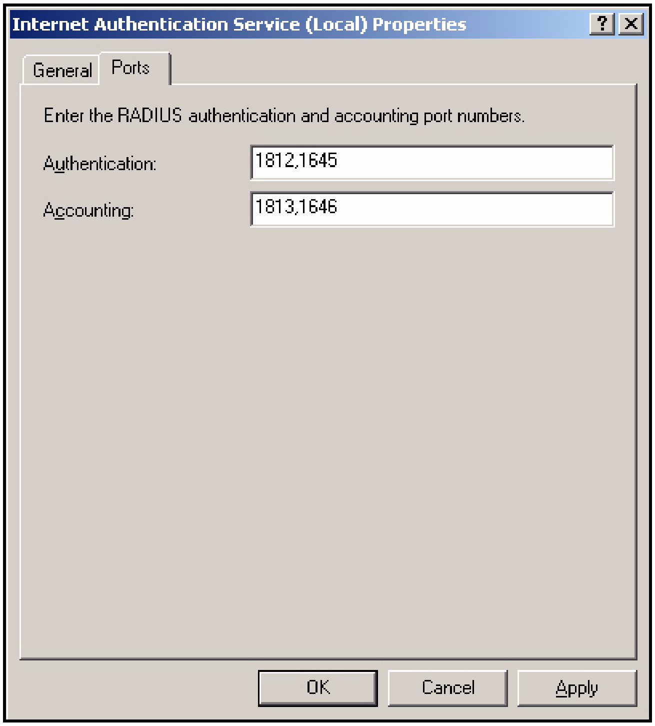
3. On the **General** tab, type a meaningful name for the **Server Description**. For example: **IAS_ProCurveU**.

4. Leave the **Rejected authentication requests** and **Successful authentication requests** check boxes selected.

Note

Typically, you should clear the **Successful authentication requests** check box after the testing period. Otherwise, in a reasonably busy network, the log file is quickly filled with successful log messages.

5. Click the **Ports** tab.



Enter the RADIUS authentication and accounting port numbers.

Authentication: 1812,1645

Accounting: 1813,1646

Figure 3-20. Internet Authentication Service (Local) Properties Window— Ports Tab

6. In the **Authentication** box, type the UDP port number (or numbers) on which IAS listens for authentication requests.
7. In the **Authentication** box, type the UDP port number (or numbers) on which IAS listens for accounting requests.
8. Click **OK**.

Configure the Remote Access Policies

Next, you must create remote access policies for endpoints, which specify:

- **Conditions**—IAS determines the policy to use when handling an authentication request by matching the request to the conditions.

  Authentication requests are characterized by many variables, any of which you can use to match the request to a policy. Some of the most common ways include:

  - **By Windows group**—You create a policy for each group that is allowed network access. To match a request to a policy, IAS verifies that the username belongs to the specified group. This is the strategy that is used in the example network. See Table 3-5.
  - **By access method**—For example, you can create different policies for wired and wireless access.
  - **By time**—You can create policies that allow, deny, or differentiate access according to the time that the request is received.
- **Authentication protocols**—After IAS receives a RADIUS access request from a NAS, it begins to authenticate the user. You can select one or more protocols for this procedure.
- **Advanced properties**—These are the dynamic settings that IAS sends to the NAS to enforce. This guide shows you how to set up dynamic VLAN assignments.

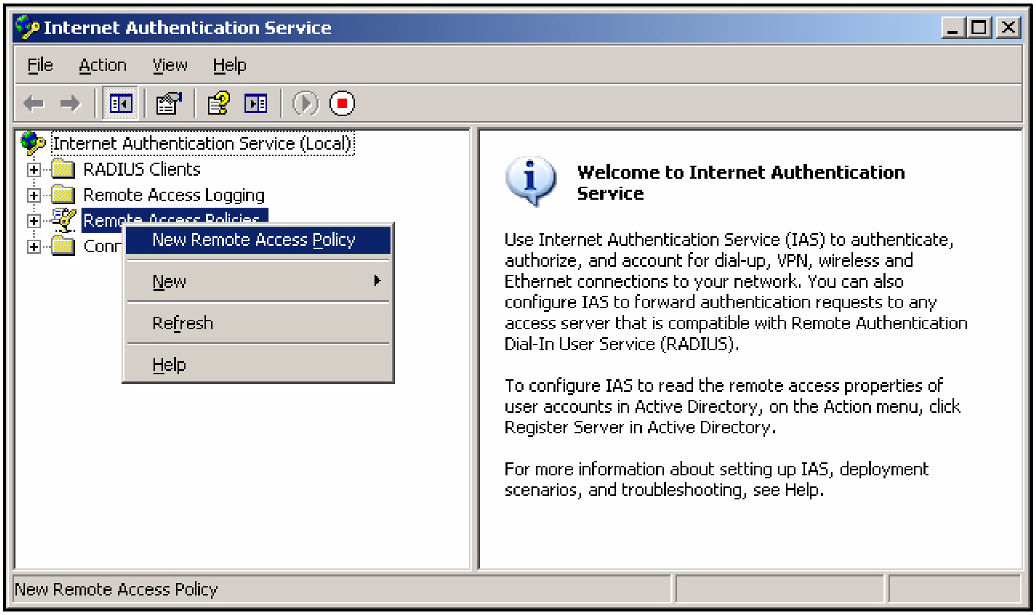
The example network has several policies, which are outlined in Table 3-5.

Table 3-5. IAS Remote Access Policies

Remote Access Policy	Condition for Matching Requests	Authentication Protocols	Dynamic Settings (Advanced)
Infrastructure Devices	Group = Infrastructure Devices Connection type = Ethernet	EAP-MD5	
Network_Admins	Group = Network_Admins	EAP-TLS	• Tunnel-Type = VLAN • Tunnel-Medium-Type = 802 • Tunnel-Pvt-Group-ID = 2
Faculty	Group = Faculty	EAP-TLS	• Tunnel-Type = VLAN • Tunnel-Medium-Type = 802 • Tunnel-Pvt-Group-ID = 8
Students	Group = Students	EAP-TLS	• Tunnel-Type = VLAN • Tunnel-Medium-Type = 802 • Tunnel-Pvt-Group-ID = 10

To create a policy, follow these steps:

1. In the **Start** menu, click **Administrative Tools** > **Internet Authentication Service**.



Welcome to Internet Authentication Service

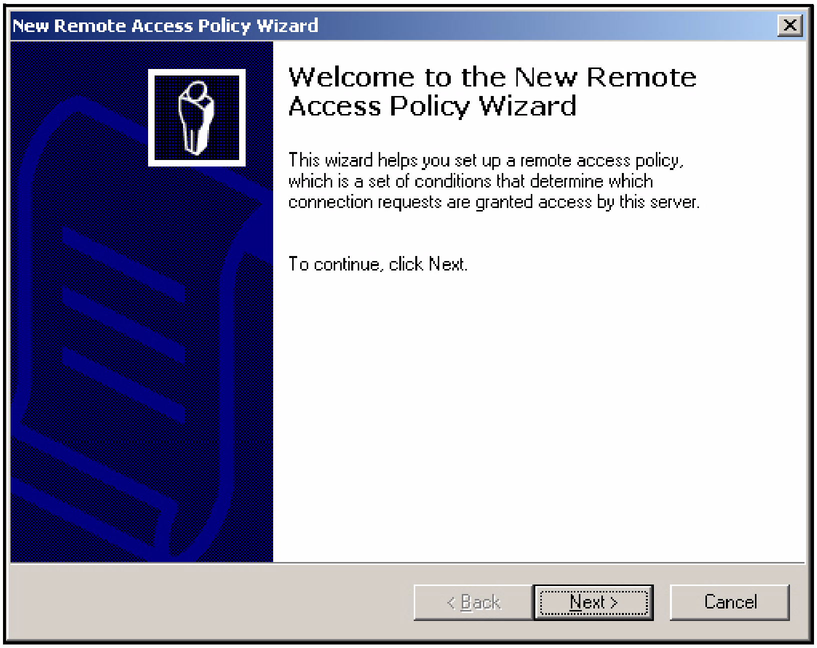
Use Internet Authentication Service (IAS) to authenticate, authorize, and account for dial-up, VPN, wireless and Ethernet connections to your network. You can also configure IAS to forward authentication requests to any access server that is compatible with Remote Authentication Dial-In User Service (RADIUS).

To configure IAS to read the remote access properties of user accounts in Active Directory, on the Action menu, click Register Server in Active Directory.

For more information about setting up IAS, deployment scenarios, and troubleshooting, see Help.

Figure 3-21. Internet Authentication Service > Remote Access Policies

2. Right-click **Remote Access Policies** and click **New Remote Access Policy**.



Welcome to the New Remote Access Policy Wizard

This wizard helps you set up a remote access policy, which is a set of conditions that determine which connection requests are granted access by this server.

To continue, click Next.

Figure 3-22. New Remote Access Policy Wizard—Welcome Page

3. Click **Next** on the **New Remote Access Policy Wizard Welcome** page.

   You must now choose between using the wizard to configure the policy or setting up the policy manually.

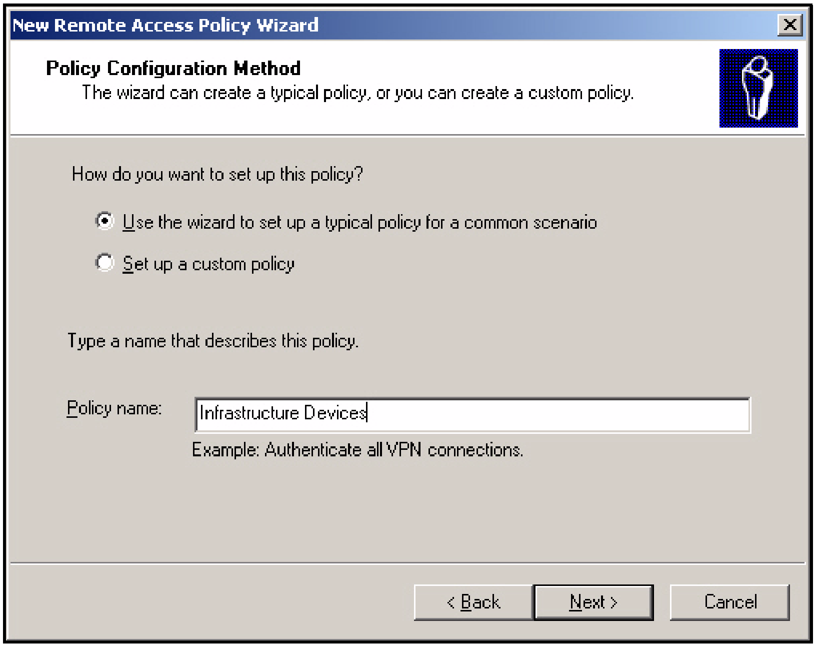
   The wizard uses the access method and either the username or the Windows group as the policy's conditions. The wizard also allows you to select the authentication protocol but not advanced options (dynamic settings). You must add those on your own.

   Setting up the policy manually gives you greater flexibility but less guidance.

   The two sections below show you how to set up two example remote access policies: one with the wizard and one manually.

Using the New Remote Access Policy Wizard

Access the New Remote Access Policy Wizard, as described in the section above. Click **Next** in the Welcome screen. You should see the screen in Figure 3-23.



New Remote Access Policy Wizard

Policy Configuration Method
The wizard can create a typical policy, or you can create a custom policy.

How do you want to set up this policy?

● Use the wizard to set up a typical policy for a common scenario

○ Set up a custom policy

Type a name that describes this policy.

Policy name: Infrastructure Devices

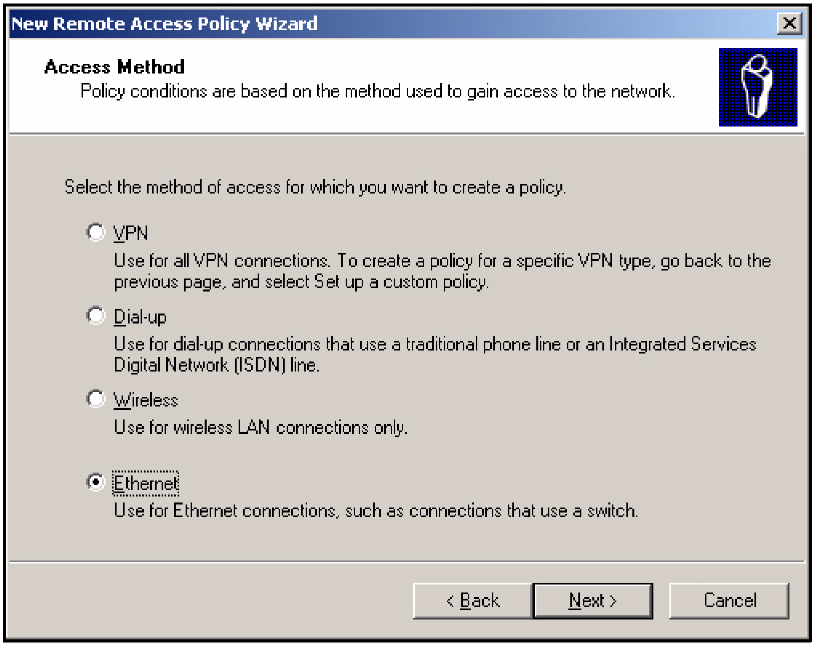
Example: Authenticate all VPN connections.

Figure 3-23. New Remote Access Policy Wizard—Policy Configuration Method Page

Then follow these steps:

1. Select **Use the wizard to set up a typical policy for a common scenario**.
2. Type a meaningful description for the **Policy name**. For example, this policy is intended to authenticate switches and APs and is named: **Infrastructure Devices**.
3. Click **Next**.

4. Select the access method. In this example, infrastructure devices are authenticated at switch ports, so you would select **Ethernet**.



Access Method

Policy conditions are based on the method used to gain access to the network.

Select the method of access for which you want to create a policy.

○ VPN
Use for all VPN connections. To create a policy for a specific VPN type, go back to the previous page, and select Set up a custom policy.

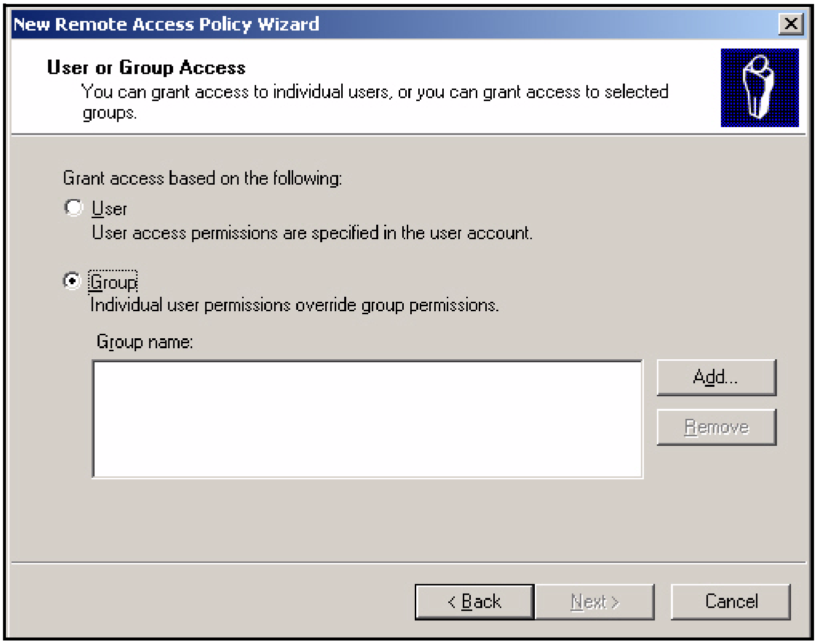
○ Dial-up
Use for dial-up connections that use a traditional phone line or an Integrated Services Digital Network (ISDN) line.

○ Wireless
Use for wireless LAN connections only.

● Ethernet
Use for Ethernet connections, such as connections that use a switch.

Figure 3-24. New Remote Access Policy Wizard—Access Method Page

5. Click **Next**.



New Remote Access Policy Wizard

User or Group Access

You can grant access to individual users, or you can grant access to selected groups.

Grant access based on the following:

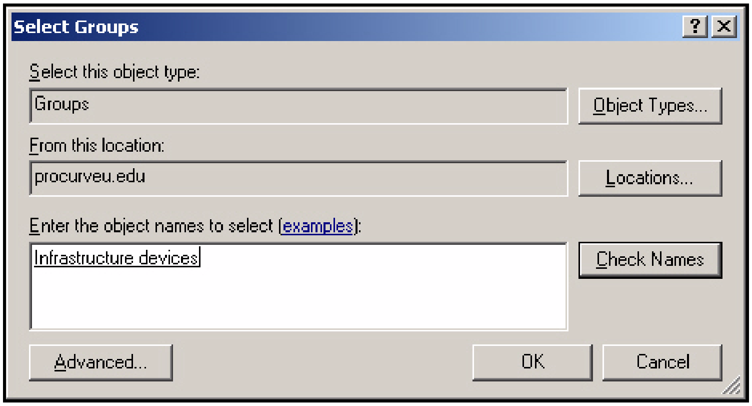
○ User
User access permissions are specified in the user account.

● Group
Individual user permissions override group permissions.

Group name:

Figure 3-25. New Remote Access Policy Wizard—User or Group Access Page

6. Select **Group** and click **Add**.



Select Groups

Select this object type:
Groups

From this location:
procurveu.edu

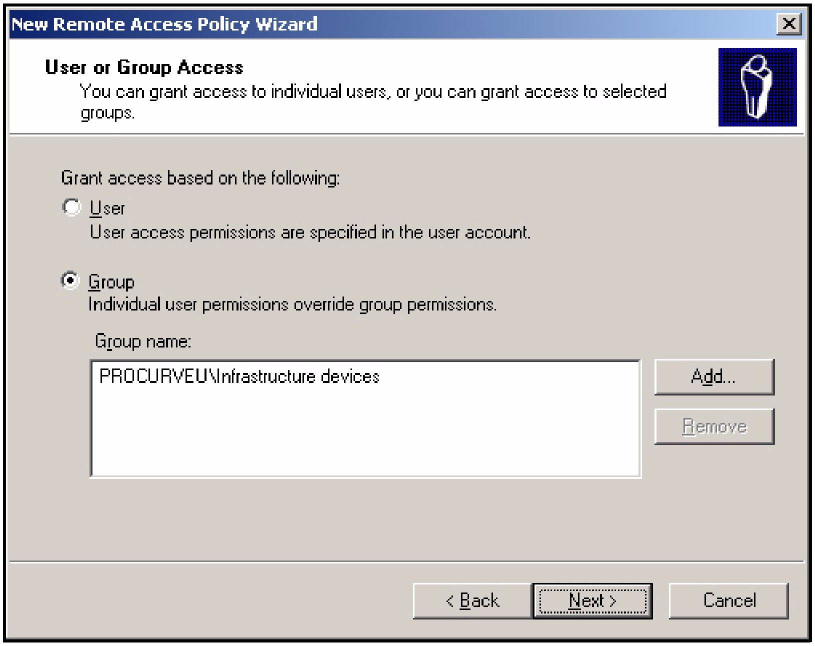
Enter the object names to select (examples):
Infrastructure devices

Figure 3-26. Select Groups Window

7. In the **Select Groups** window, make sure that **From this location** displays the name of your domain.

8. Type the name of the group and click **Check Names** to verify that you have typed the name correctly. If the group name is valid, it is underlined.

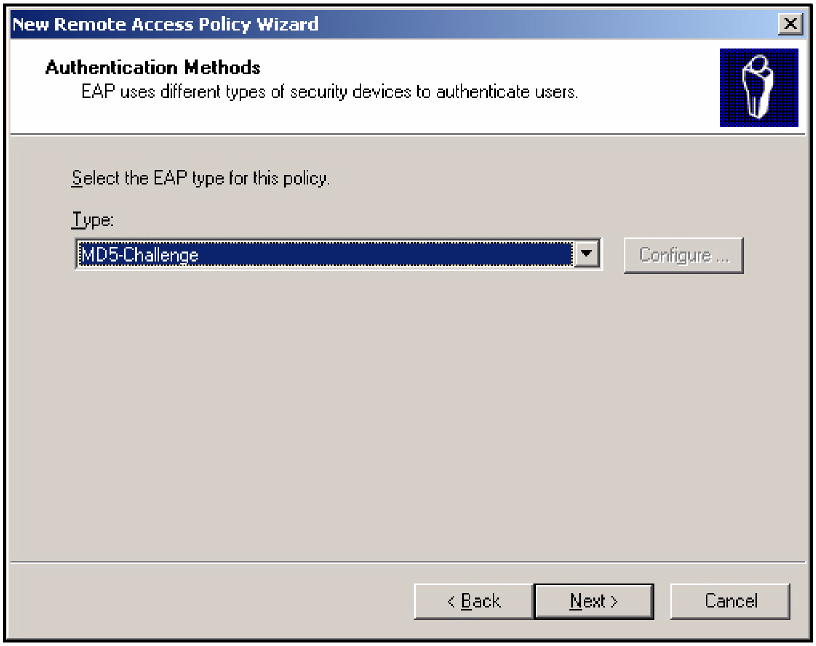
9. Click **OK**.


New Remote Access Policy Wizard
User or Group Access
You can grant access to individual users, or you can grant access to selected groups.
Grant access based on the following:
○ User
User access permissions are specified in the user account.
● Group
Individual user permissions override group permissions.
Group name:
Add...
Remove
< Back
Next >
Cancel

PROCURVEU\Infrastructure devices

Figure 3-27. New Remote Access Policy Wizard—User or Group Access Page

10. If you want to add more object names, click **Add**. Otherwise, click **Next**.


New Remote Access Policy Wizard

Authentication Methods

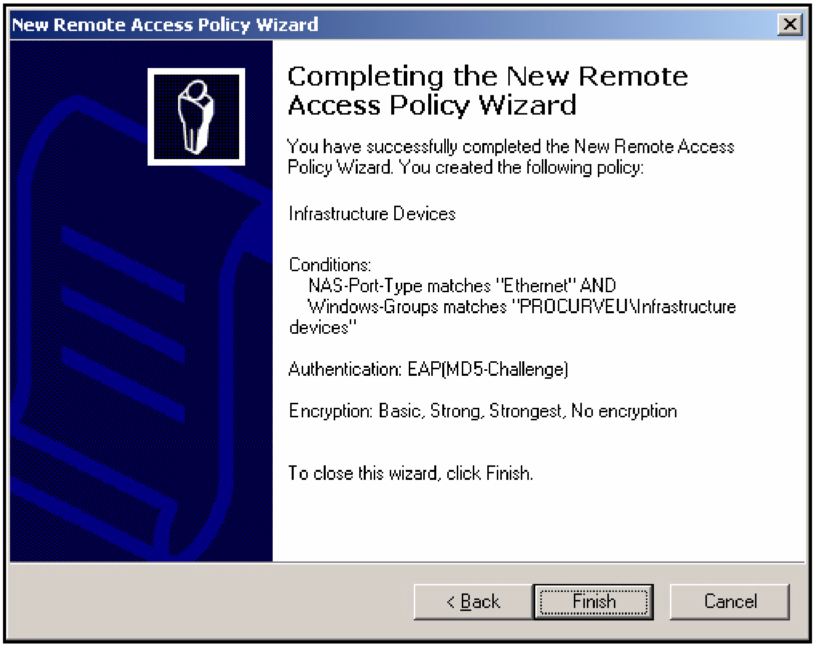
EAP uses different types of security devices to authenticate users.

Select the EAP type for this policy.

Type: MD5-Challenge

Figure 3-28. New Remote Access Policy Wizard—Authentication Methods Page

11. Select your EAP method. ProCurve devices support EAP-MD5, so for the Infrastructure Devices policy, accept the default: **MD5-Challenge**.
12. Click **Next**.



Completing the New Remote Access Policy Wizard

You have successfully completed the New Remote Access Policy Wizard. You created the following policy:

Infrastructure Devices

Conditions:
NAS-Port-Type matches "Ethernet" AND
Windows-Groups matches "PROCURVEU\Infrastructure devices"

Authentication: EAP(MD5-Challenge)

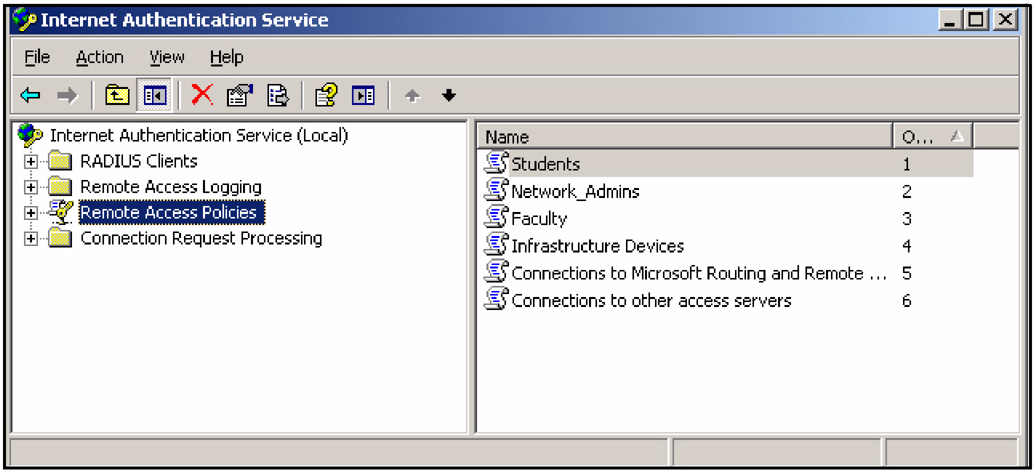
Encryption: Basic, Strong, Strongest, No encryption

To close this wizard, click Finish.

Figure 3-29. New Remote Access Policy Wizard—Completing the New Remote Access Policy Wizard Page

13. Click **Finish** on the **Completing the New Remote Access Policy Wizard** page.

14. Select **Remote Access Policies** in the **Internet Authentication Service** window.


Internet Authentication Service
File
Action
View
Help
Internet Authentication Service (Local)
RADIUS Clients
Remote Access Logging
Remote Access Policies
Connection Request Processing

Name	O...
Students	1
Network_Admins	2
Faculty	3
Infrastructure Devices	4
Connections to Microsoft Routing and Remote ...	5
Connections to other access servers	6

Figure 3-30. Internet Authentication Service > Remote Access Policies

15. Verify that the new policy is listed above the default polices:
    - Connections to Microsoft Routing and Remote
    - Connections to other access servers

    If the new policy is below the default policies, select the policy name, then click the **Order** column to move the policy up.

If you want, repeat these steps to create more policies.

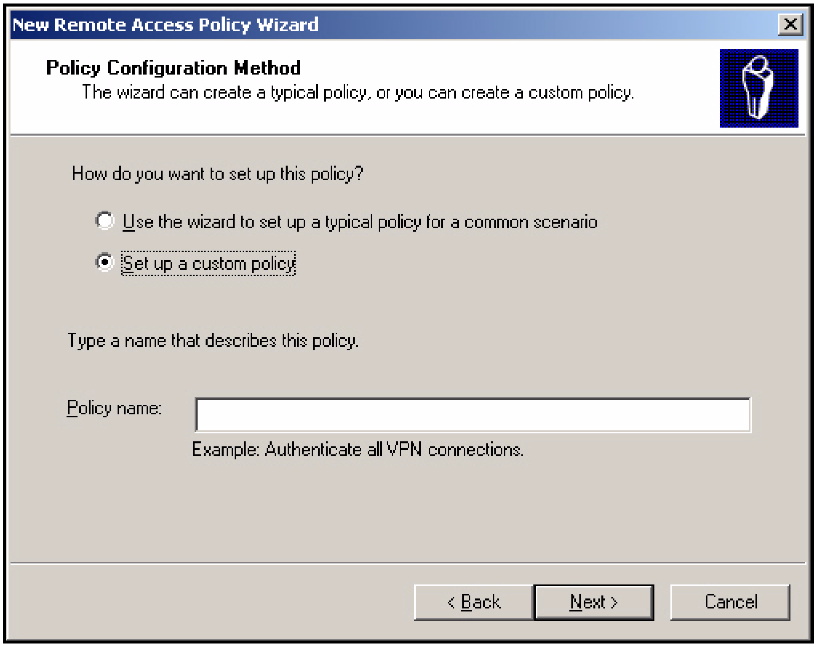
You can also edit the policy and add conditions, choose supplemental authentication methods, or configure advanced properties. See "Edit a Remote Access Policy" on page 3-62.

Manually Create a Remote Access Policy

Sometimes you will want to create a remote access policy that does not fit the options presented by the New Remote Access Policy Wizard. For example, the PCU network administrators want to give faculty members the same access whether they connect via Ethernet or the wireless network. However, the wizard forces them to choose one or the other.

Follow these steps to create the policy manually:

1. Access the New Remote Access Policy Wizard.
   a. Right-click **Remote Access Policies** in the **Internet Authentication Service** window.
   b. Select **New Remote Access Policy**.
2. Click **Next** on the **Welcome** page. You should see the page in Figure 3-31.


New Remote Access Policy Wizard

Policy Configuration Method

The wizard can create a typical policy, or you can create a custom policy.

How do you want to set up this policy?

○ Use the wizard to set up a typical policy for a common scenario

● Set up a custom policy

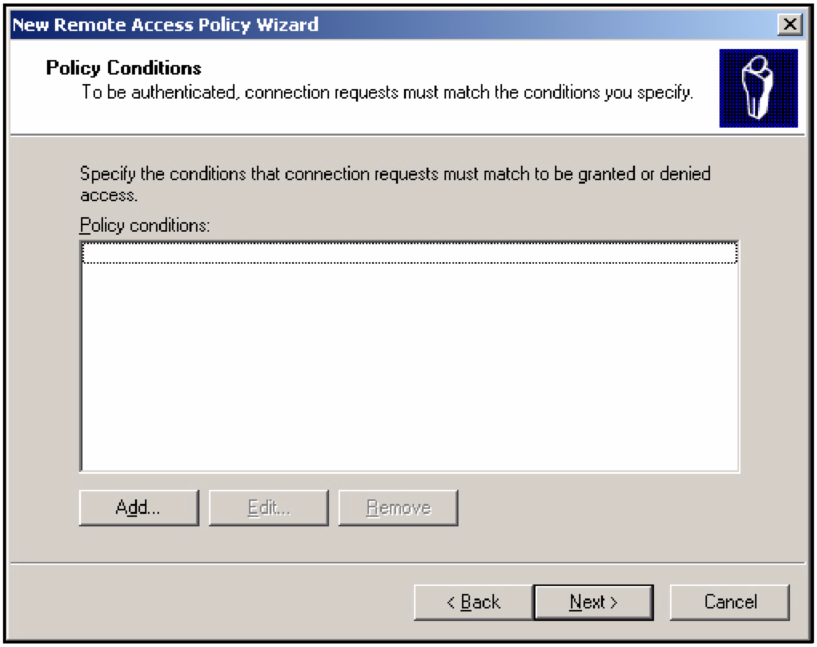
Type a name that describes this policy.

Policy name:

Example: Authenticate all VPN connections.

Figure 3-31. New Remote Access Policy Wizard—Policy Configuration Method Page

3. Select **Set up a custom policy**.
4. In the **Policy name** box, type a meaningful description for this policy. In this example, the policy is meant to control the access of members of the Faculty group; type: **Faculty**.
5. Click **Next**.



New Remote Access Policy Wizard

Policy Conditions

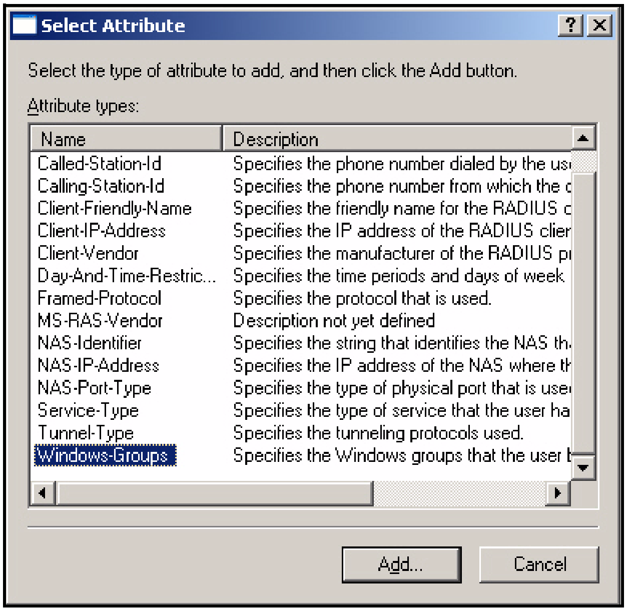
To be authenticated, connection requests must match the conditions you specify.

Specify the conditions that connection requests must match to be granted or denied access.

Policy conditions:

Figure 3-32. New Remote Access Policy Wizard—Policy Conditions Page

6. On the **Policy Conditions** page, configure how IAS matches authentication requests to this policy. Click **Add** to set up your first condition.



Select the type of attribute to add, and then click the Add button.

Attribute types:

Name	Description
Called-Station-Id	Specifies the phone number dialed by the us
Calling-Station-Id	Specifies the phone number from which the c
Client-Friendly-Name	Specifies the friendly name for the RADIUS c
Client-IP-Address	Specifies the IP address of the RADIUS clier
Client-Vendor	Specifies the manufacturer of the RADIUS pı
Day-And-Time-Restric...	Specifies the time periods and days of week
Framed-Protocol	Specifies the protocol that is used.
MS-RAS-Vendor	Description not yet defined
NAS-Identifier	Specifies the string that identifies the NAS th.
NAS-IP-Address	Specifies the IP address of the NAS where tł
NAS-Port-Type	Specifies the type of physical port that is use
Service-Type	Specifies the type of service that the user ha
Tunnel-Type	Specifies the tunneling protocols used.
Windows-Groups	Specifies the Windows groups that the user t

Figure 3-33. New Remote Access Policy Wizard—Select Attribute Window

7. In the **Select Attribute** window, select the attribute for the condition against which you want the policy to match requests. (Refer to Table 3-6.) In this example, you want the policy to apply to all requests from members of the Faculty group, so you select **Windows-Groups**.

Table 3-6. Conditions for Remote Access Policies

Condition	Attribute	Possible Values
Access method (Ethernet, wireless, and so forth)	NAS-Port-Type	• Ethernet • Wireless — IEEE 802.11 • Virtual (VPN)
Group membership	Windows-Group	Name of group in Active Directory
Location (by switch or AP)	NAS-Identifier or NAS-IP-Address	IP address
Time	Day-and-Time-Restriction	Day of the week Permitted or denied time periods

8. Click **Add**. A window is displayed that lets you select the value for the condition attribute. In this example, the **Groups** window is displayed.

9. Click **Add**.

10. In the **Select Groups** window, make sure that **From this location** displays the name of your domain.

11. In the **Enter the object names to select** box, type the name of the Windows group to which you want to apply the policy. In this example: **Faculty**.

12. Click **Check Names** to verify that you have typed the name correctly. If the group name is valid, it is underlined.

13. Click **OK**.

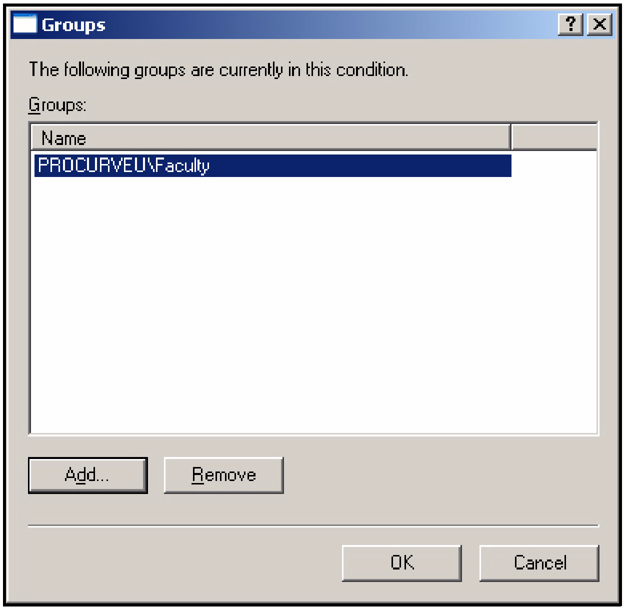
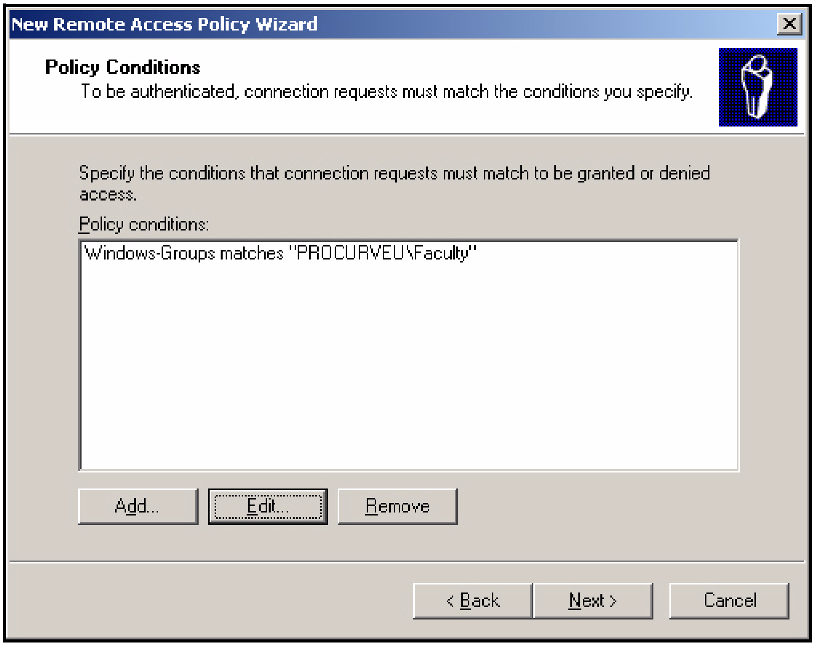


Figure 3-34. New Remote Access Policy Wizard—Groups Window

14. Click **Add** to add another group to the condition or click **OK** if this is the only group to which this policy applies. For the example network, click **OK.**



New Remote Access Policy Wizard

Policy Conditions
To be authenticated, connection requests must match the conditions you specify.

Specify the conditions that connection requests must match to be granted or denied access.

Policy conditions:

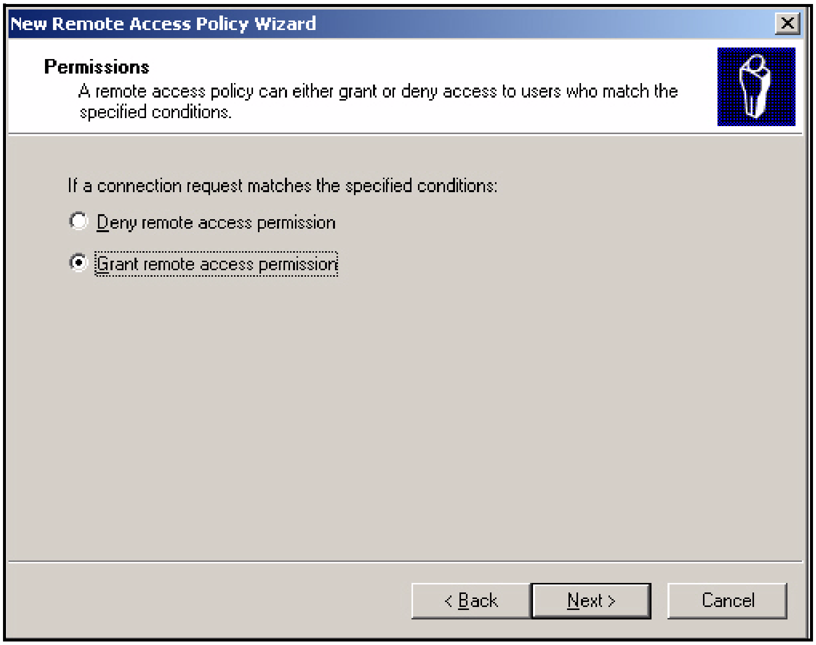
Windows-Groups matches "PROCURVEU\Faculty"

Figure 3-35. New Remote Access Policy Wizard—Policy Conditions Page

15. Click **Add** to add another policy to the condition or click **Next** if you have finished setting conditions.

    In this example, faculty members receive the same level of access no matter the time nor place, so you are finished setting conditions. Click **Next**.

16. On the **Permissions** page, select **Grant remote access permission**.



New Remote Access Policy Wizard

Permissions

A remote access policy can either grant or deny access to users who match the specified conditions.

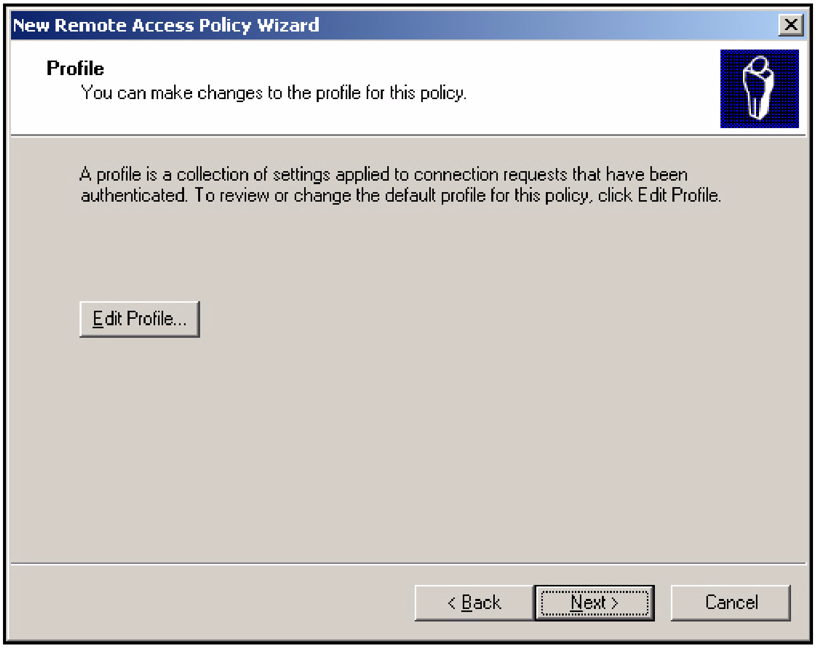
If a connection request matches the specified conditions:

○ Deny remote access permission

● Grant remote access permission

Figure 3-36. New Remote Access Policy Wizard—Permissions Page

17. Click **Next**.

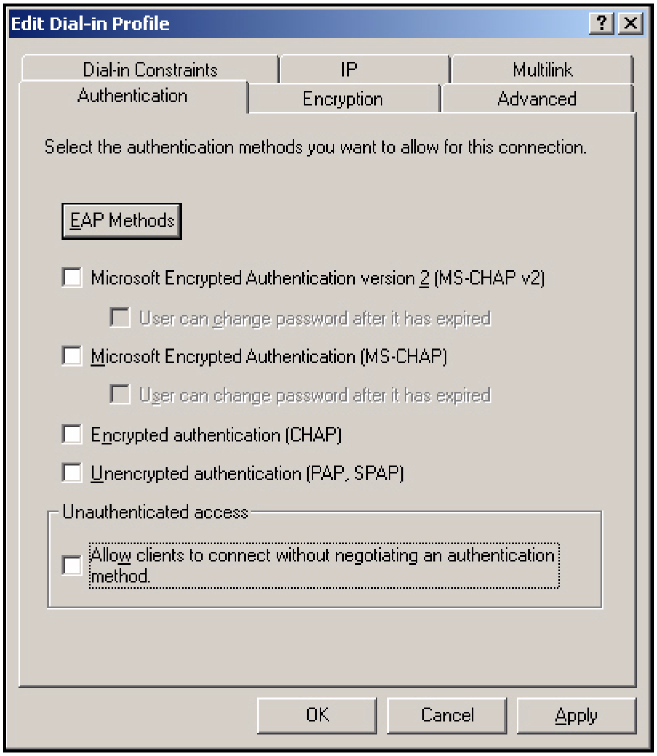

New Remote Access Policy Wizard

Profile
You can make changes to the profile for this policy.

A profile is a collection of settings applied to connection requests that have been authenticated. To review or change the default profile for this policy, click Edit Profile.

Figure 3-37. New Remote Access Policy Wizard—Profile Page

18. Click **Edit Profile**. The **Edit Dial-in Profile** window is displayed.



Select the authentication methods you want to allow for this connection.

□ Microsoft Encrypted Authentication version 2 (MS-CHAP v2)

□ User can change password after it has expired

□ Microsoft Encrypted Authentication (MS-CHAP)

□ User can change password after it has expired

□ Encrypted authentication (CHAP)

□ Unencrypted authentication (PAP, SPAP)

□ Allow clients to connect without negotiating an authentication method.

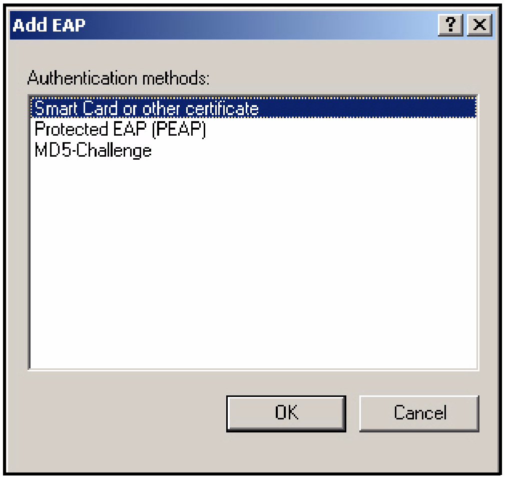
Figure 3-38. New Remote Access Policy Wizard—Edit Dial-in Profile > Authentication Tab

19. Click the **Authentication** tab.

20. Select and clear check boxes to choose the authentication protocols that you want to allow.

    In this example, the PCU network enforces 802.1X authentication, so you must choose an EAP method. Click **EAP Methods**.

21. In the **Select EAP Providers** window, click **Add**.



Add EAP

Authentication methods:

Smart Card or other certificate
Protected EAP (PEAP)
MD5-Challenge

Figure 3-39. New Remote Access Policy Wizard— Add EAP Window

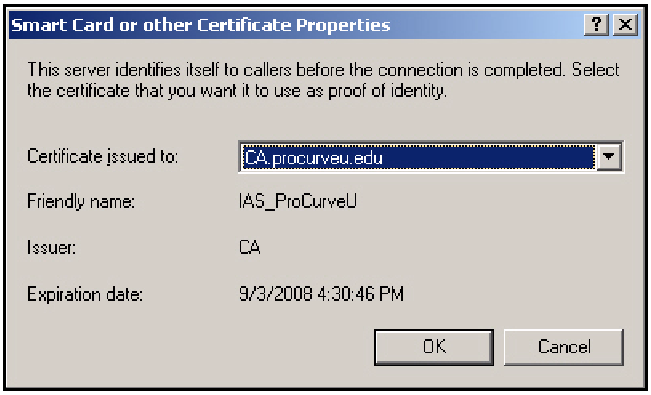
22. In the **Add EAP** window, select your method.

    In this example, the network has a PKI, so you select **Smart Card or other certificate** for EAP-TLS.

Note

You can repeat steps 21 and 22 to select multiple methods.

23. In the **Select EAP Providers** window, click **Edit**.



Smart Card or other Certificate Properties

This server identifies itself to callers before the connection is completed. Select the certificate that you want it to use as proof of identity.

Certificate issued to: CA.procurveu.edu

Friendly name: IAS_ProCurveU

Issuer: CA

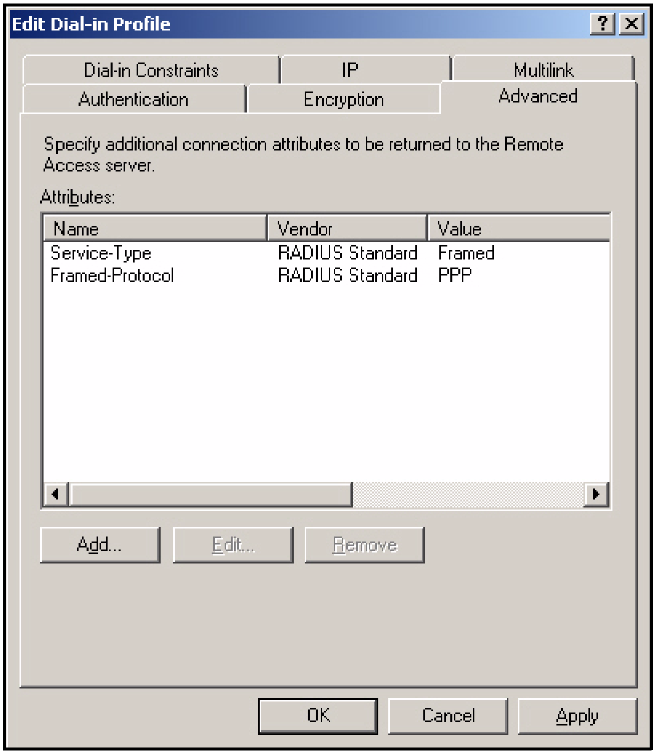
Expiration date: 9/3/2008 4:30:46 PM

Figure 3-40. New Remote Access Policy Wizard—Smart Card or other Certificate Properties Window

24. Select the certificate that you requested and installed for IAS in “Install a Certificate on the IAS Server” on page 3-21. Click **OK**.

25. Click **OK** and then **OK** again to return to the **Edit Dial-in Profile** window.

26. Next, create the dynamic VLAN assignment for users granted access by this policy. Click the **Advanced** tab.



Edit Dial-in Profile

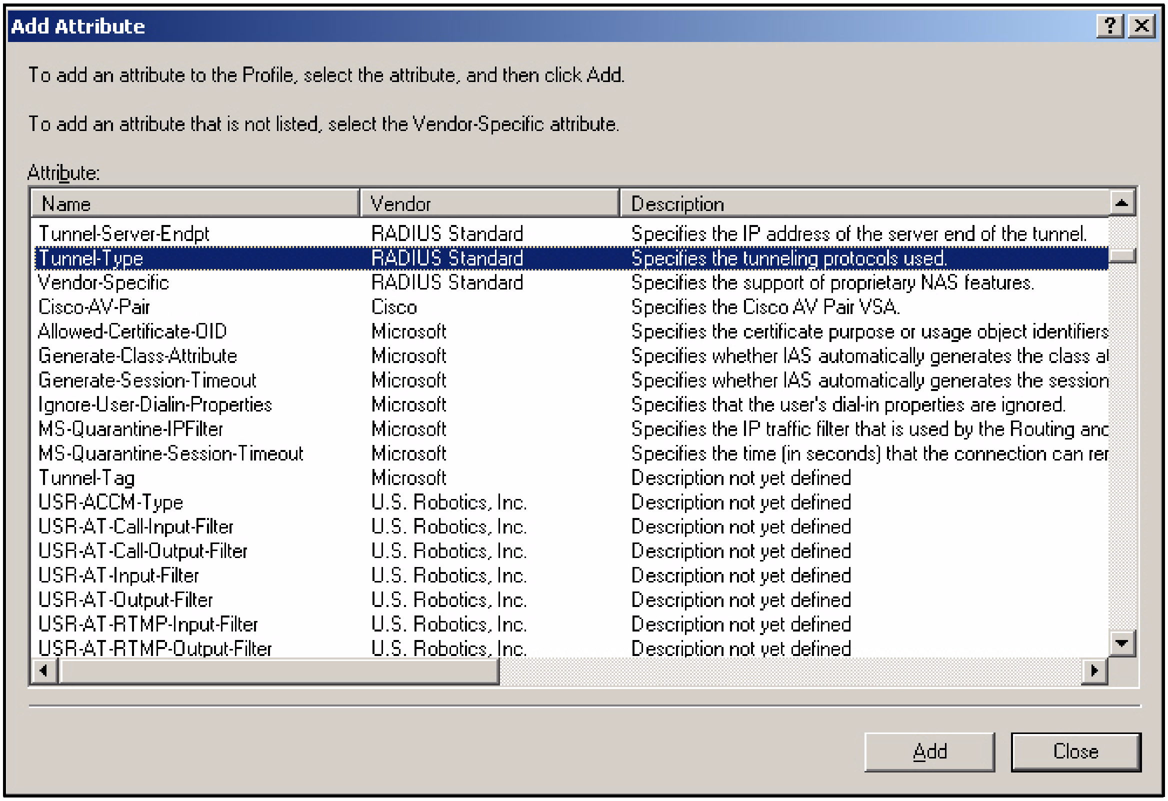
Specify additional connection attributes to be returned to the Remote Access server.

Attributes:

Name	Vendor	Value
Service-Type	RADIUS Standard	Framed
Framed-Protocol	RADIUS Standard	PPP

Figure 3-41. New Remote Access Policy Wizard—Edit Dial-in Profile > Advanced Tab

27. Click **Add**.



Add Attribute

To add an attribute to the Profile, select the attribute, and then click Add.

To add an attribute that is not listed, select the Vendor-Specific attribute.

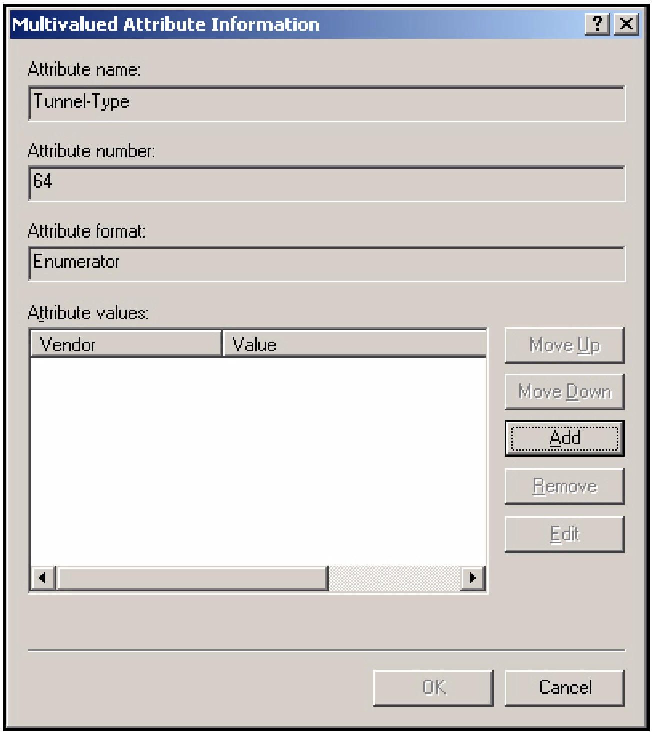
Attribute:

Name	Vendor	Description
Tunnel-Server-Endpt	RADIUS Standard	Specifies the IP address of the server end of the tunnel.
Tunnel-Type	RADIUS Standard	Specifies the tunneling protocols used.
Vendor-Specific	RADIUS Standard	Specifies the support of proprietary NAS features.
Cisco-AV-Pair	Cisco	Specifies the Cisco AV Pair VSA.
Allowed-Certificate-OID	Microsoft	Specifies the certificate purpose or usage object identifiers
Generate-Class-Attribute	Microsoft	Specifies whether IAS automatically generates the class at
Generate-Session-Timeout	Microsoft	Specifies whether IAS automatically generates the session
Ignore-User-Dialin-Properties	Microsoft	Specifies that the user's dial-in properties are ignored.
MS-Quarantine-IPFilter	Microsoft	Specifies the IP traffic filter that is used by the Routing anc
MS-Quarantine-Session-Timeout	Microsoft	Specifies the time (in seconds) that the connection can rer
Tunnel-Tag	Microsoft	Description not yet defined
USR-ACCM-Type	U.S. Robotics, Inc.	Description not yet defined
USR-AT-Call-Input-Filter	U.S. Robotics, Inc.	Description not yet defined
USR-AT-Call-Output-Filter	U.S. Robotics, Inc.	Description not yet defined
USR-AT-Input-Filter	U.S. Robotics, Inc.	Description not yet defined
USR-AT-Output-Filter	U.S. Robotics, Inc.	Description not yet defined
USR-AT-RTMP-Input-Filter	U.S. Robotics, Inc.	Description not yet defined
USR-AT-RTMP-Output-Filter	U.S. Robotics, Inc.	Description not yet defined

Figure 3-42. New Remote Access Policy Wizard—Add Attribute Window

28. From the **Add Attribute** list, select **Tunnel-Type** and click **Add**.

    Originally, the Tunnel-Type attribute specified the tunneling protocol used for remote access. In this case, however, the “tunnel” will be a VLAN.



Multivalued Attribute Information

Attribute name: Tunnel-Type

Attribute number: 64

Attribute format: Enumerator

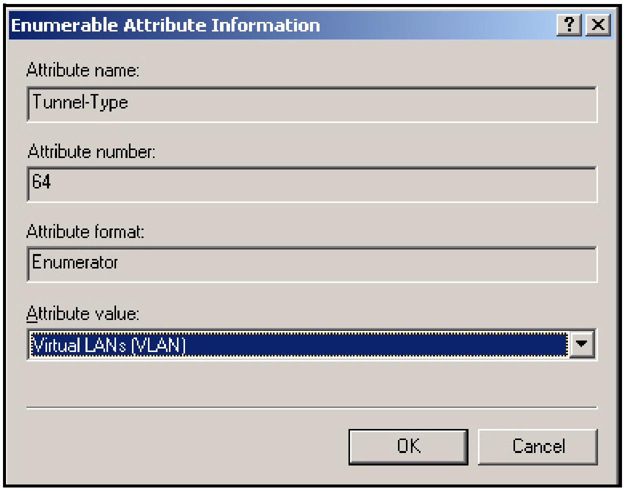
Attribute values:

Vendor	Value

Figure 3-43. New Remote Access Policy Wizard—Multivalued Attribute Information Window

29. In the **Multivalued Attribute Information** window, click **Add**.

30. In the **Enumerable Attribute Information** window, select **Virtual LANs (VLAN)**.



Enumerable Attribute Information

Attribute name:
Tunnel-Type

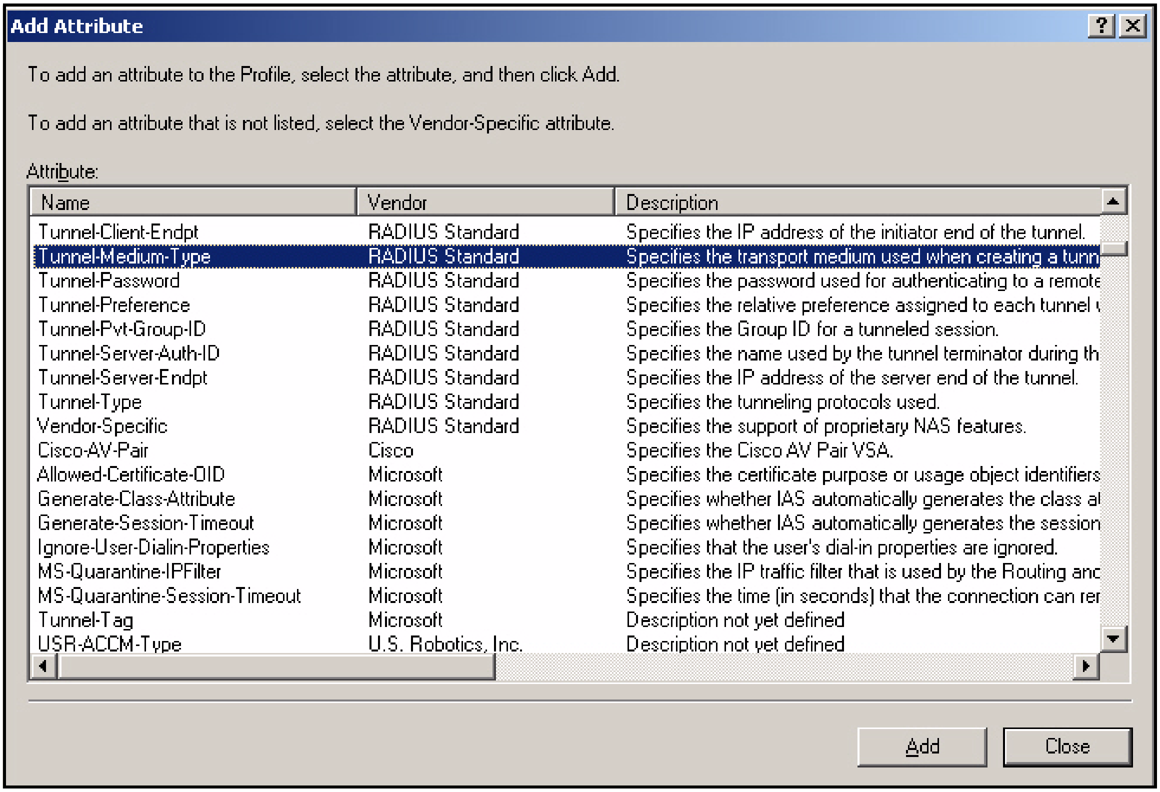
Attribute number:
64

Attribute format:
Enumerator

Attribute value:
Virtual LANs (VLAN)

Figure 3-44. New Remote Access Policy Wizard—Enumerable Attribute Information Window

31. Click **OK** and then **OK** again to return to the **Add Attribute** window.



To add an attribute to the Profile, select the attribute, and then click Add.

To add an attribute that is not listed, select the Vendor-Specific attribute.

Attribute:

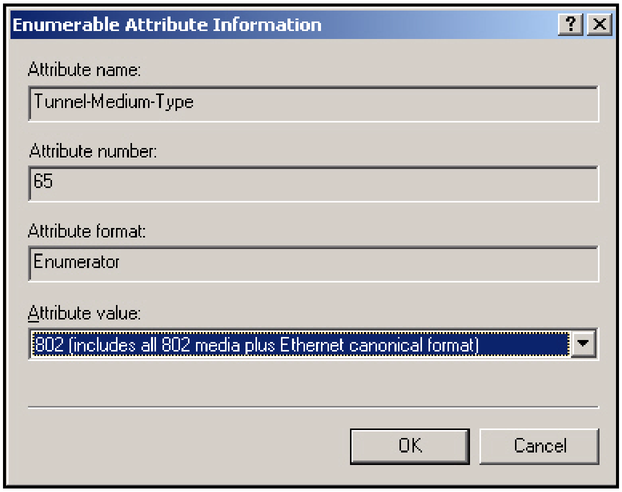
Name	Vendor	Description
Tunnel-Client-Endpt	RADIUS Standard	Specifies the IP address of the initiator end of the tunnel.
Tunnel-Medium-Type	RADIUS Standard	Specifies the transport medium used when creating a tunn
Tunnel-Password	RADIUS Standard	Specifies the password used for authenticating to a remote
Tunnel-Preference	RADIUS Standard	Specifies the relative preference assigned to each tunnel v
Tunnel-Pvt-Group-ID	RADIUS Standard	Specifies the Group ID for a tunneled session.
Tunnel-Server-Auth-ID	RADIUS Standard	Specifies the name used by the tunnel terminator during th
Tunnel-Server-Endpt	RADIUS Standard	Specifies the IP address of the server end of the tunnel.
Tunnel-Type	RADIUS Standard	Specifies the tunneling protocols used.
Vendor-Specific	RADIUS Standard	Specifies the support of proprietary NAS features.
Cisco-AV-Pair	Cisco	Specifies the Cisco AV Pair VSA.
Allowed-Certificate-OID	Microsoft	Specifies the certificate purpose or usage object identifiers
Generate-Class-Attribute	Microsoft	Specifies whether IAS automatically generates the class at
Generate-Session-Timeout	Microsoft	Specifies whether IAS automatically generates the session
Ignore-User-Dialin-Properties	Microsoft	Specifies that the user's dial-in properties are ignored.
MS-Quarantine-IPFilter	Microsoft	Specifies the IP traffic filter that is used by the Routing anc
MS-Quarantine-Session-Timeout	Microsoft	Specifies the time (in seconds) that the connection can rer
Tunnel-Tag	Microsoft	Description not yet defined
USR-ACCM-Type	U.S. Robotics, Inc.	Description not yet defined

Figure 3-45. New Remote Access Policy Wizard—Add Attribute Window

32. In the **Add Attribute** window, select **Tunnel-Medium-Type** and click **Add**.

    The Tunnel-Medium-Type attribute specifies the medium for the connection—in this case, you'll choose **802** for Ethernet.

33. In the **Multivalued Attribute Information** window, click **Add**.



Attribute name:
Tunnel-Medium-Type

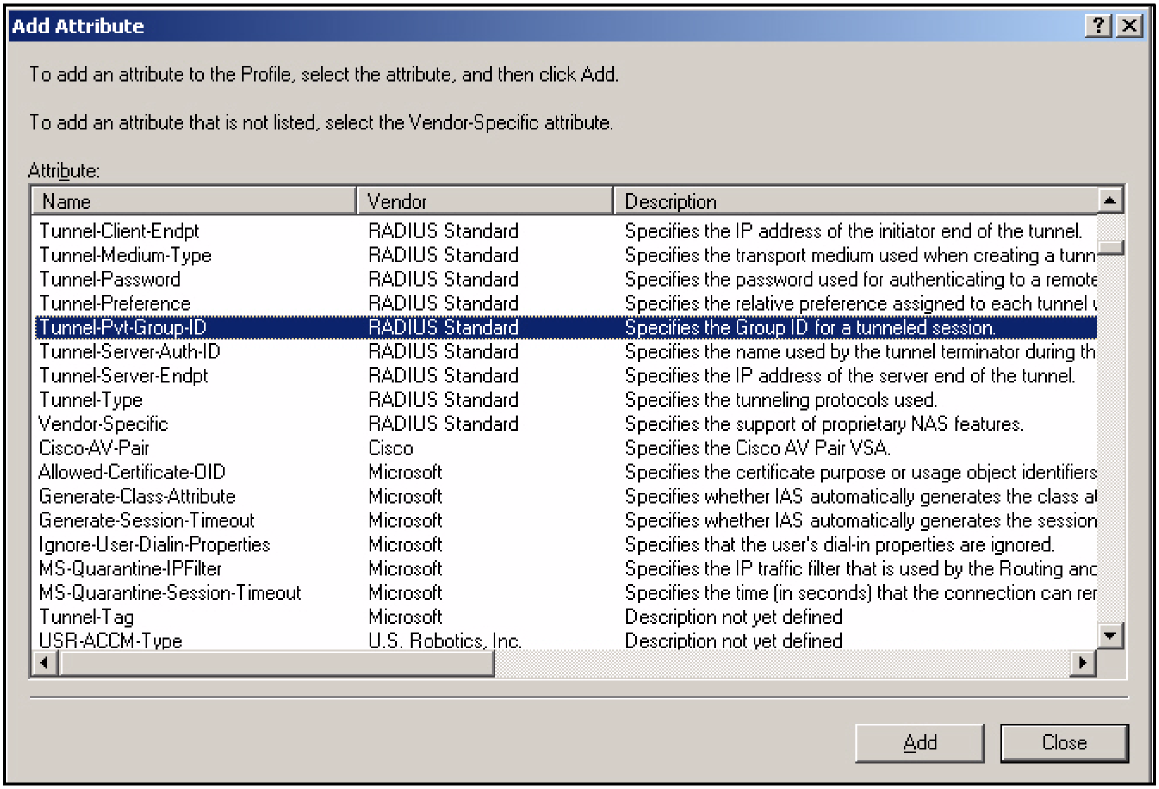
Attribute number:
65

Attribute format:
Enumerator

Attribute value:
802 (includes all 802 media plus Ethernet canonical format)

Figure 3-46. New Remote Access Policy Wizard—Enumerable Attribute Information Window

34. Select **802**.
35. Click **OK** and then **OK** again to return to the **Add Attribute** window.



To add an attribute to the Profile, select the attribute, and then click Add.

To add an attribute that is not listed, select the Vendor-Specific attribute.

Attribute:

Name	Vendor	Description
Tunnel-Client-Endpt	RADIUS Standard	Specifies the IP address of the initiator end of the tunnel.
Tunnel-Medium-Type	RADIUS Standard	Specifies the transport medium used when creating a tunn
Tunnel-Password	RADIUS Standard	Specifies the password used for authenticating to a remote
Tunnel-Preference	RADIUS Standard	Specifies the relative preference assigned to each tunnel v
Tunnel-Pvt-Group-ID	RADIUS Standard	Specifies the Group ID for a tunneled session.
Tunnel-Server-Auth-ID	RADIUS Standard	Specifies the name used by the tunnel terminator during th
Tunnel-Server-Endpt	RADIUS Standard	Specifies the IP address of the server end of the tunnel.
Tunnel-Type	RADIUS Standard	Specifies the tunneling protocols used.
Vendor-Specific	RADIUS Standard	Specifies the support of proprietary NAS features.
Cisco-AV-Pair	Cisco	Specifies the Cisco AV Pair VSA.
Allowed-Certificate-OID	Microsoft	Specifies the certificate purpose or usage object identifiers
Generate-Class-Attribute	Microsoft	Specifies whether IAS automatically generates the class at
Generate-Session-Timeout	Microsoft	Specifies whether IAS automatically generates the session
Ignore-User-Dialin-Properties	Microsoft	Specifies that the user's dial-in properties are ignored.
MS-Quarantine-IPFilter	Microsoft	Specifies the IP traffic filter that is used by the Routing anc
MS-Quarantine-Session-Timeout	Microsoft	Specifies the time (in seconds) that the connection can rer
Tunnel-Tag	Microsoft	Description not yet defined
USR-ACCM-Type	U.S. Robotics, Inc.	Description not yet defined

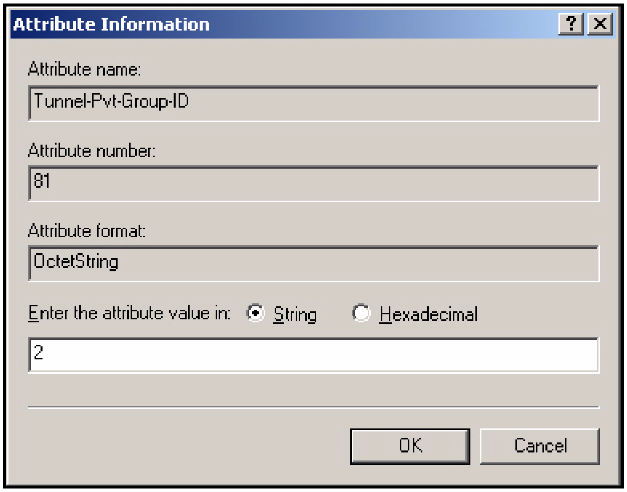
Figure 3-47. New Remote Access Policy Wizard—Add Attribute Window

The next attribute to select is **Tunnel-Pvt-Group-ID**, which specifies the dynamic VLAN ID.

36. Click **Add**.

37. In the **Multivalued Attribute Information** window, click **Add**.

38. In the **Attribute Information** window, select **String** and type the VLAN ID in the box below.



Attribute name:
Tunnel-Pvt-Group-ID

Attribute number:
81

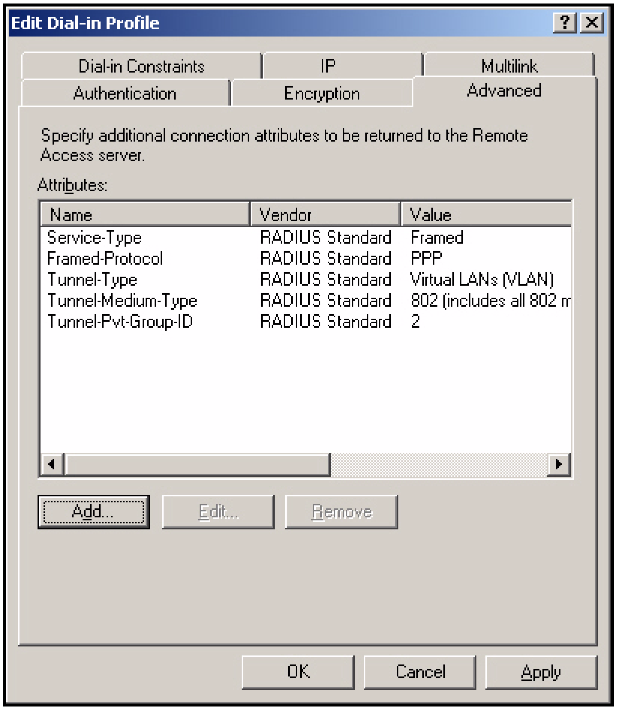
Attribute format:
OctetString

Enter the attribute value in: ● String ○ Hexadecimal

2

Figure 3-48. New Remote Access Policy Wizard—Attribute Information Window

39. Click **OK** and then **OK** again to return to the **Add Attribute** window.
40. Click **Close** on the **Add Attributes** window. Figure 3-49 shows the **Edit Dial-in Profile** window for the Faculty group in the example network.



Specify additional connection attributes to be returned to the Remote Access server.

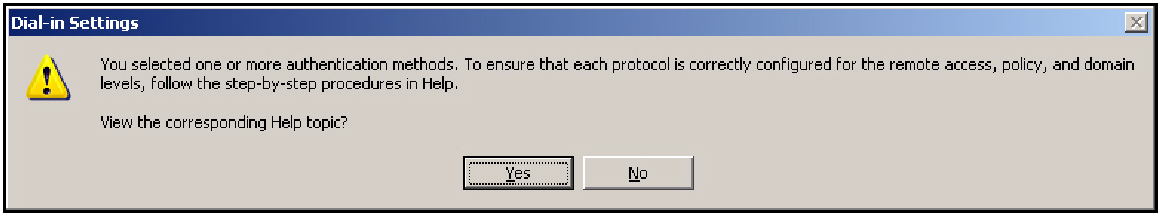
Attributes:

Name	Vendor	Value
Service-Type	RADIUS Standard	Framed
Framed-Protocol	RADIUS Standard	PPP
Tunnel-Type	RADIUS Standard	Virtual LANs (VLAN)
Tunnel-Medium-Type	RADIUS Standard	802 (includes all 802 m
Tunnel-Pvt-Group-ID	RADIUS Standard	2

Figure 3-49. New Remote Access Policy Wizard—Edit Dial-in Profile Window

41. Click **Apply** and **OK**.

    If you selected authentication protocols, the **Dial-in Settings** message is displayed.



You selected one or more authentication methods. To ensure that each protocol is correctly configured for the remote access, policy, and domain levels, follow the step-by-step procedures in Help.

View the corresponding Help topic?

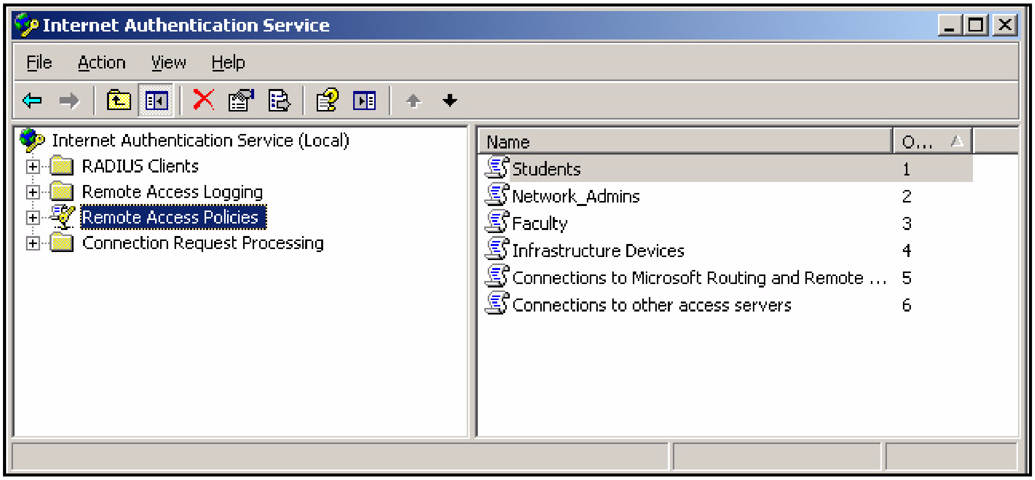
Figure 3-50. New Remote Access Policy Wizard—Dial-in Settings Message

42. Click **No**.

43. Click **Next** in the **New Remote Access Policy Wizard**.

44. Click **Finish**.

45. Click **Remote Access Policies** in the **Internet Authentication Service** window.



- Internet Authentication Service (Local)
  - RADIUS Clients
  - Remote Access Logging
  - Remote Access Policies
  - Connection Request Processing

Name	O...
Students	1
Network_Admins	2
Faculty	3
Infrastructure Devices	4
Connections to Microsoft Routing and Remote ...	5
Connections to other access servers	6

Figure 3-51. Internet Authentication Service Window

46. Verify that the new policy is listed above the default polices:

    - Connections to Microsoft Routing and Remote
    - Connections to other access servers

    If the new policy is below the default policies, select the policy name. Then click the **Order** column to move the policy up.

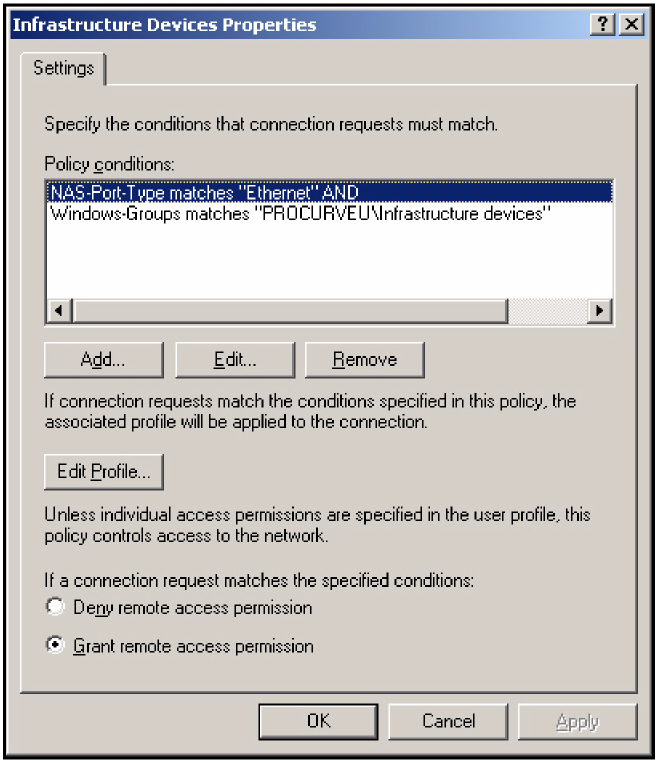
If you want, repeat these steps to create other policies. In this example, you must create four policies, one for each Windows groups to which users and devices logging in to the network belong.

Edit a Remote Access Policy

No matter how you create a policy, you might want to edit it and change conditions or alter the profile. Follow these steps:

1. In the **Internet Authentication Service** window, select **Remote Access Policies** in the left pane.

2. In the right pane, right-click the policy that you want to modify and select **Properties**.



Specify the conditions that connection requests must match.

Policy conditions:

NAS-Port-Type matches "Ethernet" AND
Windows-Groups matches "PROCURVEU\Infrastructure devices"

If connection requests match the conditions specified in this policy, the associated profile will be applied to the connection.

Unless individual access permissions are specified in the user profile, this policy controls access to the network.

If a connection request matches the specified conditions:

○ Deny remote access permission

● Grant remote access permission

Figure 3-52. *<remote access policy>* Properties Window

3. In the **Properties** window, you can alter conditions:

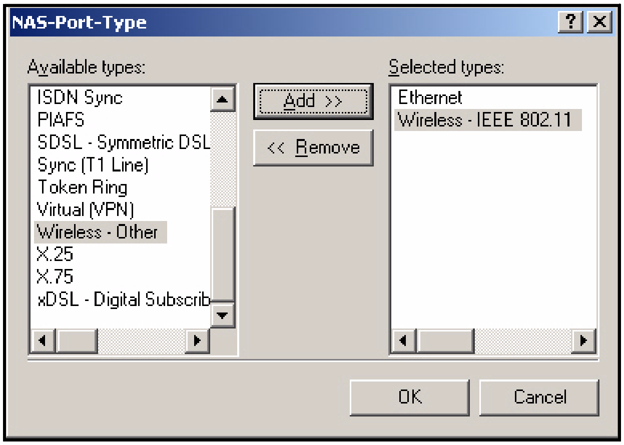
   - To add a value to an existing policy condition, select the policy condition and click **Edit**.

     For example, you might want a policy that is designed to control Ethernet access to apply to wireless access as well.

     You have two choices.

     You could select **NAS-Port-Type matches "Ethernet" AND** and click **Remove**. In this case IAS does not look at connection type when choosing a policy.

     Or you could select **NAS-Port-Type matches "Ethernet" AND** and click **Add**. The **NAS-Port-Type** window is displayed; you select the additional access method (**Wireless - IEEE 802**) and click **Add >>**.



NAS-Port-Type

Available types:

- ISDN Sync
- PIAFS
- SDSL - Symmetric DSL
- Sync (T1 Line)
- Token Ring
- Virtual (VPN)
- Wireless - Other
- X.25
- X.75
- xDSL - Digital Subscrib

Selected types:

- Ethernet
- Wireless - IEEE 802.11

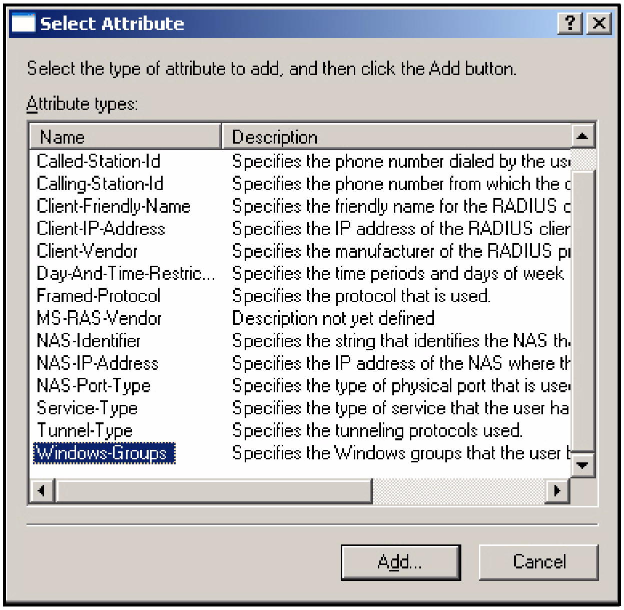
Figure 3-53. *<remote access policy>* Properties—NAS-Port-Type Window

When you have finished adding types, click **OK**.

Note

The new values are added to the condition as "OR" statements. In other words, a request can have *any* of the selected values and meet that particular condition. In this example, the request's NAS port type can be Ethernet *or* wireless 802.11.

- To add a new condition, click **Add**.



Select the type of attribute to add, and then click the Add button.

Attribute types:

Name	Description
Called-Station-Id	Specifies the phone number dialed by the us
Calling-Station-Id	Specifies the phone number from which the c
Client-Friendly-Name	Specifies the friendly name for the RADIUS c
Client-IP-Address	Specifies the IP address of the RADIUS clier
Client-Vendor	Specifies the manufacturer of the RADIUS pı
Day-And-Time-Restric...	Specifies the time periods and days of week
Framed-Protocol	Specifies the protocol that is used.
MS-RAS-Vendor	Description not yet defined
NAS-Identifier	Specifies the string that identifies the NAS th
NAS-IP-Address	Specifies the IP address of the NAS where tł
NAS-Port-Type	Specifies the type of physical port that is use
Service-Type	Specifies the type of service that the user ha
Tunnel-Type	Specifies the tunneling protocols used.
Windows-Groups	Specifies the Windows groups that the user t

Figure 3-54. *<remote access policy>* Properties—Select Attribute Window

In the **Select Attribute** window, select the attribute for the new condition. (Refer to Table 3-6.)

Table 3-7. Conditions for Remote Access Policies

Condition	Attribute
Access method (Ethernet, wireless, and so forth)	NAS-Port-Type
Group membership	Windows-Group
Location (by switch or AP)	NAS-Identifier or NAS-IP-Address
Time	Day-and-Time-Restriction

Click **Add**. A window is displayed that lets you select the value (or values) for the condition attribute. The exact steps for selecting the value depend on the condition and are beyond the scope of this guide. When you have finished configuring the condition, click **OK** to close windows until you return to the **Properties** window.

4. In the **Properties** window, click **Edit Profile**.

5. Follow the steps that begin at step 18 on page 3-50 of “Manually Create a Remote Access Policy.”

Optional Remote Access Policy for Network Administrators

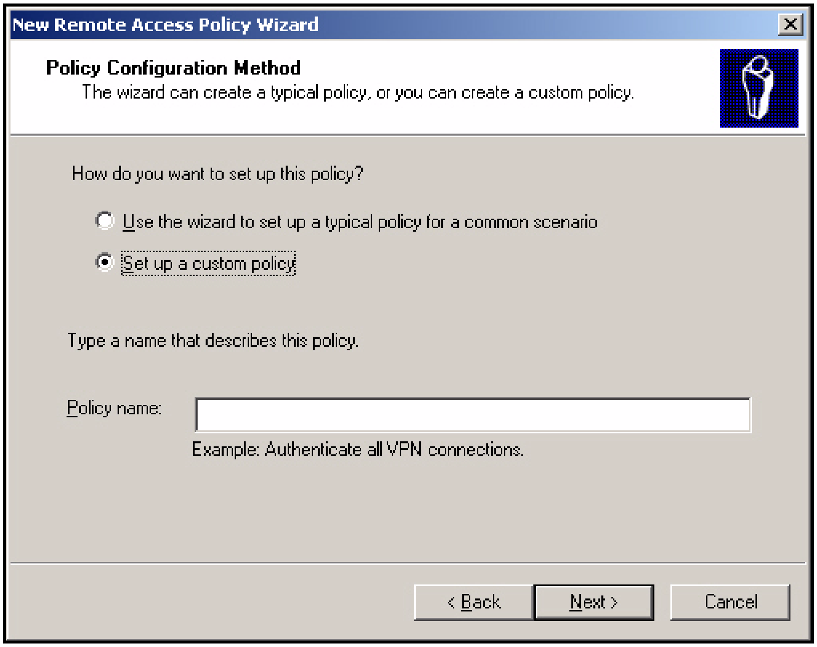
You might want to allow network administrators to use their Windows domain credentials to log in to the management interfaces of infrastructure devices. That is, when an administrator attempts to open a session with a switch and submits his or her credentials, the switch sends a RADIUS authentication request to the network server rather than checks the credentials against its local list.

The switch uses PAP, CHAP, or EAP-MD5 in the RADIUS request, so the access policy on the RADIUS server must support those methods. Because it is not generally best practice to allow EAP-MD5 in a policy for controlling users' normal network access, you should create a new policy for the network administrators.

You might also want to configure privileges for the managers in the access policy. By default, the switch logs in all authenticated network administrators with operator (read-only) privileges. To receive manager (read-write) privileges, the user must enter an additional password. However, you can enter a command on the switch (**aaa authentication login privilege-mode**) that allows the RADIUS server to assign the privileges as the user authenticates. You will learn how to specify the correct RADIUS attributes for these privileges in the access policy on IAS.

Follow these steps:

1. Access the New Remote Access Policy Wizard (right-click **Remote Access Policies** in the **Internet Authentication Service** window; select **New Remote Access Policy**.)
2. Click **Next** on the **Welcome** page.
3. Select **Set up a custom policy**.


New Remote Access Policy Wizard
Policy Configuration Method
The wizard can create a typical policy, or you can create a custom policy.
How do you want to set up this policy?

○ Use the wizard to set up a typical policy for a common scenario
● Set up a custom policy

Type a name that describes this policy.

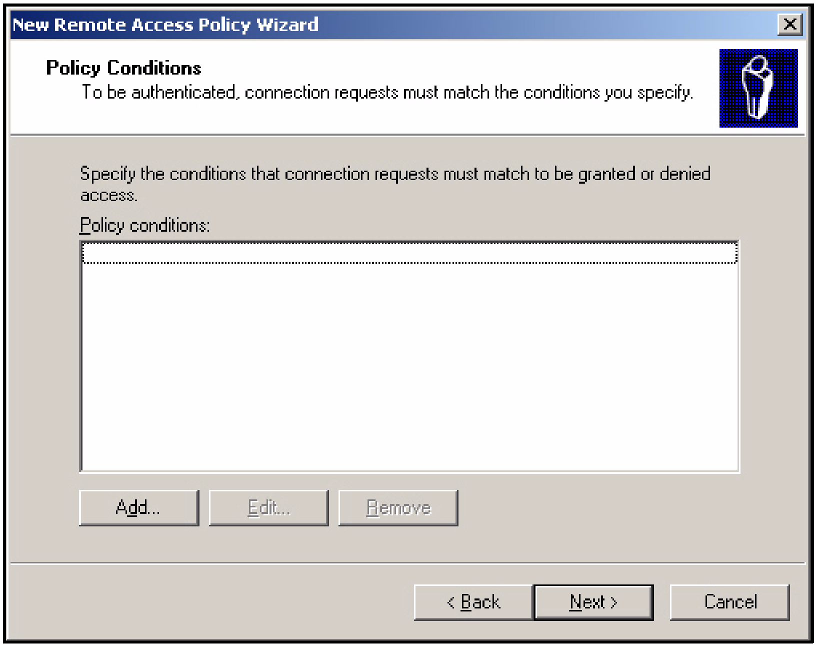
Policy name:

Example: Authenticate all VPN connections.

Figure 3-55. New Remote Access Policy Wizard—Policy Configuration Method Page

4. In the **Policy name** box, type a meaningful description for this policy. For example: **Switch_Management**.

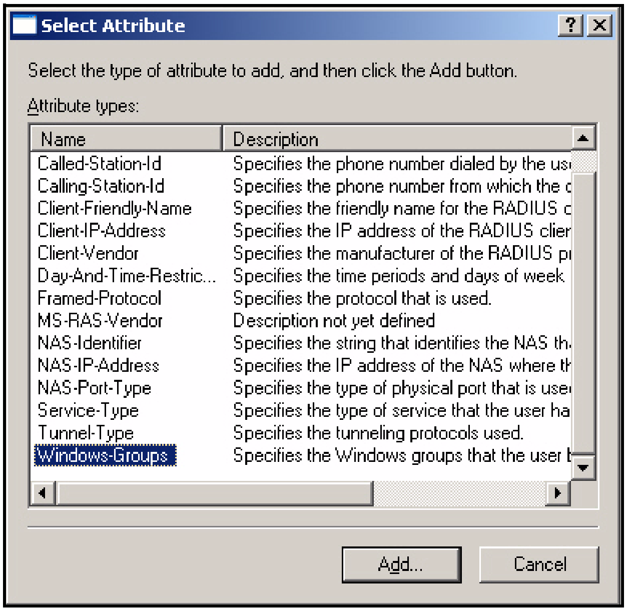
5. Click **Next**.



New Remote Access Policy Wizard
Policy Conditions
To be authenticated, connection requests must match the conditions you specify.
Specify the conditions that connection requests must match to be granted or denied access.
Policy conditions:
Add...
Edit...
Remove
< Back
Next >
Cancel

Figure 3-56. New Remote Access Policy Wizard—Policy Conditions Page

6. On the **Policy Conditions** page, click **Add**.



Select the type of attribute to add, and then click the Add button.

Attribute types:

Name	Description
Called-Station-Id	Specifies the phone number dialed by the us
Calling-Station-Id	Specifies the phone number from which the c
Client-Friendly-Name	Specifies the friendly name for the RADIUS c
Client-IP-Address	Specifies the IP address of the RADIUS clier
Client-Vendor	Specifies the manufacturer of the RADIUS pi
Day-And-Time-Restric...	Specifies the time periods and days of week
Framed-Protocol	Specifies the protocol that is used.
MS-RAS-Vendor	Description not yet defined
NAS-Identifier	Specifies the string that identifies the NAS th
NAS-IP-Address	Specifies the IP address of the NAS where th
NAS-Port-Type	Specifies the type of physical port that is use
Service-Type	Specifies the type of service that the user ha
Tunnel-Type	Specifies the tunneling protocols used.
Windows-Groups	Specifies the Windows groups that the user b

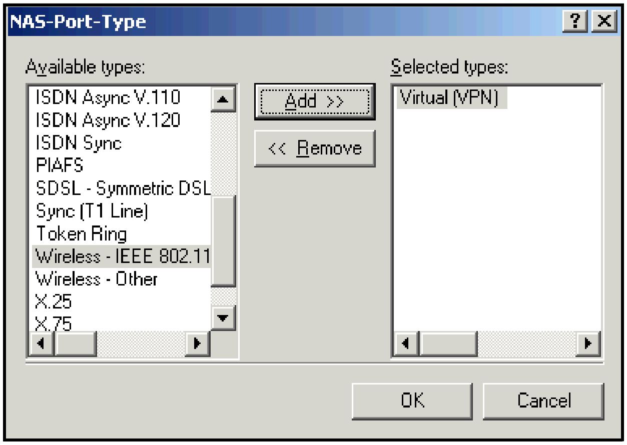
Figure 3-57. New Remote Access Policy Wizard—Select Attribute Window

7. In the **Select Attribute** window, click **NAS-Port-Type**.

8. Click **Add**.

9. When a ProCurve switch creates an authentication request for a user attempting to access its management interface, it sets the NAS-Port-Type field to **Virtual (VPN)**. Click that option in the **Available types** box.

10. Click **Add**.



NAS-Port-Type

Available types:

- ISDN Async V.110
- ISDN Async V.120
- ISDN Sync
- PIAFS
- SDSL - Symmetric DSL
- Sync (T1 Line)
- Token Ring
- Wireless - IEEE 802.11
- Wireless - Other
- X.25
- X.75

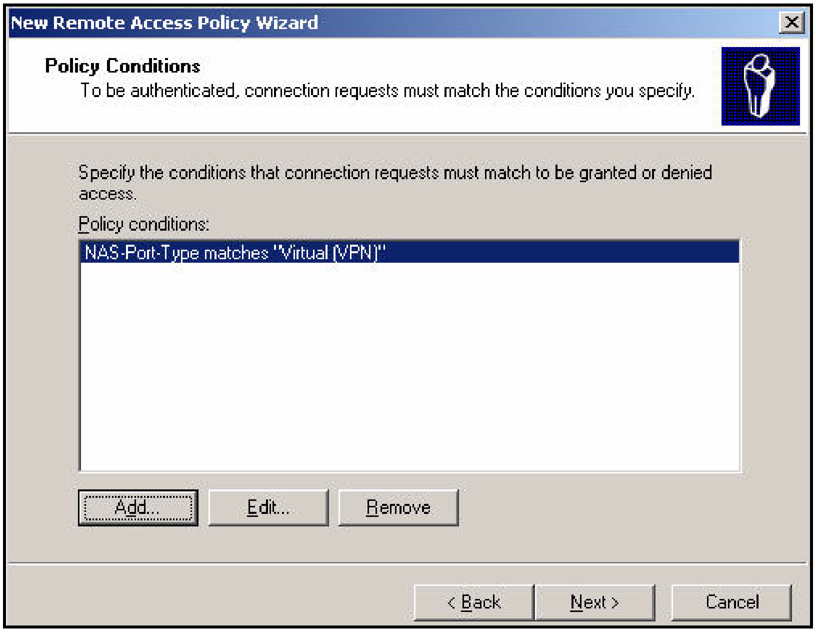
Selected types:

- Virtual (VPN)

Figure 3-58. New Remote Access Policy Wizard— NAS-Port-Type Window

11. Click **OK**.

12. The **Policy Conditions** page now lists your condition. You only want network administrators to be able to log into your devices, so you must add another condition.



New Remote Access Policy Wizard

Policy Conditions

To be authenticated, connection requests must match the conditions you specify.

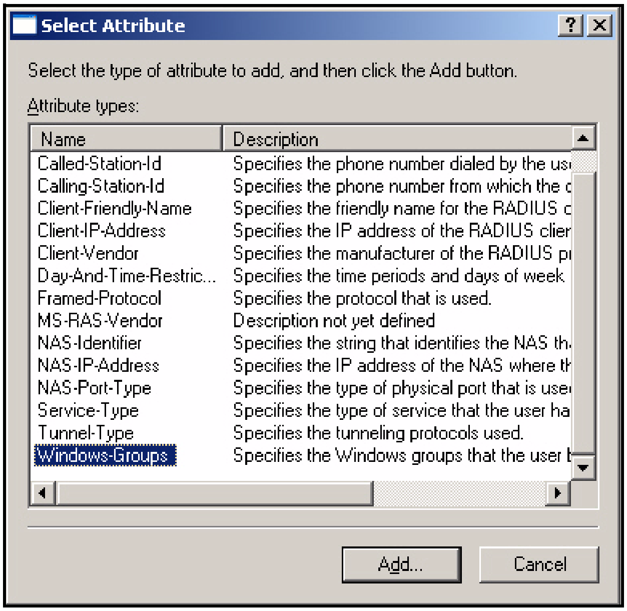
Specify the conditions that connection requests must match to be granted or denied access.

Policy conditions:

NAS-Port-Type matches "Virtual (VPN)"

Figure 3-59. New Remote Access Policy Wizard—Policy Conditions Page

13. Click **Add**.



Select Attribute

Select the type of attribute to add, and then click the Add button.

Attribute types:

Name	Description
Called-Station-Id	Specifies the phone number dialed by the us
Calling-Station-Id	Specifies the phone number from which the c
Client-Friendly-Name	Specifies the friendly name for the RADIUS c
Client-IP-Address	Specifies the IP address of the RADIUS clier
Client-Vendor	Specifies the manufacturer of the RADIUS pı
Day-And-Time-Restric...	Specifies the time periods and days of week
Framed-Protocol	Specifies the protocol that is used.
MS-RAS-Vendor	Description not yet defined
NAS-Identifier	Specifies the string that identifies the NAS th.
NAS-IP-Address	Specifies the IP address of the NAS where tł
NAS-Port-Type	Specifies the type of physical port that is use
Service-Type	Specifies the type of service that the user ha
Tunnel-Type	Specifies the tunneling protocols used.
Windows-Groups	Specifies the Windows groups that the user t

Figure 3-60. New Remote Access Policy Wizard—Select Attribute Window

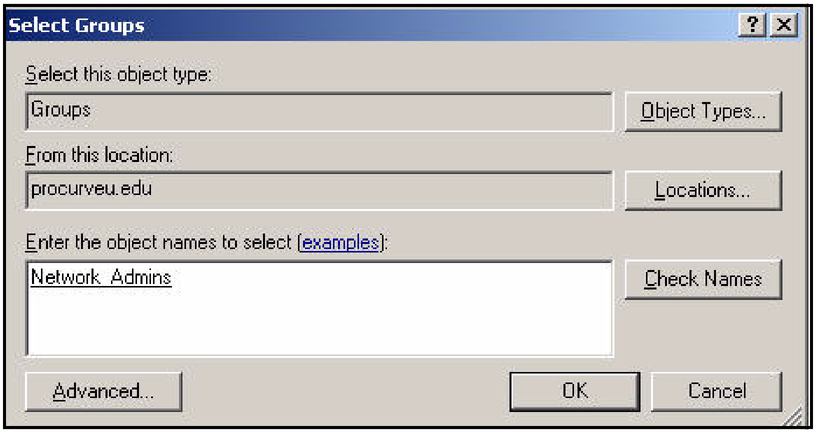
14. In the **Select Attribute** window, click **Windows-Group**.

15. Click **Add**. The **Groups** window is displayed.

16. Click **Add**.

17. In the **Enter the object names to select** box, type the name of the Windows group that includes network administrators. In this example: **Network_Admins**.

18. Click **Check Names** to verify that you have typed the name correctly. If the group name is valid, it is underlined.



Select Groups

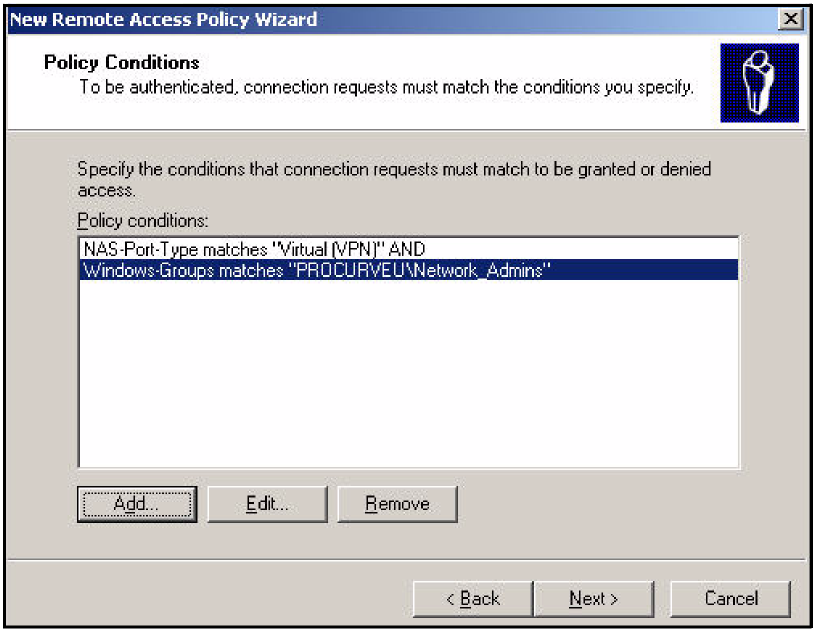
Select this object type: Groups

From this location: procurveu.edu

Enter the object names to select (examples): Network_Admins

Figure 3-61. New Remote Access Policy Wizard—Select Groups Window

19. Click **OK** and **OK** again.



New Remote Access Policy Wizard

Policy Conditions
To be authenticated, connection requests must match the conditions you specify.

Specify the conditions that connection requests must match to be granted or denied access.

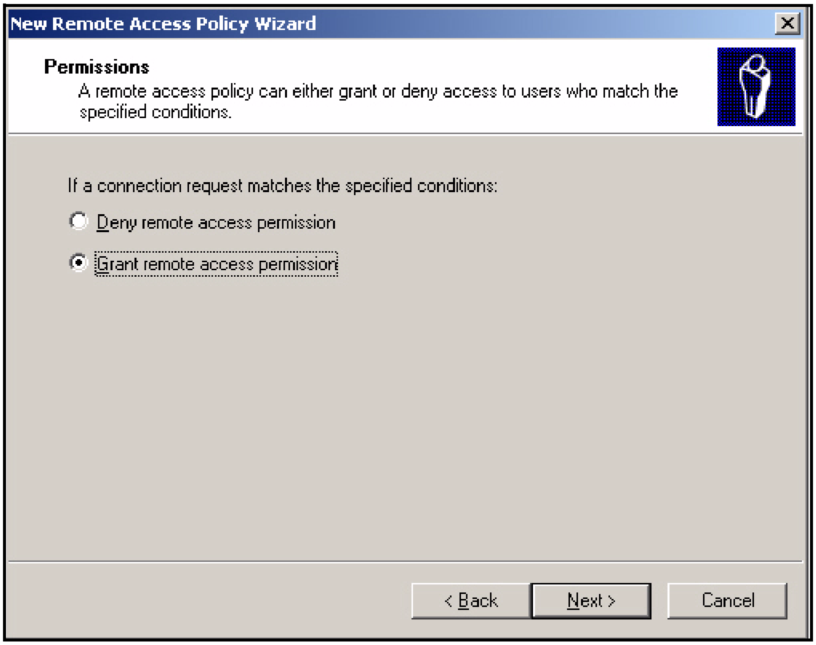
Policy conditions:

NAS-Port-Type matches "Virtual (VPN)" AND
Windows-Groups matches "PROCURVEU\Network_Admins"

Figure 3-62. New Remote Access Policy Wizard—Policy Conditions Page

20. On the **Policy Conditions** page, click **Next**.

21. On the **Permissions** page, select **Grant remote access permission**.



New Remote Access Policy Wizard

Permissions

A remote access policy can either grant or deny access to users who match the specified conditions.

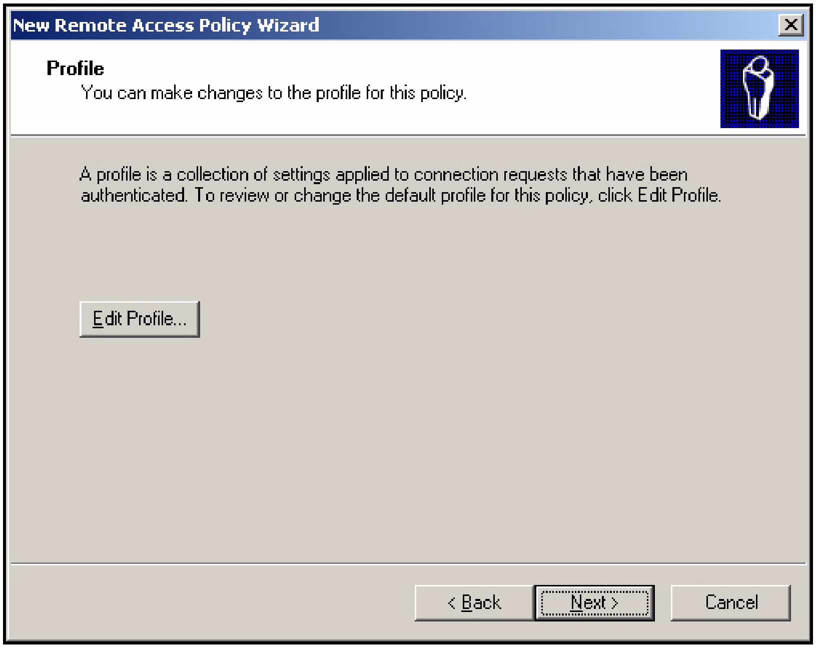
If a connection request matches the specified conditions:

○ Deny remote access permission

● Grant remote access permission

Figure 3-63. New Remote Access Policy Wizard—Permissions Page

22. Click **Next**.



New Remote Access Policy Wizard

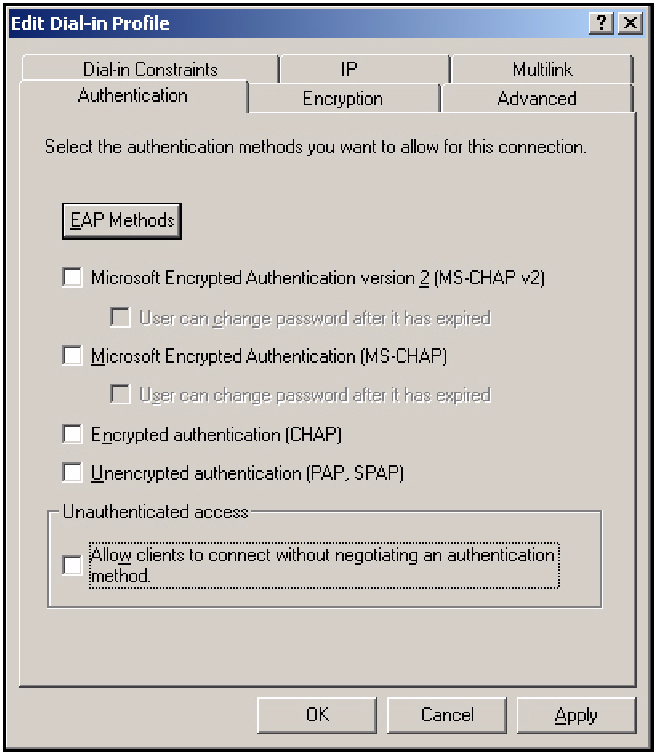
Profile

You can make changes to the profile for this policy.

A profile is a collection of settings applied to connection requests that have been authenticated. To review or change the default profile for this policy, click Edit Profile.

Figure 3-64. New Remote Access Policy Wizard—Profile Page

23. Click **Edit Profile**. The **Edit Dial-in Profile** window is displayed.



Edit Dial-in Profile

Select the authentication methods you want to allow for this connection.

□ Microsoft Encrypted Authentication version 2 (MS-CHAP v2)

□ User can change password after it has expired

□ Microsoft Encrypted Authentication (MS-CHAP)

□ User can change password after it has expired

□ Encrypted authentication (CHAP)

□ Unencrypted authentication (PAP, SPAP)

Unauthenticated access

□ Allow clients to connect without negotiating an authentication method.

Figure 3-65. Edit Dial-in Profile > Authentication Tab

24. Click the **Authentication** tab.
25. Select the **Encrypted authentication (CHAP)** and **Unencrypted authentication (PAP, SPAP)** check boxes.
26. Click **EAP Methods**.

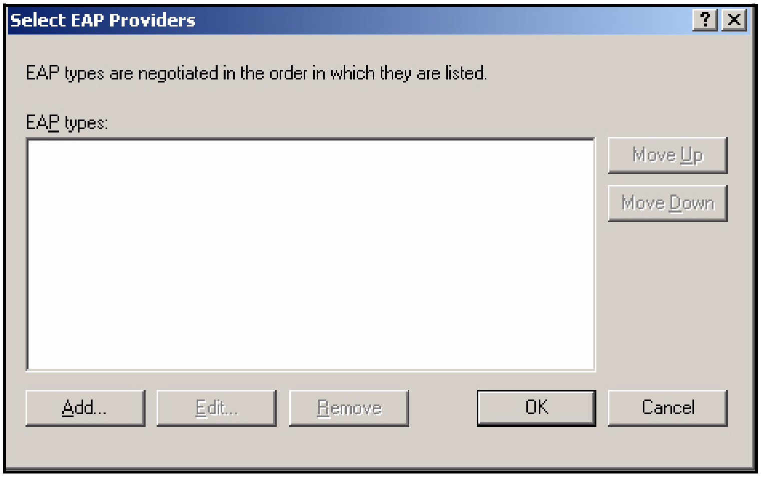


Figure 3-66. Edit Dial-in Profile—Select EAP Providers Window

27. In the **Select EAP Providers** window, click **Add**.

28. In the **Add EAP** window, click **MD5-Challenge**.

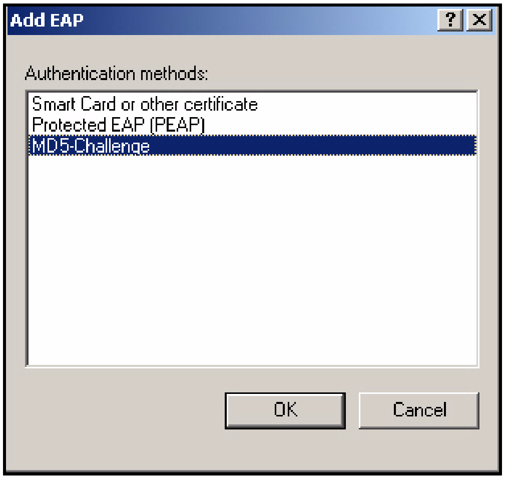
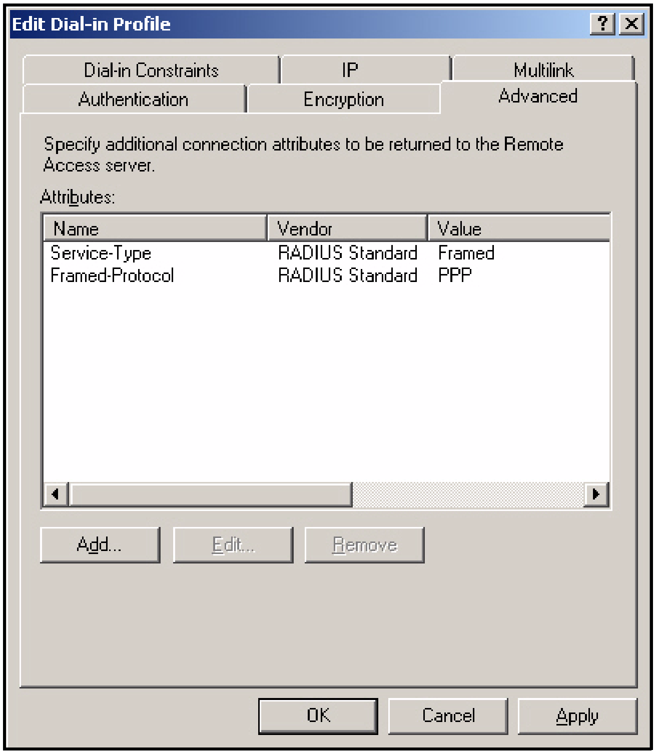


Figure 3-67. Edit Dial-in Profile—Add EAP Window

29. Click **OK** and then **OK** again to return to the **Edit Dial-in Profile** window.

30. Click the **Advanced** tab.



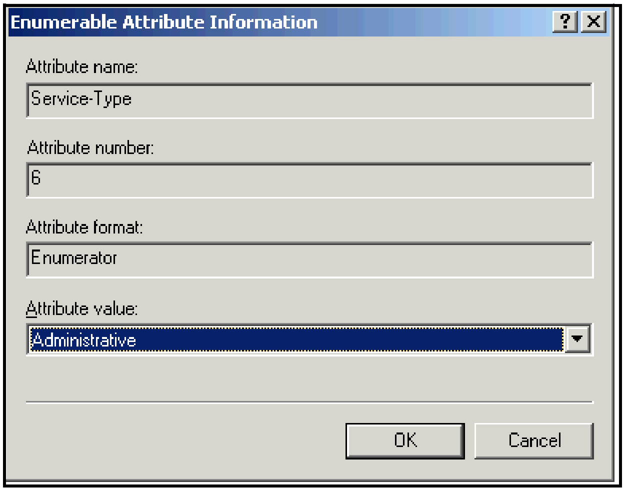
Specify additional connection attributes to be returned to the Remote Access server.

Name	Vendor	Value
Service-Type	RADIUS Standard	Framed
Framed-Protocol	RADIUS Standard	PPP

Figure 3-68. New Remote Access Policy Wizard—Edit Dial-in Profile > Advanced Tab

31. Click **Service-Type** in the **Attributes** area and click **Edit**.

32. In the **Enumerable Attribute Information** window, select an **Attribute value**. Select **Administrative** (for read-write privileges) or **NAS-Prompt** (for read-only privileges).



Enumerable Attribute Information

Attribute name: Service-Type

Attribute number: 6

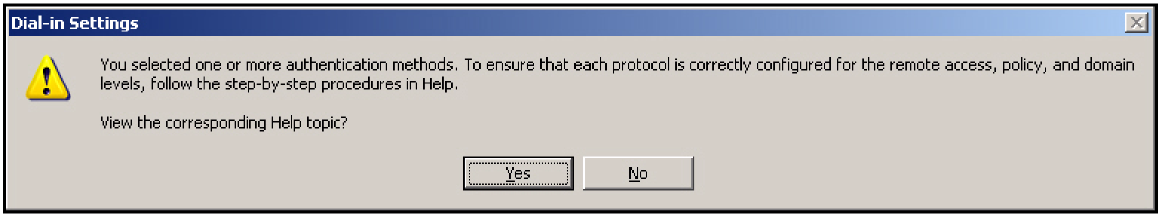
Attribute format: Enumerator

Attribute value: Administrative

Figure 3-69. New Remote Access Policy Wizard—Enumerable Attribute Information Window

33. Click **OK**.

34. Click **Apply** and **OK**.



Dial-in Settings

You selected one or more authentication methods. To ensure that each protocol is correctly configured for the remote access, policy, and domain levels, follow the step-by-step procedures in Help.

View the corresponding Help topic?

Figure 3-70. New Remote Access Policy Wizard—Dial-in Settings Message

35. In the **Dial-in Settings** window, click **No**.

36. Click **Next** in the **Profile** page.

37. Click **Finish**.

38. Click **Remote Access Policies** in the **Internet Authentication Service** window and verify that the new policy is listed above the default polices:
    - Connections to Microsoft Routing and Remote
    - Connections to other access servers

    If the new policy is below the default policies, select the policy name. Then click the **Order** column to move the policy up.

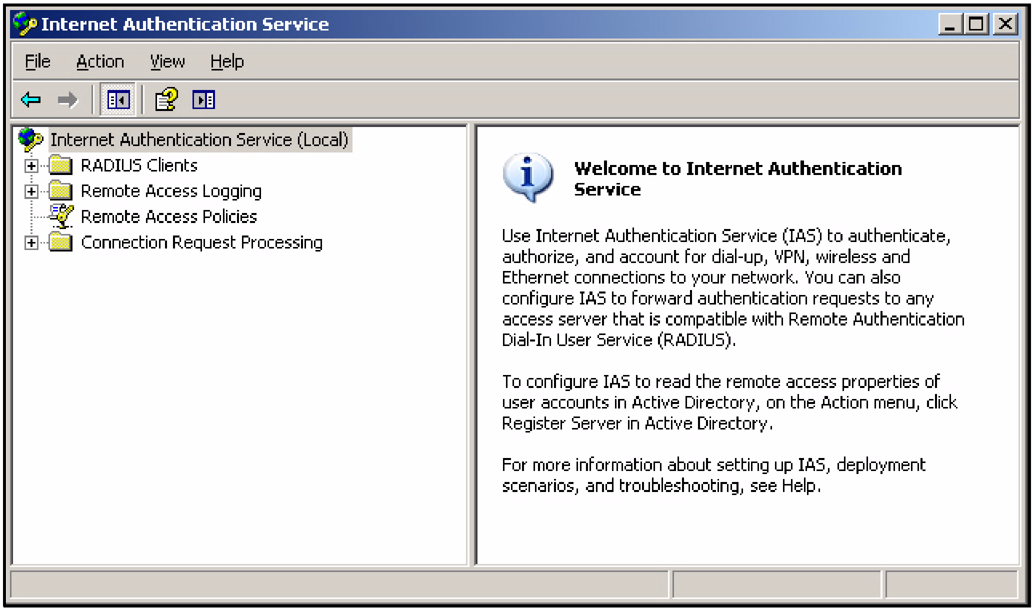
Add RADIUS Clients

You must add every NAS (switch, AP, or Wireless Edge Services Module) that enforces port authentication as a RADIUS client. You can add clients individually by DNS name or by IP address. On a Windows Server 2003 Enterprise IAS server, you can also list an entire subnet and IAS will accept requests from any device in that subnet.

In this example, you will add the Management VLAN subnet as a RADIUS client. Because the routing switch sends requests with its IP address on the IAS server's VLAN (VLAN 4), you will add a second client with that IP address (10.4.0.1).

Follow these steps:

1. In the **Start** menu, select **Administrative Tools** > **Internet Authentication Services**.


Internet Authentication Service
File
Action
View
Help
Internet Authentication Service (Local)
RADIUS Clients
Remote Access Logging
Remote Access Policies
Connection Request Processing

Welcome to Internet Authentication Service

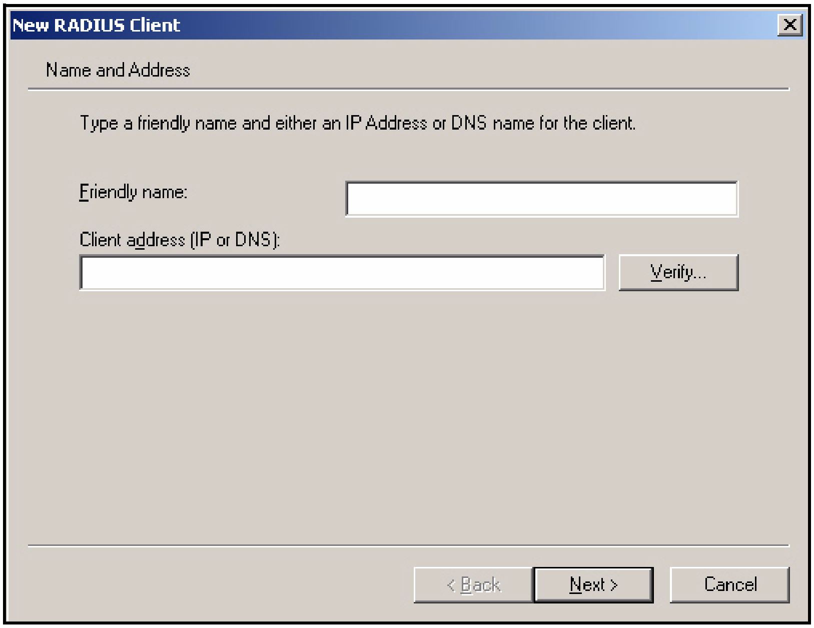
Use Internet Authentication Service (IAS) to authenticate, authorize, and account for dial-up, VPN, wireless and Ethernet connections to your network. You can also configure IAS to forward authentication requests to any access server that is compatible with Remote Authentication Dial-In User Service (RADIUS).

To configure IAS to read the remote access properties of user accounts in Active Directory, on the Action menu, click Register Server in Active Directory.

For more information about setting up IAS, deployment scenarios, and troubleshooting, see Help.

Figure 3-71. Internet Authentication Service Window

2. Right-click **RADIUS Clients**. Select **New RADIUS Client**.



New RADIUS Client

Name and Address

Type a friendly name and either an IP Address or DNS name for the client.

Friendly name:

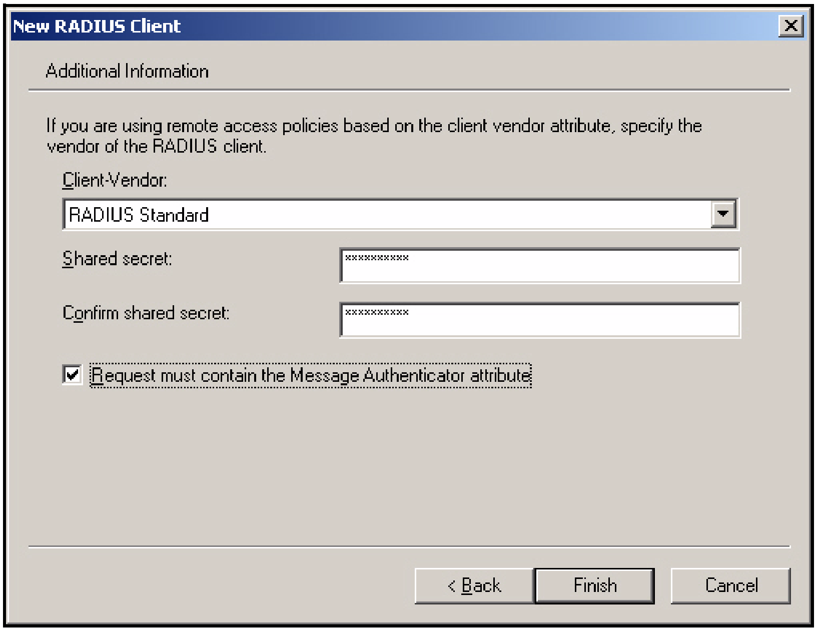
Client address (IP or DNS):

Figure 3-72. New RADIUS Client Wizard—Name and Address Page

3. On the **New RADIUS Client** page, type a descriptive name for the **Friendly name**. For example: **ManagementVLAN**.

4. Type the IP address of the management VLAN subnet in the **Client address** box. In this example: **10.2.0.0**.

5. Click **Next**.



New RADIUS Client

Additional Information

If you are using remote access policies based on the client vendor attribute, specify the vendor of the RADIUS client.

Client-Vendor: RADIUS Standard

Shared secret: ***********

Confirm shared secret: ***********

☑ Request must contain the Message Authenticator attribute

Figure 3-73. New RADIUS Client Wizard—Additional Information Page

6. Select **RADIUS Standard** from the **Client-Vendor** list.
7. Type a password in the **Shared secret** box. You must type this same password when you configure the RADIUS server on the clients. In this example: **procurve12**.

Note

The shared secret is called the key on ProCurve switches. See “Configure the ProCurve Switches” on page 3-9 for running-configs that include the shared secret.

8. Re-type the password in the **Confirm shared secret** box.
9. Select the **Request must contain the Message Authenticator attribute** check box.
10. Click **Finish**.
11. Repeat steps 2 to 10 to create another client. In this example, the client has IP address 10.7.0.1 and uses the same shared secret (procurve12).

Enable Remote Access Logging

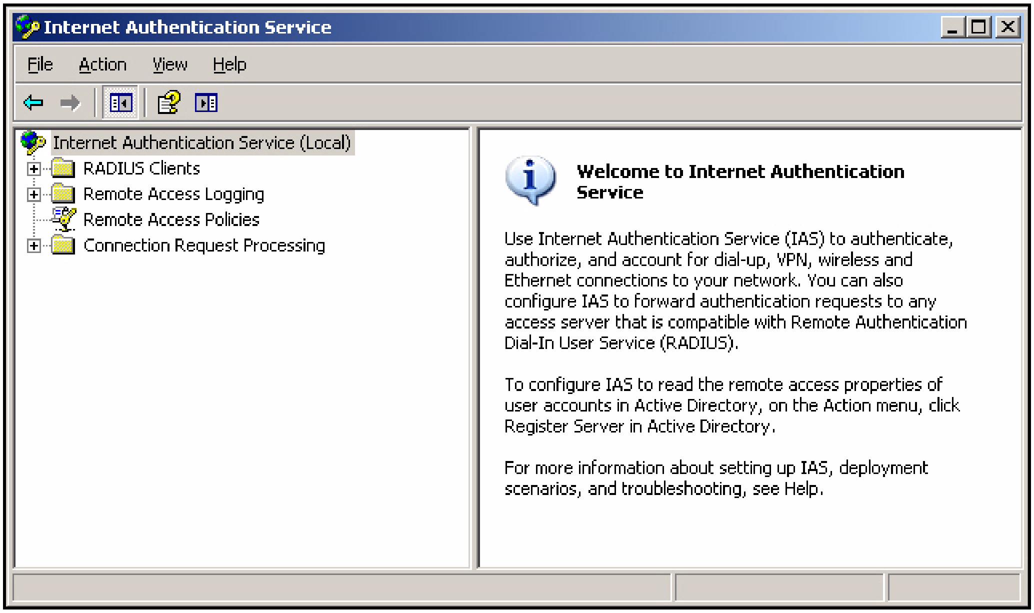
You should enable logging so that you can keep track of the users who access your system, as well as troubleshoot problems that may occur. Typically, you can accept the default properties, which are displayed in Table 3-8.

Table 3-8. Default IAS Logging Settings

Parameter	Default Setting
Log	• Accounting requests • Authentication requests • Periodic status
Local log file location	C:\\Windows\system32\LogFile
Format	IAS
Frequency for creating log files	Daily
Log files deleted when the disk is full	Enabled

To alter the logging settings, follow these steps:

1. In the **Start** menu, select **Administrative Tools** > **Internet Authentication Services**.


Internet Authentication Service
File
Action
View
Help
Internet Authentication Service (Local)
RADIUS Clients
Remote Access Logging
Remote Access Policies
Connection Request Processing

Welcome to Internet Authentication Service

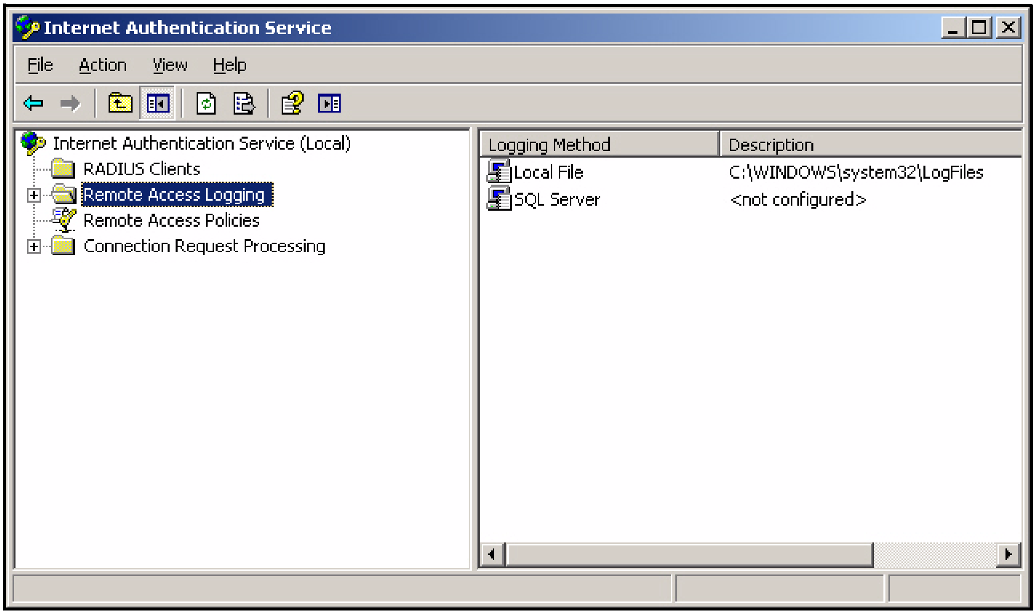
Use Internet Authentication Service (IAS) to authenticate, authorize, and account for dial-up, VPN, wireless and Ethernet connections to your network. You can also configure IAS to forward authentication requests to any access server that is compatible with Remote Authentication Dial-In User Service (RADIUS).

To configure IAS to read the remote access properties of user accounts in Active Directory, on the Action menu, click Register Server in Active Directory.

For more information about setting up IAS, deployment scenarios, and troubleshooting, see Help.

Figure 3-74. Internet Authentication Service Window

2. In the left pane, select **Remote Access Logging**.



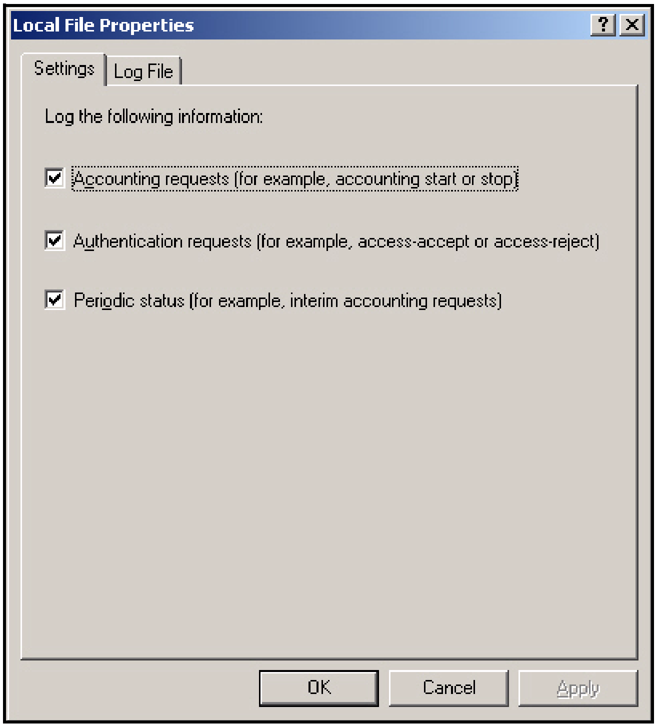
Internet Authentication Service
File Action View Help
Internet Authentication Service (Local)
RADIUS Clients
Remote Access Logging
Remote Access Policies
Connection Request Processing

Logging Method	Description
Local File	C:\WINDOWS\system32\LogFiles
SQL Server	<not configured>

Figure 3-75. Internet Authentication Service Window > Remote Access Logging

3. In the right pane, right-click **Local File**.

4. Select **Properties**.



Log the following information:

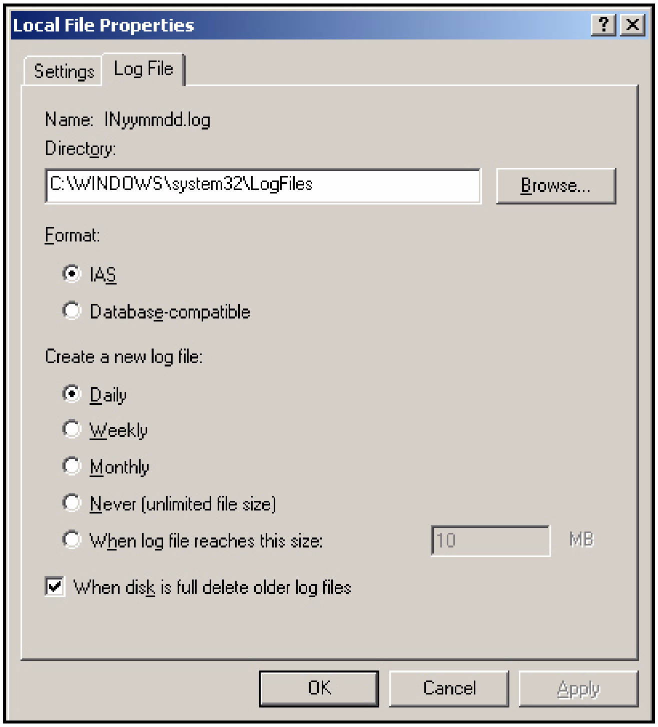
☑ Accounting requests (for example, accounting start or stop)

☑ Authentication requests (for example, access-accept or access-reject)

☑ Periodic status (for example, interim accounting requests)

Figure 3-76. Local File Properties Window > Settings Tab

5. On the **Settings** tab, select the check boxes for any of the request or status options that you are interested in logging.
6. Click the **Log File** tab.



Local File Properties

Settings | Log File

Name: INyymmdd.log

Directory: C:\WINDOWS\system32\LogFiles [Browse...]

Format:

● IAS

○ Database-compatible

Create a new log file:

● Daily

○ Weekly

○ Monthly

○ Never (unlimited file size)

○ When log file reaches this size: 10 MB

☑ When disk is full delete older log files

Figure 3-77. Local File Properties > Log File Tab

7. For the **Directory**, type (or browse for) the location where IAS should save the log files.

8. For **Format**, select **IAS**.

   If you intend to export logs to an Open Database Connectivity (ODBC)-compliant database, select **Database-compatible** instead.

9. When IAS logs an event, it adds the log to an existing log file. IAS periodically creates a new log file. Select an interval under **Create a new log file**.

10. Typically, you should leave the **When disk is full, delete older log files** check box selected.

11. Click **OK**.

Install and Configure Connectors for Endpoint Integrity with the NAC 800

You have finished configuring IAS to authenticate users. Next, enable IAS to contact the NAC 800, request endpoints' integrity posture, and place the endpoints in VLANs appropriately. You must complete these tasks:

1. Install the connector files.
2. Configure VLAN assignments for unknown, quarantined, and infected endpoints in the connector file.
3. Edit the IAS server's registry to include the .dll file.

Note These instructions apply to a solution without IDM.

Install the Connector Files

To integrate IAS with your endpoint integrity solution, the NAC 800, you must install two IAS connector files on the IAS server:

- **SAIASConnector.dll**
- **SAIASConnector.ini**

IAS calls the SAIASConnector after authenticating an endpoint and during the authorization phase. The connector contacts the NAC 800 and asks for the integrity posture of the endpoint. By default, if the endpoint has a Healthy or Check-up posture, the connector does not interfere with the attributes in the IAS remote access policy. However, if the endpoint has an Unknown, Quarantine, or Infected posture, the connector can override the IAS attributes with the attributes configured in the **SAIASConnector.ini** file.

Figure 3-78 and Figure 3-79 illustrate this process.

Note The endpoint integrity testing occurs independently from the overall authentication and authorization process. When the NAC 800 changes an endpoint's posture, it forces the NAS to reauthenticate the endpoint so that it can be reauthorized for the appropriate rights.

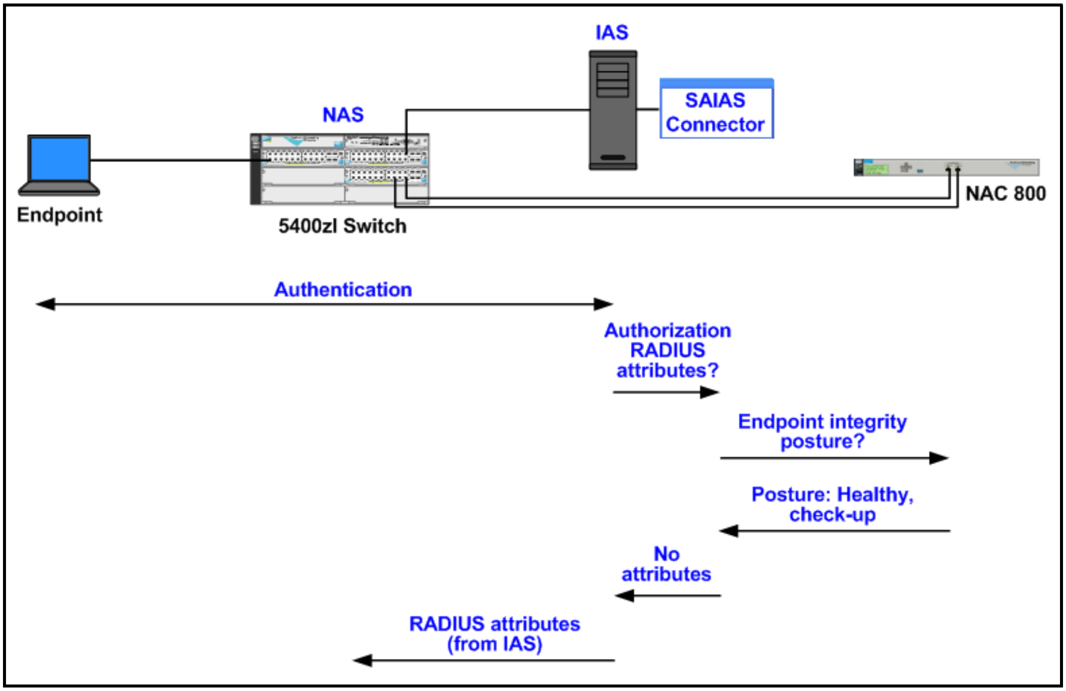

IAS
SAIAS Connector
NAS
Endpoint
5400zl Switch
NAC 800
Authentication
Authorization RADIUS attributes?
Endpoint integrity posture?
Posture: Healthy, check-up
No attributes
RADIUS attributes (from IAS)

Figure 3-78. NAC 800-to-IAS Connector—Healthy or Check-up Posture

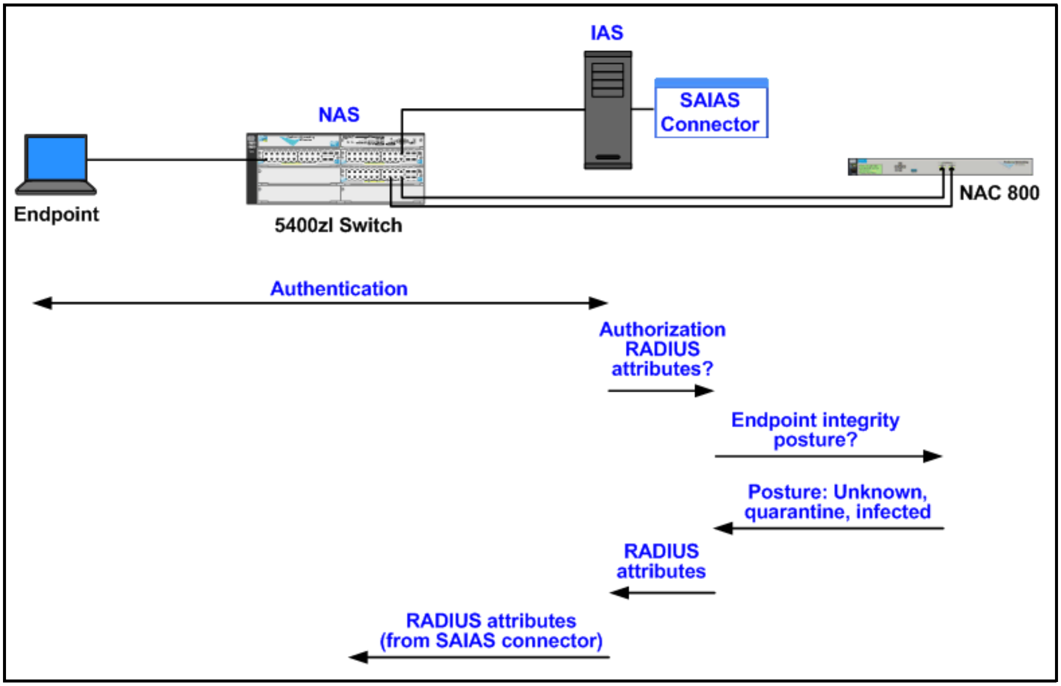

IAS
SAIAS Connector
NAS
Endpoint
5400zl Switch
NAC 800
Authentication
Authorization RADIUS attributes?
Endpoint integrity posture?
Posture: Unknown, quarantine, infected
RADIUS attributes
RADIUS attributes (from SAIAS connector)

Figure 3-79. NAC 800-to-IAS Connector—Unknown, Quarantine, or Infected Posture

Follow these steps to install and configure the connector files:

1. Download the zip file from *http://www.procurve.com/nactools/*.

   Extract the four files:

   - **SAIASConnector.dll**
   - **SAIASConnector.IDM.ini**
   - **SAIASConnector.non-IDM.ini**
   - **ProCurveNAC800Cert.cer**

2. Rename **SAIASConnector.non-IDM.ini** to **SAIASConnector.ini**.

3. Transfer the **SAIASConnector.dll** and **SAIASConnector.ini** files to the IAS server and copy them to the **WINDOWS\system32** directory.

Note

Your Windows Server 2003 directory might differ from the default (**WINDOWS**). To check your directory, type **echo %windir%** at the server's command prompt.

Configure VLAN Assignments in the SAIASConnector.ini File

You must modify the **SAIASConnector.ini** file to specify VLAN assignments for endpoints with these integrity postures:

- **Quarantined**—failed at least one test for which the penalty is quarantining (and a temporary access period, if allowed, has expired); or could not be tested (and your network quarantines untestable endpoints)
- **Infected**—infected with malware (failed the Worms, Viruses, and Trojans test)
- **Unknown**—not yet tested

In this solution, IAS, not the NAC 800, assigns VLAN assignments for endpoints with the Healthy or Check-up posture.

Follow these steps to complete the task:

1. Use a text editor to open the **SAIASConnector.ini** file.
2. By default, debugging is off. If you want the SAIASConnector to create a log file with debug messages, change the **Debug=off** line to:

   ```
   Debug=on
   ```

3. Find this section:

   ```
   [SAIASConnector-<NAS IP>]
   ```

4. Replace ***<NAS IP>*** with the IP address of the device that enforces 802.1X authentication (a switch, AP, or Wireless Edge Services Module). In this example:

   ```
   [SAIASConnector-10.2.0.5]
   ```

5. Find this line:

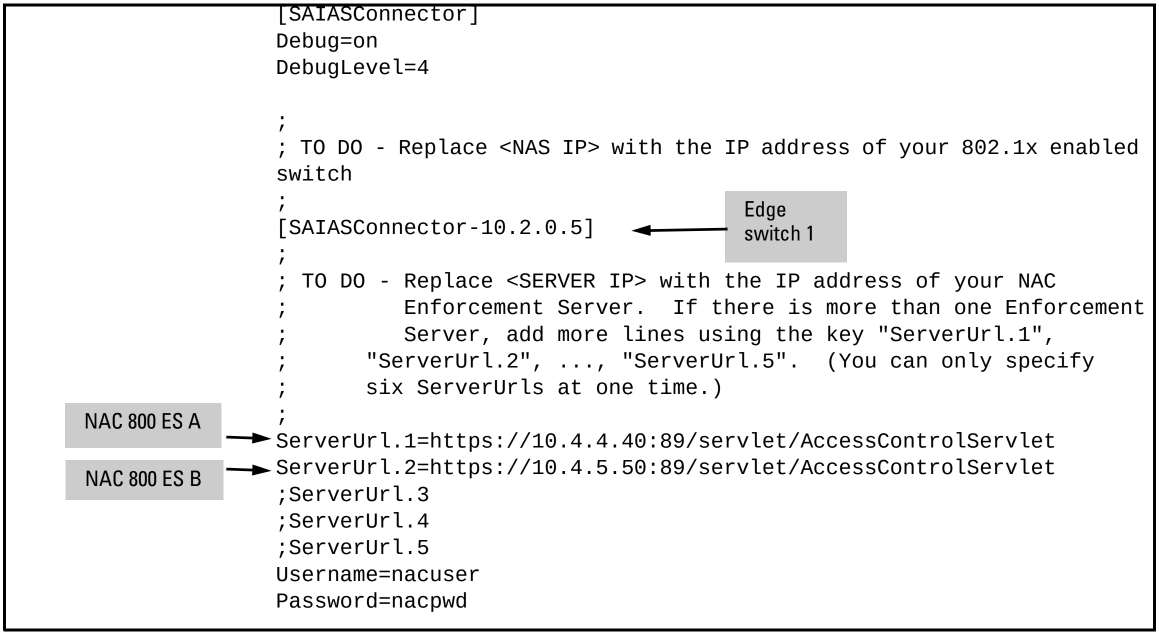
   ```
   ServerUrl=https://<SERVER IP>:89/servlet/
   AccessControlServlet
   ```

   Make sure the line is not commented. That is, there is no semi-colon (;) preceding it.

6. Replace ***<SERVER IP>*** with the IP address of one of your NAC 800 ESs. In this example:

   ```
   ServerUrl=https://10.4.4.40:89/servlet/AccessCon-
   trolServlet
   ```

7. If your cluster has multiple ESs, copy the **ServerURL** line and paste it below. In the original line, change **ServerUrl** to **ServerUrl.1**. In the new line, change **ServerUrl** to **ServerUrl.2** and replace ***<Server IP>*** with the second ES's IP address. Repeat until you have specified all of the ESs in the cluster (not MSs). For this example, see Figure 3-80:



```
[SAIASConnector]
Debug=on
DebugLevel=4

;
; TO DO - Replace <NAS IP> with the IP address of your 802.1x enabled
switch
;
[SAIASConnector-10.2.0.5]
;
; TO DO - Replace <SERVER IP> with the IP address of your NAC
;          Enforcement Server.  If there is more than one Enforcement
;          Server, add more lines using the key "ServerUrl.1",
;       "ServerUrl.2", ..., "ServerUrl.5".  (You can only specify
;       six ServerUrls at one time.)
;
ServerUrl.1=https://10.4.4.40:89/servlet/AccessControlServlet
ServerUrl.2=https://10.4.5.50:89/servlet/AccessControlServlet
;ServerUrl.3
;ServerUrl.4
;ServerUrl.5
Username=nacuser
Password=nacpwd
```

Figure 3-80. Configured SAIASConnector.ini File—Switch and NAC 800 ES Addresses

8. Complete these steps if your network has multiple NASs:

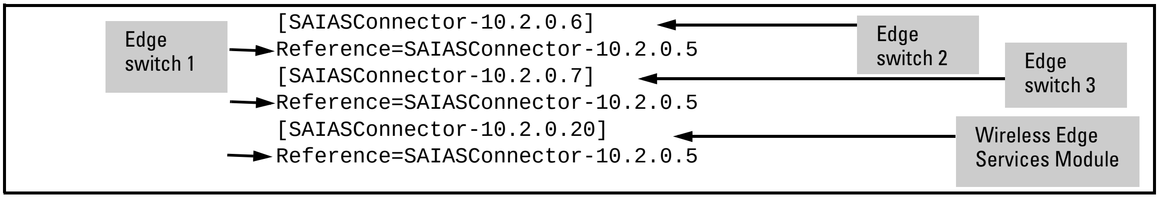
   a. Find these lines:

   ```
   ;[SAIASConnector-<NAS 2 IP>]
   ;Reference=SAIASConnector-<NAS 1 IP>
   ```

   b. Uncomment the lines; that is, delete the semi-colons (;). Replace ***<NAS 2 IP>*** with the IP address of a second NAS. Replace ***<NAS 1 IP>*** with the IP address that you typed in step 4 on page 3-89.

c. Repeat until the file includes those two lines for every NAS in your network.

For this example, see Figure 3-81:



```
[SAIASConnector-10.2.0.6]
Reference=SAIASConnector-10.2.0.5
[SAIASConnector-10.2.0.7]
Reference=SAIASConnector-10.2.0.5
[SAIASConnector-10.2.0.20]
Reference=SAIASConnector-10.2.0.5
```

Figure 3-81. Configured SAIASConnector.ini File—NAS Addresses

9. Move to the section below these lines:

```
; TO DO - Use the following settings for all non-Extreme
switches. Change the Tunnel-Pvt-GroupId settings to
match the VLAN ids on your switch
```

10. Find this section:

```
[Quarantine-Tunnel-Pvt-GroupId]
```

11. Below, set the value to the VLAN ID for your quarantine VLAN. In this example:

```
Value = 34
```

12. Find this section:

```
[Unknown-Tunnel-Pvt-GroupId]
```

13. Below, set the value to the VLAN ID for your test VLAN. In this example:

```
Value = 32
```

14. Select the 12 lines that include attributes for Unknown endpoints. Copy and paste them below. In the copied lines, change every instance of **Unknown** to **Infected**.

15. Find this section:

```
[Infected-Tunnel-Pvt-GroupId]
```

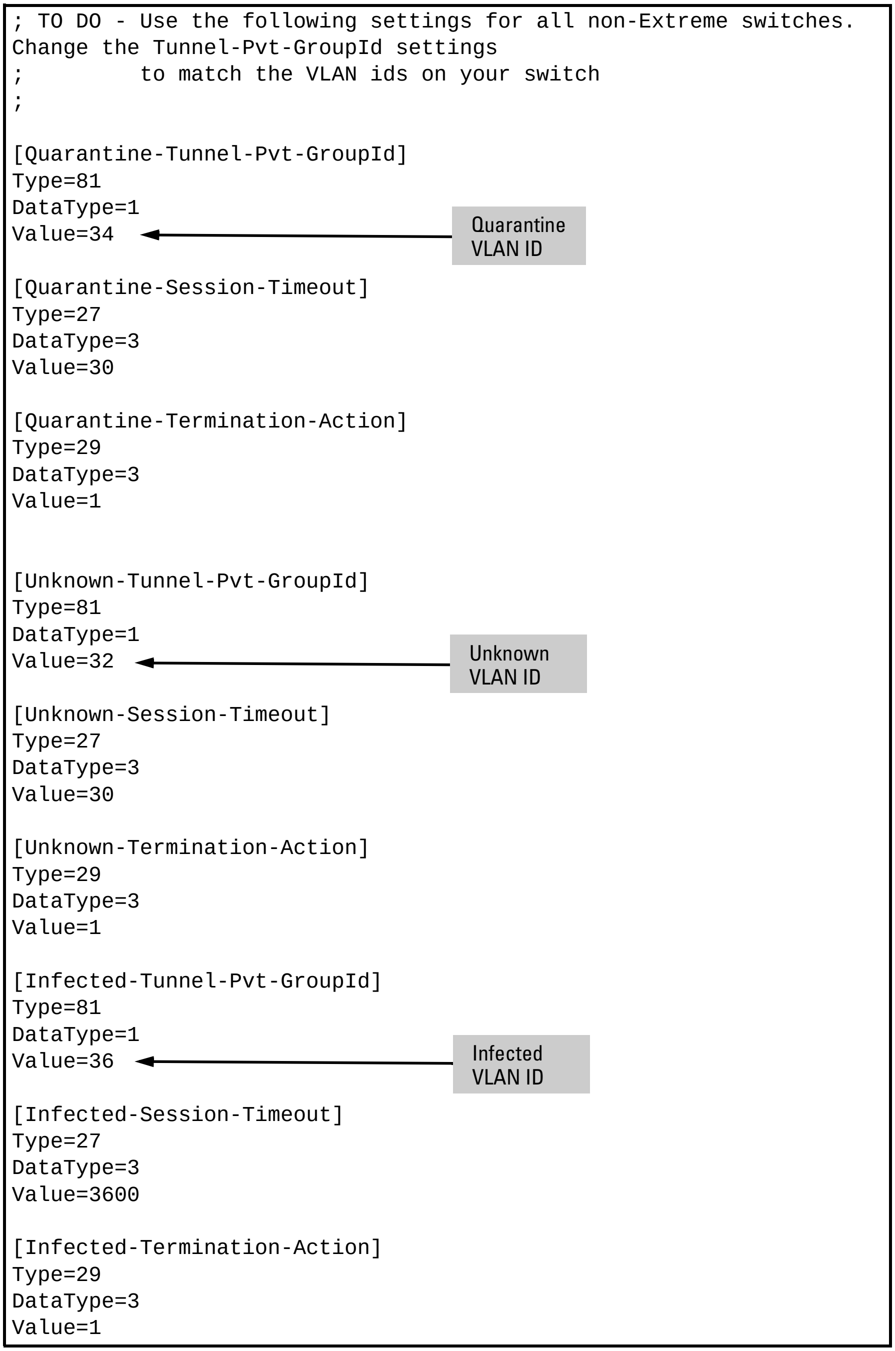
16. Below, set the value to the VLAN ID for your infected VLAN. In this example:

```
Value = 36
```

Note

Be careful to change *only* the “Value” lines. You will see other lines for “Type,” which specifies the RADIUS attribute in question, and “Data-Type,” which specifies whether the value for that attribute is a string or a number or so forth. You *must* keep these values as they are in the original file; otherwise, your configuration will fail.

Figure 3-82 shows the correctly configured file for this example.



```
; TO DO - Use the following settings for all non-Extreme switches.
Change the Tunnel-Pvt-GroupId settings
;         to match the VLAN ids on your switch
;

[Quarantine-Tunnel-Pvt-GroupId]
Type=81
DataType=1
Value=34

[Quarantine-Session-Timeout]
Type=27
DataType=3
Value=30

[Quarantine-Termination-Action]
Type=29
DataType=3
Value=1


[Unknown-Tunnel-Pvt-GroupId]
Type=81
DataType=1
Value=32

[Unknown-Session-Timeout]
Type=27
DataType=3
Value=30

[Unknown-Termination-Action]
Type=29
DataType=3
Value=1

[Infected-Tunnel-Pvt-GroupId]
Type=81
DataType=1
Value=36

[Infected-Session-Timeout]
Type=27
DataType=3
Value=3600

[Infected-Termination-Action]
Type=29
DataType=3
Value=1
```

Figure 3-82. Configured SAIASConnector.ini File—Quarantine, Unknown, Infected

17. Save and close the file.

Edit the IAS Server Registry

Enable the SAIAS connector by adding the **SAIASConnector.dll** to the registry that IAS checks at startup. Follow these steps:

1. In the **Start** menu, select **Run**.
2. Type **regedit** and click **OK**.

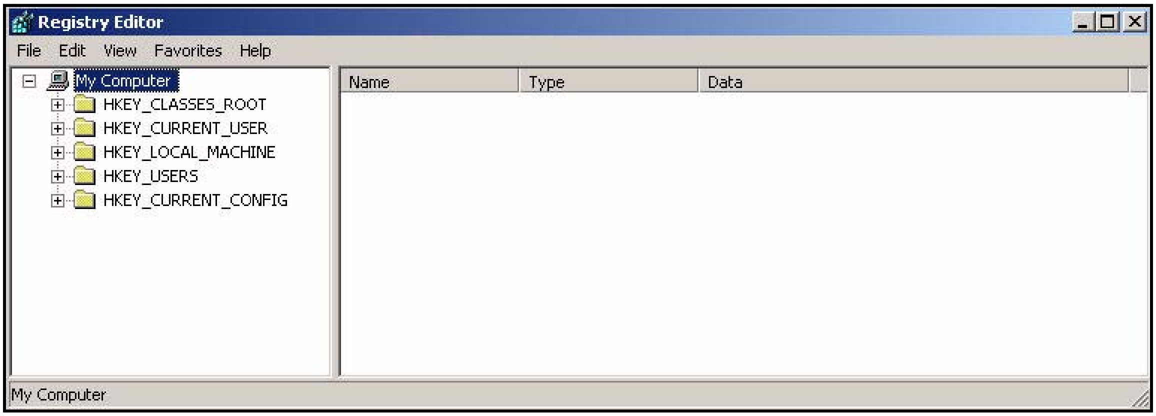
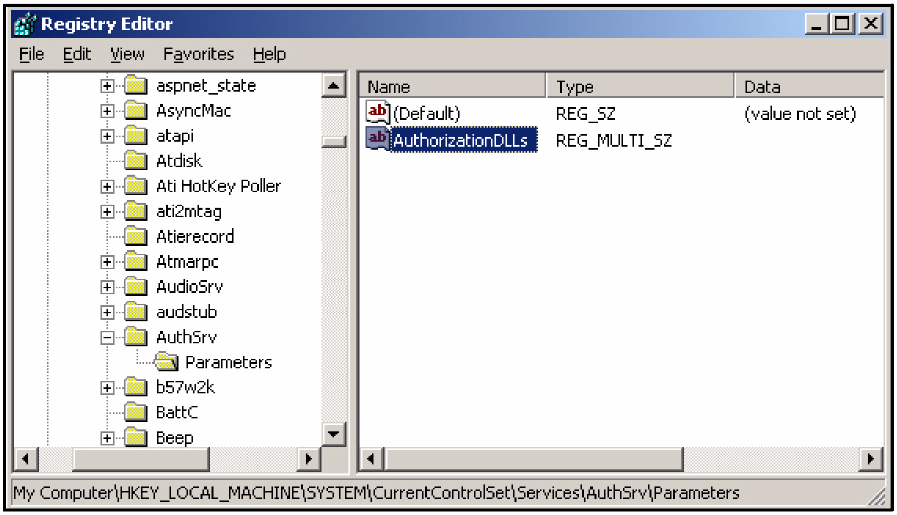


Figure 3-83. Registry Editor Window

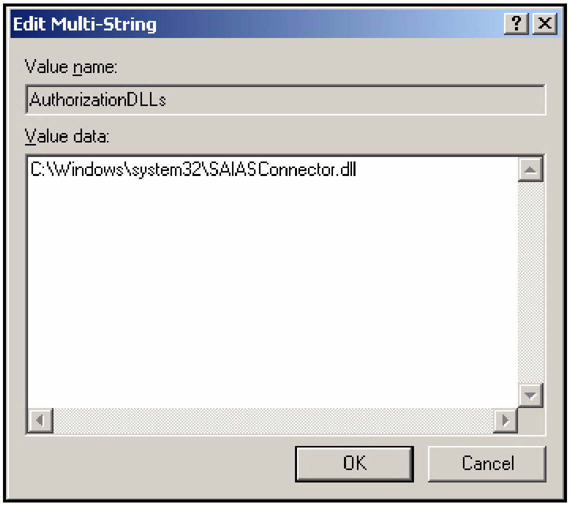
3. Expand **HKEY_LOCAL_MACHINE** > **SYSTEM** > **CurrentControlSet** > **Services**.
4. Create an AuthSrv folder if it does not already exist:
   a. Right-click **Services** and select **New** > **Key**.
   b. Type **AuthSrv** for the folder name.
5. Create a Parameters folder inside the AuthSrv folder if it does not already exist:
   a. Right-click **AuthSrv** and select **New** > **Key**.
   b. Type **Parameters** for the folder name.
6. Right-click **Parameters** and select **New** > **Multi-String** value.
7. Type **AuthorizationDLLs** for the name.



My Computer\HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\AuthSrv\Parameters

Figure 3-84. Registry Editor—AuthSrv > Parameters Window

8. Right-click **AuthorizationDLLs** and select **Modify**.



Value name: AuthorizationDLLs

Value data: C:\Windows\system32\SAIASConnector.dll

Figure 3-85. Registry Editor—Edit Multi-String Window

9. In the **Value data** box, type the path to your SAIASConnector. For example: **C:\Windows\system32\SAIASConnector.dll**.

10. Click **OK**.

11. Close the Registry Editor (press **[Alt]**+**[F4]**).

12. Restart the Windows Server 2003.

Note

If you turned on debugging in the SAIASConnector file, when IAS starts, a log file (**SAIASConnector.log**) is created in the **WINDOWS\system32** directory for debugging and troubleshooting purposes. If you open the file after the Windows Server 2003 restarts, you should see this log entry:

```
NAC IAS plugin started.
```

Install the NAC 800's CA Certificate as a Trusted Root on the IAS Server

The SAIASconnector communicates with the NAC 800's internal HTTPS server. HTTPS requires a server (in this case, the NAC 800) to authenticate to the client (the IAS server) with an certificate. So you must enable IAS to trust the NAC 800's certificate. In other words, you must install on the IAS server the root certificate for the CA that signed the NAC 800's certificate.

The NAC 800 has several options for its HTTPS server certificate:

- **Certificate signed by your domain CA**

  If, as in this solution, you plan to install a certificate signed by your domain CA, the IAS server already trusts that CA, and you do not need to complete any further steps.

  To learn how to install the server certificate on the NAC 800, see "Create and Install a Certificate for HTTPS on a NAC 800" on page 2-188 of Chapter 2: "Implementing 802.1X with ProCurve IDM and Endpoint Integrity."

- **Certificate signed by a well-known CA**

  Similarly, if the NAC 800 uses a certificate signed by a well-known CA, the IAS server probably already trusts the CA, and you do not need to complete any further steps.

  Again, see "Create and Install a Certificate for HTTPS on a NAC 800" on page 2-188 of Chapter 2: "Implementing 802.1X with ProCurve IDM and Endpoint Integrity."

- **Certificate signed by a less well-known CA**

  If the IAS server does not already trust the NAC 800's CA, follow these steps:

  a. Obtain the CA certificate from the CA.

  b. Follow the remaining steps in this section.

- **Default self-signed certificate**

  By default, the NAC 800 uses a self-signed certificate installed at the factory. If you plan to continue using that certificate:

  a. Extract the **ProCurveNAC800Cert.cer** file from the zip file available at *http://www.procurve.com/nactools/*. Transfer the file to the IAS server.

  b. Follow the remaining steps in this section.

- **New self-signed certificate**

  You might create a new self-signed certificate on the NAC 800 that includes the device's correct IP address. (See "Create and Install a Certificate for HTTPS on a NAC 800" on page 2-188 of Chapter 2: "Implementing 802.1X with ProCurve IDM and Endpoint Integrity.") In this case, you must complete the steps in "Export a Self-signed Certificate from a NAC 800 and Install it on the IAS Server" on page 3-110.

After you obtain the necessary CA certificate, install it as a trusted root on the IAS server. Follow these steps:

1. Open the Management Console that you created on the IAS server. (In the **Start** menu, select **Run** and type **mmc**; open your console.)

Note If the correct console is not opened, select it from the **File** menu.

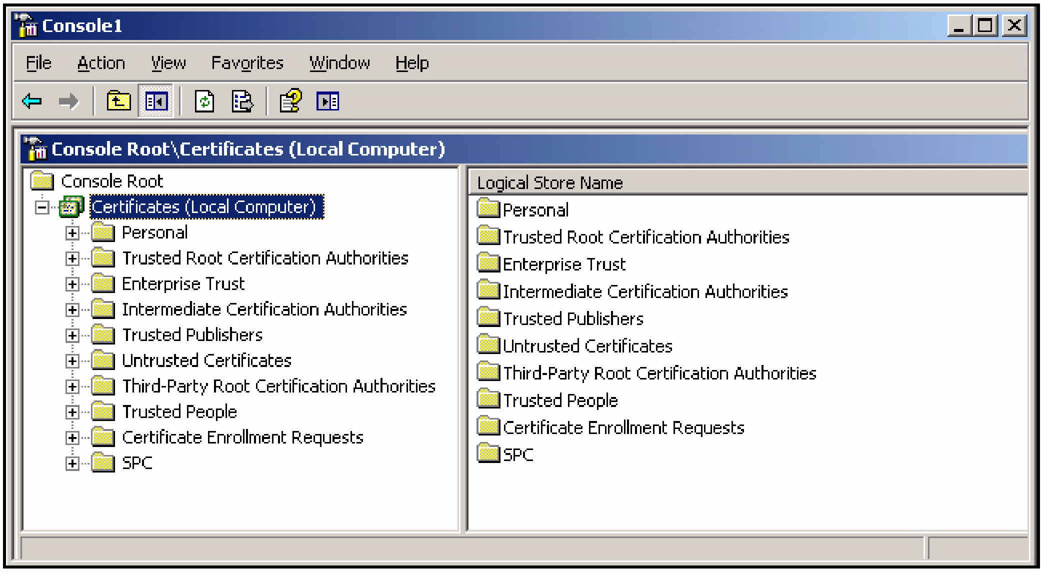

Console1
File
Action
View
Favorites
Window
Help
Console Root\Certificates (Local Computer)
Console Root
Certificates (Local Computer)
Personal
Trusted Root Certification Authorities
Enterprise Trust
Intermediate Certification Authorities
Trusted Publishers
Untrusted Certificates
Third-Party Root Certification Authorities
Trusted People
Certificate Enrollment Requests
SPC
Logical Store Name
Personal
Trusted Root Certification Authorities
Enterprise Trust
Intermediate Certification Authorities
Trusted Publishers
Untrusted Certificates
Third-Party Root Certification Authorities
Trusted People
Certificate Enrollment Requests
SPC

Figure 3-86. Management Console—Certificates (Local Computer)

2. Expand **Certificates (Local Computer)**.

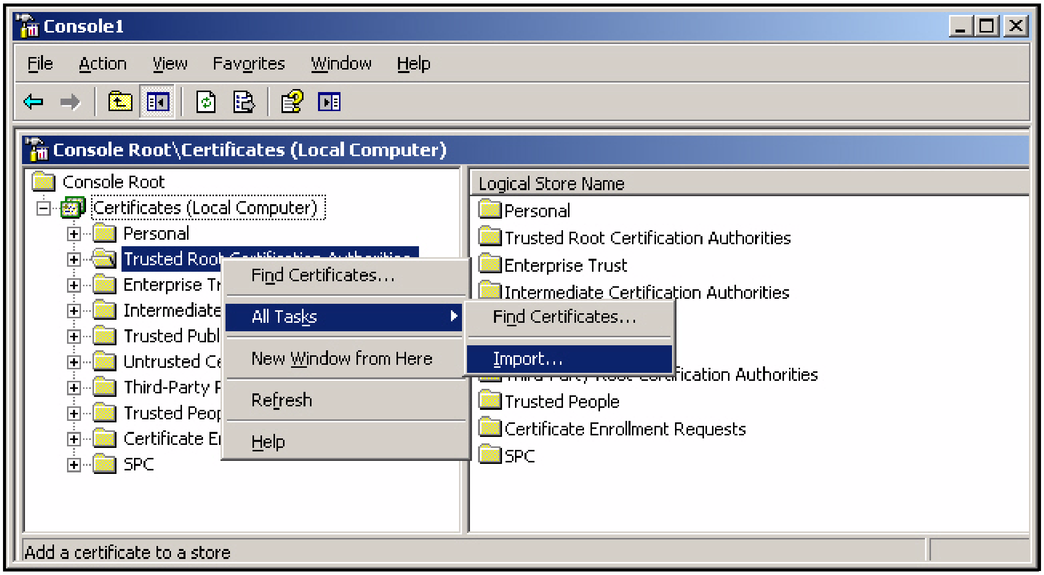
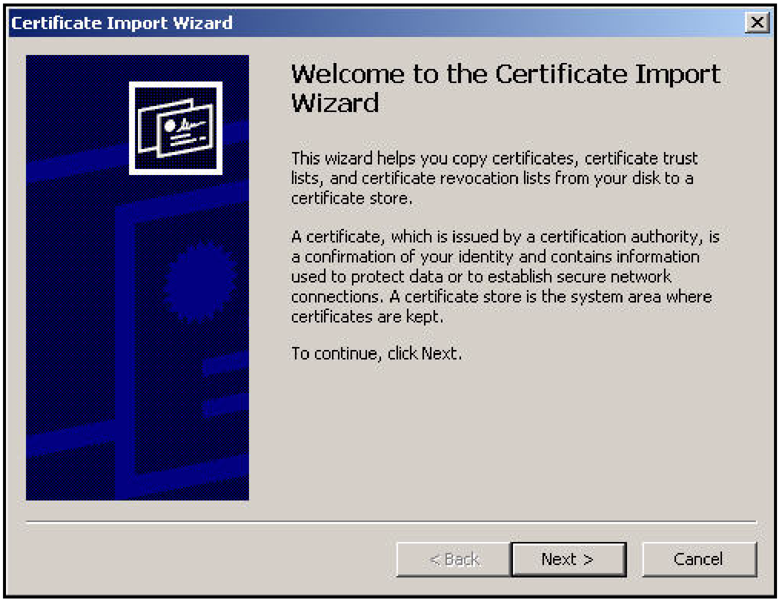

Console1
File Action View Favorites Window Help
Console Root\Certificates (Local Computer)
Console Root
Certificates (Local Computer)
Personal
Trusted Root Certification Authorities
Enterprise Tr
Intermediate
Trusted Publ
Untrusted Ce
Third-Party R
Trusted Peop
Certificate Er
SPC
Find Certificates...
All Tasks
New Window from Here
Refresh
Help
Find Certificates...
Import...
Logical Store Name
Personal
Trusted Root Certification Authorities
Enterprise Trust
Intermediate Certification Authorities
Third-Party Root Certification Authorities
Trusted People
Certificate Enrollment Requests
SPC
Add a certificate to a store

Figure 3-87. Management Console—Certificates (Local Computer) > Trusted Root Certificate Authorities

3. Right-click **Trusted Root Certificate Authorities** and select **All Tasks** > **Import**.



Certificate Import Wizard

Welcome to the Certificate Import Wizard

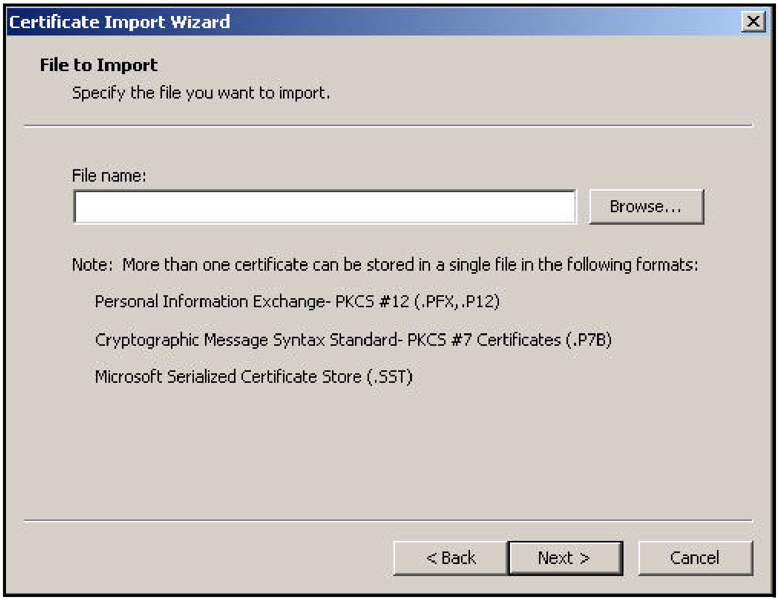
This wizard helps you copy certificates, certificate trust lists, and certificate revocation lists from your disk to a certificate store.

A certificate, which is issued by a certification authority, is a confirmation of your identity and contains information used to protect data or to establish secure network connections. A certificate store is the system area where certificates are kept.

To continue, click Next.

Figure 3-88. Certificate Import Wizard—Welcome Page

4. Click **Next**.



Certificate Import Wizard

File to Import

Specify the file you want to import.

File name:

Note: More than one certificate can be stored in a single file in the following formats:

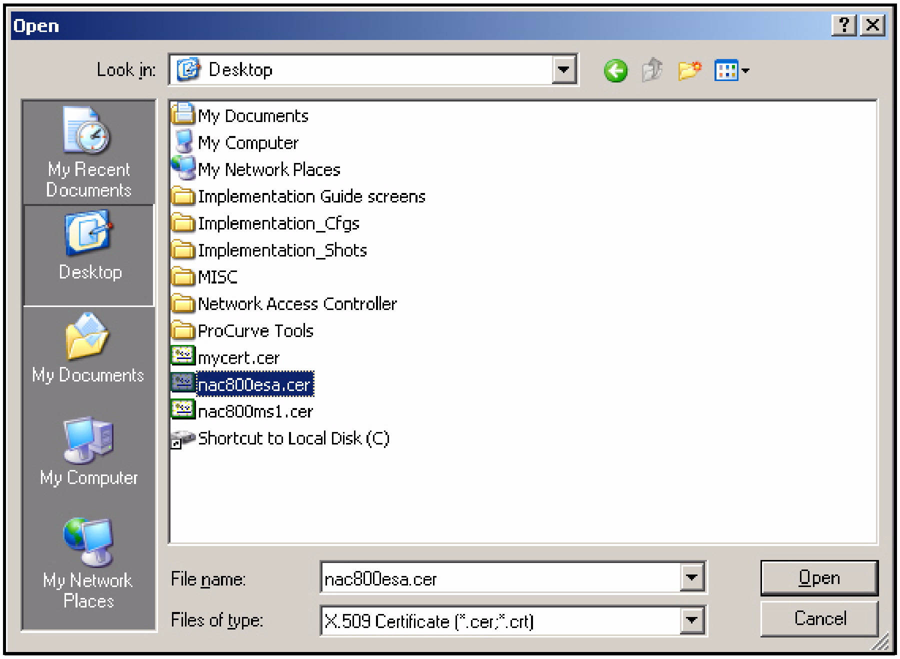
Personal Information Exchange- PKCS #12 (.PFX,.P12)

Cryptographic Message Syntax Standard- PKCS #7 Certificates (.P7B)

Microsoft Serialized Certificate Store (.SST)

Figure 3-89. Certificate Import Wizard—File to Import Page

5. Click **Browse** and select the CA root certificate for the NAC 800.



Look in: Desktop

- My Documents
- My Computer
- My Network Places
- Implementation Guide screens
- Implementation_Cfgs
- Implementation_Shots
- MISC
- Network Access Controller
- ProCurve Tools
- mycert.cer
- nac800esa.cer
- nac800ms1.cer
- Shortcut to Local Disk (C)

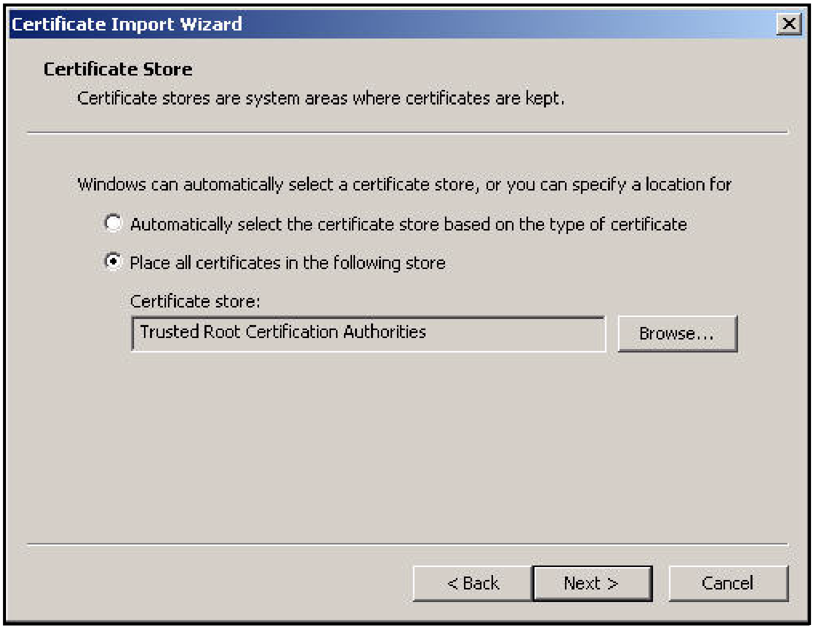
File name: nac800esa.cer

Files of type: X.509 Certificate (*.cer;*.crt)

Figure 3-90. Browsing for a File in the Certificate Import Wizard

6. Click **Open**.

7. Click **Next**.


Certificate Import Wizard

Certificate Store

Certificate stores are system areas where certificates are kept.

Windows can automatically select a certificate store, or you can specify a location for

○ Automatically select the certificate store based on the type of certificate

● Place all certificates in the following store

Certificate store: Trusted Root Certification Authorities

Figure 3-91. Certificate Import Wizard—Certificate Store Page

8. Accept the default: **Place all certificates in the following store**. Then click **Next** again.
9. Click **Finish**.

Configure the Wireless Edge Services zl Modules

Please refer to “Configuring the Wireless Edge Services Modules” on page 2-106 of Chapter 2: “Implementing 802.1X with ProCurve IDM and Endpoint Integrity” for instructions on how to install and configure the following:

- Wireless Edge Services zl Module
- Redundant Wireless Services zl Module
- RPs

Configure the NAC 800s

For instructions on installing the NAC 800s, please refer to "Configuring the NAC 800s" on page 2-134 of Chapter 2: "Implementing 802.1X with ProCurve IDM and Endpoint Integrity."

Configure Basic Settings on the NAC 800s

For instructions on configuring basic settings on the NAC 800, please refer to "Configure Basic Settings on the NAC 800s" on page 2-135 of Chapter 2: "Implementing 802.1X with ProCurve IDM and Endpoint Integrity." In this example, the NAC 800s will use the network settings in Table 3-9.

Table 3-9. NAC 800 Basic Settings

Device	Hostname	IP Address	Subnet Mask	Default Gateway	DNS Server	Time Settings
NAC 800 MS	MS.procurveu.edu	10.2.1.40	255.255.0.0	10.2.0.1	10.4.4.15	1.pool.ntp.org
NAC 800 ES	ESa.procurveu.edu	10.4.4.40	255.255.0.0	10.4.0.1	10.4.4.15	from MS
NAC 800 ES	ESb.procurveu.edu	10.4.5.50	255.255.0.0	10.4.0.1	10.4.4.15	from MS

Access the Web Browser Interface

The NAC 800s now have network connectivity. You will complete all remaining configuration through the NAC 800 MS's Web browser interface.

Follow these steps to access the Web browser interface:

1. Open the Web browser on your management station.
2. Type **https://<*NAC 800 IP address*>**. For example: **https://10.2.1.40**.

Note

The NAC 800 requires HTTPS (as opposed to HTTP) for greater security.

3. Since the NAC 800 is using its self-signed certificate, your browser will probably ask you whether you want to trust this certificate. Answer yes.
4. You connect to the NAC 800's Web browser interface.

If this is the first time that the Web browser interface has been accessed, you must complete some initial tasks. See “Configure More Basic Settings for the MS” on page 2-142 of Chapter 2: “Implementing 802.1X with ProCurve IDM and Endpoint Integrity.”

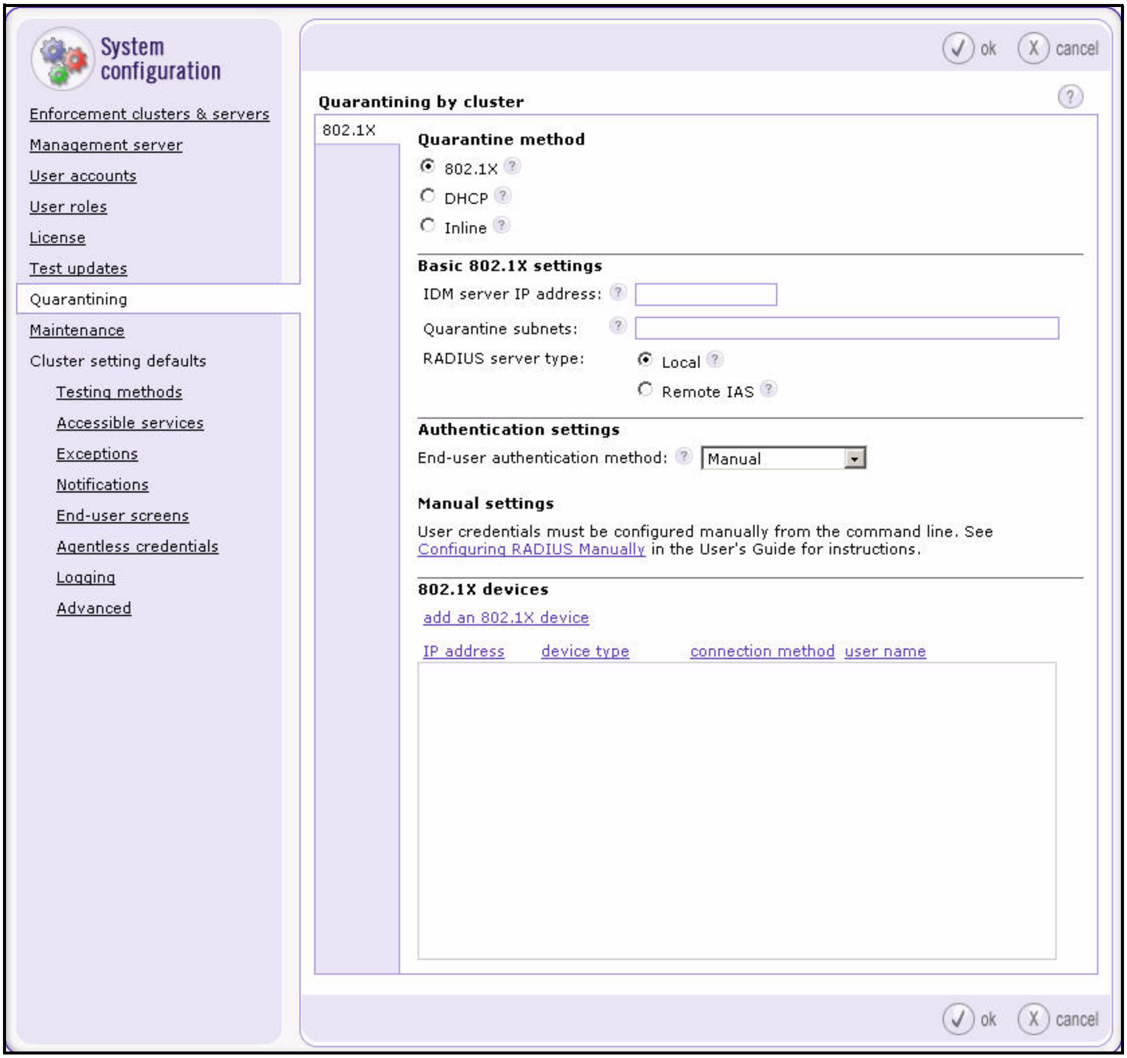
Create the Enforcement Cluster and Add ESs

For instructions, please refer to “Create an Enforcement Cluster and Add ESs” on page 2-146 of Chapter 2: “Implementing 802.1X with ProCurve IDM and Endpoint Integrity.”

Configure Quarantining

The next task is setting up quarantining with the 802.1X method and an IAS server:

1. Select **Home** > **System configuration** > **Quarantining**.
2. Make sure that the cluster you configured is selected.
3. In the **Quarantine method** area, select **802.1X**.



Quarantining by cluster

802.1X

Quarantine method

● 802.1X
○ DHCP
○ Inline

Basic 802.1X settings

IDM server IP address:

Quarantine subnets:

RADIUS server type: ● Local ○ Remote IAS

Authentication settings

End-user authentication method: Manual

Manual settings

User credentials must be configured manually from the command line. See Configuring RADIUS Manually in the User's Guide for instructions.

802.1X devices

add an 802.1X device

IP address	device type	connection method	user name

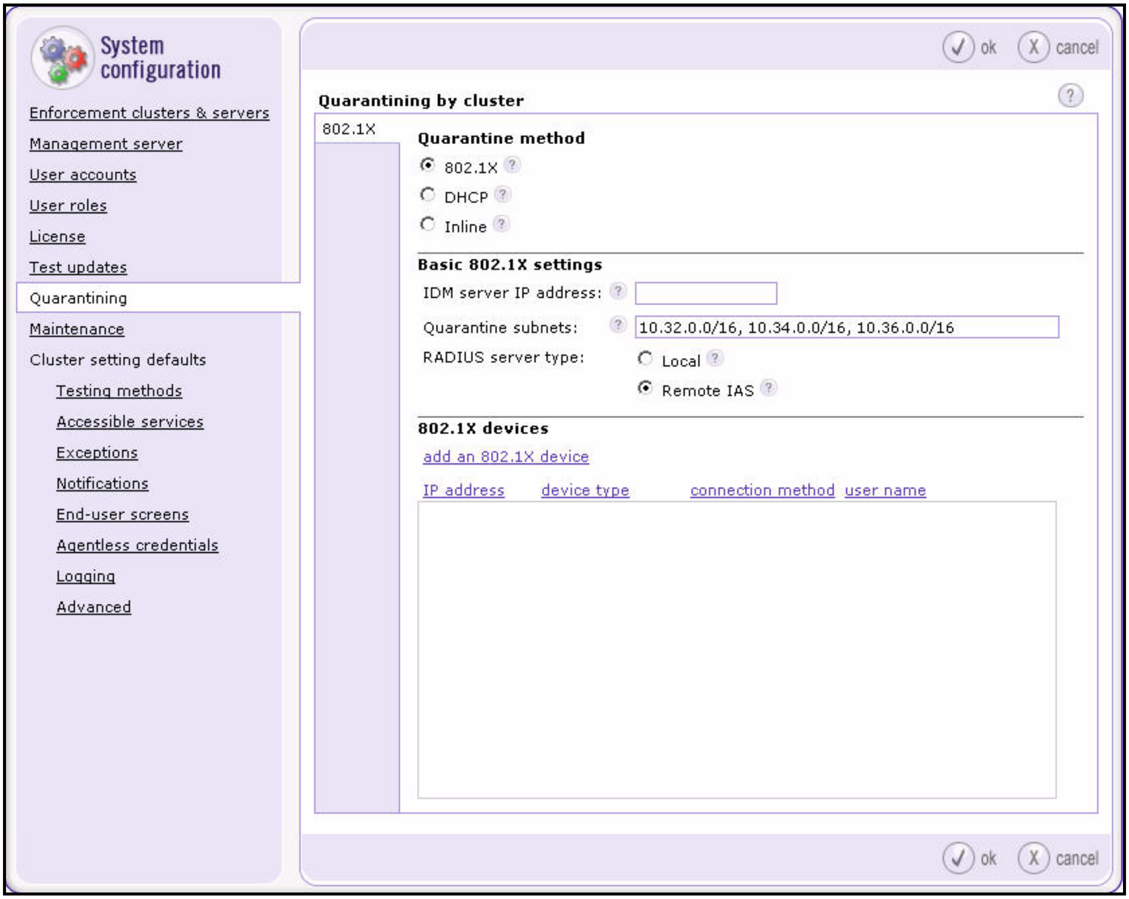
Figure 3-92. NAC 800 Web Interface—Home > System configuration > Quarantining Window

4. In the **Quarantine subnets** box, type the subnet addresses associated with Unknown (Test), Quarantine, and Infected VLANs. Refer to Table 3-1. Separate the addresses with commas (,). In this example: **10.32.0.0/16, 10.34.0.0/16,10.36.0.0/16**.

Note

The **Quarantine subnets** setting allows the NAC 800 to respond to DNS requests from endpoints in Test, Quarantine, and Infected VLANs. You should have set up the corresponding VLAN IDs on the SAIASConnector. See "Configure VLAN Assignments in the SAIASConnector.ini File" on page 3-89.

5. Select **Remote IAS** for the **RADIUS server type**.



Quarantining by cluster

802.1X

Quarantine method

● 802.1X
○ DHCP
○ Inline

Basic 802.1X settings

IDM server IP address:
Quarantine subnets: 10.32.0.0/16, 10.34.0.0/16, 10.36.0.0/16
RADIUS server type: ○ Local ● Remote IAS

802.1X devices

Figure 3-93. NAC 800 Web Interface—Home > System configuration > Quarantining Window

6. Click **ok**.

Add 802.1X Devices

The NAC 800's list of802.1X devices must include every device inyour network that can act as an authenticator. In this example, these are:

- Edge switches (which authenticate end-users, RPs, and other switches)
- Core switches (which authenticate other switches)
- Wireless Edge Services Modules (which authenticate wireless users)

When you add a device to the list you must specify:

- Device's IP address
- Device type
- Connection settings (which allow the NAC 800 to force reauthentication of an endpoint after testing)

  The NAC 800 can issue the reauthentication command through SSH, Telnet, or SNMP (although some 802.1X devices do not support all of these options). In this example, you will use SNMPv2.

Table 3-10 shows the settings for the example network. Of course, the actual list would include many more devices.

Table 3-10. 802.1X Devices

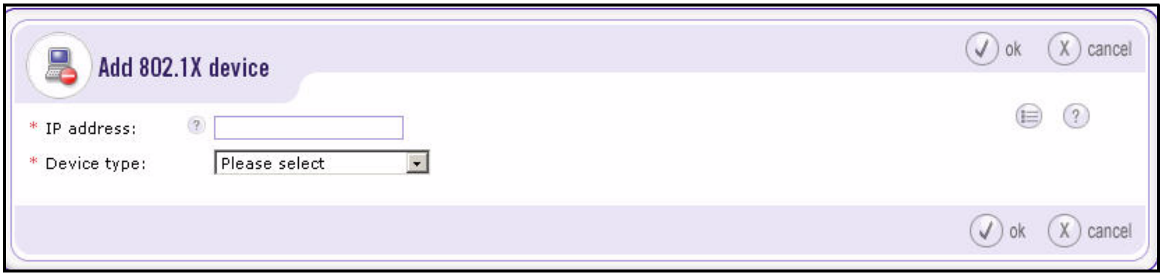
IP Address	Device Type	SNMPv2 Read-Write Community	Other SNMP Settings
10.2.0.20	ProCurve WESM	procurverw	default
10.2.0.25	ProCurve WESM	procurverw	default
10.2.0.3	ProCurve Switch	procurverw	default
10.2.0.5	ProCurve Switch	procurverw	default

Follow these steps to add the 802.1X devices:

1. Select **Home** > **System Configuration** > **Quarantining**.

   You should have already completed the steps in "Configure Quarantining" on page 3-103.

2. Click **add an 802.1X device**. The **Add 802.1X device** window is displayed.



Add 802.1X device

* IP address:

* Device type: Please select

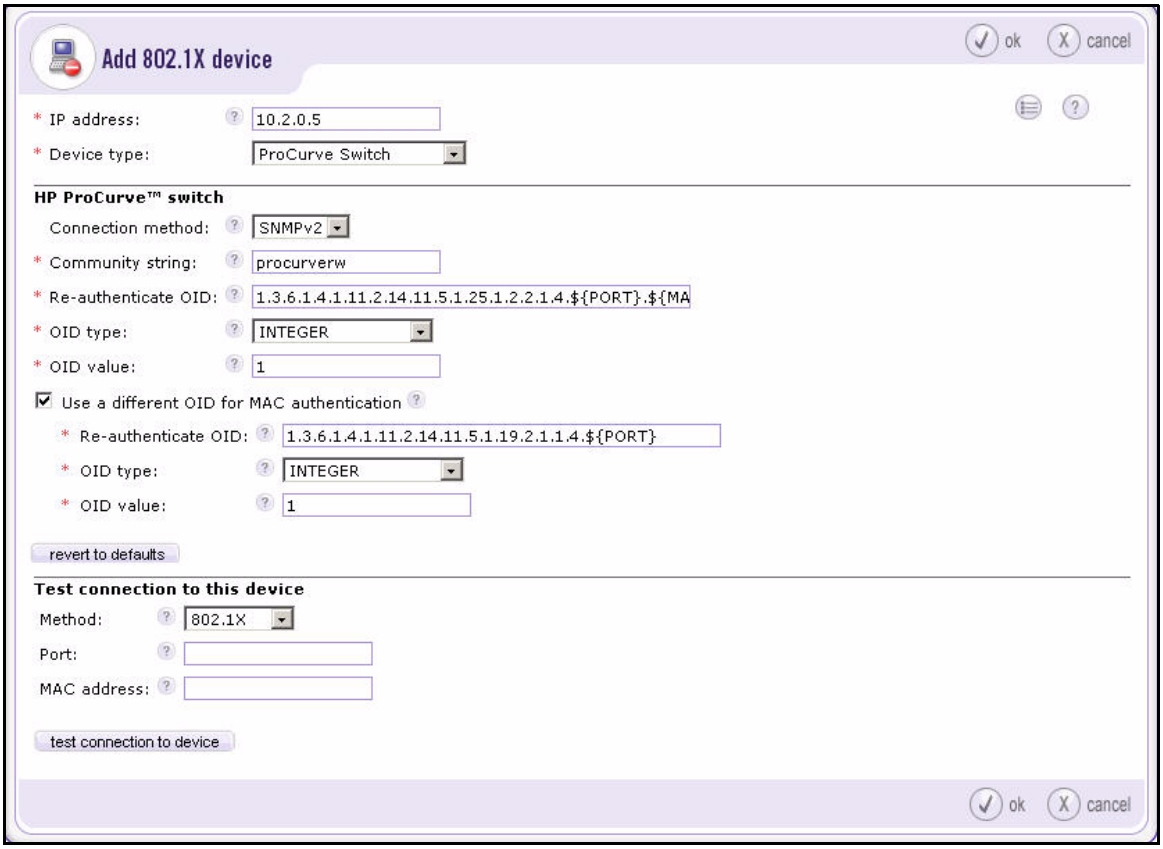
Figure 3-94. NAC 800 Web Interface—Home > System configuration > Quarantining (802.1X quarantine method) > add an 802.1X device Window

3. Type the 802.1X device's IP address in the **IP address** box. In this example:

   10.2.0.20

4. From the **Device type** box, select the type of 802.1X device (that is, its manufacturer and OS). The types for this network include **ProCurve Switch** and **ProCurve WESM**.

5. When you select the device type, the window expands to include device-specific settings.



Add 802.1X device

* IP address: 10.2.0.5

* Device type: ProCurve Switch

HP ProCurve™ switch

Connection method: SNMPv2

* Community string: procurverw

* Re-authenticate OID: 1.3.6.1.4.1.11.2.14.11.5.1.25.1.2.2.1.4.${PORT}.${MA

* OID type: INTEGER

* OID value: 1

☑ Use a different OID for MAC authentication

* Re-authenticate OID: 1.3.6.1.4.1.11.2.14.11.5.1.19.2.1.1.4.${PORT}

* OID type: INTEGER

* OID value: 1

Test connection to this device

Method: 802.1X

Port:

MAC address:

Figure 3-95. NAC 800 Web Interface—Home > System configuration > Quarantining (802.1X quarantine method) > add an 802.1X device (Connection settings) Window

6. Select a method from the **Connection method** box. In this network, devices use **SMNPv2**.

   Skip this step if you have selected **ProCurve WESM**, **ProCurve 420 AP**, or **ProCurve 530 AP** for the **Device type**.

7. Type the name of the ProCurve device's read-write community in the **Community string** box (in this example, **procurverw**).

8. Typically, you can leave all other default settings unchanged.

   For more information about these settings, see Chapter 3: "System Configuration" of the *ProCurve Network Access Controller 800 Users' Guide*.

9. Click **ok**.

10. In the **System configuration > Quarantining** window, click **ok** to save the changes.

Configure NAC Policies

Next, you should set up NAC policies, which specify the requirements that endpoints must meet to connect to the network. The NAC800 has three default policies for testing endpoint integrity (Low security, Medium security, and High security). By default, the Low security NAC policy applies to all endpoints.

Please refer to “Configure NAC Policies” on page 3-109 of Chapter 2: “Implementing 802.1X with ProCurve IDM and Endpoint Integrity” to learn how to:

- Create new NAC policies for your environment
- Assign NAC policies to the correct endpoints

Configure Endpoint Integrity Testing Methods

You must also ensure that NAC 800s can test endpoints. The NAC 800 always attempts to test an endpoint transparently first:

1. The NAC 800 tries to test the endpoint with the NAC EI agent.
2. If no agent is installed on the endpoint, the NAC 800 tries to install the ActiveX agent.
3. If the ActiveX installation fails and if credentials for the endpoint or domain exist, the NAC 800 tries to use agentless testing.

If transparent testing fails, the NAC 800 presents users with end-user access screens, which help the testing to proceed:

1. An end-user screen instructs the user to download and install the NAC EI agent.
2. Or an end-user screen instructs the user how to enable the ActiveX agent to download.
3. Or an end-user screen asks the user to submit administrator credentials for the endpoint (for agentless testing).

Please refer to Chapter 2: “Implementing 802.1X with ProCurve IDM and Endpoint Integrity” to learn how to:

- Select the testing methods presented in end-user access screens (page 2-164)
- Deploy the NAC EI agent (page 2-306)

- Configure agentless credentials (page 2-156)
- Enable the Remote Procedure Call (RPC) service for agentless testing (page 2-157)
- Open necessary ports for various testing methods (page 2-157)

Install SSL Certificates on the NAC 800s

Each NAC 800 includes an internal HTTPS server. The SAIASConnector contacts NAC 800 ESs' HTTPS servers to check endpoints' integrity posture.

The internal HTTPS server requires the NAC 800 to have an SSL certificate. At factory defaults, the NAC 800 uses a self-signed certificate. However, you should typically install a new certificate on the NAC 800, one signed either by a trusted third-party CA or your domain's own CA.

To learn how to request and install a certificate, please refer to "Create and Install a Certificate for HTTPS on a NAC 800" on page 2-188 of Chapter 2: "Implementing 802.1X with ProCurve IDM and Endpoint Integrity."

Export a Self-signed Certificate from a NAC 800 and Install it on the IAS Server

In this solution, the NAC 800s use certificates signed by a trusted CA. However, you might choose to create a self-signed certificate on your device. (See "Chapter 13: System Administration" of the *ProCurve Network Access Controller 800 Users' Guide*.) This section teaches you how to export such a certificate and install it on the IAS server as a trusted root.

Note

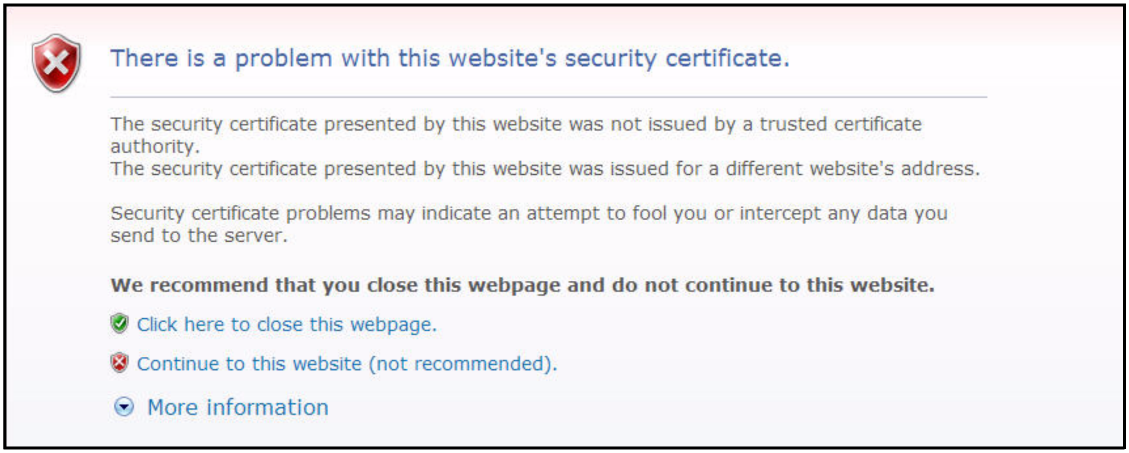
To create a self-signed certificate, you can also follow the steps in "Create and Install a Certificate for HTTPS on a NAC 800" on page 2-188; stop after step 7 on page 2-190.

The easiest way to export a self-signed certificate from a NAC 800 is to connect to its Web browser interface and download the certificate using your browser. The following steps explain how to do so using Internet Explorer (IE) 7:

1. Open IE on the IAS server and navigate to this URL: *https://<NAC 800 hostname>:89*.

   You can, alternatively, specify the NAC 800's IP address.

2. Because the IAS server does not yet trust the certificate, you should see a Web page such as the one in Figure 3-96.



There is a problem with this website's security certificate.

The security certificate presented by this website was not issued by a trusted certificate authority.
The security certificate presented by this website was issued for a different website's address.

Security certificate problems may indicate an attempt to fool you or intercept any data you send to the server.

We recommend that you close this webpage and do not continue to this website.

Click here to close this webpage.

Continue to this website (not recommended).

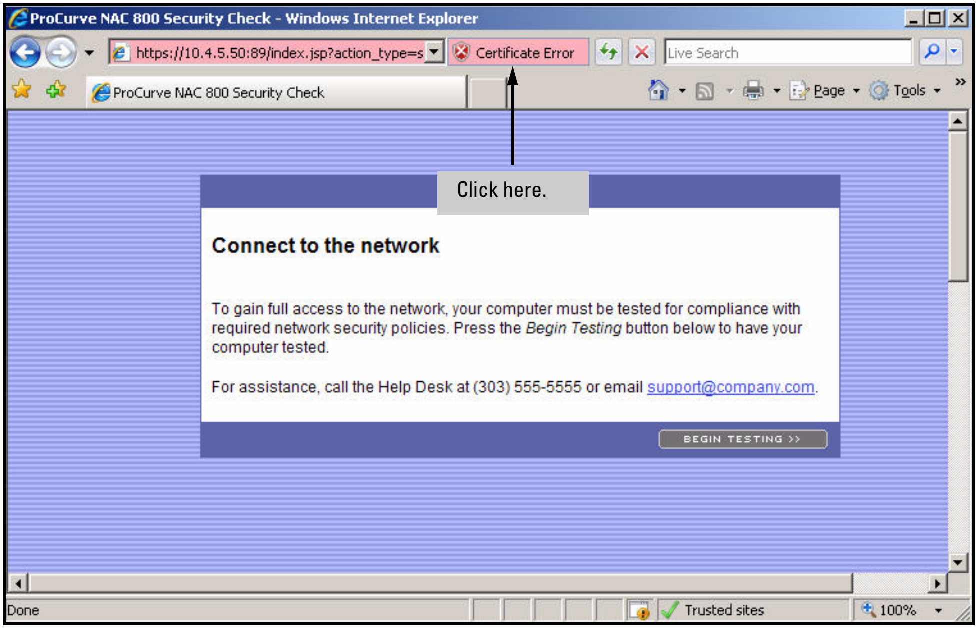
More information

Figure 3-96. Problem with Security Certificate Web Page in IE 7

3. Click **Continue to this website**.

   If prompted to add the site to your trusted site, do so.

4. You should see the page shown in Figure 3-97.


ProCurve NAC 800 Security Check - Windows Internet Explorer
https://10.4.5.50:89/index.jsp?action_type=s
Certificate Error
Live Search
ProCurve NAC 800 Security Check
Page
Tools
Click here.
BEGIN TESTING >>
Done
Trusted sites
100%

Connect to the network

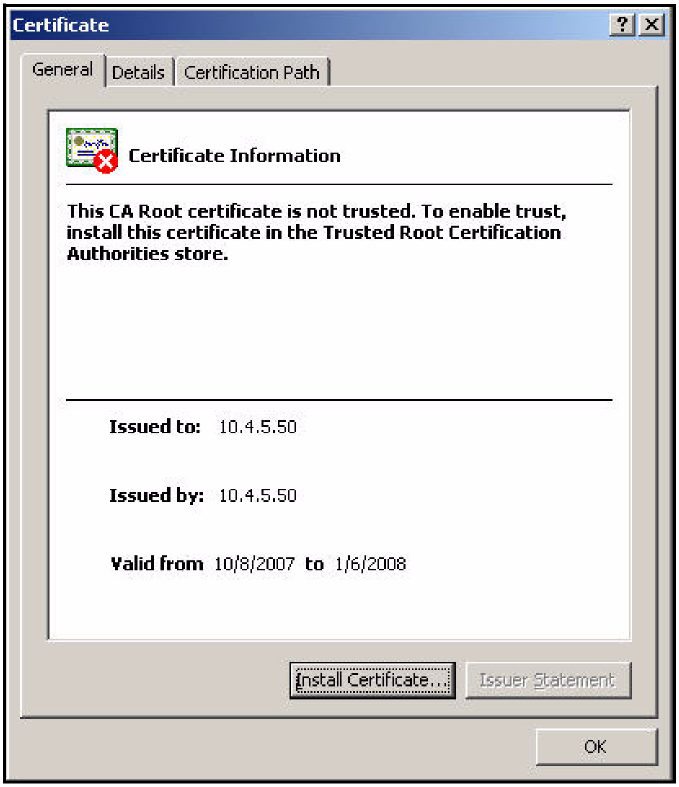
To gain full access to the network, your computer must be tested for compliance with required network security policies. Press the *Begin Testing* button below to have your computer tested.

For assistance, call the Help Desk at (303) 555-5555 or email support@company.com.

Figure 3-97. ProCurve NAC 800 Security Check Web Page

5. Click **Certificate Error** in the navigation bar.

6. Click **View certificates**. The **Certificates** window is displayed.



Certificate Information

This CA Root certificate is not trusted. To enable trust, install this certificate in the Trusted Root Certification Authorities store.

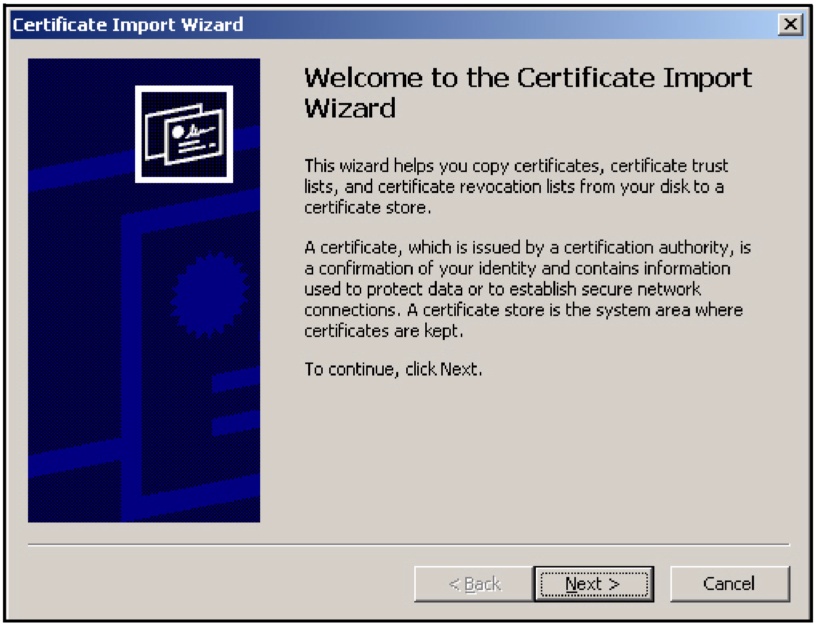
Issued to: 10.4.5.50

Issued by: 10.4.5.50

Valid from 10/8/2007 to 1/6/2008

Figure 3-98. Certificate Window

7. Click **Install Certificate**. The Certificate Import Wizard is displayed.



Welcome to the Certificate Import Wizard

This wizard helps you copy certificates, certificate trust lists, and certificate revocation lists from your disk to a certificate store.

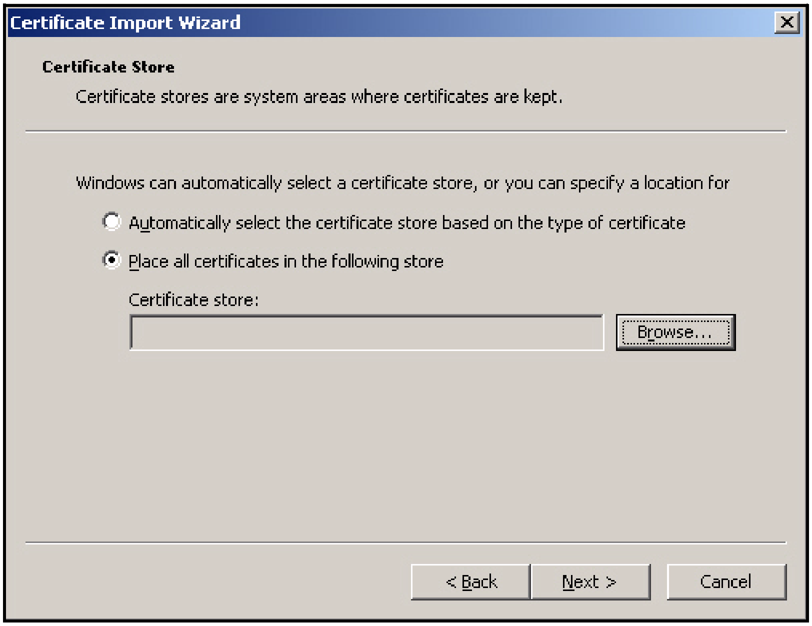
A certificate, which is issued by a certification authority, is a confirmation of your identity and contains information used to protect data or to establish secure network connections. A certificate store is the system area where certificates are kept.

To continue, click Next.

Figure 3-99. Certificate Import Wizard—Welcome Page

8. Click **Next**.

9. Click **Place all certificates in the following store.**



Certificate Import Wizard

Certificate Store

Certificate stores are system areas where certificates are kept.

Windows can automatically select a certificate store, or you can specify a location for

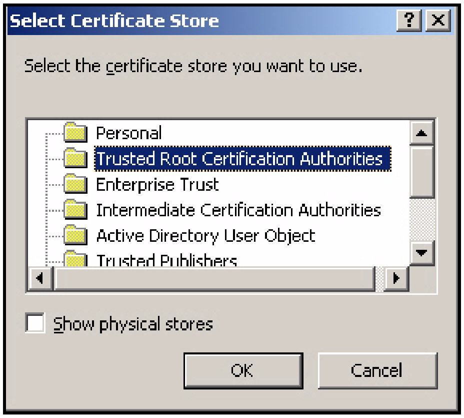
○ Automatically select the certificate store based on the type of certificate

● Place all certificates in the following store

Certificate store:

Figure 3-100.Certificate Import Wizard—Certificate Store Page

10. Click **Browse**.
11. Click the **Trusted Root Certification Authorities** folder.



Select Certificate Store

Select the certificate store you want to use.

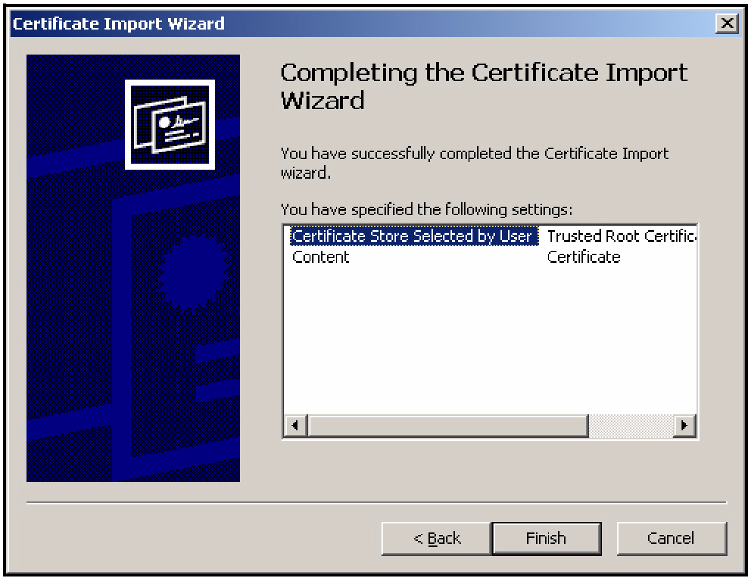
- Personal
- Trusted Root Certification Authorities
- Enterprise Trust
- Intermediate Certification Authorities
- Active Directory User Object
- Trusted Publishers

□ Show physical stores

Figure 3-101.Certificate Import Wizard—Certificate Store Page

12. Click **OK**.

13. On the **Certificate store** page, click **Next**.



Certificate Import Wizard

Completing the Certificate Import Wizard

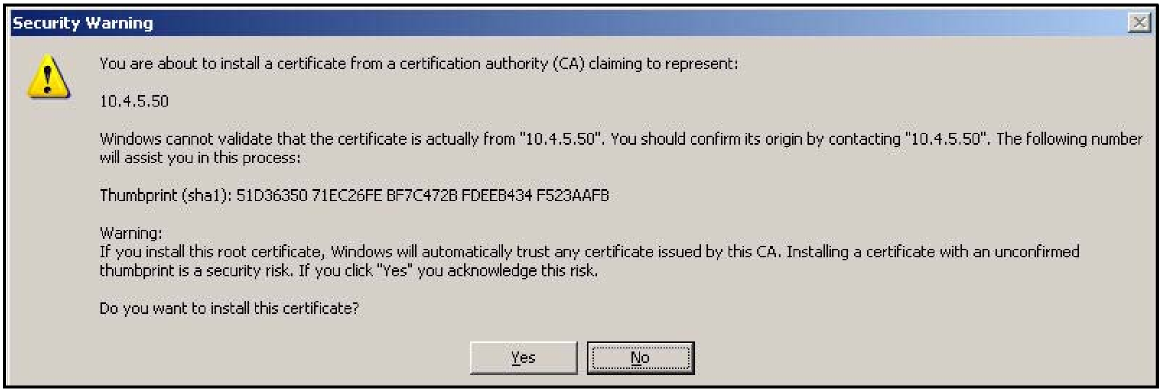
You have successfully completed the Certificate Import wizard.

You have specified the following settings:

Certificate Store Selected by User	Trusted Root Certific
Content	Certificate

Figure 3-102.Completing the Certificate Import Wizard Page

14. Click **Finish**.



Security Warning

You are about to install a certificate from a certification authority (CA) claiming to represent:

10.4.5.50

Windows cannot validate that the certificate is actually from "10.4.5.50". You should confirm its origin by contacting "10.4.5.50". The following number will assist you in this process:

Thumbprint (sha1): 51D36350 71EC26FE BF7C472B FDEEB434 F523AAFB

Warning:
If you install this root certificate, Windows will automatically trust any certificate issued by this CA. Installing a certificate with an unconfirmed thumbprint is a security risk. If you click "Yes" you acknowledge this risk.

Do you want to install this certificate?

Figure 3-103.Security Warning Window

15. When asked if you want to install the certificate, click **Yes**.

16. A window should be displayed, informing you that the import was successful. Click **OK**.

Set Up Endpoints

By now, you have set up your network infrastructure and servers to support your access control solution. Before enabling port authentication, however, you must set up the endpoints as well.

Please refer to Chapter 2: "Implementing 802.1X with ProCurve IDM and Endpoint Integrity" to learn how to:

- Enroll users for certificates (page 2-276)
- Configure Ethernet connections for 802.1X (page 2-298)
- Configure wireless connections for 802.1X (page 2-301)
- Install the NAC EI agent on endpoints (page 2-306)

Activate Network Access Control

It is recommended that, until you have completely configured and tested your network access control solution, you do not activate:

- Port authentication
- Quarantining

Otherwise, you can inadvertently lock users—and even yourself—out of the network. And, as explained in "Set Up Endpoints" on page 3-116, endpoints as well as the network infrastructure and servers must support the solution. Whether the IT staff or users themselves will prepare the endpoints, you must allow sufficient time before enforcing network access control. For example, after you install the NAC 800, you might wait several days before activating endpoint integrity to give users time to download the NAC EI agent from the NAC 800. Even if you assign the NAC EI agent in Active Directory, you must do so in advance because the agent does not install until the next reboot.

You should always test the solution before activating it throughout the network. At a minimum, you should activate port authentication on a single unused port, plug in your management station, and verify that you can log in to the network. Log in as users in all of your user groups and check the resources that they are allowed. As a next step for more rigorous testing, you might implement port authentication on one or two switches for a trial period. Guide users in the trial group through the process of connecting to the network and note any problems that they encounter. You might select the IT department as the trial group as these users tend to be best-equipped for handling the new requirements.

Once you are confident that the network infrastructure, endpoints, and users are ready, activate your solution.

Please refer to Chapter 2: "Implementing 802.1X with ProCurve IDM and Endpoint Integrity" for instructions:

- Activate port authentication (page 2-318)
- Activate quarantining (page 2-319)

Implementing a VPN with Endpoint Integrity

Contents

Introduction

This chapter teaches you how to set up a virtual private network (VPN) for remote users and then implement endpoint integrity checks on the users' endpoints. In this chapter, you will learn how to configure these network components:

- ProCurve Secure Router 7000dl, which also acts as the VPN gateway
- ProCurve Network Access Controller (NAC) 800

You will also learn about setting up an endpoint for remote access using the ProCurve VPN Client.

It is assumed that you have already implemented a network access control solution for the LAN. Examples in this chapter will, when necessary, refer to the LAN established in Chapter 2: "Implementing 802.1X with ProCurve IDM and Endpoint Integrity," which:

- Enforces 802.1X port authentication
- Has a wireless network:
  - Controlled with a Wireless Edge Services Module
  - Protected with Wi-Fi Protected Access (WPA) with 802.1X
- Enforces endpoint integrity with the 802.1X deployment (quarantine) method
- Uses ProCurve Manager Plus (PCM+) and ProCurve Identity Driven Manager (IDM) to simplify network management

Although your network environment is probably not identical to this environment, the instructions should help you understand the processes involved. You can then modify the instructions as needed to meet your company's unique requirements.

To help you, the instructions include examples, which will be based on a hypothetical network designed for a university called ProCurve University. The instructions also include tables and worksheets that you can use to record information for your network.

The ProCurve University network includes three user groups:

- Network administrators
- Faculty
- Students

Table 4-1 shows the virtual LANs (VLANs) and subnets in the LAN.

Table 4-1. Example VLANs

VLAN Category	Name	ID	Subnet
Management VLAN	Management	2	10.2.0.0/16
Server VLAN	Servers	4	10.4.0.0/16
	Faculty_Databases	5	10.5.0.0/16
User VLAN	Faculty	8	10.8.0.0/16
	Students	10	10.10.0.0/16
Test and quarantine VLAN (for endpoint integrity)	Quarantine_Faculty	32	10.32.0.0/16
	Quarantine_Students	34	10.34.0.0/16
Infected VLAN	Infected_Faculty	33	10.33.0.0/16
	Infected_Students	35	10.35.0.0/16

You can use Figure 4-2 to record information about your company's VLANs.

Table 4-2. My VLANs

Type	Name	ID	Subnet
Management			
Server			
User			
Test			

Type	Name	ID	Subnet
Quarantine			
Infected			

The university is adding a VPN so that faculty and students can access the network while at home or on sabbatical. The university's router, the Secure Router 7203dl, will act as the VPN gateway, establishing secure tunnels with remote endpoints using IP security (IPsec) with Internet Key Exchange (IKE).

PCU network administrators reserve a subnet for remote endpoints only. Of course, the remote endpoints have their own IP addresses (public or private) at the remote location. However, when they establish tunnels with the router, IKE mode config assigns them IP addresses in this subnet, as shown in Table 4-3.

Table 4-3. IP Addresses for Remote Users

User Category	Private Subnet	IP Address Range in IKE Client Configuration Pool
Remote users	10.48.100.0/23	10.48.100.10–10.48.101.250

IKE requires the VPN gateway and remote users to authenticate each other. The university already has a full public key infrastructure (PKI), and the domain CA will issue digital certificates to the router and remote users for this authentication.

Because the remote users do not log in with 802.1X authentication, they are no longer subject to the network's endpoint integrity solution, which uses the 802.1X deployment (or quarantine) method. However, checking the integrity of remote endpoints—which are outside the university's control—is particularly important.

Network administrators decide to add a NAC 800 deployed with the inline method. As explained in Chapter 2: "Implementing 802.1X with ProCurve IDM and Endpoint Integrity," ProCurve University has already deployed a management server (MS), so the university's IT staff will configure the new NAC 800 as an enforcement server (ES).

The Secure Router 7000dl, which connects to the LAN on its Ethernet port 0/1, will connect to the NAC 800 on its port 0/2. The router will forward all traffic from the VPN out this port so that it passes through the NAC 800 before reaching the private network. The core routing switch, the NAC 800, and the router's Ethernet 0/2 port will all have IP addresses on the same subnet—in this example, 10.3.0.0/24.

Figure 4-1 shows a high-level network design.

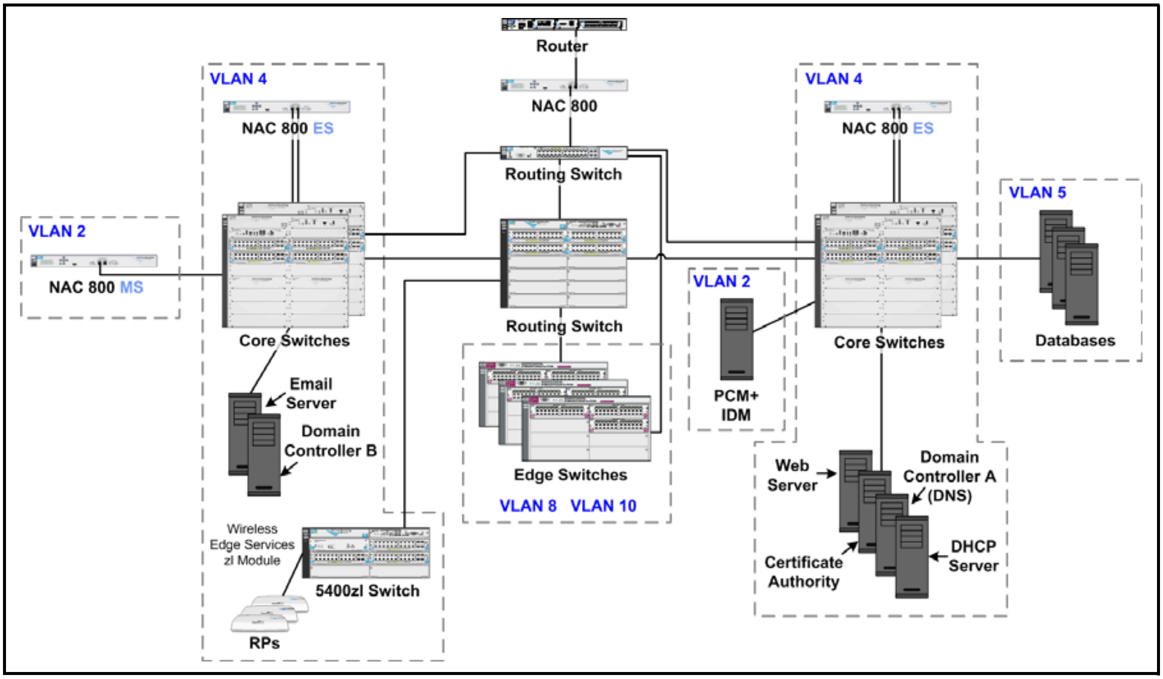


Figure 4-1. High-Level Network Design for ProCurve University

The instructions in this chapter sometimes require that you enter a specific IP address. Table 4-4 lists the IP addresses you would use for the example ProCurve University network. The table also provides spaces to list the IP addresses and VLANs for your company's network. You can easily replace the IP address given in the instructions with the correct address in your environment.

Table 4-4. Example IP Addresses

Device	Example IP Address	Example VLAN ID	Your Company's IP Address	Your Company's VLAN ID
Domain controller	10.4.4.15	4		
DNS servers	10.4.4.15 10.4.5.15	4		
DHCP server	10.4.4.20	4		
CA server	10.4.4.25	4		
PCM+/IDM server	10.4.4.30	4		
University Web server	10.4.6.30	4		
Library Web server	10.4.6.35	4		
Email server	10.4.6.40	4		
Grade database	10.5.1.45	5		
Test database	10.5.2.50	5		
Other servers and databases				
Secure Router 7000dl	Ethernet 0/1—10.2.0.100 Ethernet 0/2—10.3.0.100 WAN—192.168.1.1	No VLANs		
Routing Switch A	• 10.2.0.1 • 10.3.0.1 • 10.4.0.1 • 10.5.0.1 • 10.8.0.1 • 10.10.0.1 • 10.32.0.1 • 10.33.0.01 • 10.34.0.1 • 10.35.0.1	• 2 • 3 • 4 • 5 • 8 • 10 • 32 • 33 • 34 • 35		

Device	Example IP Address	Example VLAN ID	Your Company's IP Address	Your Company's VLAN ID
Routing Switch B	• 10.2.4.1 • 10.4.4.1 • 10.5.4.1 • 10.8.4.1 • 10.10.4.1 • 10.32.4.1 • 10.33.4.1 • 10.34.4.1 • 10.35.4.1	• 2 • 4 • 5 • 8 • 10 • 32 • 33 • 34 • 35		
Switch A	10.2.0.5	2		
Other switches				
Wireless Edge Services zl Module	10.2.0.20	2		
Redundant Wireless Services zl Module	10.2.0.25	2		
NAC 800 MS	10.2.1.40	2		
NAC 800 ES A	10.4.4.40	4		
NAC 800 ES B	10.4.5.50	4		
NAC 800 ES C	10.3.0.90	2		

Note

The "WAN" IP address in this example is a private IP address. In a production environment, however, it would be a public IP address.

In your network, some servers might run multiple services. For example, the Microsoft domain controllers might run Domain Name System (DNS).

Configuring the ProCurve Switches

This section provides an example configuration for the ProCurve routing switch that connectsto the ProCurve Secure Router 7000dl. For this solution, the routing switch has been configured to exchange routes with the Secure Router 7000dl; the devices use Routing Information Protocol (RIP) version 2.

Refer to the sample configuration as you setup your network. If you needstep-by-step instructions, you should refer to the documentation for your switch.

This solution focuses on remote access only, so it does not show configurations for other core or edge switches. To implement solutions for access control and endpoint integrity in the LAN,see the other chapters in this guide.

Routing Switch startup-config

The following is the startup-config for the routing switch (which is a ProCurve Switch 5400zl Series) used to test this network.

```
; J8692A Configuration Editor; Created on release #K.12.XX
hostname "Routing_Switch"
module 1 type J86xxA
ip routing
snmp-server community "procurvero" Operator
snmp-server community "procurverw" Unrestricted
vlan 1
   name "DEFAULT_VLAN"
   no untagged 1-20
   no ip address
   exit
vlan 2
   name "Management"
   untagged 1-19
   ip helper-address 10.4.4.20
   ip address 10.2.0.1 255.255.0.0
   exit
vlan 3
   name "Inline_NAC"
  untagged 20 //This port connects to the inline NAC 800
ES.//
   ip address 10.3.0.1 255.255.255.0
   exit
```

```
vlan 4
   name "Servers"
   ip address 10.4.0.1 255.255.0.0
   tagged 1-9
   exit
vlan 5
   name "Faculty databases"
   ip address 10.5.0.1 255.255.0.0
   tagged 1-9
   exit
vlan 10
   name "Students"
   ip helper-address 10.4.4.20
   ip address 10.10.0.1 255.255.0.0
   tagged 10-19
   exit
vlan 8
   name "Faculty"
   ip helper-address 10.4.4.20
   ip address 10.8.0.1 255.255.0.0
   tagged 10-19
   exit
vlan 32
   name "Quarantine_Faculty"
   ip helper-address 10.4.4.20
   ip address 10.32.0.1 255.255.0.0
   tagged 10-19
   exit
vlan 34
   name "Quarantine_Students"
   ip helper-address 10.4.4.20
   ip address 10.34.0.1 255.255.0.0
   tagged 10-19
   exit
vlan 2100
   name "Radio Ports"
   tagged 1-19
   no ip address
   exit
ip authorized-managers 10.2.0.0 255.255.0.0
ip authorized-managers 10.4.4.40 255.255.255.255
ip authorized-managers 10.4.5.50 255.255.255.255
ip dns domain-name "procurveu.edu"
ip dns server-address 10.4.4.15
ip route 0.0.0.0 0.0.0.0 10.2.0.100
ip route 10.48.100.0 255.254.0.0 10.3.0.100 //Include
this static route to the remote endpoints instead of
activating RIP on the VLAN that connects to the NAC 800.//
router rip
   redistribute connected
   exit
vlan 2
   ip rip 10.2.0.1
vlan 3
  ip rip 10.3.0.1 //Activate RIP on this VLAN instead of
configuring a static route. Make sure that the Secure
Router properly advertises routes.//
exit
```

Configure Windows Services

This solution builds on an existing LAN with Windows Servers 2003 that run Active Directory, DNS, Dynamic Host Configuration Protocol (DHCP), and certificate services. Please refer to Chapter 2: “Implementing 802.1X with ProCurve IDM and Endpoint Integrity” for instructions on the following:

1. Install the Windows Server 2003 (page 2-20).
2. Install Active Directory (page 2-21).
3. Configure Windows domain groups (page 2-28).
4. Configure Windows domain users (page 2-31).
5. Configure DNS services with reverse lookup zones (page 2-35).
6. Install DHCP services (page 2-43).
7. Configure DHCP services (page 2-46).

Configure Certificate Services

This section teaches you how to configure an existing enterprise root CA to issue the certificates necessary for an IPsec VPN. If you have not already installed certificate services, refer to Chapter 2: "Implementing 802.1X with ProCurve IDM and Endpoint Integrity" for instructions on these tasks:

- Install the Certificate Authority service (page 2-56).
- Create a Management Console for the CA (page 2-76).

You must then complete these tasks:

- Customize certificate templates for:
  - VPN clients
  - VPN gateway (Secure Router 7000dl)
- Export the Certificate Revocation List (CRL).
- Verify the CA certificate has the correct key size.

You will complete these tasks later in the configuration process:

- Issue a certificate to the router (see "Submit the Certificate Request to the CA Server" on page 4-112).
- Issue the VPN client certificates (see "Submit the Certificate Request to the CA" on page 4-165).

You have several options for installing VPN client certificates on remote endpoints. This solution will discuss two:

- Network administrators obtain certificates for VPN users.

  They generate one certificate for each set of users and distribute the certificate, protected with a password, as part of the ProCurve VPN Client installation package.
- Users obtain their own certificates.

  They connect to the CA from the remote endpoint and request their own certificate.

Note

When you generate certificates and import certificates, you can avoid unnecessary problems by making sure that all your devices are set to the correct time. For example, if the CA server has a later time than the device importing the certificate, you will receive an error message, telling you that the certificate is not yet valid.

Customize a Template for VPN Client Certificates

A VPN client requires a certificate with key usages for client authentication and digital signatures. The template for such a certificate on the Windows CA is Authenticated Session. However, you might need to modify the template for your solution.

Template for VPN Client Certificate Obtained Via a Manual Request

By default, the subject name for an Authenticated Session certificate comes from Active Directory. However, you might want control the subject name manually. In this case, network administrators should obtain the certificates and distribute them with the VPN Client.

This solution uses a template with the following characteristics:

- The subject name should be generated from the certificate request rather than from Active Directory.

  The Secure Router 7000dl will identify remote users by the subject names in their certificates, checking the names against entries in a remote ID list. In all but the smallest networks, creating an entry for each separate user is not feasible. Instead, you will set up two entries: one for faculty members and one for students.

  Distinguishing the two types of users is important because the Secure Router 7000dl will use the remote ID to assign remote endpoints to the proper crypto map entry. The crypto map entry, in turn, will specify the ACL that controls which resources the user can access over the VPN tunnel.

  In the example, faculty members and students are in the same OU (Users), so if the subject name were taken from Active Directory, the two types of user could not be easily distinguished. Instead the subject name should be configured manually in the certificate request.

Note If your users are divided into different OUs, the subject name can be generated from the certificate request.

- Network administrators will be responsible for obtaining certificates for the ProCurve VPN Clients. You must set permissions accordingly.

  For tighter security, network administrators—not remote users—must generate the certificate request. Otherwise, a student could request a subject name with the OU set to Faculty and receive rights to faculty resources.

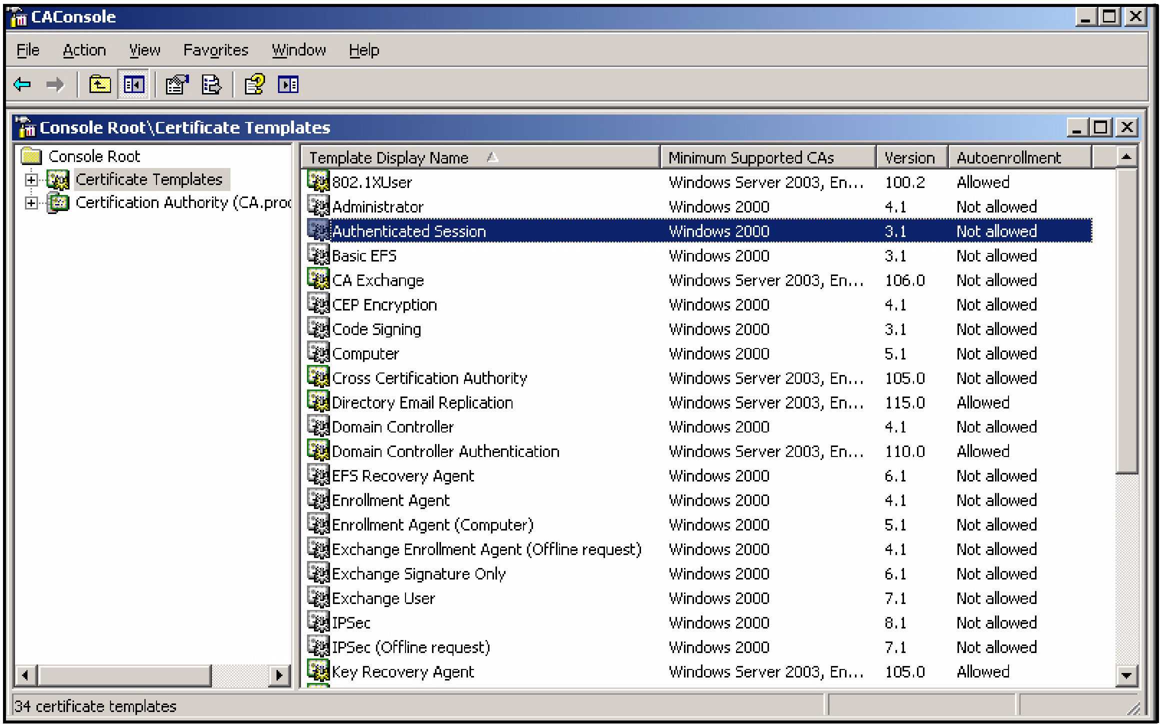
- You should allow the private key to be exported.

  To ease management, PCU network administrators will create only one certificate for each user group. They will then password protect the certificate and distribute it with the ProCurve VPN Client installation package. For this solution to function, the private key must be exportable.

Follow these steps to customize the Authenticated Session template for your environment:

1. Open a Management Console that has the Certificate Templates and the Certificate Authority snap-ins. (See “Create a Management Console for the CA” on page 2-76 of Chapter 2: “Implementing 802.1X with ProCurve IDM and Endpoint Integrity.”)

2. Select **Certificate Templates** in the left pane of the console window.



Template Display Name	Minimum Supported CAs	Version	Autoenrollment
802.1XUser	Windows Server 2003, En...	100.2	Allowed
Administrator	Windows 2000	4.1	Not allowed
Authenticated Session	Windows 2000	3.1	Not allowed
Basic EFS	Windows 2000	3.1	Not allowed
CA Exchange	Windows Server 2003, En...	106.0	Not allowed
CEP Encryption	Windows 2000	4.1	Not allowed
Code Signing	Windows 2000	3.1	Not allowed
Computer	Windows 2000	5.1	Not allowed
Cross Certification Authority	Windows Server 2003, En...	105.0	Not allowed
Directory Email Replication	Windows Server 2003, En...	115.0	Allowed
Domain Controller	Windows 2000	4.1	Not allowed
Domain Controller Authentication	Windows Server 2003, En...	110.0	Allowed
EFS Recovery Agent	Windows 2000	6.1	Not allowed
Enrollment Agent	Windows 2000	4.1	Not allowed
Enrollment Agent (Computer)	Windows 2000	5.1	Not allowed
Exchange Enrollment Agent (Offline request)	Windows 2000	4.1	Not allowed
Exchange Signature Only	Windows 2000	6.1	Not allowed
Exchange User	Windows 2000	7.1	Not allowed
IPSec	Windows 2000	8.1	Not allowed
IPSec (Offline request)	Windows 2000	7.1	Not allowed
Key Recovery Agent	Windows Server 2003, En...	105.0	Allowed

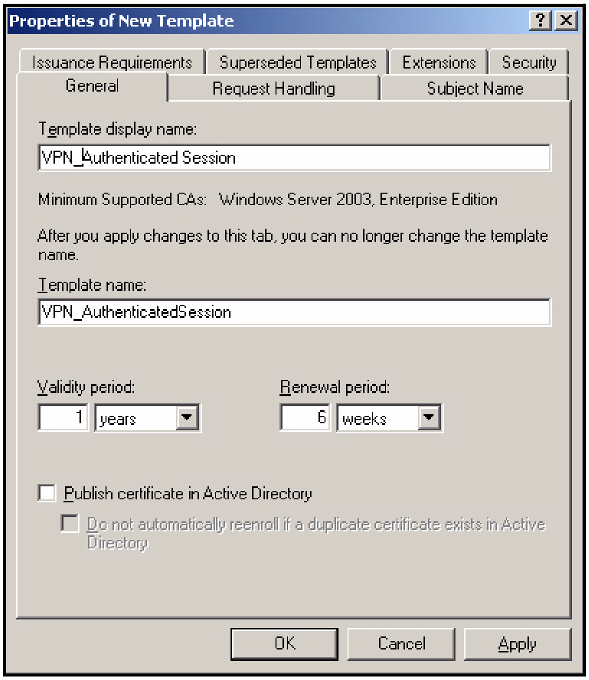
34 certificate templates

Figure 4-2. Duplicate Authenticated Session Template

3. Right-click **Authenticated Session** in the right pane.

4. In the menu that is displayed, select **Duplicate Template**. The **Properties of New Template** window is displayed.

5. At the **General** tab, type a new name fo the template in the **Template display name** box. In this example: **VPN_Authenticated Session**.



Properties of New Template

Template display name: VPN_Authenticated Session

Minimum Supported CAs: Windows Server 2003, Enterprise Edition

After you apply changes to this tab, you can no longer change the template name.

Template name: VPN_AuthenticatedSession

Validity period: 1 years

Renewal period: 6 weeks

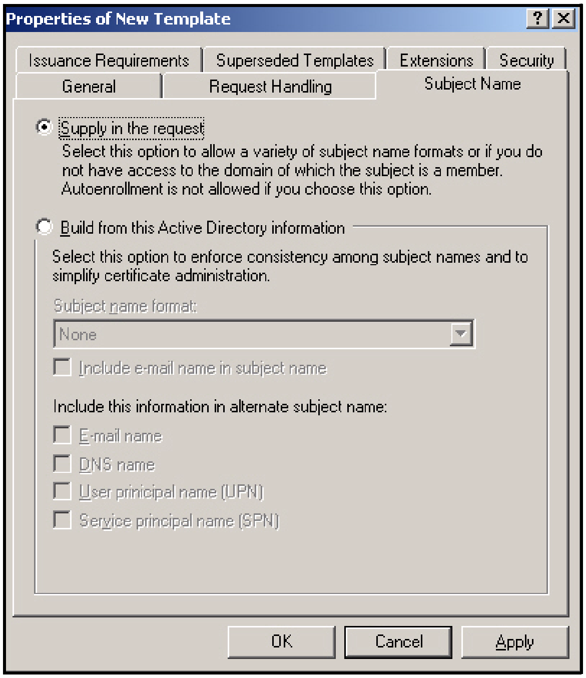
□ Publish certificate in Active Directory

□ Do not automatically reenroll if a duplicate certificate exists in Active Directory

Figure 4-3. Properties of New Template > General Tab

6. Click the **Subject Name** tab.

7. As explained earlier, the subject name in the certificate should be specified manually in the certificate request. Select **Supply in the request**.



Properties of New Template

● Supply in the request

Select this option to allow a variety of subject name formats or if you do not have access to the domain of which the subject is a member. Autoenrollment is not allowed if you choose this option.

○ Build from this Active Directory information

Select this option to enforce consistency among subject names and to simplify certificate administration.

Subject name format:

None

□ Include e-mail name in subject name

Include this information in alternate subject name:

□ E-mail name

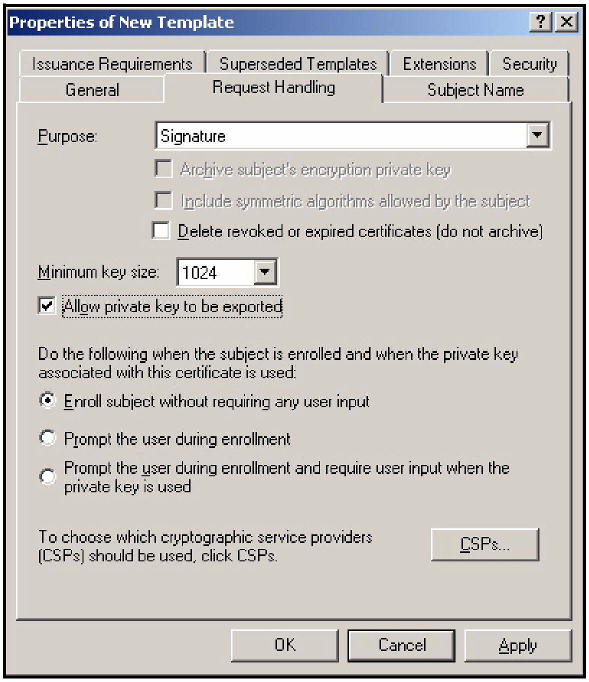
□ DNS name

□ User principal name (UPN)

□ Service principal name (SPN)

Figure 4-4. Properties of New Template > Subject Tab

8. Click the **Request Handling** tab.
9. Select the **Allow private key to be exported** check box.



Properties of New Template

Purpose: Signature

□ Archive subject's encryption private key

□ Include symmetric algorithms allowed by the subject

□ Delete revoked or expired certificates (do not archive)

Minimum key size: 1024

☑ Allow private key to be exported

Do the following when the subject is enrolled and when the private key associated with this certificate is used:

● Enroll subject without requiring any user input

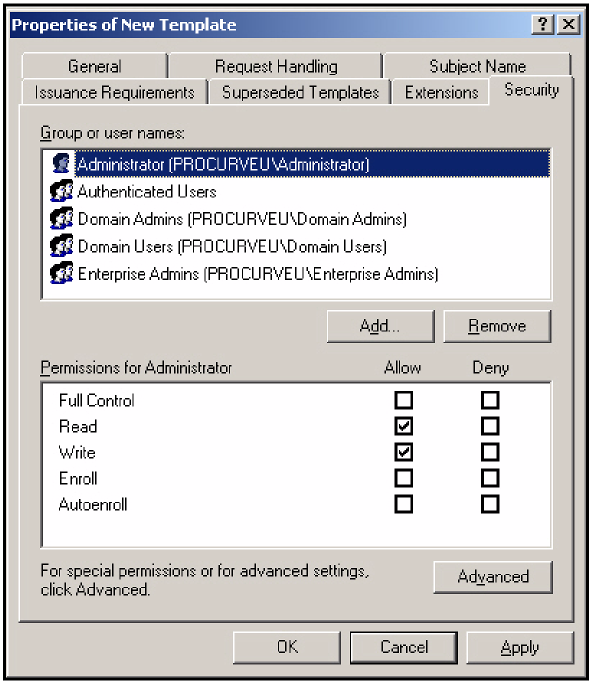
○ Prompt the user during enrollment

○ Prompt the user during enrollment and require user input when the private key is used

To choose which cryptographic service providers (CSPs) should be used, click CSPs.

Figure 4-5. Properties of New Template > Request Handling Tab

10. Click the **Security** tab.



Group or user names:

- Administrator (PROCURVEU\Administrator)
- Authenticated Users
- Domain Admins (PROCURVEU\Domain Admins)
- Domain Users (PROCURVEU\Domain Users)
- Enterprise Admins (PROCURVEU\Enterprise Admins)

Permissions for Administrator	Allow	Deny
Full Control	□	□
Read	☑	□
Write	☑	□
Enroll	□	□
Autoenroll	□	□

For special permissions or for advanced settings, click Advanced.

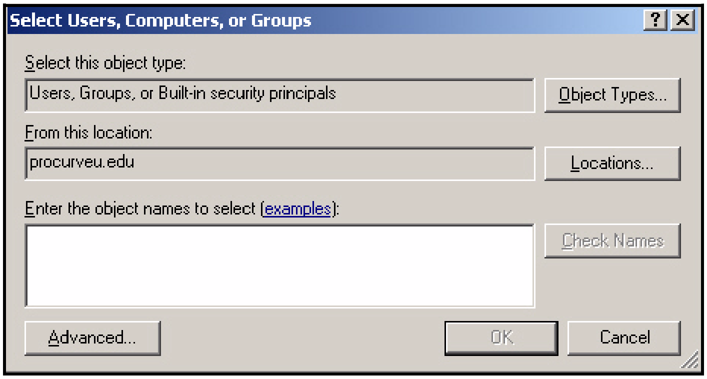
Figure 4-6. Properties of New Template > Security Tab

11. Because the certificate's subject name helps to control the user's remote access, you want to make sure the request includes the correct information. You will allow only network administrators to enroll users for the certificates:

    a. Select **Domain Users** and click **Remove**.

    b. Select **Domain Admins** and **Enterprise Admins** and clear the **Enroll** check boxes.

    c. Click **Add**.



Select Users, Computers, or Groups

Select this object type:

Users, Groups, or Built-in security principals

From this location:

procurveu.edu

Enter the object names to select (examples):

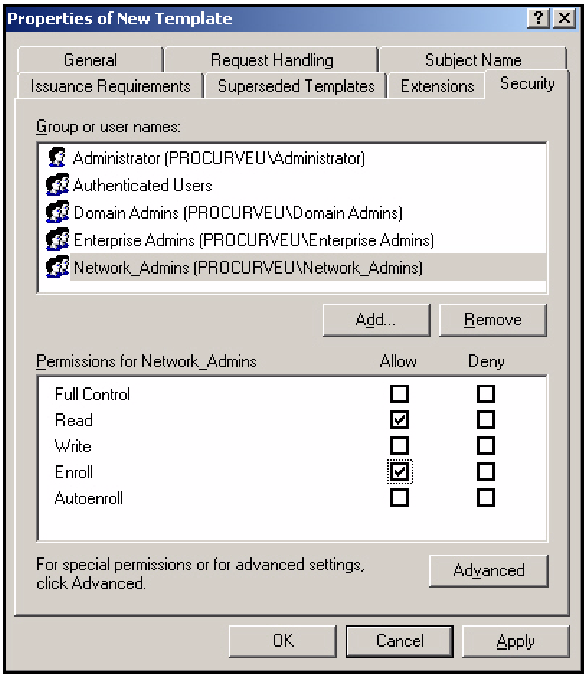
Figure 4-7. Select Users, Computers, or Groups Window

d. In the **Enter the object name to select** box, type the name of the group for network administrators. In this example: **Network_Admins**.

e. Click **Check Names** to verify that you typed the name correctly; the name should become underlined.

f. Click **OK**.

12. At the **Security** tab in the **Properties** window, select the name of the object you added and select the **Enroll** check box.



Group or user names:

- Administrator (PROCURVEU\Administrator)
- Authenticated Users
- Domain Admins (PROCURVEU\Domain Admins)
- Enterprise Admins (PROCURVEU\Enterprise Admins)
- Network_Admins (PROCURVEU\Network_Admins)

Permissions for Network_Admins	Allow	Deny
Full Control	□	□
Read	☑	□
Write	□	□
Enroll	☑	□
Autoenroll	□	□

For special permissions or for advanced settings, click Advanced.

Figure 4-8. Properties of New Template > Security Tab

13. Click **OK**.

Template for a VPN Client Certificate with an Automatically Generated Subject Name

The subject name in a user's digital certificate affects his or her level of access. The subject name can be automatically generated from Active Directory, as long as Active Directory organizes users in the same way that you want to organize them in your VPN.

This solution uses a template with the following characteristics:

- The subject name should be generated from Active Directory.

  In this solution, users are divided into two OUs in Active Directory: Faculty or Students. The router's remote ID list has two corresponding entries, which match users to a crypto map entry (and ACL) based on the OU in the subject name.

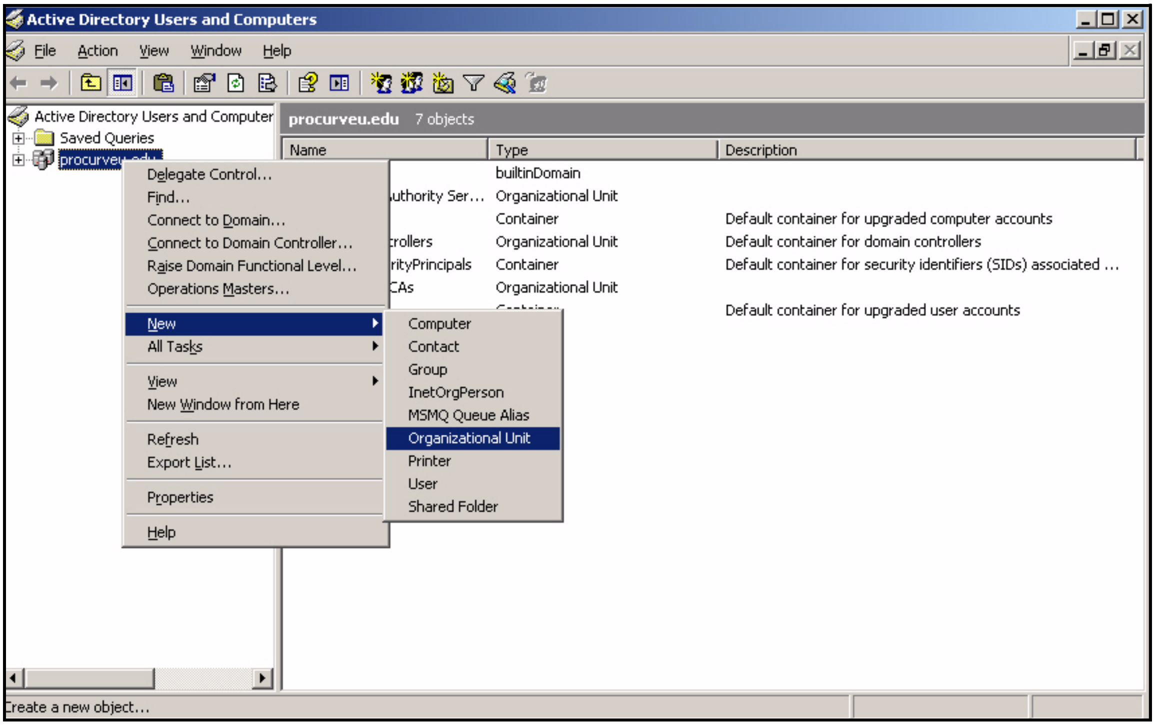
By default, the Authenticated Session template generates the subject name from Active Directory, so you do not need to change this setting. (See "Create New OUs in Active Directory" on page 4-22 if you need instructions on setting up a new OU and moving users into it.)

- Users allowed remote access become members of a new group, called, in this example, VPN. These users will be responsible for enrolling for certificates. You must set permissions accordingly.

  See "Create Groups for VPN Users" on page 4-25 if you need instructions on setting up the group.

Create New OUs in Active Directory. Follow these steps to create new OUs:

1. From the Windows **Start** menu, select **Administrative Tools** > **Active Directory Users and Computers**. Right-click the domain name and select **New** > **Organizational unit**.

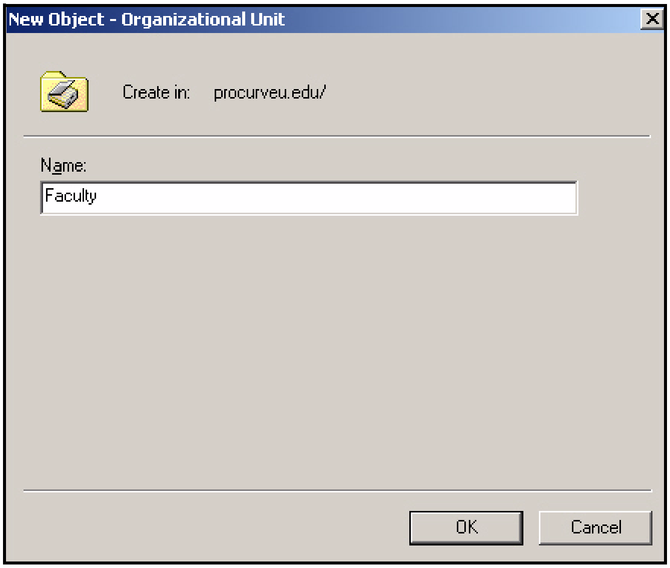


Name	Type	Description
	builtinDomain	
uthority Ser...	Organizational Unit	
	Container	Default container for upgraded computer accounts
trollers	Organizational Unit	Default container for domain controllers
rityPrincipals	Container	Default container for security identifiers (SIDs) associated ...
CAs	Organizational Unit	
	Container	Default container for upgraded user accounts

Create a new object...

Figure 4-9. Active Directory Users and Computers Window

2. In the **New Object - Organization Unit** window, type the new OU's name. In this example: **Faculty**.



New Object - Organizational Unit

Create in: procurveu.edu/

Name: Faculty

Figure 4-10. New Object - Organization Unit Window

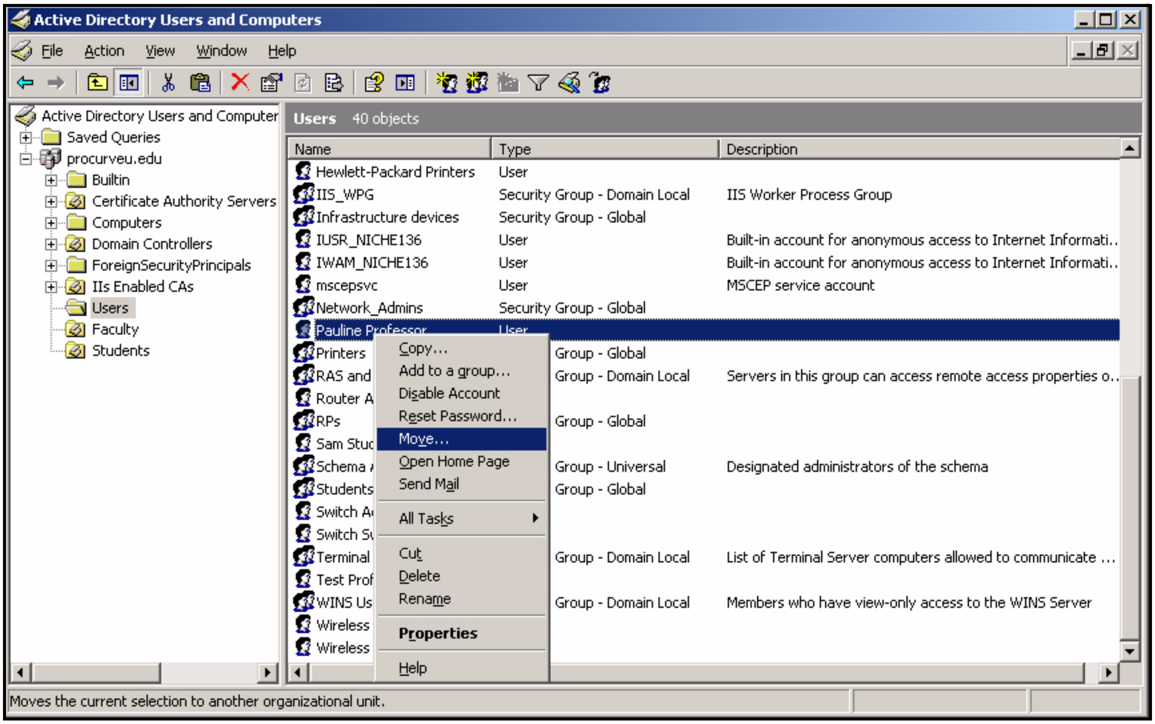
3. Click **OK**.

4. Repeat the steps for each new OU. In this example, you would also create an OU for Students.

5. Move users into the correct OU:

   a. In the Active Directory Users and Computers window, navigate to the user object.

   b. Right-click the user's name and click **Move**.



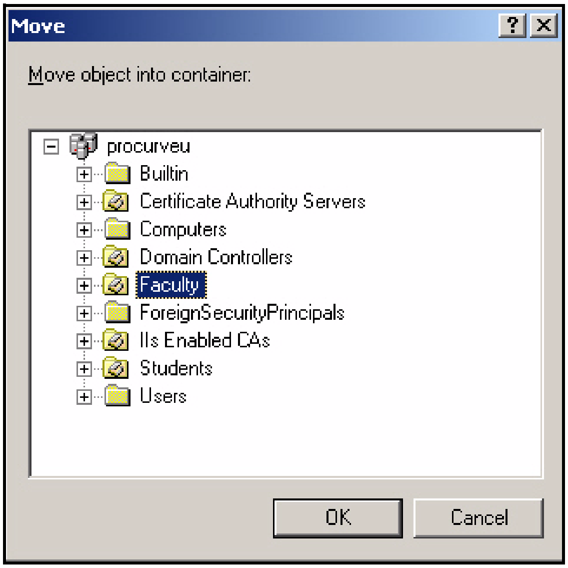
Users 40 objects

Name	Type	Description
Hewlett-Packard Printers	User	
IIS_WPG	Security Group - Domain Local	IIS Worker Process Group
Infrastructure devices	Security Group - Global	
IUSR_NICHE136	User	Built-in account for anonymous access to Internet Informati..
IWAM_NICHE136	User	Built-in account for anonymous access to Internet Informati..
mscepsvc	User	MSCEP service account
Network_Admins	Security Group - Global	
Pauline Professor	User	
Printers	Group - Global	
RAS and	Group - Domain Local	Servers in this group can access remote access properties o..
Router A		
RPs	Group - Global	
Sam Stuc		
Schema /	Group - Universal	Designated administrators of the schema
Students	Group - Global	
Switch A		
Switch S		
Terminal	Group - Domain Local	List of Terminal Server computers allowed to communicate ...
Test Prof		
WINS Us	Group - Domain Local	Members who have view-only access to the WINS Server
Wireless		
Wireless		

Moves the current selection to another organizational unit.

Figure 4-11. Active Directory Users and Computers Window

c. In the **Move** window, select the new OU for the user.



Move

Move object into container:

- procurveu
  - Builtin
  - Certificate Authority Servers
  - Computers
  - Domain Controllers
  - Faculty
  - ForeignSecurityPrincipals
  - IIs Enabled CAs
  - Students
  - Users

Figure 4-12. Move Window

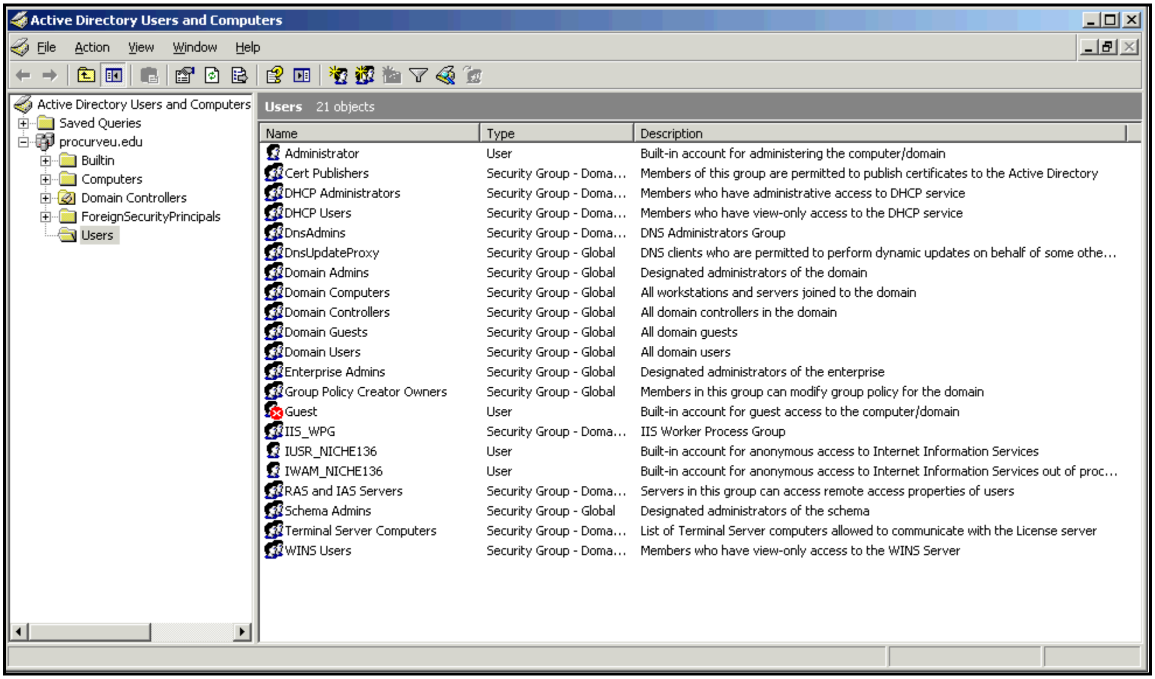
d. Click **OK**.

6. Press **[Alt]**+**[F4]** to close the window.

Create Groups for VPN Users. Follow these steps to create groups for VPN users:

1. From the Windows **Start** menu, select **Administrative Tools** > **Active Directory Users and Computers**.

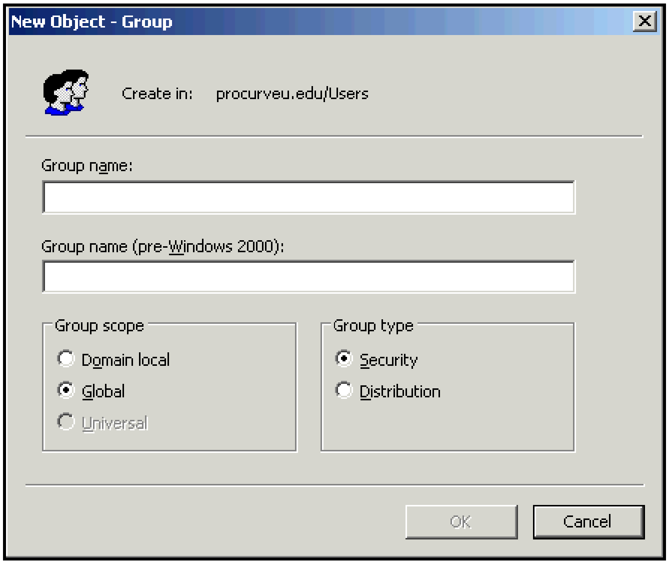
2. Expand the domain.



Name	Type	Description
Administrator	User	Built-in account for administering the computer/domain
Cert Publishers	Security Group - Doma...	Members of this group are permitted to publish certificates to the Active Directory
DHCP Administrators	Security Group - Doma...	Members who have administrative access to DHCP service
DHCP Users	Security Group - Doma...	Members who have view-only access to the DHCP service
DnsAdmins	Security Group - Doma...	DNS Administrators Group
DnsUpdateProxy	Security Group - Global	DNS clients who are permitted to perform dynamic updates on behalf of some othe...
Domain Admins	Security Group - Global	Designated administrators of the domain
Domain Computers	Security Group - Global	All workstations and servers joined to the domain
Domain Controllers	Security Group - Global	All domain controllers in the domain
Domain Guests	Security Group - Global	All domain guests
Domain Users	Security Group - Global	All domain users
Enterprise Admins	Security Group - Global	Designated administrators of the enterprise
Group Policy Creator Owners	Security Group - Global	Members in this group can modify group policy for the domain
Guest	User	Built-in account for guest access to the computer/domain
IIS_WPG	Security Group - Doma...	IIS Worker Process Group
IUSR_NICHE136	User	Built-in account for anonymous access to Internet Information Services
IWAM_NICHE136	User	Built-in account for anonymous access to Internet Information Services out of proc...
RAS and IAS Servers	Security Group - Doma...	Servers in this group can access remote access properties of users
Schema Admins	Security Group - Global	Designated administrators of the schema
Terminal Server Computers	Security Group - Doma...	List of Terminal Server computers allowed to communicate with the License server
WINS Users	Security Group - Doma...	Members who have view-only access to the WINS Server

Figure 4-13. Active Directory Users and Computers Window

3. In the left pane, right-click **Users** and select **New** > **Group**.


New Object - Group

Create in: procurveu.edu/Users

Group name:

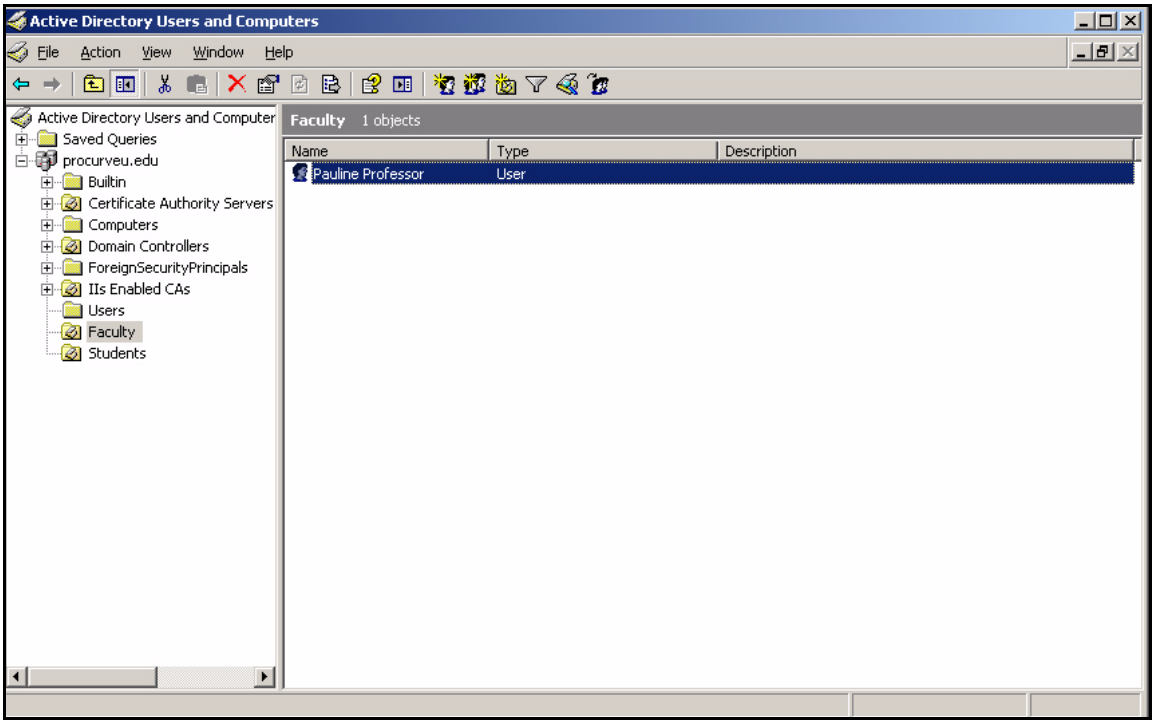
Group name (pre-Windows 2000):

Group scope
○ Domain local
● Global
○ Universal

Group type
● Security
○ Distribution

Figure 4-14. New Object – Group Window

4. Type the group name in the **Group name** box. In this example: **VPN**.
5. Accept the default setting of **Global** for the **Group scope** and **Security** for the **Group type**.
6. Click **OK**.
7. Add users who require remote access to the new group:
   a. Expand an OU that contains VPN users. In this example: **Faculty** or **Students**.



Name	Type	Description
Pauline Professor	User	

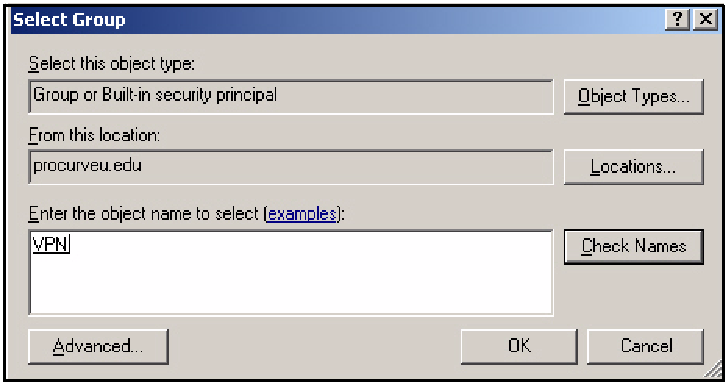
Figure 4-15. Active Directory Users and Computers Window > <*My OU*>

b. Right-click the user and, in the menu that is displayed, click **Properties**.

c. Click the **Member Of** tab and click **Add**.

d. In the **Enter the object names to select** box, type the name of the appropriate group. For the example network, you would type **VPN**.

e. Click **Check Names**. If the group name is valid, it will be underlined.



Select this object type:
Group or Built-in security principal

From this location:
procurveu.edu

Enter the object name to select (examples):
VPN

Figure 4-16. Select Group Window

f. Click **OK**.

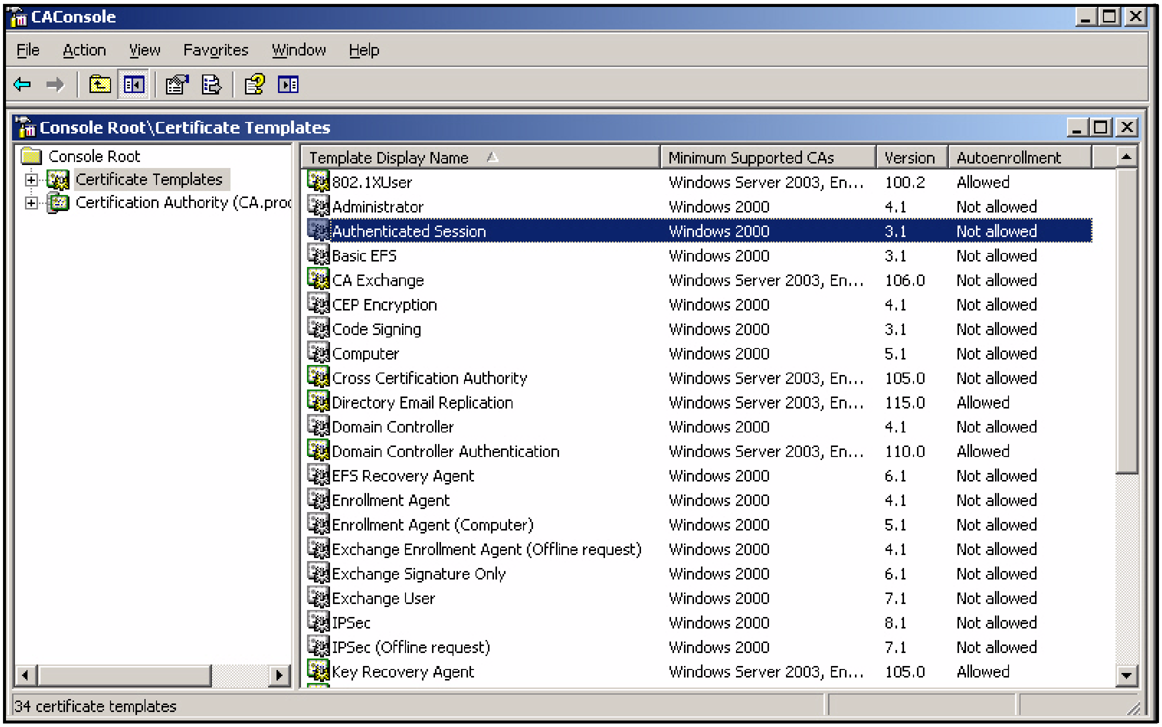
g. The group is displayed in the **Member Of** window. Click **OK** to apply the changes.

h. Repeat until you have added the membership to all VPN users.

8. Press **[Alt]**+**[F4]** to close the window.

Set Permissions in the Authenticated Session Template. Follow these steps to customize the Authenticated Session template for your environment:

1. Open a Management Console that has the Certificate Templates and the Certificate Authority snap-ins. (See “Create a Management Console for the CA” on page 2-76 of Chapter 2: “Implementing 802.1X with ProCurve IDM and Endpoint Integrity.”)
2. Select **Certificate Templates** in the left pane of the console window.



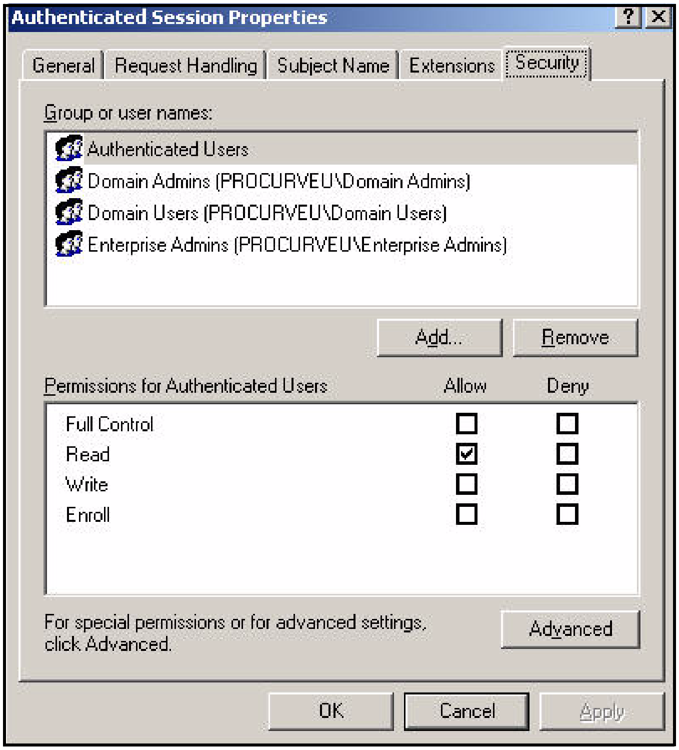
Template Display Name	Minimum Supported CAs	Version	Autoenrollment
802.1XUser	Windows Server 2003, En...	100.2	Allowed
Administrator	Windows 2000	4.1	Not allowed
Authenticated Session	Windows 2000	3.1	Not allowed
Basic EFS	Windows 2000	3.1	Not allowed
CA Exchange	Windows Server 2003, En...	106.0	Not allowed
CEP Encryption	Windows 2000	4.1	Not allowed
Code Signing	Windows 2000	3.1	Not allowed
Computer	Windows 2000	5.1	Not allowed
Cross Certification Authority	Windows Server 2003, En...	105.0	Not allowed
Directory Email Replication	Windows Server 2003, En...	115.0	Allowed
Domain Controller	Windows 2000	4.1	Not allowed
Domain Controller Authentication	Windows Server 2003, En...	110.0	Allowed
EFS Recovery Agent	Windows 2000	6.1	Not allowed
Enrollment Agent	Windows 2000	4.1	Not allowed
Enrollment Agent (Computer)	Windows 2000	5.1	Not allowed
Exchange Enrollment Agent (Offline request)	Windows 2000	4.1	Not allowed
Exchange Signature Only	Windows 2000	6.1	Not allowed
Exchange User	Windows 2000	7.1	Not allowed
IPSec	Windows 2000	8.1	Not allowed
IPSec (Offline request)	Windows 2000	7.1	Not allowed
Key Recovery Agent	Windows Server 2003, En...	105.0	Allowed

34 certificate templates

Figure 4-17. Duplicate Authenticated Session Template

3. Right-click **Authenticated Session** in the right pane. In the menu that is displayed, select **Properties**. The **Properties of Authenticated Session** window is displayed.

4. Click the **Security** tab.



Group or user names:

- Authenticated Users
- Domain Admins (PROCURVEU\Domain Admins)
- Domain Users (PROCURVEU\Domain Users)
- Enterprise Admins (PROCURVEU\Enterprise Admins)

Permissions for Authenticated Users	Allow	Deny
Full Control	□	□
Read	☑	□
Write	□	□
Enroll	□	□

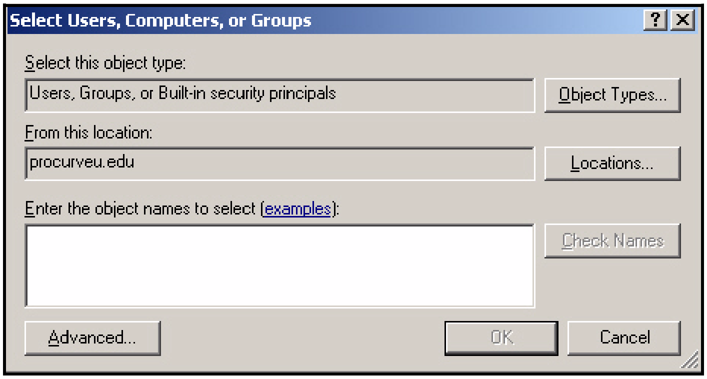
For special permissions or for advanced settings, click Advanced.

Figure 4-18. Properties of New Template > Security Tab

5. You will allow only administrators and users in the VPN group to enroll for certificates.

   a. Select **Domain Users** and click **Remove**.

   b. Click **Add**.



Select Users, Computers, or Groups

Select this object type:

Users, Groups, or Built-in security principals

From this location:

procurveu.edu

Enter the object names to select (examples):

Figure 4-19. Select Users, Computers, or Groups Window

c. In the **Enter the object name to select** box, type the name of the group for network administrators. In this example: **VPN**.

d. Click **Check Names** to verify that you typed the name correctly; the name should become underlined.

e. Click **OK**.

f. At the **Security** tab in the **Properties** window, click the name of the object you added and select the **Enroll** check box.

g. Repeat steps b to f to add another group. In this example: **Students**.

6. Click **OK**.

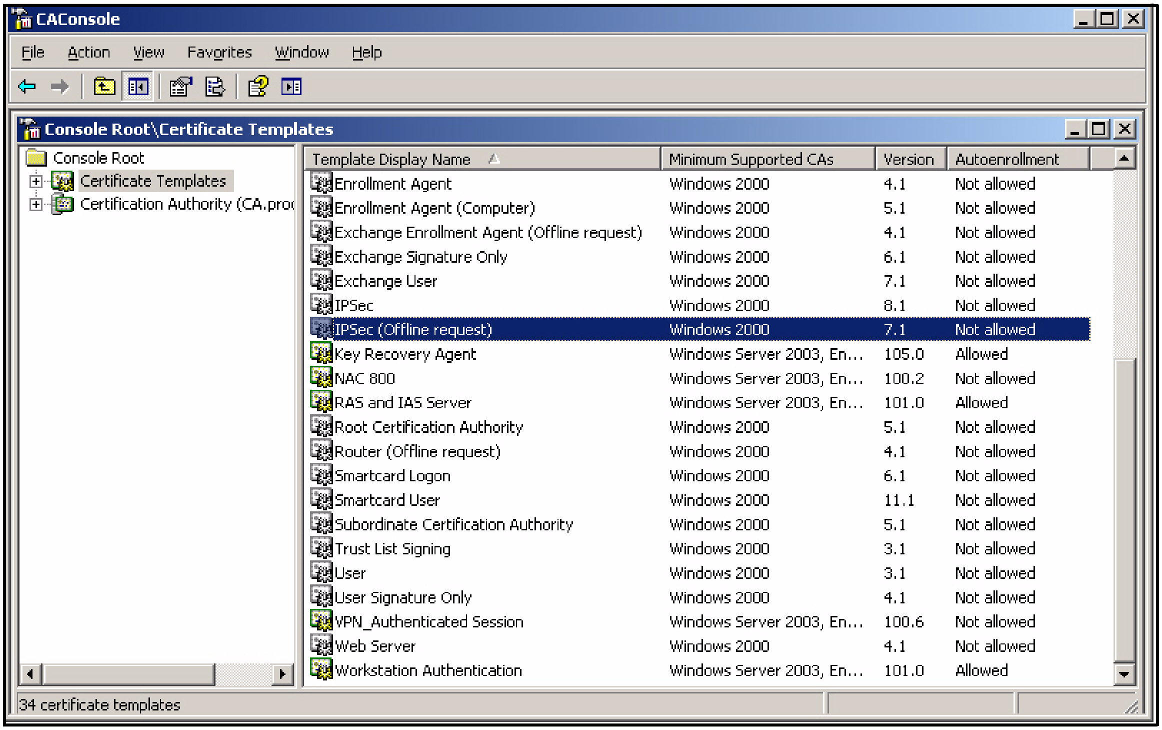
Customize the Template for the Router's IPsec Certificate

Just as VPN clients require certificates, so does the VPN gateway (in this case, the Secure Router 7000dl). You will generate the certificate request on the router itself (see "Generate a Router Certificate Request" on page 4-109), so the correct certificate template on a Windows CA is IPsec (Offline request).

The default template works in this environment. However, depending on how tasks are divided in your network, you might want to grant Read and Enroll permissions for the template specifically to managers of the Secure Router 7000dl. If so, follow these steps:

1. Open the Management Console you configured for the CA. (See "Create a Management Console for the CA" on page 2-76 of Chapter 2: "Implementing 802.1X with ProCurve IDM and Endpoint Integrity.")

2. Select **Certificate Templates** in the left pane of the console window.



CAConsole
File Action View Favorites Window Help
Console Root\Certificate Templates
Console Root
Certificate Templates
Certification Authority (CA.proc

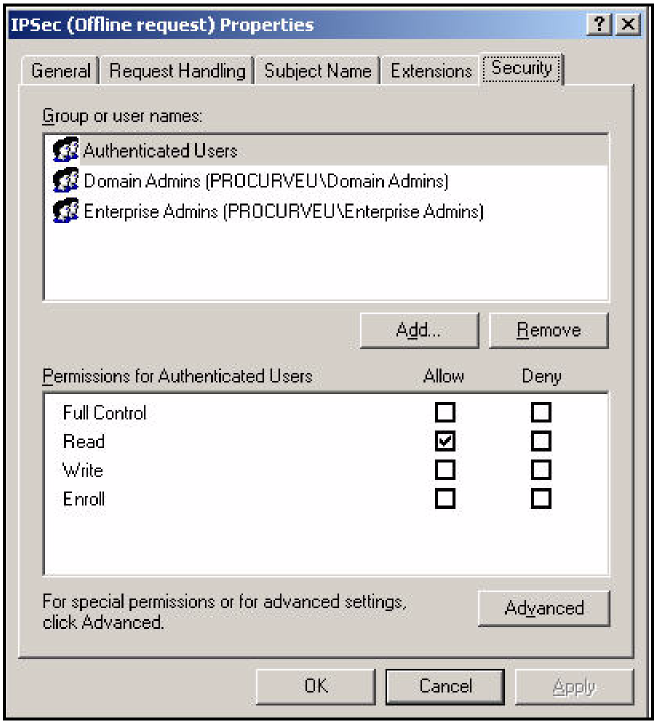
Template Display Name	Minimum Supported CAs	Version	Autoenrollment
Enrollment Agent	Windows 2000	4.1	Not allowed
Enrollment Agent (Computer)	Windows 2000	5.1	Not allowed
Exchange Enrollment Agent (Offline request)	Windows 2000	4.1	Not allowed
Exchange Signature Only	Windows 2000	6.1	Not allowed
Exchange User	Windows 2000	7.1	Not allowed
IPSec	Windows 2000	8.1	Not allowed
IPSec (Offline request)	Windows 2000	7.1	Not allowed
Key Recovery Agent	Windows Server 2003, En...	105.0	Allowed
NAC 800	Windows Server 2003, En...	100.2	Not allowed
RAS and IAS Server	Windows Server 2003, En...	101.0	Allowed
Root Certification Authority	Windows 2000	5.1	Not allowed
Router (Offline request)	Windows 2000	4.1	Not allowed
Smartcard Logon	Windows 2000	6.1	Not allowed
Smartcard User	Windows 2000	11.1	Not allowed
Subordinate Certification Authority	Windows 2000	5.1	Not allowed
Trust List Signing	Windows 2000	3.1	Not allowed
User	Windows 2000	3.1	Not allowed
User Signature Only	Windows 2000	4.1	Not allowed
VPN_Authenticated Session	Windows Server 2003, En...	100.6	Not allowed
Web Server	Windows 2000	4.1	Not allowed
Workstation Authentication	Windows Server 2003, En...	101.0	Allowed

34 certificate templates

Figure 4-20. Management Console > Certificate Templates

3. Double-click **IPSec (Offline request)** in the right pane.

4. In the **IPSec (Offline request) Properties** window, click the **Security** tab.



IPSec (Offline request) Properties

Group or user names:

- Authenticated Users
- Domain Admins (PROCURVEU\Domain Admins)
- Enterprise Admins (PROCURVEU\Enterprise Admins)

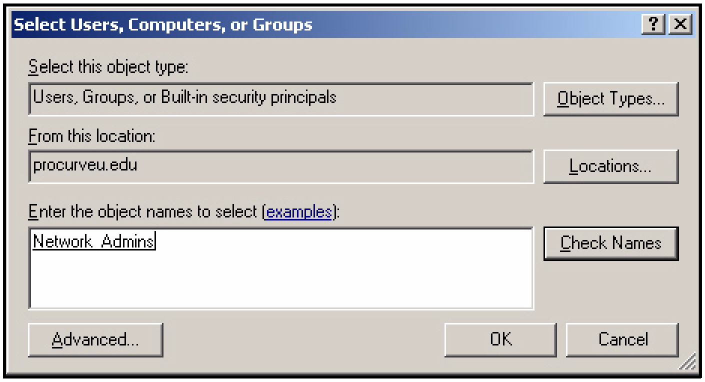
Permissions for Authenticated Users	Allow	Deny
Full Control	□	□
Read	☑	□
Write	□	□
Enroll	□	□

For special permissions or for advanced settings, click Advanced.

Figure 4-21. Properties of New Template > Security Tab

5. Click **Add**.

6. Type the name of the group (or user) that you have decided should obtain the router's certificate. In this example: **Network_Admins**. Click **Check Names**.



Select Users, Computers, or Groups

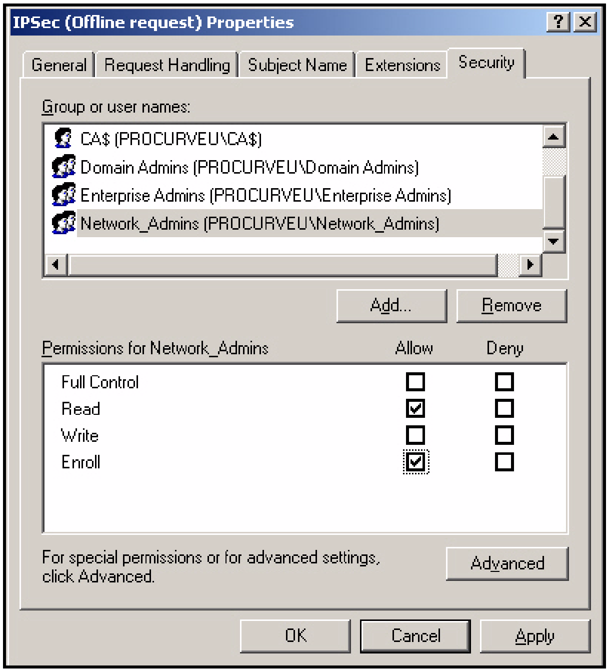
Select this object type: Users, Groups, or Built-in security principals

From this location: procurveu.edu

Enter the object names to select (examples): Network_Admins

Figure 4-22. Select Users, Computers, or Groups Window

7. Click **OK**.
8. At the **Security** tab, select the name of the new group (or user).
9. Select the **Enroll** check box.



IPSec (Offline request) Properties

Group or user names:

- CA$ (PROCURVEU\CA$)
- Domain Admins (PROCURVEU\Domain Admins)
- Enterprise Admins (PROCURVEU\Enterprise Admins)
- Network_Admins (PROCURVEU\Network_Admins)

Permissions for Network_Admins	Allow	Deny
Full Control	□	□
Read	☑	□
Write	□	□
Enroll	☑	□

For special permissions or for advanced settings, click Advanced.

Figure 4-23. Select Users, Computers, or Groups Window

10. If you do not want other types of administrators enrolling VPN gateways for certificates, select **Domain Admins** and clear the **Enroll** check box. Repeat for **Enterprise Admins**.

11. Click **OK**.

Enable Templates on the CA Server

You must enable the two templates so that the CA can issue certificates with them. Follow these steps:

1. Open the Management Console you configured for the CA. (See "Create a Management Console for the CA" on page 2-76 of Chapter 2: "Implementing 802.1X with ProCurve IDM and Endpoint Integrity.")

2. In the left pane of the console, expand **Certification Authority**.

3. Expand the CA server.

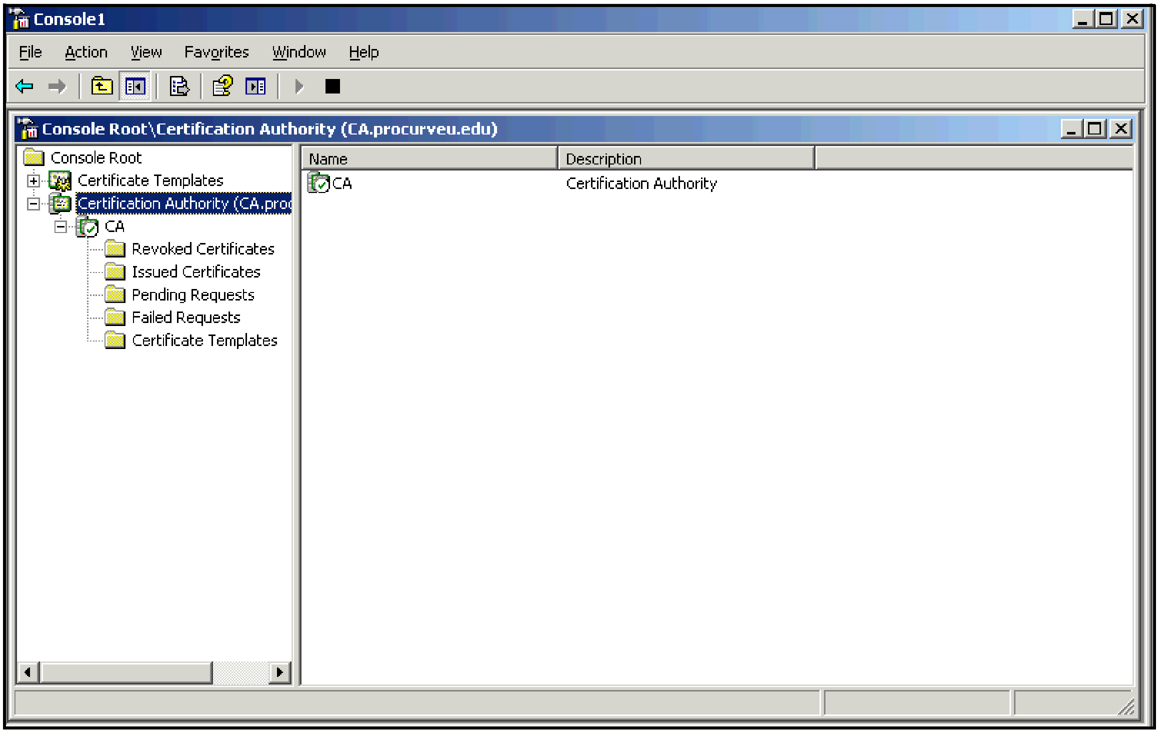
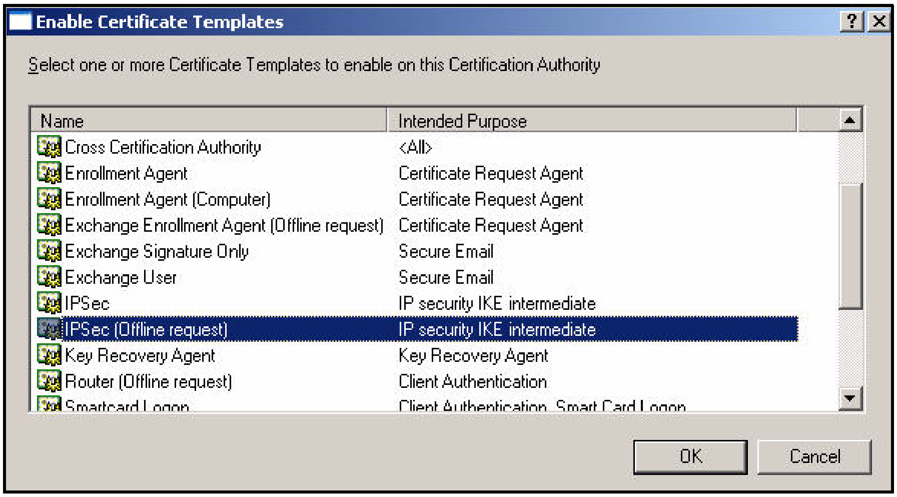


Figure 4-24. Management Console > Certification Authority

4. Right-click **Certificate Templates** and select **New** > **Certificate Template to Issue**.

5. Select **IPSec (Offline request)** in the window that is displayed.



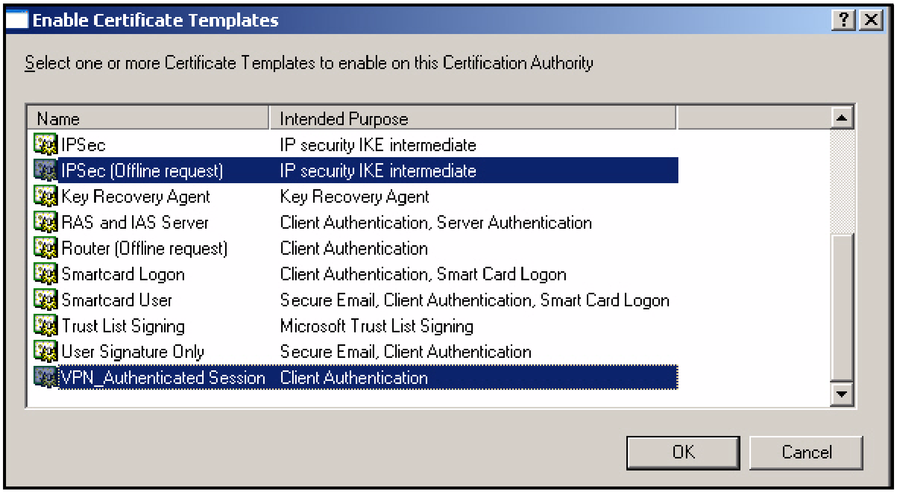
Enable Certificate Templates

Select one or more Certificate Templates to enable on this Certification Authority

Name	Intended Purpose
Cross Certification Authority	<All>
Enrollment Agent	Certificate Request Agent
Enrollment Agent (Computer)	Certificate Request Agent
Exchange Enrollment Agent (Offline request)	Certificate Request Agent
Exchange Signature Only	Secure Email
Exchange User	Secure Email
IPSec	IP security IKE intermediate
IPSec (Offline request)	IP security IKE intermediate
Key Recovery Agent	Key Recovery Agent
Router (Offline request)	Client Authentication
Smartcard Logon	Client Authentication, Smart Card Logon

Figure 4-25. Enable Certificate Templates Window

6. Hold down **[Ctrl]**; scroll to and select**VPN_Authenticated Session** (or**Authenticated Session**).



Enable Certificate Templates

Select one or more Certificate Templates to enable on this Certification Authority

Name	Intended Purpose
IPSec	IP security IKE intermediate
IPSec (Offline request)	IP security IKE intermediate
Key Recovery Agent	Key Recovery Agent
RAS and IAS Server	Client Authentication, Server Authentication
Router (Offline request)	Client Authentication
Smartcard Logon	Client Authentication, Smart Card Logon
Smartcard User	Secure Email, Client Authentication, Smart Card Logon
Trust List Signing	Microsoft Trust List Signing
User Signature Only	Secure Email, Client Authentication
VPN_Authenticated Session	Client Authentication

Figure 4-26. Enable Certificate Templates Window

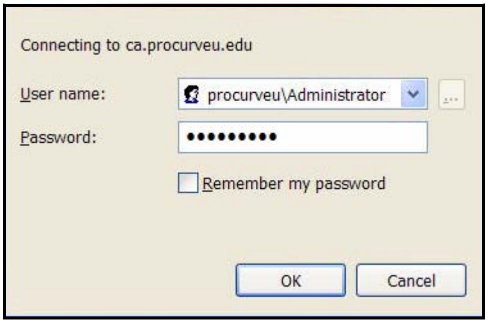
7. Click **OK**.

Export the CRL

In addition to its own certificate, the Secure Router 7000dl requires a CRL, which is a list of certificates that the CA has revoked and that the router should reject. VPN clients should also have the CRL.

In this task, you will export your domain's CRL to a file. Later, you will import this file onto the Secure Router 7000dl and ProCurve VPN Client. One way to export the CRL is through the CA's Web enrollment pages. Follow these steps:

1. Open a Web browser and type this URL: *http://<CA server hostname>/ certsrv*. In this example: *http://ca.procurveu.edu/certsrv*.
2. When prompted, type an administrator's domain credentials:
   a. For the **User name**, use this format: ***<domain>\<username>***. Do not include the top-level domain in the domain name. In this example: **procurveu\Administrator**.
   b. For the **Password**, type the user's password. In this example: **ProCurve0**.


Connecting to ca.procurveu.edu

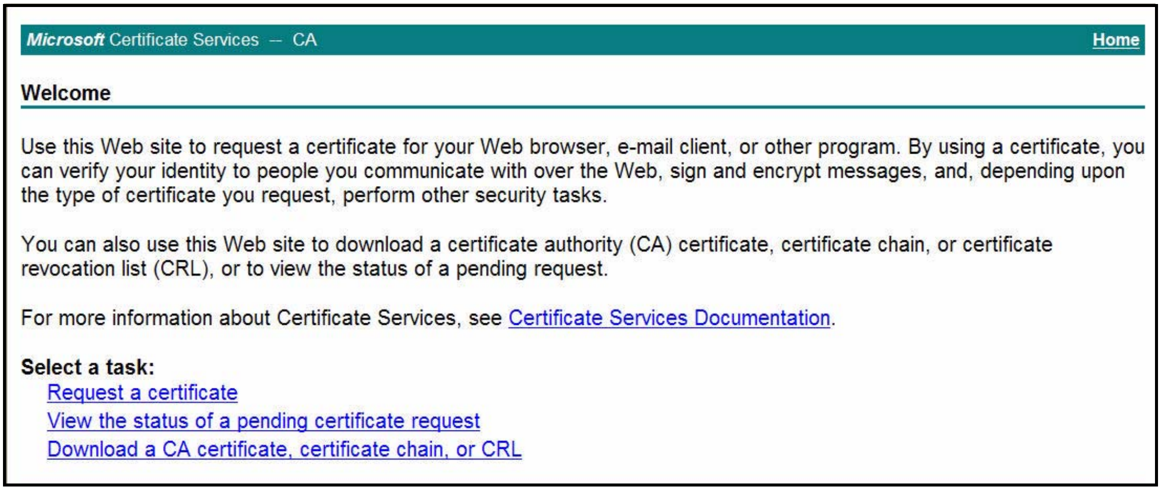
User name: procurveu\Administrator

Password: ●●●●●●●●●●

□ Remember my password

Figure 4-27. Connect to ca.procurveu.edu Window

3. Click **OK**.



Microsoft Certificate Services -- CA

Home

Welcome

Use this Web site to request a certificate for your Web browser, e-mail client, or other program. By using a certificate, you can verify your identity to people you communicate with over the Web, sign and encrypt messages, and, depending upon the type of certificate you request, perform other security tasks.

You can also use this Web site to download a certificate authority (CA) certificate, certificate chain, or certificate revocation list (CRL), or to view the status of a pending request.

For more information about Certificate Services, see Certificate Services Documentation.

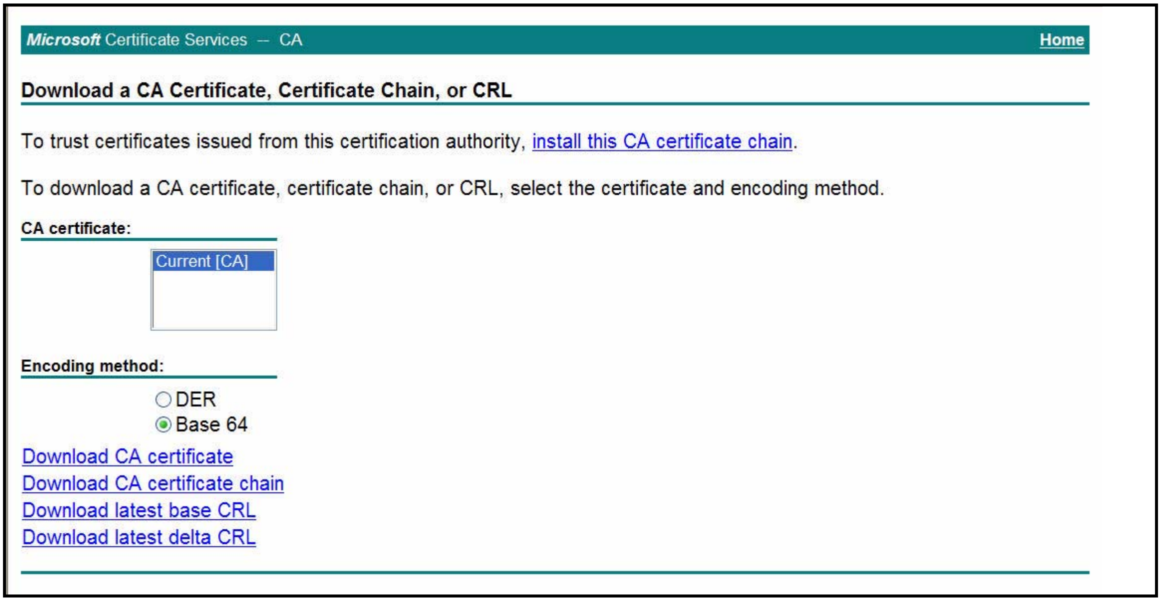
Select a task:

Request a certificate
View the status of a pending certificate request
Download a CA certificate, certificate chain, or CRL

Figure 4-28. Certificate Services > Welcome Page

4. You should see the Welcome page shown in Figure 4-28. Click **Download a CA certificate, certificate chain, or CRL**.

5. For the **Encoding method**, select **Base 64**.



Microsoft Certificate Services -- CA

Home

Download a CA Certificate, Certificate Chain, or CRL

To trust certificates issued from this certification authority, install this CA certificate chain.

To download a CA certificate, certificate chain, or CRL, select the certificate and encoding method.

CA certificate:

Current [CA]

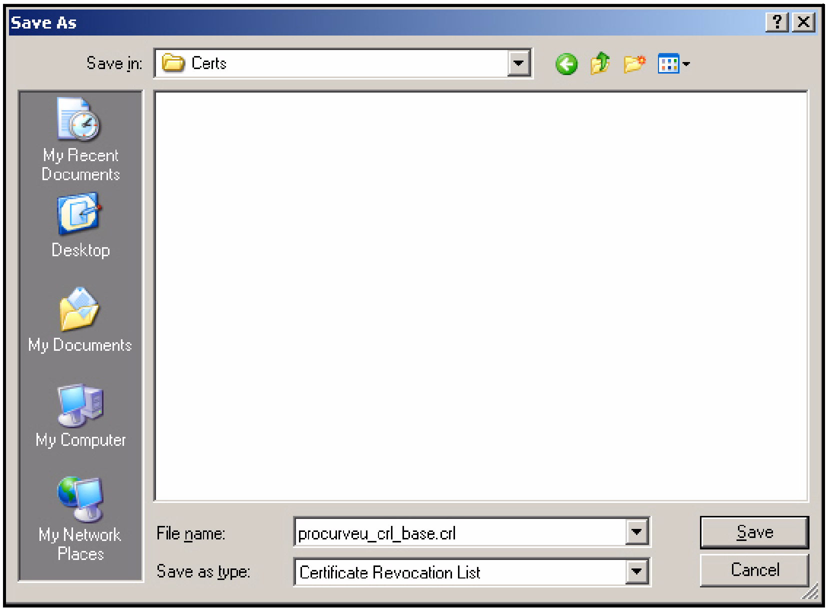
Encoding method:

○ DER
● Base 64

Download CA certificate
Download CA certificate chain
Download latest base CRL
Download latest delta CRL

Figure 4-29. Certificate Services > Download a CA Certificate, Certificate Chain, or CRL Page

6. Click **Download latest base CRL**.
7. If prompted, verify that you want to save the file.
8. In the window that is displayed, navigate to a directory and type a filename.



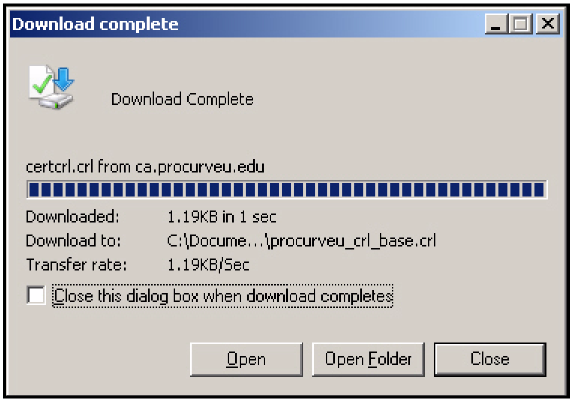
Save in: Certs

File name: procurveu_crl_base.crl

Save as type: Certificate Revocation List

Figure 4-30. Save As Window

9. Click **Save**.
10. In the **Download complete** window, click **Close**.



certcrl.crl from ca.procurveu.edu

Downloaded: 1.19KB in 1 sec
Download to: C:\Docume...\procurveu_crl_base.crl
Transfer rate: 1.19KB/Sec

☐ Close this dialog box when download completes

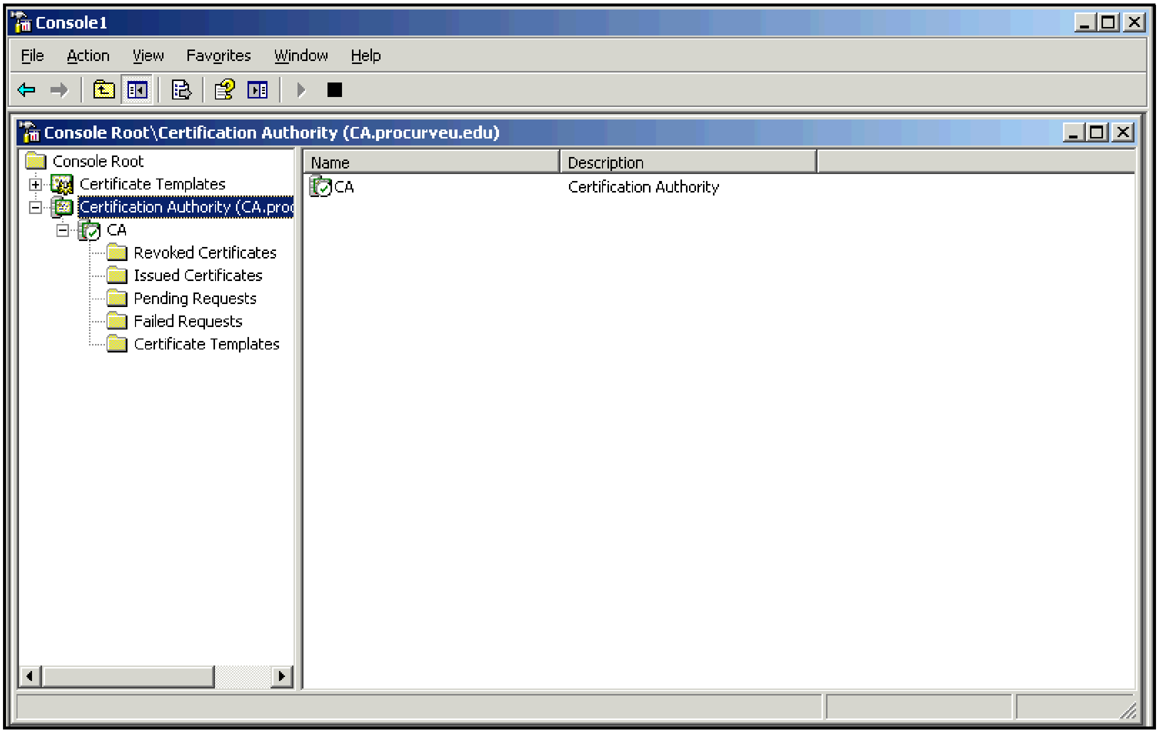
Figure 4-31. Download complete Window

11. Return to the Web page shown in Figure 4-29, click **Download latest delta CRL**.
12. Repeat steps 7 to 10.

Check the Key Size for the CA Root Certificate

The Secure Router 7000dl can import only CA root certificates with a key size less than 2048 bits. To check the key size in your domain CA certificate, follow these steps:

1. Open the Management Console that has the Certificate Authority snap-in.
2. In the left pane of the console, expand **Certification Authority**.



Console1

File Action View Favorites Window Help

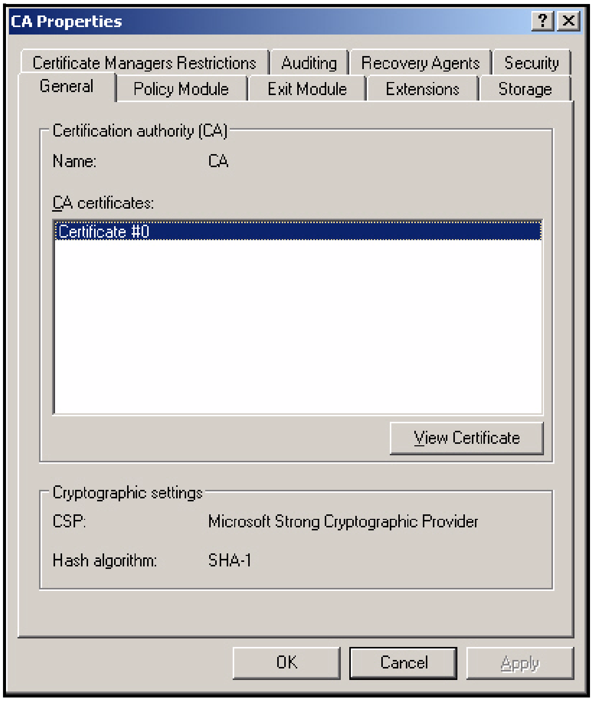
Console Root\Certification Authority (CA.procurveu.edu)

- Console Root
  - Certificate Templates
  - Certification Authority (CA.proc
    - CA
      - Revoked Certificates
      - Issued Certificates
      - Pending Requests
      - Failed Requests
      - Certificate Templates

Name	Description
CA	Certification Authority

Figure 4-32. Management Console > Certification Authority

3. Right-click the CA server. Select **Properties** in the menu that is displayed.



Certification authority (CA)

Name: CA

CA certificates:

Certificate #0

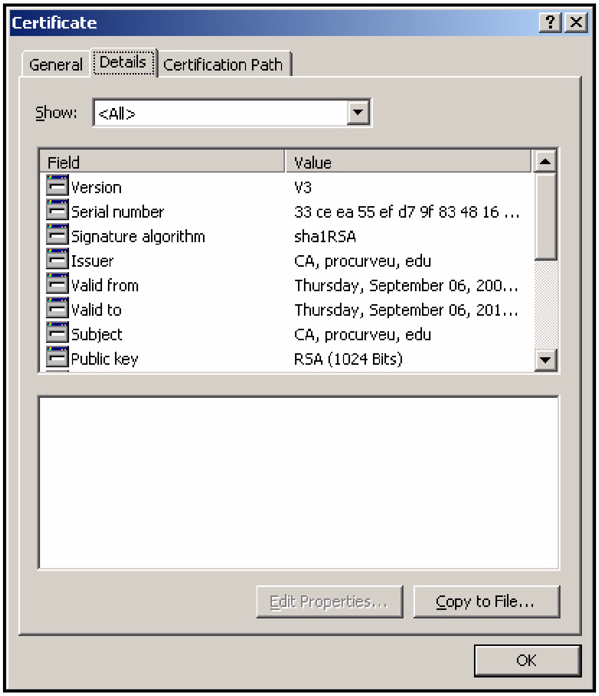
Cryptographic settings

CSP: Microsoft Strong Cryptographic Provider

Hash algorithm: SHA-1

Figure 4-33. CA Properties Window

4. At the **General** tab, select the certificate in the **CA certificates** box.
5. Click **View Certificates**.
6. Click the **Details** tab.



Field	Value
Version	V3
Serial number	33 ce ea 55 ef d7 9f 83 48 16 ...
Signature algorithm	sha1RSA
Issuer	CA, procurveu, edu
Valid from	Thursday, September 06, 200...
Valid to	Thursday, September 06, 201...
Subject	CA, procurveu, edu
Public key	RSA (1024 Bits)

Figure 4-34. Certificate Window > Details Tab

7. Check the key size; it is displayed in the **Value** column for the **Public key**.

8. Close the open windows.

The key in the certificate shown in Figure 4-34 is 1024 bits, so the certificate can be loaded on the Secure Router 7000dl. However, if the key size is 2048 bits, it is too large for the router. You must re-issue the CA root certificate with a key size of 1024 bits. By default, the CA generates a renewal key of the same length as the existing key. You will need to create a policy that allows the key to be 1024 bits.

Follow these steps to create a new CA certificate with a key size of 1024 bits:

1. Open a text editor and type this text:

   ```
   [Version]
   Signature= "$Windows NT$"
   [certsrv_server]
   renewalkeylength=1024
   RenewalValidityPeriodUnits=0x18
   RenewalValidityPeriod=years
   CRLPeriod = days
   CRLPeriodUnits = 2
   CRLDeltaPeriod = hours
   CRLDeltaPeriodUnits = 4
   ```

2. Save the file as **CAPolicy.inf**.
3. Transfer the file to the CA server and copy it to the **Windows** directory.
4. You must complete the next steps on the CA server itself. Open a Management Console that has the Certificate Authority (Local) snap-in.
5. In the left pane of the console, expand **Certification Authority**.

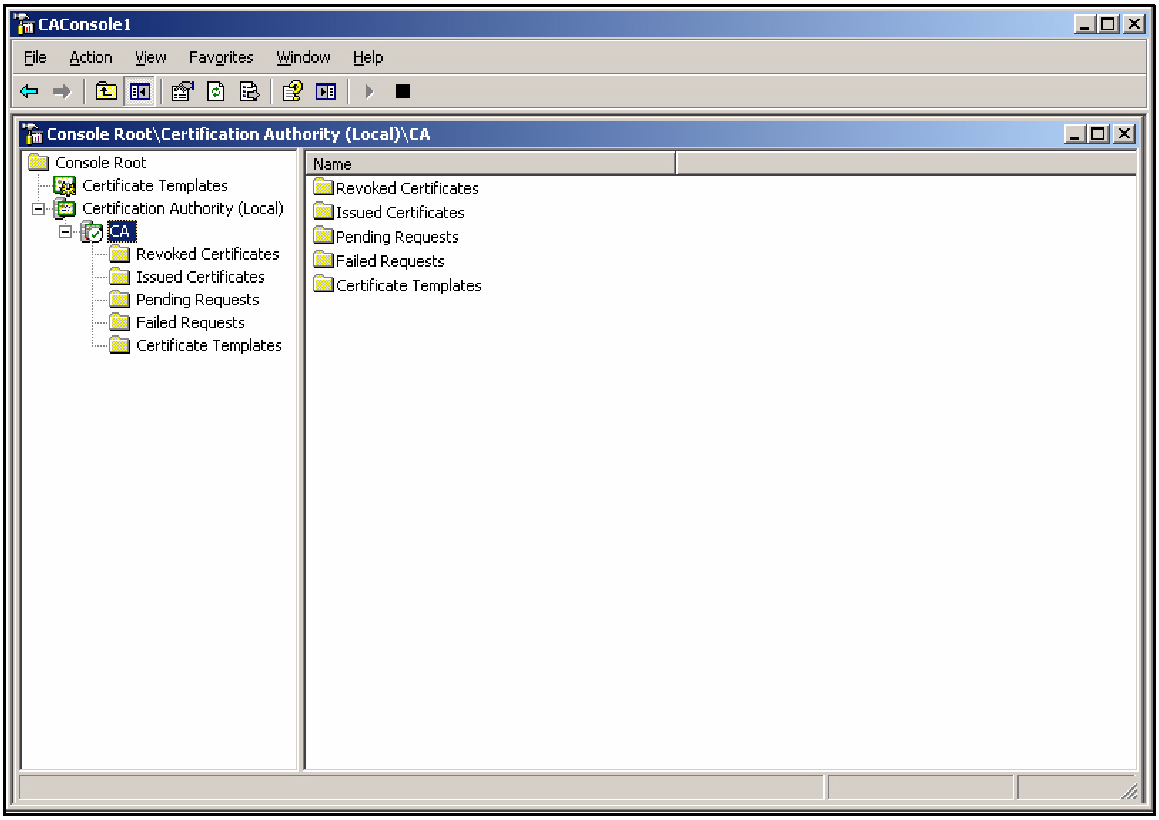
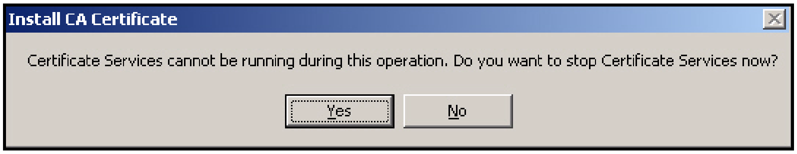


Figure 4-35. Management Console > Certification Authority

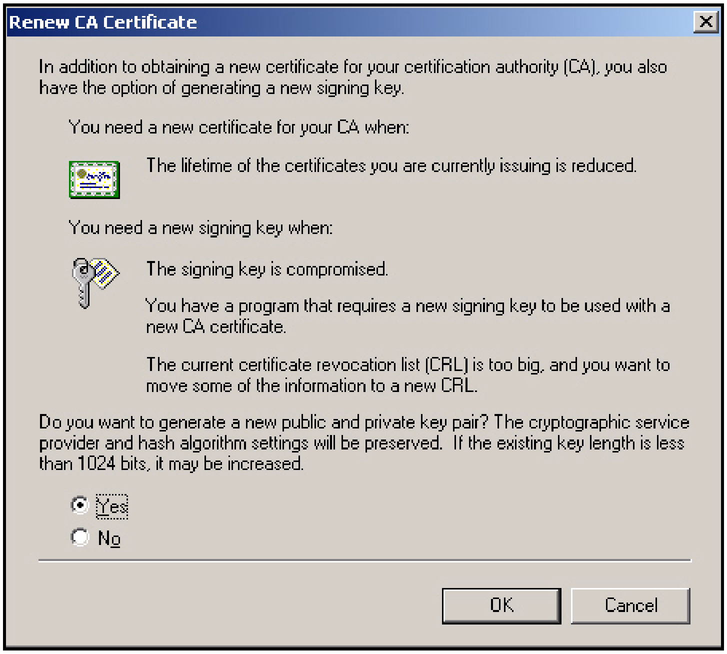
6. Right-click the CA server. In the menu that is displayed, select **All tasks** > **Renew CA certificate**.



Certificate Services cannot be running during this operation. Do you want to stop Certificate Services now?

Figure 4-36. Install CA Certificate Window

7. Click **Yes** in the **Install CA Certificate** window.



Renew CA Certificate

In addition to obtaining a new certificate for your certification authority (CA), you also have the option of generating a new signing key.

You need a new certificate for your CA when:

The lifetime of the certificates you are currently issuing is reduced.

You need a new signing key when:

The signing key is compromised.

You have a program that requires a new signing key to be used with a new CA certificate.

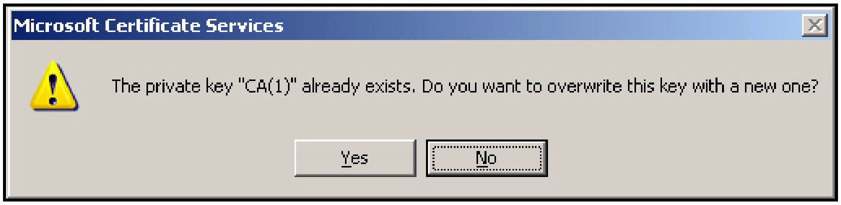
The current certificate revocation list (CRL) is too big, and you want to move some of the information to a new CRL.

Do you want to generate a new public and private key pair? The cryptographic service provider and hash algorithm settings will be preserved. If the existing key length is less than 1024 bits, it may be increased.

● Yes
○ No

Figure 4-37. Renew CA Certificate Window

8. In the **Renew CA Certificate** window, make sure that **Yes** is selected. This setting ensures that the CA generates a new key when it creates the new certificate.



Microsoft Certificate Services

The private key "CA(1)" already exists. Do you want to overwrite this key with a new one?

Figure 4-38. Microsoft Certificate Services Warning Window

9. When asked if you want to overwrite an existing key, click **Yes**.
10. View the new CA root certificate and verify that the key size is 1024 bits (see step 1 on page 4-41 to step 7 on page 4-44).

Configure the ProCurve Secure Router 7000dl

This section teaches you how to set up a Secure Router 7000dl to support VPN connections. It also provides instructions for configuring:

- The router's physical and virtual interfaces
- The routing protocol, in this example, RIPv2
- Network address translation (NAT)
- The access control lists (ACLs) and access control policies (ACPs) applied to the router's Internet interface

Configure the Physical and Virtual Interfaces

After you complete this section, your router will be configured for both a LAN and WAN connection. This section provides only the basic steps. For more detailed information on configuring physical and virtual interfaces, see the *ProCurve Secure Router Basic Management and Configuration Guide*.

Configure the Ethernet Interface

A Secure Router 7000dl has two Ethernet ports: the bottom port is numbered 0/1, and the top port is numbered 0/2. In this example, the 0/1 port connects to a routing switch in the LAN.

Complete these steps to configure the Ethernet interface:

1. Access the Secure Router 7000dl's command line interface (CLI):
   a. Use a serial cable to connect the router's console port to your management station's console port.
   b. Open a session with terminal session software (such as Tera Term). Use these settings:
      – Baud Rate = 9600
      – Parity = None
      – Data Bits = 8
      – Stop Bits = 1
      – Flow Control = None
2. You begin in the basic mode context, from which you can type a limited number of commands. Move to the enable mode context:

```
ProCurveSR7000dl>enable
```

3. Move to the global configuration mode context:

```
ProCurveSR7000dl#configure terminal
ProCurveSR7000dl(config)#
```

4. Configure a hostname for the Secure Router 7000dl:

Syntax: hostname <*hostname*>

Changes the Secure Router 7000dl's hostname, as well as the prompt in the CLI. Replace **<hostname>** *with an alphanumeric string up to 32 characters long.*

For example:

```
ProCurveSR7000dl(config)# hostname SecureRouter
SecureRouter(config)#
```

5. Access the Ethernet configuration mode context:

Syntax: interface ethernet 0/<*port*>

Moves to the specified Ethernet interface. Replace **<port>** *with* **1** *for the bottom port and* **2** *for the top port.*

For example:

```
SecureRouter(config)#interface ethernet 0/1
```

6. You can assign the interface a static IP address or have it request a DHCP address.

Note A static IP address is preferred.

a. To assign a static IP address, type this command:

Syntax: ip address <*A.B.C.D*> <*subnet mask* | /*prefix length*>

Assigns the specified IP address to the interface. You can type the address with a subnet mask or with Classless Interdomain Routing (CIDR) notation (a prefix length). (You must include a space between the IP address and the / symbol in front of the prefix length.)

For example, type:

```
SecureRouter(config-eth 0/1)#ip address 10.2.0.100
/16
```

b. To enable the DHCP client on the Ethernet interface, type:

```
SecureRouter(config-eth 0/1)#ip address dhcp
```

7. By default, all the interfaces on the Secure Router 7000dl are administratively down. To enable the Ethernet interface, type:

   ```
   SecureRouter(config-eth 0/1)#no shutdown
   ```

   After you activate the interface, a message is displayed on the CLI, reporting that the interface is administratively up. When the Ethernet interface establishes a valid connection to the connected device, another message is displayed, reporting that the interface is up.

8. Press [**Enter**] for the prompt.

9. Save your configuration changes to the startup-config:

   ```
   SecureRouter(config-eth 0/1)#do write memory
   ```

Configure the WAN Interface

This section describes how to configure a Point-to-Point Protocol (PPP) connection running over an E1 line. (Setting up a T1 line is very similar; you simply choose a different range of channels for the TDM-group.) For the purposes of establishing a VPN, the type of WAN connection does not matter. You could use any type of WAN connection.

The following are just the basic instructions for setting up a PPP connection running over an E1 line. For detailed information about setting up WAN connections on the Secure Router 7000dl, see the *ProCurve Secure Router Basic Management and Configuration Guide*.

1. Access the CLI (through a console, Telnet, or secure shell [SSH] session). (To use SSH or Telnet, you must first enable this type of access on the router.)

2. Move to the global configuration mode context:

   ```
   SecureRouter> enable
   SecureRouter# configure terminal
   ```

3. Access the E1 interface configuration mode context:

Syntax: interface <*interface*> <*slot*>/<*port*>

Moves to the physical interface you specify.

Replace **<interface>** *with the name of the specific interface, such as e1, t1, or adsl.*

Replace **<slot>** *with the number of the slot in which the E1 module is installed.*

Replace **<port>** *with the port number used for this E1 connection.*

For example:

```
SecureRouter(config)# interface e1 1/1
```

4. Configure the channels for the E1 line.

Syntax: tdm-group <*number*> timeslots <*range of numbers*>

Creates a time division multiplexing (TDM) group and assigns it a number of channels. The TDM-group number relates directly to the interface that you are configuring. This means that you can create a TDM group 1 for each E1 or T1 interface on the Secure Router 7000dl.

Replace **<number>** *with a number between 1 and 255, and replace* **<range of numbers>** *with the channels that will be used for this connection.*

For example:

```
SecureRouter(config-e1 1/1)# tdm-group 1 timeslots
1-31
```

Note

If you are configuring a T1 line, the maximum channel range is **1-24**.

5. Configure the line coding.

Syntax: coding [ami | hdb3]

Defines how digital signals are configured for transport through a physical transmission medium. Use the same line coding as your public carrier.

For example:

```
SecureRouter(config-e1 1/1)# coding ami
```

6. Configure the time source.

Syntax: clock source [internal | line | through]

Use the **line** *setting if the E1 or T1 interface will take the clock source from the public carrier.*

Use the **internal** *setting if the E1 or T1 interface will provide the clock for the connection. For example, if you connect the Secure Router 7000dl to another router, one of the routers must provide the clock source. If the local Secure Router 7000dl is providing the clock source, use the internal setting.*

Use the **through** *setting if you want the E1 or T1 interface to take the clock from the other interface on that module.*

For example:

```
SecureRouter(config-e1 1/1)# clock source line
```

7. Activate the physical interface.

```
SecureRouter(config-e1 1/1)# no shutdown
```

8. Create the logical interface (in this example, a PPP interface).

Syntax: interface <*interface*> <*number*>

Creates the logical interface you specify and moves to its configuration mode context.

Replace ***<interface>*** *with the name of the specific interface, such as* **ppp**, **fr**, *or* **atm**.

Replace ***<number>*** *with any number between 1 and 1024. Each type of logical interface you configure must have a unique number.*

For example:

```
SecureRouter(config-e1 1/1)# interface ppp 1
SecureRouter(config-ppp 1)#
```

9. Assign the PPP interface an IP address.

Syntax: ip address <*A.B.C.D*> <*subnet mask* | /*prefix length*>

Assigns a static IP address to the logical interface.

Replace ***<A.B.C.D>*** *with the IP address.*

Replace ***<subnet mask>*** *with the subnet mask* or *replace* ***</prefix length>*** *with the CIDR notation.*

For example:

```
SecureRouter(config-ppp 1)# ip address 192.168.1.1
255.255.255.0
```

Note

This example uses a private IP address. In a live configuration, you would use a public address.

10. Bind the logical interface to the physical interface.

Syntax: bind <*bind number*> <*physical interface*> <*slot*>/<*port*> <*tdm-group number*> <*logical interface*> <*logical interface number*>

Replace ***<bind number>*** *with a number that is globally significant. That is, each bind command you type on the router must have a unique bind number.*

Replace ***<physical interface>*** *with the type of WAN connection, such as* **e1**, **t1**, *or* **serial**. *Replace* ***<slot>*** *and* ***<port>*** *with the correct numbers to identify the physical interface's location on the Secure Router 7000dl.*

If you are binding an E1 or T1 interface to the PPP interface, replace ***<TDM-group number>*** *with the TDM group number you created on the E1 or T1 interface. If you are binding a serial interface to the PPP interface, omit this option.*

Replace ***<logical interface>*** *with the type of logical connection (for example,* **ppp**) *and replace* ***<logical interface number>*** *with the number you assigned to this interface.*

For example:

```
SecureRouter(config-ppp 1)# bind 1 e1 1/1 1 ppp 1
```

11. Activate the logical interface.

```
SecureRouter(config-ppp 1)# no shutdown
```

12. Save your configuration changes to the startup-config.

```
SecureRouter(config-ppp 1)# do write memory
```

Enable Telnet and SSH Access

The Secure Router 7000dl supports Telnet and Secure Shell (SSH) for inline management. However, by default, Telnet and SSH access is disabled. To enable inline management, you must configure both an enable mode password and a password for the type of session you want to use: Telnet or SSH.

Complete the following steps:

1. Establish a console session with the Secure Router 7000dl and move to the global configuration mode context.
2. If you have already configured an enable mode password, continue with step 6. To configure an enable mode password, type:

Syntax: enable password [md5] <*password*>

Requires manager to type a password to move to the enable mode context.

Replace **<password>** *with any combination of up to 30 characters.*

*Include the Message Digest 5 (***md5***) option to encrypt the password; otherwise, the password is stored in the startup- and running-configs in clear text.*

For example:

```
SecureRouter(config)# enable password md5 procurve
```

3. The Secure Router 7000dl supports up to five Telnet sessions, or lines. To enable a line, move to its line configuration mode context:

Syntax: line telnet <0-4> [<0-4>]

Accesses the Telnet configuration mode context of the line that you specify.

Replace **<0-4>** *with the line that you want to configure. To configure multiple lines at once, specify the range, separating the two numbers by a space.*

For example:

```
SecureRouter(config)# line telnet 0 4
SecureRouter(config-telnet0—4)#
```

4. To configure the password for the line, type the **password** command:

Syntax: password [md5] <*password*>

Sets the password for this line.

Replace **<password>** *with any combination of up to 30 characters.*

*Include the Message Digest 5 (***md5***) option to encrypt the password; otherwise, the password is stored in the startup- and running-configs in clear text.*

For example:

```
SecureRouter(config-telnet0-4)# password md5
procurve0
```

5. Exit the Telnet configuration mode:

```
SecureRouter(config-telnet0-4)# exit
```

6. The Secure Router 7000dl also supports five SSH lines. However, to log in to one of these lines, a user must type credentials configured in the router's local list. Type this global configuration command to add a user to the list:

Syntax: username <*username*> password <*password*>

Adds a user to the router's local login list and sets the user's password.

Replace **<username>** *and* **<password>** *with any combination of up to 30 characters each.*

For example:

```
SecureRouter(config)# username manager password
procurve0
```

7. To activate an SSH line, move to the SSH configuration mode context:

Syntax: line ssh <0-4> [<0-4>]

Accesses the SSH configuration mode context of the line that you specify.

Replace **<0-4>** *with the line that you want to configure. To configure multiple lines at once, specify the range, separating the two numbers by a space.*

For example:

```
SecureRouter(config)# line ssh 0 4
SecureRouter(config-ssh0—4)#
```

8. Enable login through the local list:

```
SecureRouter(config-ssh—4)# login local-userlist
```

9. Save your configuration changes to the startup-config:

```
SecureRouter(config-ssh0—4)# do write memory
```

Configure the Routing Protocol

The Secure Router 7000dl in this example runs RIP to exchange routes with LAN routing switches. This section gives the steps for a basic configuration. It also shows you how to create a default route to the Internet router for external traffic.

Follow these steps:

1. Access the CLI (through a console, Telnet, or SSH session).

2. Move to the global configuration mode context:

```
SecureRouter> enable
Password:
SecureRouter# configure terminal
```

3. Access the RIP configuration mode context:

```
SecureRouter(config)# router rip
```

4. Select the version:

Syntax: version [1 | 2]

Specifies RIPv1 or RIPv2.

For example:

```
SecureRouter(config-rip)# version 2
```

5. Enable RIP on the LAN subnet:

Syntax: network <*A.B.C.D*> <*A.B.C.D*>

Enables the router to advertise the specified subnet and to exchange routes on interfaces with on that subnet.

Replace <A.B.C.D> <A.B.C.D> with the subnet address and mask. For this command, you cannot use CIDR notation.

For example:

```
SecureRouter(config-rip)# network 10.2.0.0
255.255.0.0
```

Note

At this point, you should not activate RIP on the subnet on which the NAC 800 ES is installed. You will set up special routing to ensure that traffic from the remote endpoints is forwarded on this subnet. (You may later enable RIP on this subnet, but it is a decision you will make as you continue on with the configuration process.) See "Use Policy-Based Routing to Forward VPN Traffic Through the NAC 800" on page 4-58 and "Enable Routing to the Remote Endpoints" on page 4-61.

6. Exit to the global configuration mode context:

```
SecureRouter(config-rip)# exit
```

7. Add a default route to the Internet router:

Syntax: ip route 0.0.0.0 /0 [<*A.B.C.D*> | <*interface*> <*number*>]

Creates a default route, which the Secure Router uses to route all traffic for which it does not know an explicit route.

Replace ***<A.B.C.D>*** *with the IP address of the Internet router, or replace* ***<interface>*** *with the type of interface that connects to the Internet such as* **ppp** *or* **atm**. *Replace* ***<number>*** *with the number assigned to that interface when it was created. This option ensures that the route remains valid even if the Internet router changes its IP address.*

For example:

```
SecureRouter(config)# ip route 0.0.0.0 /0 ppp 1
```

8. Save your configuration changes to the startup-config:

```
SecureRouter(config)# do write memory
```

Note

You must, of course, enable the routing protocol with compatible settings on routing switches in the LAN. In this solution, the routing switches need to run RIP on the management VLAN, which is the VLAN on which the Secure Router 7000dl's Ethernet interface resides, and they must redistribute connected routes. They also require a default route to the Secure Router 7000dl.

Consult your switch documentation for instructions on setting up the protocol. "Routing Switch startup-config" on page 4-10 gives an example configuration.

Use Policy-Based Routing to Forward VPN Traffic Through the NAC 800

In this example, endpoints on the inside network are secured by NAC 800s in an 802.1X enforcement cluster, and PCU network administrators do not want to forward these endpoints' Internet traffic through the inline NAC 800. Therefore a core routing switch in the LAN connects directly to the Secure Router 7000dl's Ethernet port *0/1*.

The NAC 800 stands inline between the core routing switch and the router's Ethernet port *0/2*. Policy-based routing (PBR) must then be configured to ensure that all traffic from the remote endpoints is routed through port 0/2 and the NAC 800.

The steps below instruct you to select traffic from remote endpoints. The correct IP addresses are those that you will later specify in an IKE client configuration pool. (See "Create a Client Configuration Pool" on page 4-74.) Table 4-5 shows the subnet used for remote endpoints in the PCU example network.

Table 4-5. IP Addresses for Remote Users

IKE Client Configuration Pool Subnet	My IKE Client Configuration Pool Subnet
10.48.100.0/23	

Complete these steps to configure PBR on the Secure Router 7000dl:

1. Access the Secure Router CLI and move to the global configuration mode context.

```
SecureRouter# configure terminal
```

2. Create an ACL that selects traffic for PBR:

Syntax: ip access-list extended <*listname*>

Creates an extended ACL. Replace **<listname>** *with a string that uniquely identifies this ACL.*

For example:

```
SecureRouter(config)# ip access-list extended PBR_VPN
```

3. Deny traffic to the NAC 800's subnet. (You are going to set up the routing switch as the next hop IP address of the route, which works for most VPN traffic. However, all traffic to the NAC 800's subnet can be sent over the normal route in the routing table.)

Syntax: deny ip any host <*A.B.C.D*>

Denies traffic destined to the specified destination.

Replace **<A.B.C.D>** *with the IP address of the NAC 800 ES.*

For example:

```
SecureRouter(config-ext-nacl)# deny ip any 10.3.0.0
0.0.0.255
```

4. Permit traffic from the remote endpoints that is destined to the private network:

Syntax: permit ip <*source A.B.C.D*> <*wildcard bits*> <*destination A.B.C.D*> <*wildcard bits*>

Selects traffic from the specified source.

Replace **<source A.B.C.D>** *with the IP address of the subnet in the IKE client configuration pool. Replace* **<wildcard bits>** *with bits that use reverse logic from the subnet mask for this subnet.*

Replace **<destination A.B.C.D>** *with the IP address of the private subnet. Replace* **<wildcard bits>** *with bits that use reverse logic from the subnet mask for this subnet.*

For example:

```
SecureRouter(config-ext-nacl)# permit ip 10.48.100.0
0.0.1.255 10.0.0.0 0.15.255.255
```

5. Create a route map entry:

Syntax: route-map <*name*> <*index*>

Creates a route map entry.

Replace **<name>** *with a string that uniquely identifies this route map. Replace* **<index>** *with a number that determines the priority for this entry.*

For example:

```
SecureRouter(config-ext-nacl)# route-map PBR_VPN 10
```

6. Match the route map entry to the ACL that you created in step 2:

Syntax: match ip address <*listname*>

Selects traffic permitted in the specified ACL for the route configured in the map entry.

Replace **<listname>** *with the name that you gave the ACL in step 2.*

For example:

```
SecureRouter(config-route-map)# match ip address
PBR_VPN
```

7. Set the next-hop address for this traffic to the IP address of the core routing switch on the NAC 800's subnet:

Syntax: set ip next-hop <*A.B.C.D*>

Configures the router to forward selected traffic to this IP address. Replace **<A.B.C.D>** *with the IP address of the switch connected to the NAC 800 (on the NAC 800's VLAN).*

For example:

```
SecureRouter(config-route-map)# set ip next-hop
10.3.0.1
```

8. You might want to configure the router to drop the traffic if this address is unavailable. This prevents traffic from remote endpoints from reaching the private network without passing through the NAC 800:

Syntax: set interface null 0

Drops traffic that cannot be routed to the previously-specified IP address.

9. Apply the route map to the WAN interface:

   a. Move to the WAN interface configuration mode context:

Syntax: interface <*interface*> <*number*>

Moves to the configuration mode context for the logical interface you specify.

Replace **<interface>** *with the name of the specific interface, such as* **ppp**, **fr**, *or* **atm**.

Replace **<number>** *with the number assigned to the interface when it was created.*

For example:

```
SecureRouter(config-route-map)# interface ppp 1
```

   b. Apply the route map to incoming traffic:

Syntax: ip policy route-map <*name*>

Applies the route map to incoming traffic on the interface.

Replace **<name>** *with the name of the route map, assigned when you created it in step 5 on page 4-60.*

For example:

```
SecureRouter(config-ppp 1)# ip policy route-map
PBR_VPN
```

10. Save your configuration to the startup-config.

```
SecureRouter(config-ppp 1)# do write memory
```

Enable Routing to the Remote Endpoints

You must ensure that devices in your private network can reach the remote endpoints.

As you recall, in a client-to-site VPN, the remote endpoints are assigned IP addresses from an IKE client configuration pool. The Secure Router 7000dl tracks the VPN tunnel associated with each particular client configuration address and forwards traffic destined to that address appropriately.

You must ensure that traffic destined to the remote endpoints is forwarded back through the NAC 800 rather than to the Ethernet interface on which the Secure Router receives other traffic destined to the Internet.

You have several options:

- On the routing switches, you can create static routes to the subnet associated with the IKE client configuration pool. For the next hop, specify the Secure Router's IP address on the inline NAC 800's subnet (in this example, 10.3.0.100).
- Configure the Secure Router 7000dl to advertise routes to the LAN routing switches:
  - Advertise the route to the IKE client configuration pool subnet only on the interface that connects to the NAC 800.
  - Advertise other external routes, if any, on the interface that connects directly to the core routing switch.
  - Accept local routes on the interface that connects directly to the core routing switch.

Typically, the first option is best for a network with only one or two routing switches in the LAN. You can check your switch's documentation for instructions on setting up static routes.

The sections below explain how to configure the second option in a network that implements RIP.

Create the Route to the Remote Endpoints on the Secure Router 7000dl

You have two options for creating routes to the remote endpoints.

You can enable reverse routing in a crypto map entry with this command: **reverse-route**. Then, when the router establishes a VPN tunnel using that entry, it adds a static route to the remote endpoint. This option is easy to set up; however, it creates a separate route to each remote endpoint, which can clutter route tables in a network with many remote users.

The preferred option for this solution is to create a static route to the entire subnet associated with the IKE client configuration pool. Follow these steps:

1. Find the subnet planned for the IKE client configuration pool. For example, PCU's pool specifies IP addresses 10.48.100.10 to 10.48.101.250. This is the entire 10.48.100.0/23 subnet (less several IP addresses excluded at the beginning and the end).

Table 4-6. IP Addresses for Remote Users

IKE Client Configuration Pool Subnet	My IKE Client Configuration Pool Subnet
10.48.100.0/23	

2. Access the Secure Router 7000dl CLI and move to the global configuration mode context.

3. Create a static route to the subnet associated with the IKE client configuration pool. Specify the Internet interface for the gateway:

Syntax: ip route <*A.B.C.D*> <*subnet mask* | /*prefix length*> <*interface*> <*number*>

Creates a route to the specified subnet through the specified interface.

Replace ***<A.B.C.D>*** *with the IP address of the subnet associated with the client configuration pool. You can either type a subnet mask or use the Classless Interdomain Routing (CIDR) notation (a prefix length). (You must include a space between the IP address and the / symbol in front of the prefix length.)*

Replace ***<interface>*** *with the type of interface that connects to the Internet such as* **ppp** *or* **atm**. *Replace* ***<number>*** *with the number assigned to that interface when it was created.*

For example:

```
SecureRouter(config)# ip route 10.48.100.0 /23 ppp 1
```

Configure RIP Filters

To ensure that switches in the LAN route traffic back to the Secure Router 7000dl properly, the Secure Router 7000dl requires these filters:

- A filter that restricts advertisements on the interface that connects to the NAC 800:
  - Advertise only the route to the IKE client configuration pool subnet
- A filter that restricts advertisements on the interface that connects directly to the core routing switch:
  - Advertise any routes *except* the one to the IKE client configuration pool subnet

- A filter that restricts routes accepted on the interface that connects to the NAC 800:
  - Accept no routes

    The Secure Router 7000dl uses PBR to route traffic over this interface. See "Use Policy-Based Routing to Forward VPN Traffic Through the NAC 800" on page 4-58.

Follow these steps to create the proper filters:

1. Access the Secure Router CLI and move to the global configuration mode context.
2. Create an ACL that selects static routes to be advertised on the interface that connects to the NAC:

Syntax: ip access-list standard <*listname*>

Creates a standard ACL. Replace **<listname>** *with a string that uniquely identifies this ACL.*

For example:

```
SecureRouter(config)# ip access-list standard
Routes_Ad_NAC
```

3. Permit the route to the IKE client configuration pool subnet:

Syntax: permit <*source A.B.C.D*> <*wildcard bits*>

Selects routes that match the specified address.

Replace **<source A.B.C.D>** *with the IP address of the subnet in the IKE client configuration pool. Replace* **<wildcard bits>** *with bits that use reverse logic from the subnet mask for this subnet.*

For example:

```
SecureRouter(config-std-nacl)# permit 10.48.100.0
0.0.1.255
```

4. Create an ACL that selects static routes to be advertised on the interface that connects directly to a routing switch in the LAN:

Syntax: ip access-list standard <*listname*>

Creates a standard ACL. Replace **<listname>** *with a string that uniquely identifies this ACL.*

For example:

```
SecureRouter(config-std-nacl)# ip access-list
standard Routes_Ad_Switch
```

5. Deny the IP address of the IKE client configuration pool subnet:

Syntax: deny <*source A.B.C.D*> <*wildcard bits*>

Denies routes that match the specified address.

Replace **<source A.B.C.D>** *with the IP address of the subnet in the IKE client configuration pool. Replace* **<wildcard bits>** *with bits that use reverse logic from the subnet mask for this subnet.*

For example:

```
SecureRouter(config-std-nacl)# deny 10.48.100.0
0.0.1.255
```

6. Permit all other routes:

```
SecureRouter(config-std-nacl)# permit any
```

7. Create an ACL that restricts routes accepted on the interface that connects to the NAC 800:

Syntax: ip access-list standard <*listname*>

Creates a standard ACL. Replace **<listname>** *with a string that uniquely identifies this ACL.*

For example:

```
SecureRouter(config-std-nacl)# ip access-list
standard Routes_Accept_NAC
```

8. Deny all routes:

```
SecureRouter(config-std-nacl)# deny any
```

9. Access the RIP configuration mode context:

```
SecureRouter(config-std-nacl)# router rip
```

10. Make sure that routing is enabled on the interface that connects to the NAC 800. Specify this interface's network IP address:

Syntax: network <*A.B.C.D*> <*A.B.C.D*>

Enables the router to advertise the specified subnet and to exchange routes on interfaces with on that subnet.

Replace **<A.B.C.D> <A.B.C.D>** *with the subnet address and mask. For this command, you cannot use CIDR notation.*

For example:

```
SecureRouter(config-rip)# network 10.3.0.0
255.255.255.0
```

11. Apply the filters to the proper interfaces using this command:

Syntax: distribute-list <*listname*> [in | out] <*interface ID*>

Applies a RIP filter to an interface. Replace **<listname>** *with the name that you assigned the filter.*

Use the **in** *keyword to filter accepted routes. Use the* **out** *keyword to filter advertised routes.*

Replace **<interface ID>** *with the ID for the interface to which you are applying the filter.*

For example:

```
SecureRouter(config-rip)# distribute-list
Routes_Ad_NAC out eth 0/2

SecureRouter(config-rip)# distribute-list
Routes_Ad_Switch out eth 0/1

SecureRouter(config-rip)# distribute-list
Routes_Accept_NAC in eth 0/2
```

12. Redistribute static routes in the routing protocol.

```
SecureRouter(config-rip)# redistribute static
```

13. Save your configuration:

```
SecureRouter(config-rip)# do write memory
```

Configure Network Address Translation (NAT)

You should configure the Secure Router 7000dl to perform source NAT on traffic from the LAN destined to the Internet. The router will translate the private source IP addresses to its own public IP address.

The Secure Router 7000dl can also perform destination NAT with port translation, which allows endpoints on the Internet to contact servers on your private network using the router's public IP address.

Configure Source NAT

Follow these steps to configure source NAT:

1. Access the CLI (through a console, Telnet, or SSH session) and move to the global configuration mode context.
2. Enable the firewall.

```
SecureRouter(config)# ip firewall
```

3. Create a standard ACL:

Syntax: ip access-list standard <*name*>

Creates (or edits) an ACL of the specified name.

Replace **<name>** *with a unique name that you choose to identify this ACL.*

For example:

```
SecureRouter(config)# ip access-list standard LAN
SecureRouter(config-std-nacl)#
```

4. Create an access control entry (ACE) that selects IP addresses for source NAT. You should specify the IP addresses of all endpoints that require Internet access. In this example, you will specify your entire private network:

Syntax: permit <*source A.B.C.D*> <*source wildcard bits*>

Selects traffic with the specified source IP addresses.

Replace **<source A.B.C.D>** *with the IP address of the subnet that requires source NAT. Replace* **<source wildcard bits>** *with bits that use reverse logic from the subnet mask for this subnet.*

For example:

```
SecureRouter(config-std-nacl)# permit 10.0.0.0
0.255.255.255
```

5. Create the access control policy (ACP) for source NAT with this command:

Syntax: ip policy-class <*policyname*>

Creates an ACP.

Replace **<policyname>** *with a string that you choose to uniquely define this ACP.*

For example:

```
SecureRouter(config)# ip policy-class Source_NAT
SecureRouter(config-access-policy)#
```

6. Add a statement to perform source NAT with this command:

Syntax: nat source list <*listname*> [address <*A.B.C.D*> | interface <*interface*> <*number*>] overload

Translates the source IP addresses specified in the ACL to the specified IP address.

Replace ***<listname>*** *with the name of the ACL that you configured in 3 on page 4-67.*

*Next, you should specify the Secure Router 7000dl's public IP address. You can specify the address manually (***address*** *option), or you can specify the interface that connects to the Internet and the router automatically translates to that interface's IP address (***interface*** *option).*

Generally, you should choose the **interface** *option to ensure that the translated IP address remains correct even if the interface's address changes. Replace* ***<interface>*** *and* ***<number>*** *with the interface type and number for the logical interface that connects to the Internet.*

For example:

```
SecureRouter(config-access-policy)# nat source list
LAN interface ppp 1 overload
```

7. Exit the ACP configuration mode context:

```
SecureRouter(config-access-policy)# exit
```

8. Move to the configuration mode context for the interface on which local traffic arrives:

Syntax: interface [eth <*slot/port*> | <*interface*> <*number*>]

Moves to the configuration mode context for the logical interface you specify.

Replace ***<slot/port>*** *with slot and port for the Ethernet interface.*

If local traffic arrives on a WAN interface, instead replace ***<interface>*** *with the type for the logical interface, such as* **ppp** *or* **atm**. *Replace* ***<number>*** *with the number assigned to the interface when it was created.*

For example:

```
SecureRouter(config)# interface eth 0/1
```

9. Apply the ACP to the interface:

Syntax: access-policy <*policyname*>

Applies the ACP to incoming traffic on the logical interface.

Replace **<policyname>** *with the name that you gave the ACP in step 6 on page 4-99.*

For example:

```
SecureRouter(config-eth 0/1)# access-policy
Source_NAT
```

10. Save your configuration to the startup-config.

```
SecureRouter(config-eth 0/1)# do write memory
```

Configure Destination NAT with Port Forwarding

Without going into depth for all options, this section briefly explains how to configure destination NAT to a private Web server and to an Email server.

Note

Destination NAT allows all Internet users to reach these servers. VPN users can reach these servers and other private services.

1. Access the CLI (through a console, Telnet, or SSH session) and move to the global configuration mode context.
2. Create an extended ACL:

Syntax: ip access-list extended <*name*>

Creates (or edits) an extended ACL of the specified name.

Replace **<name>** *with a unique name that you choose to identify this ACL.*

For example:

```
SecureRouter(config)# ip access-list extended
Webserver
SecureRouter(config-ext-nacl)#
```

3. Create an ACE that selects traffic that is destined to the Secure Router's public IP address on the port for the service in question:

Syntax: permit [tcp | udp] any [hostname <*FQDN*> | host <*destination address*> { [eq | lt | gt | neq | range] <*destination port*>} [<*packet bits*>] [log | log-input]

Selects traffic that matches the specified criteria.

Type **tcp**, *or* **udp** *depending on the protocol used by the service for which you are configuring destination NAT.*

Type **hostname** *and replace* ***<FQDN>*** *with the fully qualified domain name that Internet users type to access the service. Or type* **host** *and replace* ***<destination address>*** *with the router's public IP address.*

Next, specify the port for the service. Typically, type **eq** *and replace* ***<destination port>*** *with the number or name of the well-known port. Use the help command* **[?]** *for a list of port names.*

For information about other settings, see Chapter 5: "Applying Access Control to Router Interfaces" in the ProCurve Secure Router 7000dl Series Advanced Management and Configuration Guide.

For example:

```
SecureRouter(config-ext-nacl)# permit tcp any hostname
www.procurveu.edu eq www
```

4. Repeat step 3 if users can contact the server on another port. In this example, the port for HTTPS:

```
SecureRouter(config-ext-nacl)# permit tcp any hostname
www.procurveu.edu eq https
```

5. Exit to the global configuration mode context.

```
SecureRouter(config-ext-nacl)# exit
```

6. Repeat steps 2 to 4 if you want to set up destination NAT for another private server.

For example:

```
SecureRouter(config)# ip access-list extended Email
```

```
SecureRouter(config-ext-nacl)# permit tcp any hostname
email.procurveu.edu eq pop3
```

7. Create the ACP for destination NAT with this command:

Syntax: ip policy-class <*policyname*>

Creates an ACP.

Replace **<*policyname*>** *with a string that you choose to uniquely define this ACP.*

For example:

```
SecureRouter(config)# ip policy-class Outside
SecureRouter(config-access-policy)#
```

8. Add a statement to perform destination NAT with this command:

Syntax: nat destination list <*listname*> address <*A.B.C.D*>

Translates the destination IP addresses specified in the ACL to the IP address specified with the **address** *option.*

Replace **<*listname*>** *with the name of the ACL that you configured in 2 on page 4-70.*

Replace **<*A.B.C.D*>** *with the private IP address for the server that runs the service selected in the ACL.*

For example:

```
SecureRouter(config-access-policy)# nat destination
list Webserver address 10.4.6.30
```

9. Repeat step 8 if you have created another ACL specifying a different service. This time, specify the private IP address of the server as the second service. For example:

```
SecureRouter(config-access-policy)# nat destination
list Email address 10.4.6.40
```

10. Exit the ACP configuration mode context:

```
SecureRouter(config-access-policy)# exit
```

11. Move to the configuration mode context for the interface on which Internet traffic arrives:

Syntax: interface <*interface*> <*number*>

Moves to the configuration mode context for the logical interface you specify.

Replace **<*interface*>** *with the name of the specific interface, such as* **ppp**, **fr**, *or* **atm**.

Replace **<*number*>** *with the number assigned to the interface when it was created.*

For example:

```
SecureRouter(config)# interface ppp 1
```

12. Apply the ACP to the interface:

Syntax: access-policy <*policyname*>

Applies the ACP to incoming traffic on the logical interface.

Replace **<*policyname*>** *with the name that you gave the ACP in step 6 on page 4-99.*

For example:

```
SecureRouter(config-ppp 1)# access-policy Outside
```

13. Save your configuration to the startup-config.

```
SecureRouter(config-ppp 1)# do write memory
```

Establish the VPN

To support a VPN, the Secure Router 7000dl requires one of the following modules:

- IPsec VPN Base Module (J9026A)—Supports up to 10 VPN tunnels
- IPsec VPN Module (J8471A)—Supports up to 1000 VPN tunnels

After you purchase the module, install it in the rear panel of the router chassis. (See the *ProCurve Secure Router 7100/7200 IPsec Module Quick Start Guide* for installation information.) You can then activate the **crypto** commands.

In this section, you learn how to configure the Secure Router 7000dl to act as the VPN gateway for a client-to-site VPN. You must complete the following steps:

1. Activate **crypto** commands.
2. Create client configuration pools for remote users.
3. Configure IKE policies.
4. Configure a remote ID list that identifies valid remote users.
5. Create ACLs to select valid IP addresses for VPN traffic.
6. Create transform sets, which specify encryption and authentication algorithms to secure the VPN tunnel.
7. Create crypto maps.
8. Apply the crypto map to the WAN interface.

In this example, the Secure Router 7000dl and remote endpoints authenticate each other with digital certificates, so you must also obtain a certificate and install it on the router.

Activate Crypto Commands

Establish a session with the Secure Router 7000dl and access the global configuration mode context. Then, type this command to activate the crypto commands needed to configure a VPN:

```
SecureRouter(config)#ip crypto
```

Create a Client Configuration Pool

A remote VPN user requires an IP address in the private LAN, as well as other settings such as a DNS server. The Secure Router 7000dl assign the IP address from a client configuration pool, which is similar to a DHCP pool. A client configuration pool contains:

- A range of IP addresses for remote users
- One or two DNS servers' IP addresses
- One or two WINS servers' IP addresses (optional)

You should choose private IP addresses not currently in use in the private network. As indicated above, a client configuration pool specifies a range of IP addresses, not a subnet per se. However, thinking about the addresses in terms of a subnet can help you plan necessary ACLs and routes. You will learn more about these settings in “Create ACLs for VPN Traffic” on page 4-83 and “Enable Routing to the Remote Endpoints” on page 4-61.

For now, select an unused subnet for your range of client configuration addresses. The maximum number of addresses allowed in a client configuration pool on the Secure Router is 999, which is slightly smaller that a /22 subnet (1024).

For the pool in the example network, administrators have selected an unused /23 subnet within the 10.0.0.0/8 private subnet. The IP addresses in the pool will span almost the entire subnet (512 addresses), but exclude several addresses from the beginning and the end. See Table 4-7.

Table 4-7. Client Configuration Pools PCU’s Remote Users

Pool Name	IP Address Range	DNS Servers
RemoteUsers	10.48.100.10–10.48.101.250	10.4.4.15 10.4.5.15

You can use Table 4-8 to record the client configuration pool for your company.

Table 4-8. Client Configuration Pools

Pool Name	IP Address Range	DNS Servers

Follow these steps to create the client configuration pool:

1. From the global configuration mode context, type:

Syntax: crypto ike client configuration pool <*poolname*>

*Creates a client configuration pool. Replace **<poolname>** with a string of your choice.*

For example, to create the client configuration pool for the ProCurve University faculty, you might type:

```
SecureRouter(config)# crypto ike client configuration
pool RemoteUsers
SecureRouter(config-ike-client-pool)#
```

2. Next, specify the range of IP addresses that the router can assign to remote users:

Syntax: ip-range <*first A.B.C.*D> <*final A.B.C.D*>

Specifies the range of IP addresses in the client configuration pool. When a remote user connects to the VPN, the Secure Router 7000dl chooses an IP address from this range and assigns it to the user's endpoint.

For example, to specify the range of IP addresses for the Faculty pool, type:

```
SecureRouter(config-ike-client-pool)# ip-range
10.48.100.10 10.48.101.250
```

3. Specify DNS servers in your private network:

Syntax: dns-server <*A.B.C.D*> [<*A.B.C.D*>]

Specifies the IP address of a DNS server and an optional secondary DNS server.

For example, to specify the DNS servers for the Faculty configuration pool, type:

```
SecureRouter(config-ike-client-pool)# dns-server
10.4.4.15 10.4.5.15
```

4. Exit the client configuration pool mode context:

```
SecureRouter(config-ike-client-pool)# exit
```

Configure an IKE Policy

After you set up the client configuration pool, you configure the IKE policy, which dictates settings for the first IKE phase. During this first phase, the two devices negotiate a temporary IKE tunnel, which is sometimes called the IKE security association (SA). On the Secure Router 7000dl, you must use the same IKE policy for all remote users in a client-to-site VPN.

Overview of IKE Policy Settings. An IKE policy specifies:

- The peers that are allowed to perform IKE

  In a client-to-site VPN, the peer must be set to **any**.

- The client configuration pool with IP addresses for the remote endpoints

- The local ID

  By default, the Secure Router 7000dl sends its IP address (on the Internet interface) to authenticate during IKE. However, it can also authenticate with its:

  - Fully qualified domain name (FQDN)
  - Email address
  - Abstract Syntax Notation 1 (ASN1) distinguished name (only when using digital certificates)

  The router must send the ID type request by the peer. (See “Configure a New Connection” on page 4-173 for instructions on configuring this setting on the ProCurve VPN Client.)

  If the router authenticates with a digital certificate, the local ID that you specify in the IKE policy must exactly match the subject name (or alternate subject name) in this certificate. See “Generate a Router Certificate Request” on page 4-109 for instructions on configuring the subject name.

- IKE initiate and respond mode

  In a client-to-site VPN, the Secure Router 7000dl should *not* initiate IKE.

- Xauth settings

  If you enable Xauth, remote users undergo a second authentication after IKE authentication (preshared key or digital certificate) and before the negotiation of the VPN tunnel.

  This solution does not require Xauth.

- NAT-Traversal (NAT-T) settings

  Often, a remote endpoint’s IP address undergoes NAT, which can cause integrity checks on tunneled packets to fail. NAT-T fixes this problem. Generally, you should allow both versions of NAT-T.

Table 4-9 displays available parameters for IKE policies, as well as selections for the example network and a place for you to fill in your own selections.

A client-to-site VPN on the Secure Router 7000dl can use only one IKE policy because one only policy can have the peer set to **any**.

Table 4-9. Policies for IKE Phase 1:

Parameter	Options	Default	PCU IKE Policy 10	My IKE Policy 10
peer	• any • *<A.B.C.D>*	none	any	
client configuration pool	*<poolname>*	none	RemoteUsers	
local-id	• address *<A.B.C.D>* • asn1-dn *<distinguished name>* • fqdn *<FQDN>* • user-fqdn *<email address>*	address <Internet interface A.B.C.D>	asn1-dn “CN=SecureRouter,OU=Computers,O=ProCurve University,L=Roseville, ST=California,C=US”	
client authentication server list	*<aaa listname>*	none	none	
nat-traversal v1	• allow • disable • force	allow	allow	
nat-traversal v2	• allow • disable • force	none	allow	
initiate mode	• aggressive • main	main	no initiate	
respond mode	• aggressive • main • anymode	anymode	main	

There is one more important setting for the IKE policy: an attribute policy. An attribute policy specifies:

- Authentication method (preshared key or digital certificates)
- Algorithms for securing the temporary tunnel:
  - Encryption
  - Hash
- Temporary tunnel lifetime
- Diffie-Hellman group

You can create multiple attribute policies for a single IKE policy, extending support to clients with differing capabilities. A client's IKE phase 1 settings must match at least one attribute policy exactly. (The attribute policy with the lowest priority value is preferred.)

Table 4-10 shows options for attribute policies, as well as some example attribute policies.

Table 4-10. IKE Attribute Policies

Attribute	Options	Selection for IKE Policy 10: Attribute Policy 10	Selection for IKE Policy 10: Attribute Policy 20
authentication method	• pre-shared key • digital certificate: – **rsa-sig** – **dsa-sig**	• digital certificate – **rsa-sig**	• digital certificate – **rsa-sig**
encryption	• AES: – **256-bit** – **192-bit** – **128-bit** • 3 DES • DES	AES192-bit	3DES
hash	• MD5 • SHA	SHA	MD5
IKE SA lifetime	• 60 to 86,400 seconds (1 minute to 1 day)	240 seconds	240 seconds
group	• Diffie-Hellman 1 • Diffie-Hellman 2	Diffie-Hellman 2	Diffie-Hellman 1

You can use Table 4-11 to record options for your company's IKE attribute policies.

Table 4-11. IKE Attribute Policies

Attribute	Selection for My IKE Policy 10: Attribute Policy 10	Selection for My IKE Policy 10: Attribute Policy 20
authentication method		
encryption		
hash		
IKE SA lifetime		
group		

Configuration Steps for the IKE Policy. Complete these steps to configure an IKE policy for a client-to-site VPN:

1. Create the IKE policy by typing this command from the global configuration mode context:

Syntax: crypto ike policy <*number*>

Create an IKE policy.

Replace **<number>** *with a number that indicates the policy's priority. The policy with lowest value is processed first.*

For example:

```
SecureRouter(config)# crypto ike policy 10
```

2. Set the peer:

```
SecureRouter(config-ike)# peer any
```

3. Set the local ID:

Syntax: local-id [address <*A.B.C.D*> | asn1-dn <*distinguished name*> | fqdn <*FQDN*> | user-fqdn <*email address*>]

Specifies the ID type and value that the Secure Router 7000dl sends to authenticate itself during IKE. The type (selected with the **address**, **asn1-dn**, **fqdn**, *or* **user-fqdn** *option) must match the type requested by the VPN client. And the value must also match that specified on the client as a legitimate remote device.*

4. For example:

```
SecureRouter(config-ike)# local-id asn1-dn
"CN=SecureRouter,OU=Computers,O=ProCurve
University,L=Roseville,ST=California,C=US"
```

5. Set the client configuration pool:

Syntax: client configuration pool <*poolname*>

Specifies the client configuration pool from which the Secure Router 7000dl assigns remote users an IP address and other settings.

Replace **<poolname>** *with the name that you chose in step 1 of "Create a Client Configuration Pool" on page 4-74.*

For example:

```
SecureRouter(config-ike)# client configuration pool
RemoteUsers
```

6. Turn off the initiate mode:

```
SecureRouter(config-ike)# no initiate
```

7. Set the respond mode to aggressive (faster), main (more secure), or both:

Syntax: respond [aggressive | main | anymode]

Sets the IKE mode to which the router will respond.

For example:

```
SecureRouter(config-ike)# respond main
```

8. Allow NAT-T version 2:

```
SecureRouter(config-ike)# nat-traversal v2 allow
```

9. Create an attribute policy:

Syntax: attribute <*number*>

Creates an attribute policy. The **<number>** *dictates the priority. The policy with lowest value is processed first.*

For example:

```
SecureRouter(config-ike)# attribute 10
```

10. Choose the authentication method:

Syntax: authentication [pre-share | rsa-sig | dsa-sig]

Selects the method by which the router and remote users authenticate each other.

Include **pre-share** *if you want to use preshared keys.*

Include the **rsa-sig** *or* **dsa-sig** *option if you want to use digital certificates.*

For example:

```
SecureRouter(config-ike-attribute)# authentication
rsa-sig
```

11. Specify security settings for the temporary IKE tunnel:

Syntax: encryption [aes-256-cbc | aes-192-cbc | 3des | aes-128-cbc | des]

Selects the encryption algorithm that protects the privacy of data in the temporary IKE tunnel.

Syntax: hash [md5 | sha]

Selects the hash algorithm that protects the integrity of data in the temporary IKE tunnel.

Syntax: lifetime <*seconds*>

Specifies the number of seconds that the router keeps the temporary IKE tunnel open. (Valid values are from 60 to 84600.)

Syntax: group [1 | 2 | 5]

Specifies the Diffie-Hellman key group. (The peers use the Diffie-Hellman exchange to generate encryption keys.)

For example:

```
SecureRouter(config-ike-attribute)# encryption aes-
192-cbc

SecureRouter(config-ike-attribute)# hash sha

SecureRouter(config-ike-attribute)# lifetime 240

SecureRouter(config-ike-attribute)# group 2
```

12. Exit the attribute policy configuration mode context:

```
SecureRouter(config-ike-attribute)# exit
```

13. If you want, repeat steps 9 to 12 to create multiple attribute policies.
14. Exit the IKE policy configuration mode context:

    ```
    SecureRouter(config-ike)# exit
    ```

15. Save your changes to the startup-config.

    ```
    SecureRouter(config)# do write memory
    ```

Create ACLs for VPN Traffic

The Secure Router 7000dl checks an ACL to determine whether traffic is allowed over a VPN tunnel. In this example, network administrators create two ACLs to grant remote faculty members and remote students different levels of access.

The ACL for a client-to-site VPN can include several ACEs:

- One ACE is mandatory; it permits this traffic:
  - **Source**—IP address of the private network

    Alternatively, you can specify a segment of the private network. For example, your private network address is 10.0.0.0/15, but you only want to open part of the network to remote access. You might then specify 10.1.0.0/16, restricting remote users from 10.0.0.0/16.

    When you set up the VPN client, you must specify this exact subnet as the remote subnet. See “Configure a New Connection” on page 4-173.
  - **Destination**—IP addresses in the client configuration pool
- Optionally, you can add deny ACEs.

  These ACEs prohibit remote users from accessing certain IP addresses or ranges of IP addresses within the permitted private network. Because the Secure Router 7000dl processes ACEs in order, you must specify these ACEs *before* the permit ACE.
- If necessary, an ACE permitting access to the NAC 800 ES.

  If you specify deny ACEs, make sure that they do not prevent remote users from accessing the NAC 800 ES. If one ACE prevents this access, create a permit ACE at the beginning of the list opening access to the NAC 800 ES. At the very least, TCP ports 88, 89 and 1500 must be open, as well as UDP port 1500.

Note

The ACLs for a VPN are a little different from ACLs applied to an interface. To grant remote endpoints access to a resource, you specify that resource as the permitted *source* and the remote endpoint as the *destination*.

Note

To specify multiple IP addresses in ACEs on the Secure Router 7000dl, you enter wildcard bits, which use reverse logic from a subnet mask. For example, to specify a /24 network (subnet mask 255.0.0.0), you would type these wildcard bits: **0.0.0.255**. To specify a /22 network (subnet mask 225.252.0.0), you would type **0.0.3.255**.

A quick rule: Find the IP address specified in the ACE. This is the first address in the range. Add the wildcard bits that follow. The new IP address is the last in the range. For example, **10.0.0.0 0.3.255.255** selects every IP address from 10.0.0.0 to 10.3.255.255.

PCU's remote users require remote access to the following segment of the private network: 10.0.0.0 /20. However, there are several ranges of addresses within that segment that are forbidden to either faculty members, students, or both. For example, faculty members can access the Faculty VLAN (10.8.0.0/16), but students cannot access this VLAN nor the VLAN with faculty databases (10.5.0.0/16). Neither students nor faculty members should be able to reach the management VLAN (10.2.0.0/16). However, for endpoint integrity testing, both groups must be able to communicate with the NAC 800 ES (IP address, 10.3.0.90), which is on an otherwise forbidden subnet.

Table 4-12. Resources for PCU's Remote Users

User Group	Permitted Resources
Faculty	• Server VLAN (10.4.0.0/16) • Faculty database VLAN (10.5.0.0/16) • Faculty VLAN (10.8.0.0/16) • Other VLANs (10.9.0.0/16-10.15.0.0/16)
Students	• Server VLAN (10.4.0.0/16) • Student VLAN (10.10.0.0/16) • Other VLANs (10.11.0.0/16-10.15.0.0/16)

Table 4-13 shows the plan for PCU's two ACLs.

Table 4-13. PCU VPN ACLs

ACL	ACE Type	Protocol	Source IP Address	Source Wildcard Bits	Destination IP Address	Destination Wildcard Bits
VPN_Faculty	permit	ip	10.3.0.90		any	
	deny	ip	10.0.0.0	0.3.255.255	any	
	deny	ip	10.6.0.0	0.1.255.255	any	
	permit	ip	10.0.0.0	0.15.255.255	10.48.100.0	0.0.1.255
VPN_Students	permit	ip	10.3.0.90		any	
	deny	ip	10.0.0.0	0.3.255.255	any	
	deny	ip	10.5.0.0	0.0.255.255	any	
	deny	ip	10.6.0.0	0.1.255.255	any	
	deny	ip	10.8.0.0	0.1.255.255	any	
	permit	ip	10.0.0.0	0.15.255.255	10.48.100.0	0.0.1.255

You can use Table 4-14 to plan the ACLs for your network.

Table 4-14. VPN ACLs

ACL	ACE Type	Protocol	Source IP Address	Source Wildcard Bits	Destination IP Address	Destination Wildcard Bits

Complete these steps to configure the ACL:

1. Access the router CLI and move to the global configuration mode context.
2. Create an extended ACL:

Syntax: ip access-list extended <*name*>

Creates (or edits) an ACL of the specified name.

Replace **<name>** *with a unique name that you choose to identify this ACL.*

For example:

```
SecureRouter(config)# ip access-list extended
VPN_Faculty
SecureRouter(config-ext-nacl)#
```

3. You may plan, in a later ACE, to deny remote users access to the NAC 800 ES's subnet. First add a permit ACE with NAC 800 ES as the source:

Syntax: permit ip host <*source A.B.C.D*> <*destination A.B.C.D*> <*destination wildcard bits*>

Permits remote endpoints to reach the NAC 800 for endpoint integrity testing.

Replace **<source A.B.C.D>** *with the NAC 800 ES's IP address.*

Replace **<destination A.B.C.D>** *with the IP address of the subnet in the IKE client configuration pool. Replace* **<destination wildcard bits>** *with bits that use reverse logic from the subnet mask for this subnet.*

For example:

```
SecureRouter(config-ext-nacl)# permit ip host
10.3.0.90 10.48.100.0 0.0.1.255
```

Note

If your inline enforcement cluster includes multiple ESs, add a permit ACE for each.

4. If you want, add deny ACEs that prohibit remote users from accessing certain IP addresses in the private network:

Syntax: deny ip <*source A.B.C.D*> <*source wildcard bits*> [any | <*destination A.B.C.D*> <*destination wildcard bits*>]

Denies traffic with the specified source and destination IP addresses. Replace **<source A.B.C.D>** *with the prohibited IP address in the private network. To specify multiple IP addresses, replace* **<source wildcard bits>** *with bits that use reverse logic from subnet masks.*

For the purposes on the VPN ACL, you can specify **any** *for the destination. All remote users that use the crypto map entry associated with this ACL are denied access to the resource.*

For example, PCU network administrators deny faculty members access to certain areas of the private network by typing these commands:

```
SecureRouter(config-ext-nacl)# deny ip 10.0.0.0
0.3.255.255 any
```

```
SecureRouter(config-ext-nacl)# deny ip 10.6.0.0
0.1.255.255 any
```

5. Add a permit ACE that specifies VPN traffic. (For the ProCurve University network, refer to Table 4-13.)

Syntax: permit ip <*source A.B.C.D*> <*source wildcard bits*> <*destination A.B.C.D*> <*destination wildcard bits*>

Selects traffic with the specified source and destination IP addresses. Replace **<source A.B.C.D>** *and* **<destination A.B.C.D>** *with IP addresses in the private network and the client configuration pool, respectively. Replace* **<source wildcard bits>** *and* **<destination wildcard bits>** *with bits that use reverse logic from subnet masks.*

For example:

```
SecureRouter(config-ext-nacl)# permit ip 10.0.0.0
0.15.255.255 10.48.100.0 0.0.1.255
```

6. Exit the extended ACL configuration mode context:

```
SecureRouter(config-ext-nacl)# exit
```

7. If necessary, repeat steps 2 to 6 to create an ACL for another set of remote users.

In this example, network administrators type these commands to create the ACL for students:

```
SecureRouter(config)# ip access-list extended
VPN_Students
```

```
SecureRouter(config-ext-nacl)# permit ip host
10.3.0.90 10.48.100.0 0.0.1.255
```

```
SecureRouter(config-ext-nacl)# deny ip 10.0.0.0
0.3.255.255 any
```

```
SecureRouter(config-ext-nacl)# deny ip 10.5.0.0
0.0.255.255 any
```

```
SecureRouter(config-ext-nacl)# deny ip 10.6.0.0
0.1.255.255 any
```

```
SecureRouter(config-ext-nacl)# deny ip 10.8.0.0
0.1.255.255 any
```

```
SecureRouter(config-ext-nacl)# permit ip 10.0.0.0
0.15.255.255 10.48.100.0 0.0.1.255
```

Exit to the global configurative mode and save your changes to the startup-config.

```
SecureRouter(config-ext-nacl)# exit
```

```
SecureRouter(config)# do write memory
```

Configure a Transform Set

A transform set contains the hash and encryption algorithms used to secure data transmitted over the permanent IPsec tunnel (as opposed to the temporary IKE tunnel, which is secured with the algorithms specified in the IKE attribute policy).

1. Name the transform set; the setname is alphanumeric and must be unique.
2. Choose the IPsec protocol—Authentication Header (AH) or Encapsulation Security Payload (ESP).
3. Specify the algorithms:

   If you are using AH, you can select:

   - One hash algorithm:
     – MD5
     – SHA

   If you are using ESP, you can select:

   - One encryption algorithm:
     – AES (128-, 192-, or 256-bit key)
     – 3DES
     – DES
     – Null (no encryption)
   - One hash algorithm (optional):
     – MD5
     – SHA

   If you are using AH and ESP, you can select:

   - One AH hash algorithm:
     – MD5
     – SHA

- One ESP encryption algorithm (optional):
  - AES (128-, 192-, or 256-bit key)
  - 3DES
  - DES
  - Null (no encryption)
- One ESP hash algorithm (optional):
  - MD5
  - SHA

4. Configure tunnel mode.

You complete the first three steps in a single command entered from the global configuration mode context. Type one of these three commands:

Syntax: crypto ipsec transform-set <*setname*> [ah-sha-hmac | ah-md5-hmac]

Creates a transform set that uses AH with the hash algorithm of your choice.

Replace ***<setname>*** *with a unique name that you choose for this transform set.*

Syntax: crypto ipsec transform-set <*setname*> [esp-aes-256-cbc | esp-aes-192-cbc | esp-3des | esp-aes-128-cbc | esp-des | esp-null] [esp-sha-hmac | esp-md5-hmac]

Creates a transform set that uses ESP with the encryption and hash algorithms of your choice. Specifying the encryption algorithm is required (although you can choose **esp-null** *to disable encryption). Specifying the hash algorithm (***esp-sha-hmac** *or* **esp-md5-hmac***) is optional but recommended.*

Replace ***<setname>*** *with a unique name that you choose for this transform set.*

Syntax: crypto ipsec transform-set <*setname*> [ah-sha-hmac | ah-md5-hmac] [esp-aes-256-cbc | esp-aes-192-cbc | esp-3des | esp-aes-128-cbc | esp-des | esp-null] [esp-sha-hmac esp-md5-hmac]

Creates a transform set that uses AH and ESP with the two or three algorithms of your choice. You must choose one AH hash algorithm and either or both one ESP encryption algorithm and one ESP hash algorithm.

Replace ***<setname>*** *with a unique name that you choose for this transform set.*

The command that names the transform set and adds the algorithms also moves you to the transform set configuration mode context. Specify tunnel mode, which allows the Secure Router 7000dl to act as a gateway device for endpoints behind it:

```
SecureRouter(cfg-crypto-trans)# mode tunnel
```

For the example network, type commands such as the following, which configure the sets shown in Table 4-15:

```
SecureRouter(config)# crypto ipsec transform-set
ahEsp_shaAes192 ah-sha-hmac esp-aes-192-cbc
SecureRouter(cfg-crypto-trans)# mode tunnel
SecureRouter(cfg-crypto-trans)# crypto ipsec transform-
set esp_Aes192Sha esp-aes-192-cbc esp-sha-hmac
SecureRouter(cfg-crypto-trans)# mode tunnel
SecureRouter(cfg-crypto-trans)# crypto ipsec transform-
set esp_3des esp-3des
SecureRouter(cfg-crypto-trans)# mode tunnel
SecureRouter(cfg-crypto-trans)# exit
```

Table 4-15. PCU Transform Sets

PCU Transform Set	Protocol	Algorithms
ahEsp_shaAes192	• AH • ESP	• AH-SHA • ESP-AES-192
esp_Aes192Sha	ESP	• ESP-AES-192 • ESP-SHA
esp_3des	ESP	ESP-3DES

Note

The transform set names in Table 4-15 were designed to make it immediately apparent which algorithms the set contains. This strategy might aid in troubleshooting. You can, of course, choose simpler names if you prefer.

Create a Crypto Map

A crypto map entry specifies the security parameters that the Secure Router 7000dl proposes during IKE phase 2, the negotiation of the IPsec tunnel.

For each crypto map entry, you must specify:

- One or more transform sets, which specify which hash and/or encryption algorithms secure data
- An extended ACL, which selects traffic allowed over the VPN tunnel

You can optionally specify:

- A perfect forward secrecy (PFS) group—the Diffie-Hellman group for PFS, which forces the router and remote endpoint to generate new keys for the IPsec tunnel rather than use the ones created for the temporary IKE tunnel
- An IPsec tunnel lifetime—the length of time the VPN connection stays up (without renegotiation)

Your client-to-site VPN requires at least as many crypto map entries as you have created different ACLs to control different sets of remote users. To ensure that the correct users are matched to the correct crypto map entry and ACL, you will match a remote ID entry to the correct crypto map entry. (See "Create the Remote ID List" on page 4-94.)

The PCU network administrators design two crypto map entries with the settings shown in Table 4-16. In this example, the two entries are identical in terms of security settings. However, with different ACLs, the crypto map entries allow different users different levels of access.

Table 4-16. Crypto Map Entry Settings

Crypto Map Entry	Parameter	PCU Setting	My Setting
VPN 10	ACL	VPN_Faculty	
	Transform set	• esp_Aes192Sha • esp_3des • ahEsp_shaAes192	
	PFS group	5	
	IPsec SA lifetime	7200 seconds	
VPN 20	ACL	VPN_Students	
	Transform set	• esp_Aes192Sha • esp_3des • ahEsp_shaAes192	
	PFS group	5	
	IPsec SA lifetime	7200 seconds	

Complete the following steps to create a crypto map:

1. Create a crypto map entry by typing the following command from the global configuration mode context:

Syntax: crypto map <*mapname*> <*map index*> ipsec-ike

Creates a crypto map.

Replace **<mapname>** *with an alphanumeric string, the unique name that you choose for this map.*

Replace **<map index>** *with a number between 0 and 65,535. This number specifies the order in which the router should process entries (lower numbers are processed first).*

For example:

```
SecureRouter(config)# crypto map VPN 10 ipsec-ike
```

You will enter the crypto map configuration mode:

```
SecureRouter(config-crypto-map)#
```

2. Match the crypto map entry to an extended ACL:

Syntax: match address <*listname*>

Specifies which traffic will be carried over the VPN tunnel.

Replace **<listname>** *with the name of the ACL that you created in step 2 on page 4-85.*

For example:

```
SecureRouter(config-crypto-map)# match address
VPN_Faculty
```

3. Assign at least one transform set to the crypto map entry.

Syntax: set transform-set <*setname*> [<*additional setname*>]

Assigns the transform set to the crypto map entry.

Replace **<setname>** *with the name of the transform set.*

Include **<additional setname>** *if you want to specify more than one transform set. You can specify a maximum of six.*

For example:

```
SecureRouter(config-crypto-map)# set transform-set
esp_Aes192Sha esp_3des ahEsp_shaAes192
```

4. Optionally, configure a PFS.

Syntax: set pfs [group1 | group2 | group5]

Requires the router to generate new keys for the IPsec tunnel.

The options specify the Diffie-Hellman group: **group1**, **group2**, *or* **group5**.

For example:

```
SecureRouter(config-crypto-map)# set pfs group5
```

5. Define the lifetime of an IPsec tunnel (the VPN connection). You can define the lifetime in kilobytes or in seconds or both.

Syntax: set security-association lifetime [kilobytes <*kilobytes*> | seconds <*seconds*>]

Defines the lifetime of the IPsec tunnel.

Include **kilobytes** *with the appropriate number if you want to define the lifetime in this way.*

Include **seconds** *with the appropriate number if you want to define the lifetime in seconds.*

If you set the SA lifetime in both kilobytes and seconds, the VPN connection will close after whichever limit is reached first.

For example:

```
SecureRouter(config-crypto-map)# set security-
association lifetime seconds 7200
```

6. Exit the crypto map configuration mode context.

```
SecureRouter(config-crypto-map)# exit
```

7. Save your changes to the startup-config.

```
SecureRouter(config)# do write memory
```

Create the Remote ID List

Next, you must configure the Secure Router 7000dl's remote ID list. To add an entry to the list, type this command from the global configuration mode context:

Syntax: crypto ike remote-id {address <*A.B.C.D*> <*wildcard bits*> | asn1-dn <*distinguished name*> | email address <*address*> | fqdn <*fqdn*> | any} / [preshared-key <*key*>] [crypto map <*index*>]

Allows a user with the specified ID to connect to the VPN. See "ID Types and Values" on page 4-94 for more guidelines.

If the user authenticates with a preshared key rather than a digital certificate, type the **preshared-key** *option and replace* ***<key>*** *with a string that matches the one configured on the user's client.*

The command has several optional parameters, including, among others not shown above, **crypto map *<name>* *<map index>***; *replace* ***<name>*** *and* ***<map index>*** *with the name number for the entry that you configured for this user (or, more likely, set of users). See "Additional Options" on page 4-96.*

The following sections give you additional guidelines in creating an entry:

- "ID Types and Values" on page 4-94
- "Additional Options" on page 4-96
- "Configuration Steps for PCU's Remote ID List" on page 4-96

ID Types and Values. A user's VPN client submits one of the following types of ID to authenticate to the Secure Router 7000dl:

- IP address
- Fully qualified domain name (FQDN)
- Email address

If the remote user authenticates with a digital certificate, the router takes the remote ID from the subject name in that certificate. That is, the user's remote ID is a Lightweight Directory Access Protocol (LDAP) distinguished name in Abstract Syntax Notation 1 (ASN1) format. However, the certificate might also include alternate subject names, which allow the client to request that the router check one of the three types of ID listed above.

When you create an entry in the Secure Router 7000dl's remote ID list, you must be very careful to specify the exact ID type and value submitted by the remote user's VPN client. However, you can use wildcards ("?" for one character and "*" for multiple characters) to help you configure the list more quickly. To specify multiple IP addresses, use wildcard bits, which have reverse logic from subnet masks.

Table 4-17. Remote ID Types and Values

Remote ID Type	Command Syntax	Example
IP address	crypto ike remote-id address <*A.B.C.D*> <*wildcard bits*>	crypto ike remote-id address 192.168.20.0 0.0.0.255
FQDN	crypto ike remote-id fqdn <*domain name*>	crypto ike remote-id fqdn *.procurveu.edu
email address	crypto ike remote-id user-fqdn <*email address*>	crypto ike remote-id address *@procurveu.edu
ASN distinguished name (for digital certificates only)	crypto ike remote-id asn1-dn "CN=<*common name*>, OU=<*organizational unit*>, O=<*organization*>, L=<*city*>, ST=<*state*>, C=<*country code*>"	crypto ike remote-id "CN=professor, C=US, ST=*, L=*, O=ProCurve University, OU=Faculty"
any	crypto ike remote-id any	crypto ike remote-id any

Note

The value for **C** (country) must be the two-letter country code (or a wildcard). Be very careful to type **ST** for the state (not **S**, which is shown in Windows).

In the example, network administrators leverage wildcards and decide to use only two entries for the list. The remote IDs for these entries are shown in Table 4-18.

Table 4-18. Remote IDs for PCU

ID Type	ID Value
ASN1-DN	"CN=*, C=*, ST=*, L=*,O=ProCurve University, OU=Faculty"
ASN1-DN	"CN=*, C=*, ST=*, L=*,O=ProCurve University, OU=Students"

You can use Table 4-19 to record remote IDs for your company.

Table 4-19. My Remote IDs

ID Type	ID Value

Additional Options. In addition to specifying valid IDs, the remote ID list matches users to the correct options for their VPN connection. If the user authenticates with a preshared key, that key is specified here, in the user's remote ID entry. The entry can also match the user to a specific IKE policy, to a crypto map entry, or to NAT-T and Xauth settings that override those in the IKE policy.

In this solution, the only extra option that you must specify is the crypto map entry, which enables the router to apply different ACLs to remote endpoints based on the users' identities. For example, you associate the remote ID of a student with crypto map VPN 20, which is matched to the VPN_Students ACL. This ACL prohibits access to resources (such as the faculty databases in the 10.5.0.0/16 subnet) that are inappropriate for students.

Table 4-20. Remote ID Options for PCU

Remote ID	Crypto Map Entry
asn1-dn "CN=*, C=*, ST=*, L=*,O=ProCurve University, OU=Faculty"	VPN 10
asn1-dn "CN=*, C=*, ST=*, L=*,O=ProCurve University, OU=Students"	VPN 20

To learn more about other options, see "Chapter 10: Virtual Private Networks" in the *ProCurve Secure Router 7000dl Series Advanced Management and Configuration Guide*.

Configuration Steps for PCU's Remote ID List. Follow these steps to configure the remote ID list for ProCurve University (PCU):

1. Move to the global configuration mode context.

2. Type this command to configure the entry for faculty members:

```
SecureRouter(config)# crypto ike remote-id asn1-dn
"CN=*, C=*, ST=*, L=*,O=ProCurve University, OU=Fac-
ulty" crypto map VPN 10
```

3. Type this command to configure the entry for students:

```
SecureRouter(config)# crypto ike remote-id asn1-dn
"CN=*, C=*, ST=*, L=*,O=ProCurve University, OU=Stu-
dents" crypto map VPN 20
```

4. Save your changes to the startup-config.

```
SecureRouter(config)# do write memory
```

Apply the Crypto Map to an Interface

To activate the VPN, apply the crypto map to the appropriate logical interface, almost always the interface that connects to the Internet router. Follow these steps:

1. Access the router CLI and move to the global configuration mode context.
2. Move to the appropriate interface configuration mode context.

Syntax: interface <*interface*> <*number*>

Moves to the configuration mode context of the logical interface.

Replace **<interface>** *with the name of the specific interface, such as* **ppp**, **fr**, *or* **atm**.

Replace **<number>** *with any number between 1 and 1024. Each type of logical interface you configure must have a unique number.*

For example:

```
SecureRouter(config)#interface ppp 1
```

a. Apply the crypto map:

Syntax: crypto map <*mapname*>

Applies the crypto map (including all entries) to the logical interface.

Replace **<mapname>** *with name of the crypto map that you created in step 1 on page 4-92.*

For example:

```
SecureRouter(config-ppp 1)#crypto map VPN
```

3. Save your configuration to the startup-config.

```
SecureRouter(config-ppp 1)#do write memory
```

Allow VPN Traffic on the Internet Interface

Your network design might call for access control implemented on the interface that connects to the Internet, either with an ACL or an ACP. For example, in "Configure Destination NAT with Port Forwarding" on page 4-70, you learned how to create an ACP that allows Internet endpoints to reach selected services in the private network.

This section explains how to ensure that, whatever your access controls, they do not interfere with your VPN:

- You must ensure that UDP ports are open on the Secure Router's public IP address.

  This allows the remote endpoints to contact the router and negotiate the VPN connection.

- You must also allow the VPN traffic itself, which you do differently depending on whether you are applying an ACP or an ACL to the interface:
  - In an ACP, which is applied *after* VPN traffic is decapsulated, allow the reverse list for the VPN ACLs.
  - In an ACL, which is applied *before* VPN traffic is decapsulated, simply allow all ESP and AH traffic to the Secure Router's public IP address.

If you do not want to apply an ACL or ACP to the Internet interface, you can skip this task.

Otherwise, complete the steps in the sections below.

Allow VPN Traffic in an ACP. The following section explains how to allow VPN traffic in the ACP configured for destination NAT in "Configure Destination NAT with Port Forwarding" on page 4-70:

1. Access the Secure Router CLI and move to the global configuration mode context.

2. Create an ACL that selects traffic to ports that you want to open on the Secure Router 7000dl's IP interface:

Syntax: ip access-list extended <*listname*>

Creates an extended ACL. Replace **<listname>** *with a string that uniquely identifies this ACL.*

```
SecureRouter(config)# ip access-list extended
Allow_VPN
SecureRouter(config-ext-nacl)#
```

3. Add an ACE that permits all UDP traffic to the Secure Router 7000dl's public interface:

Syntax: permit udp any host <*A.B.C.D*>

Permits UDP traffic to the specified IP address. Replace **<A.B.C.D>** *with the router's public IP address.*

For example:

```
SecureRouter(config-ext-nacl)# permit udp any host
192.168.1.1
```

4. Exit to the global configuration mode context.

```
SecureRouter(config-ext-nacl)# exit
```

5. If you want, create other ACLs to permit traffic from Internet (not VPN) users to other IP addresses on your network. For example, you might want to open the FTP port (TCP 21) or the HTTP port (TCP 80).

Note

If you have already configured destination NAT, this step may not be necessary.

6. Create the ACP, or access the existing ACP, with this command:

Syntax: ip policy-class <*policyname*>

Creates an ACP.

Replace **<policyname>** *with a string that you choose to uniquely define this ACP.*

For example:

```
SecureRouter(config)# ip policy-class Outside
SecureRouter(config-access-policy)#
```

7. Add statements, which specify how the Secure Router 7000dl handles traffic selected by the ACLs. Take care to specify the statements in the order that you want the router to process them. All traffic not explicitly selected by an allow (or NAT) list is discarded.

   At the least, allow the ACL that you configured to open all UDP ports on the router's public IP address. Use this command:

Syntax: [allow | discard] list <*listname*>

Specifies the action the Secure Router 7000dl takes on traffic selected by an ACL. Type **allow** *to have the router forward the traffic and* **discard** *to have the router drop the traffic.*

Replace ***<listname>*** *with the name of the ACL.*

For example:

```
SecureRouter(config-access-policy)# allow list
Allow_VPN
```

8. Allow the ACLs that you configured for VPN traffic. Because those ACLs specify the remote endpoints as the *destination*, you must *reverse* the lists to allow traffic from the remote endpoints. Use this command:

Syntax: allow reverse list <*listname*>

Allows traffic selected by the ACL when its ACEs are reversed. In other words, if the ACL permits traffic to a specific destination, the ACP permits traffic from that source.

Replace ***<listname>*** *with the name of the ACL.*

For example:

```
SecureRouter(config-access-policy)# allow reverse
list Faculty_VPN
```

```
SecureRouter(config-access-policy)# allow reverse
list Students_VPN
```

9. Exit the ACP configuration mode context:

```
SecureRouter(config-access-policy)# exit
```

10. If you are configuring a new ACP, apply it to the Internet interface:

    a. Move to the configuration mode context of the logical interface that connects to the Internet:

Syntax: interface <*interface*> <*number*>

Moves to the configuration mode context for the logical interface you specify.

Replace **<interface>** *with the name of the specific interface, such as* **ppp**, **fr**, *or* **atm**.

Replace **<number>** *with the number assigned to the interface when it was created.*

For example:

```
SecureRouter(config)# interface ppp 1
```

    b. Apply the ACP to the interface:

Syntax: access-policy <*policyname*>

Applies the ACP to incoming traffic on the logical interface.

Replace **<policyname>** *with the name that you gave the ACP in step 6 on page 4-99.*

For example:

```
SecureRouter(config-ppp 1)# access-policy Outside
```

11. Save your configuration to the startup-config.

```
SecureRouter(config-ppp 1)# do write memory
```

Allow VPN Traffic in an ACL. Instead of controlling incoming traffic with an ACP, you can use an ACL. Follow these steps:

1. Access the Secure Router CLI and move to the global configuration mode context.

2. To create an ACL, or, access an existing ACL, type this command:

Syntax: ip access-list [standard | extended] <*listname*>

Creates an ACL. The **standard** *option creates an ACL that selects traffic by source IP address only. You probably want to use the* **extended** *option, which allows traffic to be selected by destination IP address, as well as other characteristics.*

Replace ***<listname>*** *with a string that uniquely identifies this ACL.*

For example, type:

```
SecureRouter(config)# ip access-list extended Internet
SecureRouter(config-ext-nacl)#
```

3. If you are modifying an existing ACL, you might need to remove a deny ACE. ACEs are processed in order, so adding a permit ACE has no effect if an earlier ACE already denies the traffic in question.

   a. View the ACL with this command:

Syntax: do show access-list <listname>

Displays the ACL. Replace ***<listname>*** *with the name of the ACL applied to incoming traffic on the router's Internet interface.*

   b. Look for an ACE that denies UDP, ESP, or AH traffic to the Secure Router's public IP address.

   c. If you see such an ACE, re-type it with the **no** option. For example, you see this ACE:

   ```
   deny ip any host 192.168.1.1
   ```

   So you type this command:

   ```
   SecureRouter(config-ext-nacl)# no deny ip any host
   192.168.1.1
   ```

4. Add an ACE that permits all UDP traffic to the Secure Router 7000dl's public address:

Syntax: permit udp any host <*A.B.C.D*>

Permits UDP traffic to the specified IP address. Replace ***<A.B.C.D>*** *with the router's public IP address.*

For example:

```
SecureRouter(config-ext-nacl)# permit udp any host
192.168.1.1
```

5. Add the ACE that permits ESP or AH traffic, depending on which protocol is selected in your transform sets. Or add two ACEs and permit both:

Syntax: permit [esp | ah] any host <*A.B.C.D*>

Permits ESP or AH traffic to the specified IP address. Replace ***<A.B.C.D>*** *with the router's public IP address.*

For example:

```
SecureRouter(config-ext-nacl)# permit esp any host
192.168.1.1
SecureRouter(config-ext-nacl)# permit ah any host
192.168.1.1
```

6. Add other ACEs that open other ports. For example, you might want to open the FTP port (TCP 21) or the HTTP port (TCP 80).

Use this syntax:

Syntax: [permit | deny] <*protocol*> <*source address*> { [eq | lt | gt | neq | range] <*source port*>} <*destination address*> { [eq | lt | gt | neq | range] <*destination port*>} [<*packet bits*>] [log | log-input]

Creates an ACE in the ACL. The **permit** *option selects the specified traffic for action in the ACP. The* **deny** *option does not select the traffic. (The traffic might match a later ACE in this or another ACL in the ACP, but eventually, all unselected traffic is dropped.)*

For ***<protocol>***, *type* **ah**, **esp**, **gre**, **icmp**, **ip**, **tcp**, *or* **udp**.

Replace ***<source address>*** *with the source IP address. Use wildcard bits (which operate on reverse logic from subnet masks) to specify multiple addresses. If you want to specify a single address, type* **host** *first (for example,* **host 10.1.1.1***). To specify all IP address, type* **any**. *If you have selected* **tcp** *or* **udp** *for the protocol, you can optionally select a source port; type* **eq** *to match a single port.*

Similarly, replace ***<destination address>*** *and, optionally,* ***<destination port>*** *with the destination IP address (or addresses).*

For information about other settings, see Chapter 5: "Applying Access Control to Router Interfaces" in the ProCurve Secure Router 7000dl Series Advanced Management and Configuration Guide.

For example:

```
SecureRouter(config-ext-nacl)# permit tcp any host
192.168.1.15 eq ftp
SecureRouter(config-ext-nacl)# permit tcp any host
192.168.1.30 eq www
```

7. You might need to add a deny ACE for other traffic, but often the implicit **deny ip any any** at the end of the ACL is sufficient.

8. Exit the extended ACL configuration mode context:

```
SecureRouter(config-ext-nacl)# exit
```

9. If you are configuring a new ACL, apply it to the Internet interface:
   a. Move to the WAN interface configuration mode context:

Syntax: interface <*interface*> <*number*>

Moves to the configuration mode context for the logical interface you specify.

Replace **<interface>** *with the name of the specific interface, such as* **ppp**, **fr**, *or* **atm**.

Replace **<number>** *with the number assigned to the interface when it was created.*

For example:

```
SecureRouter(config)# interface ppp 1
```

   b. Apply the ACL to incoming traffic:

Syntax: ip access-group <*listname*> in

Applies the ACL to incoming traffic on the interface.

Replace **<listname>** *with the name of the ACL, assigned when you created it in 2 on page 4-102.*

10. Save your configuration to the startup-config.

```
SecureRouter(config-ppp 1)# do write memory
```

Using Digital Certificates

This network access control solution uses certificates to verify the identity of both the users and the Secure Router 7000dl. (For more information about certificates, see the *ProCurve Access Control Security Design Guide*.)

The example network has a full PKI with a root enterprise CA that will issue certificates for the VPN. Because this solution builds on the network access control solution described in Chapter 2: “Implementing 802.1X with ProCurve IDM and Endpoint Integrity,” the instructions focus on using a Windows Server 2003 that is configured as a CA server.

If the CA server that you select supports Simple Certificate Enrollment Protocol (SCEP), the Secure Router 7000dl can download and import certificates from it automatically.

Otherwise, you will have to paste these into the Secure Router 7000dl’s CLI.

You will need to obtain at least two certificates:

- **A CA certificate**

  The router uses the CA certificate to decrypt and check the CA's digital signature. The router's OS must include a CA certificate for each CA from which it receives a certificate and from which it accepts certificates.

  The CA certificate can be either a root certificate, which a CA issues to itself, or a subordinate certificate, which a CA issues to a subordinate CA. In this example, you will import the Windows domain CA's root certificate on to the Secure Router 7000dl.

- **A personal certificate for the router** (from here forward, called the router certificate)

  The router certificate is the certificate the Secure Router 7000dl uses to authenticate its own identity. You must create the request for this certificate on the router itself; you can then submit it to the CA.

Obtain Digital Certificates

First, select a CA—in this example, your Windows domain CA.

If your CA server supports SCEP, you must complete these steps to load the necessary certificates into the Secure Router 7000dl's operating system:

1. Create a CA profile.
2. Import the CA certificate.
3. Generate a certificate request. The router automatically sends the request to the CA and automatically installs the certificate returned by the CA.

This guide explains how to obtain the certificates manually without SCEP. You must complete these steps:

1. Create a CA profile.
2. Publish the CA certificate to a file.
3. Import the CA certificate on to the Secure Router 7000dl.
4. Generate a certificate request.
5. Submit the certificate request to the CA. When the CA issues the certificate, download it to a file.
6. Import the router certificate and the CRL.

   The CRL, which lists certificates issued to hosts and when they expire, allows the router to determine whether a peer's certificate is still valid. You learned how to obtain the CRL in "Export the CRL" on page 4-38.

Create a CA Profile. You must configure a profile for a CA before you can load its certificate into the system. To create a CA profile, follow these steps:

1. Access the Secure Router CLI and move to the global configuration mode context.
2. Type the following command to create the profile:

Syntax: crypto ca profile <*profile name*>

Creates a CA profile, which stores information about the CA, as well as information that the router will submit in its request.

*Replace **<profile name>** with a name that you choose to identify the CA.*

For example:

```
ProCurveRS7000dl(config)#crypto ca profile PCUCA
ProCurveRS7000dl(ca-profile)#
```

3. Specify the enrollment method:

Syntax: enrollment {terminal | url http://<*FQDN*>/[<*client program name*>]}

Specifies the enrollment method for the CA.

If you are loading certificates manually, use the **terminal** *option.*

*If you are using SCEP, use the url option. Replace **<FQDN>** with the URL for the CA server's Web site. Replace **<client program name>** with the name of a PKI program. If you do not include a program name, the router will use the default program* **pkiclient.exe**.

In this solution, certificates are loaded manually. Type:

```
ProCurveRS7000dl(ca-profile)# enrollment terminal
```

Note

The **url** and **terminal** options are mutually exclusive, and the most recently entered option takes precedence. For example, if you type a URL for your CA server and then type **enrollment terminal**, the URL will be erased.

Refer to Table 4-21 for the commands for specifying various information about the router in the CA profile. The Secure Router 7000dl uses this information to generate its subject name in the certificate request that you will create in "Request a Certificate" on page 4-161.

Entering this information now is optional. (Use the ? help tool to display the commands you would use to enter the information.) You can also enter this information later, in a dialog box, when you actually generate the request.

Table 4-21. Adding Information for a Self Certificate Request to a CA Profile

Information	Command Syntax
IP address	**ip-address <*A.B.C.D*>**
domain name	**fqdn <*domain nam*e>**
email address	**email-address <*email address*>**
subject name	**subject-name <*name*>**
serial number	**serial-number**

Publish the CA Certificate to a File. For instructions on publishing your CA's certificate to a file, refer to "Export the CA Root Certificate" on page 2-97 of Chapter 2: "Implementing 802.1X with ProCurve IDM and Endpoint Integrity." Export the certificate in Base-64 format.

Load the CA Certificate. You must load the CA certificate into the profile before you can create a certificate request and import the router's certificate.

Follow these steps:

1. Transfer the CA root certificate file to your management station.
2. Access the Secure Router 7000dl CLI and move to the global configuration mode context.
3. Type this command:

Syntax: crypto ca authenticate <*profile name*>

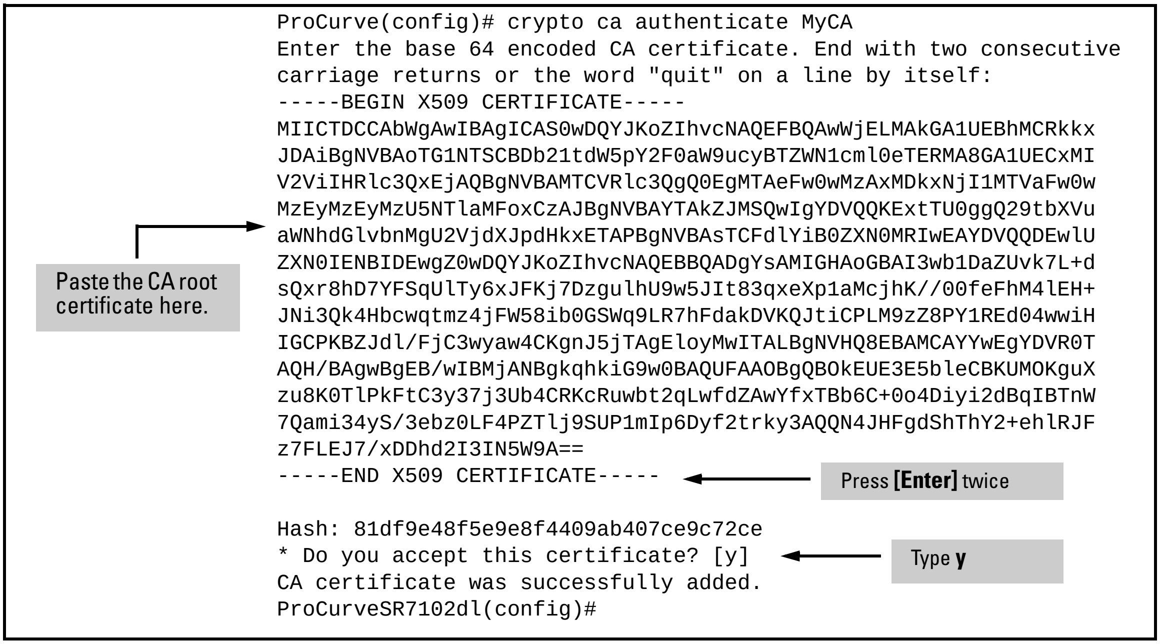
Loads a CA certificate on the router.

Replace **<profile name>** *with the name you chose for the profile (see step 2 of "Create a CA Profile" on page 4-107).*

For example:

```
ProCurveRS7000dl(config)#crypto ca authenticate PCUCA
```

4. Open the certificate file in a text editor. Select and copy the text. Then follow the directions in the CLI to paste the certificate into the command line. (See Figure 4-39.)



```
ProCurve(config)# crypto ca authenticate MyCA
Enter the base 64 encoded CA certificate. End with two consecutive
carriage returns or the word "quit" on a line by itself:
-----BEGIN X509 CERTIFICATE-----
MIICTDCCAbWgAwIBAgICAS0wDQYJKoZIhvcNAQEFBQAwWjELMAkGA1UEBhMCRkkx
JDAiBgNVBAoTG1NTSCBDb21tdW5pY2F0aW9ucyBTZWN1cml0eTERMA8GA1UECxMI
V2ViIHRlc3QxEjAQBgNVBAMTCVRlc3QgQ0EgMTAeFw0wMzAxMDkxNjI1MTVaFw0w
MzEyMzEyMzU5NTlaMFoxCzAJBgNVBAYTAkZJMSQwIgYDVQQKExtTU0ggQ29tbXVu
aWNhdGlvbnMgU2VjdXJpdHkxETAPBgNVBAsTCFdlYiB0ZXN0MRIwEAYDVQQDEwlU
ZXN0IENBIDEwgZ0wDQYJKoZIhvcNAQEBBQADgYsAMIGHAoGBAI3wb1DaZUvk7L+d
sQxr8hD7YFSqUlTy6xJFKj7DzgulhU9w5JIt83qxeXp1aMcjhK//00feFhM4lEH+
JNi3Qk4Hbcwqtmz4jFW58ib0GSWq9LR7hFdakDVKQJtiCPLM9zZ8PY1REd04wwiH
IGCPKBZJdl/FjC3wyaw4CKgnJ5jTAgEloyMwITALBgNVHQ8EBAMCAYYwEgYDVR0T
AQH/BAgwBgEB/wIBMjANBgkqhkiG9w0BAQUFAAOBgQBOkEUE3E5bleCBKUMOKguX
zu8K0TlPkFtC3y37j3Ub4CRKcRuwbt2qLwfdZAwYfxTBb6C+0o4Diyi2dBqIBTnW
7Qami34yS/3ebz0LF4PZTlj9SUP1mIp6Dyf2trky3AQQN4JHFgdShThY2+ehlRJF
z7FLEJ7/xDDhd2I3IN5W9A==
-----END X509 CERTIFICATE-----

Hash: 81df9e48f5e9e8f4409ab407ce9c72ce
* Do you accept this certificate? [y]
CA certificate was successfully added.
ProCurveSR7102dl(config)#
```

Paste the CA root certificate here.

Press **[Enter]** twice

Type **y**

Figure 4-39. Manually Loading a CA Certificate

5. The CLI terminal should display:

   `Do you accept this certificate?`

6. Type **y**.

7. You should see this message:

   `CA certificate was successfully added.`

Generate a Router Certificate Request. After you load the CA certificate, you must request a personal certificate for the router. As part of creating the request, you will specify the Secure Router 7000dl's subject name. See Table 4-22.

Table 4-22. PCU Router Certificate Subject Name and Alternate Subject Names

Subject Name Type	PCU Name
Subject name	"CN=Router,OU=Computers,O=ProCurve University,L=Roseville,ST=California,C=US"
IP address	192.168.1.1
FQDN	SecureRouter.procurveu.edu
Email address	Not used

Table 4-23. My Router Certificate Subject Name and Alternate Subject Names

Subject Name Type	My Name
Subject name	
IP address	
FQDN	
Email address	

1. From the global configuration mode context, type this command:

Syntax: crypto ca enroll <*profile name*>

Generates a self certificate request.

Replace **<profile name>** *with the name you choose for the profile (see step 2 of "Create a CA Profile" on page 4-107).*

2. The OS will then initiate a dialog with you. (See Figure 4-40.)
3. For the signature algorithm (the algorithm for the certificate's private/public keypair), type **rsa** or **dsa** and press **[Enter]**.

   You must choose the type you selected for the authentication method in the IKE policy (see step 10 Table 4-11 on page 4-80). In this example: **rsa**.
4. For the modulus length, type a number for the key size in bits and press **[Enter]**. Valid sizes include:
   - **512**
   - **1024**

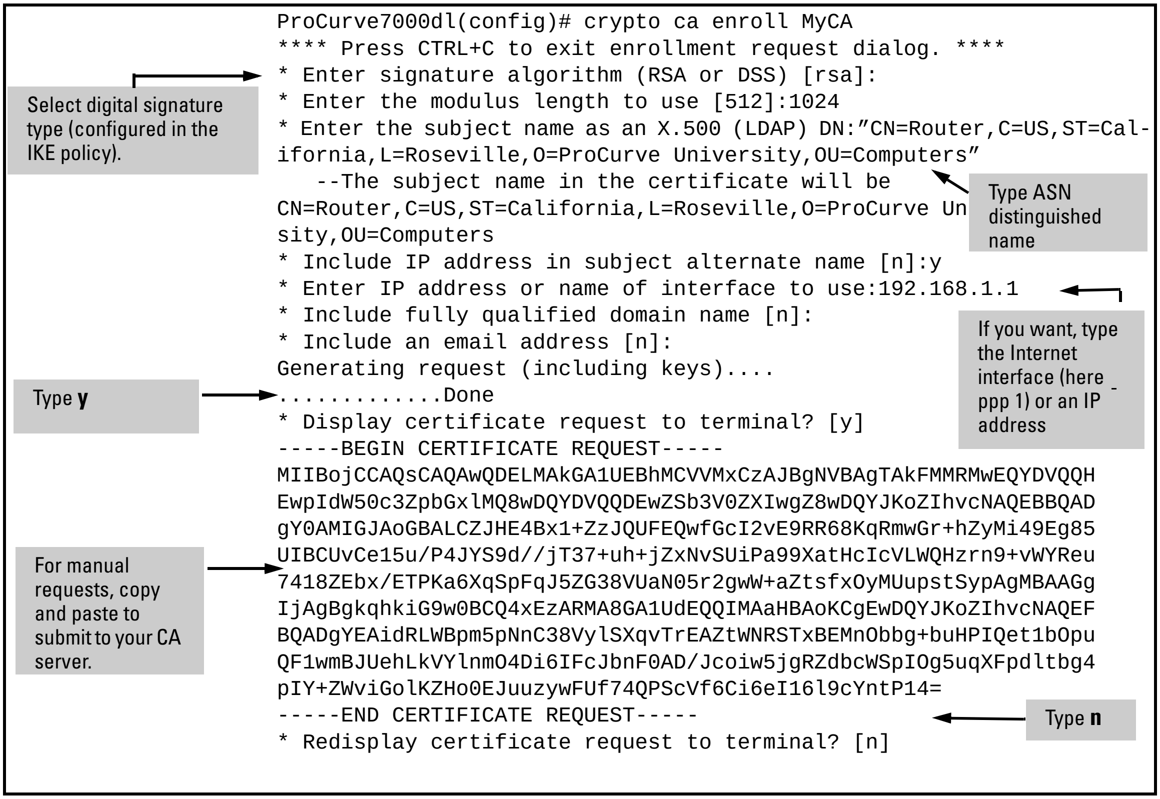
5. You will be prompted to enter any information not already configured from the CA profile configuration mode context:

   a. For the subject name, type an LDAP (ASN) format distinguished name. In this example, this is the same name that you configured as the local ID in the IKE policy: **"CN=SecureRouter,OU=Computers,O=ProCurve University,L=Roseville, ST=California,C=US"**

   b. To include an IP address as an alternate name in the certificate, type **y**. Then type the IP address of the WAN interface (in this example, **192.168.1.1**).

   c. Type **y** if you want to use the router's FQDN as an alternate name. Then type the router's FQDN. In this example: **SecureRouter.procurveu.edu**.

   d. Type **y** if you want to use the router's email address as an alternate name. Then type the router's email address. In this example: type **n**.



```
ProCurve7000dl(config)# crypto ca enroll MyCA
**** Press CTRL+C to exit enrollment request dialog. ****
* Enter signature algorithm (RSA or DSS) [rsa]:
* Enter the modulus length to use [512]:1024
* Enter the subject name as an X.500 (LDAP) DN:"CN=Router,C=US,ST=Cal-
ifornia,L=Roseville,O=ProCurve University,OU=Computers"
   --The subject name in the certificate will be
CN=Router,C=US,ST=California,L=Roseville,O=ProCurve Un
sity,OU=Computers
* Include IP address in subject alternate name [n]:y
* Enter IP address or name of interface to use:192.168.1.1
* Include fully qualified domain name [n]:
* Include an email address [n]:
Generating request (including keys)....
.............Done
* Display certificate request to terminal? [y]
-----BEGIN CERTIFICATE REQUEST-----
MIIBojCCAQsCAQAwQDELMAkGA1UEBhMCVVMxCzAJBgNVBAgTAkFMMRMwEQYDVQQH
EwpIdW50c3ZpbGxlMQ8wDQYDVQQDEwZSb3V0ZXIwgZ8wDQYJKoZIhvcNAQEBBQAD
gY0AMIGJAoGBALCZJHE4Bx1+ZzJQUFEQwfGcI2vE9RR68KqRmwGr+hZyMi49Eg85
UIBCUvCe15u/P4JYS9d//jT37+uh+jZxNvSUiPa99XatHcIcVLWQHzrn9+vWYReu
7418ZEbx/ETPKa6XqSpFqJ5ZG38VUaN05r2gwW+aZtsfxOyMUupstSypAgMBAAGg
IjAgBgkqhkiG9w0BCQ4xEzARMA8GA1UdEQQIMAaHBAoKCgEwDQYJKoZIhvcNAQEF
BQADgYEAidRLWBpm5pNnC38VylSXqvTrEAZtWNRSTxBEMnObbg+buHPIQet1bOpu
QF1wmBJUehLkVYlnmO4Di6IFcJbnF0AD/Jcoiw5jgRZdbcWSpIOg5uqXFpdltbg4
pIY+ZWviGolKZHo0EJuuzywFUf74QPScVf6Ci6eI16l9cYntP14=
-----END CERTIFICATE REQUEST-----
* Redisplay certificate request to terminal? [n]
```

Select digital signature type (configured in the IKE policy).

Type ASN distinguished name

If you want, type the Internet interface (here ppp 1) or an IP address

Type **y**

For manual requests, copy and paste to submit to your CA server.

Type **n**

Figure 4-40. Requesting the Router Certificate

Note

When you submit the request to the CA, the CA includes the information you typed in the router's certificate. VPN clients will check the subject name (or alternate subject name) in the certificate to authenticate the Secure Router 7000dl. Make sure to match the name exactly. You can fill in Table 4-22 with your information.

6. Type **y** when asked:

   ```
   Display certificate request to the terminal?
   ```

7. Copy the text that is displayed and save it to a file in a text editor. For the extension, you can use **.req** or **.txt**.

Note

If you were obtaining certificates automatically, the OS would submit the request for you. It would also automatically load the certificate and a CRL into the CA profile. You would then have completed obtaining your certificates.

Submit the Certificate Request to the CA Server. You will complete this task from the CA server. Follow these steps to submit the certificate request to the CA:

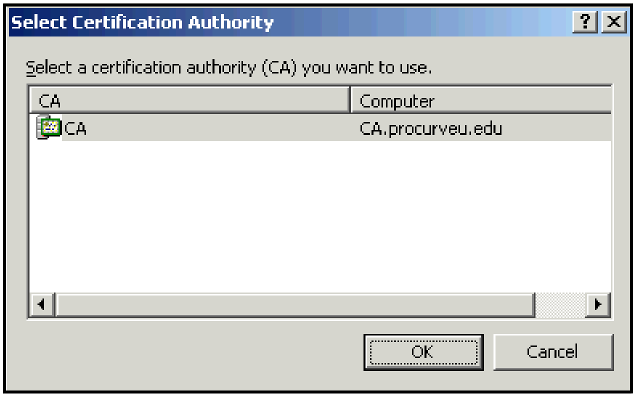
1. Transfer the certificate request file that you created in "Generate a Router Certificate Request" on page 4-109 to the server.
2. Open the command prompt (from the **Start** menu, select **Run**; type **cmd** and click **OK**).
3. Type this command:

Syntax: certreq -submit -attrib "CertificateTemplate:IPSecIntermediateOffline" <*request_filename*>

Submits the certificate request to a CA.

Replace ***<request_filename>*** *with the name of the certificate request that you transferred to the server. Make sure to specify the correct path.*

4. The **Select Certification Authority** window is displayed.



Select a certification authority (CA) you want to use.

CA	Computer
CA	CA.procurveu.edu

Figure 4-41. Select Certification Authority Window

5. Select the name of the CA server.
6. Click **OK**.
7. A window is displayed forsaving the certificate. Navigate to the location in which you want to save the certificate. Type the name for the certificate file.
8. Click **Save**.

Import a Router Certificate and CRL. You must complete these steps only if you are obtaining certificates manually:

1. Transfer the certificate file that you obtained in “Submit the Certificate Request to the CA Server” on page 4-112 to the endpoint from which you are managing the Secure Router 7000dl.
2. Also transfer the CRL file (or files) obtained in “Export the CRL” on page 4-38.
3. Access the Secure Router 7000dl CLI and move to the global configuration mode context.
4. Type the following command from the global configuration mode context:

Syntax: crypto ca import <*profile name*> certificate

Manually imports a certificate for the router.

Replace **<profile name>** *with the name you choose for the profile (see step 2 of “Create a CA Profile” on page 4-107).*

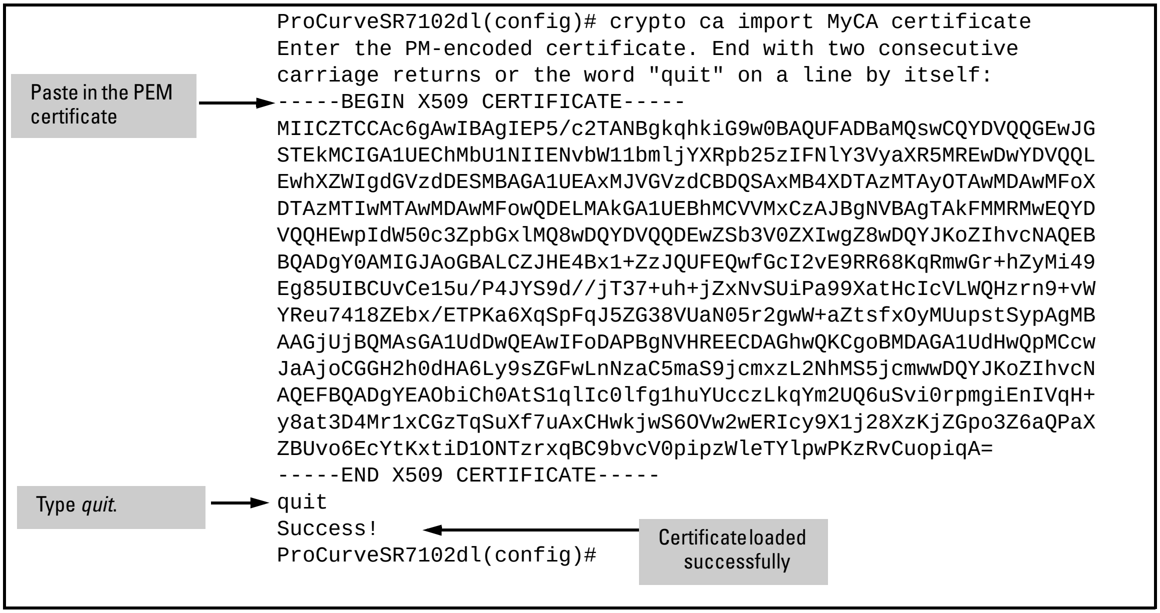
For example:

```
ProCurveRS7000dl(config)#crypto ca import PCUCA
certificate
```

5. Open the certificate file with a text editor.
6. Select and copy all of the text.
7. In the terminal session, paste the text where indicated. (See Figure 4-42.)
8. Press **[Enter]** twice. Or type **quit** and press **[Enter]**.

   You should see this message:

   ```
   Success!
   ```



```
ProCurveSR7102dl(config)# crypto ca import MyCA certificate
Enter the PM-encoded certificate. End with two consecutive
carriage returns or the word "quit" on a line by itself:
-----BEGIN X509 CERTIFICATE-----
MIICZTCCAc6gAwIBAgIEP5/c2TANBgkqhkiG9w0BAQUFADBaMQswCQYDVQQGEwJG
STEkMCIGA1UEChMbU1NIIENvbW11bmljYXRpb25zIFNlY3VyaXR5MREwDwYDVQQL
EwhXZWIgdGVzdDESMBAGA1UEAxMJVGVzdCBDQSAxMB4XDTAzMTAyOTAwMDAwMFoX
DTAzMTIwMTAwMDAwMFowQDELMAkGA1UEBhMCVVMxCzAJBgNVBAgTAkFMMRMwEQYD
VQQHEwpIdW50c3ZpbGxlMQ8wDQYDVQQDEwZSb3V0ZXIwgZ8wDQYJKoZIhvcNAQEB
BQADgY0AMIGJAoGBALCZJHE4Bx1+ZzJQUFEQwfGcI2vE9RR68KqRmwGr+hZyMi49
Eg85UIBCUvCe15u/P4JYS9d//jT37+uh+jZxNvSUiPa99XatHcIcVLWQHzrn9+vW
YReu7418ZEbx/ETPKa6XqSpFqJ5ZG38VUaN05r2gwW+aZtsfxOyMUupstSypAgMB
AAGjUjBQMAsGA1UdDwQEAwIFoDAPBgNVHREECDAGhwQKCgoBMDAGA1UdHwQpMCcw
JaAjoCGGH2h0dHA6Ly9sZGFwLnNzaC5maS9jcmxzL2NhMS5jcmwwDQYJKoZIhvcN
AQEFBQADgYEAObiCh0AtS1qlIc0lfg1huYUcczLkqYm2UQ6uSvi0rpmgiEnIVqH+
y8at3D4Mr1xCGzTqSuXf7uAxCHwkjwS6OVw2wERIcy9X1j28XzKjZGpo3Z6aQPaX
ZBUvo6EcYtKxtiD1ONTzrxqBC9bvcV0pipzWleTYlpwPKzRvCuopiqA=
-----END X509 CERTIFICATE-----
quit
Success!
ProCurveSR7102dl(config)#
```

Figure 4-42. Manually Importing a Router Certificate

9. Type the following command from the global configuration mode context:

Syntax: crypto ca import <*profile name*> crl

Manually imports a CRL.

Replace **<profile name>** *with the name you choose for the profile (see step 2 of "Create a CA Profile" on page 4-107).*

For example:

```
ProCurveRS7000dl(config)#crypto ca import PCUCA crl
```

10. Open the CRL file with a text editor.
11. Select and copy all of the text.
12. In the terminal session, paste the text where indicated.
13. Press **[Enter]** twice. Or type **quit** and press **[Enter]**.
14. Save your changes to the startup-config:

```
SecureRouter(config)# do write memory
```

Manage Certificates

The certificates configured on the Secure Router 7000dl vouch for the router's identity. It is very important that the information in them be correct and up to date.

This section gives you instruction for viewing and deleting certificates. If you do not need to complete these tasks, you can move to the next section: "Configuring the NAC 800" on page 4-128.

Viewing Certificates. Use the **show crypto ca** commands to view:

- Certificates
- CRLs
- CA profiles

You can view certificates to verify that the information in them is correct. You should also keep track of when your certificates expire and periodically update them. If the information in a router certificate is incorrect, you should view the CA profile. Information may have been miskeyed into the profile, which would cause the OS to include incorrect information in the certificate request.

Type this command from the enable mode context:

Syntax: show crypto ca [certificates | crls | profiles]

Displays information about certificates, CRLs, or CA profiles.

Include the **certificates** *option to view both CA and self certificates.*

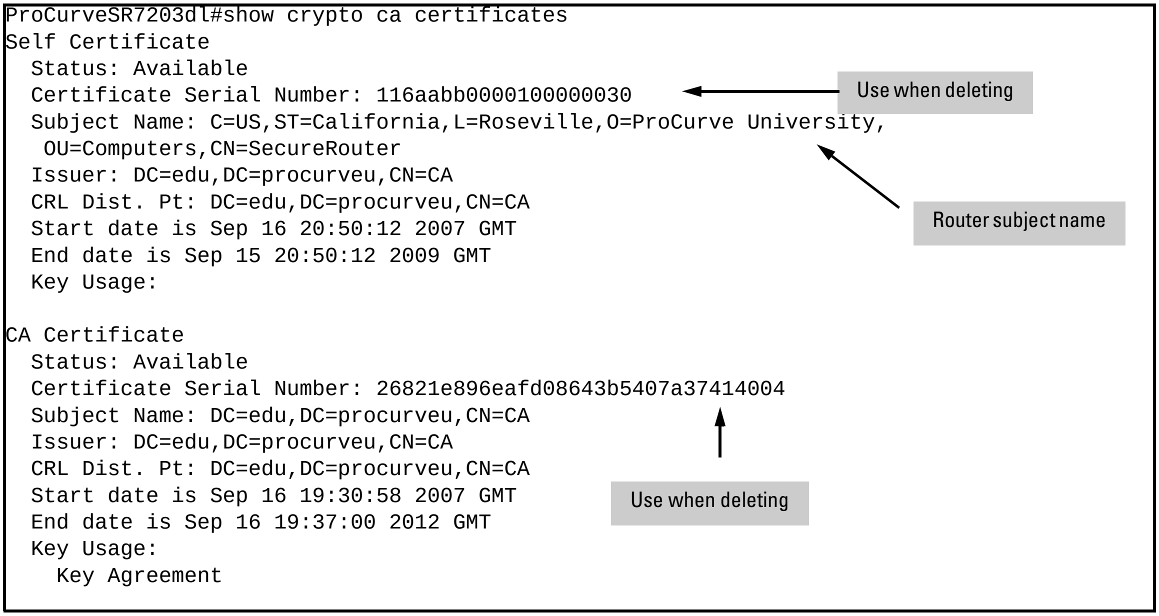
Include the **crls** *option to view the CRLs imported from this CA.*

Include the **profiles** *option to view the profiles configured on the router. The profile includes the enrollment method and optionally information to be included in a request.*

For example:

```
ProCurveRS7000dl#show crypto ca certificates
```

Figure 4-43 shows a sample display of certificates loaded on a router.



```
ProCurveSR7203dl#show crypto ca certificates
Self Certificate
  Status: Available
  Certificate Serial Number: 116aabb0000100000030
  Subject Name: C=US,ST=California,L=Roseville,O=ProCurve University,
   OU=Computers,CN=SecureRouter
  Issuer: DC=edu,DC=procurveu,CN=CA
  CRL Dist. Pt: DC=edu,DC=procurveu,CN=CA
  Start date is Sep 16 20:50:12 2007 GMT
  End date is Sep 15 20:50:12 2009 GMT
  Key Usage:

CA Certificate
  Status: Available
  Certificate Serial Number: 26821e896eafd08643b5407a37414004
  Subject Name: DC=edu,DC=procurveu,CN=CA
  Issuer: DC=edu,DC=procurveu,CN=CA
  CRL Dist. Pt: DC=edu,DC=procurveu,CN=CA
  Start date is Sep 16 19:30:58 2007 GMT
  End date is Sep 16 19:37:00 2012 GMT
  Key Usage:
    Key Agreement
```

Figure 4-43. Viewing Certificates

Deleting Certificates. Follow this process to delete a certificate:

1. View the certificate using the **show crypto ca certificates** command.
2. Find the certificate's serial number.
3. Move to the global configuration mode context and access the certificate chain command set for the corresponding CA profile:

Syntax: crypto ca certificate chain <*profile name*>

Accesses the certificate chain command.

Replace ***<profile name>*** *with the name of the profile for CA that signed the certificate you want to delete.*

4. Delete the certificate:

Syntax: no certificate [ca <*serial number*> | <*serial number*>]

Deletes a certificate.

To delete a CA certificate, type **ca** *and replace* ***<serial number>*** *with the serial number you located when you viewed the CA certificate.*

To delete a router certificate, replace ***<serial number>*** *with the serial number you located when you viewed the certificate.*

For example to delete the router certificate shown in Figure 4-43, type:

```
ProCurveRS7000dl(config)# crypto ca certificate chain
PCUCA
ProCurveRS7000dl(config-cert-chain)# no certificate
3f9fdcd9
```

Note

The Secure Router OS uses the commands in the **certificate chain** command set to load certificates. However, you should only use these commands *only* to delete certificates.

Managing CRLs. A CRL is a list of digital certificate subscribers. It includes information about each subscriber's certificates, including:

- current status
- date of issue
- CA from which the certificate was obtained

The CRL also lists revoked certificates, accompanied by the cause for the revocation.

IKE uses the CRL to help determine whether a peer can be trusted to connect over the VPN tunnel. To keep your private network secure, you should make sure that the CA profile contains an up-to-date CRL.

To delete a CRL:

1. Access the **certificate chain** command set for the corresponding CA profile:

Syntax: crypto ca certificate chain <*profile name*>

Accesses the certificate chain command.

Replace **<profile name>** *with the name of the CA that issued the CRL that you want to delete.*

2. Delete the CRL:

```
ProCurveRS7000dl(config-cert-chain)# no crl
```

Note

Always reinstall a CRL after you delete one. Otherwise, the certificates do not function properly.

Secure Router 7000dl Running-Config

This section includes the running-config for the example Secure Router 7203dl after all configurations have been completed.

```
!
!
! ProCurve Secure Router 7203dl SROS version J08.03
! Boot ROM version J06.06
! Platform: ProCurve Secure Router 7203dl, part number
J8753A
! Serial number US449TS073
! Flash: 33554432 bytes  DRAM: 268435455 bytes
! Date/Time: Thu Oct 11 2007, 11:02:10 MDT
!
!
hostname "SecureRouter"
enable password md5 encrypted
b46f9961af093fdfb9e177eda7784f09
!
clock timezone -8
```

```
!
ip subnet-zero
ip classless
ip routing
ip local policy route-map pbr_VPN
!
event-history on
no logging forwarding
no logging email
logging email priority-level info
!
no service password-encryption
!
username "manager" password "procurve"
!
!
ip firewall
no ip firewall alg msn
no ip firewall alg h323
!
!
!
!
!
!
no autosynch-mode
no safe-mode
!
!
!
!
!
!
!
ip crypto
!
crypto ike client configuration pool RemoteUsers
  ip-range           10.48.100.10      10.48.101.250
  dns-server         10.4.4.15         10.4.5.15
!
```

```
crypto ike policy 10
  no initiate
  respond main
  local-id asn1-dn CN=SecureRouter,OU=Computers,O=Pro-
Curve University,L=Roseville,ST=California,C=US
  peer any
  client configuration pool RemoteUsers
  attribute 10
    encryption aes-192-cbc
    authentication rsa-sig
    group 2
    lifetime 240
  attribute 20
    encryption 3des
    hash md5
    authentication rsa-sig
    lifetime 240
!
crypto ike remote-id asn1-dn "CN=*,OU=Faculty,O=ProCurve
University,L=*,ST=*,C=*" crypto map VPN 10
crypto ike remote-id asn1-dn "CN=*,OU=Students,O=ProCurve
University,L=*,ST=*,C=*" crypto map VPN 20
!
crypto ipsec transform-set esp_Aes192Sha esp-aes-192-cbc
esp-sha-hmac
  mode tunnel
crypto ipsec transform-set esp_3des esp-3des
  mode tunnel
crypto ipsec transform-set ahEsp_shaAes192 ah-sha-hmac
esp-aes-192-cbc
  mode tunnel
!
crypto map VPN 10 ipsec-ike
  match address VPN_Faculty
  set transform-set ahEsp_shaAes192 esp_Aes192Sha
esp_3des
  set security-association lifetime seconds 7200
  set pfs group5
crypto map VPN 20 ipsec-ike
  match address VPN_Students
  set transform-set ahEsp_shaAes192 esp_Aes192Sha
esp_3des
  set security-association lifetime seconds 7200
  set pfs group5
```

```
!
crypto ca profile "PCUCA"
!
crypto ca certificate chain "PCUCA"
  certificate ca 0f79fa721a6f9da04118447f73a1f64c
-----BEGIN CERTIFICATE-----
MIIDVDCCAr2gAwIBAgIQD3n6chpvnaBBGER/
c6H2TDANBgkqhkiG9w0BAQUFADA9MRMwEQYKCZImiZPyLGQBGRYDZWR
1MRkwFwYKCZImiZPyLGQBGRYJcHJvY3VydmV1MQswCQYDVQQDEwJDQT
AeFw0wNzEwMDMyMDQ0MTJaFw0xMjEwMDMyMDUwMjRaMD0xEzARBgoJk
iaJk/IsZAEZFgNlZHUxGTAXBgoJkiaJk/
IsZAEZFglwcm9jdXJ2ZXUxCzAJBgNVBAMTAkNBMIGfMA0GCSqGSIb3D
QEBAQUAA4GNADCBiQKBgQDunj2ZyfkCtxbs4/
01YZsh9gAuoY78b5+ZsUdRGf3t+U+6TnAjyEhkw44/
0uN9+LRBA2Df6FU4HFQWPCIDdmf5ScKZrao8lBGrNt1Yi12OuCX62K+
pm5Cm9bQFT3XcEZ0Q729KhWqAqkjLzMdRxm1/
RhhjwHihlxjGZcZGvyxXIwIDAQABo4IBUzCCAU8wEwYJKwYBBAGCNxQ
CBAYeBABDAEEwCwYDVR0PBAQDAgGGMA8GA1UdEwEB/
wQFMAMBAf8wHQYDVR0OBBYEFEgZV2Z8x/
rS9nPwwRzr+DI3UwqyMIHoBgNVHR8EgeAwgd0wgdqggdeggdSGgaZsZ
GFwOi8vL0NOPUNBLENOPUNBLENOPUNEUCxDTj1QdWJsaWMlMjBLZXkl
MjBTZXJ2aWNlcyxDTj1TZXJ2aWNlcyxDTj1Db25maWd1cmF0aW9uLER
DPXByb2N1cnZldSxEQz1lZHU/
Y2VydGlmaWNhdGVSZXZvY2F0aW9uTGlzdD9iYXNlP29iamVjdENsYXN
zPWNSTERpc3RyaWJ1dGlvblBvaW50hilodHRwOi8vY2EucHJvY3Vydm
V1LmVkdS9DZXJ0RW5yb2xsL0NBLmNybDAQBgkrBgEEAYI3FQEEAwIBA
DANBgkqhkiG9w0BAQUFAAOBgQBTSh01OAC0Ff33m+CqNZtS0MRvy23N
COD47isfLqgiF1d1Vc6ZFtVrq3zuMWTEboKWHI10N8q1uTP1HllPzKn
M0Ll1UPt9LYwRBIqiNlQDX778lmhKT4AFUjSa+D1iwzhR7bdfUv1H5m
CimDo1PHp8DGcOYfHc9sFJAegcBZw8Jg==
-----END CERTIFICATE-----
quit
!
!
  certificate 6102f09f000000000020
-----BEGIN CERTIFICATE-----
MIIE7TCCBFagAwIBAgIKYQLwnwAAAAAAIDANBgkqhkiG9w0BAQUFADA
9MRMwEQYKCZImiZPyLGQBGRYDZWR1MRkwFwYKCZImiZPyLGQBGRYJcH
JvY3VydmV1MQswCQYDVQQDEwJDQTAeFw0wNzEwMDgxOTU5MzZaFw0wO
TEwMDcxOTU5MzZaMGExCzAJBgNVBAYTAlVTMRMwEQYDVQQIEwpDYWxp
Zm9ybmlhMRIwEAYDVQQHEwlSb3NldmlsbGUxEjAQBgNVBAsTCUNvbXB
1dGVyczEVMBMGA1UEAxMMU2VjdXJlUm91dGVyMIGfMA0GCSqGSIb3DQ
EBAQUAA4GNADCBiQKBgQDMqOA6yOCw6aOiXdZYk7GoPfOScnH8uKBDQ
LYo5msDPQ5EcJPEvP3ehCa14Gi1hu+kbYCPOcA5d9dsHImddAVIyY+W
```

```
o/
1Yck+OY2YW7691XyrCixwI5M4pGqNED5QVWvKMtqNlCZhPF1LrOZ7hQ
SvNycoiX7SIlIhIXPMn9e7XzwIDAQABo4ICzjCCAsowKwYDVR0RBCQw
IocEwKgBAYIaU2VjdXJlUm91dGVyLnByb2N1cnZldS5lZHUwHQYDVR0
OBBYEFFT4Pesfp7ICtXIGAdulinG/
VTehMB8GA1UdIwQYMBaAFEgZV2Z8x/
rS9nPwwRzr+DI3UwqyMIHoBgNVHR8EgeAwgd0wgdqggdeggdSGgaZsZ
GFwOi8vL0NOPUNBLENOPUNBLENOPUNEUCxDTj1QdWJsaWMlMjBLZXkl
MjBTZXJ2aWNlcyxDTj1TZXJ2aWNlcyxDTj1Db25maWd1cmF0aW9uLER
DPXByb2N1cnZldSxEQz1lZHU/
Y2VydGlmaWNhdGVSZXZvY2F0aW9uTGlzdD9iYXNlP29iamVjdENsYXN
zPWNSTERpc3RyaWJ1dGlvblBvaW50hilodHRwOi8vY2EucHJv
Y3VydmV1LmVkdS9DZXJ0RW5yb2xsL0NBLmNybDCB/
gYIKwYBBQUHAQEEgfEwge4wgaMGCCsGAQUFBzAChoGWbGRhcDovLy9D
Tj1DQSxDTj1BSUEsQ049UHVibGljJTIwS2V5JTIwU2VydmljZXMsQ04
9U2VydmljZXMsQ049Q29uZmlndXJhdGlvbixEQz1wcm9jdXJ2ZXUsRE
M9ZWR1P2NBQ2VydGlmaWNhdGU/
YmFzZT9vYmplY3RDbGFzcz1jZXJ0aWZpY2F0aW9uQXV0aG9yaXR5MEY
GCCsGAQUFBzAChjpodHRwOi8vY2EucHJvY3VydmV1LmVkdS9DZXJ0RW
5yb2xsL0NBLnByb2N1cnZldS5lZHVfQ0EuY3J0MD8GCSsGAQQBgjcUA
gQyHjAASQBQAFMARQBDAEkAbgB0AGUAcgBtAGUAZABpAGEAdABlAE8A
ZgBmAGwAaQBuAGUwDAYDVR0TAQH/
BAIwADALBgNVHQ8EBAMCBaAwEwYDVR0lBAwwCgYIKwYBBQUIAgIwDQY
JKoZIhvcNAQEFBQADgYEAR9zCzVCb/
gzUpHyRPF4MRVB8mJs5pljCOk77ZqFHsie7+sm66lWbQxVflbeEnR2F
paxBxlP2uT64LFVZhqNaLk7TqG3lJvXEpUD/
EkdYZIKum2pkmO3mGSVV5GWmC/eJ+crLpJ/
EHLhVPpoSUkYx83PvroqnbZjLH5pxq+7Vy4c=
-----END CERTIFICATE-----
quit
!
  crl
-----BEGIN X509 CRL-----
MIIDFzCCAoACAQEwDQYJKoZIhvcNAQEFBQAwPTETMBEGCgmSJomT8ix
kARkWA2VkdTEZMBcGCgmSJomT8ixkARkWCXByb2N1cnZldTELMAkGA1
UEAxMCQ0EXDTA3MTAwMzIwNDQ0MFoXDTA3MTAxMTA5MDQ0MFqgggINM
IICCTAfBgNVHSMEGDAWgBRIGVdmfMf60vZz8MEc6/
gyN1MKsjAQBgkrBgEEAYI3FQEEAwIBADAKBgNVHRQEAwIBATAcBgkrB
gEEAYI3FQQEDxcNMDcxMDEwMjA1NDQwWjCB4wYDVR0uBIHbMIHYMIHV
oIHSoIHPhoGgbGRhcDovLy9DTj1DQSxDTj1DQSxDTj1DRFAsQ049UHV
ibGljJTIwS2V5JTIwU2VydmljZXMsQ049U2VydmljZXMsQ049Q29uZm
lndXJhdGlvbixEQz1wcm9jdXJ2ZXUsREM9ZWR1P2RlbHRhUmV2b2Nhd
Glvbkxpc3Q/
YmFzZT9vYmplY3RDbGFzcz1jUkxEaXN0cmlidXRpb25Qb2ludIYqaHR
```

```
0cDovL2NhLnByb2N1cnZldS5lZHUvQ2VydEVucm9sbC9DQSsuY3JsMI
HDBgkrBgEEAYI3FQ4EgbUwgbIwga+ggayggamGgaZsZGFwOi8vL0NOP
UNBLENOPUNBLENOPUNEUCxDTj1QdWJsaWMlMjBLZXklMjBTZXJ2aWNl
cyxDTj1TZXJ2aWNlcyxDTj1Db25maWd1cmF0aW9uLERDPXByb2N1cnZ
ldSxEQz1lZHU/
Y2VydGlmaWNhdGVSZXZvY2F0aW9uTGlzdD9iYXNlP29iamVjdENsYXN
zPWNSTERpc3RyaWJ1dGlvblBvaW50MA0GCSqGSIb3DQEBBQUAA4GBAG
Co/Pi65V5xc1wexV9yQa8zZO8Psv/
QPCnbcICL8DHRwoyNxuYFqvaa5IHyn+RYYI6CihtrdxuOcPEW7BziAB
z6mcbt3UE6/YHd/
ZveA4L6xFSDBBKgPnyOWu61mpyv3o+cnq6JzJ0XmRRsUJ2yf50ahQ/
bDfVOovjkpoRV7Y4C
-----END X509 CRL-----
quit
!
!
!
!
interface eth 0/1
  ip address  10.2.0.100  255.255.0.0
  access-policy NAT_Source
  no shutdown
!
!
interface eth 0/2
  ip address  10.3.0.100  255.255.255.0
  no shutdown
!
!
!
!
interface e1 2/1
  coding ami
  tdm-group 1 timeslots 1-31 speed 64
  no shutdown
!
interface e1 2/2
  clock source through
  shutdown
!
interface t1 3/1
  shutdown
!
interface t1 3/2
```

```
  shutdown
!
interface t1 3/3
  shutdown
!
interface t1 3/4
  shutdown
!
interface t1 3/5
  shutdown
!
interface t1 3/6
  shutdown
!
interface t1 3/7
  shutdown
!
interface t1 3/8
  shutdown
!
interface bri 1/3
  shutdown
!
interface bri 1/1
  shutdown
interface bri 1/2
  shutdown
!
interface ppp 1
  ip address  192.168.1.1  255.255.255.0
  ip policy route-map pbr_VPN
  access-policy Outside
  crypto map VPN
  no shutdown
  bind 1 e1 2/1 1 ppp 1
!
!
!
!
router rip
  version 2
  redistribute static
  network 10.2.0.0 255.255.0.0
  network 10.3.0.0 255.255.255.0
  distribute-list Routes_Ad_Switch out eth 0/1
  distribute-list Routes_Accept_NAC in eth 0/2
  distribute-list Routes_Ad_NAC out eth 0/2
!
!
!
route-map pbr_VPN permit 10
  match ip address pbr_VPN
  set ip next-hop 10.3.0.1
  set interface null 0
!
!
!
!
ip access-list standard LAN
  permit 10.0.0.0 0.255.255.255
!
ip access-list standard Routes_Accept_NAC
  deny   any
!
ip access-list standard Routes_Ad_NAC
  permit 10.48.100.0 0.0.1.255
!
ip access-list standard Routes_Ad_Switch
  deny   10.48.100.0 0.0.1.255
  permit any
!
!
ip access-list extended Email
  permit tcp any  host 192.168.1.1 eq pop3
!
ip access-list extended pbr_VPN
  deny   ip any 10.3.0.0 0.0.0.255
 permit ip 10.48.100.0 0.0.1.100  10.0.0.0 0.15.255.255
!
ip access-list extended VPN_Faculty
  permit ip host 10.3.0.90  10.48.100.0 0.0.1.255
  deny   ip 10.0.0.0 0.3.255.255  any
  deny   ip 10.6.0.0 0.1.255.255  any
 permit ip 10.0.0.0 0.15.255.255 10.48.100.0 0.0.1.255
!
ip access-list extended VPN_Students
  permit ip host 10.3.0.90  10.48.100.0 0.0.1.255
  deny   ip 10.0.0.0 0.3.255.255  any
  deny   ip 10.5.0.0 0.0.255.255  any
  deny   ip 10.6.0.0 0.1.255.255  any
  deny   ip 10.8.0.0 0.1.255.255  any
 permit ip 10.0.0.0 0.15.255.255 10.48.100.0 0.0.1.255
!
ip access-list extended Webserver
  permit tcp any  host 192.168.1.1 eq www
  permit tcp any  host 192.168.1.1 eq https
!
ip policy-class NAT_Source
  nat source list LAN interface ppp 1 overload
!
ip policy-class Outside
  nat destination list Webserver address 10.4.6.30
  nat destination list Email address 10.4.6.40
  allow list Allow_VPN
  allow reverse list VPN_Faculty
  allow reverse list VPN_Students
!
!
!
ip route 0.0.0.0 0.0.0.0 ppp 1
ip route 10.48.100.0 255.255.254.0 ppp 1
!
no ip tftp server
no ip tftp server overwrite
ip http server
ip http secure-server
no ip snmp agent
no ip ftp server
ip ftp server default-filesystem flash
no ip scp server
no ip sntp server
!
!
!
!
!
!
!
ip sip
ip sip proxy
!
!
```

```
!
line con 0
  no login
!
line telnet 0 4
  login
 password md5 encrypted a74989ae1872da969ab8395ae74ccfa2
  no shutdown
line ssh 0 4
  login local-userlist
  no shutdown
!
!
end
```

Configuring the NAC 800

This section describes how to add a NAC 800 ES deployed with the inline method to an existing system of NAC 800s.

In the example, the PCU network has an existing set of NAC 800s, which test and enforce endpoint integrity on local endpoints. Now network administrators are adding one additional NAC 800 to control remote endpoints. They will add the new NAC 800 as an ES on the existing MS, however, in a new enforcement cluster. The new NAC 800 ES will be the only device in that cluster. See Figure 4-44.

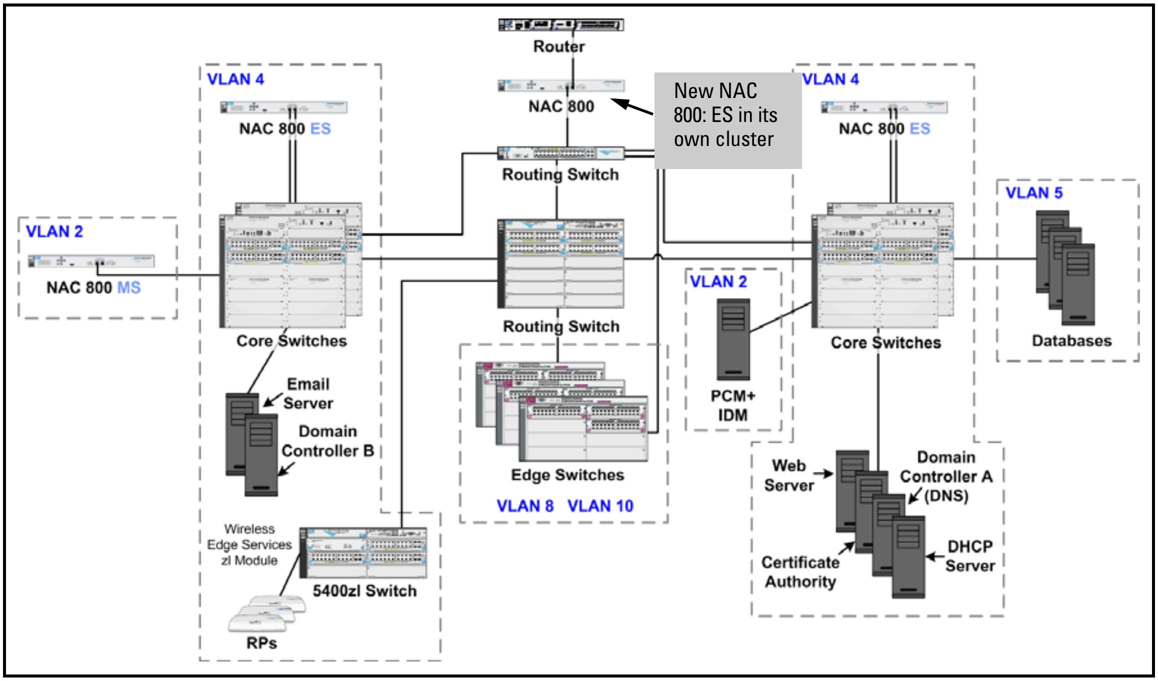


Figure 4-44. Inline Deployment—VPN with a NAC 800 That Is Part of an Enforcement Cluster

If your inline deployment is your network's only deployment, you can follow the steps in the sections below with just a few differences:

- In a network that requires only one NAC 800 (fewer than 3000 users with no redundancy), configure the NAC 800 as a Combination Server (CS). See Figure 4-45.

  Complete the instructions in the sections that follow; when you are instructed to configure the NAC 800 as an ES, configure it as a CS instead. Then adapt the instructions as necessary for a CS; for example, skip the instructions on creating enforcement clusters and adding ES.

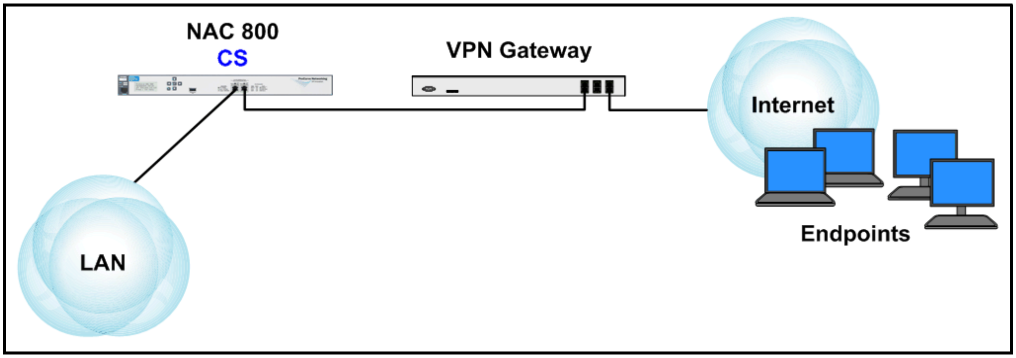


Figure 4-45. Inline Deployment—VPN With a Single NAC 800

- In a network that requires multiple NAC 800s, designate one device as the MS and the others as ESs. See Figure 4-46.

  Then follow the instructions in "Install the NAC 800" on page 4-130 and "Configure Initial Settings on the New NAC 800" on page 4-131 on all ESs and the MS.

  Other instructions should apply to your network as written; however, you will need to configure some initial settings when you first access the MS Web browser interface. See "Configure More Basic Settings for the MS" on page 2-142 of Chapter 2: "Implementing 802.1X with ProCurve IDM and Endpoint Integrity."

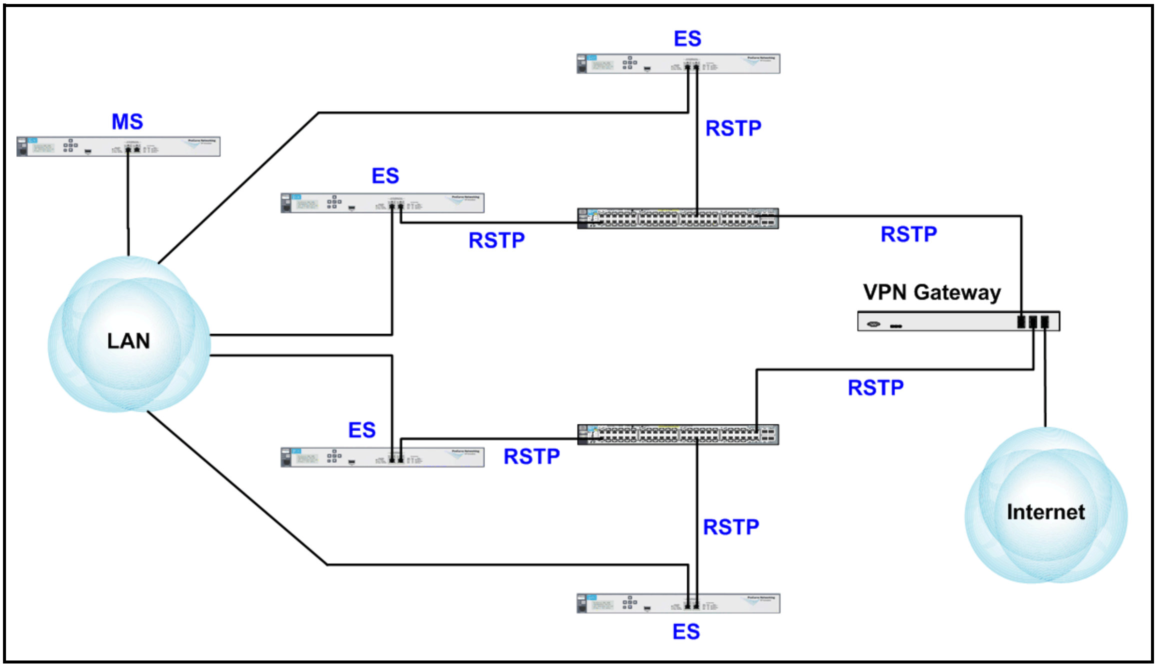


Figure 4-46. Inline Deployment—VPN with a Cluster of NAC 800s

Install the NAC 800

The NAC 800 in this solution enforces endpoint integrity by standing inline between remote users and the LAN. It filters all traffic with its internal firewall and allows only the following traffic:

- From sources that have passed the endpoint integrity test
- To accessible services

As you can see in Figure 4-44, Figure 4-45, and Figure 4-46, the NAC 800 ES is deployed between a core switch in the LAN and the Secure Router 7000dl. Port 1 on the NAC 800 connects to the core switch, and port 2 connects to the router.

Refer to the *Network Access Controller 800 Hardware Installation Guide* for more detailed mounting and installation instructions.

Configure Initial Settings on the New NAC 800

Before you can add the new NAC 800 to a network, you must configure some initial settings on it.

In this example, the NAC 800s will use the network settings in Table 4-24.

Table 4-24. NAC 800 Basic Settings

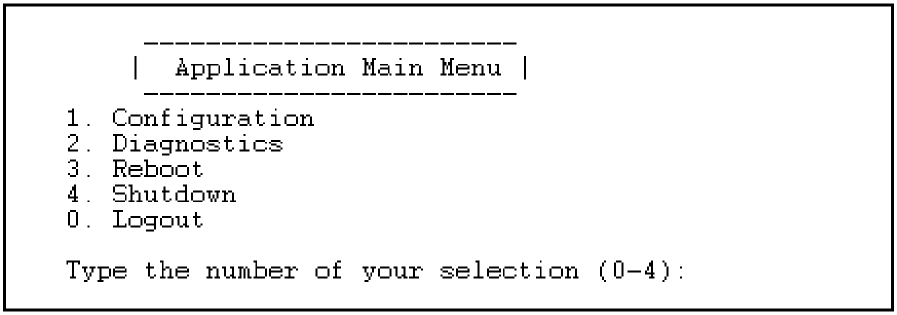
Device	Hostname	IP Address	Subnet Mask	Default Gateway	DNS Server	Time Settings
NAC 800 ES	ESc.procurveu.edu	10.3.0.90	255.255.255.0	10.3.0.1	10.4.4.15	From MS (10.2.1.40)

Configure Initial Settings through a Console Session

The following steps guide you through initial configuration of a NAC 800 ES.

1. Your NAC 800 ships with a console cable. Plug the cable's Ethernet (RJ45) connector into the Console Ethernet port, which is located on the left front panel of the NAC 800.
2. Plug the cable's DB-9 connector into a console port on your management workstation.
3. Use terminal session software such as Tera Term to open a console session with the NAC 800. Use the following settings:
   - Baud rate = 9600
   - Bits = 8
   - Stop rate = 1
   - Parity = None
   - Flow control = None
   - For the Windows Terminal program, disable (uncheck) the "Use Function, Arrow, and Ctrl Keys for Windows" option.
   - For the Hilgraeve HyperTerminal program, select the "Terminal keys" option for the "Function, arrow, and ctrl keys act as" parameter.
4. When prompted for your username, enter **admin**.
5. When prompted, enter your password (default, **procurve**).

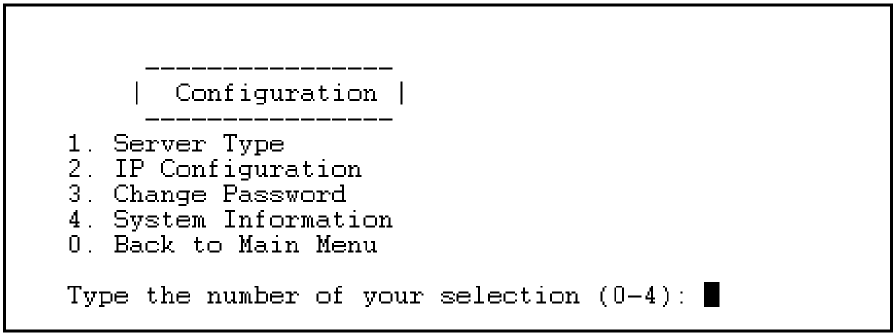
   You should now see the Application Main Menu.



```
     ------------------------
    |  Application Main Menu |
     ------------------------
1. Configuration
2. Diagnostics
3. Reboot
4. Shutdown
0. Logout

Type the number of your selection (0-4):
```

Figure 4-47. NAC 800 Menu Interface—Application Main Menu

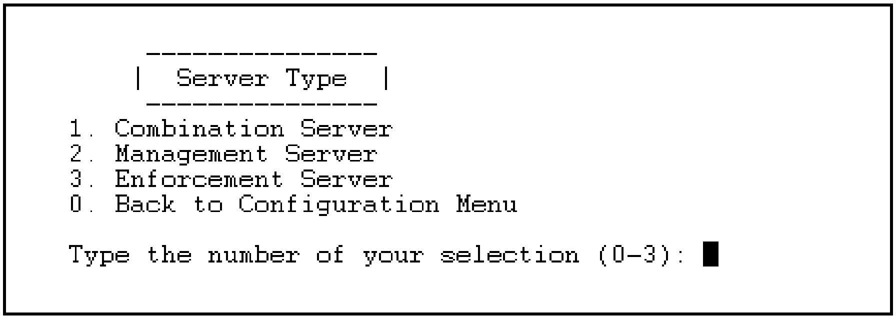
6. In the main menu, press [**1**] for **Configuration**.



```
     ----------------
    |  Configuration |
     ----------------
1. Server Type
2. IP Configuration
3. Change Password
4. System Information
0. Back to Main Menu

Type the number of your selection (0-4):
```

Figure 4-48. NAC 800 Menu Interface—Main Menu > 1. Configuration

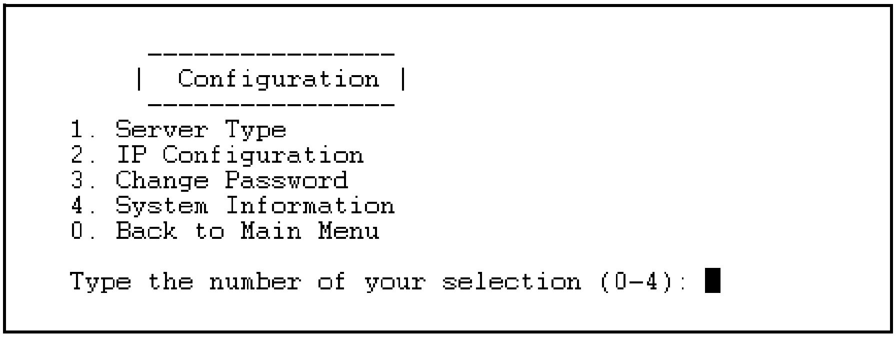
7. Press **[1]** for **Server Type**.



```
     ---------------
    |  Server Type  |
     ---------------
1. Combination Server
2. Management Server
3. Enforcement Server
0. Back to Configuration Menu

Type the number of your selection (0-3):
```

Figure 4-49. NAC 800 Menu Interface—Application Main Menu > 1. Configuration > 1. Server Type

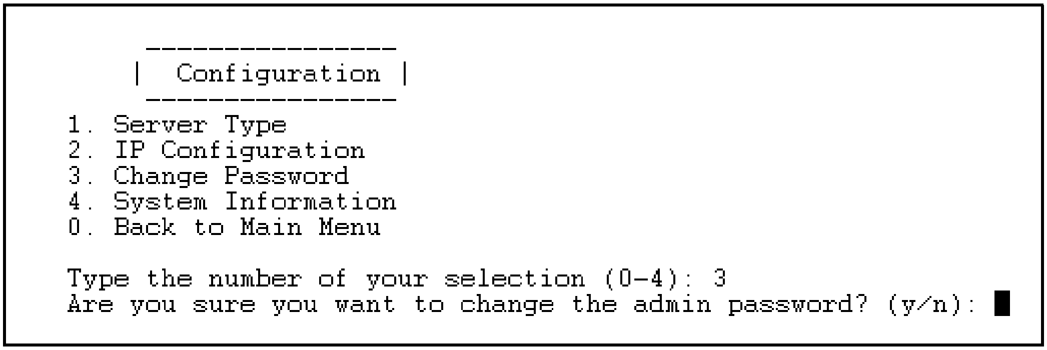
8. Press **[3]** for **Enforcement Server**.
9. Enter **y** when asked: **Set the ProCurve NAC 800 to Enforcement Server only?**
10. Press **[0]**.



```
       ----------------
      |  Configuration |
       ----------------
  1. Server Type
  2. IP Configuration
  3. Change Password
  4. System Information
  0. Back to Main Menu

  Type the number of your selection (0-4): █
```

Figure 4-50. NAC 800 Menu Interface—Application Main Menu > 1. Configuration

11. You should change the password to the menu interface. Press [**3**] for **Change Password**.



```
       ----------------
      |  Configuration |
       ----------------
  1. Server Type
  2. IP Configuration
  3. Change Password
  4. System Information
  0. Back to Main Menu

  Type the number of your selection (0-4): 3
  Are you sure you want to change the admin password? (y/n): █
```

Figure 4-51. NAC 800 Menu Interface—Main Menu > 1. Configuration > 3. Change Password

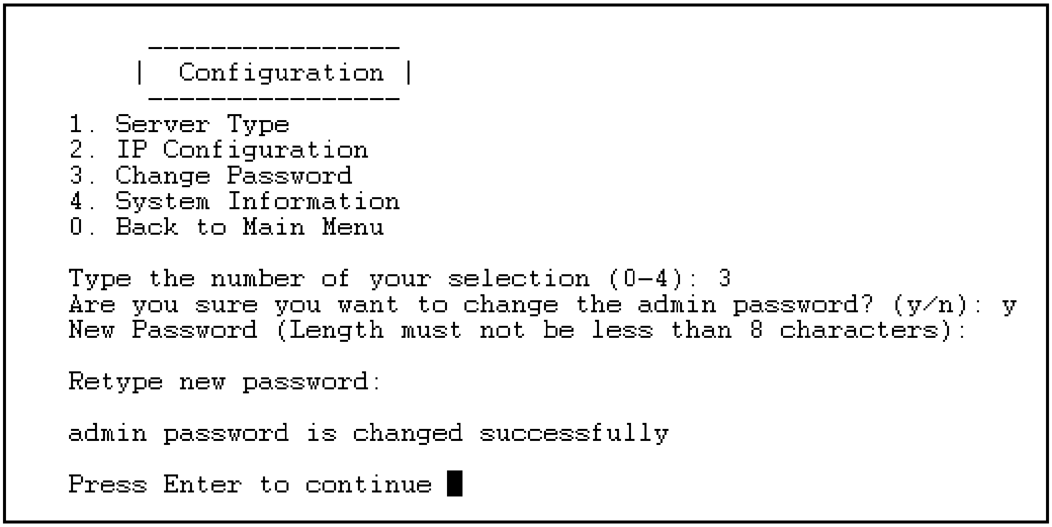
12. Enter **y** to confirm that you want to change the password.
13. Enter a password 8 characters or longer. The password can include alphanumeric and special characters, but does not have specific complexity requirements.

    In our example, management access to NAC 800s is protected with this password: **procurvenac9**.

Note

If you want the menu password to match the password created for the administrator of the Web browser interface, you must use a mix of letters and numbers.

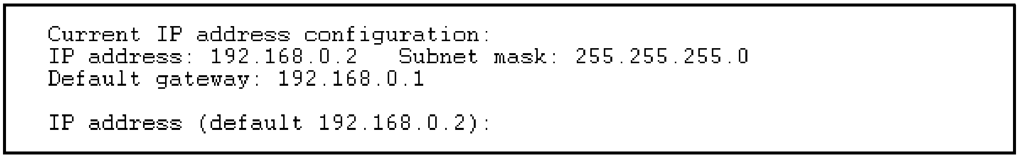
14. When prompted, re-enter the same password.



```
     ----------------
    |  Configuration |
     ----------------
1. Server Type
2. IP Configuration
3. Change Password
4. System Information
0. Back to Main Menu

Type the number of your selection (0-4): 3
Are you sure you want to change the admin password? (y/n): y
New Password (Length must not be less than 8 characters):

Retype new password:

admin password is changed successfully

Press Enter to continue
```

Figure 4-52. NAC 800 Menu Interface—Main Menu > 1. Configuration

15. Press **[Enter]**.
16. Press **[2]** for **IP Configuration**.

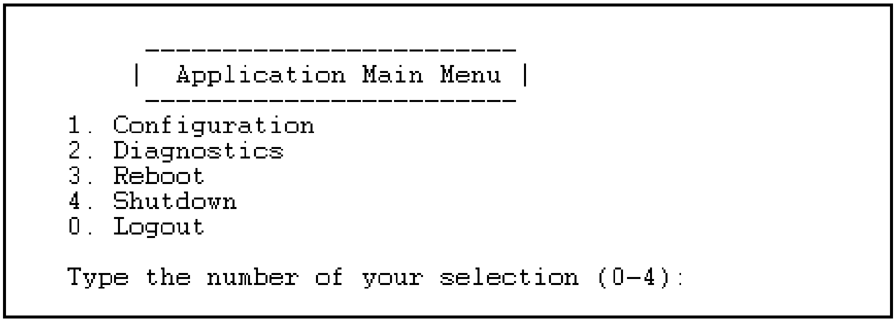


```
Current IP address configuration:
IP address: 192.168.0.2   Subnet mask: 255.255.255.0
Default gateway: 192.168.0.1

IP address (default 192.168.0.2):
```

Figure 4-53. NAC 800 Menu Interface—Application Main Menu > 1. Configuration > 2. IP Configuration

17. The window displays the NAC 800's default settings. Type the new IP address. Because this NAC 800 is deployed inline, it must be on the same subnet as the ports to which it connects. In this example: **10.3.0.90**.
18. Enter the subnet mask for the NAC 800's subnet. In this example: **255.255.0.0**.

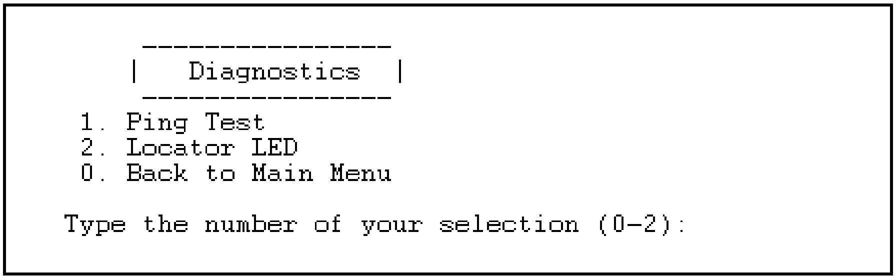
19. Enter the IP address of the default router on the NAC 800's subnet. In this example: **10.2.0.1**.
20. When asked to confirm the settings, check them and (if they are correct), enter **y**.
21. Press **[Enter]**.
22. Press **[0]**.



```
          ------------------------
         |  Application Main Menu |
          ------------------------
    1. Configuration
    2. Diagnostics
    3. Reboot
    4. Shutdown
    0. Logout

    Type the number of your selection (0-4):
```

Figure 4-54. NAC 800 Menu Interface—Application Main Menu

23. Press **[2]** for **Diagnostics**.



```
          ----------------
         |   Diagnostics  |
          ----------------
     1. Ping Test
     2. Locator LED
     0. Back to Main Menu

    Type the number of your selection (0-2):
```

Figure 4-55. NAC 800 Menu Interface—Application Main Menu > 2. Diagnostics

24. Press **[1]** for **Ping test**.
25. Press **[Enter]** to ping the default gateway.

    The results of the ping, including the times for the round trip, are displayed.

If the ping is successful, you can close the session and move on to the next task.

Access the MS's Web Browser Interface

The NAC 800 now has network connectivity, so you can add it to an enforcement cluster on the existing NAC 800 MS and finish configuring it. Follow these steps:

1. Open the Web browser on your management station.

2. For the URL, type **https://<*NAC 800 MS hostname*>**. For example: **https://ms.procurveu.edu**.

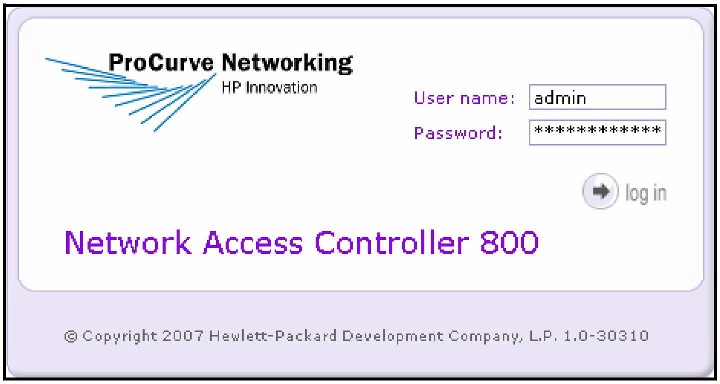
   You can type the NAC 800's IP address instead of its hostname.

Note

The NAC 800 requires HTTPS (as opposed to HTTP) for stronger security.

3. You connect to the NAC 800's Web browser interface. Log in with the username and password that you created when you first accessed the interface.

   If this is the first time that you have accessed the MS's interface, complete the steps described in "Configure More Basic Settings for the MS" on page 2-142 of Chapter 2: "Implementing 802.1X with ProCurve IDM and Endpoint Integrity."



User name: admin
Password: ************

ProCurve Networking
HP Innovation
log in
Network Access Controller 800
© Copyright 2007 Hewlett-Packard Development Company, L.P. 1.0-30310

Figure 4-56. NAC 800 Web Interface—Login Page

Create the Enforcement Cluster

Next create a enforcement cluster for the new NAC 800. In this example, the MS has an existing cluster called "802.1X." The new cluster will be called "Inline/VPN."

1. Select **Home** > **System configuration** > **Enforcement clusters & servers**.

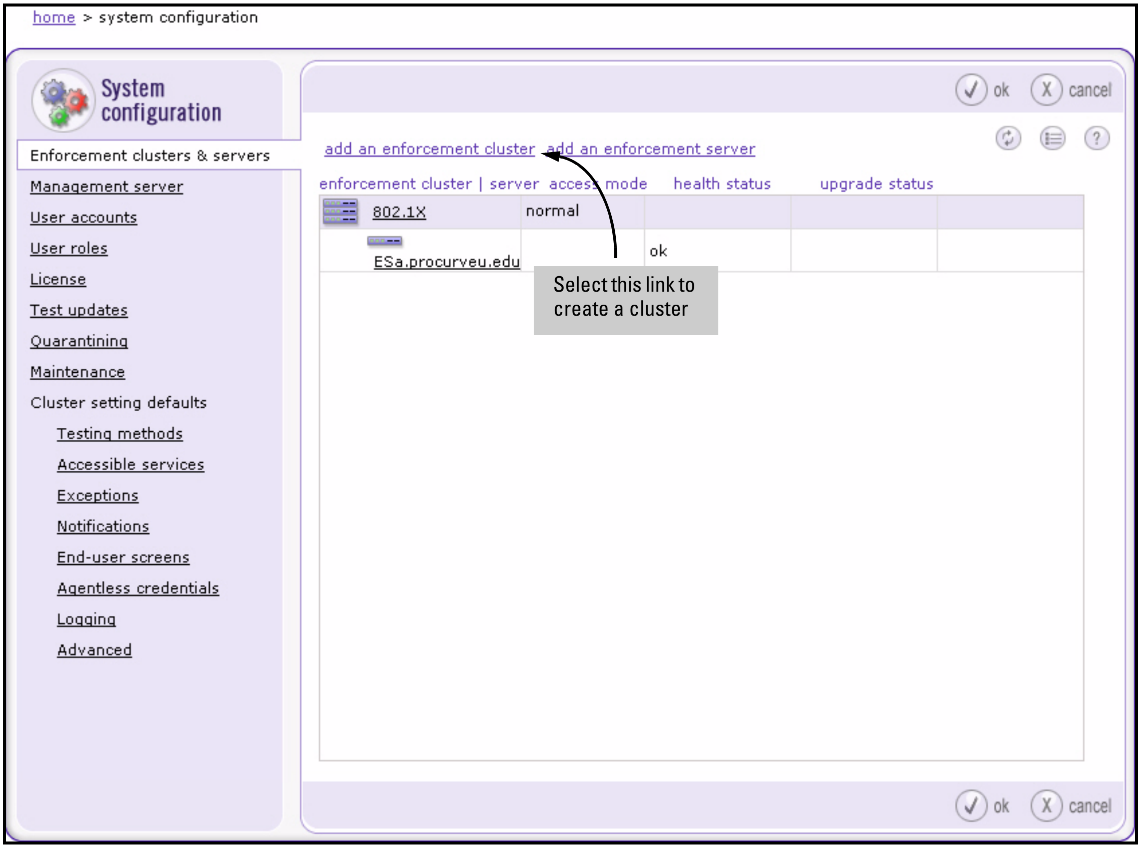
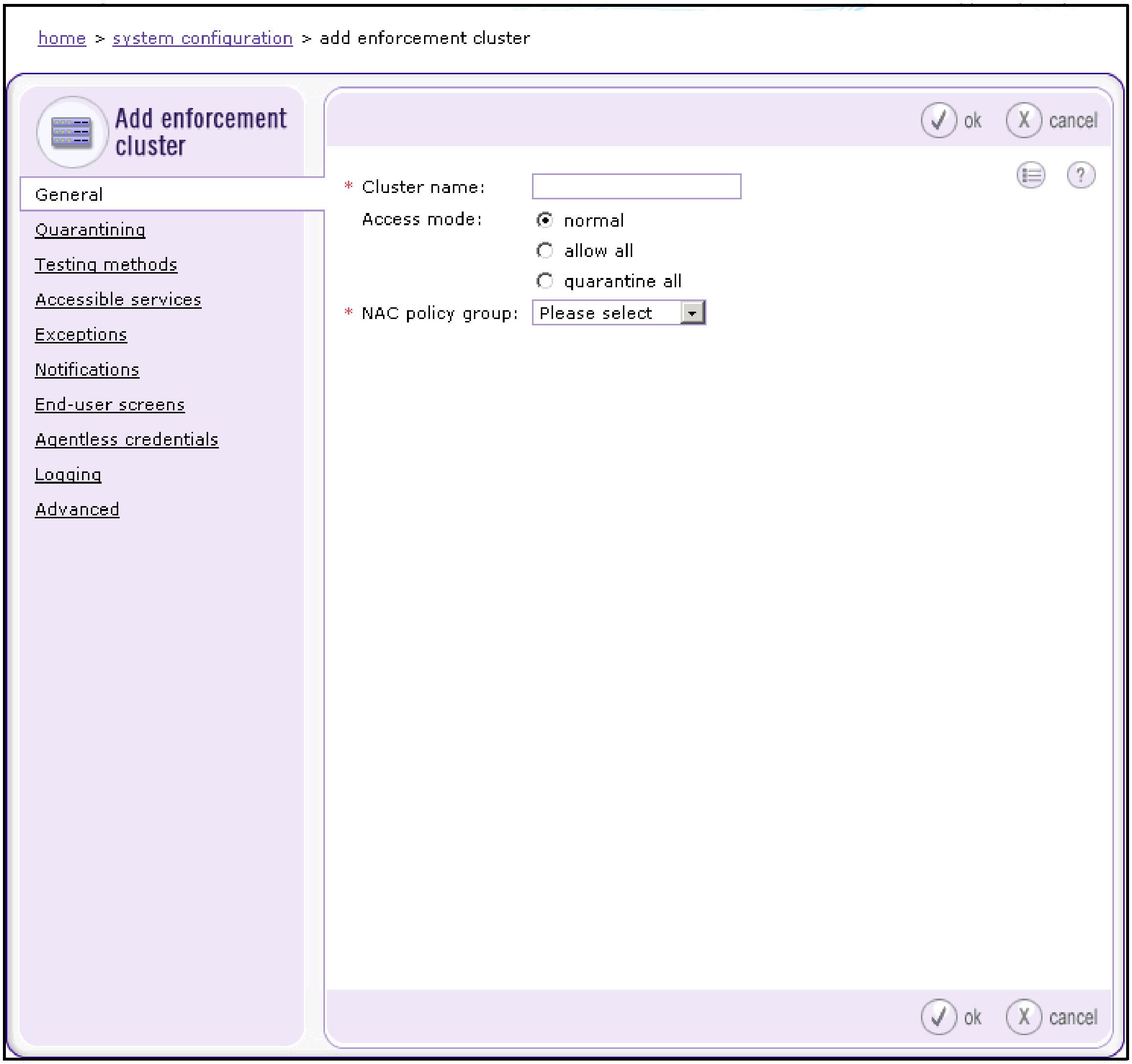


Figure 4-57. NAC 800 Web Interface—Home > System configuration > Enforcement clusters & servers > add an enforcement cluster Window

2. Click **add an enforcement cluster.**

   The **Add enforcement cluster** window is displayed. The left navigation bar lists several menu options; for now, you can ignore all options except **General**, which is selected by default.



home > system configuration > add enforcement cluster

Add enforcement cluster

- General
- Quarantining
- Testing methods
- Accessible services
- Exceptions
- Notifications
- End-user screens
- Agentless credentials
- Logging
- Advanced

* Cluster name:

Access mode: ● normal ○ allow all ○ quarantine all

* NAC policy group: Please select

Figure 4-58. NAC 800 Web Interface—Home > System configuration > Enforcement clusters & servers > Add enforcement cluster > General Window

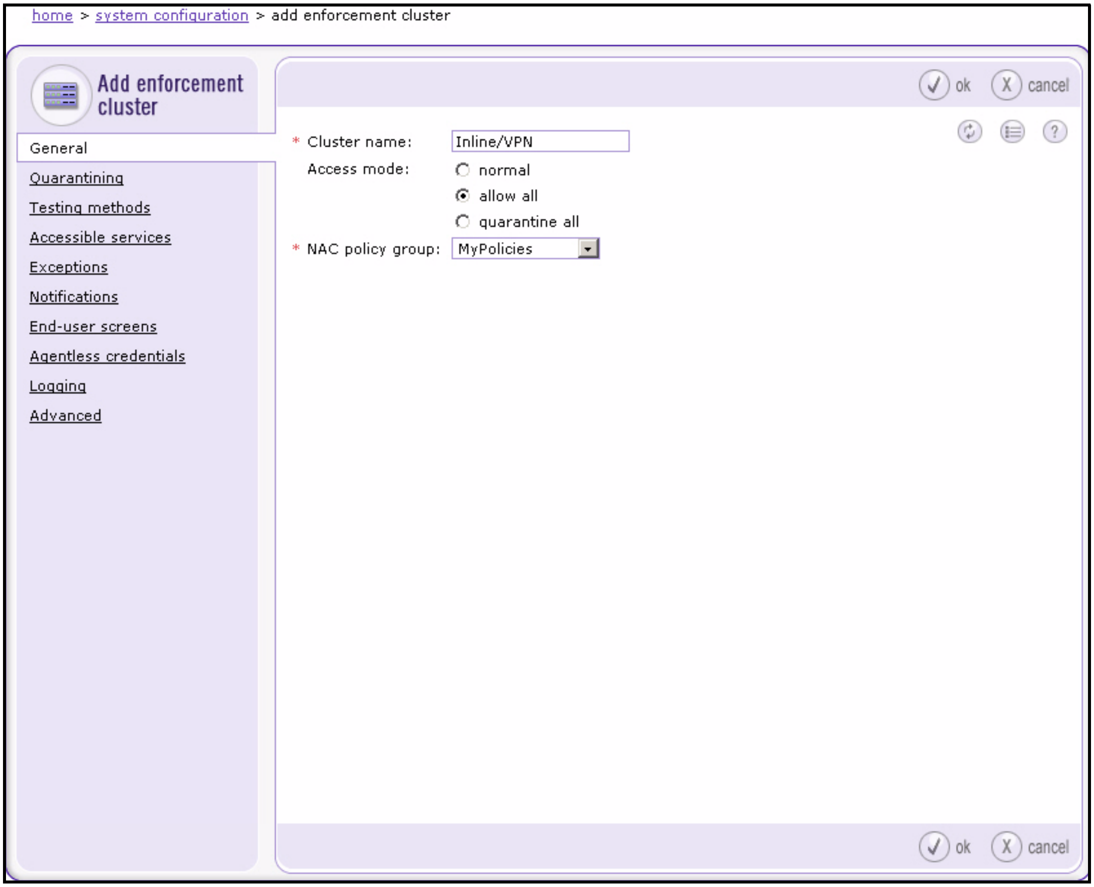
3. In the **Cluster name** field, type a string that describes this cluster. For example: **Inline/VPN**.

4. Choose the **allow all** for the **Access mode**.

You will change the access mode to **normal** later. For now, the **allow all** mode prevents you from disrupting network services while you ready the endpoint integrity solution.

5. For the **NAC policy group**, select the policies you have established for testing your endpoints. For example: **MyPolicies**.

   In this example, the network administrators have already created NAC policies for testing endpoints in the LAN, and they want to use the same policies for remote endpoints. If you want, you can create and use different policies. (See "Configure NAC Policies" on page 2-165 of Chapter 2: "Implementing 802.1X with ProCurve IDM and Endpoint Integrity.")



* Cluster name: Inline/VPN

Access mode:
○ normal
● allow all
○ quarantine all

* NAC policy group: MyPolicies

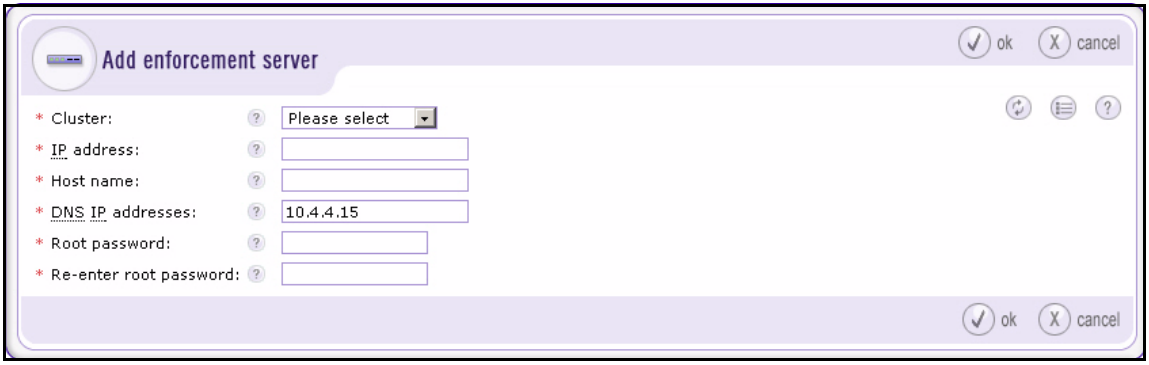
Figure 4-59. NAC 800 Web Interface—Home > System configuration > Enforcement clusters & servers > Add enforcement cluster > General Window

6. Click **ok**.

Add the ES to the Enforcement Cluster

The steps below describe how to add a new NAC 800 ES to the enforcement cluster. If you want to move an existing NAC 800 ES to a different cluster, follow the steps in “Move an Existing ES to the New Cluster” on page 4-142.

1. Access the **Home** > **System configuration** > **Enforcement clusters & servers** window.
2. Click **add an enforcement server**. The **Add enforcement server** window is displayed.



* Cluster:	Please select
* IP address:	
* Host name:	
* DNS IP addresses:	10.4.4.15
* Root password:	
* Re-enter root password:	

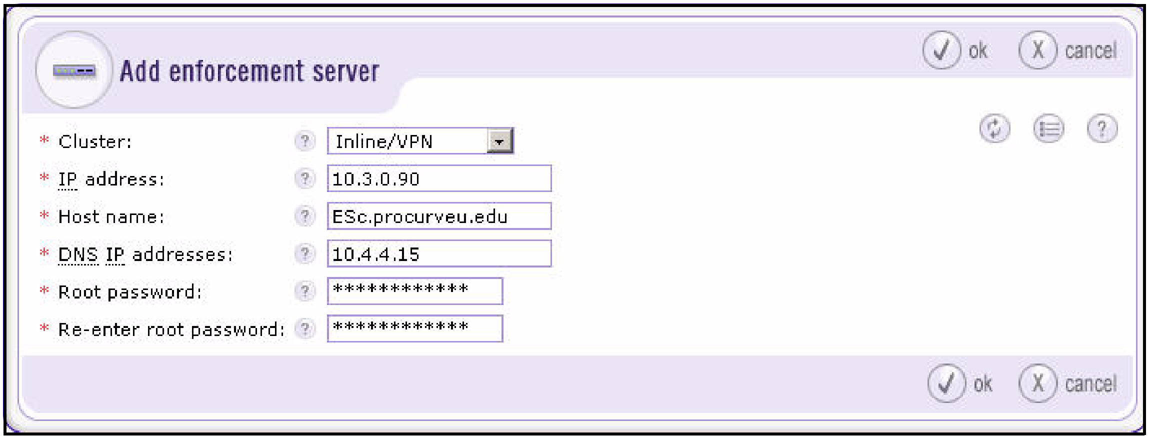
Figure 4-60. NAC 800 Web Interface—Home > System configuration > Enforcement clusters & servers > Add enforcement server

3. From the **Cluster** drop-down menu, choose the cluster that you just configured.
4. Type the ES’s IP address in the **IP address** field. For example: **10.3.0.90**.

   You should have already set this IP address as described in “Configure Initial Settings through a Console Session” on page 4-131.
5. Type the ES’s hostname in the **Host name** field. For example: **ESc.procurveu.edu**.
6. The **DNS IP addresses** box displays the IP address of the MS’s DNS server. Typically, you should keep this DNS server, but you can specify the IP address of a different one.

7. Type a password in the **Root password** and **Re-enter root password** fields.

   In this example, the root password for the ES is the same as for the MS: **procurvenac9**.



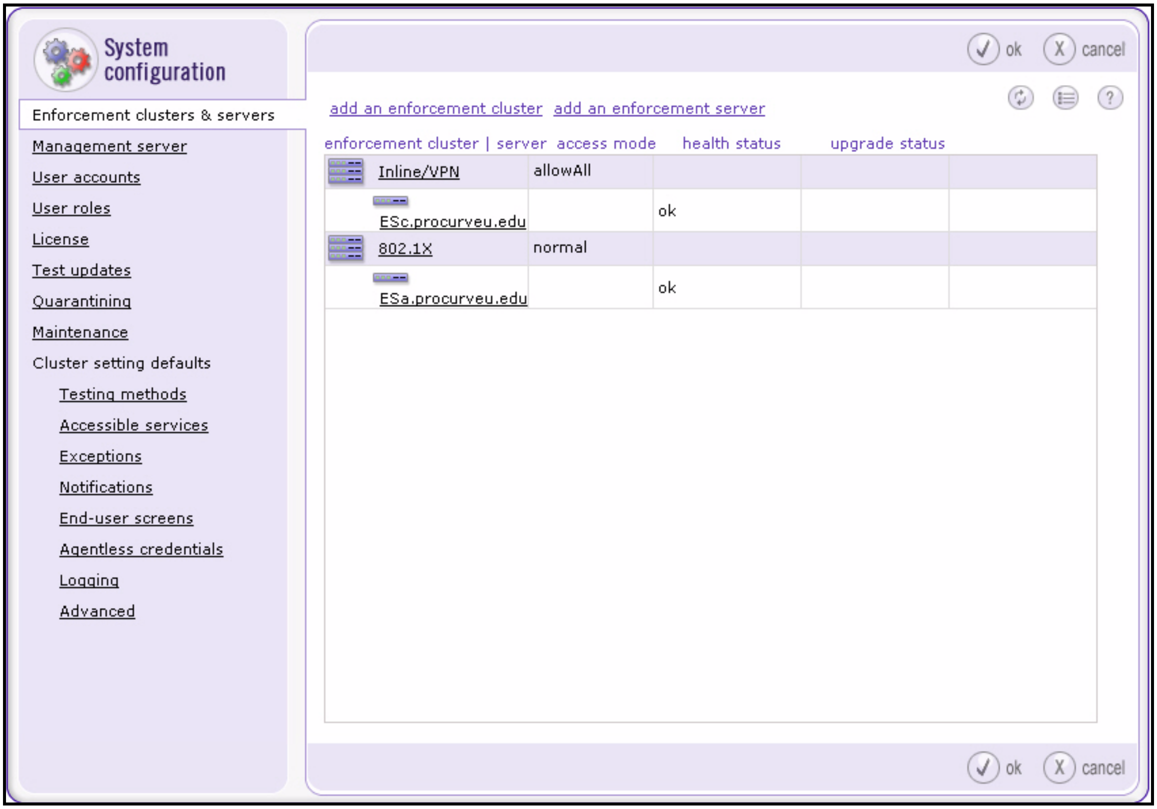
Add enforcement server

* Cluster:	Inline/VPN
* IP address:	10.3.0.90
* Host name:	ESc.procurveu.edu
* DNS IP addresses:	10.4.4.15
* Root password:	************
* Re-enter root password:	************

Figure 4-61. NAC 800 Web Interface—Home > System configuration > Enforcement clusters & servers > Add enforcement server Window

8. Click **ok**.

   You return to the **Home** > **System configuration** > **Enforcement clusters & servers** window, where you can see the new ES.



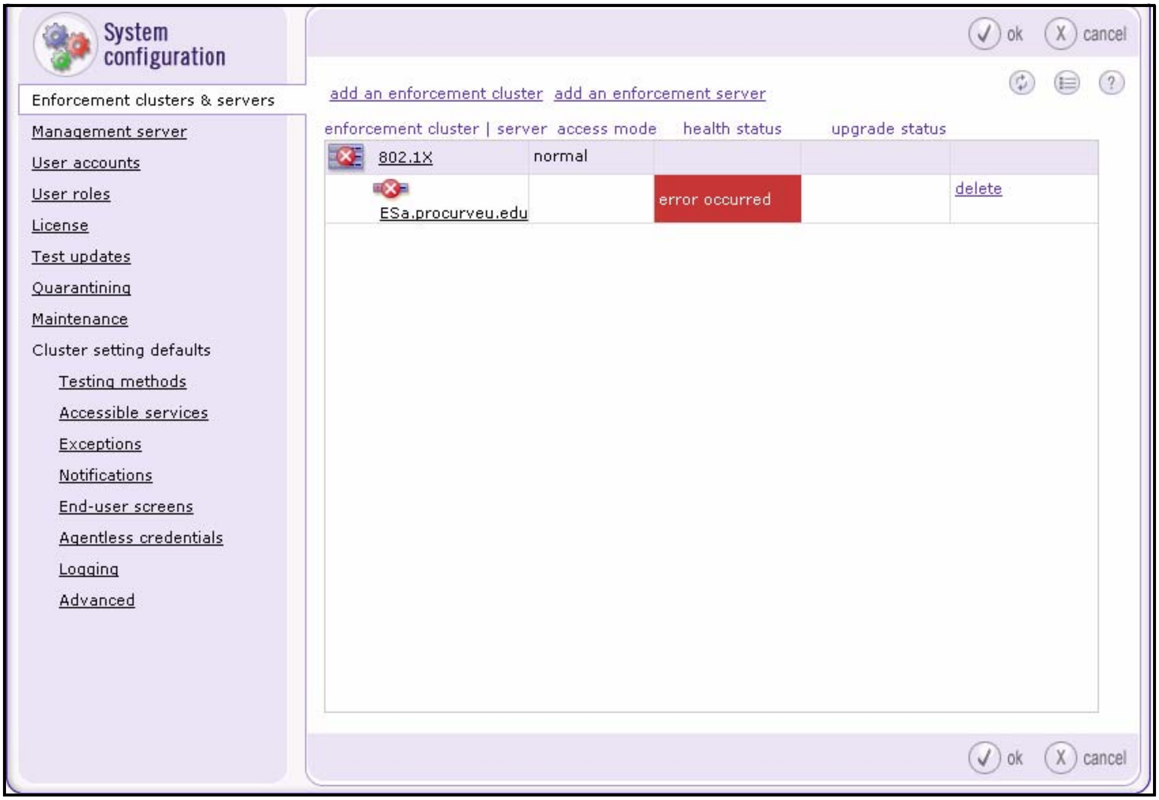
enforcement cluster | server	access mode	health status	upgrade status
Inline/VPN	allowAll		
ESc.procurveu.edu		ok	
802.1X	normal		
ESa.procurveu.edu		ok	

Figure 4-62. NAC 800 Web Interface—Home > System configuration > Enforcement clusters & servers Window

Move an Existing ES to the New Cluster

Sometimes you may want to move an ES in one cluster to another cluster. Follow these steps:

1. Power down the ES that you want to move to the new cluster.
2. Access the **Home** > **System configuration** > **Enforcement clusters & servers** window in the MS Web browser interface.



enforcement cluster | server	access mode	health status	upgrade status	
802.1X	normal			
ESa.procurveu.edu		error occurred		delete

Figure 4-63. NAC 800 Web Interface—Home > System configuration > Enforcement clusters & servers Window

3. Click the **delete** link next to the ES's name.

4. Return power to the ES.

5. Log in as root to the ES OS:

   a. Open a console or SSH session with the ES.

   b. When prompted, type **root** for the username.

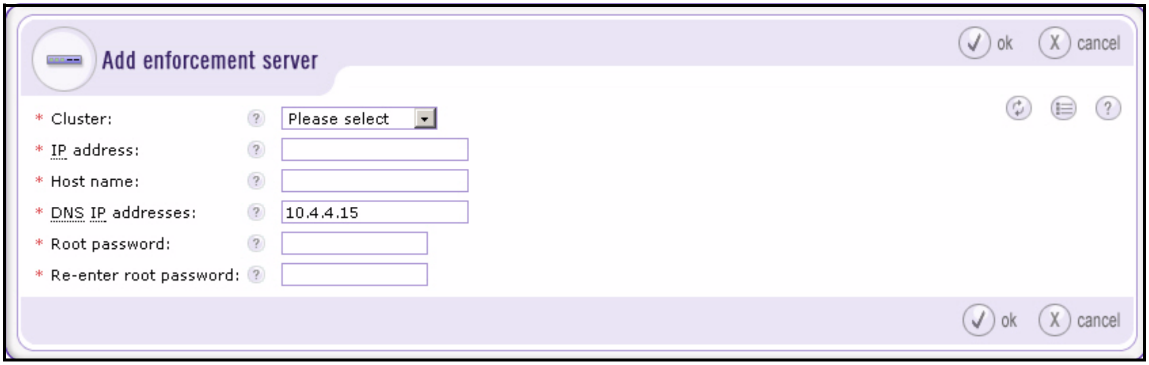
   c. When prompted, type the root password. In this example: **procurvenac9**.

6. Type this command:

```
ProCurve NAC 800:# resetSystem.py
```

7. When the ES has finished resetting, return to the MS Web browser interface.

8. In the **Home** > **System configuration** > **Enforcement clusters & servers** window, click **add an enforcement server**. The **Add enforcement server** window is displayed.



Add enforcement server

- * Cluster: Please select
- * IP address:
- * Host name:
- * DNS IP addresses: 10.4.4.15
- * Root password:
- * Re-enter root password:

Figure 4-64. NAC 800 Web Interface—Home > System configuration > Enforcement clusters & servers > Add enforcement server

9. For the **Cluster**, select the new cluster that you configured in “Create the Enforcement Cluster” on page 4-136.

10. Type the ES’s IP address in the **IP address** box. For example: **10.3.0.90**.

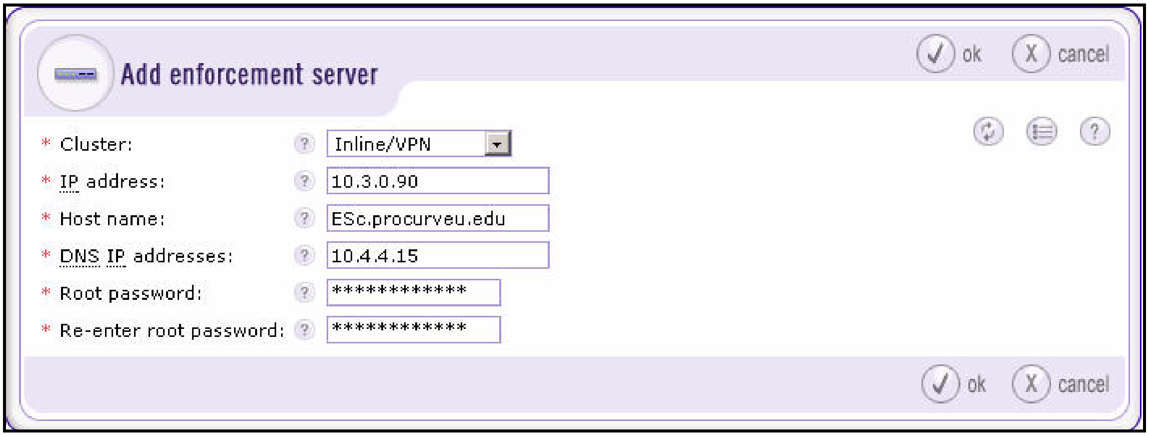
    You should have already set this IP address as described in “Configure Initial Settings through a Console Session” on page 4-131.

11. Type the ES’s hostname in the **Host name** box. For example: **ESc.procurveu.edu**.

12. The **DNS IP addresses** box displays the IP address of the MS’s DNS server. Typically, you should keep this DNS server, but you can specify the IP address of a different one.

13. Type a password in the **Root password** and **Re-enter root password** fields.

    Make sure to match the password that was already set on this ES. In this example: **procurvenac9**.

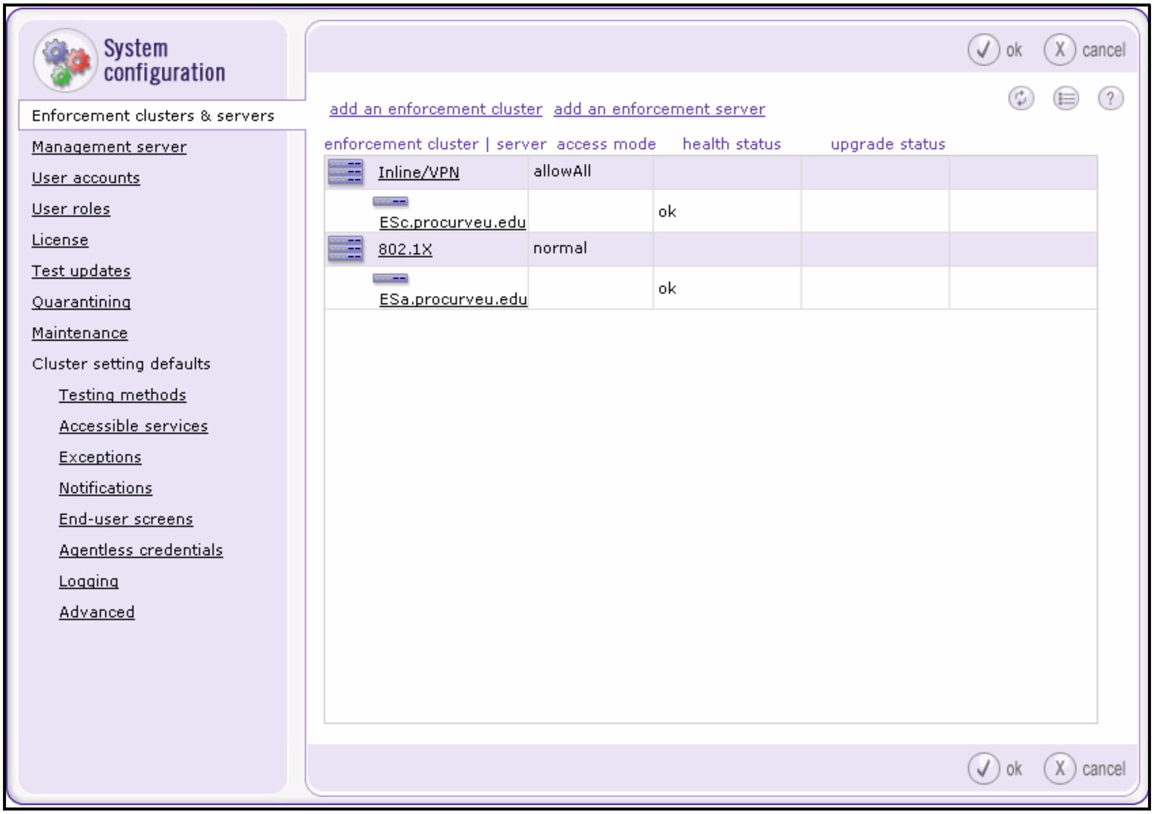


* Cluster:	Inline/VPN
* IP address:	10.3.0.90
* Host name:	ESc.procurveu.edu
* DNS IP addresses:	10.4.4.15
* Root password:	************
* Re-enter root password:	************

Figure 4-65. NAC 800 Web Interface—Home > System configuration > Enforcement clusters & servers > Add enforcement server Window

14. Click **ok**.

    You return to the **Home** > **System configuration** > **Enforcement clusters & servers** window, where you can see the ES in the new cluster.



enforcement cluster | server	access mode	health status	upgrade status
Inline/VPN	allowAll		
ESc.procurveu.edu		ok	
802.1X	normal		
ESa.procurveu.edu		ok	

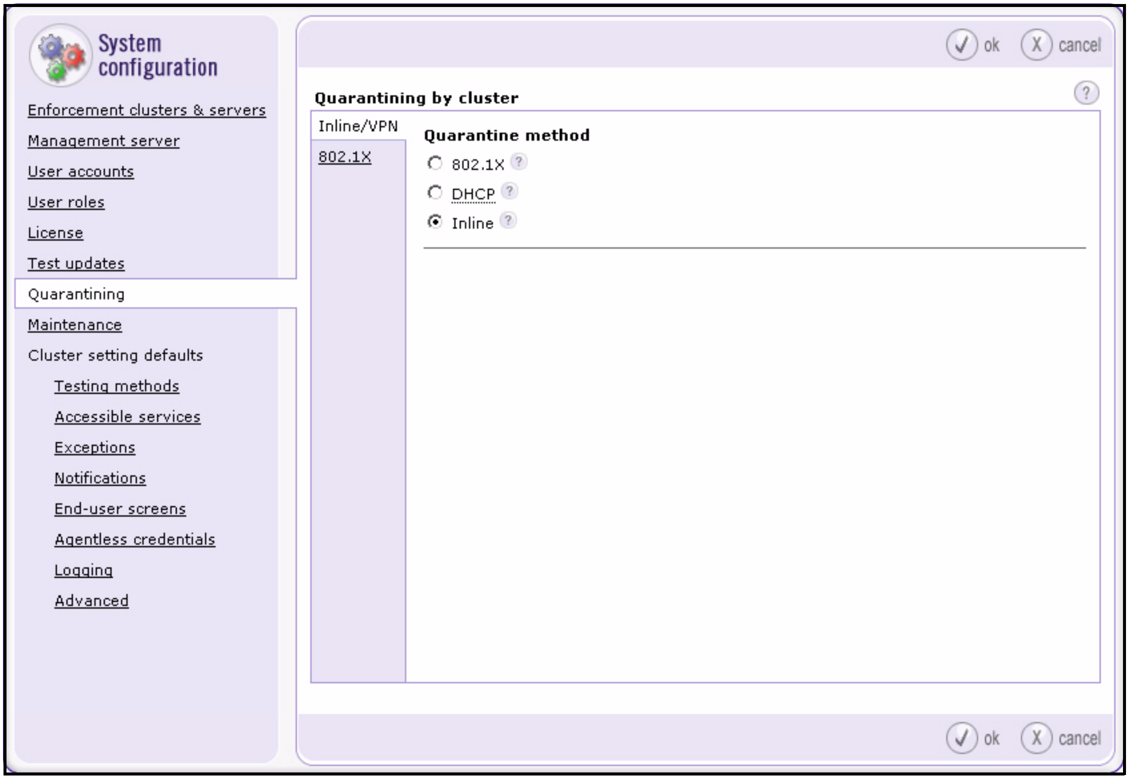
Figure 4-66. NAC 800 Web Interface—Home > System configuration > Enforcement clusters & servers Window

Configure Quarantining

This section teaches you how to set up inline quarantining.

Follow these steps:

1. Select **Home** > **System configuration** > **Quarantining**.
2. Select the new cluster, which you created in “Create the Enforcement Cluster” on page 4-136.
3. In the **Quarantine method** area, select **Inline**.



Quarantining by cluster

Quarantine method

○ 802.1X

○ DHCP

● Inline

Figure 4-67. NAC 800 Web Interface—Home > System configuration > Quarantining Window

4. Click **ok**.

Set Up Accessible Services

The accessible services list, by default, enables quarantined endpoints to reach a variety of remediation services. But you might want to add your own remediation services.

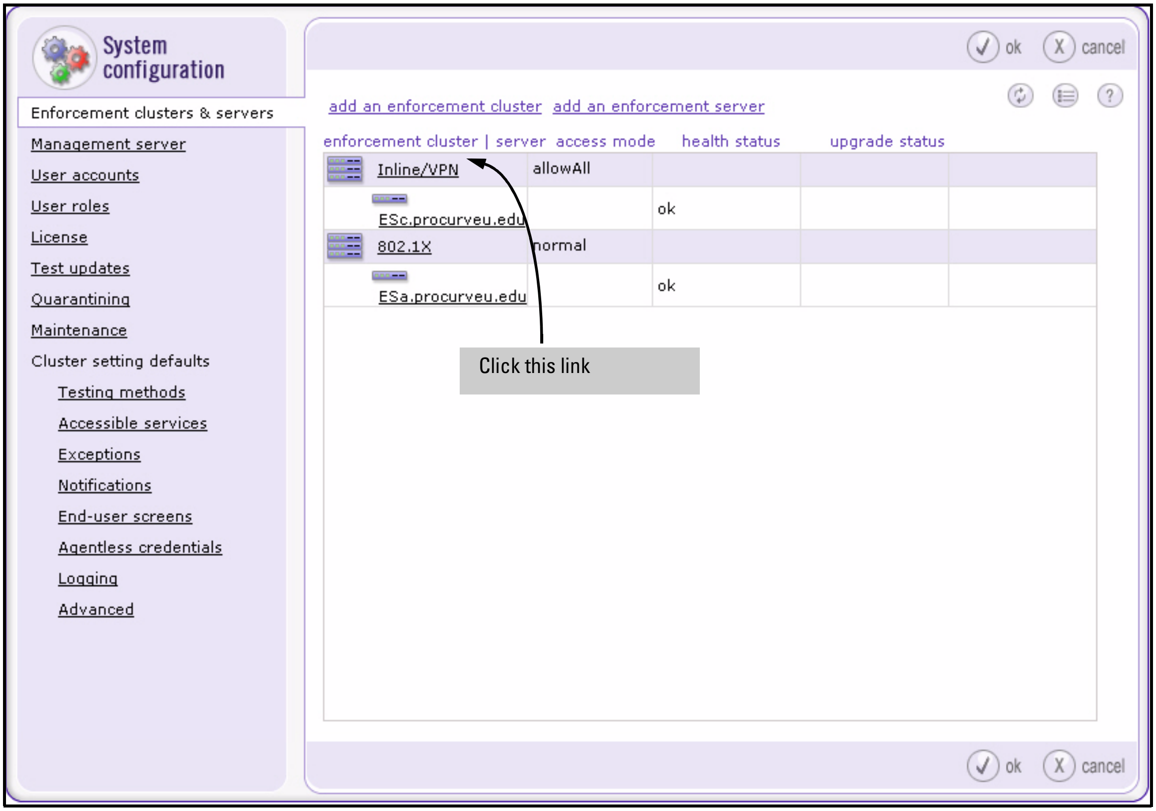
In addition, the NAC 800 ES's internal firewall filters all traffic between its port 1 and port 2. This means that it might filter and drop some necessary traffic destined from the LAN to the Secure Router 7000dl. Add the router's IP address to the accessible services.

Note

Another way to prevent the NAC 800 from dropping necessary traffic to the router is to add the router's IP address as an exception.

Follow these steps to add traffic to the list of accessible services for the inline cluster only:

1. Select **Home** > **System configuration** > **Enforcement clusters & servers**.



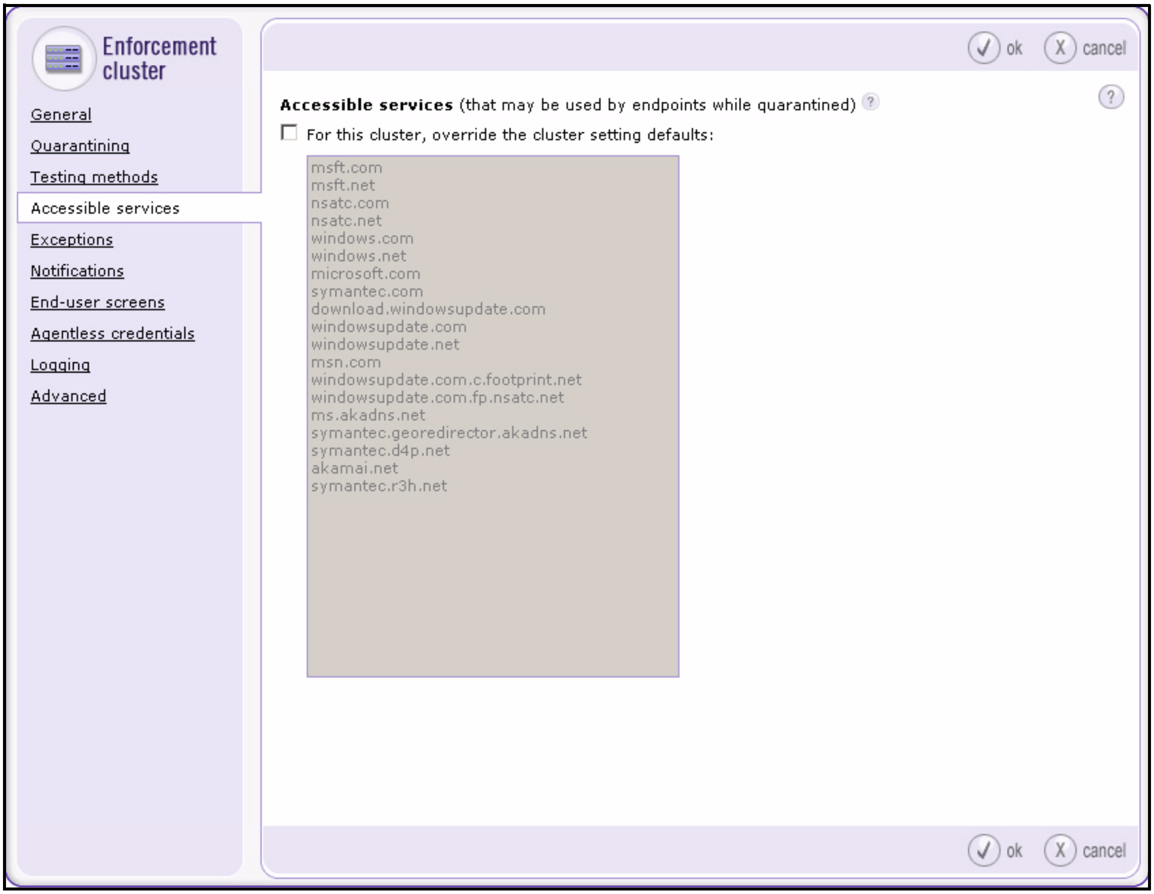
enforcement cluster | server	access mode	health status	upgrade status
Inline/VPN	allowAll		
ESc.procurveu.edu		ok	
802.1X	normal		
ESa.procurveu.edu		ok	

Click this link

Figure 4-68. NAC 800 Web Interface—Home > System configuration > Enforcement clusters & servers Window

2. Click the name of the cluster configured for the inline quarantine method. In this example: **Inline/VPN**.

3. Click **Accessible services** in the left navigation bar.



Accessible services (that may be used by endpoints while quarantined)

□ For this cluster, override the cluster setting defaults:

```
msft.com
msft.net
nsatc.com
nsatc.net
windows.com
windows.net
microsoft.com
symantec.com
download.windowsupdate.com
windowsupdate.com
windowsupdate.net
msn.com
windowsupdate.com.c.footprint.net
windowsupdate.com.fp.nsatc.net
ms.akadns.net
symantec.georedirector.akadns.net
symantec.d4p.net
akamai.net
symantec.r3h.net
```

Figure 4-69. NAC 800 Web Interface—Home > System configuration > Enforcement clusters & servers > Accessible services Window

4. Select the **For this cluster, override the cluster setting defaults** check box.

5. Type the router's IP address in the area. For example: **10.3.0.100**.

6. If you want, enter another IP address to enable quarantined endpoints to reach a remediation service.

   The service must be specified as an IP address (not a hostname).

   To enter a range of IPs, use a dash (-) between the IP addresses or CIDR addresses. For example: **10.4.16.1-10.0.16.5**

7. Click **ok**.

Other Settings for the NAC 800

After configuring the accessible services, refer to Chapter 2: "Implementing 802.1X with ProCurve IDM and Endpoint Integrity" and configure:

- Testing methods (page 2-155)
- NAC policies (page 2-165)

Also obtain a certificate for the NAC 800's HTTPS server and install it on the device. See "Create and Install a Certificate for HTTPS on a NAC 800" on page 2-188 of Chapter 2: "Implementing 802.1X with ProCurve IDM and Endpoint Integrity."

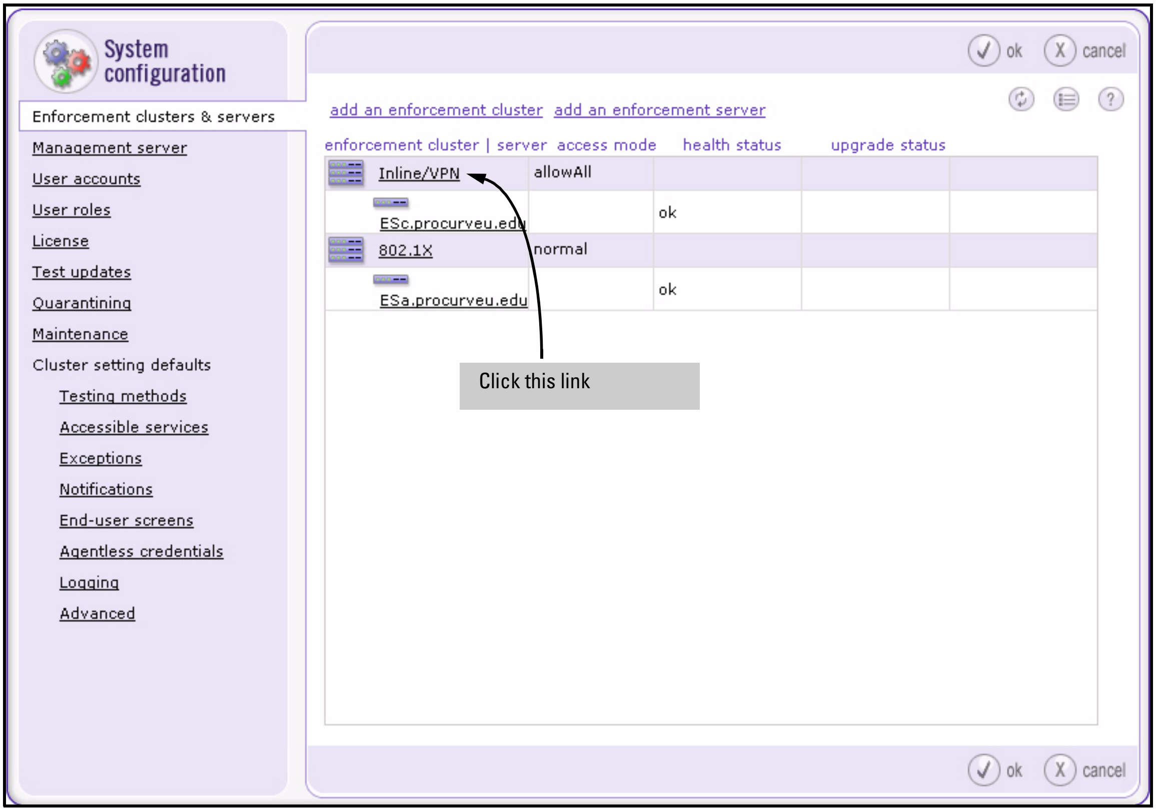
Activate Quarantining

Earlier, it was recommended that you set the access mode for the inline enforcement cluster to **allow all**. Now that you have configured the accessible services, you can change the access mode to **normal**.

It is best to do this after hours in case you need to fix a misconfiguration that, for example, prevents the Secure Router 7000dl from receiving routes.

Follow these steps:

1. Log in to the Web browser interface of the NAC 800 MS.
2. Select **Home** > **System configuration** > **Enforcement clusters & servers**.



enforcement cluster | server	access mode	health status	upgrade status
Inline/VPN	allowAll		
ESc.procurveu.edu		ok	
802.1X	normal		
ESa.procurveu.edu		ok	

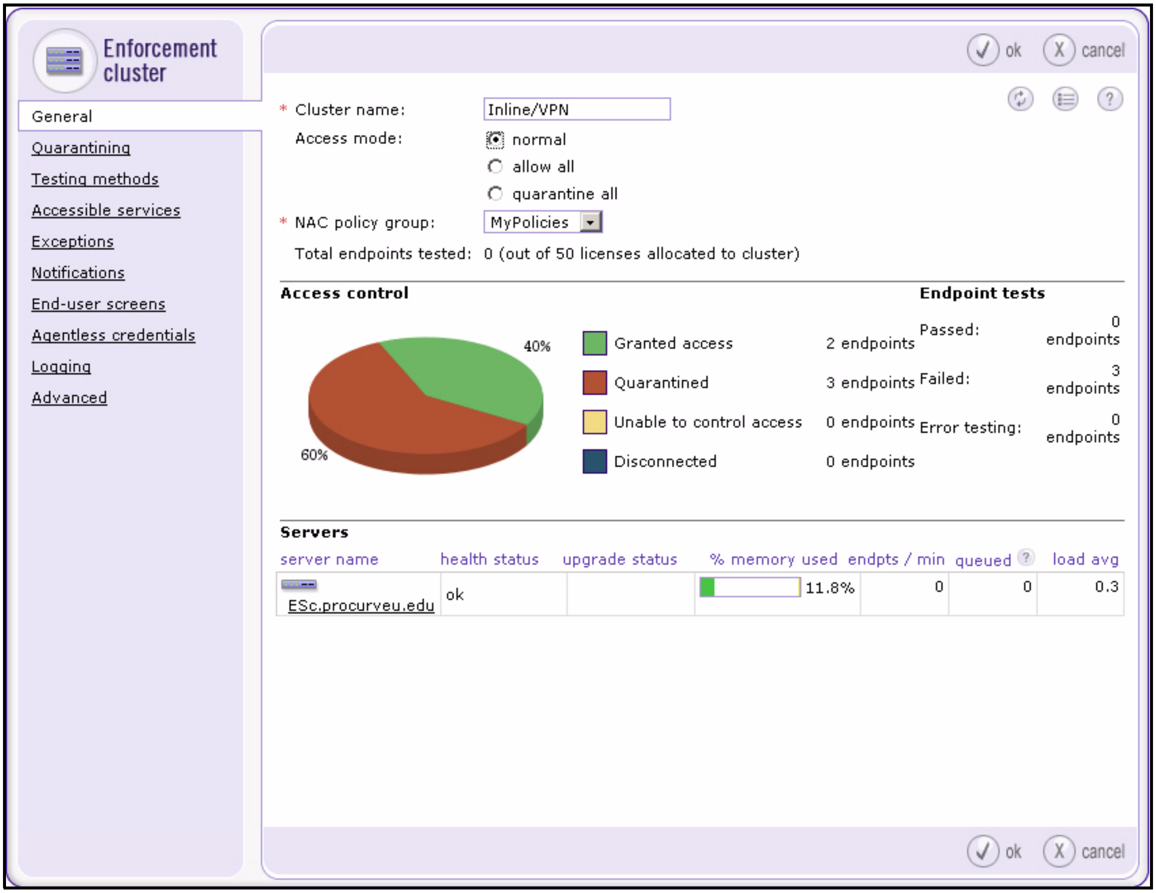
Click this link

Figure 4-70. NAC 800 Web Interface—Home > System configuration > Enforcement clusters & servers Window

3. Click the name of your enforcement cluster (in this example, **Inline/VPN**).

4. The **General** tab should be selected.

5. Select **normal** for the **Access mode**.



* Cluster name: Inline/VPN

Access mode: ● normal ○ allow all ○ quarantine all

* NAC policy group: MyPolicies

Total endpoints tested: 0 (out of 50 licenses allocated to cluster)

Access control

🟩	Granted access	2 endpoints
🟥	Quarantined	3 endpoints
🟨	Unable to control access	0 endpoints
■	Disconnected	0 endpoints

Endpoint tests

Passed:	0 endpoints
Failed:	3 endpoints
Error testing:	0 endpoints

Servers

server name	health status	upgrade status	% memory used	endpts / min	queued ?	load avg
ESc.procurveu.edu	ok		11.8%	0	0	0.3

Figure 4-71. NAC 800 Web Interface—Home > System configuration > Enforcement clusters & servers > Add enforcement cluster > General Window

6. Click **ok** and then **ok** again.

The NAC 800 ES now quarantines non-compliant endpoints.

Make sure that the accessible services are functioning correctly:

- Can you access the Secure Router 7000dl’s management interfaces?
- Does the Secure Router 7000dl’s route table have the correct routes?
- If you have an SNMP server, can it still access the Secure Router 7000dl?

Set Up Endpoints

This section explains how to configure the VPN client required for this network access control solution. This example features the ProCurve VPN Client.

This section also instructs you in obtaining certificates for the VPN client. As discussed earlier, VPN client certificates can be obtained via automatically-generated requests or via requests generated manually in the ProCurve VPN Client. You should have already chosen one option and have set up your CA server to support your solution. (See "Customize a Template for VPN Client Certificates" on page 4-14.)

If you chose automatically-generated requests, follow the instructions in "Obtain a Certificate Using the Windows CA Web Enrollment Pages" on page 4-153. Otherwise, you will learn how to create and submit a request as part of configuring the ProCurve VPN client.

For information about installing the NAC EI agent on endpoints, see "Pre-install the NAC EI Agent on Endpoints" on page 2-306 of Chapter 2: "Implementing 802.1X with ProCurve IDM and Endpoint Integrity."

Obtain a Certificate Using the Windows CA Web Enrollment Pages

This section applies to solutions in which users obtain certificates for their VPN clients in much the same way that they do user certificates for other types of authentication. They do not need to create a manual request but instead request a certificate through the CA's web enrollment pages.

The users require access to the issuing CA server from the endpoints on which they want to install the certificates—that is, the remote endpoints. If your employees use laptops to connect remotely, they can bring in the laptops and connect them to the private network. Otherwise, you must allow hosts on the Internet to access your issuing CA server. Alternatively, to better secure your CA server, allow the private key for VPN client certificates to be exported. In this case, users will access the CA server from a local endpoint, install the certificate, export the certificate to a file, and later install it on the remote endpoint.

Give users the steps in “Web Enrollment Pages” on page 2-285 of Chapter 2: “Implementing 802.1X with ProCurve IDM and Endpoint Integrity.” However, instruct them to choose the customized “Authenticated Session” template.

Configure the ProCurve VPN Client

The ProCurve VPN Client establishes remote, secure communication with another device. It supports both secure client-to-client and client-to-gateway communications (the latter is used in this solution).

The ProCurve VPN Client starts automatically when the user’s endpoint starts and runs transparently behind other software programs. Through a system tray icon, the user can determine the client’s communications status, open the client’s components, and perform other actions, such as managing security policies or viewing logs.

In addition to storing security policies and establishing the VPN connection, the ProCurve VPN Client helps you to request, import, and export certificates with its Certificate Manager.

To set up the client, you must:

1. Obtain the ProCurve VPN Client.
2. Install the ProCurve VPN Client.
3. Install digital certificates.
4. Configure the connection and associated security policies.
5. Test the VPN configuration.
6. You can optionally, export the policy and certificates.

In this solution, network administrators are in charge of configuring the client. They will configure one set connection settings for both faculty members and students. However, faculty members’ connections will differ from students’ in one way: their clients will submit different certificates to authenticate to the VPN gateway.

Network administrators will obtain one certificate for faculty members and one for students. They will password protect these certificates and include them, with the exported policies, in the ProCurve VPN Client installation folders that they will distribute to the users who need remote access.

They will then verbally inform the users of the appropriate passwords.

Obtain the ProCurve VPN Client

You can download a 10-user version of the ProCurve VPN Client from the My ProCurve Web portal. If you have not used the My ProCurve Web portal before, you can easily register. Go to *http://my.procurve.com* and click **REGISTER HERE**. Then, complete the registration form and click **Submit**. You will receive an email that contains a password for logging in to the portal.

After you log in to the My ProCurve Web portal, complete the following steps to download the ProCurve VPN Client:

1. Click the **My Software** tab.
2. Click **ProCurve 10 User VPN Client Software**.
3. Select the **I agree to the license terms** check box and click **Download**.

After you download the zip file that contains the ProCurve VPN Client installation file and related support files, you can extract the files and install the client.

Install the ProCurve VPN Client

Before you begin to install the ProCurve VPN Client, ensure that your workstation or laptop meets the minimum software requirements:

- IBM-compatible computer with Pentium processor or equivalent (not Alpha platforms)
- 10 MB hard disk space
- Native Microsoft TCP/IP communications protocol
- Compatible OS with minimum RAM, as outlined in Table 4-25

Table 4-25. Minimum RAM Requirements for ProCurve VPN Client

OS	Minimum RAM
Microsoft® Windows® 95	16 MB
Windows 98 and Windows NT® Workstation 4.0	32 MB
Windows Me and 2000 Professional	64 MB
Windows XP Home and Professional	64 MB; 128 MB recommended

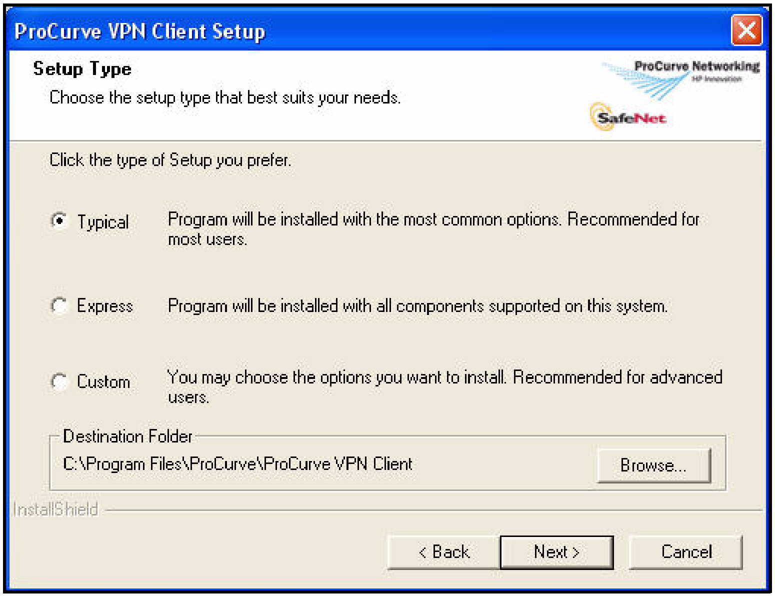
For dial-up connections, you also need:

- Non-encrypting modem
- Native Microsoft PPP dialer

For network connections, you need a network interface card (NIC) and a valid Ethernet (or wireless) connection.

If your endpoint meets these requirements, complete the following steps to install the client:

1. Open the **10_User_ProCurveVPNClient.zip** file and extract all contents.
2. Double-click the extracted **Setup.exe** file. The **Welcome** page is displayed.
3. Click **Next**. The **License Agreement** page is displayed.
4. Click **Yes**. The **Setup Type** page is displayed.



ProCurve VPN Client Setup

Setup Type

Choose the setup type that best suits your needs.

Click the type of Setup you prefer.

● Typical — Program will be installed with the most common options. Recommended for most users.

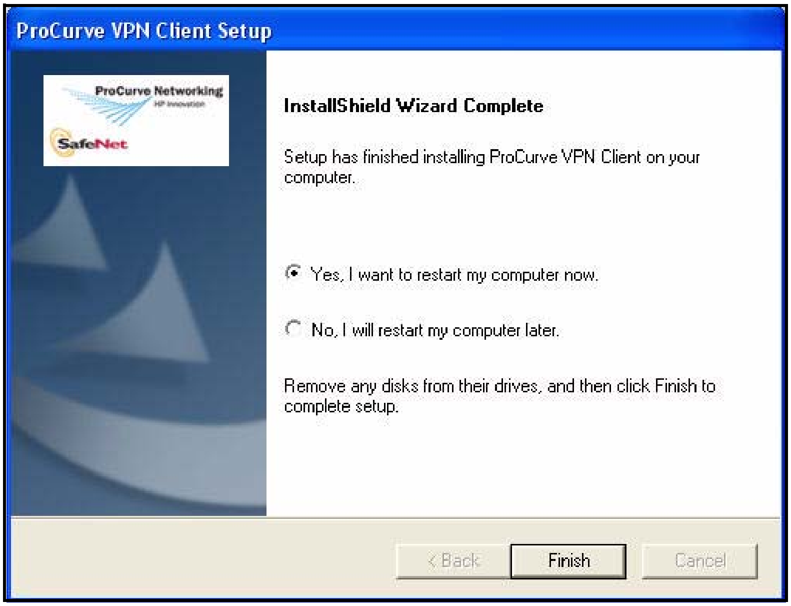
○ Express — Program will be installed with all components supported on this system.

○ Custom — You may choose the options you want to install. Recommended for advanced users.

Destination Folder
C:\Program Files\ProCurve\ProCurve VPN Client

Figure 4-72. Setup Type Page in the ProCurve VPN Client Setup Program

5. Select **Typical** and click **Next**. The **Start Copying Files** page is displayed.
6. Click **Next**. The installation process begins.



ProCurve VPN Client Setup

InstallShield Wizard Complete

Setup has finished installing ProCurve VPN Client on your computer.

● Yes, I want to restart my computer now.

○ No, I will restart my computer later.

Remove any disks from their drives, and then click Finish to complete setup.

Figure 4-73. InstallShield Wizard Complete Page in the ProCurve VPN Client Setup Program

7. When the **InstallShield Wizard Complete** page is displayed, select **Yes, I want to restart my computer now** and click **Finish**.

The ProCurve VPN Client includes two primary components for configuring VPN connections:

- **Certificate Manager**—allows you to request, retrieve, import, and store certificates you receive from CAs, as well as to set the client's trust policy
- **Security Policy Editor**—allows you to create, import, and manage connections and the associated proposals that make up each connection's security policy

You can access these components by right-clicking the ProCurve VPN Client icon in the notification area of the Windows taskbar. Or you can access them from the **Start** menu.

Install Certificates

The ProCurve VPN Client requires the domain CA root certificate, as well as a certificate for the client.

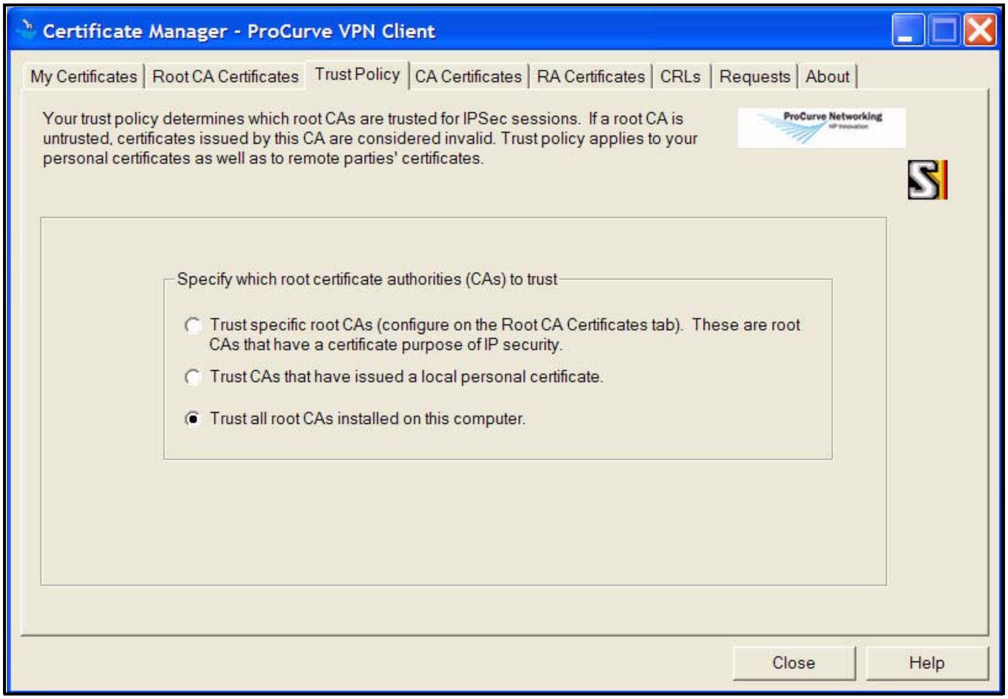
Complete these tasks in the Certificate Manager:

1. Install the CA root certificate on the ProCurve VPN Client:
   - If the CA certificate is already installed on the endpoint, configure the trust policy to add the certificate to the ProCurve VPN Client.
   - Otherwise, obtain the CA certificate and import it to the client.
2. Request a certificate for the VPN client.
3. Submit the certificate request to the CA.
4. Import the certificate into the VPN client.

The PCU network administrator in charge of configuring the VPN client must complete the final three steps twice—once to obtain a certificate for faculty members and once to obtain a certificate for students.

Configure the Trust Policy. The CA root certificate for the domain may already be installed on the endpoint. Make sure that the ProCurve VPN Client trusts the certificate by following these steps:

1. From the Windows **Start** menu, select **Programs** > **ProCurve VPN Client > Certificate Manager.**
2. Click the **Trust Policy** tab.



Certificate Manager - ProCurve VPN Client

Your trust policy determines which root CAs are trusted for IPSec sessions. If a root CA is untrusted, certificates issued by this CA are considered invalid. Trust policy applies to your personal certificates as well as to remote parties' certificates.

Specify which root certificate authorities (CAs) to trust

○ Trust specific root CAs (configure on the Root CA Certificates tab). These are root CAs that have a certificate purpose of IP security.

○ Trust CAs that have issued a local personal certificate.

● Trust all root CAs installed on this computer.

Figure 4-74. Certificate Manager > Trust Policy Tab in the ProCurve VPN Client

3. Select **Trust all root CAs installed on this computer**.

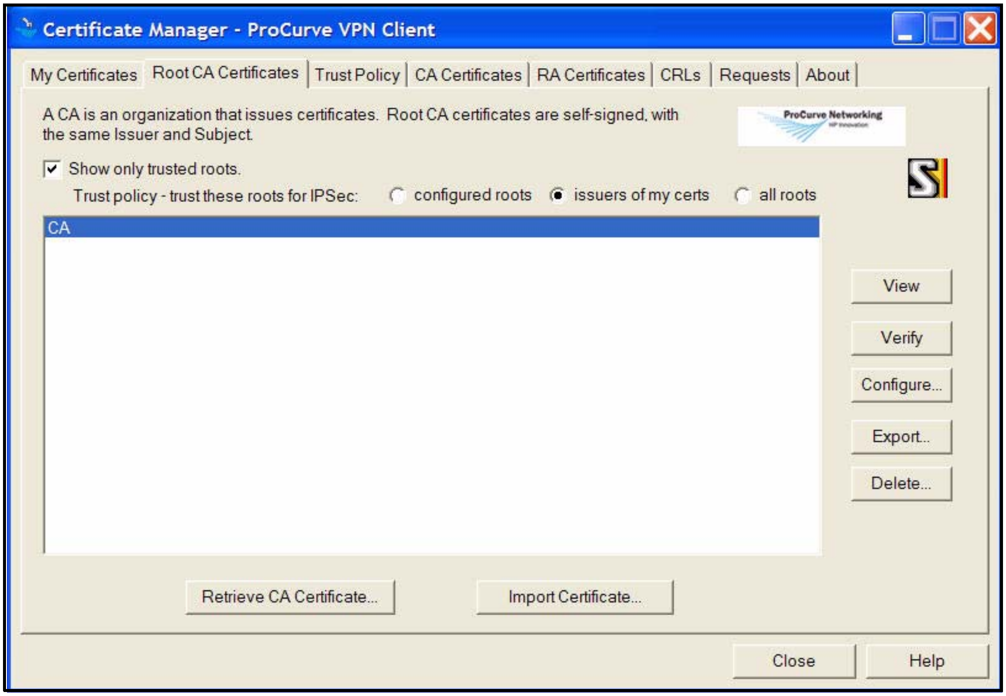
4. Click the **Root CA Certificates** tab and verify that your CA's root certificate is present.

Import a CA Certificate. If the endpoint does not have the root certificate for the CA that will sign its certificate, you must import the root certificate. However, you can skip this task if you obtain a certificate chain, rather than a simple certificate, when you submit the certificate request to the CA.

Otherwise, follow these steps:

1. Obtain the root certificate from your CA. See "Export the CA Root Certificate" on page 2-97 of Chapter 2: "Implementing 802.1X with ProCurve IDM and Endpoint Integrity." Save the CA root certificate on the endpoint.

2. In the Certificate Manager, click the **Root CA Certificates** tab.



Certificate Manager - ProCurve VPN Client

My Certificates | Root CA Certificates | Trust Policy | CA Certificates | RA Certificates | CRLs | Requests | About

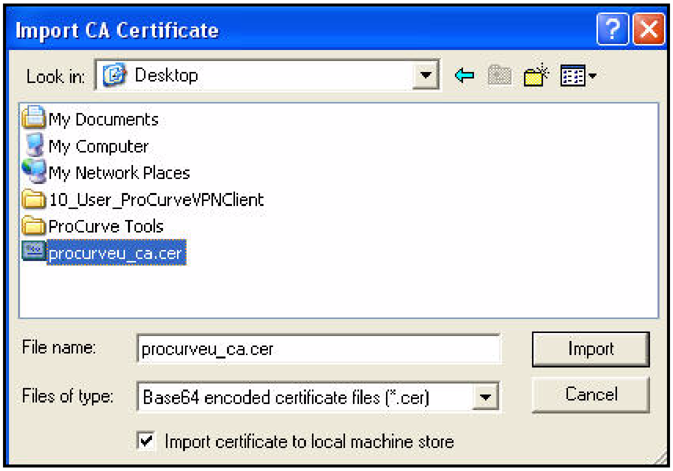
A CA is an organization that issues certificates. Root CA certificates are self-signed, with the same Issuer and Subject.

☑ Show only trusted roots.

Trust policy - trust these roots for IPSec: ○ configured roots ● issuers of my certs ○ all roots

Figure 4-75. Certificate Manager > CA Certificates Tab in the ProCurve VPN Client

3. Click **Import Certificate**.



Import CA Certificate

Look in: Desktop

File name: procurveu_ca.cer

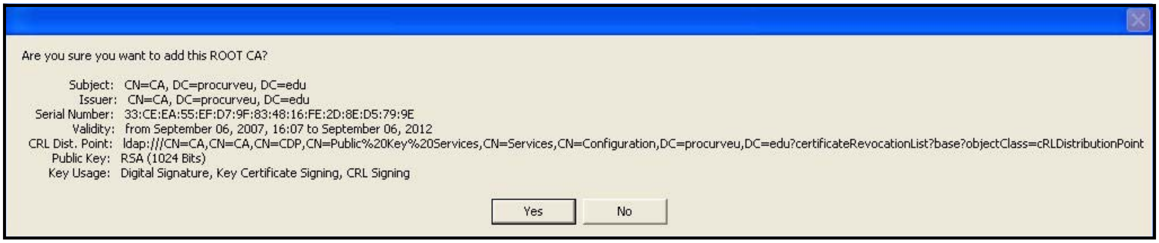
Files of type: Base64 encoded certificate files (*.cer)

☑ Import certificate to local machine store

Figure 4-76. Import CA Certificate

4. Navigate to the directory in which you saved the CA root certificate. Select the certificate.

5. Click **Import**.



Are you sure you want to add this ROOT CA?

```
      Subject:  CN=CA, DC=procurveu, DC=edu
       Issuer:  CN=CA, DC=procurveu, DC=edu
Serial Number:  33:CE:EA:55:EF:D7:9F:83:48:16:FE:2D:8E:D5:79:9E
     Validity:  from September 06, 2007, 16:07 to September 06, 2012
CRL Dist. Point: ldap:///CN=CA,CN=CA,CN=CDP,CN=Public%20Key%20Services,CN=Services,CN=Configuration,DC=procurveu,DC=edu?certificateRevocationList?base?objectClass=cRLDistributionPoint
   Public Key:  RSA (1024 Bits)
    Key Usage:  Digital Signature, Key Certificate Signing, CRL Signing
```

Figure 4-77. Verify Import CA Certificate in the ProCurve VPN Client

6. When the window shown in Figure 4-135 is displayed, click **Yes**.

7. When asked if you want to trust the root CA certificate, click **Yes** again.

Request a Certificate. Complete this task if your solution calls for network administrators to use the ProCurve VPN Client to request certificates on behalf of remote users.

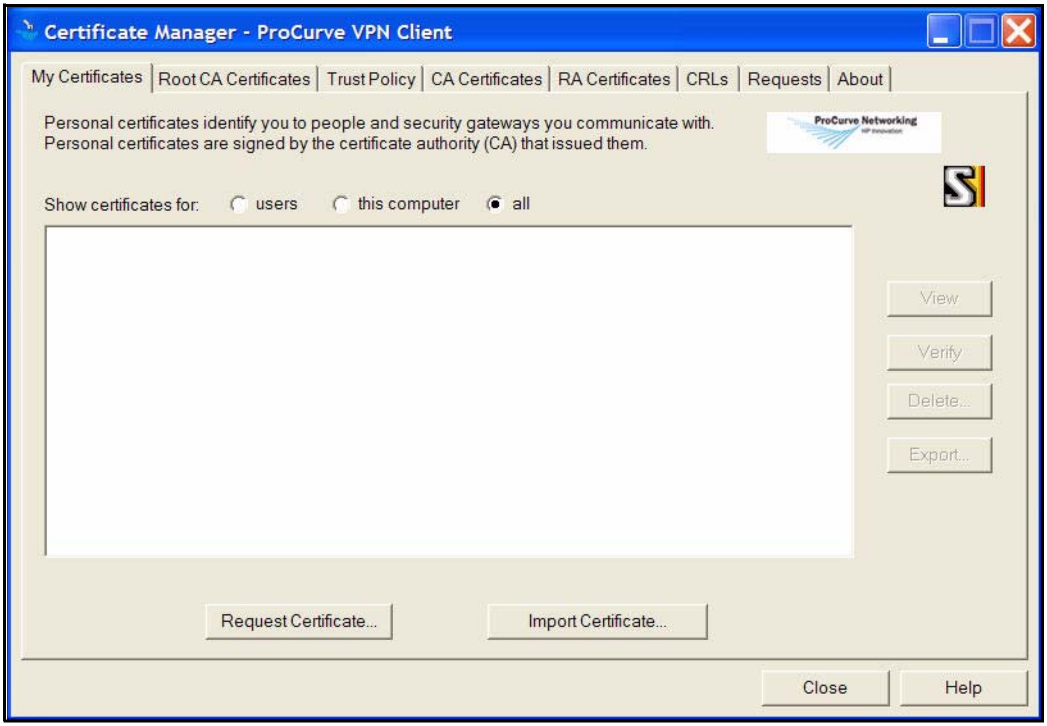
Note

If users will obtain their own certificates (see “Obtain a Certificate Using the Windows CA Web Enrollment Pages” on page 4-153), you can move to “Create a Security Policy” on page 4-179.

Follow these steps:

1. From the Windows **Start** menu, select **Programs** > **ProCurve VPN Client > Certificate Manager.**

2. Click the **My Certificates** tab.

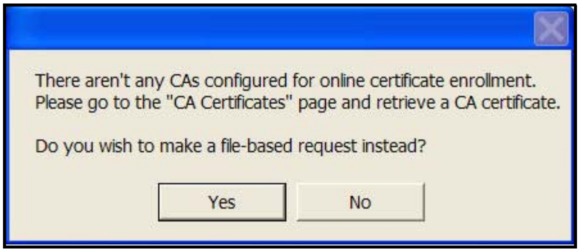


Personal certificates identify you to people and security gateways you communicate with. Personal certificates are signed by the certificate authority (CA) that issued them.

Show certificates for: ○ users ○ this computer ● all

Figure 4-78. Certificate Manager > My Certificates Tab in the ProCurve VPN Client

3. Click **Request Certificate**.



There aren't any CAs configured for online certificate enrollment. Please go to the "CA Certificates" page and retrieve a CA certificate.

Do you wish to make a file-based request instead?

Figure 4-79. Request Certificate Query Window

4. In the window that is displayed, click **Yes**.

5. In the **File-based Certificate Request** window, enter information about the user in the **Subject Name** area.

   Only the **Name** box requires an entry. However, the values entered for the **Subject Name** must match exactly an entry in the VPN gateway's remote ID list, unless, of course, the value is a wildcard (*). See Table 4-26.

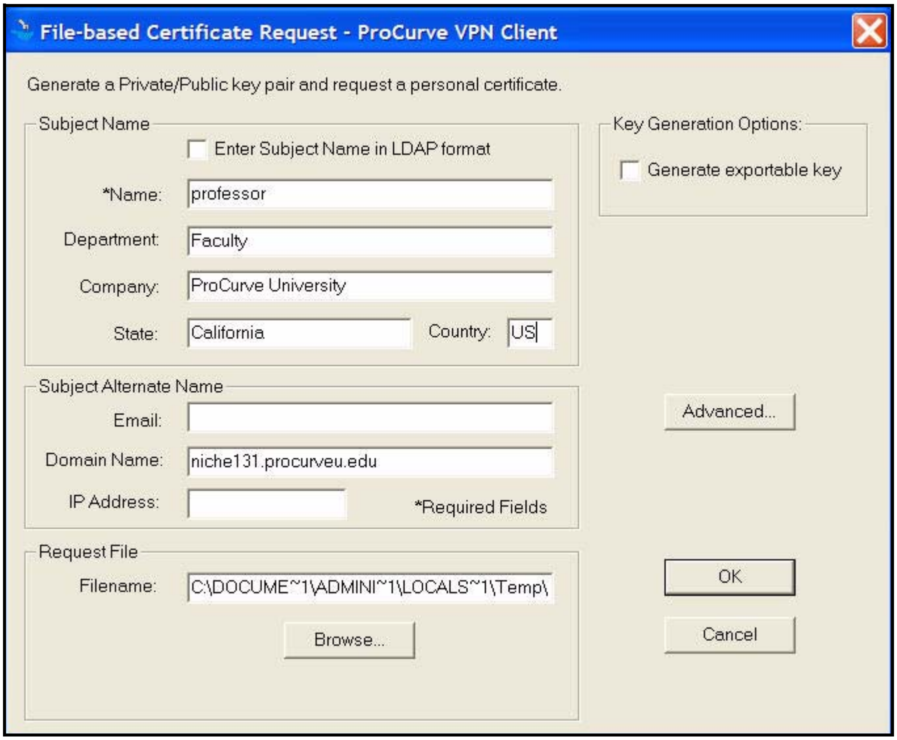
   a. For **Name**, type the username. In this example: **professor**.

   b. For **Department**, type the user's group or organizational unit (OU). In this example: **Faculty**.

   c. For **Company**, type the name of your organization. In this example: **ProCurve University**.

   d. For **State**, type the full name of the user's state. In this example: **California**.

   e. For **Country**, type the two-letter code for the user's country. In this example: **US**.



File-based Certificate Request - ProCurve VPN Client

Generate a Private/Public key pair and request a personal certificate.

Subject Name

□ Enter Subject Name in LDAP format

*Name: professor

Department: Faculty

Company: ProCurve University

State: California

Country: US

Key Generation Options:

□ Generate exportable key

Subject Alternate Name

Email:

Domain Name: niche131.procurveu.edu

IP Address:

*Required Fields

Request File

Filename: C:\DOCUME~1\ADMINI~1\LOCALS~1\Temp\

Figure 4-80. File-based Certificate Request in the ProCurve VPN Client

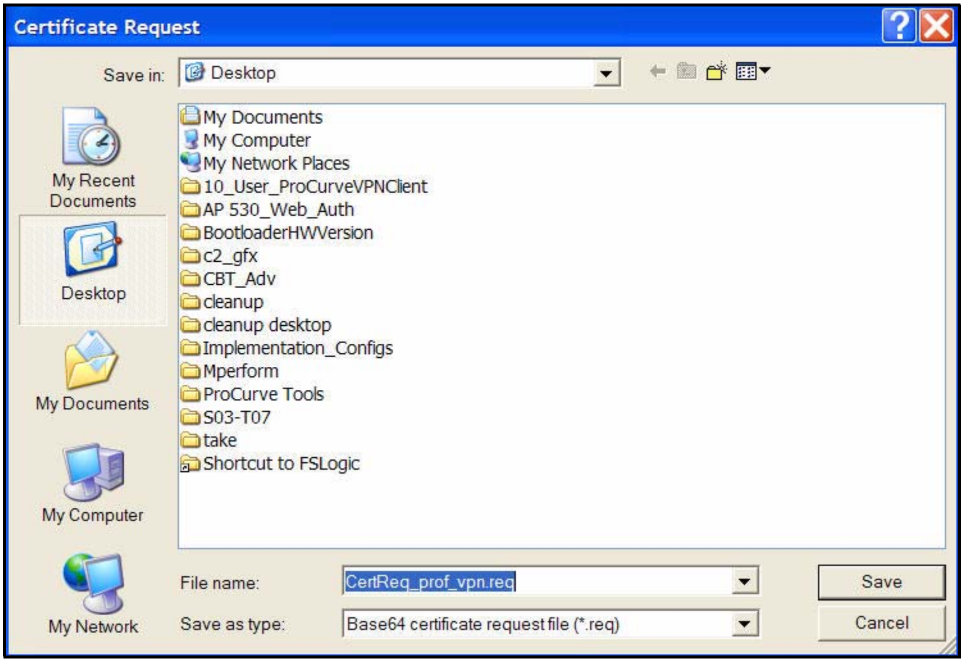
Table 4-26. Translating Boxes in the ProCurve VPN Client Certificate Request to LDAP format

Box Name in the ProCurve VPN Client	LDAP Format on the Secure Router
Name	CN
Department	OU
Company	O
State	ST
Country	C

Note

The state portion of the subject name will display as **S** on the client. However, on the Secure Router, you must specify **ST**.

6. In the **File-based Certificate Request** window, click **Browse** in the **Request File** area.



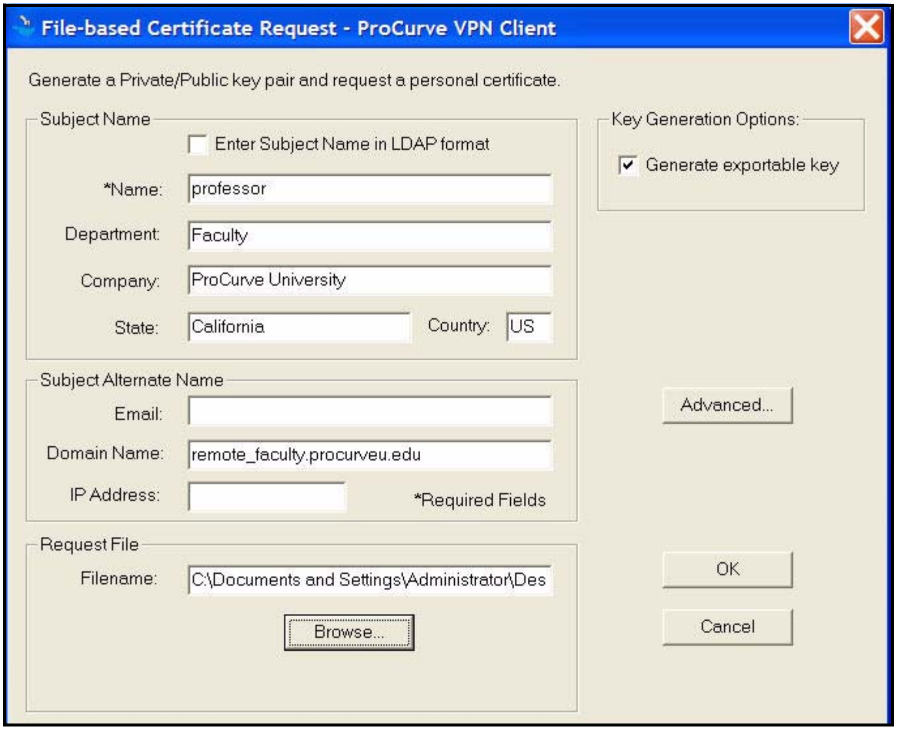
File name: CertReq_prof_vpn.req

Save as type: Base64 certificate request file (*.req)

Figure 4-81. Certificate Request—Save File

7. Navigate to the location to which you want to save the request. Type a descriptive name for the **File Name** and click **Save**.

8. In the **File-based Certificate Request** window, select the **Generate exportable key** check box.



File-based Certificate Request - ProCurve VPN Client

Generate a Private/Public key pair and request a personal certificate.

Subject Name

□ Enter Subject Name in LDAP format

*Name: professor

Department: Faculty

Company: ProCurve University

State: California Country: US

Subject Alternate Name

Email:

Domain Name: remote_faculty.procurveu.edu

IP Address:

*Required Fields

Request File

Filename: C:\Documents and Settings\Administrator\Des

Key Generation Options:

☑ Generate exportable key

Figure 4-82. File-based Certificate Request in the ProCurve VPN Client

9. Click **OK**.

The request saves to the location you selected, ready for you to submit to the CA.

Submit the Certificate Request to the CA. This section explains how to submit the certificate request to a Windows CA using the web enrollment pages. Follow these steps:

1. Open a Web browser and type this URL:

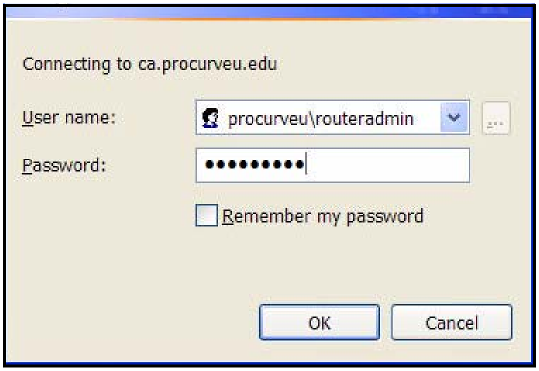
   http://<CA server hostname>/certsrv. In this example: *http://ca.procurveu.edu/certsrv.*

2. When prompted, enter credentials for an administrator allowed to enroll for the VPN client certificate.

You set up the permissions in "Customize a Template for VPN Client Certificates" on page 4-14. In this example, network administrators have permission to enroll clients for the certificates, and the username for the network administrator in charge of managing the Secure Router 7000dl is **routeradmin**.

a. Type the **User name** in this format: ***<domain>\<username>***. In this example: **procurveu\routeradmin**.

b. For the **Password**, type the user's domain password. In this example: **ProCurve0**.


Connecting to ca.procurveu.edu

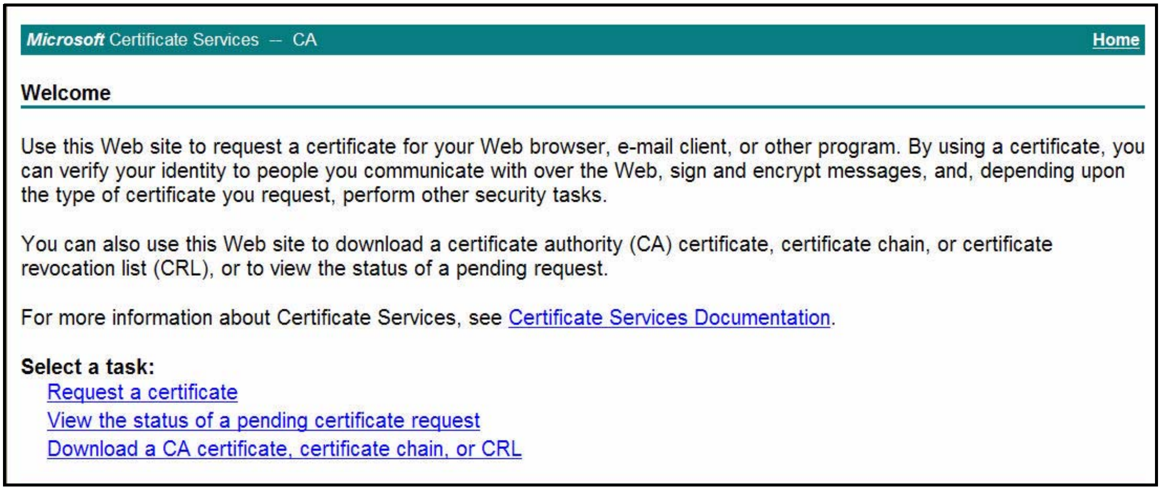
User name: procurveu\routeradmin

Password: ●●●●●●●●●

□ Remember my password

Figure 4-83. Connect to ca.procurveu.edu

3. Click **OK**.


Microsoft Certificate Services -- CA

Welcome

Use this Web site to request a certificate for your Web browser, e-mail client, or other program. By using a certificate, you can verify your identity to people you communicate with over the Web, sign and encrypt messages, and, depending upon the type of certificate you request, perform other security tasks.

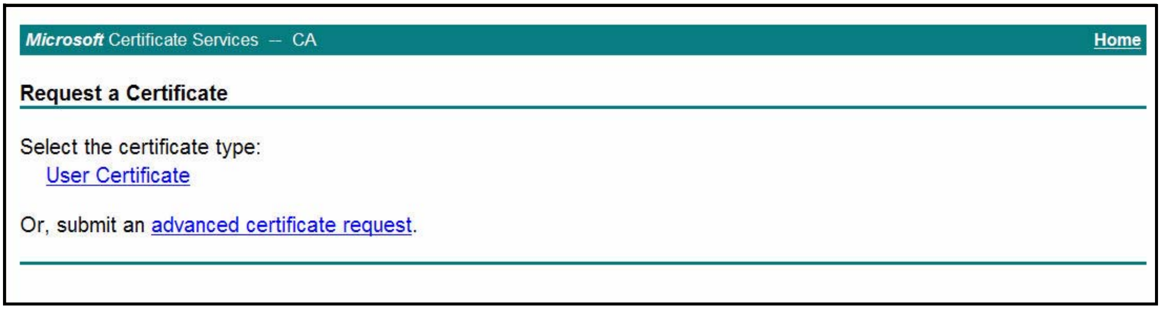
You can also use this Web site to download a certificate authority (CA) certificate, certificate chain, or certificate revocation list (CRL), or to view the status of a pending request.

For more information about Certificate Services, see Certificate Services Documentation.

Select a task:
Request a certificate
View the status of a pending certificate request
Download a CA certificate, certificate chain, or CRL

Figure 4-84. Certificate Services—Welcome Page

4. Click **Request a certificate**.



Microsoft Certificate Services -- CA

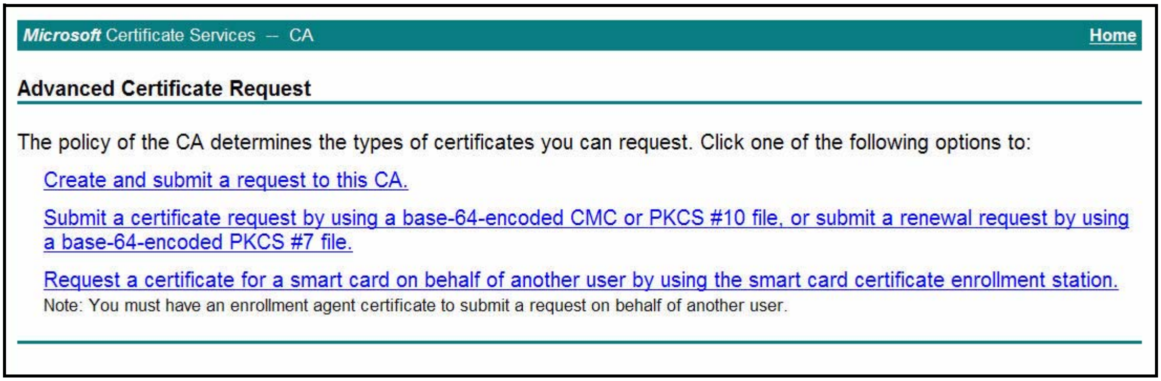
Request a Certificate

Select the certificate type:
User Certificate

Or, submit an advanced certificate request.

Figure 4-85. Certificate Services—Request a Certificate Page

5. Click **advanced certificate request**.



Microsoft Certificate Services -- CA

Advanced Certificate Request

The policy of the CA determines the types of certificates you can request. Click one of the following options to:

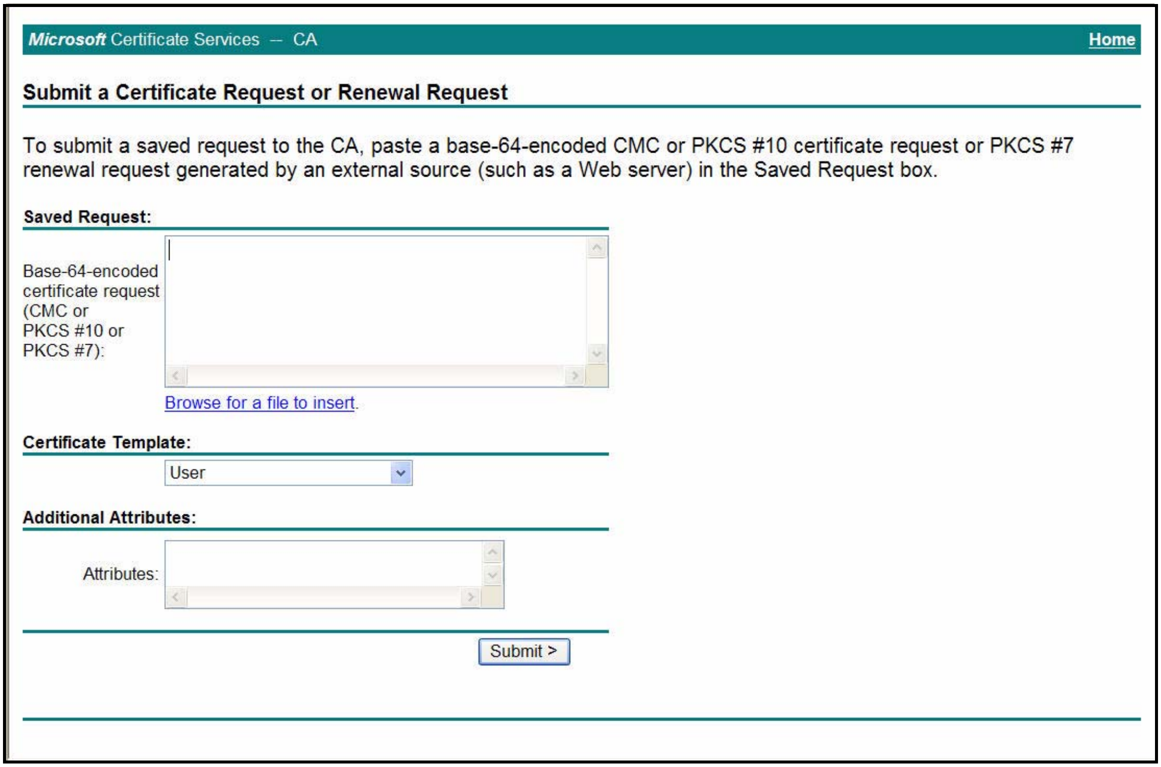
Create and submit a request to this CA.

Submit a certificate request by using a base-64-encoded CMC or PKCS #10 file, or submit a renewal request by using a base-64-encoded PKCS #7 file.

Request a certificate for a smart card on behalf of another user by using the smart card certificate enrollment station.
Note: You must have an enrollment agent certificate to submit a request on behalf of another user.

Figure 4-86. Certificate Services—Advanced Certificate Request Page

6. Click **Submit a certificate request by using a base-64-encoded CMC or PKCS #10 file, or submit a renewal request by using a base-64[encoded PKCS #7 file**.



Microsoft Certificate Services -- CA | Home

Submit a Certificate Request or Renewal Request

To submit a saved request to the CA, paste a base-64-encoded CMC or PKCS #10 certificate request or PKCS #7 renewal request generated by an external source (such as a Web server) in the Saved Request box.

Saved Request:

Base-64-encoded certificate request (CMC or PKCS #10 or PKCS #7):

Browse for a file to insert.

Certificate Template:

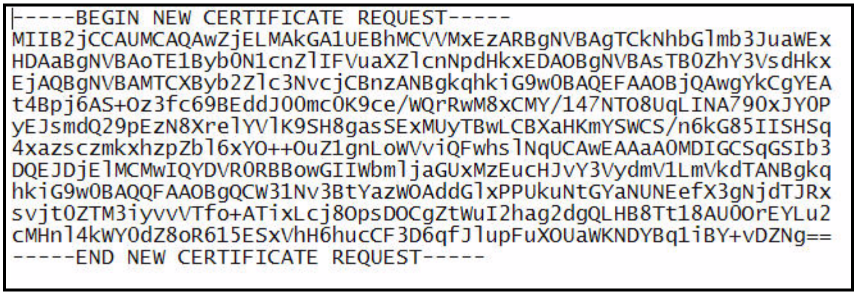
User

Additional Attributes:

Attributes:

Figure 4-87. Certificate Services—Submit a Certificate Request or Renewal Request Page

7. The certificate request created in “Request a Certificate” on page 4-161 should be saved on the current endpoint. Open the file with a text editor.



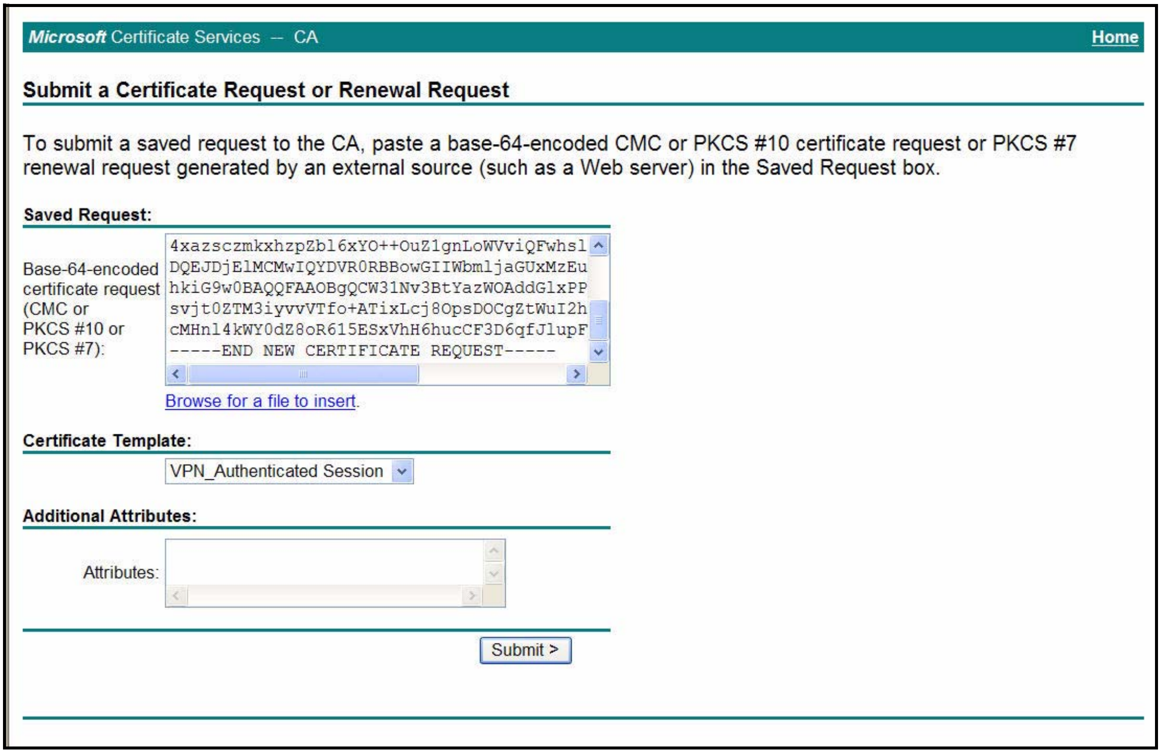
```
-----BEGIN NEW CERTIFICATE REQUEST-----
MIIB2jCCAUMCAQAwZjELMAkGA1UEBhMCVVMxEzARBgNVBAgTCkNhbGlmb3JuaWEx
HDAaBgNVBAoTE1Byb0N1cnZlIFVuaXZlcnNpdHkxEDAOBgNVBAsTB0ZhY3VsdHkx
EjAQBgNVBAMTCXByb2Zlc3NvcjCBnzANBgkqhkiG9w0BAQEFAAOBjQAwgYkCgYEA
t4Bpj6AS+Oz3fc69BEddJO0mc0K9ce/WQrRwM8xCMY/147NTO8UqLINA790xJY0P
yEJsmdQ29pEzN8XrelYVlK9SH8gasSExMUyTBwLCBXaHKmYSWCS/n6kG85IISHSq
4xazsczmkxhzpZbl6xYO++OuZ1gnLoWVviQFwhslNqUCAwEAAaA0MDIGCSqGSIb3
DQEJDjElMCMwIQYDVR0RBBowGIIWbmljaGUxMzEucHJvY3VydmV1LmVkdTANBgkq
hkiG9w0BAQQFAAOBgQCW31Nv3BtYazWOAddGlxPPUkuNtGYaNUNEefX3gNjdTJRx
svjt0ZTM3iyvvVTfo+ATixLcj8OpsDOCgZtWuI2hag2dgQLHB8Tt18AU0OrEYLu2
cMHnl4kWY0dZ8oR615ESxVhH6hucCF3D6qfJlupFuXOUaWKNDYBq1iBY+vDZNg==
-----END NEW CERTIFICATE REQUEST-----
```

Figure 4-88. Certificate Request File in a Text Editor

8. Select and copy the complete text.

9. Return to the open Web page and paste the text in the **Base-64-encoded certificate request** box.

10. For **Certificate Template**, select the template you created for VPN users. In this example: **VPN_Authenticated Session**.



Submit a Certificate Request or Renewal Request

To submit a saved request to the CA, paste a base-64-encoded CMC or PKCS #10 certificate request or PKCS #7 renewal request generated by an external source (such as a Web server) in the Saved Request box.

Saved Request:

Base-64-encoded certificate request (CMC or PKCS #10 or PKCS #7):

```
4xazsczmkxhzpZbl6xYO++OuZ1gnLoWVviQFwhsl
DQEJDjElMCMwIQYDVR0RBBowGIIWbmljaGUxMzEu
hkiG9w0BAQQFAAOBgQCW31Nv3BtYazWOAddGlxPP
svjt0ZTM3iyvvVTfo+ATixLcj8OpsDOCgZtWuI2h
cMHnl4kWY0dZ8oR615ESxVhH6hucCF3D6qfJlupF
-----END NEW CERTIFICATE REQUEST-----
```

Certificate Template:

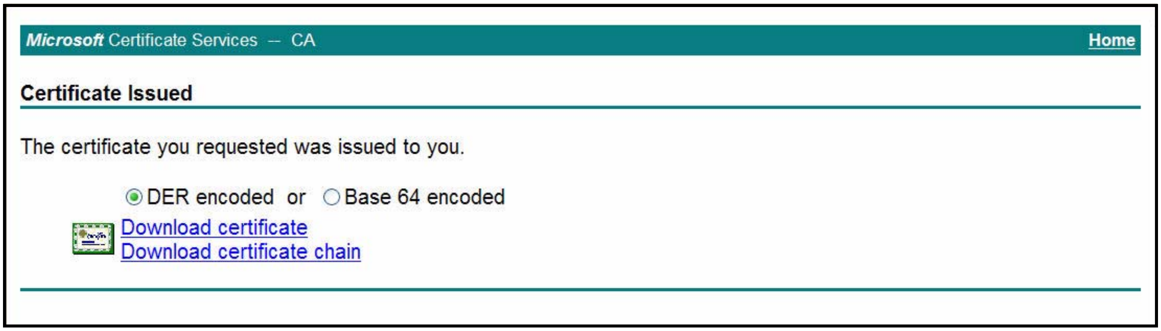
VPN_Authenticated Session

Additional Attributes:

Attributes:

Figure 4-89. Certificate Services—Submit a Certificate Request or Renewal Request Page

11. Click **Submit**.



Microsoft Certificate Services -- CA

Home

Certificate Issued

The certificate you requested was issued to you.

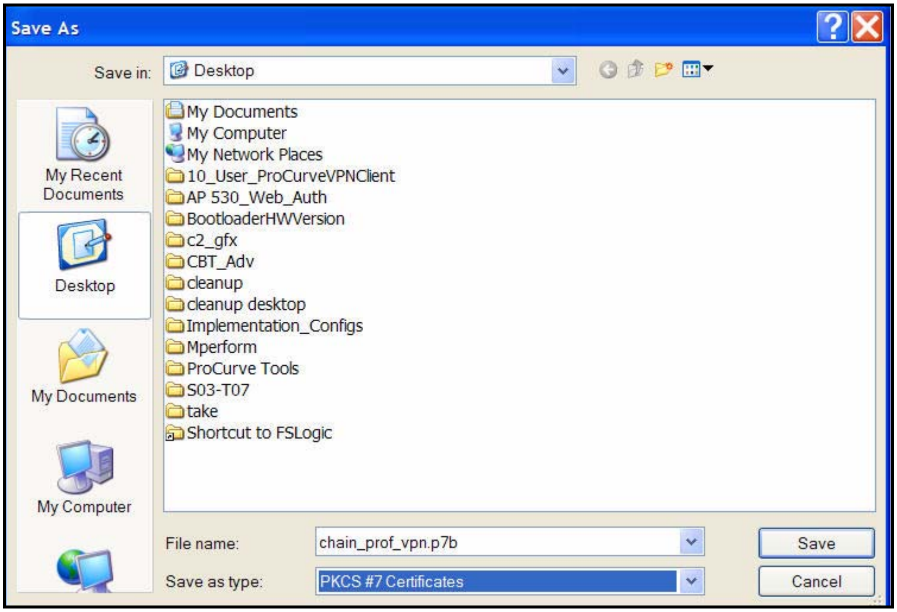
● DER encoded or ○ Base 64 encoded

Download certificate

Download certificate chain

Figure 4-90. Certificate Services—Certificate Issued Page

12. Download the certificate:
    - If the ProCurve VPN Client already has the CA root certificate installed on it, select **Download certificate**.
    - If the ProCurve VPN Client does not have the CA root certificate, select **Download certificate chain**.
13. When prompted, verify that you want to save the certificate and choose the location.



File name: chain_prof_vpn.p7b

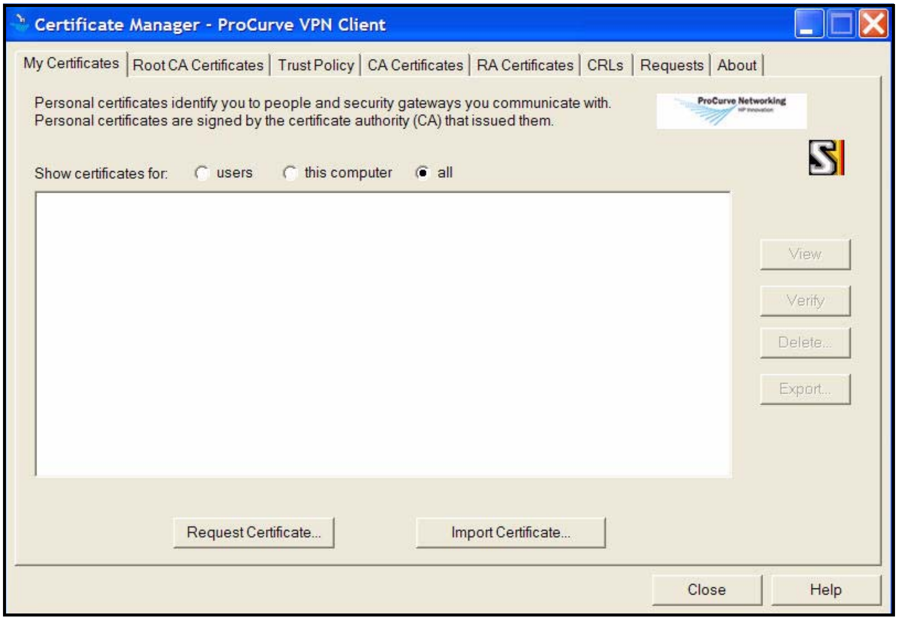
Save as type: PKCS #7 Certificates

Figure 4-91. Save the Certificate Chain

You have now obtained the necessary certificate and can import it to the ProCurve VPN Client.

Import a Certificate to the ProCurve VPN Client. Follow these steps to import the certificate that you obtained for the ProCurve VPN Client:

1. From the Windows **Start** menu, select **Programs** > **ProCurve VPN Client > Certificate Manager.**
2. Click the **My Certificates** tab.



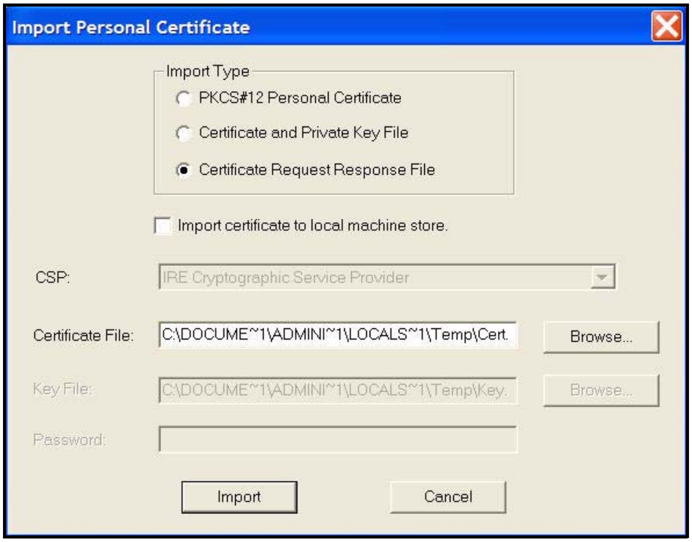
Certificate Manager - ProCurve VPN Client

Personal certificates identify you to people and security gateways you communicate with.
Personal certificates are signed by the certificate authority (CA) that issued them.

Show certificates for: ○ users ○ this computer ● all

Figure 4-92. Certificate Manager > My Certificates Tab in the ProCurve VPN Client

3. Click **Import Certificate**.
4. For **Import Type**, select **Certificate Request Response File**.



Import Personal Certificate

Import Type
○ PKCS#12 Personal Certificate
○ Certificate and Private Key File
● Certificate Request Response File

□ Import certificate to local machine store.

CSP: IRE Cryptographic Service Provider

Certificate File: C:\DOCUME~1\ADMINI~1\LOCALS~1\Temp\Cert.

Key File: C:\DOCUME~1\ADMINI~1\LOCALS~1\Temp\Key.

Password:

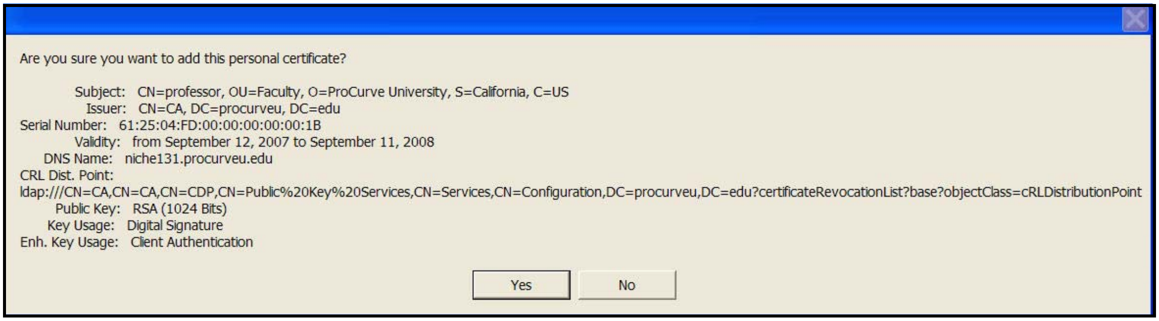
Figure 4-93. Import Personal Certificate in the ProCurve VPN Client

5. For **Certificate File**, type the path and name of the file to which you saved the certificate in “Submit the Certificate Request to the CA” on page 4-165.

   Or click **Browse** to search for the file. (If you do not see the file in the window that is displayed, make sure that you are looking for the correct file types—probably CER or DER, but if you downloaded a certificate chain, PKCS#7.)

6. Click **Import**.

7. A window is displayed that asks you to confirm the installation of the certificate. Click **Yes**.



Are you sure you want to add this personal certificate?

```
          Subject:   CN=professor, OU=Faculty, O=ProCurve University, S=California, C=US
           Issuer:   CN=CA, DC=procurveu, DC=edu
Serial Number:   61:25:04:FD:00:00:00:00:00:1B
          Validity:   from September 12, 2007 to September 11, 2008
     DNS Name:   niche131.procurveu.edu
CRL Dist. Point:
ldap:///CN=CA,CN=CA,CN=CDP,CN=Public%20Key%20Services,CN=Services,CN=Configuration,DC=procurveu,DC=edu?certificateRevocationList?base?objectClass=cRLDistributionPoint
       Public Key:   RSA (1024 Bits)
      Key Usage:   Digital Signature
Enh. Key Usage:   Client Authentication
```

Figure 4-94. Verify Import Personal Certificate in the ProCurve VPN Client

Note

If you have imported a complete certificate chain, you are first asked to verify the CA certificate, then the personal certificate. Click **Yes** for both. Also click **Yes** when asked if you want to trust the root CA certificate.

Configure a New Connection

Configure the connection to the Secure Router 7000dl.

1. From the Windows **Start** menu, select **Programs** > **ProCurve VPN Client > Security Policy Editor**.

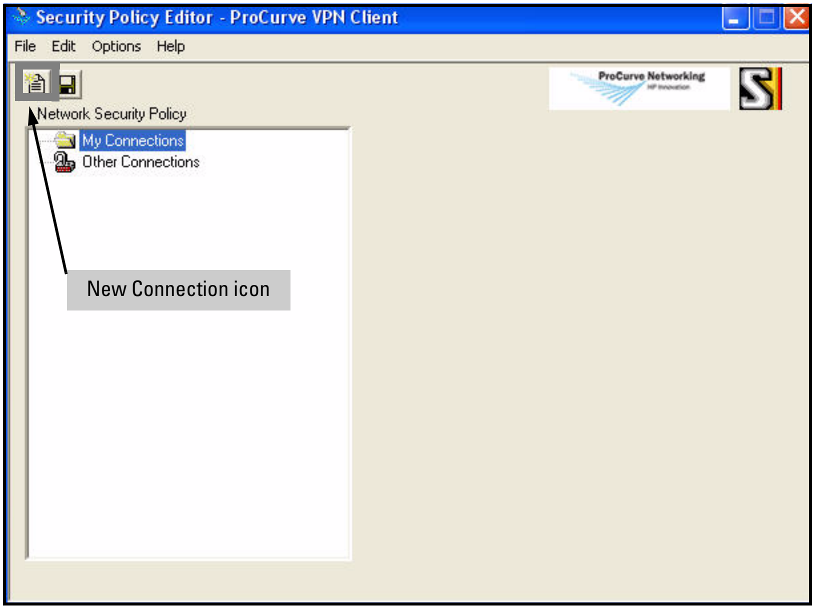
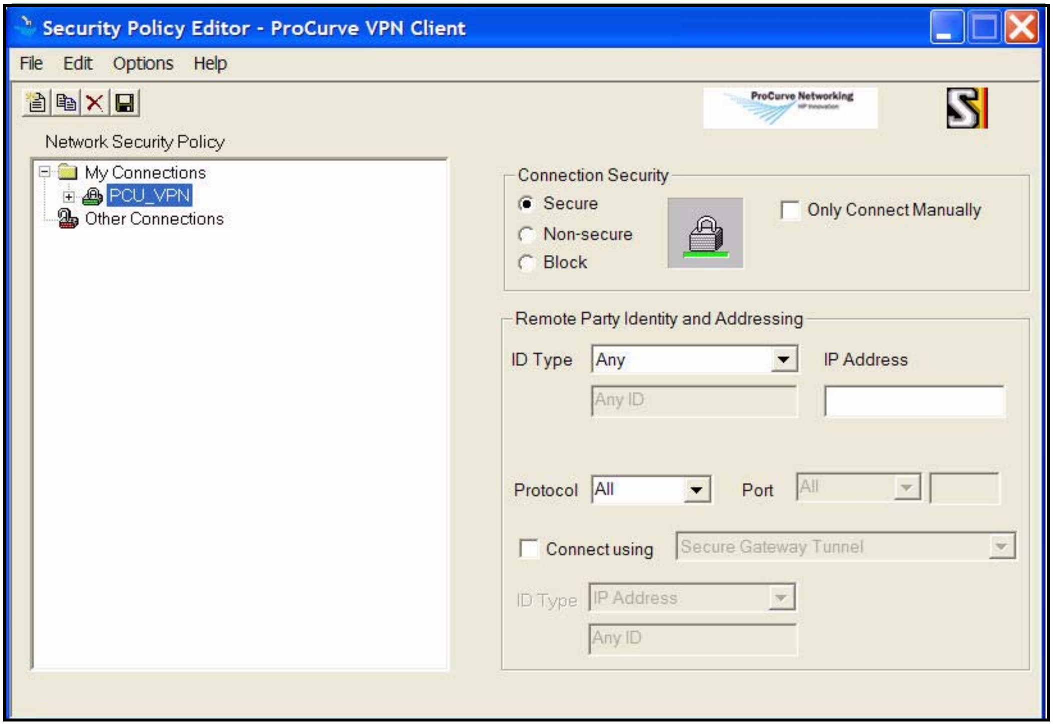


Figure 4-95. Security Policy Editor in the ProCurve VPN Client

2. Click the **New Connection** icon at the top left of the window. An icon is added under **My Connections** in the left pane. Type a name for the connection. In this example: **PCU_VPN**.

3. Select the icon for the connection that you just added.



Network Security Policy

- My Connections
  - PCU_VPN
- Other Connections

Connection Security

● Secure
○ Non-secure
○ Block

□ Only Connect Manually

Remote Party Identity and Addressing

ID Type: Any

Any ID

IP Address

Protocol: All

Port: All

□ Connect using: Secure Gateway Tunnel

ID Type: IP Address

Any ID

Figure 4-96. New Connection in the ProCurve VPN Client

4. Set up the new connection.

   a. Under **Connection Security**, select **Secure**.

   b. Under **Remote Party Identity and Addressing**, select **IP Subnet** for **ID Type**.

   c. For **Subnet** and **Mask**, type the network IP address and mask of the private network.

      This option specifies the LAN that the user is allowed to access and must match *exactly* the permitted source address in the VPN ACL that you configured in "Create ACLs for VPN Traffic" on page 4-83.

      For example, type **10.0.0.0** as the IP address and **255.240.0.0** as the subnet mask.

   d. For **Protocol**, maintain the default setting of **All**.

   e. Select the **Connect using** option and use the drop-down menu to select **Secure Gateway Tunnel**.

f. In the left **ID Type** box, select **Distinguished Name**.

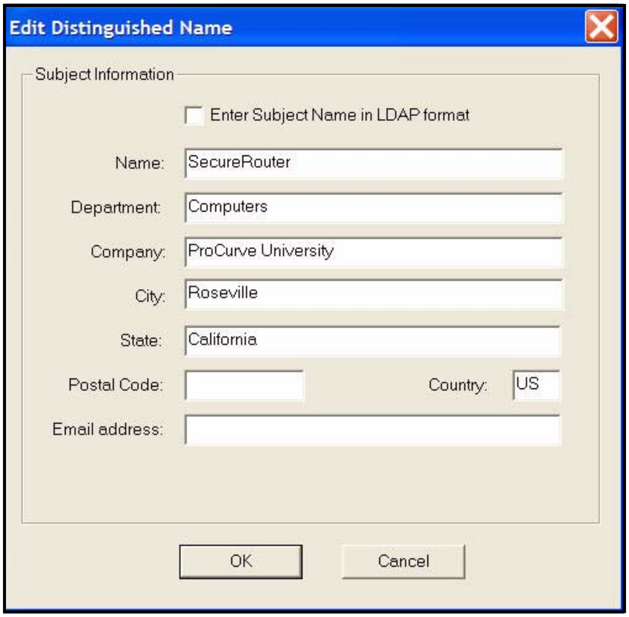
The choice of ID type depends on the local ID that you configured in the IKE policy (see "Configure an IKE Policy" on page 4-76).

g. Click **Edit Name**.

h. In the **Edit Distinguished Name** window, type information about the router.

The values must match exactly the subject name in the router's certificate. If the subject name does not include one of the attributes, do not specify a value for that attribute.

i. For **Name**, type the router's CN. In this example: **SecureRouter**.
ii. For **Department**, type the router's OU. In this example: **Computers**.
iii. For **Company**, type your organization name. In this example: **ProCurve University**.
iv. For **City**, type the router's city. In this example: **Roseville**.
v. For **State**, type the router's state. In this example: **California**.
vi. For **Postal Code**, type the router's postal code. In this example, the router's subject name does not specify that attribute.
vii. For **Country**, type the two-letter code for the router's country. In this example: **US**.
viii. For **Email address**, type the router's email address. In this example, the router's certificate does not include that alternate ID.



☐ Enter Subject Name in LDAP format

Name: SecureRouter
Department: Computers
Company: ProCurve University
City: Roseville
State: California
Postal Code:
Country: US
Email address:

Figure 4-97. Edit Distinguished Name Window in ProCurve VPN Client

Note

To make sure that you are configuring the name correctly, you can access the Secure Router CLI and view the certificate (**show crypto ca certificates**). Refer to Table 4-27 for help translating the LDAP format name displayed into the boxes in the **Edit Distinguished Name** window.

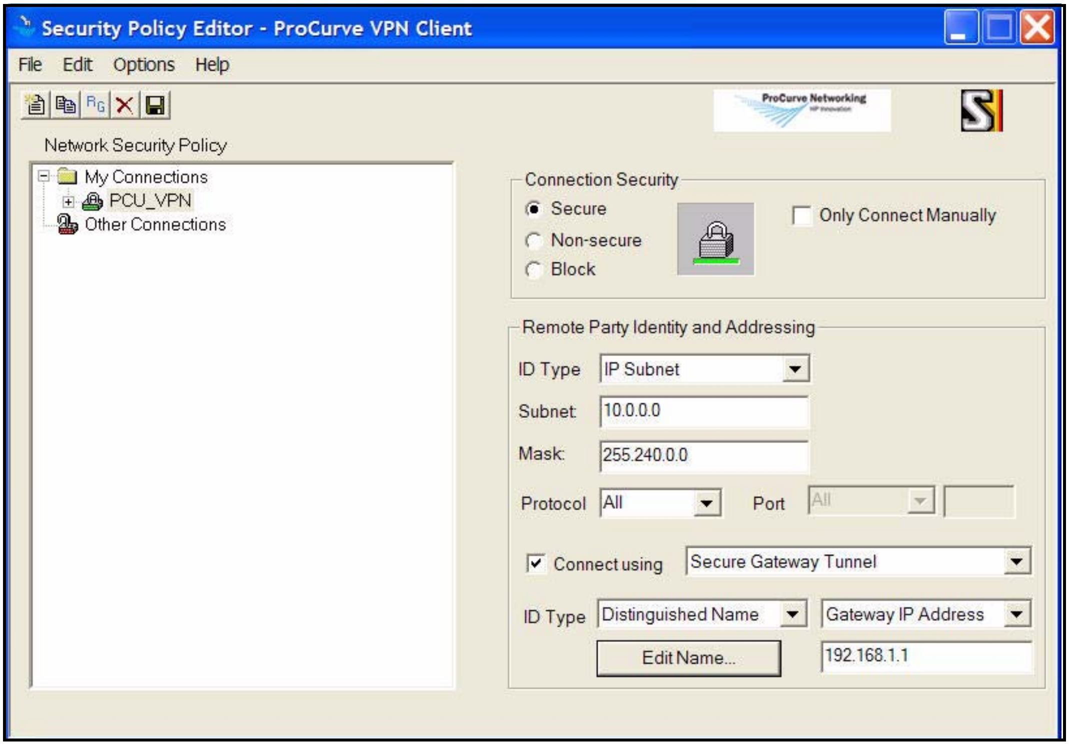
i. Click **OK**.

Table 4-27. Entering the Secure Router 7000dl LDAP Format Name in the ProCurve VPN Client

LDAP Format on the Router	Box Name in the ProCurve VPN Client
CN	Name
OU	Department
O	Company
L	City
ST	State
C	Country

j. For the right **ID Type** box in the window shown in Figure 4-98, select **Gateway IP Address**.

k. Then type the IP address of the WAN interface on your router. The WAN interface is the router interface that receives user’s traffic and the address is usually a public IP address. In this example: **192.168.1.1**.



Security Policy Editor - ProCurve VPN Client

Network Security Policy

- My Connections
  - PCU_VPN
- Other Connections

Connection Security

● Secure
○ Non-secure
○ Block

□ Only Connect Manually

Remote Party Identity and Addressing

ID Type: IP Subnet

Subnet: 10.0.0.0

Mask: 255.240.0.0

Protocol: All   Port: All

☑ Connect using: Secure Gateway Tunnel

ID Type: Distinguished Name   Gateway IP Address

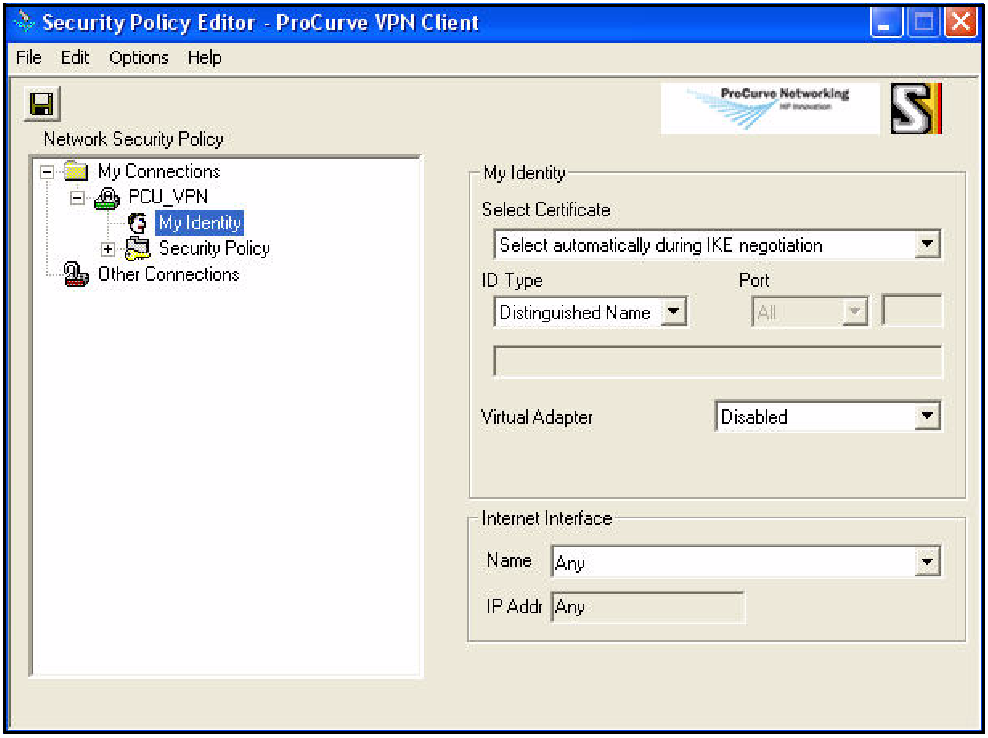
192.168.1.1

Figure 4-98. New Connection in the ProCurve VPN Client

Note

The “public” IP address, 192.168.1.1, is, in reality, a private address. It is simply used as an example.

5. In the left pane, expand the connection that you are configuring and click **My Identity**.



Select Certificate: Select automatically during IKE negotiation
ID Type: Distinguished Name
Port: All
Virtual Adapter: Disabled
Name: Any
IP Addr: Any

Figure 4-99. Security Policy Editor > My Identity in the ProCurve VPN Client

6. Keep the default setting for **Select Certificate: Select automatically during IKE negotiation**.

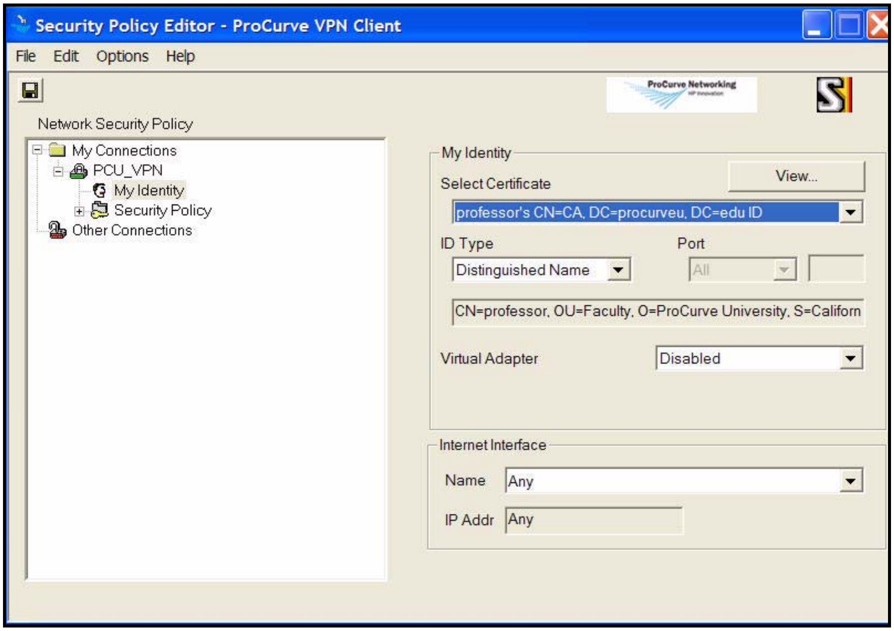
Note

If your VPN used preshared keys instead, you would select **None**. The **View** button becomes the **Pre-Shared Key** button; click it and configure the preshared key in the window that is displayed.

7. For **ID Type**, select **Distinguished Name**.

   As you can see in Figure 4-100, the box below **ID Type** displays the distinguished name in the certificate. Match this name exactly in the remote ID list on the Secure Router 7000dl. (However, type **ST** instead of **S** for the state.)

8. Leave all other fields on the **My Identity** window at the default settings.



My Identity

Select Certificate: professor's CN=CA, DC=procurveu, DC=edu ID

ID Type: Distinguished Name

Port: All

CN=professor, OU=Faculty, O=ProCurve University, S=Californ

Virtual Adapter: Disabled

Internet Interface

Name: Any

IP Addr: Any

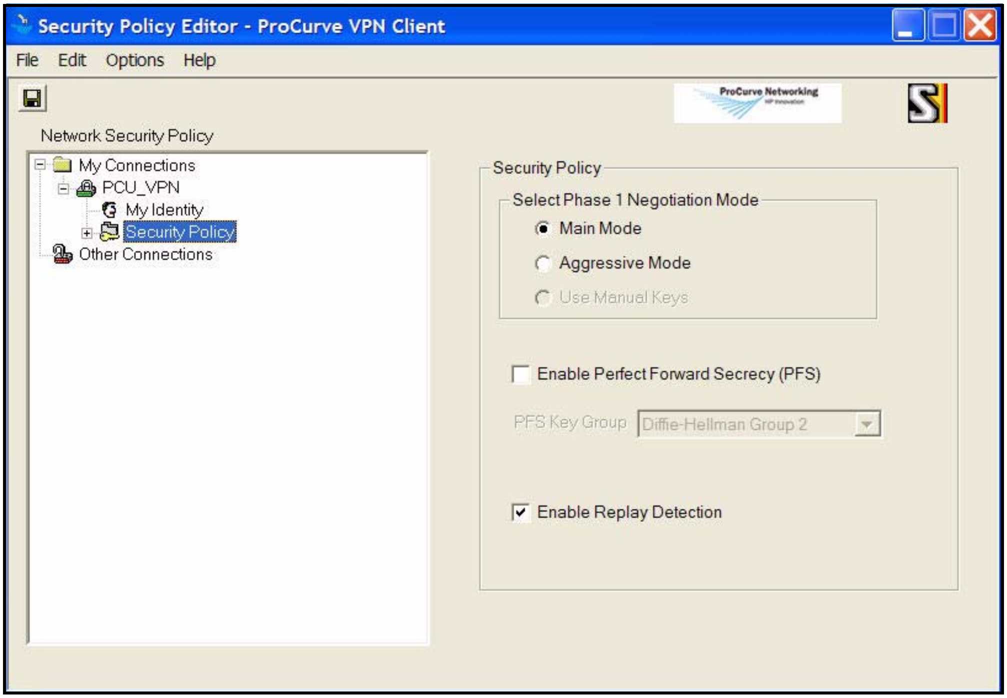
Figure 4-100.My Identity Page in the ProCurve VPN Client

Create a Security Policy

To create and secure a connection to the Secure Router 7000dl, you must configure a security policy by completing the following steps:

1. Under **New Connection** in the left pane, click **Security Policy**. The **Security Policy** page is displayed.

2. Under **Select Phase 1 Negotiation Mode**, select the mode that matches the respond mode in the router's IKE policy. In this example: **Main Mode**.



Security Policy

Select Phase 1 Negotiation Mode

● Main Mode

○ Aggressive Mode

○ Use Manual Keys

□ Enable Perfect Forward Secrecy (PFS)

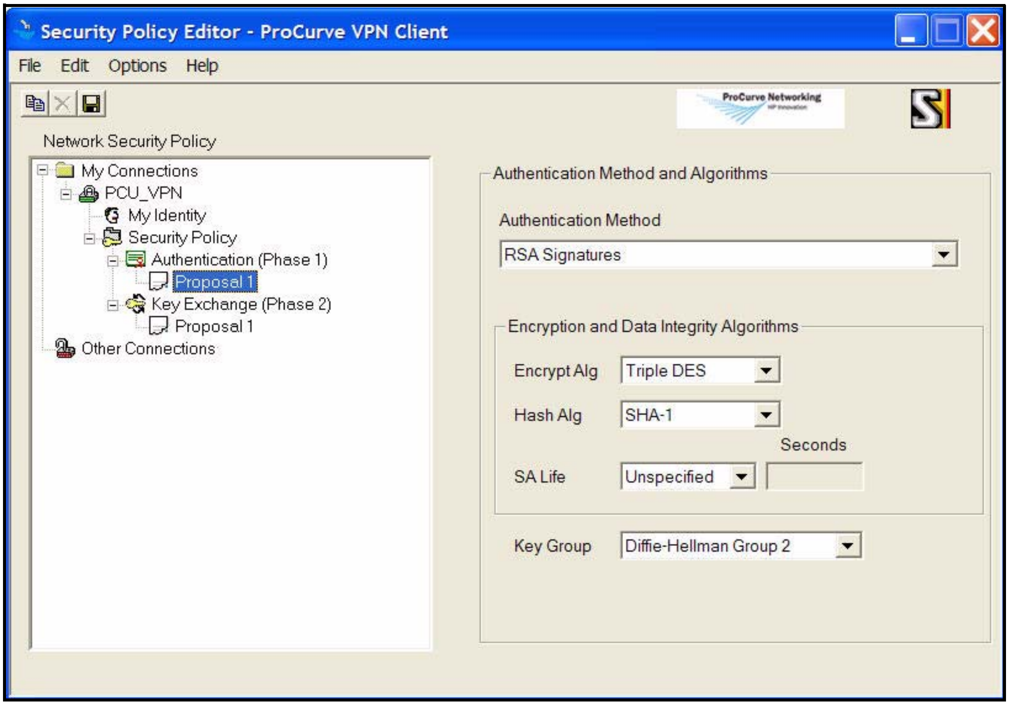
PFS Key Group: Diffie-Hellman Group 2

☑ Enable Replay Detection

Figure 4-101.Security Policy Page in the ProCurve VPN Client

3. If you configured PFS in the crypto map on the VPN gateway, follow these steps:
   a. Select the **Enable Perfect Forward Secrecy (PFS)** check box.
   b. Select the Diffie-Hellman group for the PFS. The Secure Router 7000dl supports group 1, 2, and 5. For the example network, select **Diffie-Hellman 5.**
4. Expand the **Security Policy** section in the left pane. Two options are displayed:
   - **Authentication (Phase 1)**
   - **Key Exchange (Phase 2)**

   Expand both of these options.
5. Select **Proposal 1** under **Authentication (Phase 1)**, and configure the settings for IKE phase 1. These settings must match IKE attribute polity settings that are configured on the Secure Router 7000dl.



Authentication Method and Algorithms

Authentication Method: RSA Signatures

Encryption and Data Integrity Algorithms

Encrypt Alg: Triple DES

Hash Alg: SHA-1

SA Life: Unspecified — Seconds:

Key Group: Diffie-Hellman Group 2

Figure 4-102.Security Policy > Proposal 1 in the ProCurve VPN Client

a. For **Authentication Method**, select one of the following:

- **DSA Signatures**
- **RSA Signatures**
- **DSA Signatures: Extended Authentication**
- **RSA Signatures: Extended Authentication**

You would select one of the extended authentication methods if you are using Xauth.

For the example network, select **RSA Signatures**.

Note

If, in step 6 of “Configure a New Connection” on page 4-173, you selected **None** for the certificate, these options are available for the Authentication Method:

- **Pre-Shared Key**
- **Pre-Shared Key; Extended Authentication**

b. For **Encrypt Alg**, select one of the following:
   - **DES**
   - **Triple DES**
   - **AES-128**
   - **AES-192**
   - **AES-256**

   For the example network, select **AES-192.**

c. For **Hash Alg**, select one of the following:
   - **MD5**
   - **SHA-1**

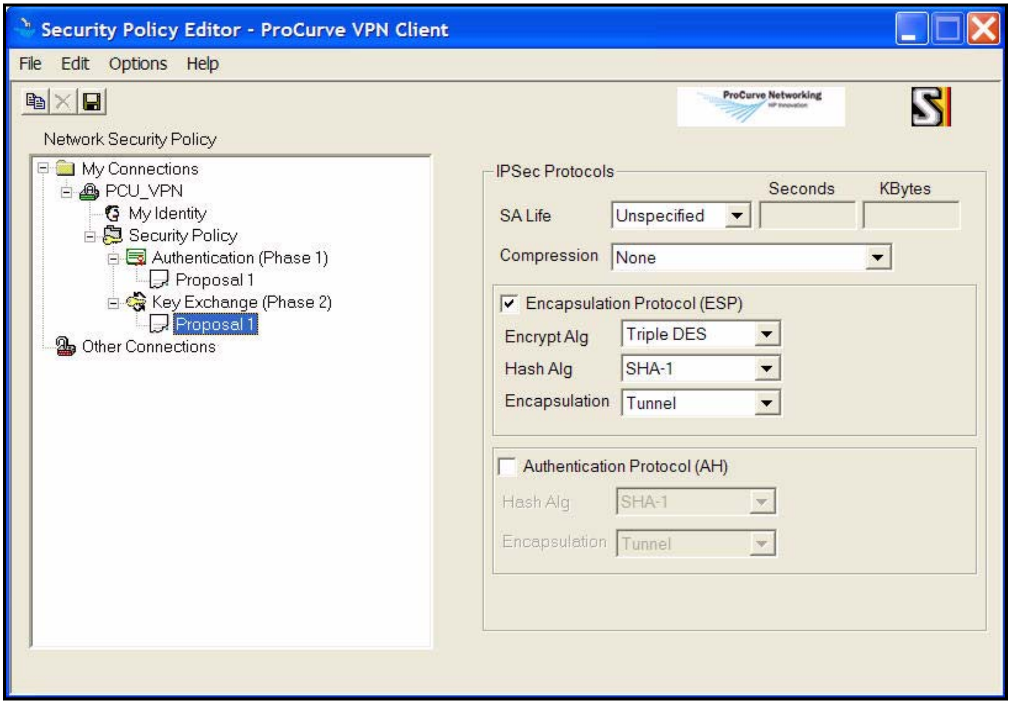
   For the example network, select **SHA-1.**

d. For **SA Life**, select one of the following:
   - **Seconds**—Then, type the number of seconds for the temporary IKE tunnel lifetimes.
   - **Unspecified**

   For the example network, select **Seconds** and type **240.**

e. For **Key Group**, select a Diffie-Hellman group. The Secure Router 7000dl supports group 1 and group 2. For the example network, select **Diffie-Hellman Group 2**.

6. Click **Proposal 1** under **Key Exchange (Phase 2)**. These settings are used for the IKE phase 2, which negotiates the IPsec parameters. They must match settings in a Secure Router 7000dl crypto map entry (and associated transform sets) exactly.



Network Security Policy

- My Connections
  - PCU_VPN
    - My Identity
    - Security Policy
      - Authentication (Phase 1)
        - Proposal 1
      - Key Exchange (Phase 2)
        - Proposal 1
- Other Connections

IPSec Protocols

		Seconds	KBytes
SA Life	Unspecified		

Compression: None

☑ Encapsulation Protocol (ESP)

Encrypt Alg: Triple DES

Hash Alg: SHA-1

Encapsulation: Tunnel

□ Authentication Protocol (AH)

Hash Alg: SHA-1

Encapsulation: Tunnel

Figure 4-103.Security Policy Editor in the ProCurve VPN Client

a. For **SA Life**, select one of the following:
   - **Unspecified**
   - **Seconds**—Type the number of seconds for the IPsec tunnel lifetime.
   - **Kbytes**—Type the number of KB for IPsec tunnel lifetime.
   - **Both**—Type the number of seconds and the KB IPsec tunnel lifetime.

   For the example network, select **Seconds** and type **7200.**

b. For **Compression**, leave the default: **None**.

c. Select the **Encapsulation Protocol (ESP)** or **Authenticate Protocol (AH)** check box. ESP allows encryption so you should use it whenever possible. Select the corresponding check boxes. In this example: select the **Encapsulation Protocol (ESP)** check box.

d. If you have selected ESP, for **Encrypt Alg,** select one of the following:
   - **Triple DES**
   - **Null**
   - **AES-128**
   - **AES-192**

   In this example: **AES-192**.

e. For **Hash Alg** (if you selected either ESP or AH), select one of the following:
   - **MD5**
   - **SHA-1**
   - **DES-MAC** (ESP only)

   In this example: **SHA-1**.

f. For **Encapsulation**, select **Tunnel**.

7. Save the new connection. (Select **File** > **Save**.)

You have finished configuring the connection.

Test the VPN Connection

You should now test the VPN connection and verify that the Secure Router 7000dl and the ProCurve VPN Client are correctly configured and have all necessary certificates. You may need to test the connection from home; your endpoint must connect to the router through the Internet.

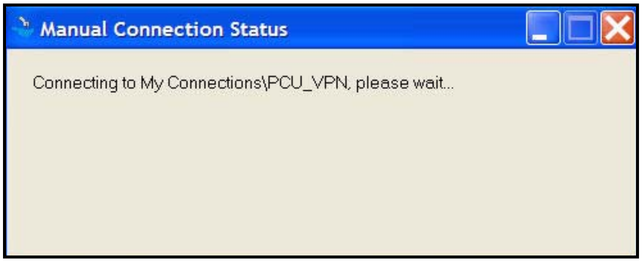
Follow these steps on the endpoint with the VPN client:

1. In the **Start** menu, select **Programs** > **ProCurve VPN Client** > **Log Manager**.

   The Log Manager displays messages that help you troubleshoot the connection.

2. Right-click the ProCurve VPN Client icon in the right of the Windows taskbar.

3. Select **Connect** > **MyConnections\<*connection name*>**.

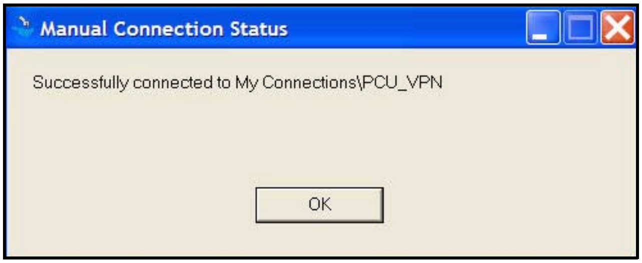


Connecting to My Connections\PCU_VPN, please wait...

Figure 4-104.Manual Connection Status Window in the ProCurve VPN Client

4. Wait while the VPN tunnel is established. After a minute or two, you should see the window shown in Figure 4-105.

   You have successfully connected.



Successfully connected to My Connections\PCU_VPN

Figure 4-105.Manual Connection Status Window in the ProCurve VPN Client—Success

If you do not see this window, check the Log Manager and look for messages that indicate the error.

Export the Policy and Certificates

After testing your policy and ensuring that it works, you can export it from the endpoint and distribute it to users. This section teaches you how to create two prepackaged installations for two different sets of users.

The endpoint on which you configured the ProCurve VPN Client should have the installation directory for the client—for example, **10_User_ProCurveVPNClient**. Copy the directory once for each different prepackaged installation; then rename the new directories. For example:

- **ProCurveVPNClient_Faculty**
- **ProCurveVPNClient_Students**

These directories contain the installation files. You are going to add three files to each:

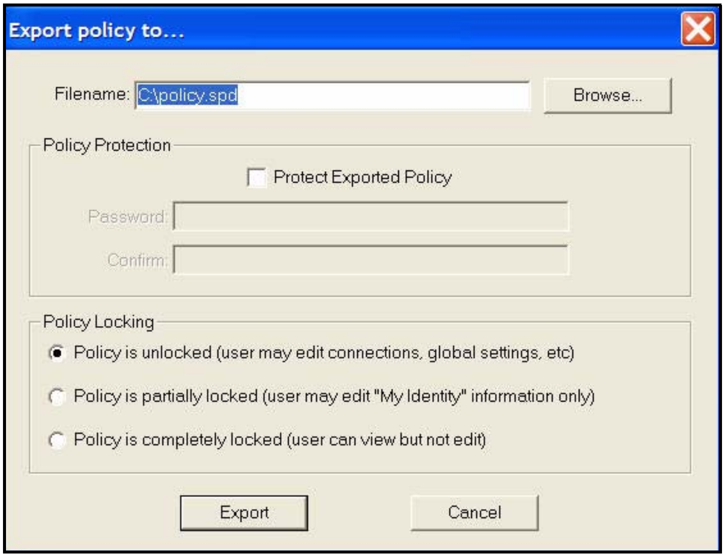
- **IPSecPolicy.spd**—the preconfigured connection settings and security policies for this set of users
- **IPSecCerts.p12**—the correct VPN client certificate for this set of users

  You do not need to add this file if users will obtain their own certificates.
- **CaCert.cser**—the root certificate for the CA that issued the VPN client certificate

Using these exact names allows the policy and certificates to automatically import at the same time that the client installs.

Export the Policy. Follow these steps to export the connection settings and security policy:

1. In the **Start** menu, select **Programs** > **ProCurve VPN Client** > **Security Policy Editor**.
2. Click one of the secure connections in the left pane.
3. Select **File** > **Export Security Policy**.


Export policy to...

Filename: C:\policy.spd

Policy Protection

□ Protect Exported Policy

Password:

Confirm:

Policy Locking

● Policy is unlocked (user may edit connections, global settings, etc)

○ Policy is partially locked (user may edit "My Identity" information only)

○ Policy is completely locked (user can view but not edit)

Figure 4-106.Export policy to Window in the ProCurve VPN Client

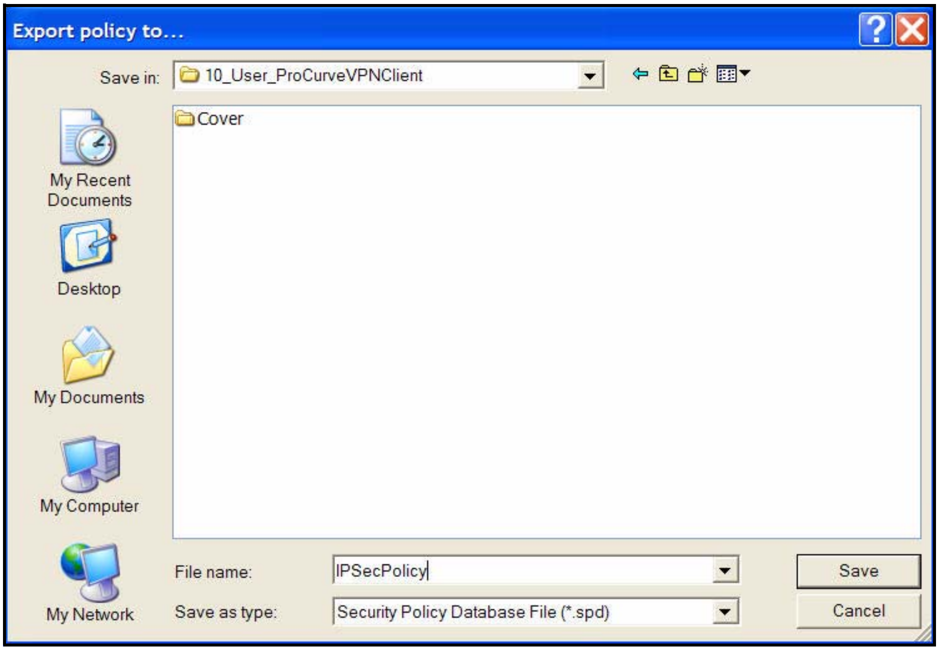
4. Click **Browse** next to the **Filename** box.

5. Navigate to the prepackaged installation directory for the users for whom you designed this policy.

6. For **Filename**, type this exact name: **IPSecPolicy**.

   You can type a different name, but then the policy will not automatically install.

7. Leave the default setting in the **Save as type** box: **Security Policy Database File (*.spd)**.



File name: IPSecPolicy

Save as type: Security Policy Database File (*.spd)

Figure 4-107.Export policy to Window

8. Click **Save**.

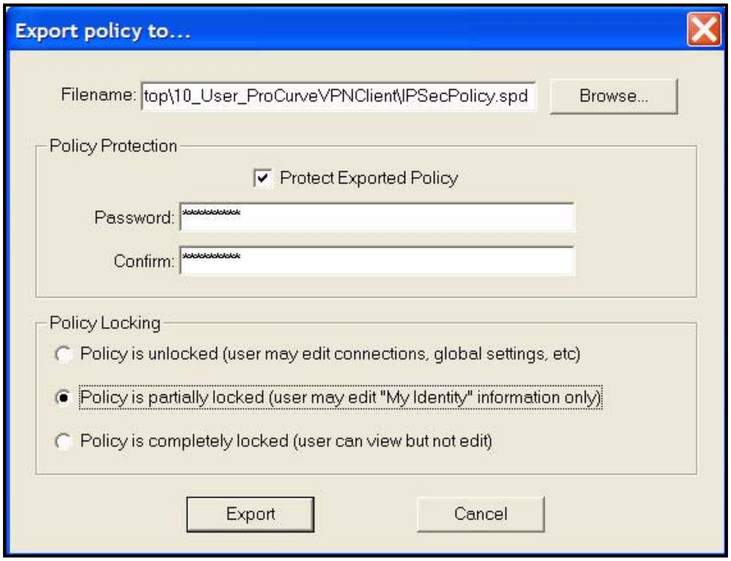
9. You return to the previous **Export policy to** window. Select the **Protect Exported Policy** check box to password-protect the policy. Then, type the password and confirm it.

10. Select one of the following options:

    - **Unlocked policy**—Users can change any settings.
    - **Partially locked policy**—Users can configure My Identity settings only. For example, they can type a preshared key or select a certificate.

- **Completely locked policy**—Users can view settings but cannot change them.

For this solution, you should select **Policy is partially locked**. Completely locking the policy prevents the user from selecting the correct certificate and can cause the connection to fail.



Export policy to...

Filename: top\10_User_ProCurveVPNClient\IPSecPolicy.spd

Policy Protection

☑ Protect Exported Policy

Password: *********

Confirm: *********

Policy Locking

○ Policy is unlocked (user may edit connections, global settings, etc)

● Policy is partially locked (user may edit "My Identity" information only)

○ Policy is completely locked (user can view but not edit)

Figure 4-108.Export policy to Window

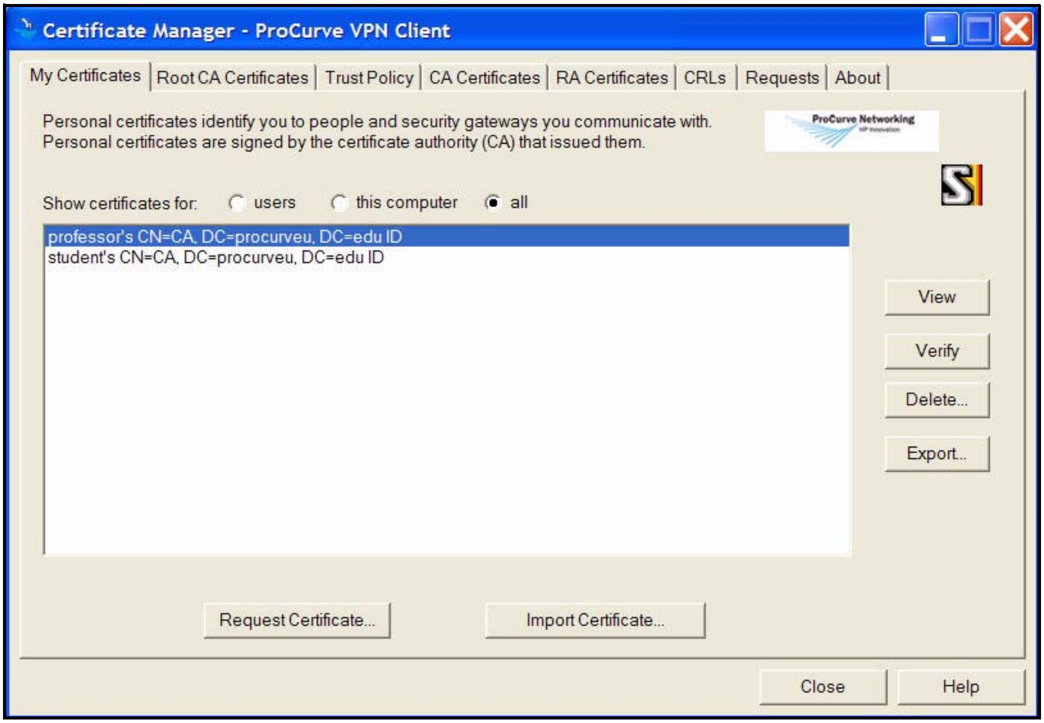
11. Click **Export**.

12. Repeat steps 2 to 11. This time save the policy in the prepackaged installation folder for the second set of users. You may also want to set a different password.

Export the VPN Client Certificate. Follow these steps to export the client certificate:

1. In the **Start** menu, select **Programs** > **ProCurve VPN Client** > **Security Policy Editor**.

2. Click the **My Certificates** tab.



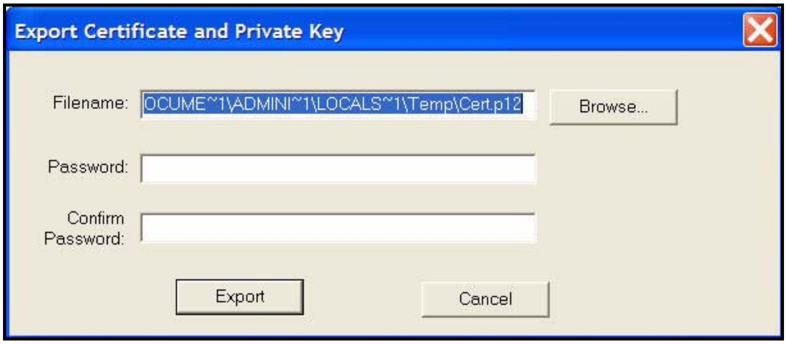
Personal certificates identify you to people and security gateways you communicate with.
Personal certificates are signed by the certificate authority (CA) that issued them.

Show certificates for: ○ users ○ this computer ● all

professor's CN=CA, DC=procurveu, DC=edu ID
student's CN=CA, DC=procurveu, DC=edu ID

Figure 4-109.Certificate Manager > My Certificates Tab in the ProCurve VPN Client

3. Select the correct certificate for the users for whom you designed this prepackaged installation.
4. Click **Export**.



Filename: OCUME~1\ADMINI~1\LOCALS~1\Temp\Cert.p12

Password:

Confirm Password:

Figure 4-110.Export Certificate and Private Key Window

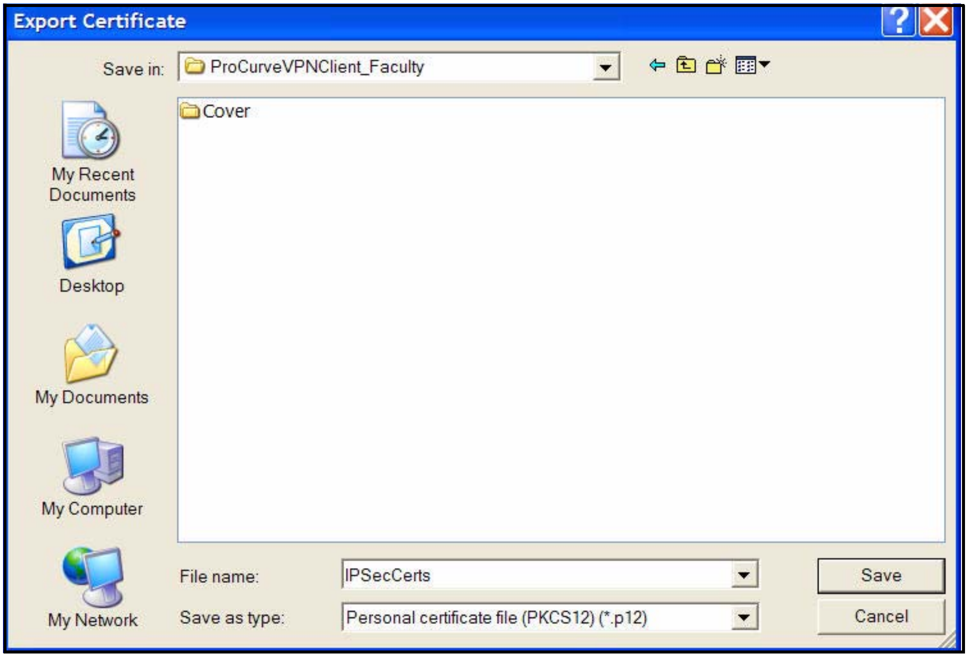
5. Click **Browse**.

6. Navigate to the prepackaged installation directory.

7. For **File name**, type: **IPSecCerts**.

   Use this exact filename to ensure that the certificate imports automatically when the user installs the ProCurve VPN Client.

8. For **Save as type**, leave the default: **Personal certificate file (PKCS12) (*.p12)**.


Export Certificate

Save in: ProCurveVPNClient_Faculty

Cover

File name: IPSecCerts

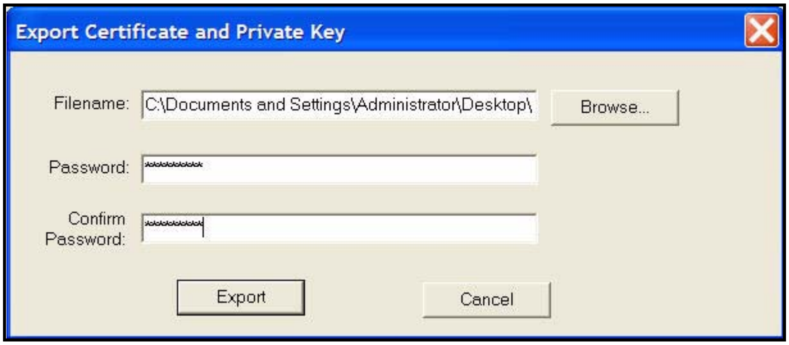
Save as type: Personal certificate file (PKCS12) (*.p12)

Figure 4-111.Export Certificate Window

9. Click **Save**.

10. In the **Export Certificate and Private Key** window, type a password in the **Password** and **Confirm Password** boxes.

    The password prevents users from importing and using a certificate grants them rights they do not merit.



Export Certificate and Private Key

Filename: C:\Documents and Settings\Administrator\Desktop\

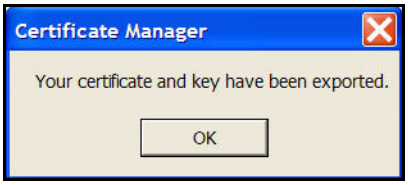
Password: **********

Confirm Password: **********

Figure 4-112.Export Certificate and Private Key Window

11. Click **Export**.

12. You should see the window shown in Figure 4-113.



Certificate Manager

Your certificate and key have been exported.

Figure 4-113.Certificate Manager Window

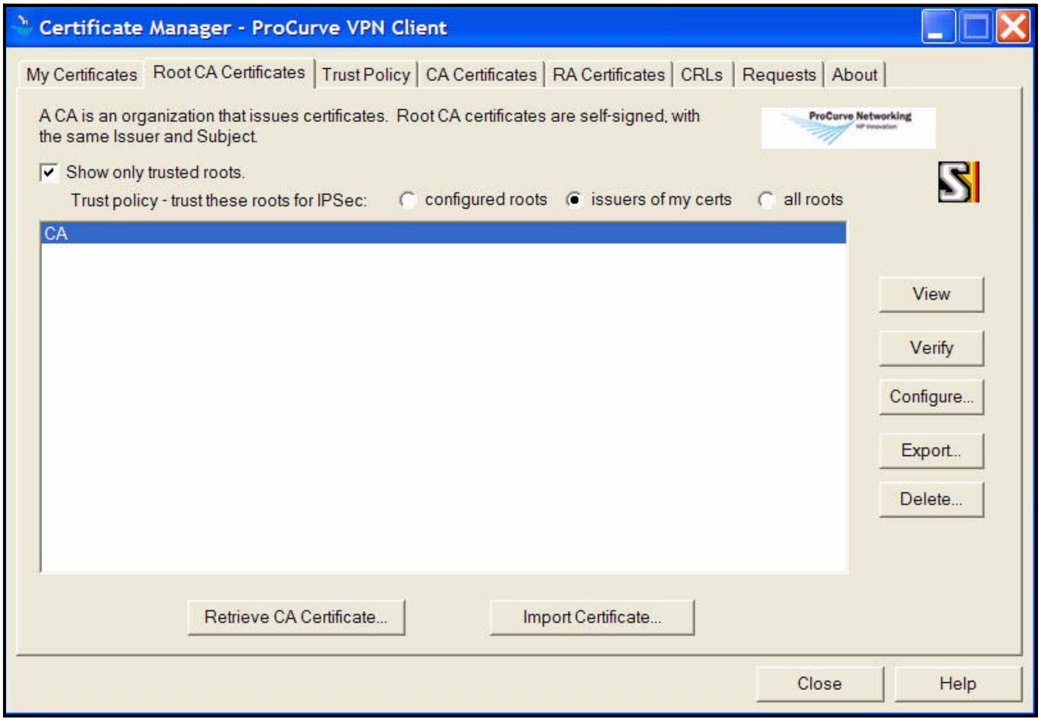
Export the CA Root Certificate. Follow these steps to export the certificate for the CA that signed the VPN client certificate:

1. In the **Start** menu, select **Programs** > **ProCurve VPN Client** > **Security Policy Editor**.

2. Click the **Root CA Certificates** tab.

3. Select the **Show only trusted roots** check box.

4. Click **issuers of my certs**.



Certificate Manager - ProCurve VPN Client

A CA is an organization that issues certificates. Root CA certificates are self-signed, with the same Issuer and Subject.

☑ Show only trusted roots.

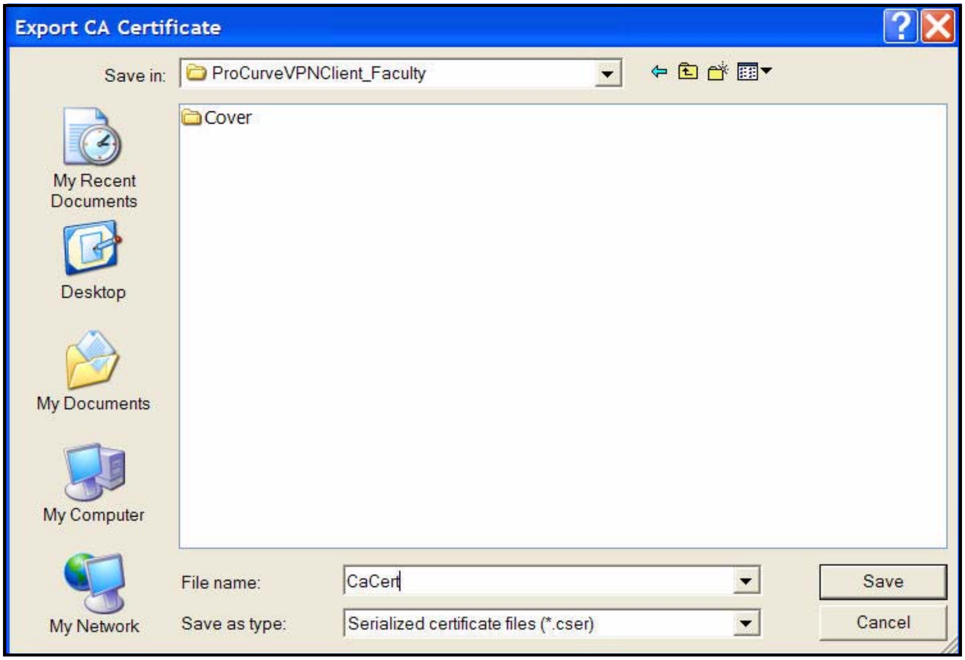
Trust policy - trust these roots for IPSec: ○ configured roots ● issuers of my certs ○ all roots

CA

Figure 4-114.Certificate Manager > Root CA Certificates Tab in the ProCurve VPN Client

5. Select the CA root certificate.
6. Click **Export**.
7. Navigate to the prepackaged installation directory.
8. For **File name**, type: **CaCert**.

   Use this exact filename to ensure that the certificate imports automatically when the user installs the ProCurve VPN Client.
9. For **Save as type**, leave the default: **Serialized certificate files (*.cser)**.

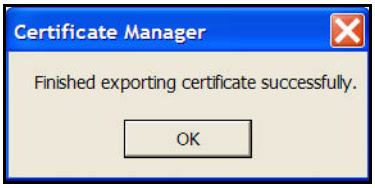


File name: CaCert

Save as type: Serialized certificate files (*.cser)

Figure 4-115.Export CA Certificate Window

10. Click **Save**.
11. You should see the window shown in Figure 4-113.



Finished exporting certificate successfully.

Figure 4-116.Certificate Manager Window

Distribute the Prepackaged Installations. You can distribute the prepackaged installation directories through a network directory, a CD, or a Web site.

Verbally inform users of the passwords that protect:

- Their policy
- Their VPN client certificate

And tell the users the name in their personal certificate so that they can choose the correct certificate in their **My Identity** settings.

Table 4-28 summarizes this information for PCU; you can fill in your settings in Table 4-29.

Table 4-28. PCU Prepackaged Installations

	PCU Faculty Member Installation	PCU Student Installation
Directory name	ProCurveVPNClient_Faculty	ProCurveVPNClient_Students
Policy password	ProCurve3	ProCurve4
VPN client certificate password	ProCurve3	ProCurve4
VPN client certificate name	professor	student

Table 4-29. My Prepackaged Installations

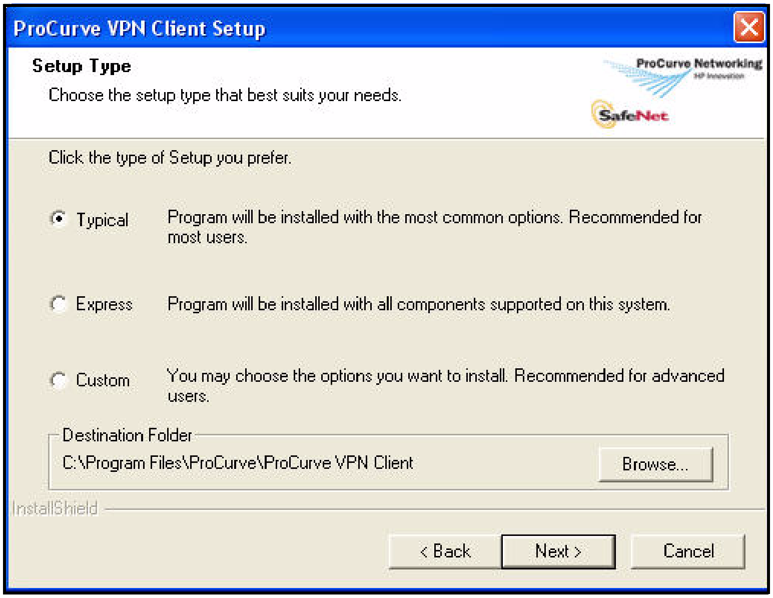
	Installation 1	Installation 2
Directory name		
Policy password		
VPN client certificate password		
VPN client certificate name		

Also distribute instructions such as the ones in the section below.

User Instructions: Install the ProCurve VPN Client and the Preconfigured Policy

To install the ProCurve VPN Client and import the policy, complete these simple steps:

1. Open the installation directory.
2. Double-click the extracted **Setup.exe** file. The **Welcome** page is displayed.
3. Click **Next**. The **License Agreement** page is displayed.
4. Click **Yes**. The **Setup Type** page is displayed.



ProCurve VPN Client Setup

Setup Type

Choose the setup type that best suits your needs.

Click the type of Setup you prefer.

● Typical — Program will be installed with the most common options. Recommended for most users.

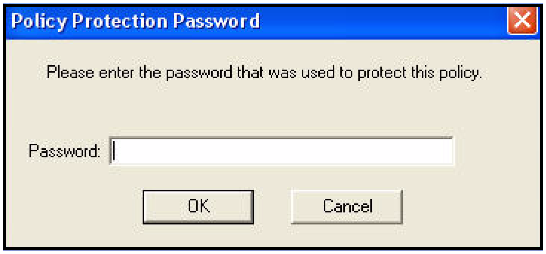
○ Express — Program will be installed with all components supported on this system.

○ Custom — You may choose the options you want to install. Recommended for advanced users.

Destination Folder: C:\Program Files\ProCurve\ProCurve VPN Client

Figure 4-117.Setup Type Page in the ProCurve VPN Client Setup Program

5. Select **Typical** and click **Next**. The **Start Copying Files** page is displayed.
6. Click **Next**. The installation process begins.
7. When the **Policy Protection Password** window is displayed, type the password that your network administrator told you for the policy.



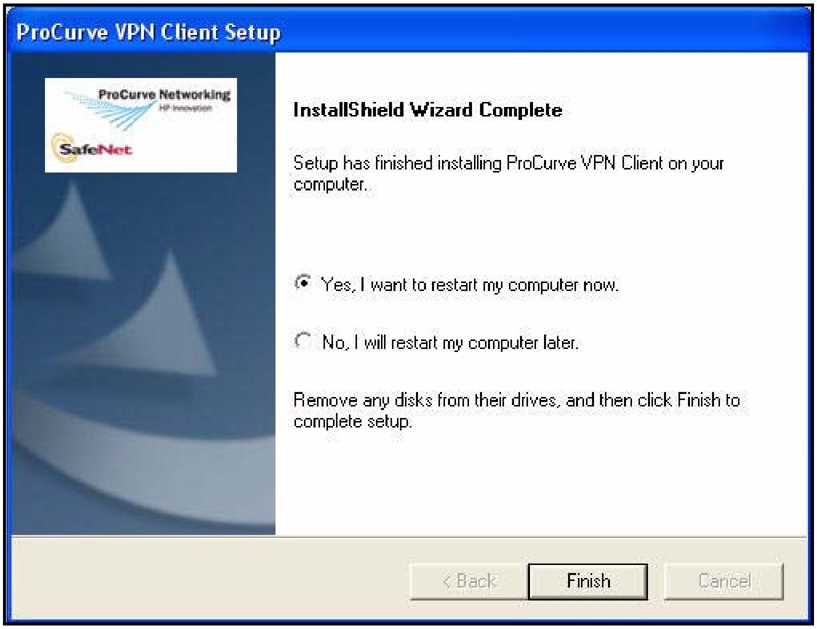
Policy Protection Password

Please enter the password that was used to protect this policy.

Password:

Figure 4-118.Policy Protection Password Window

8. Click **OK**.



ProCurve VPN Client Setup

InstallShield Wizard Complete

Setup has finished installing ProCurve VPN Client on your computer.

● Yes, I want to restart my computer now.

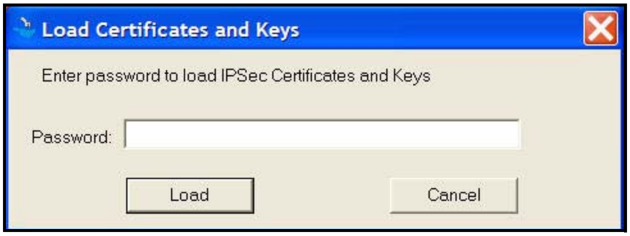
○ No, I will restart my computer later.

Remove any disks from their drives, and then click Finish to complete setup.

Figure 4-119.InstallShield Wizard Complete Page in the ProCurve VPN Client Setup Program

9. When the **InstallShield Wizard Complete** page is displayed, select **Yes, I want to restart my computer now** and click **Finish**.

10. After your computer restarts, you should see the **Load Certificates and Keys** window.



Load Certificates and Keys

Enter password to load IPSec Certificates and Keys

Password:

Figure 4-120.Load Certificates and Keys Window

11. For **Password**, type the password that you network administrator told you for the VPN client certificate password.

12. Click **Load**.

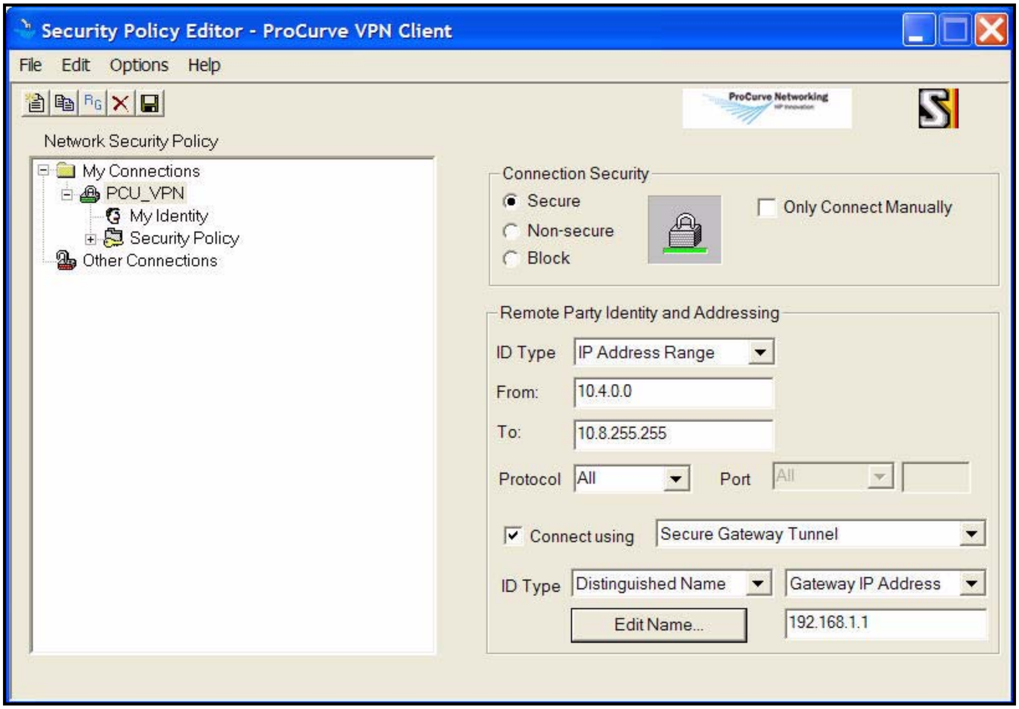
13. From the **Start** menu, select **Programs** > **ProCurve VPN Client** > **Security Policy Editor**.

    The notification area of the Windows taskbar now contains an icon for the ProCurve VPN Client. You can also right-click this icon and click **Security Policy Editor**.

14. You should see a connection listed under **My Connections** in the left pane. The connection should have a closed lock icon like the PCU_VPN connection in Figure 4-121.

    If you do not see this connection, the policy failed to import. See "Import the Policy Manually" on page 4-199.

15. Expand the connection.



Connection Security

- ● Secure
- ○ Non-secure
- ○ Block
- □ Only Connect Manually

Remote Party Identity and Addressing

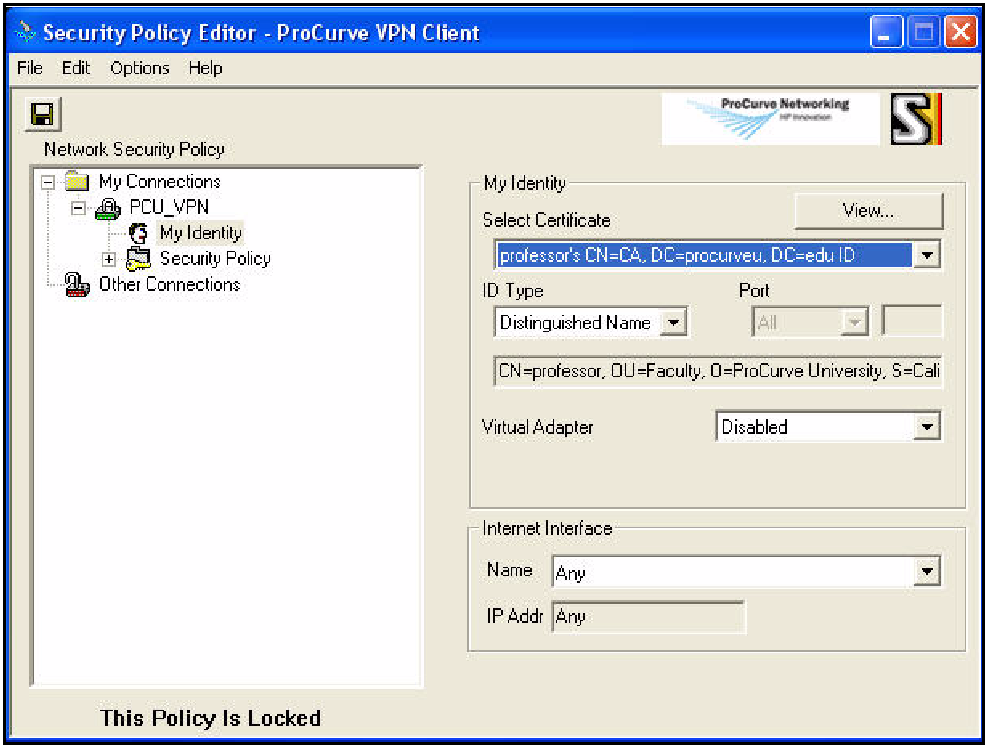
ID Type: IP Address Range
From: 10.4.0.0
To: 10.8.255.255
Protocol: All
Port: All
☑ Connect using: Secure Gateway Tunnel
ID Type: Distinguished Name; Gateway IP Address: 192.168.1.1

Figure 4-121.Security Policy Editor in the ProCurve VPN Client

16. Click **My Identity**. The right pane displays settings for your local ID, as shown in Figure 4-122.

17. From the **Selected Certificate** box, select the certificate that your network administrator informed you is yours (or that you obtained yourself).

If the certificate is not listed, you must manually import it. See “Manually Import Certificates” on page 4-201.



Select Certificate: professor's CN=CA, DC=procurveu, DC=edu ID

ID Type: Distinguished Name

Port: All

CN=professor, OU=Faculty, O=ProCurve University, S=Cali

Virtual Adapter: Disabled

Name: Any

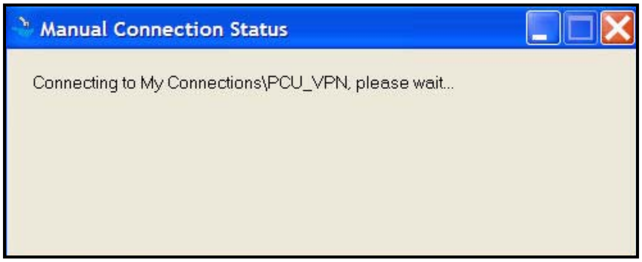
IP Addr: Any

Figure 4-122.Security Policy Editor > My Identity Window in the ProCurve VPN Client

18. Select **File** > **Save**.

When you want to establish the VPN connection, follow these steps:

1. Right-click the ProCurve VPN Client icon in the right of the Windows taskbar.
2. Select **Connect** > **MyConnections\<*connection name*>**.

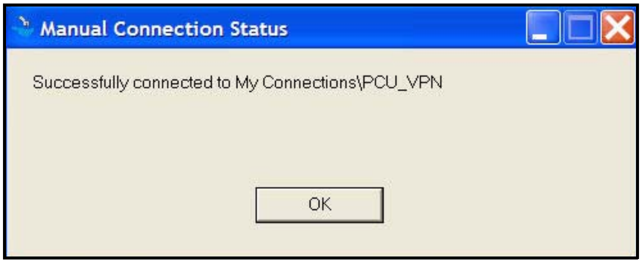


Connecting to My Connections\PCU_VPN, please wait...

Figure 4-123.Manual Connection Status Window in the ProCurve VPN Client

3. Wait while the VPN tunnel is established. After a minute or two, you should see the window shown in Figure 4-124.

   You have successfully connected.



Successfully connected to My Connections\PCU_VPN

Figure 4-124.Manual Connection Status Window in the ProCurve VPN Client—Success

If you do not see this window, contact your network administrator for help.

Import the Policy Manually

If the policy failed to import when you installed the ProCurve VPN Client, follow these steps:

1. Open the Security Policy Editor (from the **Start** menu, select **Programs** > **ProCurve VPN Client** > **Security Policy Editor**).
2. Select **File** > **Import Security Policy**. The **Import Policy From** window is displayed.
3. Navigate to the prepackaged installation folder.

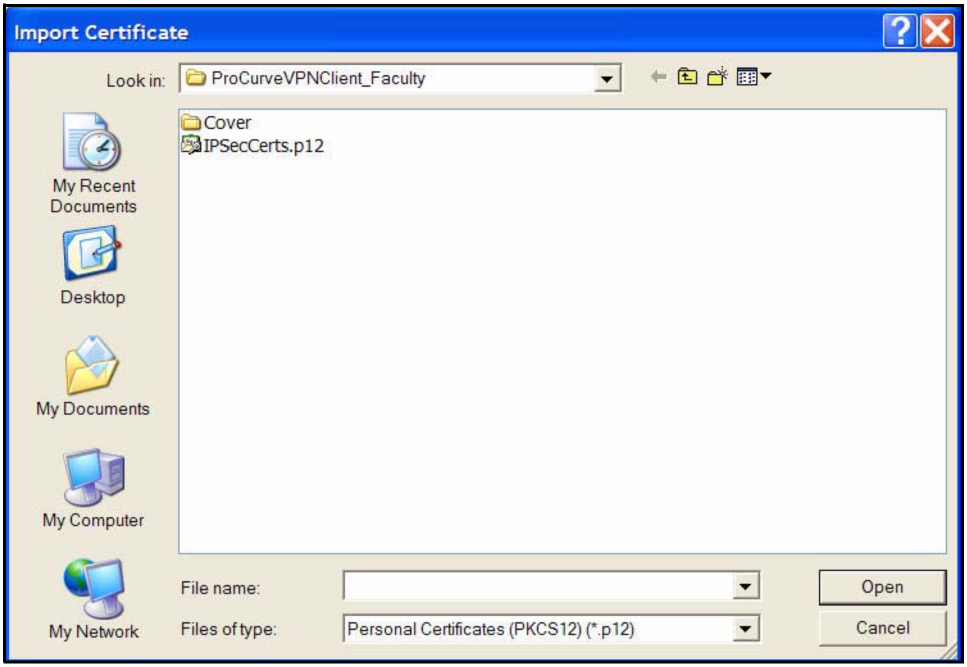
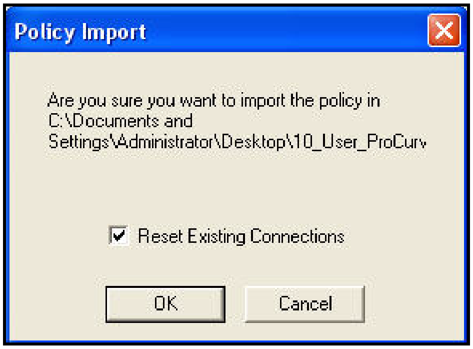


Figure 4-125.Import Certificate Window

4. Locate and select the **IPSecPolicy.spd** file and then click **Open**. The **Policy Import** window is displayed.

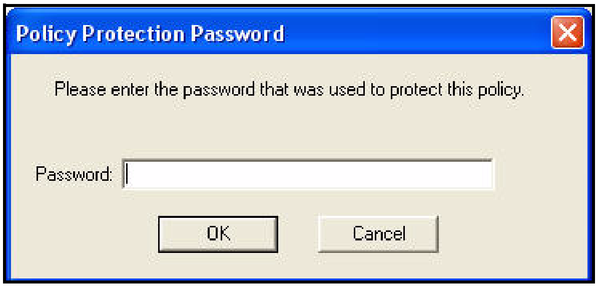


Are you sure you want to import the policy in
C:\Documents and
Settings\Administrator\Desktop\10_User_ProCurv

☑ Reset Existing Connections

Figure 4-126.Policy Import Window in the ProCurve VPN Client

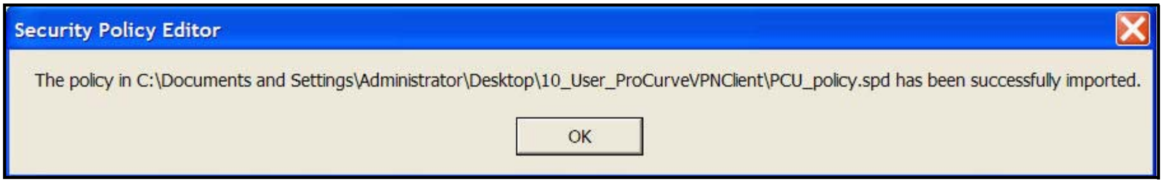
5. Click **OK** to verify that you want to import the policy.
6. If the **Policy Protection Password** window is displayed, type the password that your network administrator gave you for the policy.



Policy Protection Password
Please enter the password that was used to protect this policy.
Password:
OK
Cancel

Figure 4-127.Policy Protection Password Window

7. A confirmation message is displayed, telling you the security policy was imported successfully. Click **OK**.



The policy in C:\Documents and Settings\Administrator\Desktop\10_User_ProCurveVPNClient\PCU_policy.spd has been successfully imported.

Figure 4-128.Security Policy Editor Message

Manually Import Certificates

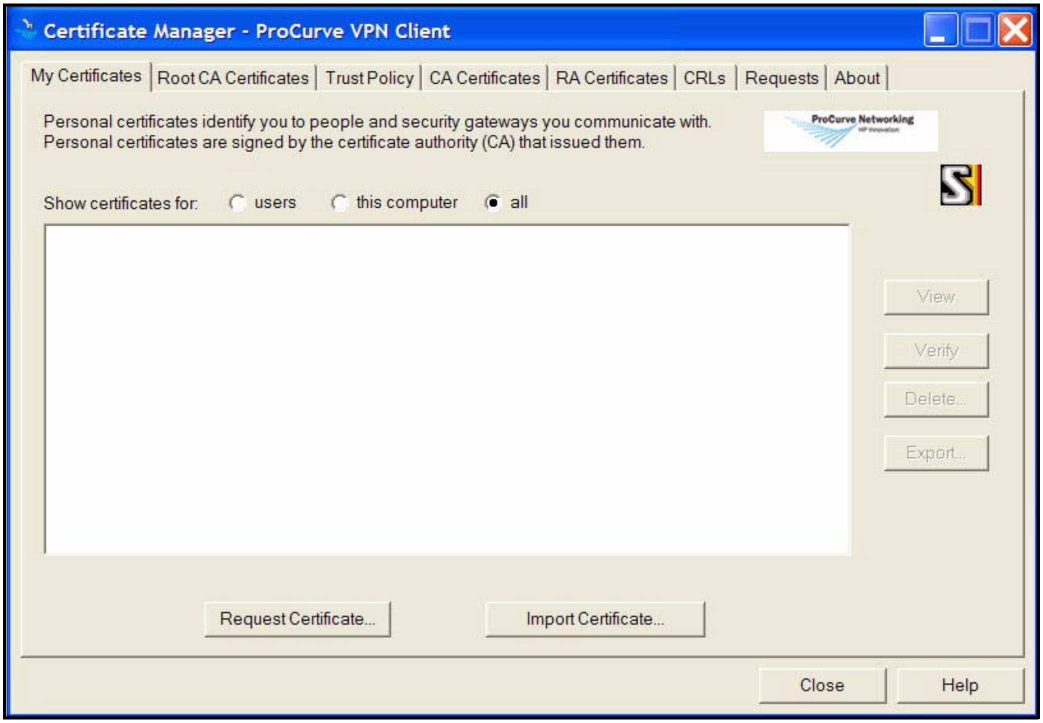
Your VPN client requires two certificates:

- A CA certificate
- A personal certificate for your client

These certificates should be saved in your prepackaged installation directory. The CA certificate probably has an extension such as **.cser** or **.cer**. The personal certificate probably has an extension such as **.cer**, **.der**, or **.p12**.

Follow these steps to import the certificates:

1. From the Windows **Start** menu, select **Programs** > **ProCurve VPN Client > Certificate Manager.**
2. Click the **My Certificates** tab.



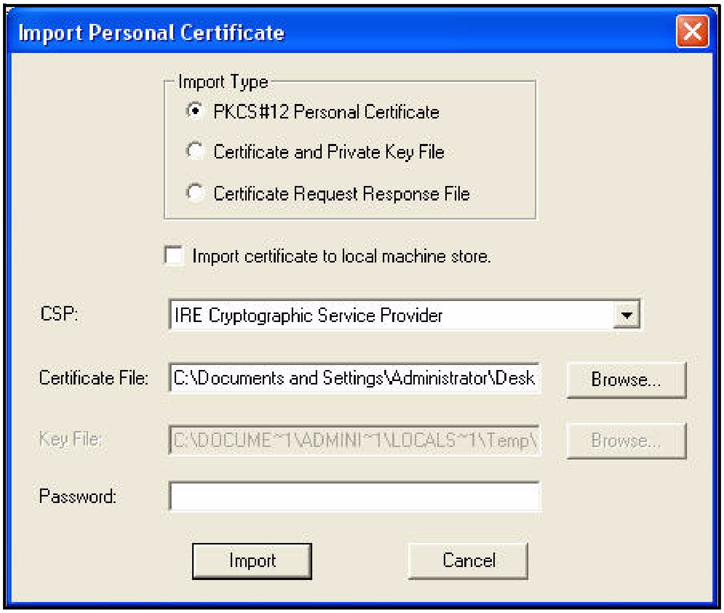
Certificate Manager - ProCurve VPN Client

Personal certificates identify you to people and security gateways you communicate with.
Personal certificates are signed by the certificate authority (CA) that issued them.

Show certificates for: ○ users ○ this computer ● all

Figure 4-129.Certificate Manager > My Certificates Tab in the ProCurve VPN Client

3. Click **Import Certificate**.



Import Personal Certificate

Import Type

● PKCS#12 Personal Certificate

○ Certificate and Private Key File

○ Certificate Request Response File

□ Import certificate to local machine store.

CSP: IRE Cryptographic Service Provider

Certificate File: C:\Documents and Settings\Administrator\Desk

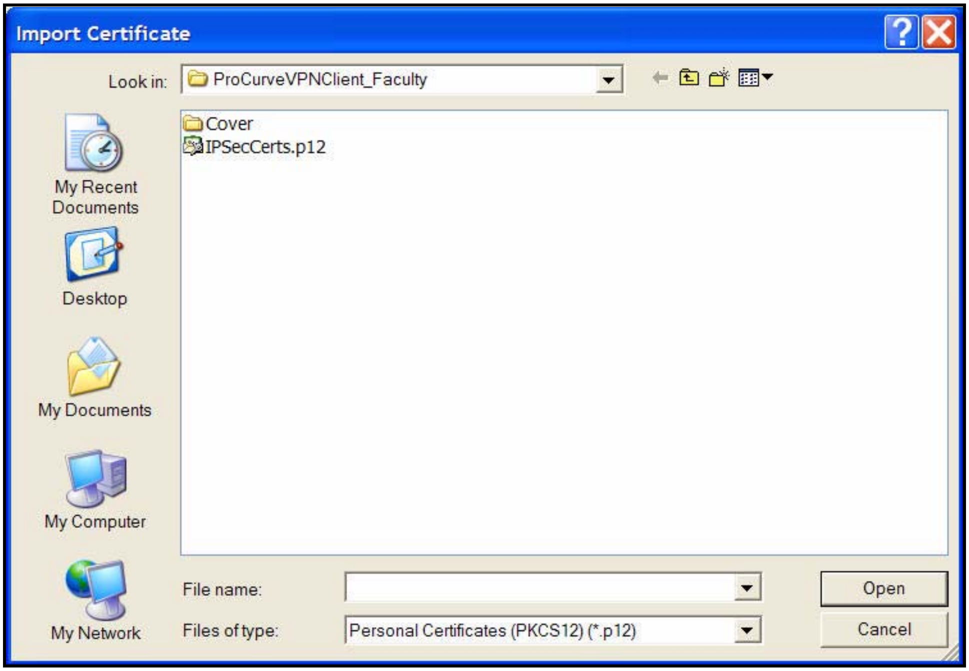
Key File: C:\DOCUME~1\ADMINI~1\LOCALS~1\Temp\

Password:

Figure 4-130.Import Personal Certificate Window in the ProCurve VPN Client

4. For **Import Type**, leave **PKCS#12 Personal Certificate**.

5. For **Certificate File**, click **Browse** to search for the file.



Import Certificate

Look in: ProCurveVPNClient_Faculty

Cover
IPSecCerts.p12

File name:

Files of type: Personal Certificates (PKCS12) (*.p12)

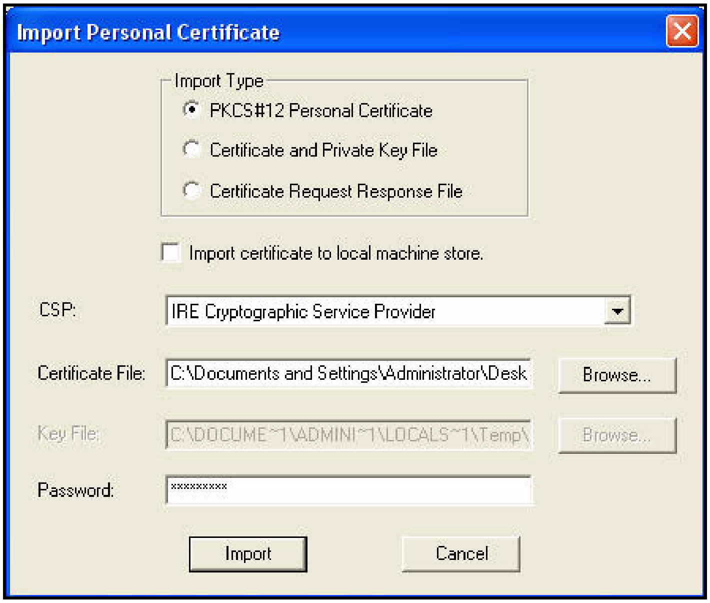
Figure 4-131.Import Certificate Window

6. Navigate to your prepackaged installation directory. Or, if you obtained your own certificate, navigate to the directory to which you saved it.

7. Select the certificate file. If you do not see the file in the window that is displayed, try selecting **All Files** from the **Files of type** box.

8. Click **Open**.

9. If necessary, in the **Import Personal Certificate** window, in the **Password** box, type the password that your network administrator gave you for the VPN client certificate.



Import Personal Certificate

Import Type
● PKCS#12 Personal Certificate
○ Certificate and Private Key File
○ Certificate Request Response File

□ Import certificate to local machine store.

CSP: IRE Cryptographic Service Provider

Certificate File: C:\Documents and Settings\Administrator\Desk

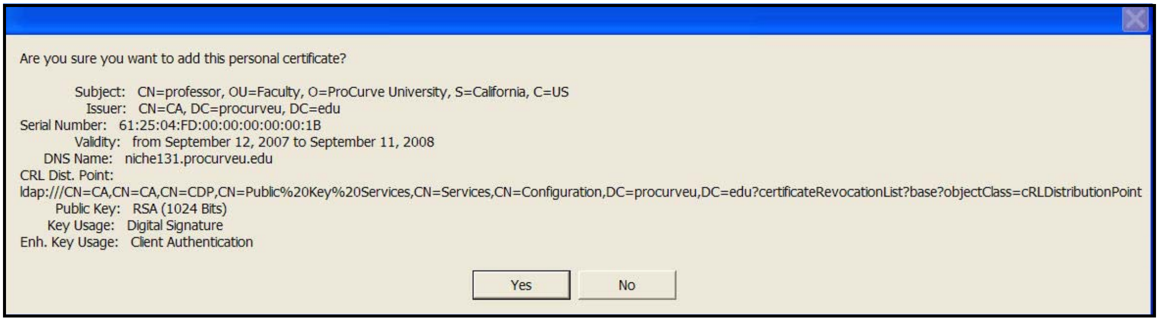
Key File: C:\DOCUME~1\ADMINI~1\LOCALS~1\Temp\

Password: *********

Figure 4-132.Import Personal Certificate Window in the ProCurve VPN Client

10. Click **Import**.

11. A window is displayed that asks you to confirm the installation of the certificate. Click **Yes**.



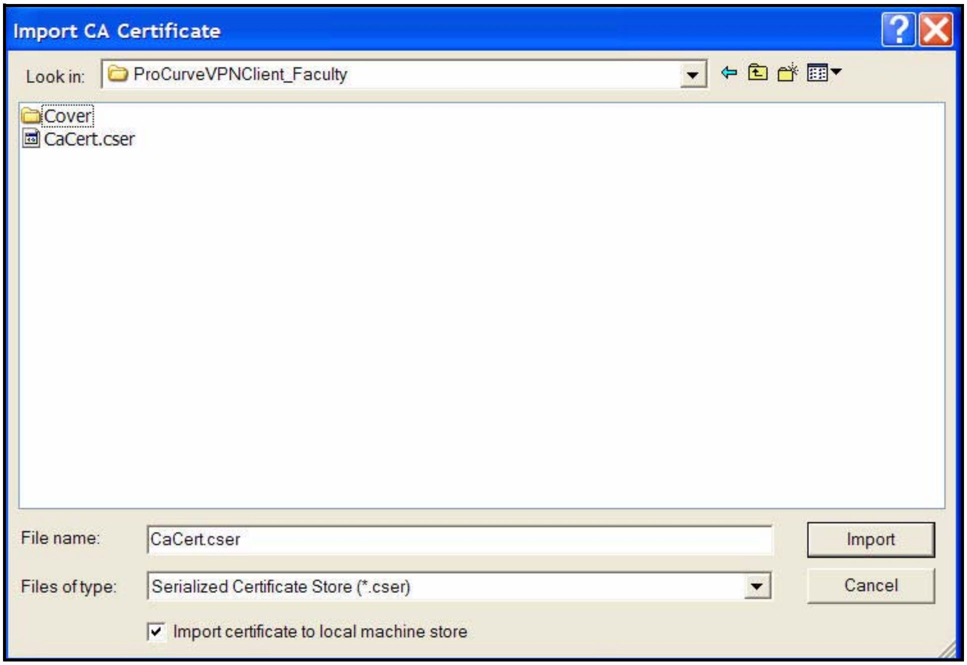
Are you sure you want to add this personal certificate?

```
        Subject:   CN=professor, OU=Faculty, O=ProCurve University, S=California, C=US
         Issuer:   CN=CA, DC=procurveu, DC=edu
Serial Number:   61:25:04:FD:00:00:00:00:00:1B
        Validity:   from September 12, 2007 to September 11, 2008
    DNS Name:   niche131.procurveu.edu
CRL Dist. Point:
ldap:///CN=CA,CN=CA,CN=CDP,CN=Public%20Key%20Services,CN=Services,CN=Configuration,DC=procurveu,DC=edu?certificateRevocationList?base?objectClass=cRLDistributionPoint
      Public Key:   RSA (1024 Bits)
     Key Usage:   Digital Signature
Enh. Key Usage:   Client Authentication
```

Figure 4-133.Verify Import Personal Certificate in the ProCurve VPN Client

12. In the Certificate Manager, click the **CA Root Certificates** tab.

13. Click **Import**.



Import CA Certificate

Look in: ProCurveVPNClient_Faculty

Cover
CaCert.cser

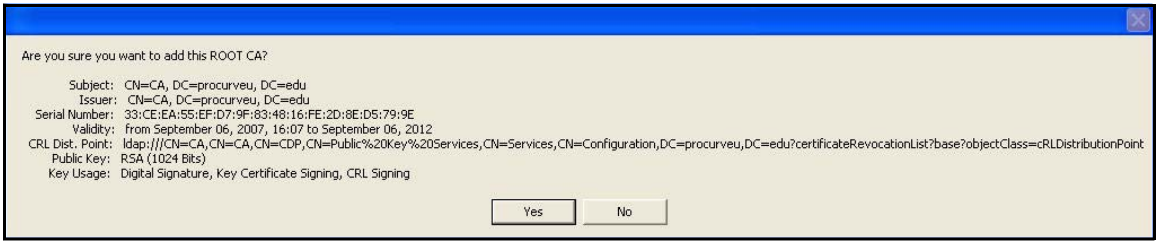
File name: CaCert.cser

Files of type: Serialized Certificate Store (*.cser)

☑ Import certificate to local machine store

Figure 4-134.Import CA Certificate

14. Navigate to the prepackaged installation directory, and select the CA certificate. If you do not see the file in the window that is displayed, try selecting **All Files** from the **Files of type** box.
15. Click **Import**.



```
Are you sure you want to add this ROOT CA?

        Subject:  CN=CA, DC=procurveu, DC=edu
         Issuer:  CN=CA, DC=procurveu, DC=edu
  Serial Number:  33:CE:EA:55:EF:D7:9F:83:48:16:FE:2D:8E:D5:79:9E
       Validity:  from September 06, 2007, 16:07 to September 06, 2012
CRL Dist. Point:  ldap:///CN=CA,CN=CA,CN=CDP,CN=Public%20Key%20Services,CN=Services,CN=Configuration,DC=procurveu,DC=edu?certificateRevocationList?base?objectClass=cRLDistributionPoint
     Public Key:  RSA (1024 Bits)
      Key Usage:  Digital Signature, Key Certificate Signing, CRL Signing
```

Figure 4-135.Verify Import CA Certificate in the ProCurve VPN Client

16. When the window shown in Figure 4-135 is displayed, click **Yes**.
17. When asked if you want to trust the CA, click **Yes**.

5

Using the NAC 800 in a RADIUS-Only Configuration

Contents

Introduction

This chapter explains how to implement an access control solution for an existing wired network, which uses a directory service to control access to data and applications. Specifically, this chapter explains how to set up 802.1X as the predominant access control method for wired access with MAC authentication (MAC-Auth) enforced for devices that do not support 802.1X.

In addition, this chapter explains how to set up Wireless LANs (WLANs), which provide wireless services for different types of users. Accordingly, there are several WLANs, and different access control methods are enforced for each one:

- 802.1X with Wi-Fi Protected Access (WPA)/WPA2
- Web authentication (Web-Auth) without encryption for the wireless transmissions
- Web authentication (Web-Auth) with WPA preshared key (WPA-PSK) encryption

This access control solution does not enforce endpoint integrity.

This chapter provides detailed instructions for setting up this network access control solution. To help you, the instructions include examples, which have been designed for a hypothetical organization—the Medical Center associated with ProCurve University.

Currently, the Medical Center is using Open Lightweight Directory Access Protocol (OpenLDAP) to secure access to data and applications on the network (although the Medical Center could just as easily be using Novell eDirectory or Microsoft Active Directory). The IT staff has been asked to implement a wireless network, which provides wireless access for employees as well as patients. In addition, the IT staff must accommodate “headless” devices such as Voice-over-IP (VoIP) phones and printers. (“Headless” refers to devices that do not have a user interface.)

As part of this effort, the IT staff has evaluated network security overall and has conducted a needs assessment. (For more information about such an assessment, see the *ProCurve Access Control Security Design Guide*.) From this assessment, the IT staff has recommended that the Medical Center strengthen network security by implementing:

- Access controls at the network edge when users attempt to access the network
- Endpoint integrity

However, the Medical Center administration is concerned about the impact of implementing both security measures at the same time. The Medical Center administrators want to implement network access controls first and then impose endpoint integrity checking in six months.

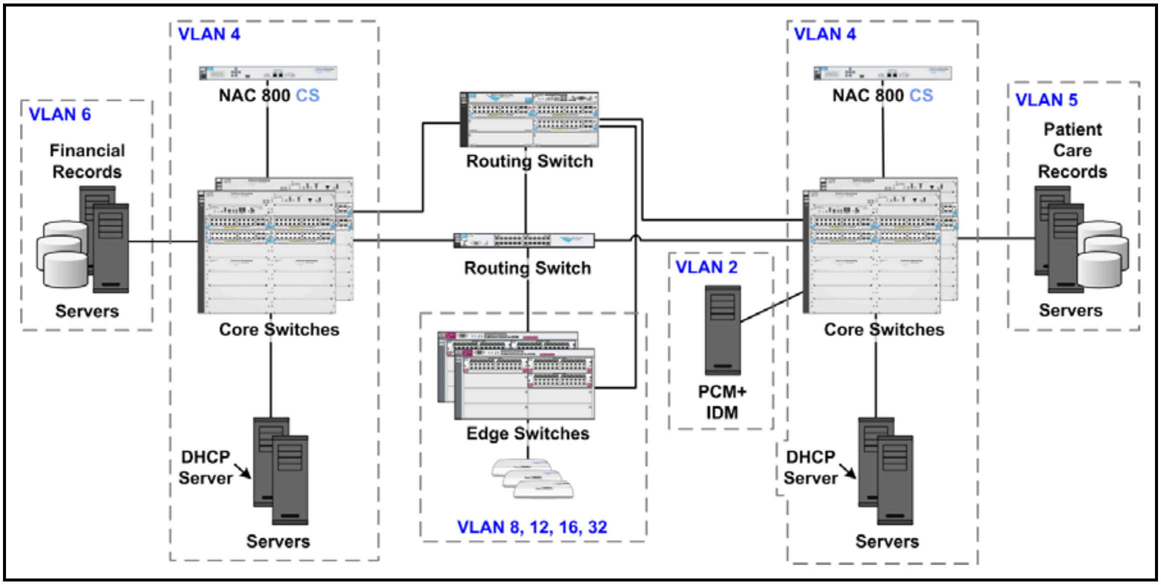


Figure 5-1. Sample Network for the Medical Center

Configuring This Access Control Solution

In this chapter, you will learn how to configure, from beginning to end, the components that provide the access control solution for the Medical Center network:

- ProCurve Network Access Controller (NAC) 800s, which provide RADIUS services
- ProCurve Identity Driven Manager (IDM), which is a a plug-in for ProCurve Manager Plus (PCM+)
- ProCurve Wireless Edge Services Module, which controls multiple coordinated (or lightweight) Access Points (APs) referred to as radio ports (RPs)
- OpenLDAP, which is an LDAPv3 open source directory
- 802.1X supplicants, which enable users to log in to an 802.1X-enabled network
- Concurrent MAC-Auth and 802.1X access

In addition, this chapter provides the startup-configs for:

- Routing switch
- Server switch
- Edge Switches

Although your network environment is not identical to the Medical Center network, the instructions should help you understand the processes involved so that you can then modify the instructions as needed for your organization's unique environment.

Example—the Existing Network Environment

As discussed in the *ProCurve Access Control Security Design Guide*, you must thoroughly understand your network environment before you begin to implement an access control solution. When you conduct a needs assessment, one of the first things you will try to discover is the users and the groups who need to access the network.

For example, the Medical Center network serves the following groups:

- Network administrators
- Doctors and nurses
- Staff (except the Accounting department)
- Accounting department
- Patients

Depending on the size of your organization, you may have many more groups.

VLANs

The Medical Center network is divided into virtual LANs (VLANs) that allow users to access the resources they require. Table 5-1 shows one approach to designing the VLANs.

Table 5-1. VLANs

Name	ID	Subnet
Network management and network administrators	2	10.2.0.0/16
Servers (OpenLDAP, DHCP, DNS, email, Web, scheduling database) Printers and VoIP phones	4	10.4.0.0/16
Patient care servers (patient care records and related user applications)	5	10.5.0.0/16
Accounting servers (financial and insurance records)	6	10.6.0.0/16
Medical (doctors and nurses)	8	10.8.0.0/16
Staff (except Accounting)	12	10.12.0.0/16
Accounting	16	10.16.0.0/16
Patients	32	10.32.0.0/16
Radio Port VLAN for the RPs	2100	N/A

As you can see, the VLANs divide into these general categories:

- **Management VLAN**—for infrastructure devices and the network administrators that manage them
- **Server VLANs**—for servers

  In this example, servers are placed in different VLANs according to which users need to access them. All users need to be able to access the servers in VLAN 4. These include the OpenLDAP, DHCP, DNS, email, Web, and directory servers. VLAN 5 houses the servers that hold patient care information and the related applications. Only the doctors, nurses, and other patient care staff should be able to access these servers. Finally, only the Accounting department should be able to reach billing and patients' insurance information stored on the servers in VLAN 6.
- **User VLANs**—one for each user group

  You could create VLANs for users according to when and how they connect to the network. In this example, however, a particular user always receives the same VLAN assignment, and IDM is used to grant users various resources under various conditions.

You can use Table 5-2 to record VLANs used in your network.

Table 5-2. VLANs for Your Network

Name	ID	Subnet

The Medical Center uses the addressing scheme outlined in Table 5-3. You can use the rows provided to record the IP addresses used in your network. Then, you can insert your IP addresses in the steps provided in this chapter.

Table 5-3. Example IP Addresses

Device	IP Address	VLAN ID	Your Network IP Addresses	Your VLAN ID
OpenLDAP server	10.2.1.10	2		
DNS servers	10.4.4.15 10.4.5.15	4		
DHCP server	10.4.7.20	4		
Hospital Web server	10.4.6.30	4		
Email server	10.4.6.40	4		
Medical history database	10.5.1.45	5		
Medical dictionary and diagnosis database	10.5.2.55	4		
Insurance records	10.6.2.50	6		
Billing database	10.6.2.60	6		
PCM+/IDM server	10.2.0.50	2		
Routing switch (3500yl Switch)	• 10.2.0.1 • 10.4.0.1 • 10.5.0.1 • 10.6.0.1 • 10.8.0.1 • 10.12.0.1 • 10.16.0.1 • 10.32.0.1	• 2 • 4 • 5 • 6 • 8 • 12 • 16 • 32		
Edge switch (5300zl Switch)	• 10.2.0.3 • 10.4.0.2 • 10.5.0.1 • 10.6.0.1 • 10.8.0.2 • 10.12.0.2 • 10.16.0.2	• 2 • 4 • 5 • 6 • 8 • 12 • 16		
Switch A (5400zl Switch)	10.2.0.5	• 2 • 4		
Wireless Edge Services Module	10.2.0.99	2		
NAC 800 CS A	10.4.7.50	4		
NAC 800 CS B	10.4.6.50	4		

DHCP and DNS Services

You must have a functioning DHCP server and DNS server, properly configured for your network environment. For the example Medical Center network, the network administrators have configured the DHCP scopes listed in Table 5-4.

Table 5-4. DHCP Scopes

Scope	VLAN	Subnet	Range	Default Gateway	DNS Server	Other Options
Management	2	10.2.0.0/16	10.2.16.0- 10.2.16.255	10.2.0.1 10.2.0.2	10.4.4.15 10.4.8.15	domain name= medcenter.com
Medical (doctors and nurses)	8	10.8.0.0/16	10.8.16.0- 10.8.19.254	10.8.0.1 10.8.0.2	10.4.4.15 10.4.8.15	domain name= medcenter.com
Staff (except Accounting)	12	10.12.0.0/16	10.12.16.0- 10.12.19.254	10.12.0.1 10.12.0.2	10.4.4.15 10.4.8.15	domain name= medcenter.com
Accounting	16	10.16.0.0/16	10.16.16.0- 10.16.19.254	10.16.0.1 10.16.0.2	10.4.4.15 10.4.8.15	domain name= medcenter.com
Patients	32	10.32.0.0/16	10.32.16.0- 10.32.29.254	10.32.0.1 10.32.0.2	10.4.4.15 10.4.8.15	domain name= medcenter.com

In addition, the network administrators have configured their DNS servers with the following reverse lookup zones:

- 10.2.0.0/16
- 10.4.0.0/16
- 10.5.0.0/16
- 10.6.0.0/16
- 10.8.0.0/16
- 10.12.0.0/16
- 10.16.0.0/16
- 10.32.0.0/16

Switches

This section provides example configurations for:

- A routing switch, which connects only to other switches.
- A server switch, which connects to VLAN 4, 5, and 6 servers. Its uplink ports are A1 and B1.
- An edge switch, which connects to endpoints. Its uplink ports are A1 and B1. The edge switch is also a wireless services-enabled switch.

Refer to the following sample configurations as you set up your network. If you need step-by-step instructions, you should consult the documentation for your switch.

You can configure all of the settings manually, or you can create a minimal configuration (with IP, SNMP, and VLAN settings) and then use PCM+ to configure other settings.

Note

In the startup-configsshown below, ports that connectto users' endpointsare not tagged for user VLANs because the users will receive dynamic VLAN assignments through IDM.The ports that connect to printers and VoIP phones are untagged members of VLAN 4.

Concurrent Access Methods on the Same Port

This section provides example configurations for ProCurve switches in a network that implements:

- 802.1X port authentication for the majority of endpoints
- MAC-Auth for some endpoints

On the example network, some ports require concurrent MAC-Auth and 802.1X authentication because the network includes headless devices, such as printers and VoIP phones, which don't support 802.1X, and the Medical Center network administrators do not want to track which ports connect to these devices and which connect to users' workstations. In addition, users might unplug their phone and workstation and reconnect them to different ports. The Medical Center network administrators do not want to receive support calls when users cannot access the network because they inadvertently plugged their workstation into a port that is enabled for MAC-Auth, rather than 802.1X. By enabling both, the Medical Center network administrators will allow the ports to apply MAC-Auth for devices and 802.1X for users.

There are other reasons for enabling MAC-Auth and 802.1X concurrently on the same port. For example, your organization might want to use PXE imaging to re-image workstations. For this scenario, you would want a user's workstation to authenticate first via MAC-Auth and boot to a PXE server, receive an image, and reboot with the new OS. You would then want the user to authenticate through 802.1X.

You might also want to enable both MAC-Auth and 802.1X on the same port so that you can authenticate new workstations via MAC-Auth and allow them to access the Windows domain controller. Or, VoIP and users might connect their VoIP phone and workstation to the same switch port. The VoIP phones must be authenticated through MAC-Auth, and the users must be authenticated through 802.1X.

In some environments, you might want to enable Web-Auth and 802.1X on the same port instead. (MAC-Auth and Web-Auth are mutually exclusive. You cannot enable them both on the same port.) For example, you might want to allow guests to access the network on ports that are typically used by employees who are authenticated through 802.1X. You might also choose this configuration if you have some endpoints that do not support 802.1X. For these endpoints, you want users to authenticate using Web-Auth. However, you do not want to track which ports connect to these endpoints, so you decide to enable both Web-Auth and 802.1X on your ports.

To set up concurrent access methods on the same port, you must configure the switch to use 802.1X in user-based mode, rather than port-based mode.

In user-based mode, the port supports multiple authenticated clients. The number of authenticated clients supported per port varies, depending on the switch. For example, the 3500yl, 5400zl, and 6200yl Switches support up to 32 authenticated clients per port with user-based mode.

Requiring each of the multiple users or endpoints to authenticate before being granted access strengthens security. At the same time, access to unauthenticated users and endpoints is denied.

Port-based authentication, on the other hand, allows a single client to open the port. However, it does not limit the clients that can subsequently access the network through that port. Once a single client authenticates, any additional clients that access the network through that port are not required to authenticate; the additional clients simply use the login credentials of the authenticated user. Consequently, port-based mode is used for switch-to-switch links.

When combined with MAC-Auth or Web-Auth, 802.1X in port-based mode is subordinate. If 802.1X operates in port-based mode and MAC-Auth or Web-Auth is enabled on the sameport, the endpoint must successfully authenticate through MAC-Auth or Web-Auth *before* the user can authenticate through 802.1X. As usual with port-based authentication, only one client must complete 802.1X authentication. However, *each* client must authenticate through Web-Auth or MAC-Auth.

In summary, you should configure 802.1X in user-based mode, and combine it with MAC-Auth (or Web-Auth), when you want a switch port to enforce *either* of the authentication methods on *each* client.

To configure the switch to use 802.1X in user-based mode, complete the following steps:

1. Enable 802.1X on the selected ports. From the global configuration mode context, type:

Syntax: aaa port-access authenticator <port-list>

Enables the specified ports to operate as 802.1X authenticators. 802.1X functions in port-based mode. (You must complete step 2 to change it to user-based mode.)

Replace ***<port list>*** *with the ports on which you want to enforce 802.1X in user-based mode.*

---

2. Configure 802.1X user-based authentication for those ports.:

Syntax: aaa port-access authenticator <port-list> client-limit <1–32>

Configures the specified ports to use 802.1X in user-based mode.

Replace ***<port list>*** *with the ports on which you want to enforce 802.1X in user-based mode.*

Replace ***<1–32>*** *with the number of client sessions you want to allow on the specified ports.*

If a port currently has no authenticated client sessions, the next authenticated client session the port accepts determines the untagged VLAN membership to which the port is assigned during the session. If another client session begins later on the same port while an earlier session is active, the later session will be on the same untagged VLAN membership as the earlier session.

---

3. Configure the 802.1X authentication method.

Syntax: aaa authentication port-access <local | eap-radius | chap-radius>

Determines the type of RADIUS authentication to use.

Include the appropriate option for the type of authentication you want to use—local, EAP RADIUS, or CHAP-RADIUS (MD5).

4. Specify the RADIUS host.

Syntax: radius host <ip-address> [key <*key-strin*g>]

Specifies the RADIUS server that the switch should contact to verify login credentials.

Include the **key** *option and replace* ***<key-string>*** *with the shared key if it is required for the RADIUS server.*

5. Enable 802.1X authentication on the switch.

Syntax: aaa port-access authenticator active

Enables 802.1X authentication on the specified ports.

After you configure 802.1X in user-based mode, you can configure MAC-Auth as shown in “Edge Switch Startup-Configs” on page 5-18.

Routing Switch Startup-Config

```
; J8692A Configuration Editor; Created on release #K.12.XX

hostname “Routing_Switch”
module 1 type J86xxA
ip routing
snmp-server community "procurvero" Operator
snmp-server community "procurverw" Manager Unrestricted
snmp-server host 10.2.0.50 "public"
vlan 1
   name "DEFAULT_VLAN"
   no untagged 1-20
   no ip address
   exit
```

```
vlan 2
   name "Management"
   untagged 1-20
   ip helper-address 10.4.7.20
   ip address 10.2.0.1 255.255.0.0
   exit
vlan 4
   name "Servers"
   ip address 10.4.0.1 255.255.0.0
   tagged 11-20
   exit
vlan 5
   name "PatientServers"
   ip address 10.5.0.1 255.255.0.0
   tagged 11-20
   exit
vlan 6
   name "AcctgServers”
   ip address 10.6.0.1 255.255.0.0
   tagged 11-20
   exit
vlan 8
   name "Medical"
   ip helper-address 10.4.7.20
   ip address 10.8.0.1 255.255.0.0
   tagged 1-10
   exit
vlan 12
   name "Staff"
   ip helper-address 10.4.7.20
   ip address 10.12.0.1 255.255.0.0
   tagged 1-10
   exit
vlan 16
   name "Accounting"
   ip helper-address 10.4.7.20
   ip address 10.16.0.1 255.255.0.0
   tagged 1-10
   exit
```

```
vlan 32
   name "Patients"
   ip helper-address 10.4.7.20
   ip address 10.32.0.1 255.255.0.0
   tagged 1-10
   exit
vlan 2100
   name "RPs"
   tagged 1-20
   no ip address
   exit
ip authorized-managers 10.2.0.0 255.255.0.0
ip authorized-managers 10.4.7.50 255.255.255.255
ip authorized-managers 10.4.6.50 255.255.255.255
ip dns domain-name "MedCenter.com"
ip dns server-address 10.4.4.15
ip dns server-address 10.4.8.15
aaa authentication port-access eap-radius
radius-server host 10.4.7.50 key procurvea
radius-server host 10.4.6.50 key procurveb
aaa port-access authenticator 1-10 //These ports connect
to edge switches//
aaa port-access authenticator active //Do not enter this
command until you have completed setting up the entire
solution//
password manager
password operator
```

Server Switch Startup-Config

```
; J8697A Configuration Editor; Created on release #K.12.XX

hostname "Server_Switch"
web-management management-url ""
module 1 type J8702A
module 2 type J8702A
module 3 type J8702A
ip default-gateway 10.2.0.1
snmp-server community "procurvero" Operator
snmp-server community "procurverw" Manager Unrestricted
snmp-server host 10.2.0.50 "public"
vlan 1
   name "DEFAULT_VLAN"
   no untagged A1-A24,B1-B24
   no ip address
   exit
vlan 2100
   name "RPs"
   tagged A1,B1
   no ip address
   exit
vlan 2
   name "Management"
   untagged A1,B1
   ip address 10.2.0.3 255.255.0.0
   exit
vlan 4
   name "Servers"
   untagged B2-B24,C1-C24 //Ports for DNS, DHCP, email,
and OpenLDAP servers//
   tagged A1,B1
   no ip address
   exit
vlan 5
   name "PatientServers"
   untagged A2-A12
   tagged A1,B1
   no ip address
   exit
vlan 6
   name "AcctgServers"
   untagged A12-A24
   tagged A1,B1
   no ip address
   exit
ip authorized-managers 10.2.0.0 255.255.0.0
ip authorized-managers 10.4.7.50 255.255.255.255
ip authorized-managers 10.4.6.50 255.255.255.255
ip dns domain-name "MedCenter.com"
ip dns server-address 10.4.4.15
ip dns server-address 10.4.8.15
aaa authentication port-access eap-radius
radius-server host 10.4.7.50 key procurvea
radius-server host 10.4.6.50 key procurveb
aaa port-access mac-based C10-C20 //Ports for printers
and other headless devices//
password manager
password operator
```

Edge Switch Startup-Configs

Depending on the size of your network, you may have many edge switches. This section provides a sample configuration of an edge switch that houses the Wireless Edge Services Module. To improve readability, however, the encrypted Wireless Edge Services Module commands have been omitted.

```
; J8697A Configuration Editor; Created on release #K.12.XX

hostname "Wireless Switch"
module 1 type J8702A
module 2 type J8702A
module 3 type J9051A
web-management management-url ""
ip default-gateway 10.2.0.1
snmp-server community "procurvero" Operator
snmp-server community "procurverw" Manager Unrestricted
snmp-server host 10.2.0.50 "public"
vlan 1
   name "DEFAULT_VLAN"
   no untagged A1-A24,B1-B24
   no ip address
   exit
vlan 4
   name "Servers"
   untagged A2-A24,B2-B11 //Ports that might connect to
printers or VoIP phones//
   tagged A1,B1
   no ip address
   exit
vlan 8
   name "Medical"
   tagged A1,B1,CUP
   exit
lldp auto-provision radio-ports auto-vlan 2100 auto
vlan 2100
   name "RPs"
   tagged A1,B1,CDP
   exit
vlan 12
   name "Staff"
   tagged A1,B1,CUP
   exit
vlan 16
```

```
   name "Accounting"
   tagged A1,B1,CUP
   exit
vlan 32
   name "Patients"
   tagged A1,B1,CUP
   exit
vlan 2
   name "Management"
   untagged A1,B1
   ip address 10.2.0.5 255.255.0.0
   tagged CUP
   exit
ip authorized-managers 10.2.0.0 255.255.0.0
ip authorized-managers 10.4.7.50 255.255.255.255
ip authorized-managers 10.4.6.50 255.255.255.255
ip dns domain-name "MedCenter.com"
ip dns server-address 10.4.4.15
ip dns server-address 10.4.8.15
aaa authentication port-access eap-radius
radius-server host 10.4.7.50 key procurvea
radius-server host 10.4.6.50 key procurveb
aaa port-access authenticator A2-A24,B1,B12-B24
aaa port-access authenticator A2 client-limit 10 //If A1,
an uplink port, enforced 802.1X authentication, it should
operate in port-based mode.//
aaa port-access authenticator A3 client-limit 10
aaa port-access authenticator A4 client-limit 10
aaa port-access authenticator A5 client-limit 10
aaa port-access authenticator A6 client-limit 10
aaa port-access authenticator A7 client-limit 10
aaa port-access authenticator A8 client-limit 10
aaa port-access authenticator A9 client-limit 10
aaa port-access authenticator A10 client-limit 10
aaa port-access authenticator A11 client-limit 10
aaa port-access authenticator A12 client-limit 10
aaa port-access authenticator A13 client-limit 10
aaa port-access authenticator A14 client-limit 10
aaa port-access authenticator A15 client-limit 10
aaa port-access authenticator A16 client-limit 10
aaa port-access authenticator A17 client-limit 10
aaa port-access authenticator A18 client-limit 10
aaa port-access authenticator A19 client-limit 10
aaa port-access authenticator A20 client-limit 10
aaa port-access authenticator A21 client-limit 10
aaa port-access authenticator A22 client-limit 10
aaa port-access authenticator A23 client-limit 10
aaa port-access authenticator A24 client-limit 10
aaa port-access authenticator active //Do not enter this
command until you have completed setting up the entire
solution.//
aaa port-access supplicant A1, B1
aaa port-access supplicant A1 identity "switch"
aaa port-access supplicant B1 identity "switch"
aaa port-access mac-based A2-A24, B2-B11 //Only MAC-Auth
is enabled on ports B2-B11. Either MAC-Auth or 802.1X is
enforced on each client connected to ports A2-A24.//
aaa port-access mac-based A2 addr-limit 10
aaa port-access mac-based A3 addr-limit 10
aaa port-access mac-based A4 addr-limit 10
aaa port-access mac-based A5 addr-limit 10
aaa port-access mac-based A6 addr-limit 10
aaa port-access mac-based A7 addr-limit 10
aaa port-access mac-based A8 addr-limit 10
aaa port-access mac-based A9 addr-limit 10
aaa port-access mac-based A10 addr-limit 10
aaa port-access mac-based A11 addr-limit 10
aaa port-access mac-based A12 addr-limit 10
aaa port-access mac-based A13 addr-limit 10
aaa port-access mac-based A14 addr-limit 10
aaa port-access mac-based A15 addr-limit 10
aaa port-access mac-based A16 addr-limit 10
aaa port-access mac-based A17 addr-limit 10
aaa port-access mac-based A18 addr-limit 10
aaa port-access mac-based A19 addr-limit 10
aaa port-access mac-based A20 addr-limit 10
aaa port-access mac-based A21 addr-limit 10
aaa port-access mac-based A22 addr-limit 10
aaa port-access mac-based A23 addr-limit 10
aaa port-access mac-based A24 addr-limit 10
aaa port-access A1-A24,B1,B12-B24
password manager
password operator
```

Configure the Wireless Edge Services Module

This section describes how to set up the Wireless Edge Services Module to establish a wireless network for the Medical Center, which wants to provide wireless access for the doctors, nurses, support staff, and patients in certain areas of the Medical Center, such as the small cafeteria and some of the larger waiting rooms.

Because of the need to protect patients' billing and insurance records, however, the Accounting department is prohibited from accessing the network through a wireless connection. Their access to this sensitive information is limited to their workstations during business hours only.

As Table 5-5 shows, there are three WLANs for the Medical Center.

Table 5-5. Medical Center WLANs

Service Set Identifier (SSID)	Users	Open or Closed System	Access Control Method
Medical	Doctors, nurses, staff, and network administrators	Closed	802.1X with WPA/WPA2
Staff	Support staff	Closed	Web-Auth with WPA-PSK security for the wireless communications
Patients	Patients	Open	Web-Auth with no security for the wireless communications

In addition to describing how to set up these WLANs, this section also provides step-by-step instructions for:

- Initial setup on the Wireless Edge Services Module
- Simple Network Management Protocol (SNMP) settings
- 802.1X authentication for the RPs

This solution uses a Wireless Edge Services zl Module, which must be installed in a ProCurve Switch 5400zl or 8200zl series. ProCurve Networking also offers a Wireless Edge Services xl Module, which must be installed in a ProCurve Switch 5300xl Switch. After the module is installed, the switch is then referred to as a *wireless services-enabled switch*. (For detailed instructions to install the module into the switch, see the *ProCurve Switch zl Module Installation Guide* or the *ProCurve Switch xl Module Installation Guide*.)

Configuration on both modules is nearly identical, so you can use the instructions in this section for either one.

Note

You can purchase a Redundant Wireless Services Module and establish a redundancy group to provide failover capabilities for your wireless network. To provide higher availability, you should install the Redundant Wireless Services Module in another switch (although you can install in the same switch that holds the Wireless Edge Services Module). For instructions on setting up a redundancy group, see “Configure the Redundancy Group” on page 2-114 in Chapter 2: “Implementing 802.1X with ProCurve IDM and Endpoint Integrity.”

Configure Initial Settings on the Wireless Edge Services Modules

Before you can access the Web browser interface on a Wireless Edge Services Module, you must configure its IP settings through the wireless services-enabled switch.

Complete these steps:

1. Access the wireless services-enables switch’s command line interface (CLI) through a console, Telnet, or SSH session.
2. Move to the global configuration mode context of the wireless-services switch.

Syntax: `configure terminal`

Moves you to the global configuration mode context.

3. Move to the wireless-services context by typing:

Syntax: wireless-services <*slot letter*>

*Replace **<slot letter>** with the letter for the chassis slot in which the module is installed.*

For example:

```
ProCurve Switch# wireless-services c
```

4. Move to the global configuration mode context.

Syntax: configure terminal

Moves you to the global configuration mode context.

---

5. Move to the configuration mode context for the management VLAN.

Syntax: interface vlan<*ID*>

*Replace **<ID>** with the number or name of the VLAN.*

In this example, the management VLAN is 2.

```
ProCurve(wireless-services-C) (config)# interface
vlan2
```

6. Specify the IP address on the management VLAN:

Syntax: ip address <A.B.C.D>/<*prefix length*>

*Replace **<A.B.C.D>** with the IP address and **<prefix length>** with the Classless Interdomain Routing (CIDR) notation.*

The Wireless Edge Services Module's IP address in that VLAN is 10.2.0.99.

```
ProCurve(wireless-services-C)(config-if)# ip address
10.2.0.99/16
```

7. Define this VLAN as the management VLAN.

```
ProCurve(wireless-services-C)(config-if)# management
```

8. Exit to the global configuration mode context:

```
ProCurve(wireless-services-C)(config-if)# exit
```

9. Specify the default router:

Syntax: ip default-gateway <*A.B.C.D*>

Replace **<A.B.C.D>** *with the IP address of the default router.*

For example:

```
ProCurve(wireless-services-C)(config)# ip default-
gateway 10.2.0.1
```

10. You can optionally enable secure management, which restricts the module to accepting management traffic that arrives on its management VLAN:

Syntax: management secure

Permits management traffic only on this VLAN.

---

11. Set the country code for the RPs.

Syntax: country <*code*>

Replace **<code>** *with the two-letter abbreviation for the country in which the Wireless Edge Services Module operates. Type* **country ?** *to see a list of country codes.*

For example:

```
ProCurve(wireless-services-C) (config)# country fr
```

12. Save the configuration:

Syntax: write memory

Saves changes to the startup-config.

You can now access the module's Web browser interface, which you will use to configure all remaining settings.

Configure WLAN Settings

This section explains how set up a WLAN on the Wireless Edge Services Module through its Web browser interface.

For this access control solution, you will set up WLANs with the settings outlined in Table 5-6:

Table 5-6. WLANs

Setting	WLAN 1	WLAN 2	WLAN 3
SSID	Medical	Staff	Patients
VLAN ID	8	12	32
Radio	1, 2	1, 2	1, 2
Open or closed system	Closed	Closed	Open
Authentication	802.1X	Web-Auth	Web-Auth
Encryption	WPA/WPA2 (TKIP and AES)	WPA-PSK	None
Primary RADIUS server	NAC 800 A	NAC 800 A	NAC 800 B
Shared secret for primary RADIUS server	procurvea	procurvea	procurveb
Secondary RADIUS server	NAC 800 B	NAC 800 B	NAC 800 A
Shared secret for secondary RADIUS server	procurveb	procurvea	procurvea
Dynamic VLANs	Yes	Yes	No

Configure 802.1X as the Security for WLAN 1

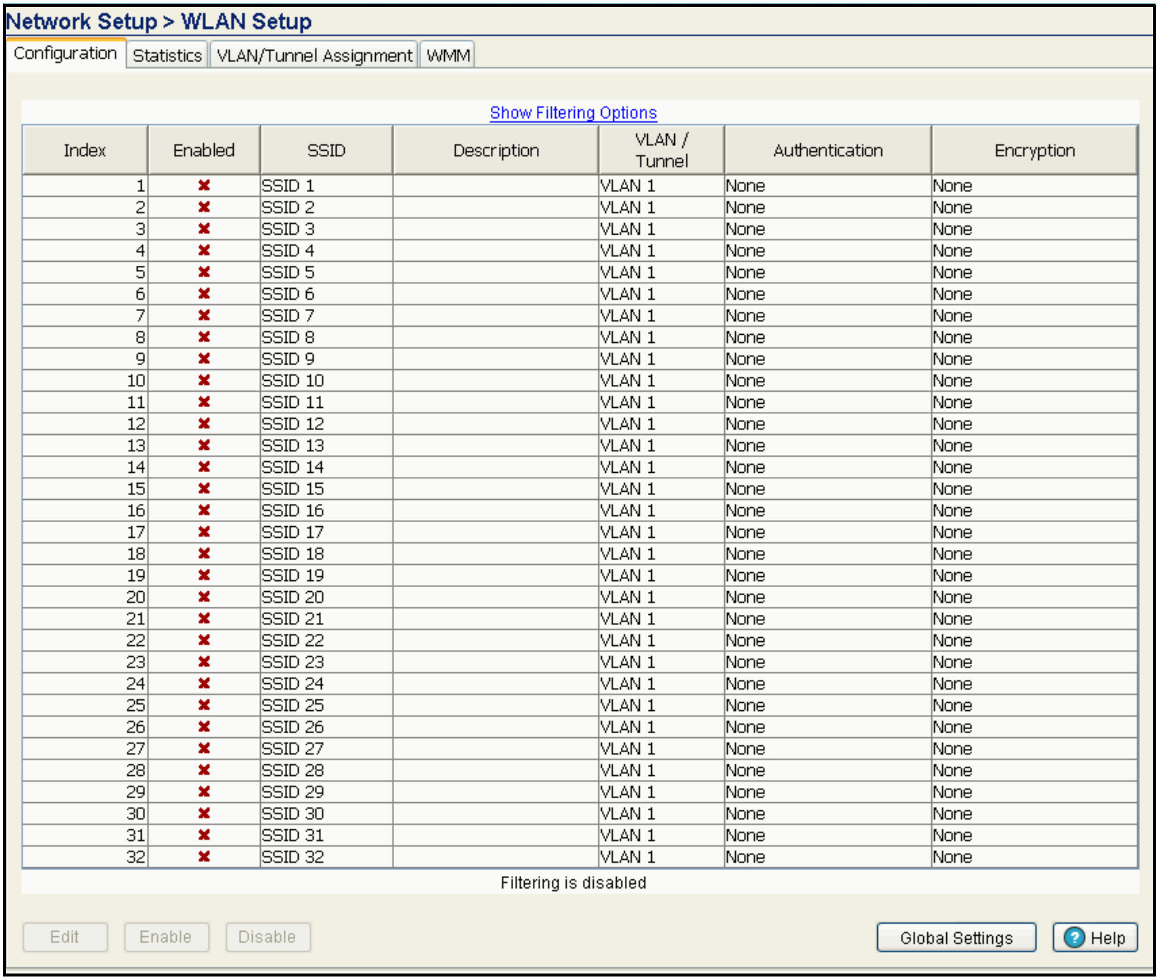
Because the Medical Center WLAN provides wireless services for doctors, nurses, and other employees who will access confidential information, it must be protected with the strongest security measures. To configure a WLAN that uses 802.1X with WPA/WPA2, complete the following steps:

1. Open the Web browser interface on your management station. For the URL, type the IP address that you configured on the Wireless Module. In the example network, the IP address is 10.2.0.99.

   Your station must have the Java Runtime Environment (JRE).

2. Log in with the default manager credentials:
   - **Username = manager**
   - **Password = procurve**

3. Select **Network Setup** > **WLAN Setup** > **Configuration**.

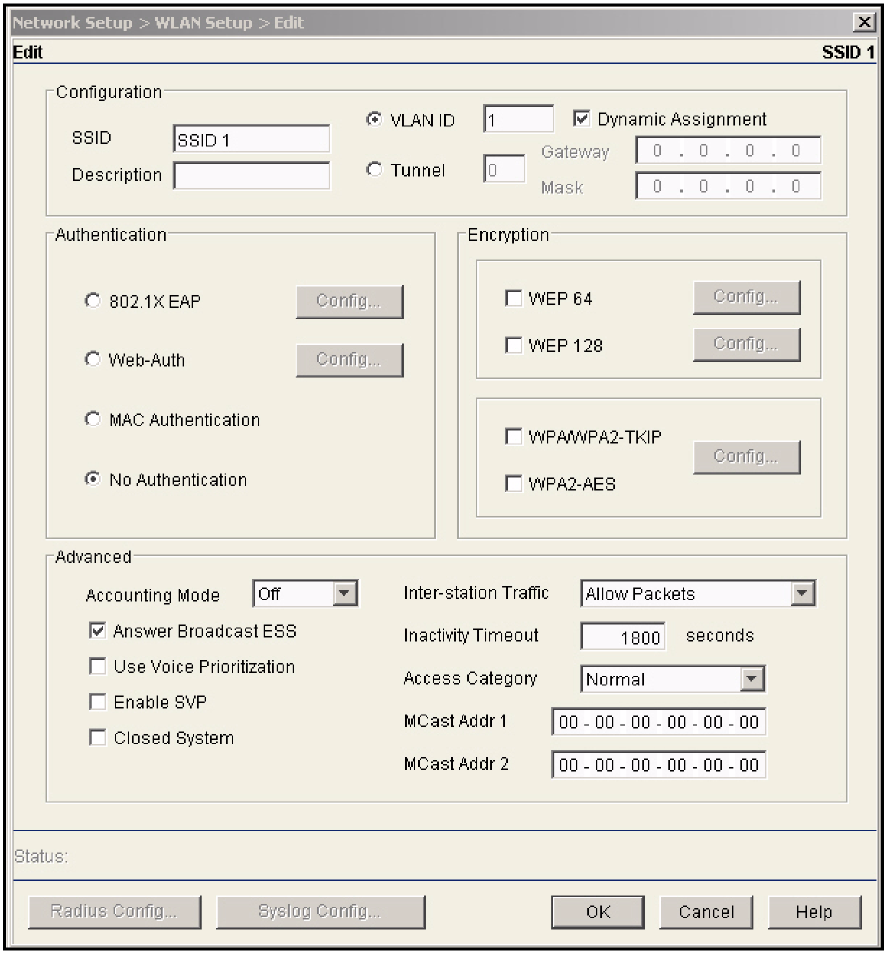


Index	Enabled	SSID	Description	VLAN / Tunnel	Authentication	Encryption
1	✘	SSID 1		VLAN 1	None	None
2	✘	SSID 2		VLAN 1	None	None
3	✘	SSID 3		VLAN 1	None	None
4	✘	SSID 4		VLAN 1	None	None
5	✘	SSID 5		VLAN 1	None	None
6	✘	SSID 6		VLAN 1	None	None
7	✘	SSID 7		VLAN 1	None	None
8	✘	SSID 8		VLAN 1	None	None
9	✘	SSID 9		VLAN 1	None	None
10	✘	SSID 10		VLAN 1	None	None
11	✘	SSID 11		VLAN 1	None	None
12	✘	SSID 12		VLAN 1	None	None
13	✘	SSID 13		VLAN 1	None	None
14	✘	SSID 14		VLAN 1	None	None
15	✘	SSID 15		VLAN 1	None	None
16	✘	SSID 16		VLAN 1	None	None
17	✘	SSID 17		VLAN 1	None	None
18	✘	SSID 18		VLAN 1	None	None
19	✘	SSID 19		VLAN 1	None	None
20	✘	SSID 20		VLAN 1	None	None
21	✘	SSID 21		VLAN 1	None	None
22	✘	SSID 22		VLAN 1	None	None
23	✘	SSID 23		VLAN 1	None	None
24	✘	SSID 24		VLAN 1	None	None
25	✘	SSID 25		VLAN 1	None	None
26	✘	SSID 26		VLAN 1	None	None
27	✘	SSID 27		VLAN 1	None	None
28	✘	SSID 28		VLAN 1	None	None
29	✘	SSID 29		VLAN 1	None	None
30	✘	SSID 30		VLAN 1	None	None
31	✘	SSID 31		VLAN 1	None	None
32	✘	SSID 32		VLAN 1	None	None

Filtering is disabled

Figure 5-2. Network Setup > WLAN Setup > Configuration Window

4. Access the **Edit** window for the WLAN by selecting the WLAN and clicking **Edit**.



Configuration

SSID: SSID 1

Description:

● VLAN ID: 1 ☑ Dynamic Assignment

○ Tunnel: 0 Gateway: 0 . 0 . 0 . 0 Mask: 0 . 0 . 0 . 0

Authentication

○ 802.1X EAP

○ Web-Auth

○ MAC Authentication

● No Authentication

Encryption

□ WEP 64

□ WEP 128

□ WPA/WPA2-TKIP

□ WPA2-AES

Advanced

Accounting Mode: Off

☑ Answer Broadcast ESS

□ Use Voice Prioritization

□ Enable SVP

□ Closed System

Inter-station Traffic: Allow Packets

Inactivity Timeout: 1800 seconds

Access Category: Normal

MCast Addr 1: 00 - 00 - 00 - 00 - 00 - 00

MCast Addr 2: 00 - 00 - 00 - 00 - 00 - 00

Status:

Figure 5-3. WLAN Edit Window

5. Under **Configuration**, in the **SSID** box, type the SSID that you have chosen for this WLAN. For example: **Medical**.

   When you enable the WLAN, the Wireless Edge Services Module automatically configures this SSID on all adopted RP radios (as long as you are using normal mode). (For more information about normal mode and the alternative setting, advanced mode, see the *ProCurve Wireless Edge Services zl Module* and *Redundant Wireless Services zl Module Management and Configuration Guide*.)

6. In the **Description** box, type information about this WLAN to remind you and other network administrators of its purpose. This setting is optional.

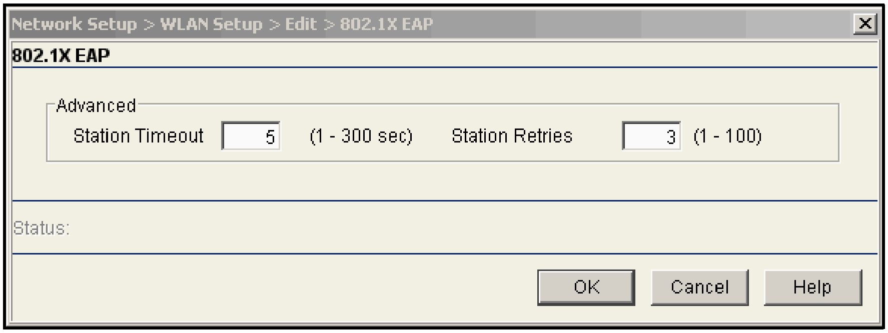
7. In the **VLAN ID** box, specify the VLAN to which the module maps wireless traffic. The VLAN ID can be a value from 1 to 4096. For the example network, you would type 8.

8. Check the **Dynamic Assignment** box to enable the Wireless Edge Services Module to apply dynamic (or user-based) VLAN assignments received from a RADIUS server.

9. Under **Advanced**, select **Closed System** if you do not want the RPs to advertise the SSID.

10. Under **Authentication**, select **802.1X EAP**.

11. Optionally, click **Config** next to **802.1X EAP** to configure advanced settings for the stations:



Network Setup > WLAN Setup > Edit > 802.1X EAP

802.1X EAP

Advanced

Station Timeout 5 (1 - 300 sec) Station Retries 3 (1 - 100)

Status:

Figure 5-4. Specifying 802.1X EAP Settings

a. Type a value in the **Station Timeout** box to control how long the module will wait for a station to authenticate itself.

   The **Station Timeout** can be from 1 to 60 seconds, and the default setting is 5 seconds.

b. Type a value in the **Station Retries** box to control how many times the module will reissue a challenge to the station.

   The setting for **Station Retries** can be from 1 to 10; the default setting is 3.

c. Click **OK**. You are returned to the WLAN's **Edit** window.

12. Under **Encryption**, select your encryption protocol:

- To use TKIP, select **WPA/WPA2-TKIP**.

  The Wireless Edge Services Module and wireless stations will use TKIP for all encryption. Note that both WPA and WPA2 stations can connect, but WPA2 stations will use TKIP.

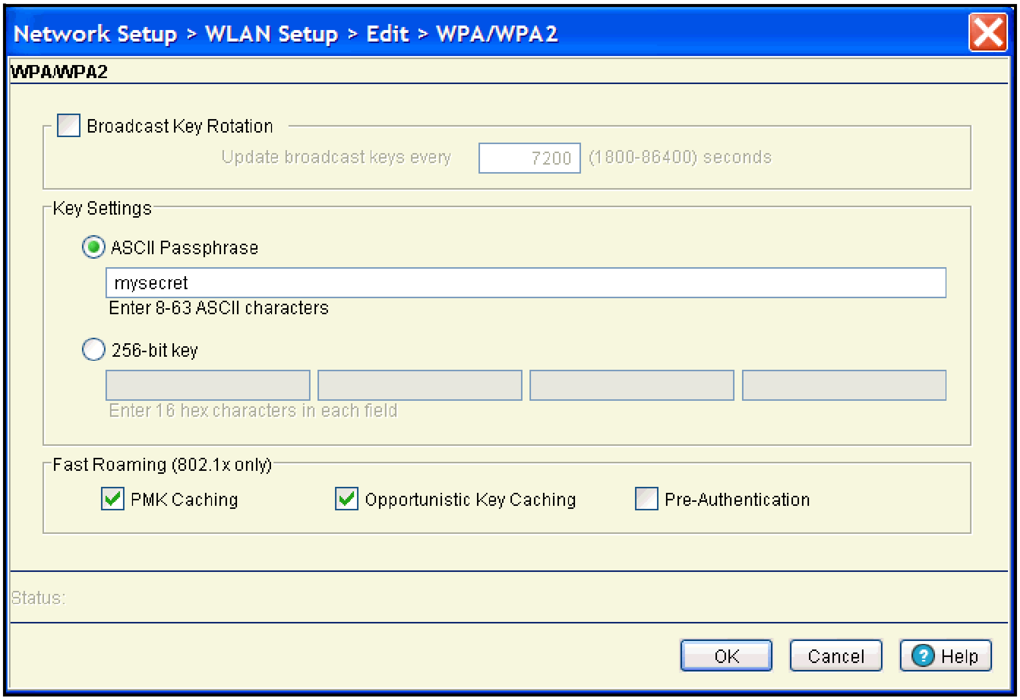
- To use AES, select **WPA2-AES**.

  This option forces all wireless stations to use AES, which is the most secure algorithm used for wireless encryption.

- To allow both protocols (mixed-mode), select both options.

13. If you want, you can also configure advanced encryption options.

    a. Click **Config** in the WPA section of the **Edit** window. The **WPA/WPA2** window is displayed.



Network Setup > WLAN Setup > Edit > WPA/WPA2

WPA/WPA2

□ Broadcast Key Rotation

Update broadcast keys every 7200 (1800-86400) seconds

Key Settings

● ASCII Passphrase

mysecret

Enter 8-63 ASCII characters

○ 256-bit key

Enter 16 hex characters in each field

Fast Roaming (802.1x only)

☑ PMK Caching ☑ Opportunistic Key Caching □ Pre-Authentication

Status:

Figure 5-5. Advanced Options for WPA/WPA2

b. If you want, check the **Broadcast Key Rotation** box.

Because all stations must use the same broadcast key, this key is clearly more vulnerable to hackers than the per-session keys. Periodically changing the broadcast key helps to protect your WLAN.

By default, the Wireless Edge Services Module does not rotate the broadcast key. However, if you enable the feature, the default rotation period is every 7200 seconds (two hours).

In the **Update broadcast keys every** box, you can type any value from 60 seconds (one minute) through 86,400 seconds (one day). The shorter the rotation period, the more secure, but also the more overhead added by the key redistribution.

c. Enable fast roaming features (to speed roaming with 802.1X).

A station might roam back and forth between several RPs. Ideally, such roaming is hidden from the wireless user, who need not know when he or she connects to a new RP, but only that the wireless connection remains good.

Fast roaming speeds authentication to a new RP, which can be the most time-consuming phase of the roam, so it only applies to WLANs that use 802.1X authentication.

Check these boxes to enable the Wireless Edge Services Module's fast roaming capabilities:

– **PMK Caching**—The RP and the wireless station agree on a PMK identifier for their session, which each stores even after the station disassociates. If the wireless station roams back to the RP, the two can quickly exchange the PMK identifier and renegotiate necessary keys, instead of completing the entire authentication process.

Note

When PMK caching is enabled, a WPA2 station that roams is no longer controlled by any dynamic ACLs configured with IDM. If you use IDM to assign ACLs to users with WPA2 connections, you should disable PMK caching.

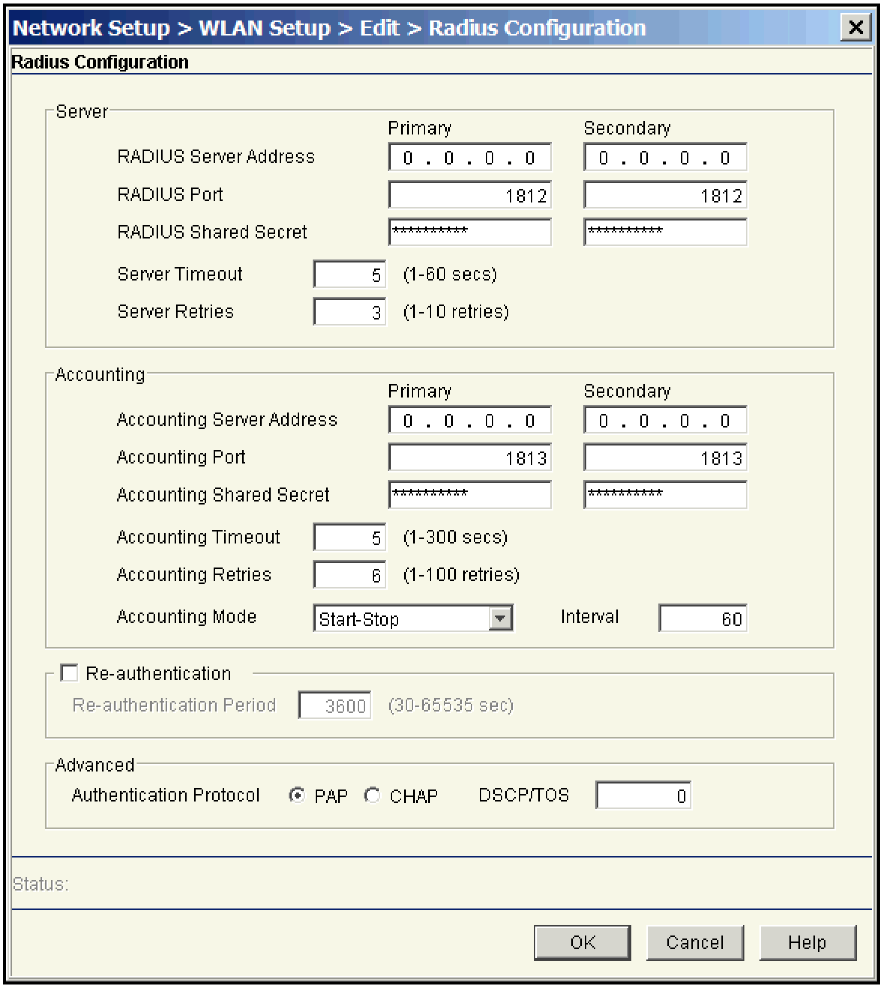
– **Opportunistic Key Caching**—This capability further speeds roaming between RPs that are connected to the same module. The wireless station can use the same PMK to associate to any RP that connects to the module.

– **Pre-Authentication**—Pre-authentication speeds roaming for stations that move from an RP on a *different* Wireless Edge Services to an RP on *this* module.

The station must also support pre-authentication. It listens for beacons from other RPs that support its SSID and authenticates to them before it roams. The station sends its EAP messages through its current RP, and that RP's module broadcasts the EAP messages throughout the wired network. Pre-authentication allows your module to listen for and respond to EAP messages destined to its RPs.

d. After you have configured all the advanced options that you want, click **OK**.

14. Click **Radius Config** at the bottom of the window. The **Radius Configuration** window is displayed.



Network Setup > WLAN Setup > Edit > Radius Configuration

Radius Configuration

Server

	Primary	Secondary
RADIUS Server Address	0 . 0 . 0 . 0	0 . 0 . 0 . 0
RADIUS Port	1812	1812
RADIUS Shared Secret	***********	***********

Server Timeout 5 (1-60 secs)

Server Retries 3 (1-10 retries)

Accounting

	Primary	Secondary
Accounting Server Address	0 . 0 . 0 . 0	0 . 0 . 0 . 0
Accounting Port	1813	1813
Accounting Shared Secret	***********	***********

Accounting Timeout 5 (1-300 secs)

Accounting Retries 6 (1-100 retries)

Accounting Mode Start-Stop Interval 60

□ Re-authentication

Re-authentication Period 3600 (30-65535 sec)

Advanced

Authentication Protocol ● PAP ○ CHAP DSCP/TOS 0

Status:

Figure 5-6. Radius Configuration Window

15. In the **Radius Configuration** window, under **Server**, specify settings for your network's RADIUS servers. For the example network, use the settings in Table 5-7.

Table 5-7. RADIUS Settings for WLAN 1

Setting	WLAN 1
Primary RADIUS server	NAC 800 A
Shared secret for primary server	procurvea
IP address for primary server	10.4.7.50
Secondary RADIUS server	NAC 800 B
Shared secret for secondary server	procurveb
IP address for secondary sever	10.4.6.50

a. Type the settings for your primary server in the **Primary** column:

  i. In the **RADIUS Server Address** box, specify the IP address of your network's primary RADIUS server. (To use the module's internal server, type **127.0.0.1**.)

  ii. Leave the **RADIUS Port** box at the default value unless you know that your server uses a different port. The default value is 1812.

  iii. In the **RADIUS Shared Secret** box, type a character string up to 127 characters. The RADIUS server uses the secret to identify the Wireless Edge Services Module as a legitimate client. You must match the secret configured for the module in your RADIUS server's configuration. (If you are using the module's internal server, you do not need to type a shared secret.)

b. Optionally, type settings for a secondary RADIUS server in the boxes in the **Secondary** column.

16. Check the **Re-authentication** box if you want to force stations to periodically re-authenticate to the network. Specify how often (in seconds) stations must re-authenticate in the **Re-authentication Period** box.

    Re-authentication occurs in the background. By default, re-authentication is disabled, but if you enable it, the default period is one hour (3600 seconds). The valid range is 30 to 65,535 seconds.

17. Optionally, alter settings in the **Server** section:

    - Type a value in the **Server Timeout** to control how long the Wireless Edge Services Module will wait for a reply from the RADIUS server.

      The **Server Timeout** can be from 1 to 60 seconds, and the default setting is 5 seconds.

Note

Depending on your network configuration, you may need to increase the timeout value. If you have checked your OpenLDAP server and NAC 800 settings, but users are not being granted access to the WLAN, you may want to increase the timeout setting. (You can double-check if this is a problem by using a protocol analyzer, such as Wireshark, to capture and analyze the traffic between the NAC 800, OpenLDAP server, and the Wireless Edge Services Module.)

- Type a value in the **Server Retries** box to control how many times the module will reattempt to contact a server that does not reply.

  The setting for **Server Retries** can be from 1 to 10. By default, the Wireless Edge Services Module attempts to contact the server up to four times (one initial try and three subsequent tries).

18. Optionally, type a value in the DSCP/TOS box to prioritize traffic to the RADIUS server.

    Valid values range from 0 through 63.

    a. Leave the other settings at their defaults and click **OK**. You will return to the WLAN's **Edit** window.

19. Click **OK** to save all your configuration changes.
20. Click **OK** to return to the **WLAN Setup** window.
21. Select the **Medical SSID** and click **Enable**.
22. In the upper right corner of the Wireless Module Web browser interface, click **Save** to save the changes to the startup-config.

Configure Web-Auth for WLANs 2 and 3

In the simplest configuration for Web-Auth, no security is required for the 802.11 association process. A user can simply open a wireless utility, select the WLAN, and associate to it.

Because wireless transmissions are not protected, they are open to eavesdroppers. To protect these transmissions, the Wireless Edge Services Module supports optional encryption for Web-Auth WLANs, as shown in Table 5-8.

Table 5-8. Encryption Options for Web-Auth on the Wireless Edge Services Module

Encryption Option	Security Option
WEP 64	static WEP
WEP 128	static WEP
WPA/WPA2-TKIP	WPA/WPA2-PSK
WPA2-AES	WPA2-PSK
WPA/WPA2-TKIP and WPA2-AES	WPA/WPA2-PSK

The hypothetical organization used in this access control solution requires two Web-Auth WLANs:

- WLAN for patients who will be given only Internet access
- WLAN for support staff who may access some confidential information

For the Patients WLAN, no security is required for wireless transmissions. The patients will be accessing only information on the Internet, so the Medical Center does not need to worry about protecting its confidential information. The burden of protecting wireless transmissions is left up to the patients themselves. If they don't want anyone to eavesdrop on their wireless transmissions, they must use a virtual private network (VPN) or a Secure Socket Layer (SSL) connection.

However, the Medical Center wants to protect the transmissions of the support staff, who may access some confidential information on the organization's network. For example, they may access their compensation information or the business contact information of other employees. For the Staff WLAN, therefore, the organization will use WPA/WPA2-TKIP and WPA2-AES to encrypt the wireless transmissions.

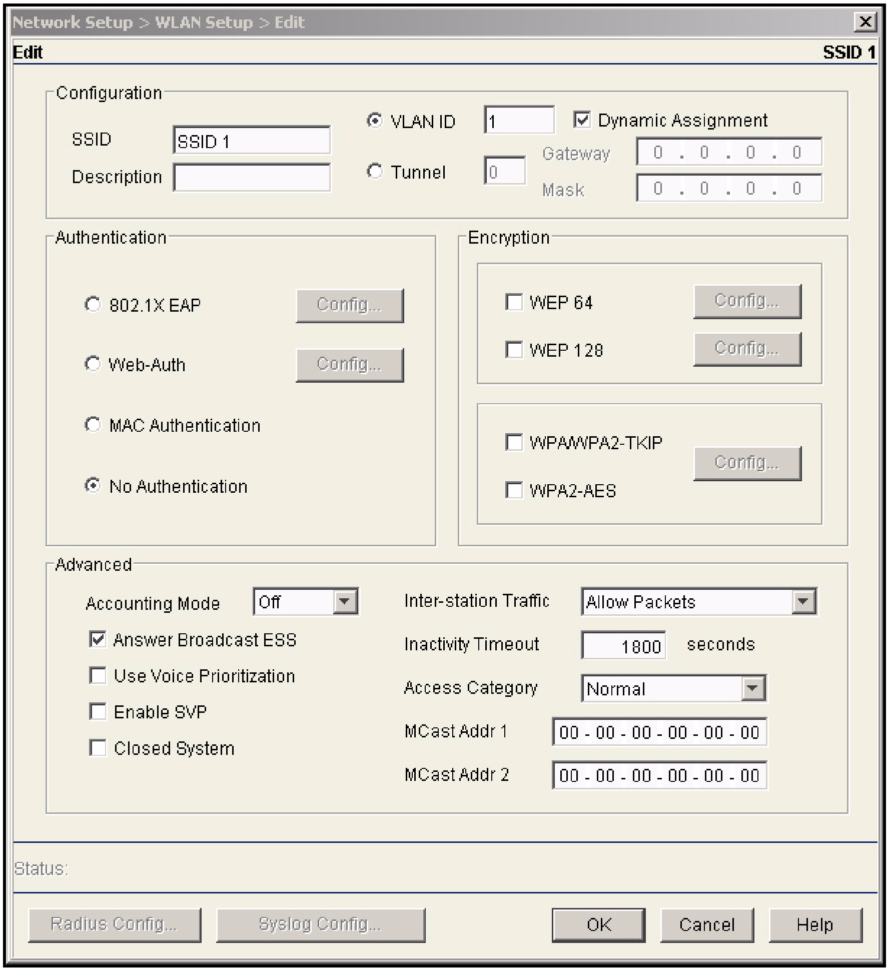
In addition, the Medical Center will use the settings listed in Table 5-9 for WLANs 2 and 3.

Table 5-9. Settings for WLANs 2and 3

Setting	WLAN 2	WLAN 3
SSID	Staff	Patients
VLAN ID	12	32
Radio	Both	Both
Closed system	Yes	No

Configure Web-Auth. To configure Web-Auth for a WLAN, complete the following steps:

1. Select **Network Setup** > **WLAN Setup** > **Configuration**.
2. Select the WLAN that you want to use Web-Auth, and then click **Edit**. The **Edit** window is displayed.



Network Setup > WLAN Setup > Edit

Edit SSID 1

Configuration

SSID: SSID 1

Description:

● VLAN ID: 1 ☑ Dynamic Assignment

○ Tunnel: 0

Gateway: 0 . 0 . 0 . 0

Mask: 0 . 0 . 0 . 0

Authentication

○ 802.1X EAP

○ Web-Auth

○ MAC Authentication

● No Authentication

Encryption

☐ WEP 64

☐ WEP 128

☐ WPA/WPA2-TKIP

☐ WPA2-AES

Advanced

Accounting Mode: Off

☑ Answer Broadcast ESS

☐ Use Voice Prioritization

☐ Enable SVP

☐ Closed System

Inter-station Traffic: Allow Packets

Inactivity Timeout: 1800 seconds

Access Category: Normal

MCast Addr 1: 00 - 00 - 00 - 00 - 00 - 00

MCast Addr 2: 00 - 00 - 00 - 00 - 00 - 00

Status:

Figure 5-7. WLAN Edit Window

3. Under **Configuration**, type an SSID for this WLAN in the **SSID** box. For example: **Staff**.

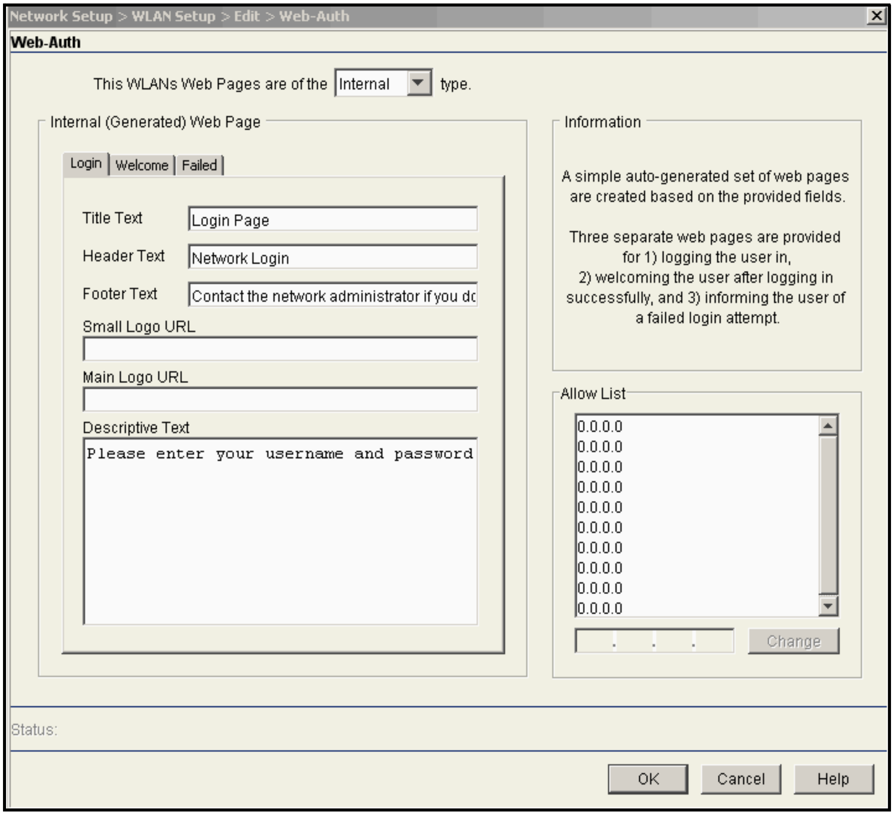
4. In the **Description** box, you can type information that will help you identify this WLAN. This is an optional setting.

5. By default, the Wireless Edge Services Module places all wireless traffic in VLAN 1. If you want to assign this WLAN to a different VLAN, type the number in the **VLAN ID** box. For example: **12**.

   Make sure that either your module or another infrastructure device is configured to assign wireless stations DHCP addresses in this VLAN.

6. Under **Authentication**, select **Web-Auth**.

7. On the WLAN **Edit** window, under **Authentication**, click **Config** next to **Web-Auth**. The **Web-Auth** window is displayed.



Network Setup > WLAN Setup > Edit > Web-Auth

Web-Auth

This WLANs Web Pages are of the Internal type.

Internal (Generated) Web Page

Title Text: Login Page

Header Text: Network Login

Footer Text: Contact the network administrator if you dc

Small Logo URL:

Main Logo URL:

Descriptive Text: Please enter your username and password

Information

A simple auto-generated set of web pages are created based on the provided fields.

Three separate web pages are provided for 1) logging the user in, 2) welcoming the user after logging in successfully, and 3) informing the user of a failed login attempt.

Allow List

```
0.0.0.0
0.0.0.0
0.0.0.0
0.0.0.0
0.0.0.0
0.0.0.0
0.0.0.0
0.0.0.0
0.0.0.0
0.0.0.0
```

Status:

Figure 5-8. Configuring the Login Page

8. Select the location for the Web-Auth Web pages from the list at the top of the window.

   You can select one of three options for these Web pages:

   - **Internal**—three default pages stored on the Wireless Edge Services Module
   - **External**—three pages stored on an external Web server
   - **Advanced**—pages that you have loaded onto the Wireless Edge Services Module's flash memory

   Select **Internal** from the list at the top of the window.

9. Under **Internal (Generated) Web Page**, click the **Login** tab to configure the login page, which users see when they try to access your network services. (See Figure 5-8.)

   a. In the **Title Text** box, accept the default text shown on the window, or type the text that you want to use.

   b. In the **Header Text** box, accept the default text shown on the window, or type the text that you want to be displayed at the top of the login page. (See Figure 5-9.)

Note

If you customize the **Header Text**, **Footer Text**, or **Descriptive Text** boxes, you can type a maximum of 1024 characters.

   c. In the **Footer Text** box, accept the default text shown on the window, or type the text that you want to be displayed at the bottom of the login page. (See Figure 5-9.) For example, you might want to type:

   Call the IT department at ext. 1253 to receive a valid username and password.

   d. In the **Small Logo URL** box, type the name of a logo file to include a small logo on the login page. (See Figure 5-9.) You must copy this logo to the flash on the Wireless Edge Services Module. (For instructions on how to copy the logo file to flash, see “Copying Logo Files to the Module’s Flash” on page 5-50.)

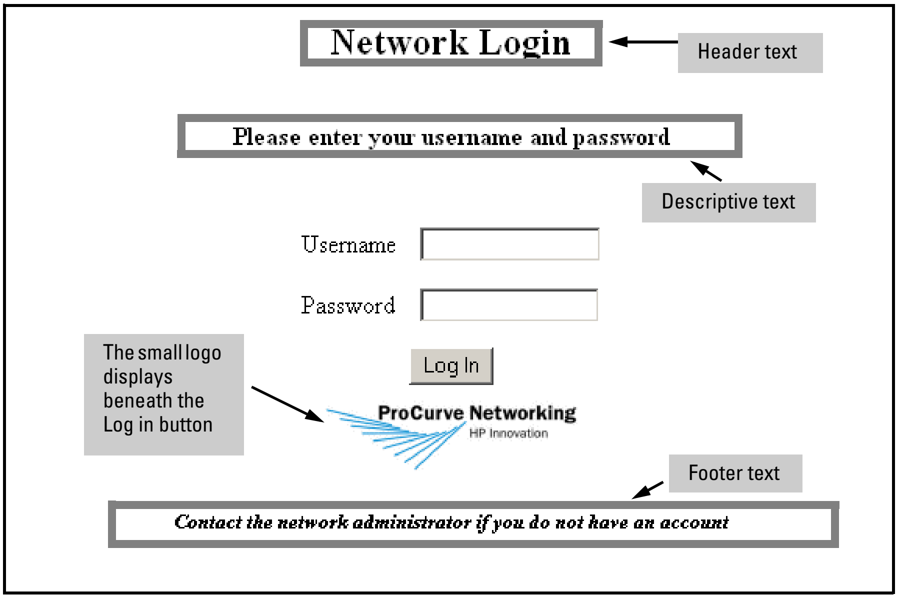
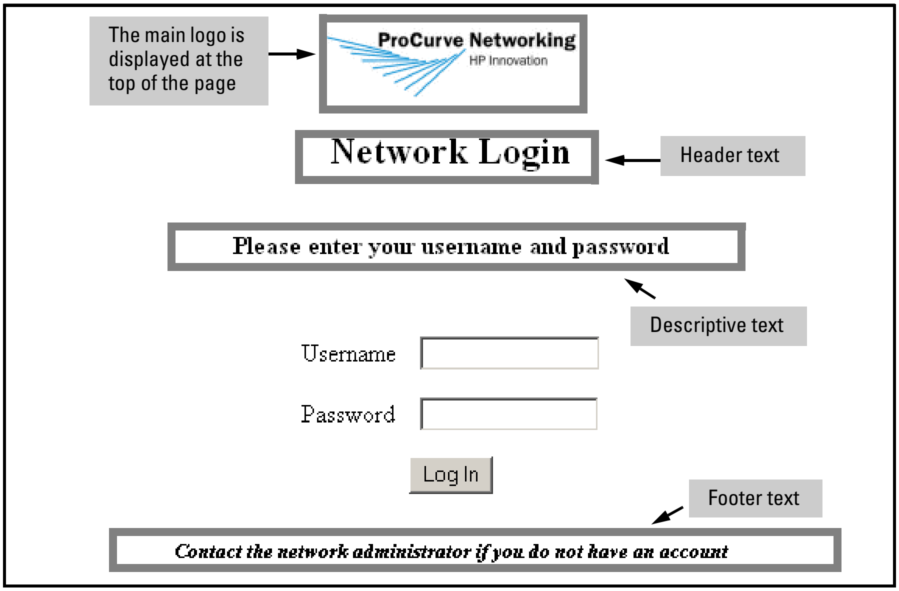

Network Login
Header text
Please enter your username and password
Descriptive text
Username
Password
The small logo displays beneath the Log in button
Log In
ProCurve Networking
HP Innovation
Footer text
Contact the network administrator if you do not have an account

Figure 5-9. Displaying a Small Logo on the Web-Auth Login Page

e. In the **Main Logo URL** box, type the name of a logo file to include a logo at the top of the login page. (See Figure 5-10.) You must copy this logo to the flash on the Wireless Edge Services Module. (For instructions on how to copy the logo file to flash, see “Copying Logo Files to the Module’s Flash” on page 5-50.)

f. In the **Descriptive Text** box, accept the default text shown on the window, or type the text that you want to use. (See Figure 5-10.) For example, you might type:

Enter the username and password you were assigned. Remember that both the username and password are case sensitive.



The main logo is displayed at the top of the page

Network Login

Header text

Please enter your username and password

Descriptive text

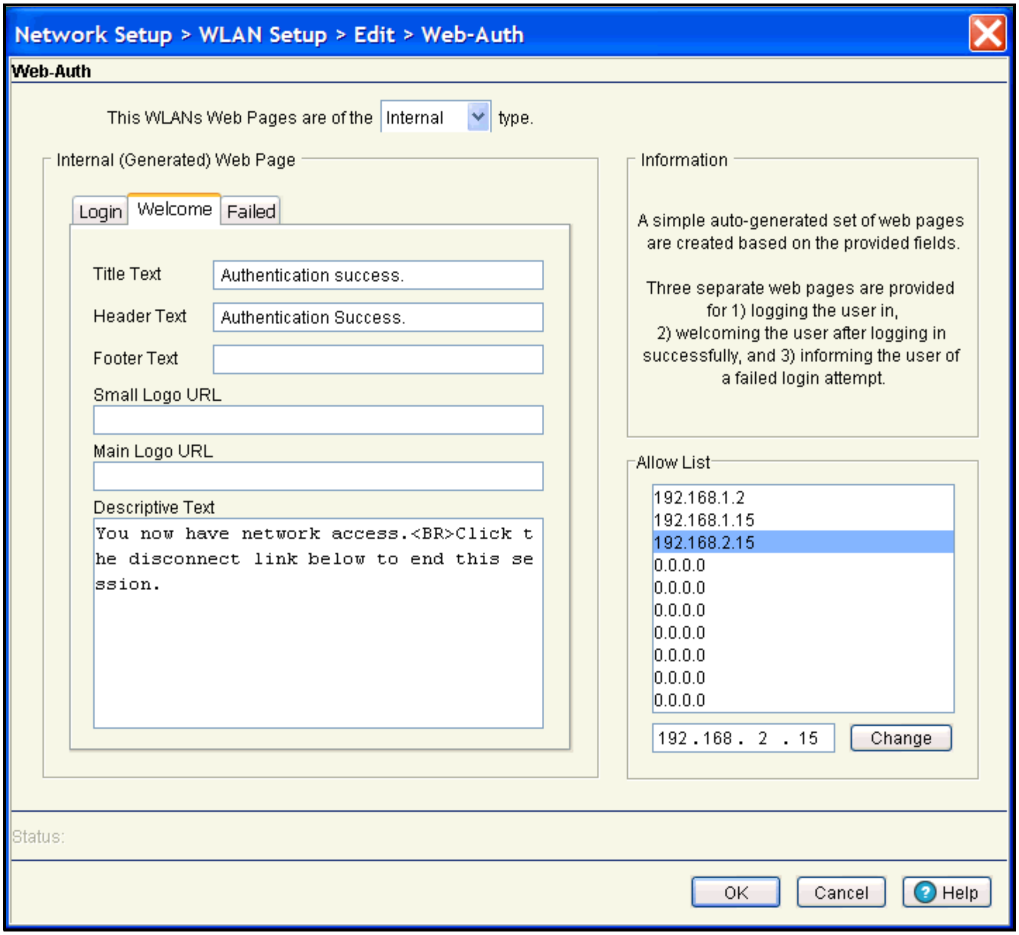
Footer text

Contact the network administrator if you do not have an account

Figure 5-10. Displaying the Main Logo on the Web-Auth Login Page

10. Configure the welcome page, which mobile users see if they type a valid username and password and the RADIUS server authenticates them.

a. Click the **Welcome** tab. (See Figure 5-11.)



Network Setup > WLAN Setup > Edit > Web-Auth

Web-Auth

This WLANs Web Pages are of the Internal type.

Internal (Generated) Web Page

Title Text: Authentication success.

Header Text: Authentication Success.

Footer Text:

Small Logo URL:

Main Logo URL:

Descriptive Text:

```
You now have network access.<BR>Click t
he disconnect link below to end this se
ssion.
```

Information

A simple auto-generated set of web pages are created based on the provided fields.

Three separate web pages are provided for 1) logging the user in, 2) welcoming the user after logging in successfully, and 3) informing the user of a failed login attempt.

Allow List

```
192.168.1.2
192.168.1.15
192.168.2.15
0.0.0.0
0.0.0.0
0.0.0.0
0.0.0.0
0.0.0.0
0.0.0.0
0.0.0.0
```

192 . 168 . 2 . 15

Status:

Figure 5-11. Configuring the Welcome Page

b. In the **Title Text** box, accept the default text shown on the window, or type the text that you want to use.

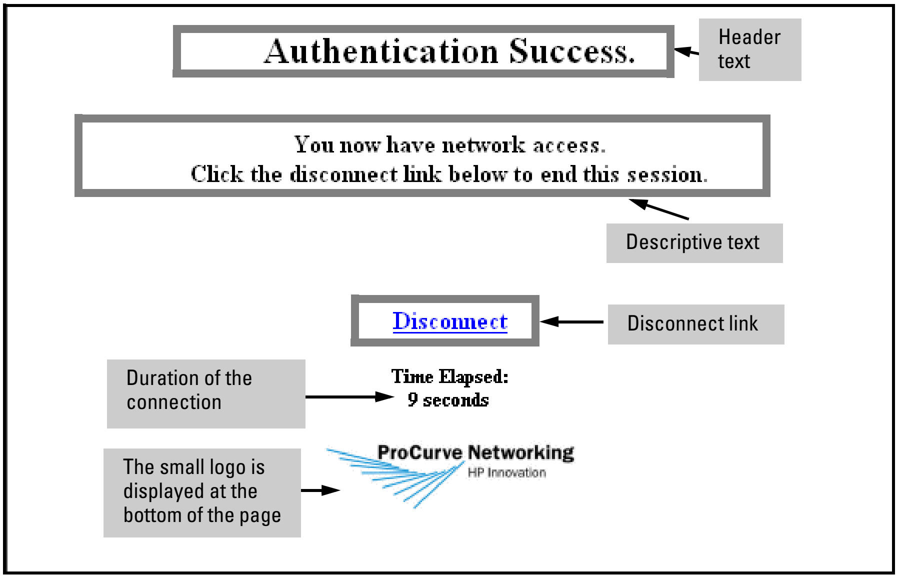
c. In the **Header Text** box, accept the default text shown on the window, or type the text that you want users to see when they log in. (See Figure 5-12.)

Note

If you customize the **Header Text**, **Footer Text**, or **Descriptive Text** boxes, you can type a maximum of 1024 characters.

d. In the **Footer Text** box, type the text that will be displayed at the bottom of the welcome page. By default, this box is empty.

e. In the **Small Logo URL** box, type the name of a logo file to include a small logo on the welcome page. (See Figure 5-12.) You must copy this logo to the flash on the Wireless Edge Services Module. (For instructions on how to copy the logo file to flash, see "Copying Logo Files to the Module's Flash" on page 5-50.)



Authentication Success.

You now have network access.
Click the disconnect link below to end this session.

Disconnect

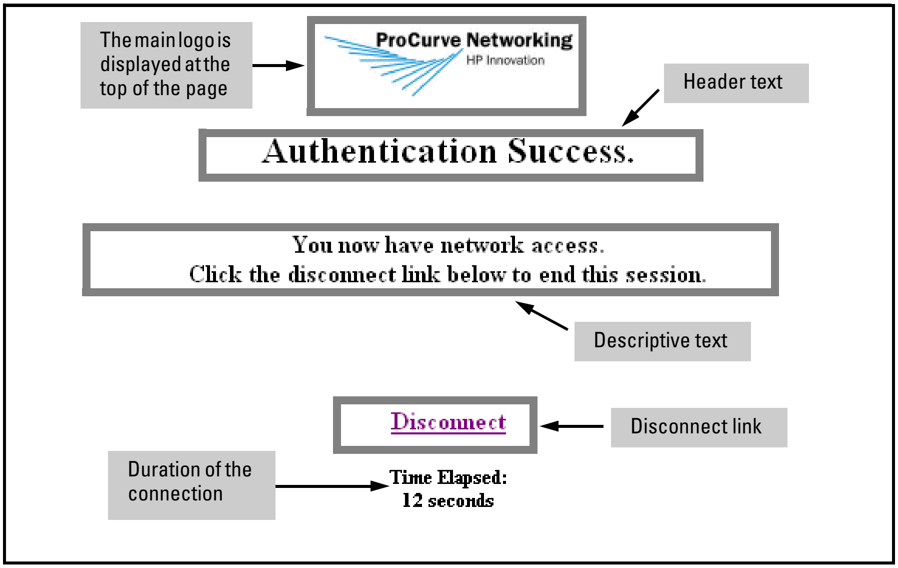
Time Elapsed:
9 seconds

Header text
Descriptive text
Disconnect link
Duration of the connection
The small logo is displayed at the bottom of the page
ProCurve Networking
HP Innovation

Figure 5-12. Displaying a Small Logo on the Web-Auth Welcome Page

f. In the **Main Logo URL** box, type the name of a logo file to display a logo at the top of the welcome page. (See Figure 5-13.) You must copy this logo to the flash on the Wireless Edge Services Module. (For instructions on how to copy the logo file to flash, see "Copying Logo Files to the Module's Flash" on page 5-50.)

g. In the **Descriptive Text** box, accept the default text shown on the window, or customize the text as needed. (See Figure 5-13.)



The main logo is displayed at the top of the page

Header text

Authentication Success.

You now have network access.
Click the disconnect link below to end this session.

Descriptive text

Disconnect

Disconnect link

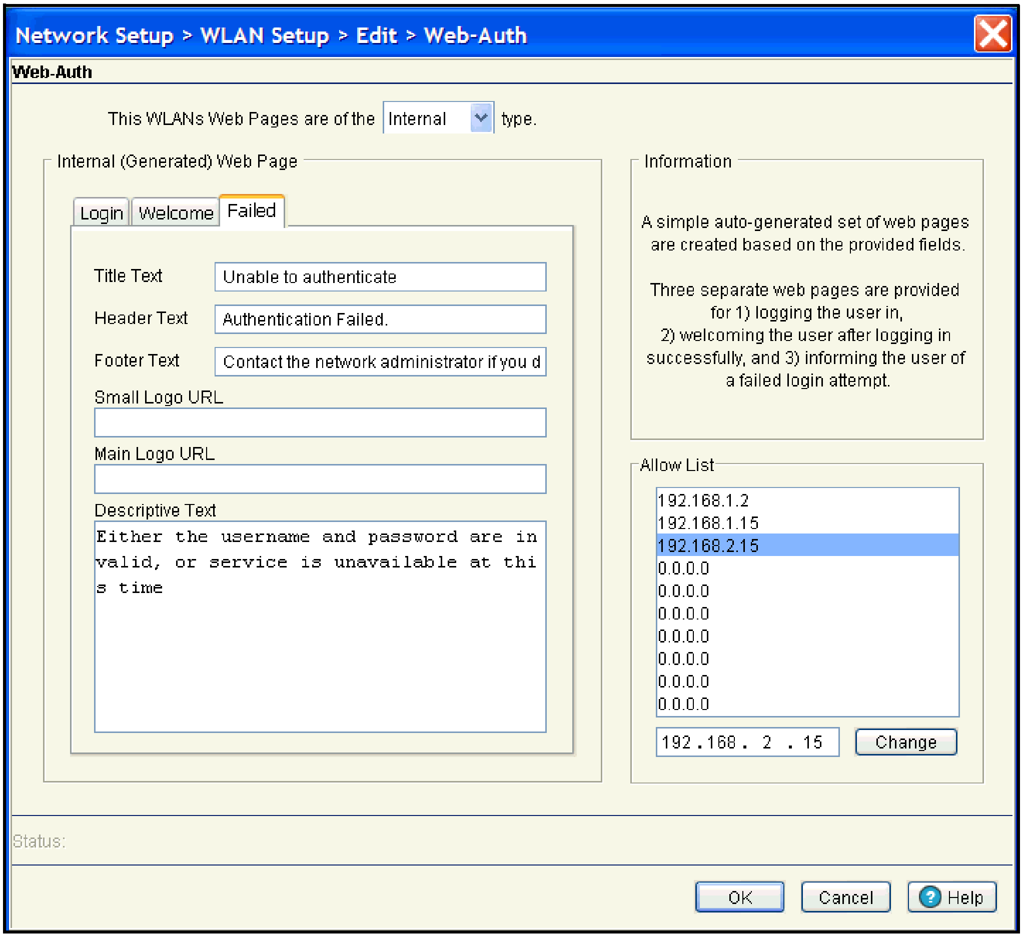
Duration of the connection

Time Elapsed:
12 seconds

Figure 5-13. Displaying the Main Logo on the Web-Auth Welcome Page

11. Configure the failed page, which mobile users see if they type an invalid username and password.

    a. Click the **Failed** tab. (See Figure 5-14.)



Network Setup > WLAN Setup > Edit > Web-Auth

Web-Auth

This WLANs Web Pages are of the Internal type.

Internal (Generated) Web Page

Title Text: Unable to authenticate

Header Text: Authentication Failed.

Footer Text: Contact the network administrator if you d

Small Logo URL:

Main Logo URL:

Descriptive Text: Either the username and password are invalid, or service is unavailable at this time

Information

A simple auto-generated set of web pages are created based on the provided fields.

Three separate web pages are provided for 1) logging the user in, 2) welcoming the user after logging in successfully, and 3) informing the user of a failed login attempt.

Allow List

```
192.168.1.2
192.168.1.15
192.168.2.15
0.0.0.0
0.0.0.0
0.0.0.0
0.0.0.0
0.0.0.0
0.0.0.0
0.0.0.0
```

192 . 168 . 2 . 15

Status:

Figure 5-14. Configuring the Failed Page

b. In the **Title Text** box, accept the default text shown on the window, or change the text as needed.

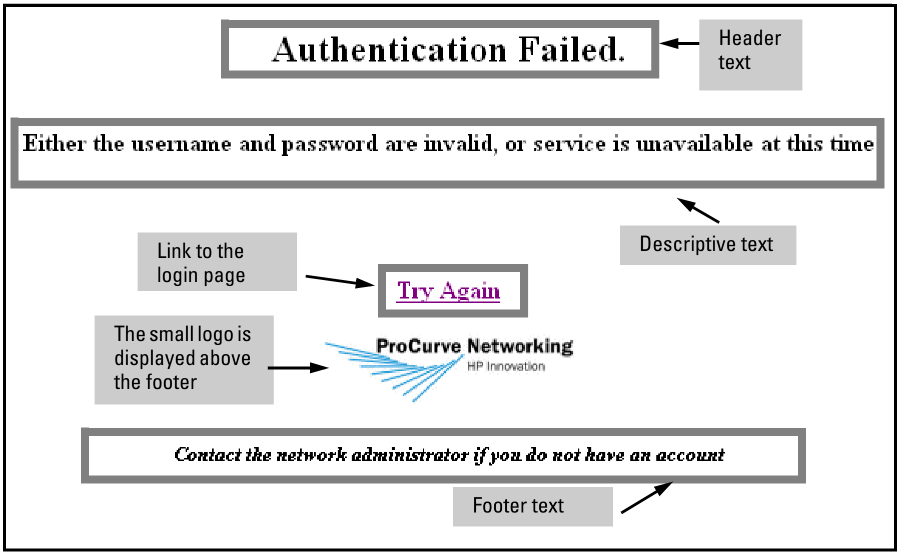
c. In the **Header Text** box, accept the default text shown on the window, or type the text that you want users to see if they fail to log in. (See Figure 5-15.)

Note

If you customize the **Header Text**, **Footer Text**, or **Descriptive Text** boxes, you can type a maximum of 1024 characters.

d. In the **Footer Text** box, accept the default text shown on the window, or type the text that you want to be displayed at the bottom of the failed page. (See Figure 5-15.) For example, you may want to add the extension that users should call if they cannot log in.

e. In the **Small Logo URL** box, type the name of a logo file to include a small logo on the failed page. (See Figure 5-15.) You must copy this logo to the module's flash. (For instructions on how to copy the logo file to flash, see "Copying Logo Files to the Module's Flash" on page 5-50.)



Authentication Failed.

Either the username and password are invalid, or service is unavailable at this time

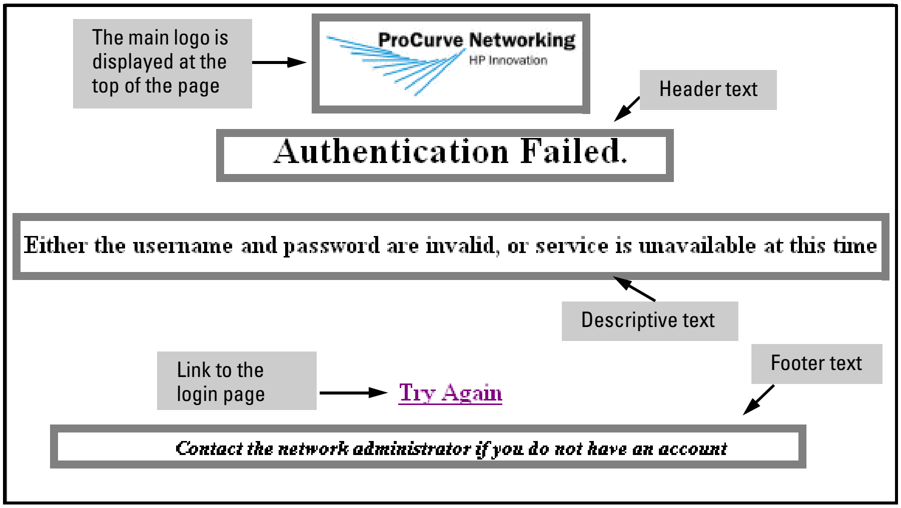
Try Again

Contact the network administrator if you do not have an account

Figure 5-15. Displaying the Small Logo on the Web-Auth Failed Page

f. In the **Main Logo URL** box, type the name of a logo file to include a large logo on the failed page. (See Figure 5-16.) You must copy this logo to the flash on the Wireless Edge Services Module. (For instructions on how to copy the logo file to flash, see "Copying Logo Files to the Module's Flash" on page 5-50.)

g. In the **Descriptive Text** box, accept the default text shown on the window, or customize the text as needed. (See Figure 5-16.)



Authentication Failed.

Either the username and password are invalid, or service is unavailable at this time

Try Again

Contact the network administrator if you do not have an account

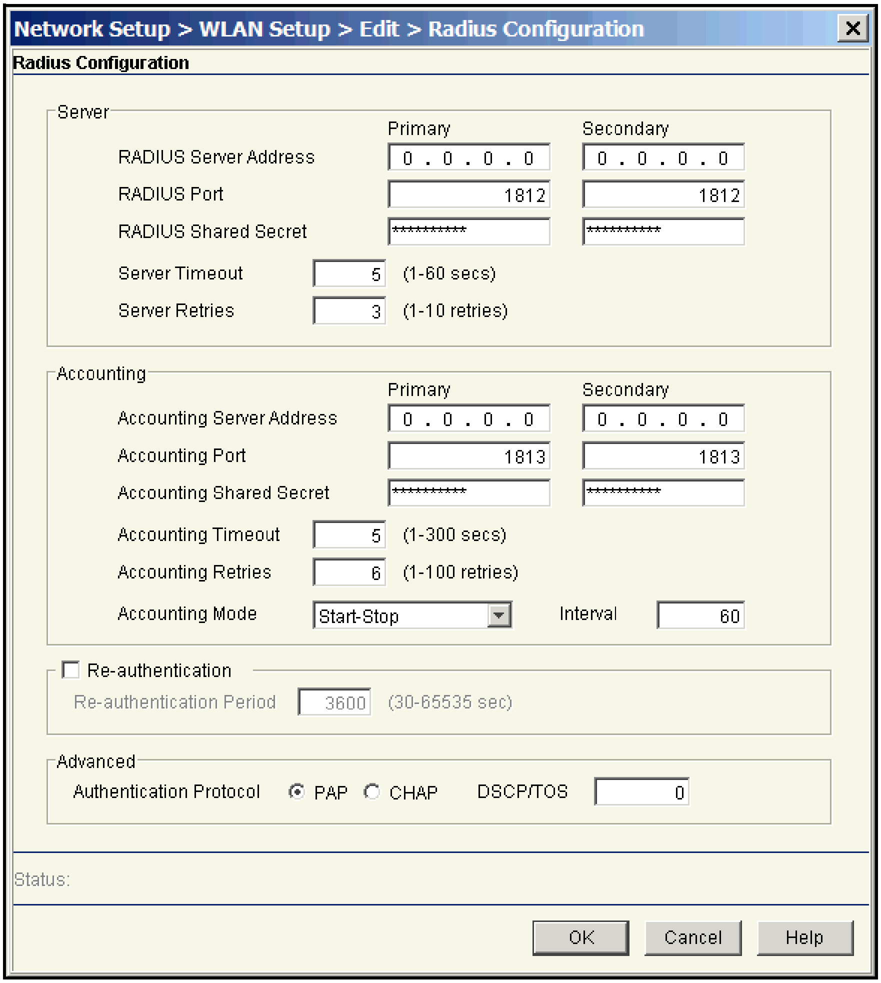
Figure 5-16. Displaying the Main Logo on the Web-Auth Failed Page

12. On the **Web-Auth** window, under **Allow List**, add the IP addresses that *unauthorized* stations are allowed to access.

    The Wireless Edge Services Module automatically handles traffic such as DHCP and DNS requests. Therefore, you do not need to add any IP addresses to the Allow list to make Web-Auth function correctly using the internal pages.

13. Leave other settings at their defaults and click **OK**.

14. Web-Auth requires a RADIUS server to act as the authentication server. Click **Radius Config** at the bottom of the window. The **Radius Configuration** window is displayed.



Network Setup > WLAN Setup > Edit > Radius Configuration

Radius Configuration

Server

	Primary	Secondary
RADIUS Server Address	0 . 0 . 0 . 0	0 . 0 . 0 . 0
RADIUS Port	1812	1812
RADIUS Shared Secret	**********	**********

Server Timeout 5 (1-60 secs)

Server Retries 3 (1-10 retries)

Accounting

	Primary	Secondary
Accounting Server Address	0 . 0 . 0 . 0	0 . 0 . 0 . 0
Accounting Port	1813	1813
Accounting Shared Secret	**********	**********

Accounting Timeout 5 (1-300 secs)

Accounting Retries 6 (1-100 retries)

Accounting Mode Start-Stop Interval 60

□ Re-authentication

Re-authentication Period 3600 (30-65535 sec)

Advanced

Authentication Protocol ● PAP ○ CHAP DSCP/TOS 0

Status:

Figure 5-17. Radius Configuration Window

15. In the **Radius Configuration** window, under **Server**, specify settings for your network's RADIUS servers. For the example network, the network administrators will use the settings shown in Table 5-10.

Table 5-10. RADIUS Settings for WLANs 2 and 3

Setting	WLAN 2	WLAN 3
Primary RADIUS server	NAC 800 A	NAC 800 B
Shared secret for primary server	procurvea	procurveb
IP address for primary server	10.4.7.50	10.4.6.50
Secondary RADIUS server	NAC 800 B	NAC 800 A
Shared secret for secondary server	procurveb	procurvea
IP address for secondary sever	10.4.6.50	10.4.7.50

Type settings for your primary server in the boxes in the **Primary** column:

a. In the **RADIUS Server Address** box, specify the IP address of your network's primary RADIUS server.

b. Leave the **RADIUS Port** box at the default value unless you know that your server uses a different port.

   The default value is 1812.

c. In the **RADIUS Shared Secret** box, type a character string up to 127 characters.

   The RADIUS server uses the secret to identify the Wireless Edge Services Module as a legitimate client. You must match the secret configured for the module in your RADIUS server's configuration.

d. If you have two NAC 800s, type settings for a secondary RADIUS server in the boxes in the **Secondary** column.

16. Check the **Re-authentication** box if you want to force stations to periodically re-authenticate to the network. Specify how often (in seconds) stations must re-authenticate in the **Re-authentication Period** box.

    Re-authentication occurs in the background. By default, re-authentication is disabled, but if you enable it, the default period is one hour (3600 seconds). The valid range is 30 to 65,535 seconds.

17. Optionally, alter settings in the **Server** section:
    - Type a value in the **Server Timeout** to control how long the Wireless Edge Services Module will wait for a reply from the RADIUS server. The **Server Timeout** can be from 1 to 60 seconds, and the default setting is 5 seconds.

Note

Depending on your network configuration, you may need to increase the timeout value. If you have checked your OpenLDAP server and NAC 800 settings, but users are not being granted access to the WLAN, you may want to increase the timeout setting. (You can double-check if this is a problem by using a protocol analyzer, such as Wireshark, to capture and analyze the traffic between the NAC 800, OpenLDAP server, and the Wireless Edge Services Module.)

- Type a value in the **Server Retries** boxes to control how many times the module will reattempt to contact a server that does not reply.

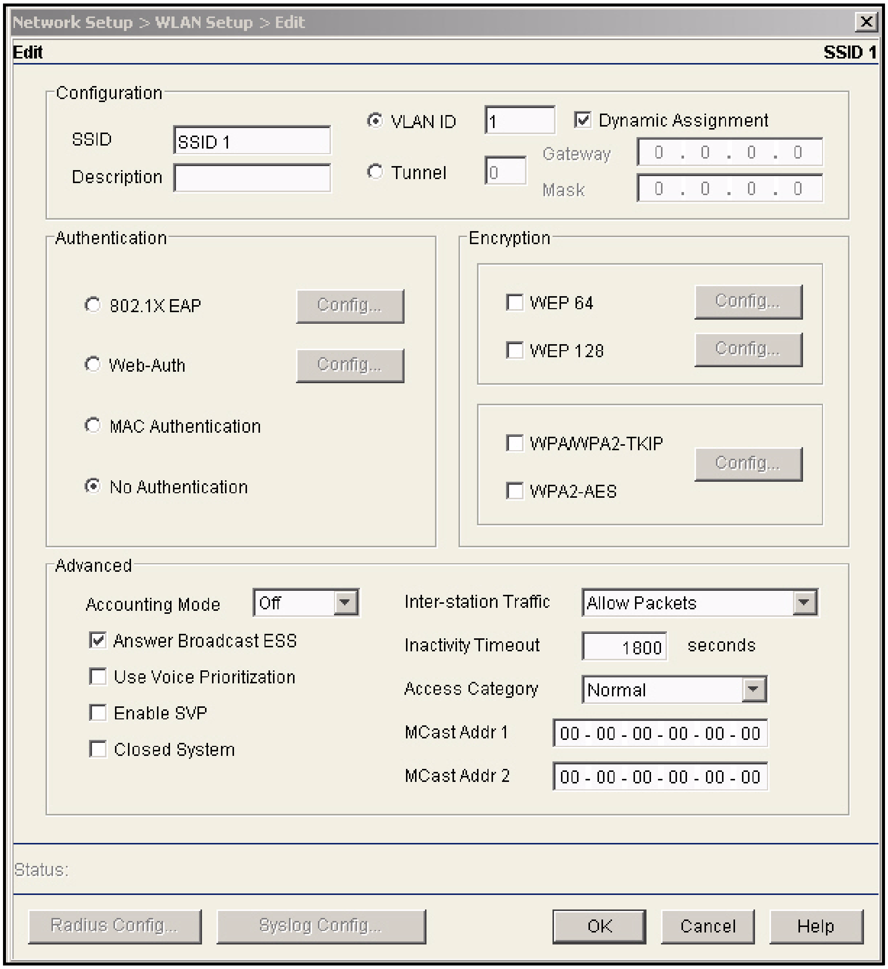
  The setting for **Server Retries** can be from 1 to 10. By default, the Wireless Edge Services Module attempts to contact the server up to four times (one initial try and three subsequent tries).

18. Choose the protocol in which the Wireless Edge Services Module packages users' credentials. Select **PAP** (the default) or **CHAP** for the **Authentication Protocol**.

19. Optionally, type a value in the DSCP/TOS box to prioritize traffic to the RADIUS server.

    Valid values range from 0 through 63.

20. Leave the other settings at their defaults and click **OK**. You are returned to the WLAN **Edit** window.



Network Setup > WLAN Setup > Edit

Edit SSID 1

Configuration

SSID: SSID 1

Description:

● VLAN ID: 1 ☑ Dynamic Assignment

○ Tunnel: 0

Gateway: 0 . 0 . 0 . 0

Mask: 0 . 0 . 0 . 0

Authentication

○ 802.1X EAP

○ Web-Auth

○ MAC Authentication

● No Authentication

Encryption

☐ WEP 64

☐ WEP 128

☐ WPA/WPA2-TKIP

☐ WPA2-AES

Advanced

Accounting Mode: Off

☑ Answer Broadcast ESS

☐ Use Voice Prioritization

☐ Enable SVP

☐ Closed System

Inter-station Traffic: Allow Packets

Inactivity Timeout: 1800 seconds

Access Category: Normal

MCast Addr 1: 00 - 00 - 00 - 00 - 00 - 00

MCast Addr 2: 00 - 00 - 00 - 00 - 00 - 00

Status:

Figure 5-18. WLAN Edit Window

21. If you want to encrypt the wireless transmissions, select one of the options listed under **Encryption**. Use Table 5-9 to make your selection.

Table 5-11. Encryption Options for Web-Auth on the Wireless Edge Services Module

Encryption Option	Security Option
WEP 64	static WEP
WEP 128	static WEP
WPA/WPA2-TKIP	WPA/WPA2-PSK
WPA2-AES	WPA2-PSK
WPA/WPA2-TKIP and WPA2-AES	WPA/WPA2-PSK

For example, the Medical Center IT staff select **WPA/WPA2-TKIP** and **WPA2-AES** for the Staff WLAN. They do not select any encryption options for the Patients WLAN.

22. Click **OK**.
23. Select the WLAN and click **Enable**.
24. In the upper right corner of the Wireless Module Web browser interface, click **Save** to save the settings to the startup-config.

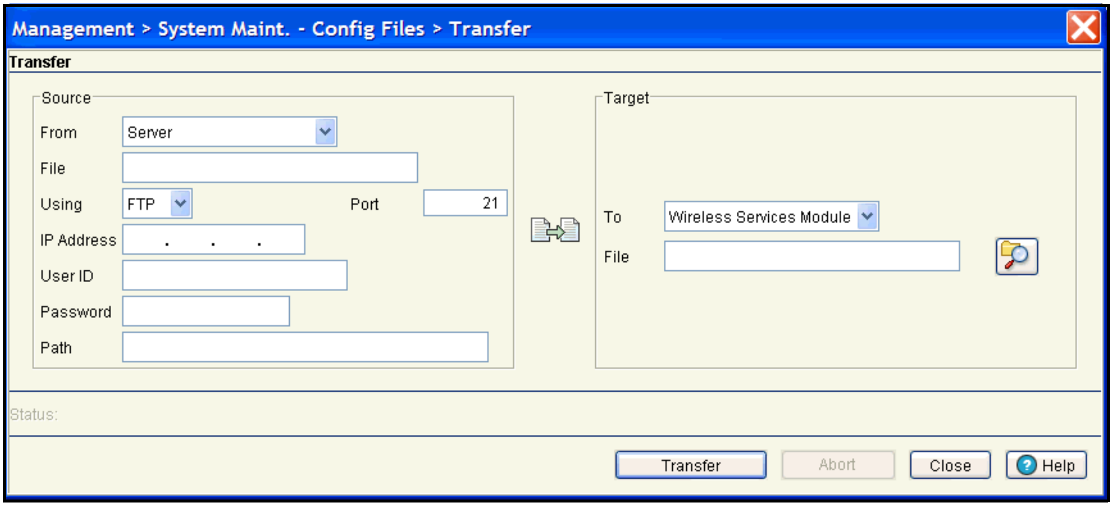
Copying Logo Files to the Module's Flash

If you want to display your organization's logo on the Web-Auth login, welcome, or failed page, you must copy the logo file to the appropriate directory on the Wireless Edge Services zl Module's flash.

The module's flash contains a **hotspot** directory that, in turn, contains a subdirectory for each WLAN on the module. To display a logo on one of the Web-Auth pages, you must copy the logo file to the **hotspot** subdirectory for the WLAN that you are configuring. For example, if you are configuring Web-Auth as the authentication method for WLAN 2, you must copy your organization's logo file to the **/hotspot/wlan2** directory in the module's flash. If you are configuring Web-Auth for WLAN 1, you must copy your organization's logo file to the **/hotspot/wlan1** directory.

To copy the logo file to the appropriate directory for the WLAN that you are configuring, you can use either an FTP or TFTP server. Copy the logo file to the FTP or TFTP server, and then complete these steps:

1. Select **Management** > **System Maint.—Config Files**.
2. Click **Transfer Files** at the bottom of the window. The **Transfer** window is displayed. (See Figure 5-19.)



Management > System Maint. - Config Files > Transfer

Transfer

Source

From: Server

Using: FTP

Port: 21

Target

To: Wireless Services Module

Figure 5-19. Management > System Maint.—Config Files > Transfer Window

3. Specify the source for the file transfer:

   a. In the **From** box under **Source**, select **Server** from the list.

   b. In the **File** box, type the name of the logo file.

   c. In the **Using** box, select either **FTP** or **TFTP** from the list.

   d. In the **IP Address** box, type the IP address of the FTP or TFTP server.

   e. If you are using an FTP server, type the login credentials.
      i. In the **User ID** box, type the username for the FTP server.
      ii. In the **Password** box, type the password for this username.

   f. In the **Path** box, type the path where the configuration is saved on the server. If you are using an FTP server and the logo file is saved at the server's root level, type a period followed by a slash (./). If the logo file resides at a different level on the FTP server, type the complete path. (If you are using a TFTP server, this box may not be required.)

4. Specify the destination as the Wireless Edge Services zl Module:

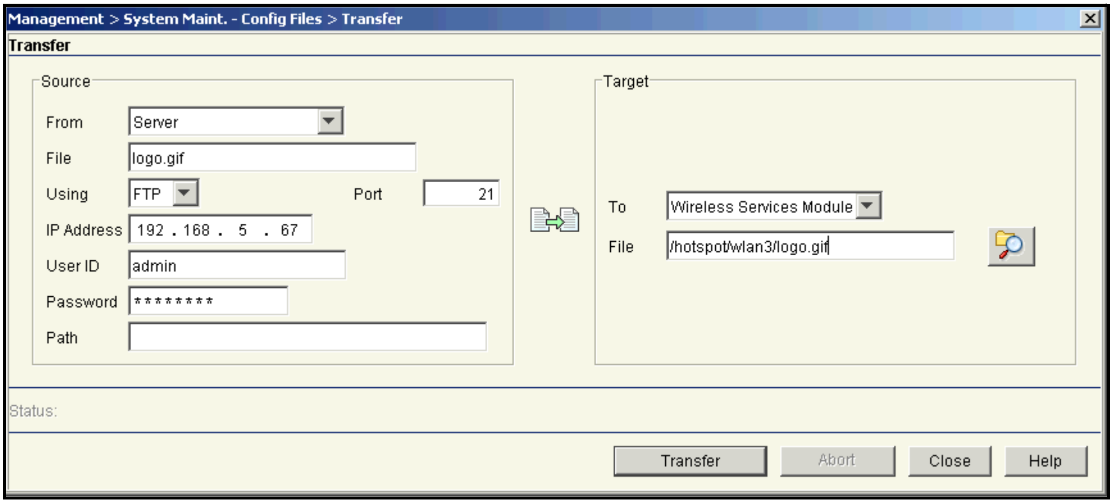
   a. In the **To** box under **Target**, select **Wireless Services Module**.

   b. In the **File** box, type the hotspot directory, the WLAN subdirectory, and the name of the logo file. Use the following syntax:

      /hotspot/<*WLAN subdirectory*>/<*logo filename*>

Replace **<*WLAN subdirectory*>** with the subdirectory for the WLAN that you are configuring, and replace **<*logo filename*>** with the filename that contains your organization's logo. For example, if you are configuring Web-Auth as the authentication method for WLAN 3, you would type:

/hotspot/wlan3/logo.gif



Management > System Maint. - Config Files > Transfer

Transfer

Source

From: Server
File: logo.gif
Using: FTP
Port: 21
IP Address: 192 . 168 . 5 . 67
User ID: admin
Password: ********
Path:

Target

To: Wireless Services Module
File: /hotspot/wlan3/logo.gif

Status:

Figure 5-20. Management > System Maint.—Config Files > Transfer Window

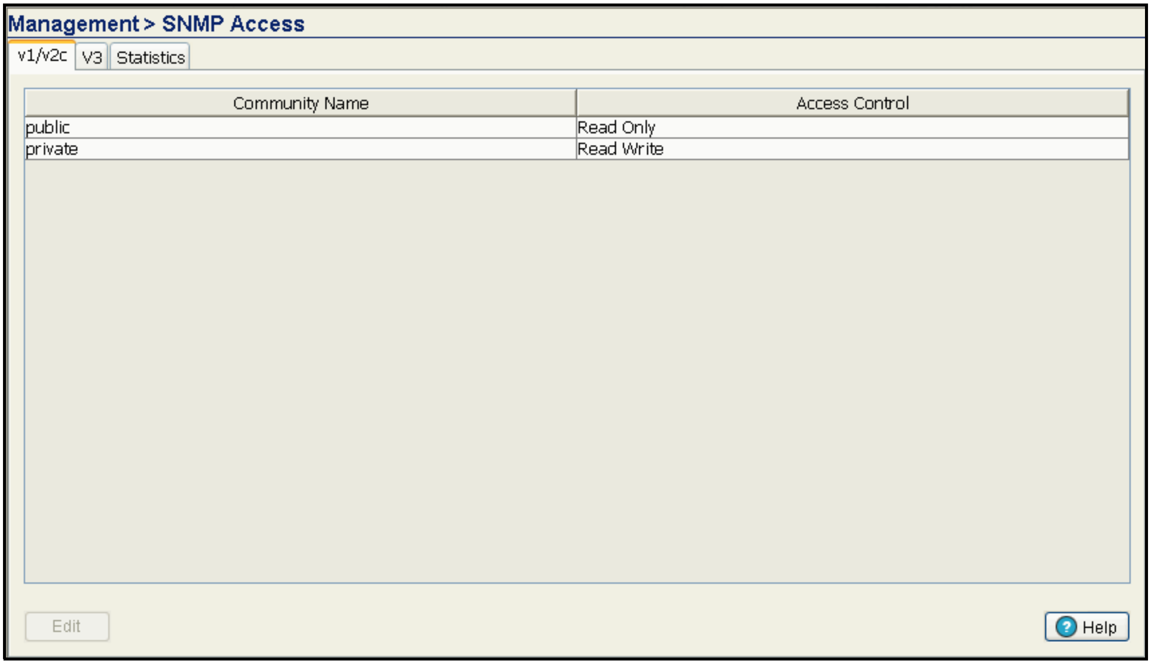
5. Click **Transfer**. In the **Status** area at the bottom of the window, a message is displayed, reporting whether the transfer was successful.

Configure SNMP on the Wireless Edge Services Modules

You must configure the Wireless Edge Services Modules' SNMP settings to allow PCM+ to manage it. SNMPv3 also controls access to the Module's Web browser interface.

Complete the following steps to configure SNMP:

1. You should be in the Wireless Edge Services Module's Web browser interface.
2. Click **Management** > **SNMP Access**. You begin at the **v1/v2c** tab.



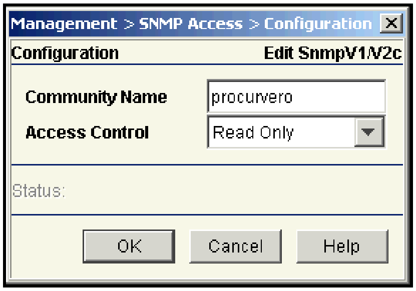
Management > SNMP Access

Community Name	Access Control
public	Read Only
private	Read Write

Figure 5-21. Wireless Edge Services Module Web Interface— Management > SNMP Access > V1/V2c Tab

3. Select **public** and click **Edit**. The **Edit SnmpV1/V2c** window is displayed.

4. For the **Community Name**, type the new name for the community (in this example, **procurvero**).



Management > SNMP Access > Configuration

Configuration Edit SnmpV1/V2c

Community Name: procurvero

Access Control: Read Only

Status:

Figure 5-22. Wireless Edge Services Module Web Interface— Edit SnmpV1/V2c Window

5. Keep the default setting, **Read Only**, in the **Access Control** box.

6. Click **OK**.

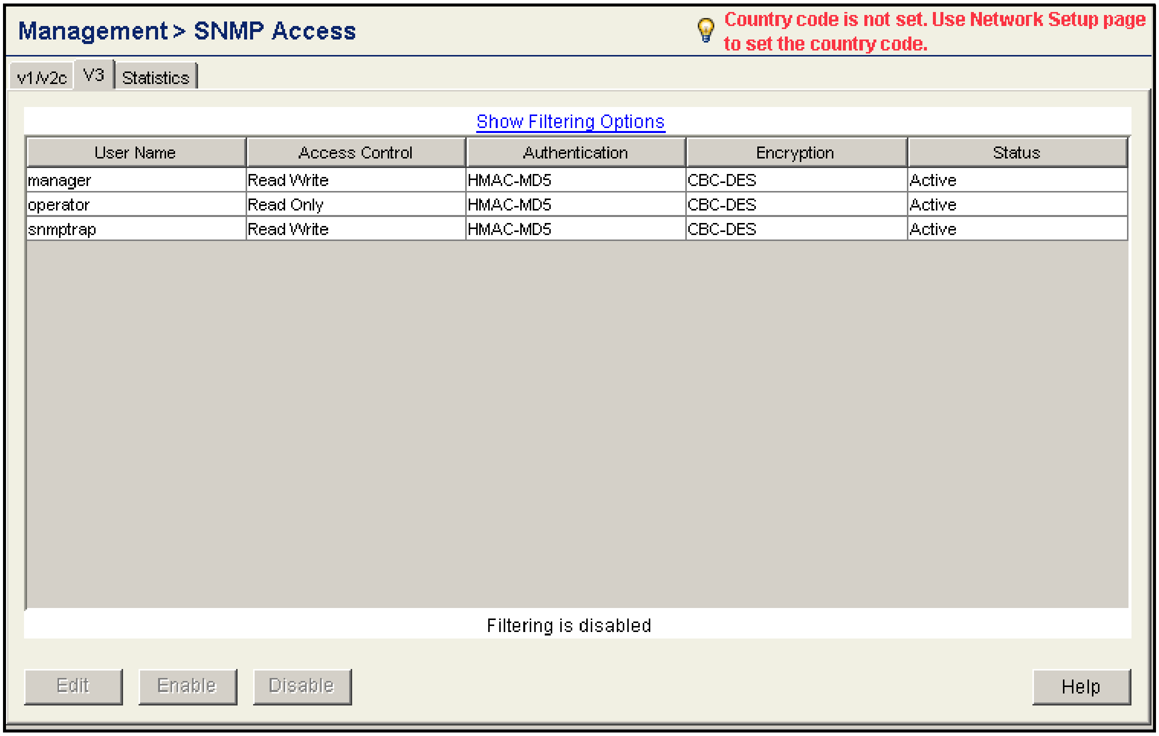
7. Select **private** and click **Edit**.

8. In the **Community Name** box, type the new name for the community. In this example: **procurverw**.

9. Keep the default setting, **Read Write**, in the **Access Control** box.

10. Click **OK**.

11. Click the **V3** tab.



Management > SNMP Access

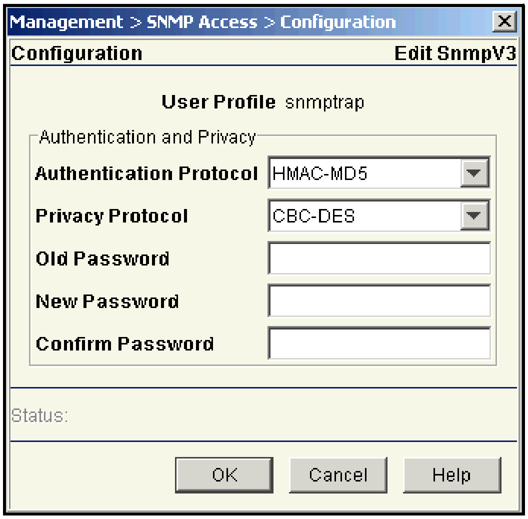
Country code is not set. Use Network Setup page to set the country code.

User Name	Access Control	Authentication	Encryption	Status
manager	Read Write	HMAC-MD5	CBC-DES	Active
operator	Read Only	HMAC-MD5	CBC-DES	Active
snmptrap	Read Write	HMAC-MD5	CBC-DES	Active

Filtering is disabled

Figure 5-23. Wireless Edge Services Module Web Interface—Management > SNMP Access > V3 Tab

12. Select **snmptrap** and click **Edit**. The **Edit SnmpV3** window is displayed.



Management > SNMP Access > Configuration

Configuration — Edit SnmpV3

User Profile snmptrap

Authentication and Privacy

Authentication Protocol: HMAC-MD5

Privacy Protocol: CBC-DES

Old Password:

New Password:

Confirm Password:

Status:

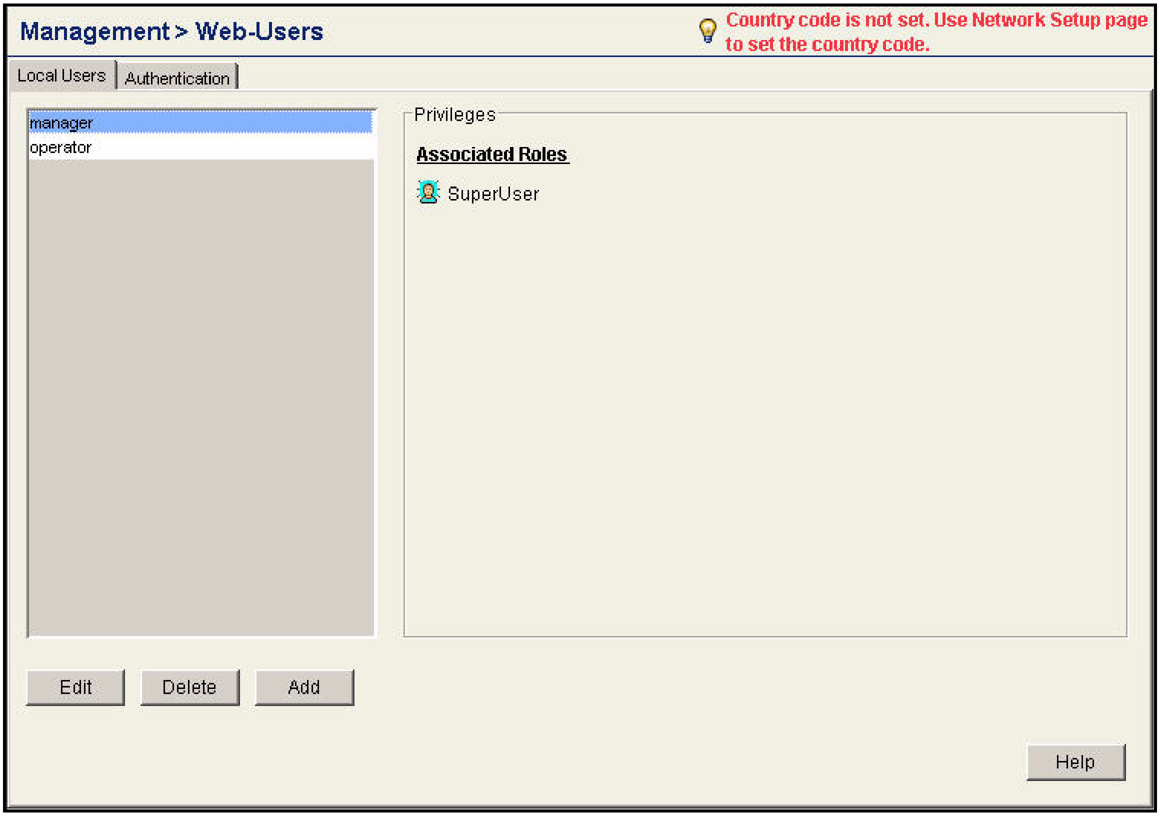
Figure 5-24. Wireless Edge Services Module Web Interface—Edit SnmpV3 Window

13. In the **Old Password** box, type the current password: **trapuser**.

14. In the **New Password** and **Confirm Password** boxes, type the new password (in this example, **procurve**).

15. Click **OK**.

16. The other two default SNMPv3 users are also part of the Wireless Edge Services Module's Web-Users. You will control them on the window for those users. Click **Management** > **Web-Users**.

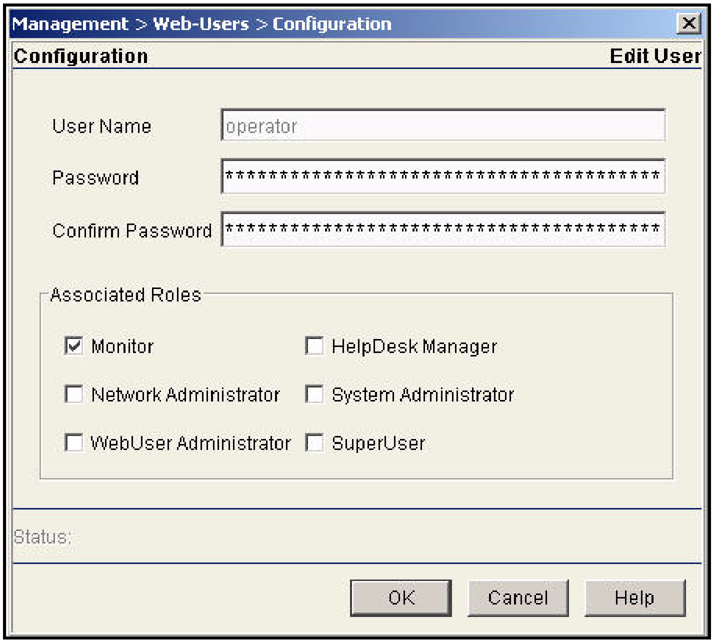


Management > Web-Users

Country code is not set. Use Network Setup page to set the country code.

Figure 5-25. Wireless Edge Services Module Web Interface—Management > Web-Users

17. Select **operator** and click **Edit**.



Management > Web-Users > Configuration

Configuration | Edit User

User Name: operator

Password: **

Confirm Password: **

Associated Roles

☑ Monitor　□ HelpDesk Manager

□ Network Administrator　□ System Administrator

□ WebUser Administrator　□ SuperUser

Status:

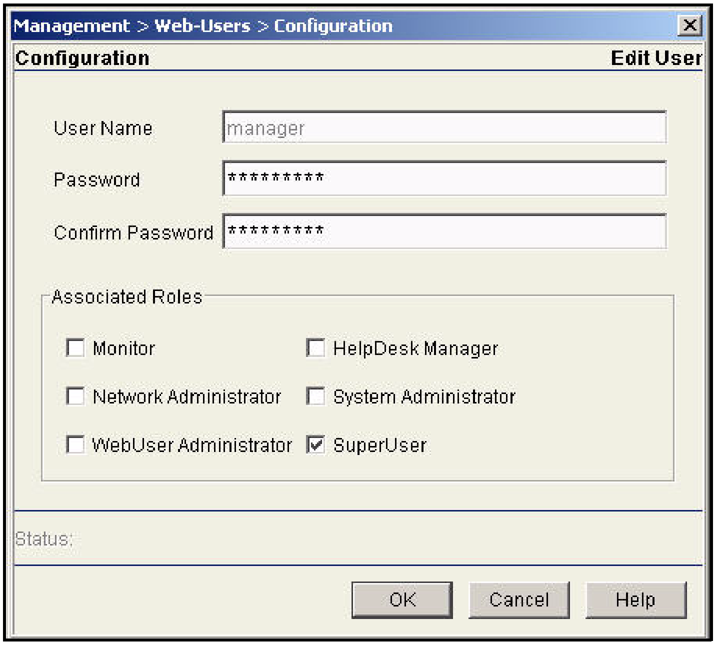
Figure 5-26. Wireless Edge Services Module Web Interface—Management > Web-Users > Configuration (operator)

18. In the **Password** and **Confirm Password** boxes, type the new password (in this example, **procurveoperator**).

19. Under **Associated Roles**, the **Monitor** check box is selected. Keep this default setting.

20. Click **OK**.

21. Select **manager** and click **Edit**.



User Name: manager

Password: *********

Confirm Password: *********

Associated Roles

□ Monitor	□ HelpDesk Manager
□ Network Administrator	□ System Administrator
□ WebUser Administrator	☑ SuperUser

Status:

Figure 5-27. Wireless Edge Services Module Web Interface—Management > Web-Users > Configuration (manager)

22. In the **Password** and **Confirm Password** boxes, type the new password (in this example, **Procurve1**).

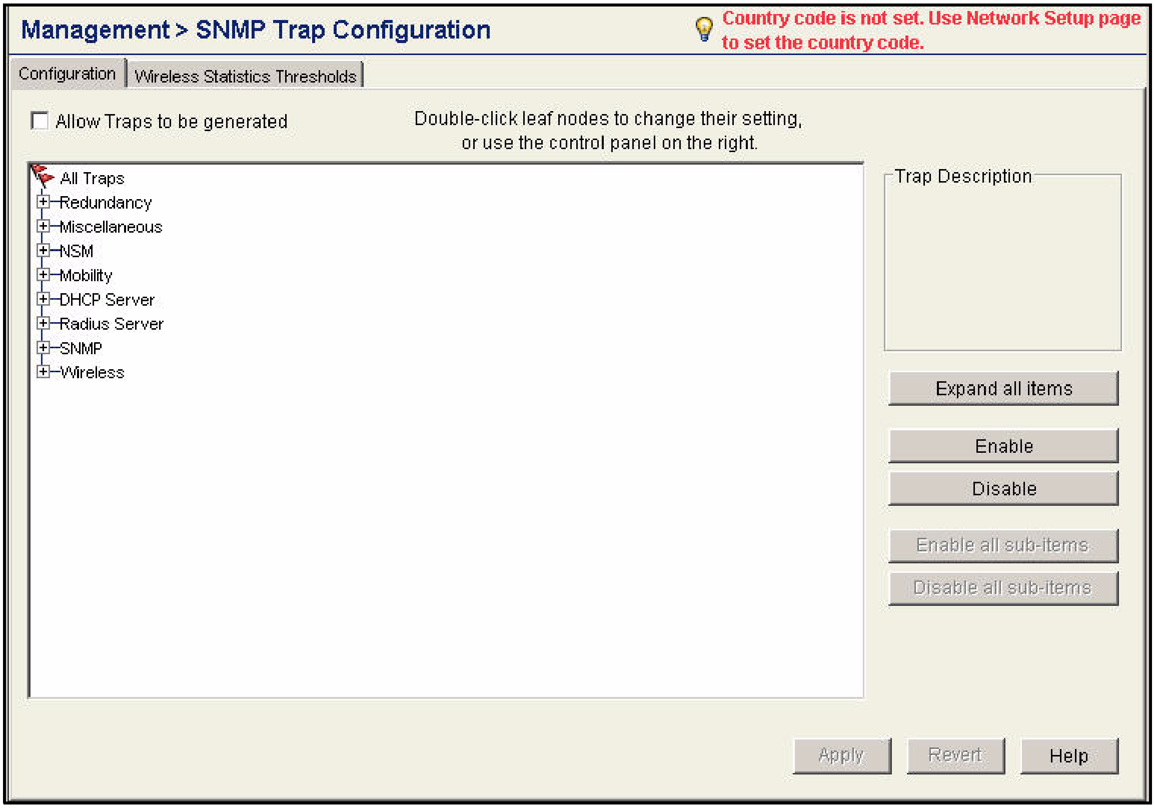
23. Under **Associated Roles**, the **SuperUser** check box is selected. Keep this default setting.

24. Click **OK**.

Note

You must enter this new password the next time you log in to the Web browser interface.

25. Select **Management** > **SNMP Trap Configuration**.


Management > SNMP Trap Configuration

Country code is not set. Use Network Setup page to set the country code.

□ Allow Traps to be generated

Double-click leaf nodes to change their setting, or use the control panel on the right.

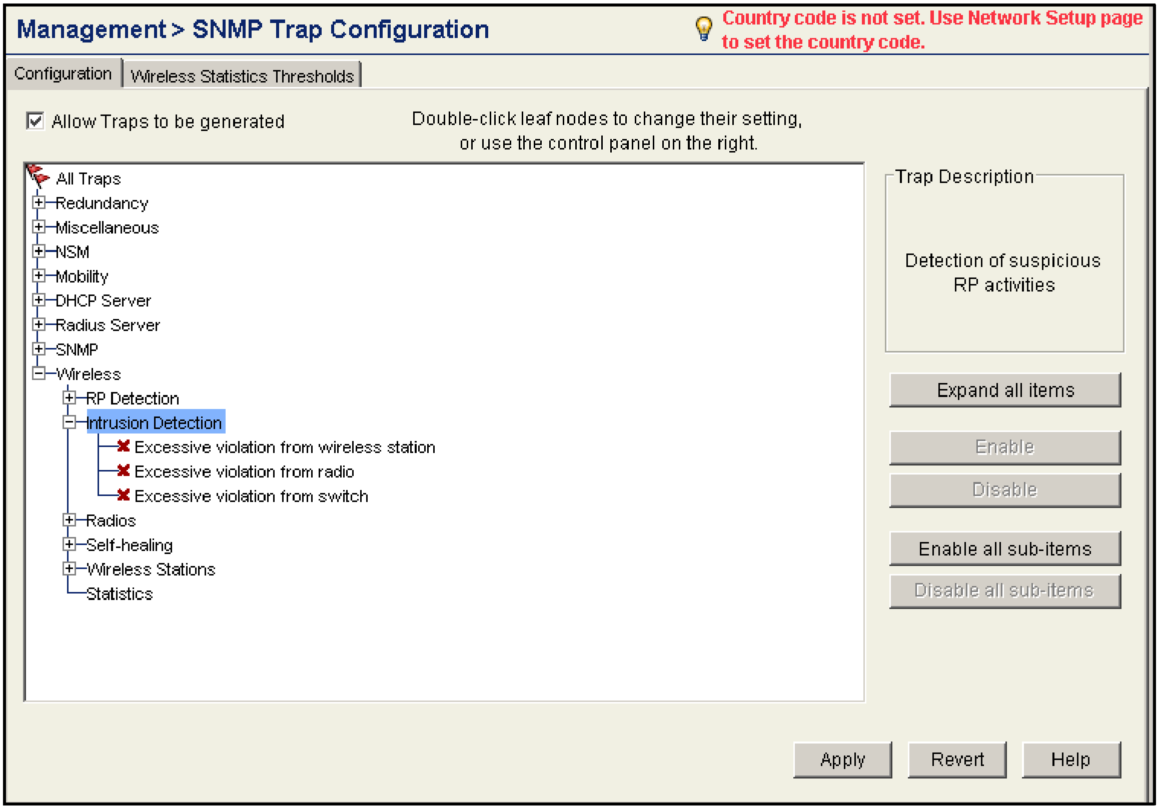
Figure 5-28. Wireless Edge Services Module Web Interface—Management > SNMP Trap Configuration > Configuration Tab

26. Select the **Allow Traps to be generated** check box.

27. To view the SNMP traps in a category, expand the category. To view the SNMP traps in all categories, click **Expand all items**.

28. To enable all the traps, select **All Traps** and click **Enable all sub-items**.

29. To enable all the SNMP traps in a category, select the category and click **Enable all sub-items**.



Management > SNMP Trap Configuration

Country code is not set. Use Network Setup page to set the country code.

☑ Allow Traps to be generated

Double-click leaf nodes to change their setting, or use the control panel on the right.

Trap Description: Detection of suspicious RP activities

Figure 5-29. Wireless Edge Services Module Web Interface—Management > SNMP Trap Configuration > Configuration Tab

30. To enable a specific SNMP trap, select the trap and dick **Enable** or double-click the trap. A green check mark is displayed next to enabled traps. A red x is displayed next to disabled traps.

31. Click **Apply**.

802.1X Authentication for RPs

Enforcing 802.1X authentication on your network switch ports can help you prevent rogue RPs from being adopted by your Wireless Edge Services Module. The ProCurve RPs 210, 220, and 230 include an 802.1X supplicant so that they can connect to ports that enforce such authentication. Using MD5 authentication, the supplicant automatically sends the RP's credentials when the RP connects to a network device. The switch to which the RP connects forwards the credentials to an authentication server and, if the credentials are correct, allows the RP to join the network.

You must create an account for the RP on the RADIUS server. In the example network used, the NAC 800 is the RADIUS server and uses OpenLDAP as its data store. Therefore, you must create the account in OpenLDAP.

The authentication server may store a VLAN setting for the RP, which it sends to the switch after the RP authenticates. Such dynamic configuration of the Radio Port VLAN can replace auto-provisioning on the wireless services-enabled switch or manual configuration on an infrastructure switch.

Note

When you implement 802.1X on a port, auto-provisioning is disabled on that port. You must either manually set the port to the correct VLAN for the RP or configure the VLAN assignment on the RADIUS server.

However, the wireless services-enabled switch can continue to implement auto-provisioning on ports that do not enforce 802.1X.

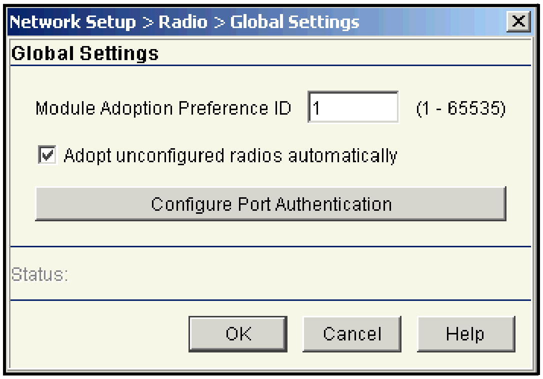
The default username and password on all ProCurve 200 Series RPs are **admin** and **procurve**.

ProCurve Networking suggests that you use pre-adoption to change these settings, using a Wireless Edge Services Module to load new credentials on your organization's RPs. You can then move these RPs to their final locations and be sure that only these RPs can connect to your network.

Configure 802.1X Authentication for RPs

To configure 802.1X authentication for RPs, complete these steps:

1. Select **Network Setup** > **Radio** > **Configuration**.
2. Click **Global Settings**. The **Global Settings** window is displayed.



Network Setup > Radio > Global Settings

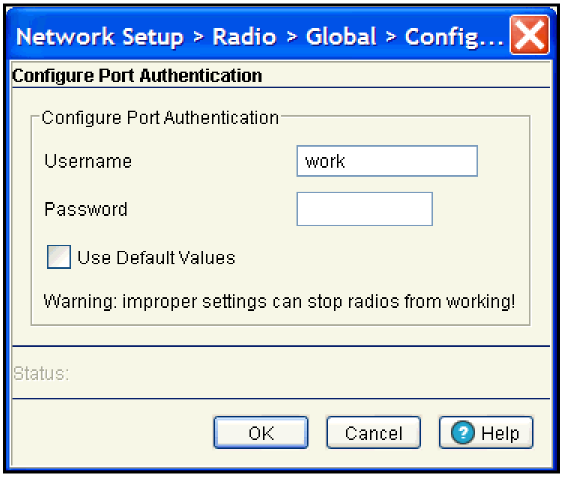
Global Settings

Module Adoption Preference ID 1 (1 - 65535)

☑ Adopt unconfigured radios automatically

Figure 5-30. Radio Global Settings Window

3. Click **Configure Port Authentication**. The **Configure Port Authentication** window is displayed.



Network Setup > Radio > Global > Config...

Configure Port Authentication

Configure Port Authentication

Username work

Password

□ Use Default Values

Warning: improper settings can stop radios from working!

Figure 5-31. Configure Port Authentication Window

4. Configure a username and password.
   - Check the **Use Default Values** box to use the default username and password:
     – **Username**: **admin**
     – **Password**: **procurve**
   - Or, in the **Username** and **Password** boxes, type the username and password that you want to use.

5. Click **OK**, and then click **OK** on the **Global** window.

Note

The Wireless Edge Services Module pushes the username and password to the RPs as a one time occurrence. You must complete these steps again to configure the username and password on an RP that is adopted later.

6. Click **Save** at the top of the Web browser interface to save the changes to the startup-config.

Configure OpenLDAP

Although a detailed discussion of an LDAP directory is beyond the scope of this guide, this section is designed to provide instructions for the tasks related to using OpenLDAP as the data store for network access control. If you are not familiar with OpenLDAP, it will help you understand the basic structure of OpenLDAP so that you can configure OpenLDAP settings on the NAC 800 and IDM.

If you are the OpenLDAP administrator, you already have an in-depth knowledge of OpenLDAP and will simply need to ensure that you have extended the OpenLDAP schema to support RADIUS and have uploaded a root Certificate Authority (CA) certificate on OpenLDAP. You can then upload the same CA certificate on both the NAC 800 and PCM+. This will allow you to secure communications between OpenLDAP and the NAC 800 and OpenLDAP and PCM+.

This section describes the following:

- Extending the OpenLDAP schema
- Creating objects in OpenLDAP
- Binding to OpenLDAP
- Using OpenSSL to create a root CA certificate and a server certificate for the OpenLDAP directory

It is assumed that OpenLDAP is already installed and set up for your network environment. (For information about installing OpenLDAP and completing the initial setup, visit *http://www.openldap.org* or *http://www.bind9.net/download-openldap.*)

Extend the OpenLDAP Schema to Support RADIUS

OpenLDAP is an object-based directory service, and the types of objects it supports—called object classes—are controlled by the schema. You can think of the schema as the policies and rules that govern the directory. The schema not only controls the type of objects that you can create, but also the attributes, or characteristics, that you can define for each one. (For more detailed information about OpenLDAP object classes and attributes, visit *http://www.openldap.org*.)

Objects in the Standard OpenLDAP Schema

OpenLDAP installs with a standard schema that allows you to create objects that:

- Help you organize the information you store in OpenLDAP
- Represent users and devices

For example, the organizational unit (OU) is a container object, which can hold other objects. You can use an OU to organize your directory by branch office, department, or types of objects.

For the purposes of access control, the most important object classes are:

- **Person**—This object class allows you to define objects for users. Supported attributes include common name (CN), surname (SN), userPassword, and mobileTelephoneNumber.

  For the example network, you will also use the person object to define accounts for RPs. This will allow you to manage the RPs through IDM. (You will learn how to import person objects from OpenLDAP into IDM in “Import Users” on page 5-109.)

  Because other directories have user objects rather than person objects, applications are often configured by default to search for user objects in the directory tree. You must check the search settings in applications to ensure that they are using the correct object classes and attributes for OpenLDAP.
- **Device**—This object class allows you to define objects for devices such as printers and VoIP phones. Headless devices such as printers and VoIP phones can be authenticated using MAC-Auth. For MAC-Auth, you must create an object that uses the device’s MAC address for both the CN or unique ID (UID) and the userPassword.

  By default, the device object does not support the UID or userPassword attribute. You must extend the OpenLDAP schema to provide this support, as described in the next section.

- **GroupofNames or GroupofuniqueNames**—These container objects allow you to group users with similar access rights. Although both GroupofNames and GroupofuniqueNames create groups in OpenLDAP, the latter imposes an additional requirement. When you define a GroupofuniqueNames, you must assign it a name that is not used anywhere else in the directory. Likewise, the uniqueMembers of the group can be members of only one group.

  When you define a GroupofNames, you typically rely on context to ensure uniqueness. For example, you cannot create two Marketing GroupofNames objects in the same container object. However, you could create two OU objects—one called Europe and one called Asia. You could then create a Marketing group in each OU. The DN of both groups would be unique:

  cn=Marketing,ou=Europe,o=MyCompany.com

  cn=Marketing,ou=Asia,o=MyCompany.com

  In addition to the member attribute, GroupofNames supports the CN and businessCategory attributes. The GroupofuniqueNames supports these two attributes as well.

  Again, other directories name this object class differently, using group, rather than GroupofNames, so you will need to check the search settings in applications that bind to OpenLDAP.

Create and Modify Files to Extend the Schema

The standard OpenLDAP schema does not support RADIUS. To use OpenLDAP to verify login information for a RADIUS server, therefore, you must first extend the schema to support RADIUS-related objects and attributes.

To download the file that you need to extend the schema, visit *http://www.freeradius.org/radiusd/doc/* and download the *ldap_howto.txt* file. Using this file, complete the following steps to extend the schema:

1. Use a text editor to open the *ldap_howto.txt* file. Locate the “Begin RADIUS-LDAPv3.schema” section and copy the entire section, until you see the heading “End RADIUS-LDAPv3.schema.”

2. Create a file containing the text you copied and save it with the filename RADIUS-LDAPv3.schema.

3. Copy the RADIUS-LDAPv3.schema file to the OpenLDAP directory that contains the other schema files. Typically, this directory is:

   /usr/local/etc/openldap/schema

If you are running OpenLDAP on Windows and you installed OpenLDAP in the *Program Files* directory, the schema files are located in the following directory:

C:/Program Files/OpenLDAP/schema

4. Modify the **slapd.conf** file, which is located in the main OpenLDAP directory.

   /usr/local/etc/openldap/schema

   or

   C:/Program Files/OpenLDAP/schema

   a. Use a text editor to open the **slapd.conf** file.

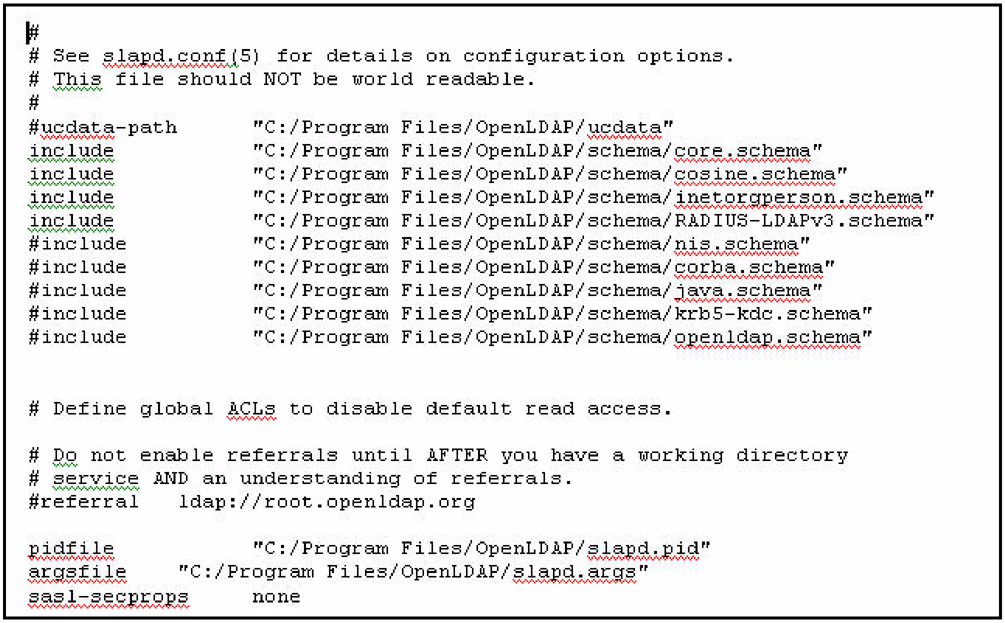
   b. Locate the include section, as shown in Figure 5-32.

   c. Add a new line to the include section:

   ```
   include /usr/local/etc/openldap/schema/
   RADIUS-LDAPv3.schema
   ```

   or

   ```
   include C:/Program Files/OpenLDAP/schema/
   RADIUS-LDAPv3.schema
   ```



```
#
# See slapd.conf(5) for details on configuration options.
# This file should NOT be world readable.
#
#ucdata-path      "C:/Program Files/OpenLDAP/ucdata"
include           "C:/Program Files/OpenLDAP/schema/core.schema"
include           "C:/Program Files/OpenLDAP/schema/cosine.schema"
include           "C:/Program Files/OpenLDAP/schema/inetorgperson.schema"
include           "C:/Program Files/OpenLDAP/schema/RADIUS-LDAPv3.schema"
#include          "C:/Program Files/OpenLDAP/schema/nis.schema"
#include          "C:/Program Files/OpenLDAP/schema/corba.schema"
#include          "C:/Program Files/OpenLDAP/schema/java.schema"
#include          "C:/Program Files/OpenLDAP/schema/krb5-kdc.schema"
#include          "C:/Program Files/OpenLDAP/schema/openldap.schema"


# Define global ACLs to disable default read access.

# Do not enable referrals until AFTER you have a working directory
# service AND an understanding of referrals.
#referral   ldap://root.openldap.org

pidfile           "C:/Program Files/OpenLDAP/slapd.pid"
argsfile    "C:/Program Files/OpenLDAP/slapd.args"
sasl-secprops     none
```

Figure 5-32. The OpenLDAP slapd.conf File

d. Save the change you made to the **slapd.conf** file and restart the RADIUS server.

RADIUS Objects

After you extend the schema, OpenLDAP supports the object class radiusprofile, which includes the attributes needed to allow a person object to be authenticated through a RADIUS server that uses OpenLDAP as the data store:

- UID
- userPassword
- dialupAccess

(These are only a few of the attributes that are added when you extend the OpenLDAP schema to support RADIUS. For a more complete list, see the *ldap_howto.txt* file at *http://www.freeradius.org/radius/doc*.)

If the NAC 800 is configured to use OpenLDAP as its data store and a user attempts to access the network, the NAC 800 will search the OpenLDAP directory for these three attributes. If the OpenLDAP schema has not been extended to include the radiusprofile object and these attributes, OpenLDAP cannot return values for the attributes. It will appear as if OpenLDAP is rejecting the NAC 800's bind request. (For more information about binding to OpenLDAP, see "Bind to OpenLDAP" on page 5-73.)

Create Objects in OpenLDAP

To add objects such OUs, persons, and GroupofNames to OpenLDAP, you must create a file and define the objects and their attributes using the Lightweight Directory Interchange Format (LDIF) format. OpenLDAP can then recognize the objects and add them to its database.

The LDIF format requires you to type the distinguished name (DN) for the object you are creating. The DN includes the object name and the context in the directory tree. You must also specify the object class and the attributes you are configuring. Each object class has required attributes and optional attributes. For example, when you create a person object, the CN, SN, and userPassword attributes are required.

To allow users to be authenticated through a RADIUS server, you add the radiusprofile object as an auxiliary object class for person objects. When you define an auxiliary object class, one object class must be used to establish the object's place in the directory. You would typically use the person object class for this purpose. As an auxiliary object, the radiusprofile object class adds the attributes required to support RADIUS. For the person object, the radiusprofile object adds the UID and dailupAccess attributes. The person object already supports the userPassword attribute.

For the device object, however, the radiusprofile object adds the userPassword object as well. This allows the device object to be authenticated through MAC-Auth.

To create the LDIF file to add objects to your OpenLDAP directory, complete these steps.

1. Open a text editor and create a file.
2. Use the following syntax to add an OU to the directory:

Syntax: dn: ou=<*ou_name*>,[o=<*mydomain.com*> | dc=<*mydomain*>,dc=<*com*>]
objectclass: organizational unit
ou: <*ou_name*>

Defines the OU that you want to create.

To specify the dn, type the ou followed by the location in the OpenLDAP tree. Depending on how your directory is configured, use either o= or dc= to specify the base dn.

For example, to create an OU for the Medical Center groups, type:

```
dn: ou=Medgroups,o=MedCenter.com
objectclass: organizational unit
ou: Medgroups
```

3. Use the following syntax to add a user object to the directory and define the radiusprofile object as an auxiliary object class:

Syntax: dn: cn=<*username*>,[o=<*mydomain.com*> | dc=<*mydomain*>,dc=<*com*>]
objectclass: person
objectclass: radiusprofile
cn: <*username*>
son: <*surname*>
userPassword: <*password*>
uid: <*username*>
dialiupAccess: true

Specifies the user that you want to add to OpenLDAP.

To specify the dn, type the cn followed by the location in the OpenLDAP tree where you want to create the user. Depending on how your directory is configured, use either o= or dc=.

If you want to place the user in an OU, include the OU as part of the dn:

dn: cn=<*username*>,ou=<*ou_name*>,[o=<*mydomain.com*> | dc=<*mydomain*>,dc=<*com*>]

*Replace <**username**>, <**surname**>, and <**password**> with information specific to each user.*

For the **dialupAccess** *attribute, type the* **true** *value. This attribute is required for RADIUS authentication.*

For example:

```
dn: cn=Heidi,o=MedCenter.com
objectclass: person
object class: radiusprofile
cn: Heidi
sn: Olson
userPassword: procurve101
uid: Heidi
dialupAccess: true
```

Because you want to use IDM to manage RADIUS attributes for users and devices, you will use the person object to create accounts for devices. That way, they can be imported into IDM. To define a person object for a headless device, which will be authenticated through MAC-Auth, type:

```
dn: cn=000E35CE8290,o=MedCenter.com
objectclass: person
objectclass: radiusprofile
cn: 000E35CE8290
sn: printer
userPassword: 000E35CE8290
uid: 000E35CE8290
dialupAccess: true
```

For MAC-Auth, the userPassword must match the CN and UID, and you must type it in the format used by the edge switch that submits the endpoint's MAC address as the login credentials. By default, the ProCurve 5300xl, 3500yl, 5400zl, and 6200yl Switches use the format **aabbccddeeff**.

You can define additional attributes for devices. For more information, visit *http://www.openldap.org*.

4. To create a group and assign users or devices to that group, type:

Syntax: dn: cn=<*group_name*>,ou=<*OU_name*>,[o=<*mydomain.com*> | dc=<*mydomain*>,dc=<*com*>]

objectclass: groupofnames

cn: <*group_name*>

member: cn=<username>,[o=<*mydomain.com*> | dc=<*mydomain*>,dc=<*com*>]

Defines the group that you want to add to OpenLDAP.

*Replace <**group_name**> with the name of the group you are creating.*

*Replace <**OU_name**> and <**mydomain**> with information specific to your network.*

*Replace <**username**> with a person object that you have already created in OpenLDAP.*

Depending on how your directory is configured, use either **o=** *or* **dc=** *to define the DN.*

For example:

```
dn: cn=Staff,ou=Medgroups,o=MedCenter.com
objectclass: groupofnames
cn: Staff
member: cn=Heidi,o=MedCenter.com
member: cn=Hans,o=MedCenter.com
```

In a live network, you would, of course, add many users to this group.

5. Save the file with the .LDIF extension and copy it to your OpenLDAP directory. (If you do not copy the file to your OpenLDAP directory, you must include the path to the file when you type your **ldapadd** command, as described in the next step.)

6. From the command line, move to the OpenLDAP directory and type the following command. If you do not move to the OpenLDAP directory, simply include the directory path before the **ldapadd** command.

Syntax: <*directory*/>ldapadd [options] -f <*LDIF_filename*>

If you are not in the directory that contains **ldapadd**, *include the directory path where* **ldapadd** *resides in your command.*

Options include:
-x
-D "cn=Manager,[o=<*mydomain.com*> | dc=<*mydomain*>,dc=com]"
-h <*hostname*>
-W
-w

Adds the objects specified in the LDIF file to the OpenLDAP datastore.

Include **-x** *to have the OpenLDAP server sort results before sending the results to the client.*

Include **-D** *and the DN with which to authenticate to the server. Specify a DN that has rights to search the directory and enclose it in quotation marks. If your OpenLDAP server supports anonymous searches, you do not need to include this option.*

Include **-h** *and the hostname of the OpenLDAP server if you are conducting a remote search. If you do not specify a host,* **ldapadd** *command uses the localhost.*

Include **-W** *to be prompted for the password for the DN you provided with* **-D**.

Use **-w** *to include the password in your* **ldapadd** *command. If you do not specify a password, an anonymous search is used (but your OpenLDAP server must support anonymous searches).*

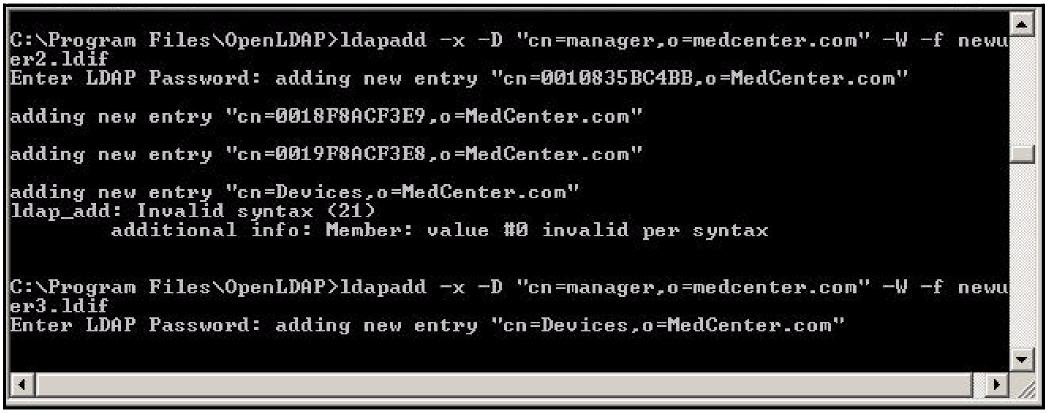
Include **-f** *and replace <**LDIF_filename**> with the name of the file you created.*

For example:

```
ldapadd -x -D "cn=Manager,o=MedCenter.com" -W -f
newuser.ldif
```

If you use the correct syntax in your **LDAPadd** command, all the users you configured will be added, and messages will be displayed at the command prompt, listing the DN of the users added as shown in Figure 5-33.

If there is a problem with the syntax you typed in the LDIF file, **ldapadd** will display a message to notify you of the problem. For example, the LDIF file may contain entries with incorrect syntax, as shown in Figure 5-33. You can then correct the LDIF file and re-type the **ldapadd** command.



```
C:\Program Files\OpenLDAP>ldapadd -x -D "cn=manager,o=medcenter.com" -W -f newu
er2.ldif
Enter LDAP Password: adding new entry "cn=0010835BC4BB,o=MedCenter.com"

adding new entry "cn=0018F8ACF3E9,o=MedCenter.com"

adding new entry "cn=0019F8ACF3E8,o=MedCenter.com"

adding new entry "cn=Devices,o=MedCenter.com"
ldap_add: Invalid syntax (21)
        additional info: Member: value #0 invalid per syntax


C:\Program Files\OpenLDAP>ldapadd -x -D "cn=manager,o=medcenter.com" -W -f newu
er3.ldif
Enter LDAP Password: adding new entry "cn=Devices,o=MedCenter.com"
```

Figure 5-33. Adding Users to an OpenLDAP Directory

Bind to OpenLDAP

When you use OpenLDAP as the data store for access controls, the NAC 800 must bind to OpenLDAP before submitting queries to verify users' or devices' login credentials. If you are using IDM, it must also bind to OpenLDAP if you want to import user data from the directory into IDM.

To bind to OpenLDAP, the NAC 800 must know:

- The base DN, or root, of the directory
- The administrator with rights to the entire directory
- Object class for user accounts and the attribute that stores passwords (userPassword in OpenLDAP)

(You will learn how to configure the OpenLDAP information in the NAC 800 Web browser interface later in this chapter. See "Configure Authentication to an OpenLDAP Server" on page 5-85.)

If you are using IDM to define policies for your users and you want to import users from OpenLDAP, you will also need to know:

- Object class for group—groupofnames or groupofuniquenames, depending on which object class your organization uses
- Attributes for the person and groupofnames (or groupofuniquenames) objects

(You will learn how to configure this information in IDM later in this chapter. See “Importing Users from an LDAP Server” on page 5-113.)

Base DN and Administrator

The base DN and the administrator that resides there are defined when OpenLDAP is installed. If you are not the OpenLDAP administrator, contact the administrator and request this information. The base DN is typically defined in one of the following ways:

dc=MedCenter,dc=com

or

o=MedCenter.com

In OpenLDAP, the administrator is a person object that has rights to the entire directory. This object must be created at the base DN level of the directory. When specifying the administrator, you typically type the CN and the object’s context, or place, in the directory. To define a context in OpenLDAP, you must include the object’s CN, the base DN, and any container objects in between. Because the administrator must be created at the base DN, you would typically type something like:

cn=Manager,dc=MedCenter,dc=com

or

cn=Manager,o=MedCenter.com

Configure a Root CA with OpenSSL

Whenever possible, you should use Transport Layer Security (TLS) to protect the communications between the NAC 800 and the OpenLDAP server. Using TLS requires you to load a CA certificate on the OpenLDAP server. You must then load that CA certificate on the NAC 800 as well.

You can request a CA certificate from a CA such as VeriSign. You can also use OpenSSL to create a root CA certificate and a server, or intermediate, certificate.

Because OpenLDAP requires OpenSSL (and several other software components), you should already be running OpenSSL on your OpenLDAP server.

To create a CA certificate using OpenSSL, complete these steps.

1. Access a command prompt and move to the OpenSSL bin directory. For example:

   ```
   cd openssl\bin
   ```

   If you are using a Linux system and do not move to this directory, include the directory path where OpenSSL resides on your computer in the commands that follow.

2. Create the private key for the CA certificate:

Syntax: openssl genrsa [-out <*key_name*>] [<*encryption options*>] <*size of key*>

Generates a private CA key.

*Replace <***key_name***> with a name that meets the requirements of your environment. By default, OpenLDAP is configured to use the name* **cakey.pem***. (You can change this name by editing the* **CA.conf** *file.)*

For encryption options, select one of the following or omit this option for no encryption:

- **-des**
- **-des3**
- **-idea**

*Replace <***size of key***> with* **512**, **1024**, **2048**, *or* **4096**. *Include this option last in your command.*

Other options are available for this command. See http://www.openssl.org/docs/apps/genrsa.html for more information.

For example:

```
openssl genrsa -out -des3 cakey.pem 1024
```

3. When prompted, type and re-type a pass phrase (password). Ensure that you are following best practices for creating a password.

4. Create the public key and the CA certificate.

Syntax: openssl req -new -x509 -days <*number of days*> -key <*key_name*> -out <*certificate_name*>

Generates a public CA key.

Include the **-x509** *option to generate a certificate (rather than a request).*

*Replace <***number of days***> with the number of days that you want the certificate to be valid. The default value is 30.*

*Replace <***key_name***> with a name that meets the requirements of your environment. Type the name you specified for the private key in step 3. By default, OpenLDAP is configured to use the name* **cakey.pem**.

*Replace <***certificate_name***> with a name that meets the requirements of your environment. By default, OpenLDAP is configured to use the name* **ca.pem**.

This command supports numerous options. For more information, visit http://www.openssl.org/docs/apps/req.html.

For example:

```
openssl req -x509 -days 365 -key cakey.pem -out ca.pem
```

5. When prompted, type the information for your directory:

Country name—Specify the two-digit country code.

State name—Specify the complete name of the state or province.

Locality—Specify the name of the city.

Organization—Type the name of the Organization object as defined in the OpenLDAP.

Organization unit—Type the OU as defined in OpenLDAP.

Common name—Type the DN of your base DN in OpenLDAP.

Email—Type a valid email address.

For the example network, you would enter:

Table 5-12. Entering Information for a CA Certificate for OpenLDAP

Encryption Option	Security Option
Country name	US
State name	California
Locality	Roseville
Organization	MedCenter
Organization unit	Medical
Common name	MedCenter.com
Email	ca@MedCenter.com

Create an Intermediate Certificate

You must now create an intermediate, or server, certificate.

1. Access a command prompt and move to the OpenSSL bin directory. For example:

   ```
   cd openssl\bin
   ```

   If you do not move to this directory, include the directory path where OpenSSL resides on your computer in the commands that follow.

2. Generate a private key by typing:

Syntax: openssl genrsa [-des | -des3 | idea] -out <*server key name*> <*size of key*>

Generates a private key for the intermediate certificate.

Include **-des**, **-des3**, *or* **idea** *to specify the type of encryption you want to use.*

*Replace <**server key name**> with the name of the public key you want to generate. OpenLDAP by default uses* **serverkey.pem** *as the server key name.*

*Replace <**size of key**> with* **512**, **1024**, **2048**, *or* **4096**. *Include this as the last option in your command.*

For example:

```
openssl genrsa -des3 -out serverkey.pem 1024
```

3. When prompted, type and re-type a password.

4. Create a certificate request:

Syntax: openssl req -new -key <*server key name*> -out <*server CSR name*>

Generates a certificate request.

Include the **-new** *option to request a new certificate.*

*Replace <***server key name***> with the name of the public key you generated in step 2. For example:* **serverkey.pem**.

*Replace <***server CSR name***> with the name you want to give the certificate signing request (CSR) name. For example,* **servercsr.pem**.

For example:

```
openssl req -new -key serverkey.pem -out server.pem
```

5. When prompted, enter the pass phrase for the serverkey.pem.

6. When prompted, type the information for your directory. You should type the same information you typed when you created the root CA certificate. See Table 5-13.

   Country name—Specify the two-digit country code.

   State name—Specify the complete name of the state or province.

   Locality—Specify the name of the city.

   Organization—Type the name of the Organization object as defined in the OpenLDAP.

   Organization unit—Type the OU as defined in OpenLDAP.

   Common name—Type the DN of your base DN in OpenLDAP.

   Email—Type a valid email address.

   When you are prompted for a challenge password and optional company name, simply press **Enter** to skip.

Table 5-13. Entering Information for the OpenLDAP Server Certificate

Encryption Option	Security Option
Country name	US
State name	California
Locality	Roseville
Organization	MedCenter
Organization unit	Medical
Common name	MedCenter.com
Email	ca@MedCenter.com

7. Type the following command to sign the request.

Syntax: openssl x509 -req -days <*number of days*> -in <*server CSR name*> -CA <*certificate name*> -CAkey <*public key name*> -set_serial 01 -out <*server certificate name*>

Signs a certificate request.

*Replace <***number of days***> with the number of days that you want the certificate to be valid. The default value is 30.*

*Replace <***server CSR name***> with the name you gave the CSR in step 5.* For example, **servercsr.pem.**

*Replace <***certificate_name***> with the CA certificate you generated. For example,* **ca.pem.**

*Replace <***public key name***> with the public key you generated. For example,* **cakey.pem.**

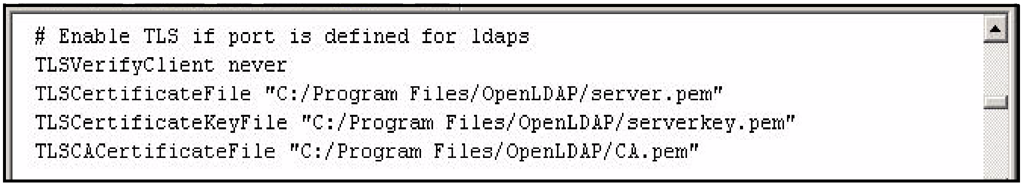
*Replace <***server certificate name***> with the name of the certificate you want to create. By default, OpenLDAP uses the name* **server.pem**.

Copy the Keys and Certificates to OpenLDAP

You must then copy the following to the OpenLDAP directory referenced in the **slapd.conf** file:

- CA certificate, which is named **cacrt.pem** in the example
- Server key, which is named **serverkey.pem** in the example
- Server certificate, which is named **servercrt.pem** in the example

You must also ensure that the *slapd.conf* file uses the correct names for the key and the certificates, as shown in Figure 5-34.



```
# Enable TLS if port is defined for ldaps
TLSVerifyClient never
TLSCertificateFile "C:/Program Files/OpenLDAP/server.pem"
TLSCertificateKeyFile "C:/Program Files/OpenLDAP/serverkey.pem"
TLSCACertificateFile "C:/Program Files/OpenLDAP/CA.pem"
```

Figure 5-34. Certificate Section in the slapd.conf File

After you copy the files to the directory referenced in the **slapd.conf** file and ensure the names of the key and the certificates are correct, restart OpenLDAP. OpenLDAP should by default use TLS. However, you can include the **ldaps://** option when you start slapd to ensure that it uses TLS.

```
slapd ldaps://
```

Configure the NAC 800 for a RADIUS-Only Deployment

Other chapters in this implementation guide describe how to deploy the ProCurve Network Access Controller (NAC) 800 as:

- Both an endpoint integrity solution and a RADIUS server
- Only an endpoint integrity solution

This chapter describes a third option for deploying the NAC 800—as a RADIUS server only. If you are not yet ready to implement endpoint integrity checking, you can use the NAC 800's RADIUS services to:

- **Implement 802.1X**—You may want to implement 802.1X for your wired network, your wireless network, or both. For example, an organization that has been using a directory service (such as OpenLDAP, Active Directory, or Novell eDirectory) to control access to data and applications might decide to implement 802.1X to strengthen security. Because the NAC 800 integrates with these LDAP-compliant directory services, the organization can easily add a NAC 800 to implement 802.1X.
- **Provide redundancy for RADIUS services**—If you are using 802.1X as your access control method, you should eliminate any single point of failure in your 802.1X setup—including the RADIUS server. Deploying another RADIUS server provides failover capabilities and can also reduce the workload on the existing RADIUS server.

The Medical Center IT staff has two reasons for selecting the NAC 800 for their RADIUS server.

- It is an appliance and can be easily added to the existing network.
- It allows you to implement endpoint integrity checking at a later time.

Data Store Overview

When you deploy the NAC 800 as a RADIUS server, you must decide which data store you will use. The NAC 800 can search one of several data stores for a user's credentials:

- A local database of users
- A Windows domain controller, which runs Active Directory

- An LDAP server:
  - OpenLDAP
  - Novell eDirectory
- Another RADIUS server (via a proxy request)

This section provides instructions for using OpenLDAP.

Configuration Options

This access control solution has two NAC 800s, which are configured as combination servers (CSs). All the settings are established on each CS individually.

Because you are using both NAC 800s as RADIUS servers, you will use the 802.1X deployment method. For this deployment method, you can place the NAC 800 as you would any RADIUS server. Network access servers (NASs) throughout the network will need to contact the NAC 800, so you should typically place it in a server VLAN in the network core.

Refer to the *ProCurve Network Access Controller 800 Hardware Installation Guide* for more detailed mounting and installation instructions.

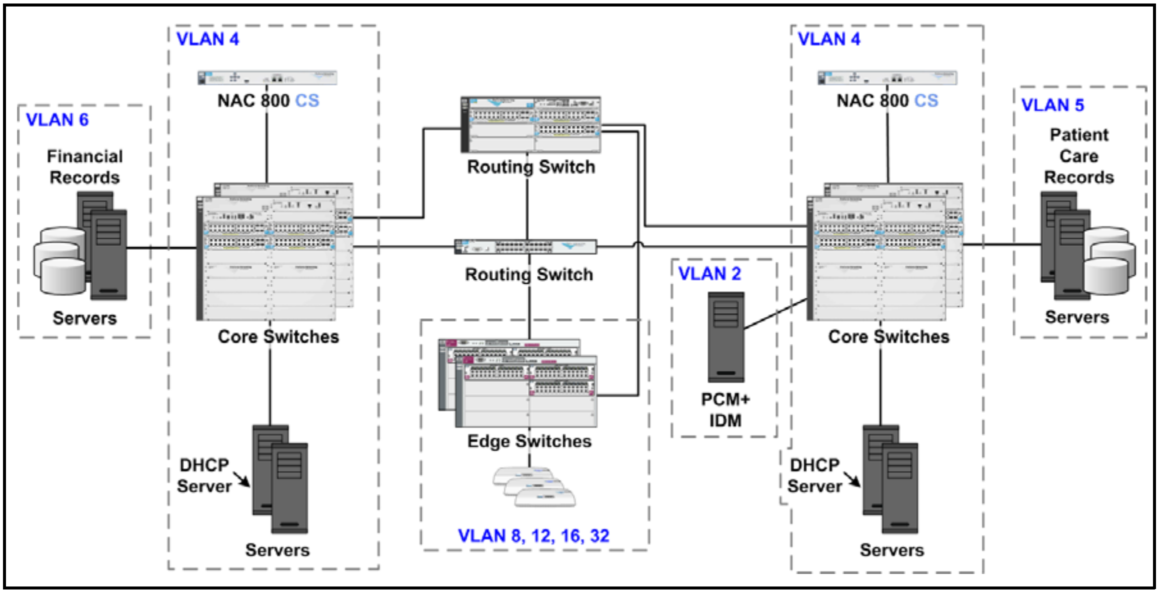


Figure 5-35. Placing the NAC 800s in the Network Core

Initial Setup

After you install the NAC 800s, use the following settings to set up each one, completing the steps outlined in "Configure Basic Settings on the NAC 800s" on page 2-135 of Chapter 2: "Implementing 802.1X with ProCurve IDM and Endpoint Integrity."

- Server type = CS
- Hostname = CSa.MedCenter.com or CSb.MedCenter.com
- IP address = 10.4.7.50 or 10.4.6.50
- DNS server = 10.4.4.15 and 10.4.5.15
- SNMP community = procurvero

Note

To manage NAC 800s through PCM+, you must configure the read-only and read-write SNMP community on PCM+ to use the same community name. In the example, you would type procurvero for both the read-only and read-write communities.

Device Access

Configure the following settings to control access to the NAC 800:

Administrator access

- Administrator name = managernac
- Password = procurve0

Operator

- Operator name = operatornac
- Password = procurve0

Linux shell

- Root administrator name = root
- Password = procurve0

Specify the Quarantine Method (802.1X)

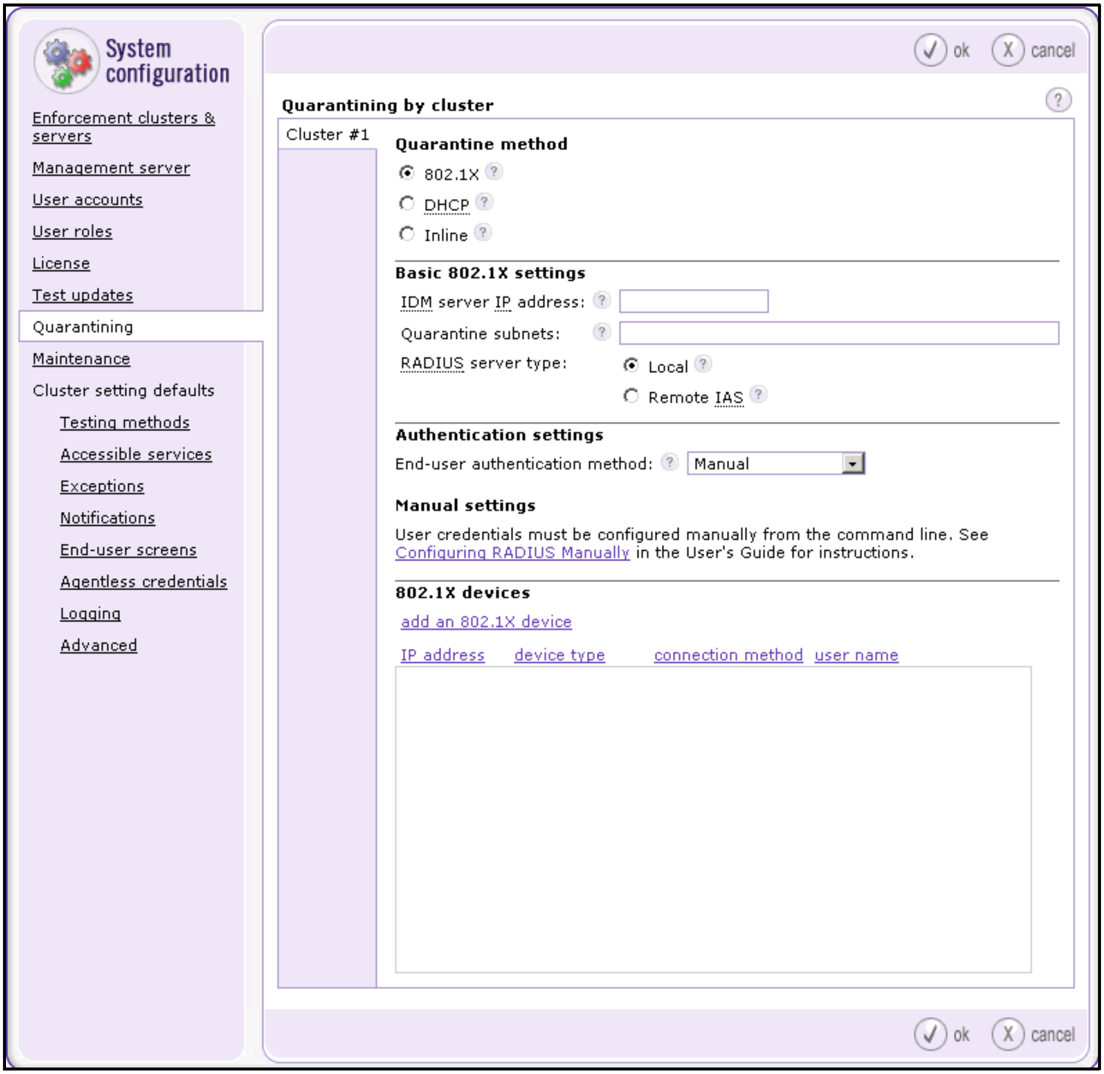
To act as a RADIUS server, the ProCurve NAC 800 must use the 802.1X quarantine method. (However, you then disable the actual quarantining. See "Configure Exceptions" on page 5-101.)

Complete the following steps:

1. Select **Home** > **System configuration** > **Quarantining**.

   If the NAC 800 is configured as a CS (as it is in the example network), the default and only cluster is automatically selected. If you have a multiple NAC 800 deployment (MS and multiple ESs), choose the cluster that includes the RADIUS server ESs.

2. In the **Quarantine method** area, select **802.1X**.



Quarantining by cluster

Quarantine method

● 802.1X
○ DHCP
○ Inline

Basic 802.1X settings

IDM server IP address:

Quarantine subnets:

RADIUS server type: ● Local ○ Remote IAS

Authentication settings

End-user authentication method: Manual

Manual settings

User credentials must be configured manually from the command line. See Configuring RADIUS Manually in the User's Guide for instructions.

802.1X devices

add an 802.1X device

IP address	device type	connection method	user name

Figure 5-36. Home > System configuration > Quarantining

3. In the **Basic 802.1X settings** area, type the IP address of the server that runs PCM+ with IDM in the **IDM server IP address** box. For example, type **10.2.0.50**.

4. For the **RADIUS server type,** select **Local**.

Note If you select **Remote IAS** for the **RADIUS server type**, you must also edit the SAIASConnector.in file. For more information, see *Chapter 3: Implementing 802.1X with Endpoint Integrity but without IDM*.

You have now enabled the NAC 800 to make access control decisions as a RADIUS server. Next, you must configure the RADIUS server's authentication settings.

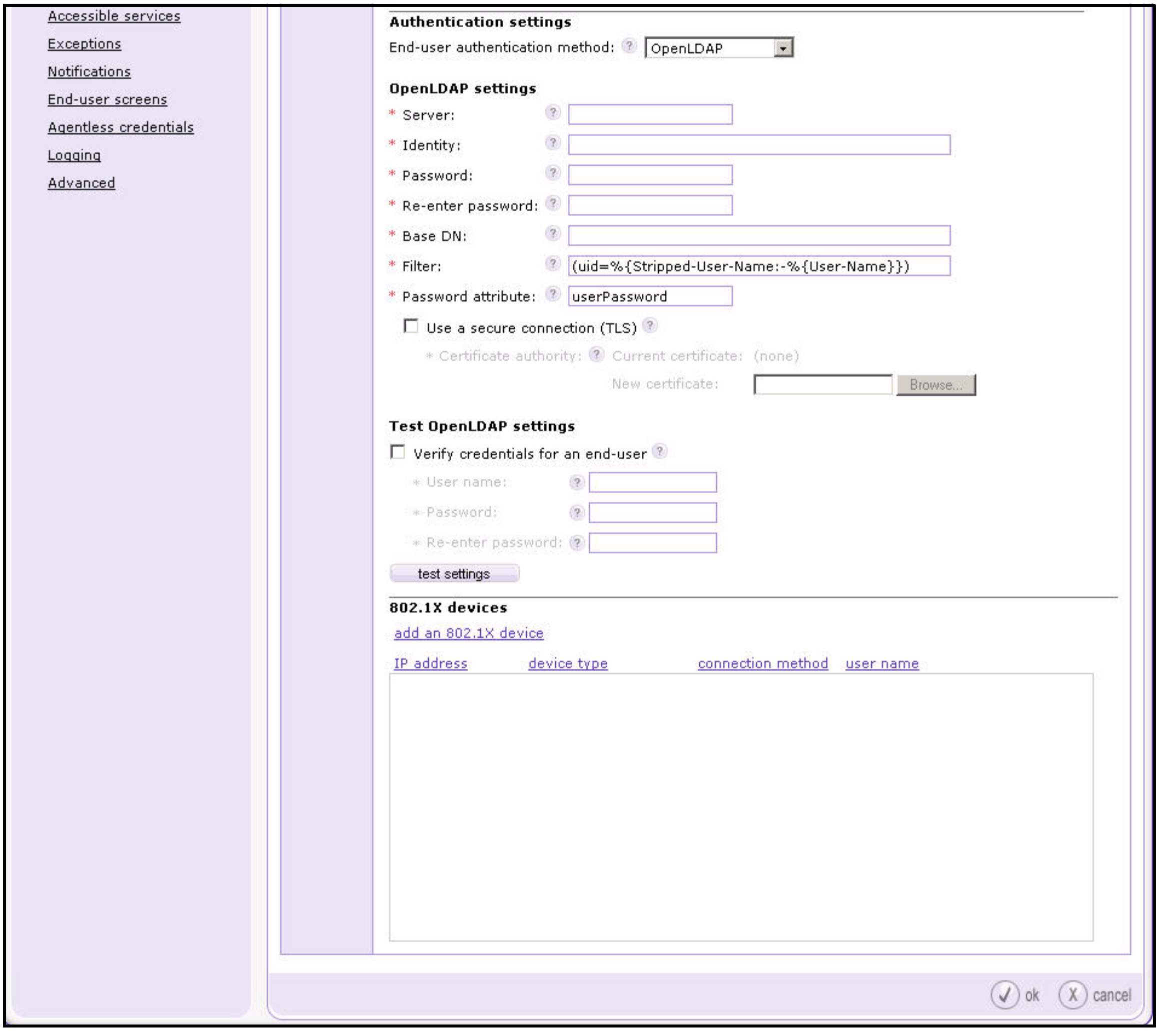
Note The **Quarantine subnets** box applies only if the NAC 800 enforces endpoint integrity. This setting allows the NAC 800 to respond to DNS requests from endpoints in quarantine VLANs.

Configure Authentication to an OpenLDAP Server

This section describes how to configure the NAC 800's authentication settings to verify accounts through an OpenLDAP server. You should have already completed the steps outlined in the preceding section.

1. From the **Home** > **System configuration** > **Quarantining** window, select **OpenLDAP** for the **End-user authentication method**.

   The **OpenLDAP settings** and **Test OpenLDAP settings** areas are displayed.



Authentication settings

End-user authentication method: OpenLDAP

OpenLDAP settings

- * Server:
- * Identity:
- * Password:
- * Re-enter password:
- * Base DN:
- * Filter: (uid=%{Stripped-User-Name:-%{User-Name}})
- * Password attribute: userPassword

□ Use a secure connection (TLS)

* Certificate authority: Current certificate: (none)

New certificate: Browse...

Test OpenLDAP settings

□ Verify credentials for an end-user

- * User name:
- * Password:
- * Re-enter password:

802.1X devices

IP address	device type	connection method	user name

Figure 5-37. Home > System configuration > Quarantining—OpenLDAP Authentication Method

2. In the **Server** box, type the hostname or IP address of the OpenLDAP server. For example:

   10.2.1.10

   If your OpenLDAP server is not using the standard port, append a colon and port number to the IP address to specify the port it uses. For example:

   10.2.10.10:1000

If you do not specify the port, the NAC 800 uses one of the following:

- Uses port 389 if the connection is not secure
- Uses port 636 if the connection is secure

Step 9 on page 5-89 explains how to choose a secure connection.

Note

If you specify a hostname, remember to check the NAC 800's DNS server setting to ensure that it is configured to use the correct server. Select **Home** > **System configuration** > **Management server**. To edit the DNS server setting, click **edit network settings** under **Network settings**.

3. In the **Identity** box, type the DN of an object in the directory with administrative rights.

   Type the name in standard LDAP format. For example:

   cn=Manager,o=MedCenter.com

   or

   cn=Manager,dc=MedCenter,dc=com

4. In the **Password** box, type the password for the object specified in the previous step.

5. In the **Re-enter password** box, type this password again.

6. In the **Base DN** box, type the DN for the object at which the NAC 800 begins searches—almost always the DN of the top level of the tree.

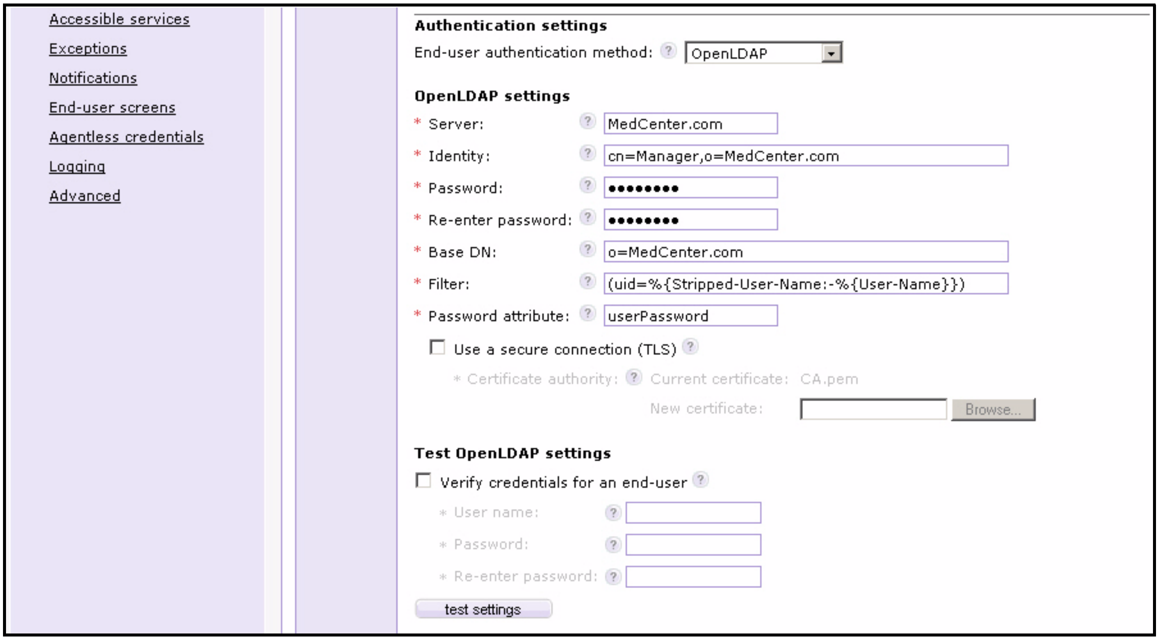
   For example:

   cn=Manager,o=MedCenter.com

   or

   dc=MedCenter,dc=com

   The administrator specified in the **Identity** box should be in the base DN.



Authentication settings

End-user authentication method: OpenLDAP

OpenLDAP settings

* Server: MedCenter.com

* Identity: cn=Manager,o=MedCenter.com

* Password: ••••••••

* Re-enter password: ••••••••

* Base DN: o=MedCenter.com

* Filter: (uid=%{Stripped-User-Name:-%{User-Name}})

* Password attribute: userPassword

□ Use a secure connection (TLS)

* Certificate authority: Current certificate: CA.pem

New certificate:

Test OpenLDAP settings

□ Verify credentials for an end-user

* User name:

* Password:

* Re-enter password:

Figure 5-38. Home > System configuration > Quarantining—OpenLDAP Authentication Method

7. Typically, leave **Filter** and **Password attribute** at their default settings.

   The user filter and password attribute help the NAC 800 perform searches within the directory. Your settings must match up with attribute names used in your OpenLDAP installation, and the syntax must follow LDAP syntax.

   The default filter is shown in Figure 5-37; it tells the NAC 800 to search for an entry in which the “uid” attribute equals whatever username is submitted in an authentication request. (The “Stripped-User-Domain” portion of the filter allows the NAC 800 to remove an appended domain name, which may be necessary to match the uid as stored in the directory.)

   The password attribute (default “userPassword”) must match the name of the attribute that stores passwords in your directory. Remember the OpenLDAP directory must allow the NAC 800 “auth” access to this attribute.

Note

Be careful when altering the default settings: if you cause searches to fail, you effectively lock out all users.

8. Select the **Use a secure connection (TLS)** box.

   ProCurve Networking recommends that you always enable this option. The NAC 800 and the OpenLDAP server then perform a TLS handshake to authenticate each other, as well as set up encryption keys to secure the connection.

9. If you selected the box in the previous step, verify that the NAC 800 has the proper certificate authority (CA) certificate.

   The NAC 800 requires the CA certificate for the CA that signed the OpenLDAP server's certificate. (For information on configuring a CA certificate on OpenLDAP, see "Configure a Root CA with OpenSSL" on page 5-74.) Save this certificate on your management station. Then click **Browse** next to **New certificate** to upload it to the NAC 800.

10. To verify that the NAC 800 can successfully bind to the OpenLDAP server, click **test settings**.

    See "Test Authentication Settings" on page 5-89 for more information on setting up the test.

Note

You may receive a message that the test failed because the LDAP query returned no results. Do not worry: although the search did not return any results, the bind completed successfully.

You can successfully bind to OpenLDAP in this test even if you have not extended the OpenLDAP schema to support RADIUS. However, when a user attempts to log in and the NAC 800 submits a RADIUS request to OpenLDAP, the directory will not be able to respond appropriately. It will appear as if OpenLDAP is rejecting the bind request. For more information, see "Extend the OpenLDAP Schema to Support RADIUS" on page 5-64.

For information about other result messages, see Table 5-14 on page 5-93.

You are now ready to specify your network's NASs. (See "Add NASs as 802.1X Devices" on page 5-94.)

Test Authentication Settings

After configuring the OpenLDAP test method, you should test whether the NAC 800 can:

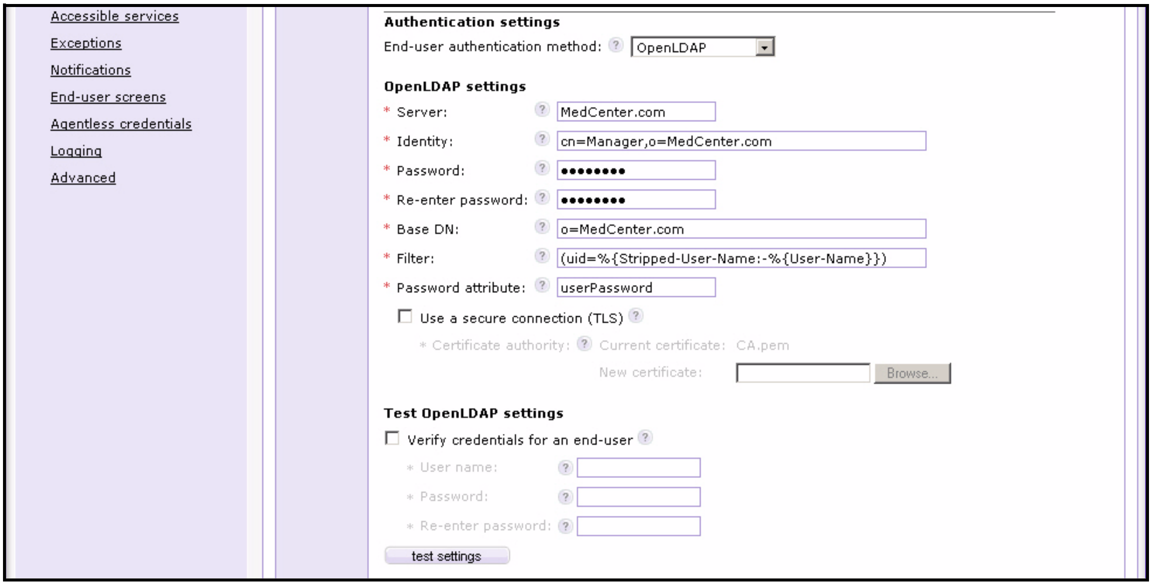
- Contact the directory
- Bind to it
- Optionally, perform a successful search

You should test the settings to eliminate problems before the NAC 800 begins to authenticate end-users on a live network.

Before testing these settings, you must complete the steps listed in:

- "Specify the Quarantine Method (802.1X)" on page 5-83
- "Configure Authentication to an OpenLDAP Server" on page 5-85

1. Locate the **Test OpenLDAP settings** area on the **Home** > **System configuration** > **Quarantining** window, as shown in Figure 5-39.



Authentication settings

End-user authentication method: OpenLDAP

OpenLDAP settings

* Server: MedCenter.com

* Identity: cn=Manager,o=MedCenter.com

* Password: ••••••••

* Re-enter password: ••••••••

* Base DN: o=MedCenter.com

* Filter: (uid=%{Stripped-User-Name:-%{User-Name}})

* Password attribute: userPassword

☐ Use a secure connection (TLS)

* Certificate authority: Current certificate: CA.pem

New certificate:

Test OpenLDAP settings

☐ Verify credentials for an end-user

* User name:

* Password:

* Re-enter password:

Figure 5-39. Home > System configuration > Quarantining

2. If you are configuring a CS, you can skip this step. Otherwise, you must select an ES from the **Server to test from** list.

   In a multiple NAC 800 deployment, ESs (not the MS) bind to the LDAP server when they need to authenticate end-users. When you test settings, you must choose the appropriate ES.

3. Complete one of two tests:

   - Test the bind operation only.

     Click **test settings**.

     This test verifies that:

     – The NAC 800 can reach the domain controller or LDAP server.

     – The administrator username and password are correct.

Note

If you choose this option, you may receive a message that the test failed because the LDAP query returned no results or multiple results. Do not worry: although the search didn't return results, the bind completed successfully. See Table 5-14 for results that *do* indicate a problem.

- Test the bind operation and look up an end-user's credentials:
  i. Check the **Verify credentials for an end-user** box.
  ii. Type the username for a valid user in the **User name** box.
  iii. Type the user's password in the **Password** box.
  iv. Re-type the password in the **Re-enter password** box.
  v. Click **test settings**.

  This test verifies that:
  – The NAC 800 can reach the LDAP server.
  – The administrator username and password are correct.
  – The filter and password attribute are correct.
  – The end-user credentials that you typed are correct.

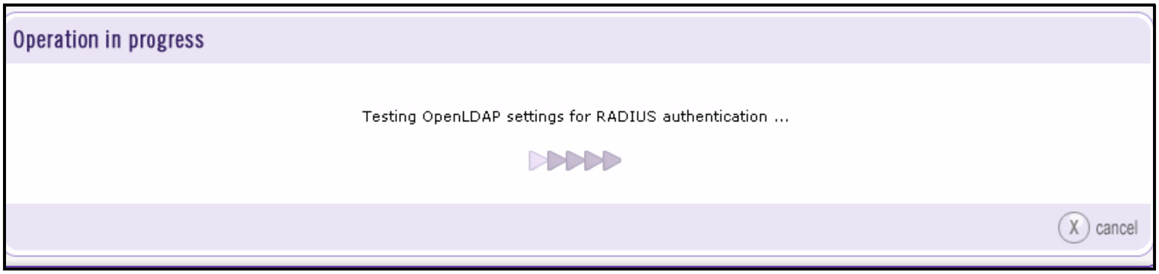
Note

When you first test a configuration with the **Verify credentials for an end-user** option, choose an end-user username and password that you are certain are correct (for example, the administrator password). In that way, you verify that the configuration itself functions correctly.

Later, if a particular user has difficulty connecting, you can use the **Verify credentials for an end-user** option to check the user's credentials.

The **Operation in progress** window is displayed.

Figure 5-40 shows the window for testing LDAP authentication settings.

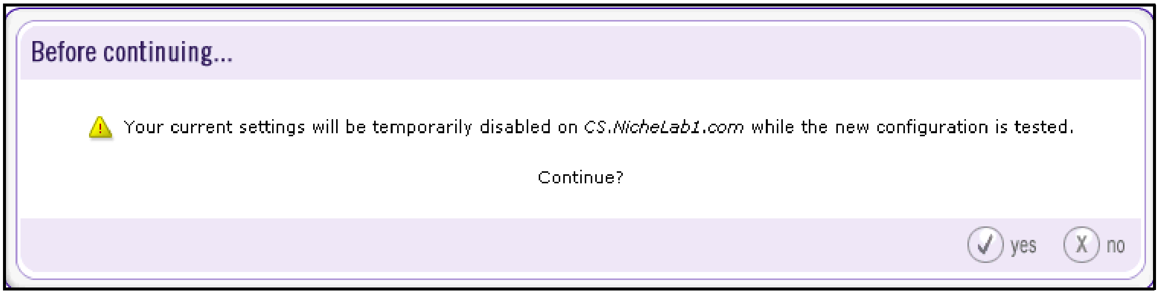


Operation in progress

Testing OpenLDAP settings for RADIUS authentication ...

Figure 5-40. Home > System configuration > Quarantining > test settings button

You might see, instead, the window shown in Figure 5-41.



Before continuing...

⚠ Your current settings will be temporarily disabled on *CS.NicheLab1.com* while the new configuration is tested.

Continue?

Figure 5-41. Home > System configuration > Quarantining > test settings button

This window is displayed when you have edited previously configured authentication settings. To test the new settings, the NAC 800 must temporarily write them over the old settings, which—if the NAC 800 is the RADIUS server for an active network—can briefly interrupt service.

Click **no** to cancel the test (in which case you should also wait before applying your new settings).

Click **yes** to proceed with the test.

Note that proceeding with the test only temporarily overwrites the old settings. You must still click **ok** in the **Home > System configuration > Quarantining** window to save the new settings.

When the test completes, you are returned to the **Home > System configuration > Quarantining** window. The message at the top of the window indicates the result. Refer to Table 5-14 for help interpreting the message.

Table 5-14. Authentication Settings Test Results

Message	Result	Possible Cause of Failure
LDAP settings successfully validated.	• The NAC 800 successfully bound to the LDAP server. • The NAC 800 successfully validated the test credentials.	
Test failed: LDAP query returned no results.	• The NAC 800 successfully bound to the LDAP server. • You didn't ask to verify credentials.	
Test failed: LDAP query returned more than one result.	• The NAC 800 successfully bound to the LDAP server. • You didn't ask to verify credentials.	
Test failed: [LDAP: error code 48 - Inappropriate Authentication].	The NAC 800 failed to bind to the LDAP server.	The bind password is incorrect.
Test failed: could not authenticate identity.	The NAC 800 failed to bind to the LDAP server.	• The bind username is incorrect. • The base DN is incorrect.
Test failed: [LDAP: error code 32 - NDS error: no such entry (-601)]	The NAC 800 failed to bind to the LDAP server.	• The bind username is incorrect. • The base DN is incorrect.
Test failed: [LDAP: error code 13 - Confidentiality Required]	The NAC 800 failed to bind to the LDAP server.	The LDAP server requires TLS, but this option is not selected.
Test failed: connection error (Connection refused).	The NAC 800 failed to bind to the LDAP server.	The LDAP server requires TLS, but this option is not selected.
Test failed: could not verify server's certificate signature.	The NAC 800 failed to bind to the LDAP server.	The CA certificate for TLS authentication does not match the LDAP server's CA certificate.
Test failed: end-user <*username*> not found.	• The NAC 800 successfully bound to the LDAP server. • The NAC 800 failed to validate the test credentials.	• The test username is incorrect. • The base DN is incorrect. • The filter specifies the wrong attribute name.
Test failed: password for end user <*username*> is invalid.	• The NAC 800 successfully bound to the LDAP server. • The NAC 800 failed to validate the test credentials.	The test password is incorrect.
Test failed: Attribute <*attribute name*> not found.	• The NAC 800 successfully bound to the LDAP server. • The NAC 800 failed to validate the test credentials.	The password attribute is incorrect.

Add NASs as 802.1X Devices

A NAS is the device to which end-users connect—typically, a switch or an AP. The NAS enforces port authentication on end-user ports, forwarding users' authentication requests to a RADIUS server.

You must add each NAS that uses the NAC 800 as its RADIUS server to the NAC 800's list of 802.1X devices.

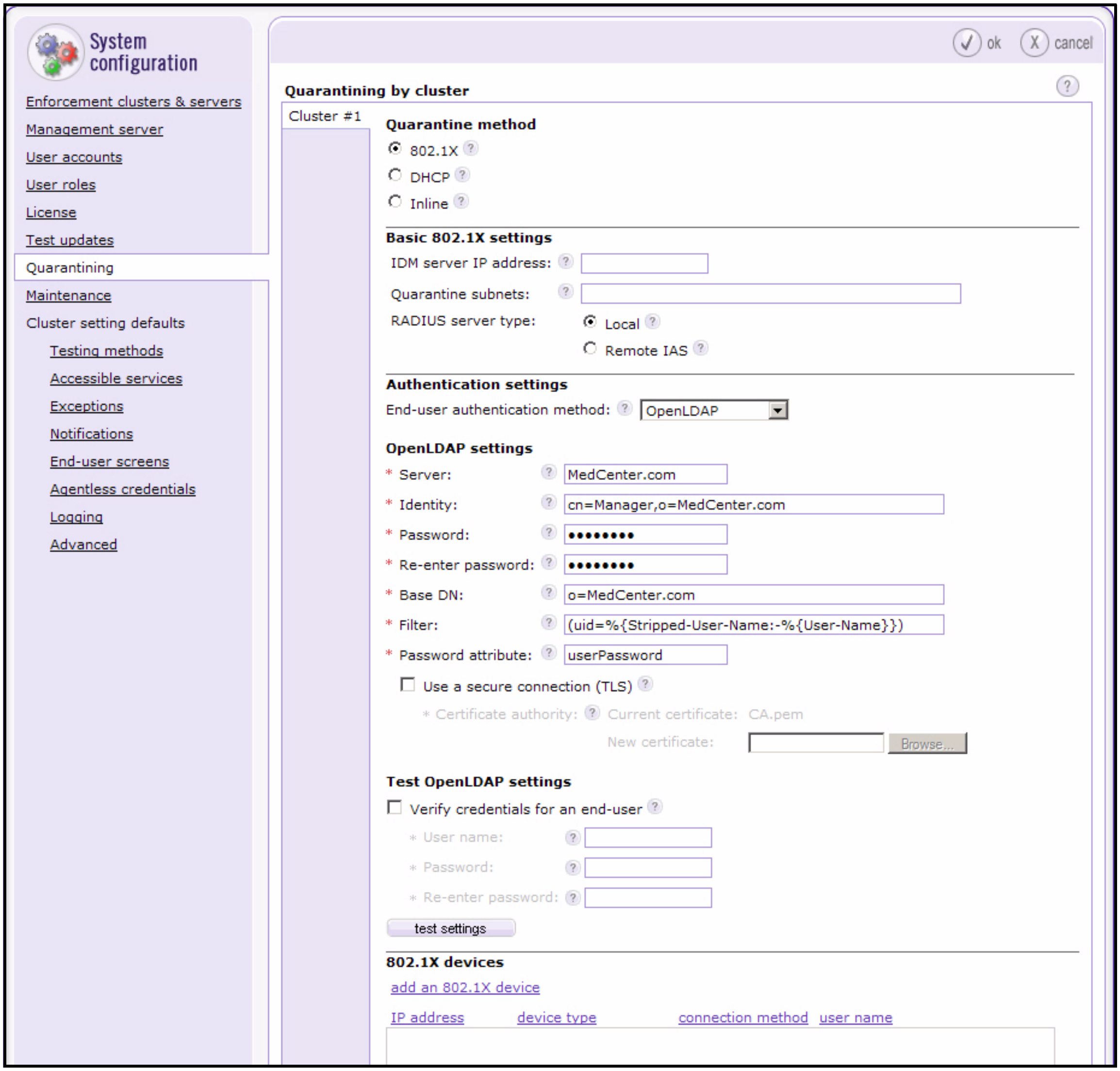
Note

The NASs are often called RADIUS clients. The Web browser interface, however, as well as this guide, will refer to them as 802.1X devices.

Follow these steps to add the 802.1X devices:

1. Complete the steps listed in "Specify the Quarantine Method (802.1X)" on page 5-83.
2. Complete the steps for your selected authentication method. (See "Configure Authentication to an OpenLDAP Server" on page 5-85.)

   You should see a window similar to that illustrated in Figure 5-42.



System configuration

- Enforcement clusters & servers
- Management server
- User accounts
- User roles
- License
- Test updates
- Quarantining
- Maintenance
- Cluster setting defaults
  - Testing methods
  - Accessible services
  - Exceptions
  - Notifications
  - End-user screens
  - Agentless credentials
  - Logging
  - Advanced

ok cancel

Quarantining by cluster

Cluster #1

Quarantine method

● 802.1X
○ DHCP
○ Inline

Basic 802.1X settings

IDM server IP address:
Quarantine subnets:
RADIUS server type: ● Local ○ Remote IAS

Authentication settings

End-user authentication method: OpenLDAP

OpenLDAP settings

* Server:	MedCenter.com
* Identity:	cn=Manager,o=MedCenter.com
* Password:	••••••••
* Re-enter password:	••••••••
* Base DN:	o=MedCenter.com
* Filter:	(uid=%{Stripped-User-Name:-%{User-Name}})
* Password attribute:	userPassword

□ Use a secure connection (TLS)

* Certificate authority: Current certificate: CA.pem
New certificate: Browse...

Test OpenLDAP settings

□ Verify credentials for an end-user

* User name:
* Password:
* Re-enter password:

test settings

802.1X devices

add an 802.1X device

IP address	device type	connection method	user name

Figure 5-42. Home > System configuration > Quarantining—802.1X quarantine method

3. Click **add an 802.1X device**. The **Add 802.1X device** window is displayed.

4. Type the 802.1X device's IP address in the **IP address** box.

   For example, in the example network endpoints connect to an edge switch that has 10.2.0.3 for its management IP address. Type: **10.2.0.3**.

   For the example network, you would add all the edge switches and the Wireless Edge Services Module as 802.1X devices.

5. Type a character string in the **Shared secret** box.

   This string and the RADIUS server secret configured on the 802.1X device must match exactly. You set this secret on the Wireless Edge Services Module in "Configure WLAN Settings" on page 5-25. (See your device's documentation for more information on configuring this secret. Or use PCM Plus's Secure Access Wizard, described in the *ProCurve Identity Driven Manager User's Guide*.)

   The secret can include alphanumeric and special characters.

6. Type the same character string in the **Re-enter shared secret** box.

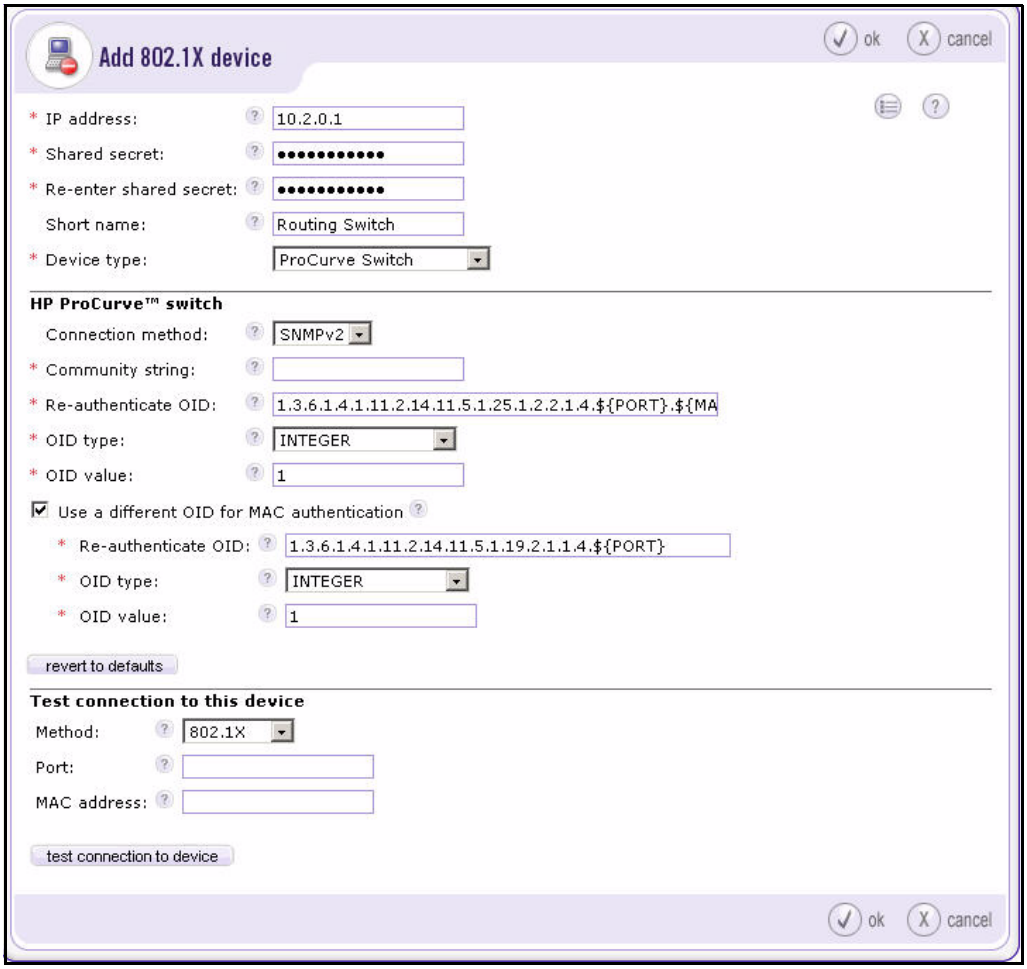
7. Optionally, give the 802.1X device a descriptive name by typing a string in the **Short name** box.

   The name is displayed in logs and can include alphanumeric and special characters.

8. From the **Device type** list, choose the type of 802.1X device (that is, its manufacturer and OS).

   The list includes several common devices, but the NAC 800 supports any device that can act as a standard RADIUS client. If your device is not listed, select **Other**.

9. Options for connecting to the selected device are displayed.



* IP address: 10.2.0.1
* Shared secret: ●●●●●●●●●●●
* Re-enter shared secret: ●●●●●●●●●●●
Short name: Routing Switch
* Device type: ProCurve Switch

HP ProCurve™ switch
Connection method: SNMPv2
* Community string:
* Re-authenticate OID: 1.3.6.1.4.1.11.2.14.11.5.1.25.1.2.2.1.4.${PORT}.${MA
* OID type: INTEGER
* OID value: 1
☑ Use a different OID for MAC authentication
* Re-authenticate OID: 1.3.6.1.4.1.11.2.14.11.5.1.19.2.1.1.4.${PORT}
* OID type: INTEGER
* OID value: 1

Test connection to this device
Method: 802.1X
Port:
MAC address:

Figure 5-43. Home > System configuration > Quarantining (802.1X quarantine method) > Add an 802.1X device

Because you are using the NAC 800 as a RADIUS server only, the connection settings do not matter.

Leave the settings at the defaults; or for the ProCurve Wireless Edge Services Module, ProCurve 420 AP, and ProCurve 530 AP, fill in only the community name.

10. Click **ok**.
11. To apply and save the 802.1X device configuration, you *must* also click **ok** in the **Home > System configuration > Quarantining** window.

Apply Changes

Whenever you alter the configuration for the 802.1X and RADIUS settings (including adding an 802.1X device), you must apply and save the changes. When you apply the changes, the CS's internal RADIUS server or the RADIUS servers on all ESs in the cluster automatically restart.

Note The RADIUS server typically takes several seconds to restart. During this period, the RADIUS server is unavailable for authenticating end-users. To avoid interrupting services, configure 802.1X quarantining settings after hours.

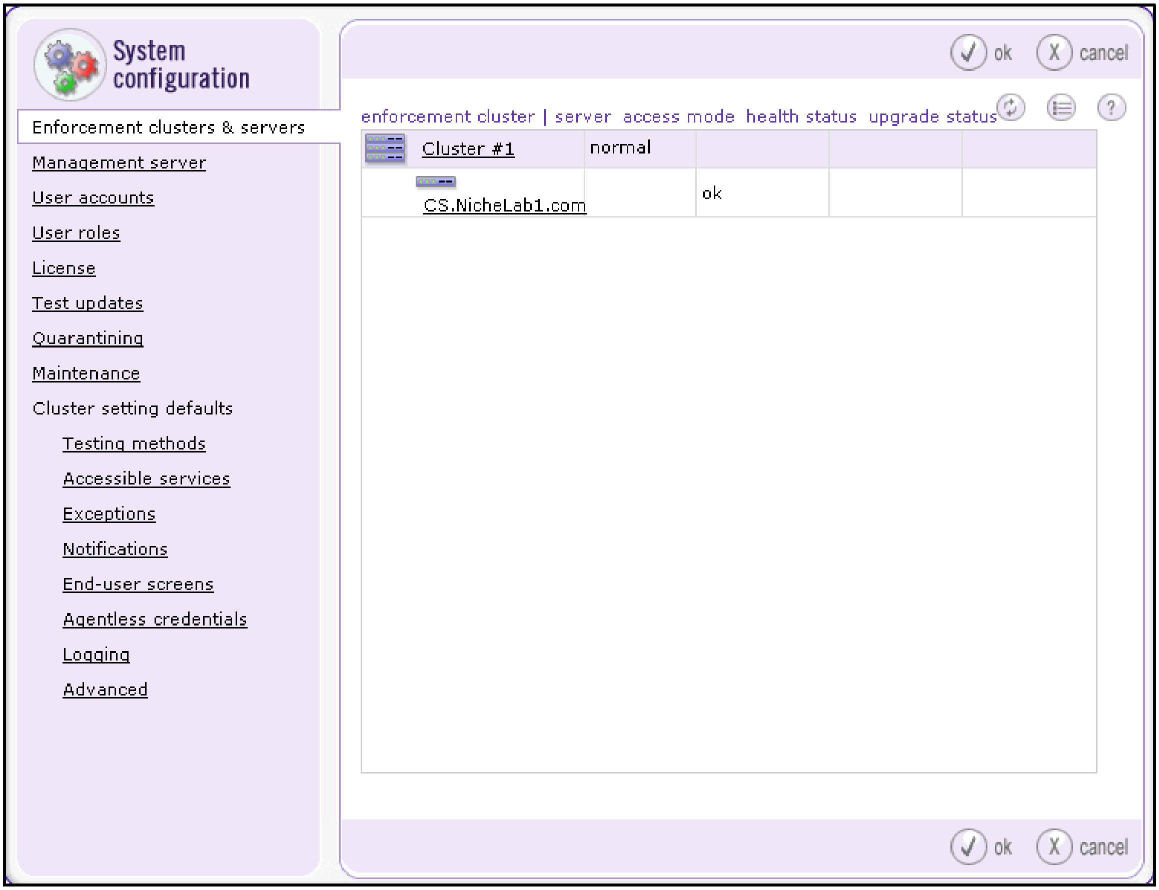
If you have not already done so, click **ok** in the **Home > System configuration > Quarantining** window.

Clicking **ok** writes the change to both the startup-config and the running-config.

Restart the RADIUS Server

Follow these steps if you need to restart the RADIUS server manually:

1. Select **Home** > **System configuration** > **Enforcement clusters & servers**.



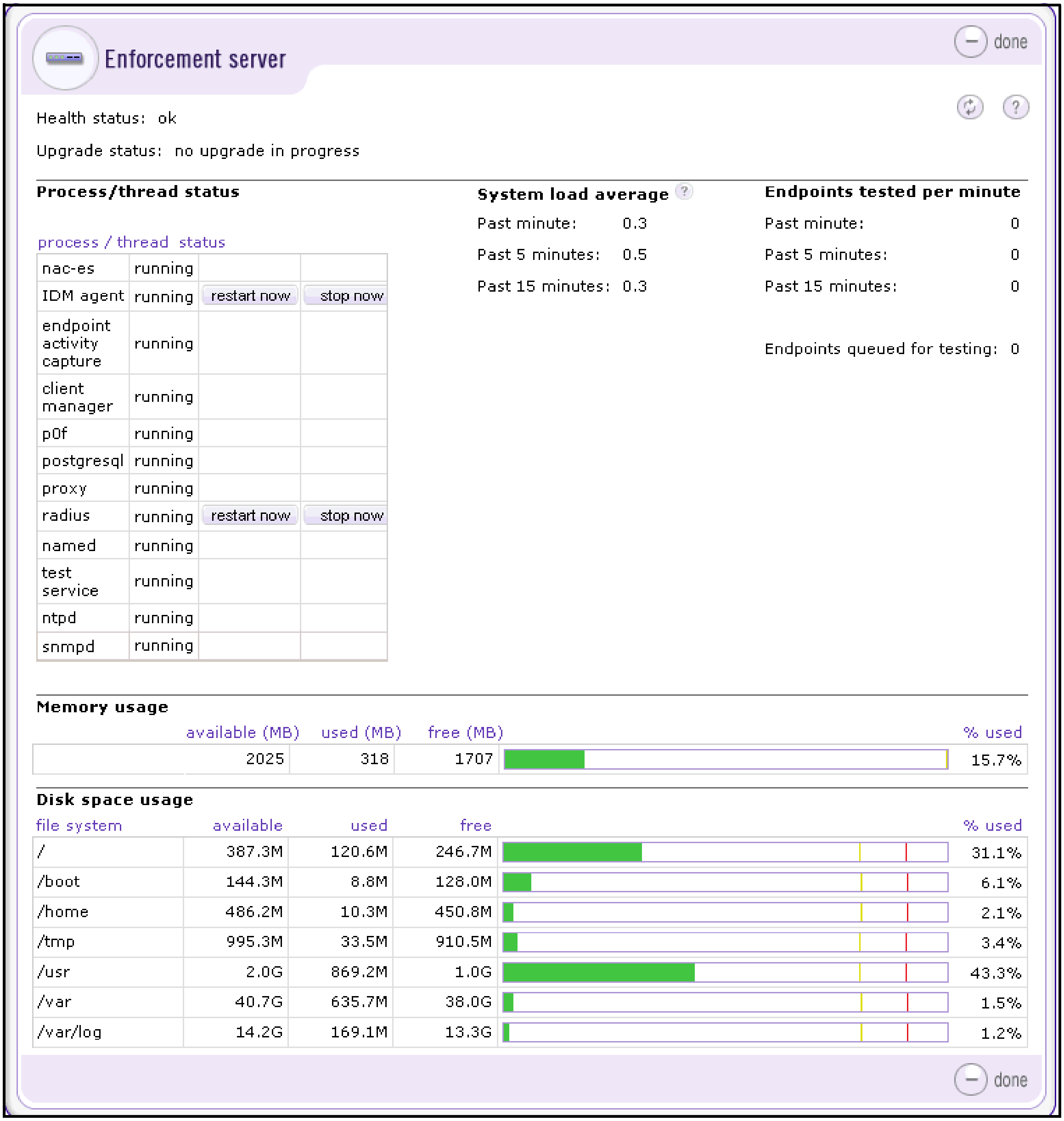
enforcement cluster | server	access mode	health status	upgrade status
Cluster #1	normal		
CS.NicheLab1.com		ok	

Figure 5-44. Home > System configuration > Enforcement clusters & servers

2. Click the name of the CS or ES. The **Enforcement server** window is displayed.

Note

Figure 5-45 shows the **Enforcement server** window for a CS. The window for an ES features two menu options: **General** and **Configuration**. You should select the **General** menu option.



Health status: ok

Upgrade status: no upgrade in progress

Process/thread status

process / thread	status		
nac-es	running		
IDM agent	running	restart now	stop now
endpoint activity capture	running		
client manager	running		
p0f	running		
postgresql	running		
proxy	running		
radius	running	restart now	stop now
named	running		
test service	running		
ntpd	running		
snmpd	running		

System load average

Past minute:	0.3
Past 5 minutes:	0.5
Past 15 minutes:	0.3

Endpoints tested per minute

Past minute:	0
Past 5 minutes:	0
Past 15 minutes:	0

Endpoints queued for testing: 0

Memory usage

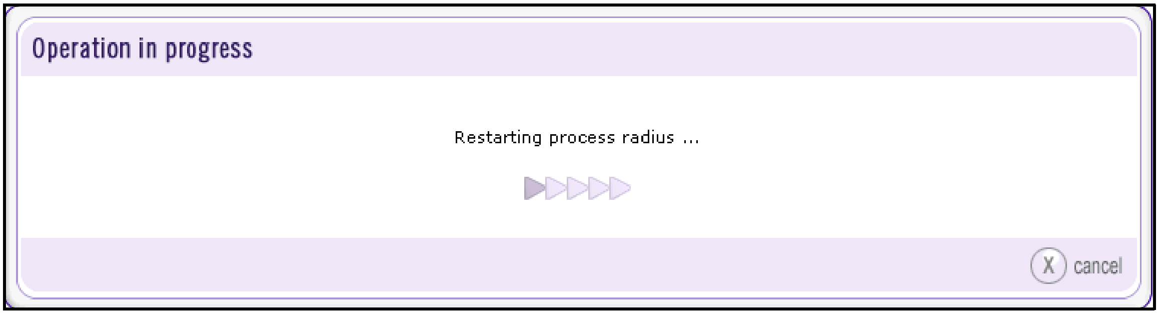
	available (MB)	used (MB)	free (MB)		% used
	2025	318	1707		15.7%

Disk space usage

file system	available	used	free		% used
/	387.3M	120.6M	246.7M		31.1%
/boot	144.3M	8.8M	128.0M		6.1%
/home	486.2M	10.3M	450.8M		2.1%
/tmp	995.3M	33.5M	910.5M		3.4%
/usr	2.0G	869.2M	1.0G		43.3%
/var	40.7G	635.7M	38.0G		1.5%
/var/log	14.2G	169.1M	13.3G		1.2%

Figure 5-45. Home > System configuration > Enforcement clusters & servers > *selected Enforcement server*

3. The **Process/thread status** area lists a number of services. Click **restart now** for radius. The **Operation in progress** window is displayed.



Operation in progress

Restarting process radius ...

Figure 5-46. Home > System configuration > Enforcement clusters & servers > selected Enforcement server > radius restart now button

4. Within several seconds, the **Operation in progress** window should close. At the top of the **Enforcement server** window, this message should be displayed:

   The radius process was restarted.

Note

Typically, the RADIUS server restarts without a problem. If it encounters difficulties, you should restart it from the root of the OS. Follow these steps:

1. Open an SSH or console session with the NAC 800.
2. When asked for your username and password, type **root** and the root password (default, **procurve**).
3. Type this command:

   ```
   service radiusd restart
   ```

4. Read any messages that display. For example, if you have altered configuration files, one of the files might have an error and fail to load.

Configure Exceptions

On the NAC 800, you configure exceptions for endpoints that you do not want tested for endpoint integrity. When you designate an endpoint as an exception, the NAC 800 discovers but does not test that endpoint.

To configure exceptions, you can type an address or a Windows domain name.

For an address, you can specify:

- **IP address**—Type individual IP addresses or a range of IP addresses using Classless Inter-Domain Routing (CIDR) format. For example, you might type:

  10.5.0.0/16
  10.6.0.0/16

- **MAC address**—Use the standard MAC address format: FF:FF:FF:FF:FF. For example, you might type:

  00:11:43:66:68:CC

- **NetBIOS name**—To provide backward compatibility with a legacy Windows system, type the NetBIOS name assigned to the device. For example, you might type:

  MyLaptop

To exclude an entire domain, type your organization's domain name, such as:

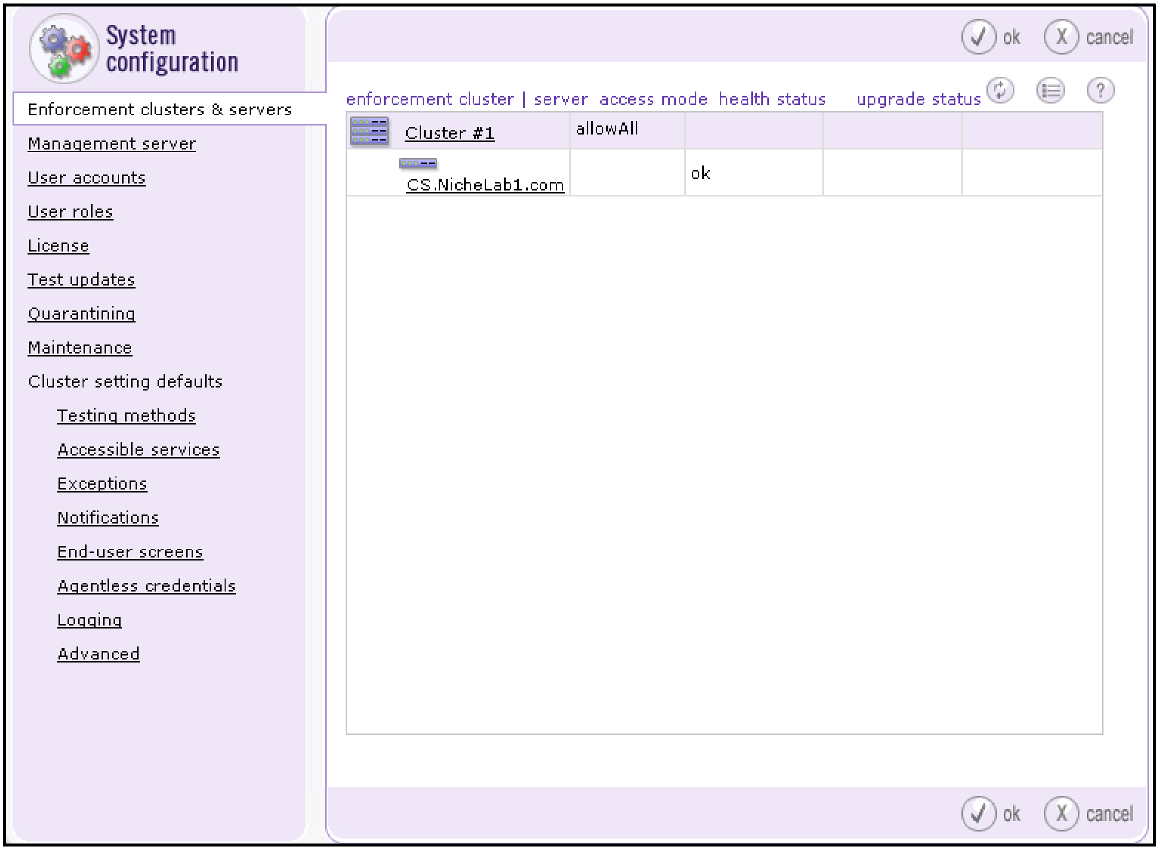
ABCCompany.com

Because you are setting up the NAC 800 to function as a RADIUS server only, you will typically specify a range or several ranges of addresses or a domain name.

Configure Exceptions for the Cluster Default Settings

To configure exceptions as part of the cluster default settings, which are then applied to all clusters, complete the following steps:

1. Select **Home > System configuration**.



enforcement cluster | server	access mode	health status	upgrade status
Cluster #1	allowAll		
CS.NicheLab1.com		ok	

Figure 5-47. Home > System configuration

2. Select **Cluster setting defaults > Exceptions**.

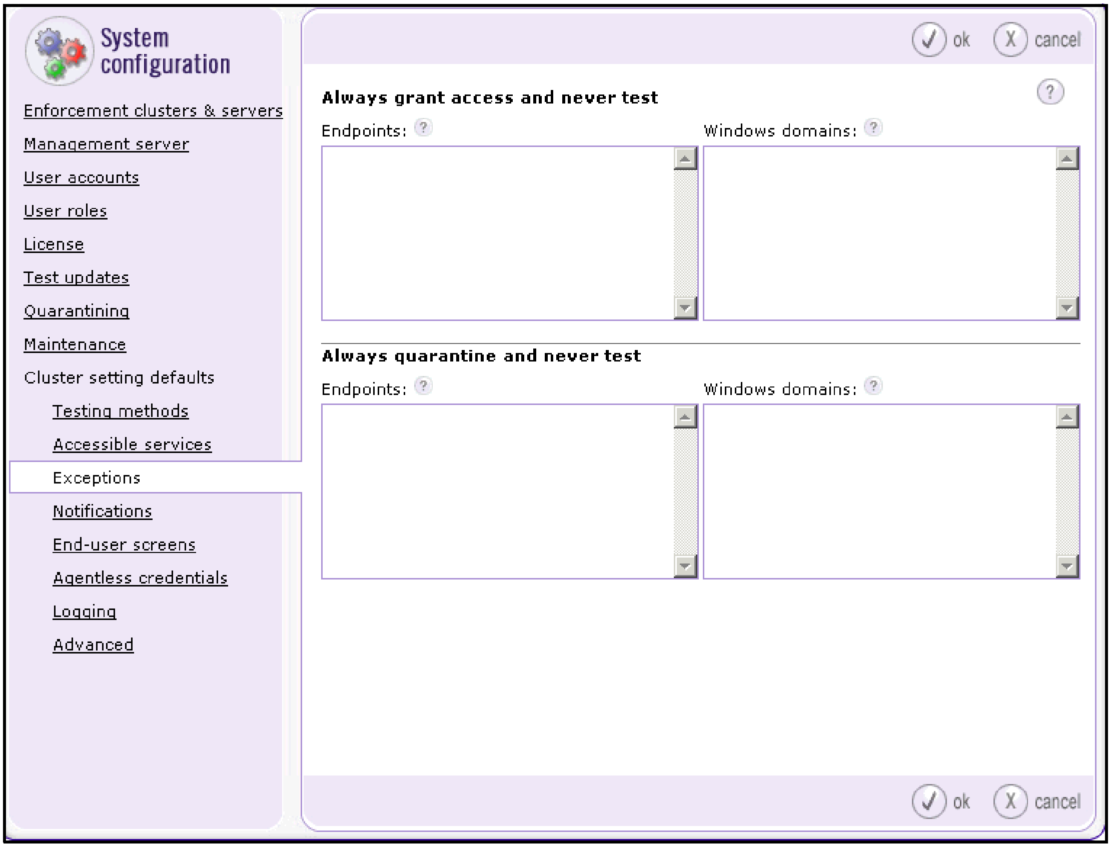


Figure 5-48. Home > System configuration > Cluster setting defaults > Exceptions

3. Under **Always grant access and never test**, type either the addresses of endpoints or the domain name you want to exclude.

   - Under **Endpoints**, type an IP address, a range of IP addresses in CIDR format, a MAC address, or a NetBIOS name.
   - Under **Windows domain**, type the domain name.

   Separate addresses and names with carriage returns, as shown below:

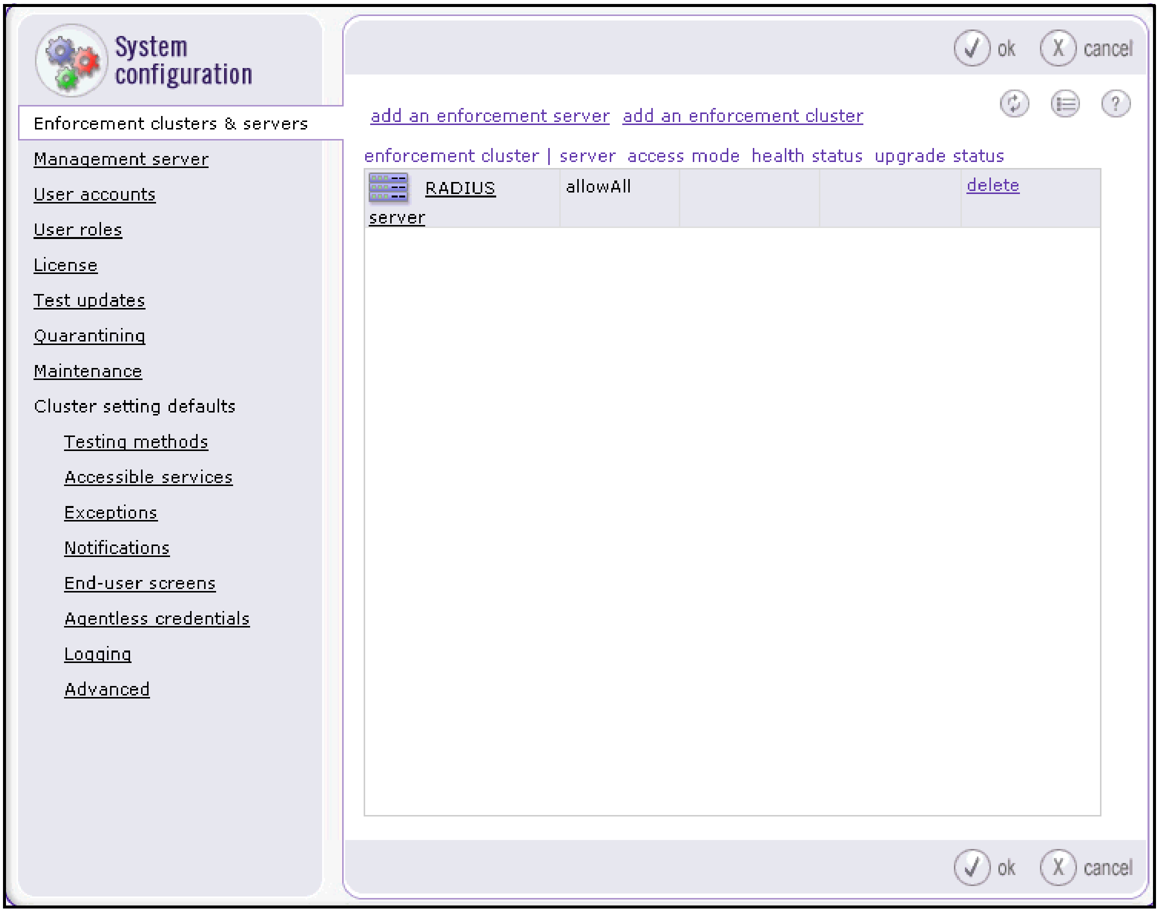
   10.2.0.0.0/16
   10.4.0.0/16
   10.5.0.0/16
   10.6.0.0/16
   10.12.0.0/16
   10.16.0.0/16
   10.32.0.0/16

4. Click **ok**.

Configure Exceptions for a Particular Cluster

If you want to disable endpoint integrity for only one of the clusters you have configured on the Management Server (MS), complete the following steps:

1. Select **Home > System configuration**.



enforcement cluster | server	access mode	health status	upgrade status	
RADIUS server	allowAll			delete

Figure 5-49. Home > System configuration

2. Click **Enforcement clusters & servers** and select the link for the cluster that implements RADIUS without endpoint integrity.

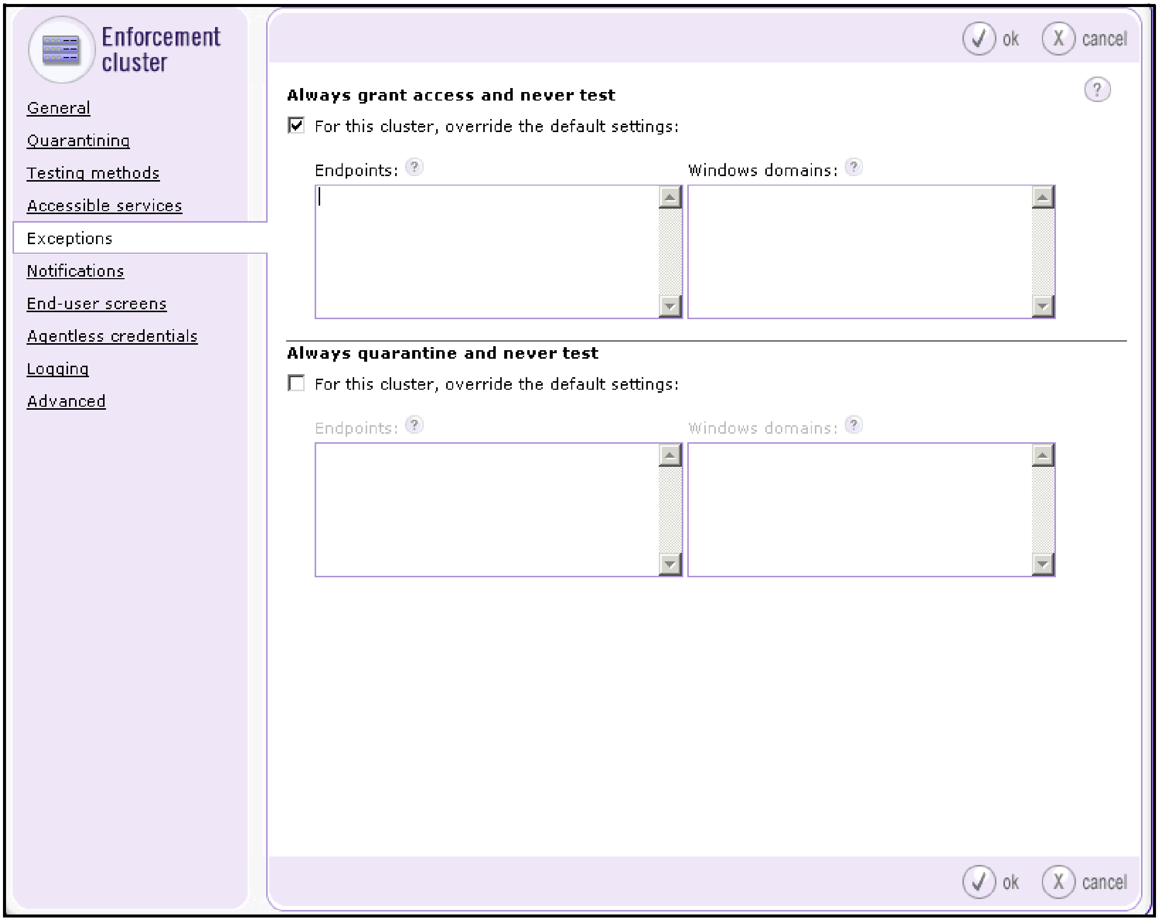
   The **Enforcement cluster** window is displayed.

3. Click **Exceptions**.

Note

The settings you configure for a particular cluster override the cluster setting defaults.

4. Select the **For this cluster, override the default settings** check box.



Always grant access and never test

☑ For this cluster, override the default settings:

Endpoints:

Windows domains:

Always quarantine and never test

□ For this cluster, override the default settings:

Endpoints:

Windows domains:

Figure 5-50. Home > System configuration > Enforcement clusters & servers > cluster_name > Exceptions

5. Under **Always grant access and never test**, type either the addresses of endpoints or the domain name you want to exclude.
   - Under **Endpoints**, type an IP address, a range of IP addresses in CIDR format, a MAC address, or a NetBIOS name.
   - Under **Windows domain**, type the domain name.

   Separate addresses and names with carriage returns, as shown below:

   10.5.0.0/16
   10.6.0.0/16
   MedCenter.com

6. Click **ok**.

Configuring Network Access Control with IDM

IDM enables you to implement granular, user-based network access control more easily than is possible by configuring a RADIUS server directly. In this section, you learn how to configure IDM to assign rights to successfully authenticated users.

You must complete the following steps:

1. Install and complete the initial setup on PCM+. For installation and setup instructions, see "Install PCM+" on page 2-203 of Chapter 2: "Implementing 802.1X with ProCurve IDM and Endpoint Integrity."
2. Add the NAC 800s to the list of devices allowed to access the PCM+/IDM server.
3. Import users from OpenLDAP.
4. Define resources to be controlled.
5. Define times and locations.
6. Create profiles (sets of rights).
7. Configure access policy group rules to assign profiles to users based on various conditions.

Add NAC 800s to the Access.txt File

IDM will not add a NAC 800 to its list of managed devices unless the NAC 800's IP address is listed in the server's **access.txt** file. To add the NAC 800 to this file, complete these steps:

1. On the IDM server, open **C:\Program Files\Hewlett-Packard\PNM\server\config\access.txt.**

   Open the file in a text-based editor such as Notepad or Wordpad.

2. Add each NAC 800's IP address or hostname on its own line. If you have a NAC 800 cluster, you only need to add the ESs. In the example network, you would add both CSs. For example:

   10.4.7.50
   10.4.6.50

3. Save and close the file.

4. Open PCM+ and click the **Identity Manager** tab.
5. Expand your realm.
6. Expand the **Network Access Controller 800** folder.
7. Verify that the NAC 800s appear below.

Import Users

IDM includes an Import Wizard, which allows you to add users to IDM from another source, such as an LDAP v3 server. The IDM Import Wizard also synchronizes the IDM user database with the import source directory and allows you to delete users from the IDM user database that are not found in the import source directory.

IDM does this by copying the list of users from the directory to an XML file, comparing users in the XML file to users in the IDM user database, and listing the differences for you to add or remove the mismatched users in the IDM user database.

Importing users from your directory services allows you to automatically populate your IDM directory. If the directory service contains group assignments, users can be automatically assigned to the appropriate policy group (based on membership in the directory service).

To keep IDM up-to-date with changes made to OpenLDAP, you can periodically import users from the directory.

Install the OpenLDAP Server's CA Certificate on PCM+

Whenever possible, you should use SSL to secure the communications between the PCM+ server and the OpenLDAP server. You should first ensure that your OpenLDAP server supports SSL, as explained in "Configure a Root CA with OpenSSL" on page 5-74.

You must then load the OpenLDAP server's CA certificate on PCM+. If you are not the OpenLDAP administrator, contact the appropriate person to get the CA certificate that the OpenLDAP server is using. Then complete the following steps:

1. Copy the certificate to the PCM+ Java trust store. If PCM is installed under Program Files\Hewlett-Packard, the Java trust store is in the following directory:

   ```
   C:\Program files\Hewlett-Packard\PNM\jre\
   lib\security
   ```

2. Access the command prompt and move to this directory. Type:

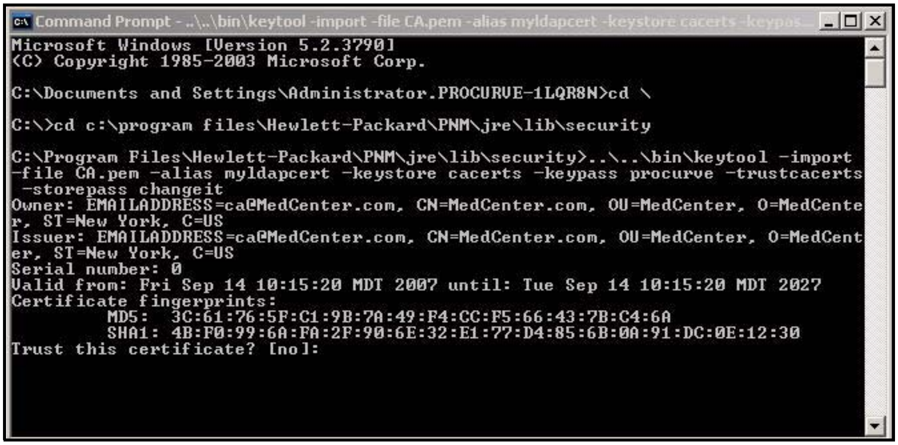
Syntax: C:> ..\..\bin\keytool -import -file <ldapcertfile> -alias myldapcert -keystore cacerts -keypass <certificate_password> -trustcacerts -storepass <keystore_password>

Replace ***<ldapcertfile>*** *with the name of the CA certificate on your OpenLDAP server.*

Replace ***<certificate_password>*** *with the password assigned to the CA certificate.*

Replace ***<keystore_password>*** *with the password assigned to the PCM+ keystore. The default keystore password is* ***changeit.***

3. During the process of loading the certificate, PCM+ displays a prompt, asking you if you want to trust this certificate. Answer Yes.



Command Prompt - ..\..\bin\keytool -import -file CA.pem -alias myldapcert -keystore cacerts -keypas...

```
Microsoft Windows [Version 5.2.3790]
(C) Copyright 1985-2003 Microsoft Corp.

C:\Documents and Settings\Administrator.PROCURVE-1LQR8N>cd \

C:\>cd c:\program files\Hewlett-Packard\PNM\jre\lib\security

C:\Program Files\Hewlett-Packard\PNM\jre\lib\security>..\..\bin\keytool -import
-file CA.pem -alias myldapcert -keystore cacerts -keypass procurve -trustcacerts
 -storepass changeit
Owner: EMAILADDRESS=ca@MedCenter.com, CN=MedCenter.com, OU=MedCenter, O=MedCente
r, ST=New York, C=US
Issuer: EMAILADDRESS=ca@MedCenter.com, CN=MedCenter.com, OU=MedCenter, O=MedCent
er, ST=New York, C=US
Serial number: 0
Valid from: Fri Sep 14 10:15:20 MDT 2007 until: Tue Sep 14 10:15:20 MDT 2027
Certificate fingerprints:
         MD5:  3C:61:76:5F:C1:9B:7A:49:F4:CC:F5:66:43:7B:C4:6A
         SHA1: 4B:F0:99:6A:FA:2F:90:6E:32:E1:77:D4:85:6B:0A:91:DC:0E:12:30
Trust this certificate? [no]:
```

Figure 5-51. Loading the OpenLDAP Server's Certificate on PCM+

If the certificate is imported successfully, the following message is displayed:

Certificate was added to the keystore.

4. Restart the PCM+ server.

Editing IDM Configuration for LDAP Import

The IDM server includes several configuration files that control how user and group information is imported from OpenLDAP. The default configuration settings will work if you are using Microsoft Active Directory. If you are using another LDAP directory—such as OpenLDAP or Novell eDirectory—you will need to modify the LDAP directory settings in:

```
C:\Program Files\Hewlett-Packard\PNM\server\config\
IDMImportServerComp.scp
```

The default settings in the IDMImportServerComp.scp file are shown below. Comments are indicated by "//".

```
LDAP_SERVER_CONFIG {

   PORT=389 //Port where LDAP server receives bind
   request.
   SSL_PORT=636 // Port where LDAP server receives SSL
   bind requests.
   BATCH_SIZE=50 // Internal to IDM.
   COUNT_LIMIT=0 // Internal to IDM.

   SASL_CONFIGURATION { // This section is for SSL
   configuration: Digest MD5, Kerberos V5 and External.
   QOP=auth-conf,auth-int,auth // Quality of protection.
   Valid values are 1 and more of "auth-conf", auth-int",
   "auth" separated by ",".
   ENCRYPTION_STRENGTH=high,medium,low // Strength of
   encryption. Valid values are 1 and more of "high",
   "medium", "low" separated by ",".
   MUTUAL_AUTHENTICATION=true // If both LDAP server and
   IDM server wants to authenticate each other. }

   KERBEROS_JAAS_CONFIG { // This section is for Kerberos
   authentication method.
   KERBEROS_AUTH_MODULE=IDMKerberos // Kerberos authen-
   tication module name. If this entry is changed, you
   must also change the module name in
   idm_kerberos_jass.conf file.
   KERBEROS_JAAS_CONFIG_FILE=config/
   idm_kerberos_jaas.conf // configuration file for JAAS
   Kerberos configuration. } }

   LDAP_DIRECTORY_CONFIG {Configuration for LDAP direc-
   tory. Following values are for Active Directory. Change
   as needed per object class and attributes in LDAP
```

```
    directory being used.
    USER { // User object
    OBJECT_CLASS=User // User object class
    LOGON_NAME=sAMAccountName // Login name attribute.
    COMMON_NAME=cn // Common Name attribute
    DESCRIPTION=description // User description attribute
    DISPLAY_NAME=displayName // User display name attri-
    bute
    }
    GROUP { // Group object
    OBJECT_CLASS=Group // Object class for Group
    COMMON_NAME=cn // common name attribute
    DESCRIPTION=description // Group Description attribute
    MEMBER=member // Group member attribute
    USER_MEMBER_ATTRIBUTE=cn // User attribute used to
    link member users from Group objects.
    }

}
```

You would modify the LDAP_Server_Config section only if your LDAP server is using a port other than the standard port (389).

You must edit the LDAP_DIRECTORY_CONFIG section for OpenLDAP as follows:

```
OBJECT_CLASS=Person // User object class
LOGON_NAME=UID // Login name attribute
```

Depending on how your OpenLDAP directory is configured, you may need to use CN for the LOGON_NAME, as shown below.

```
OBJECT_CLASS=Person // User object class
LOGON_NAME=cn // Login name attribute
```

You must also edit the group object class as follows:

```
OBJECT_CLASS=GroupofNames // Object class for Group
```

If you select any of SASL or Kerberos authentication methods, edit the related sections of the config file as needed to match custom configurations.

After you make these edits, you must restart PCM+.

Importing Users from an LDAP Server

To import user information from an OpenLDAP Server into IDM, complete these steps:

1. From **Tools** in the global toolbar, select **IDM User Import** to launch the IDM User Import Wizard.
2. Click **Next.** The **Data Source** page is displayed.

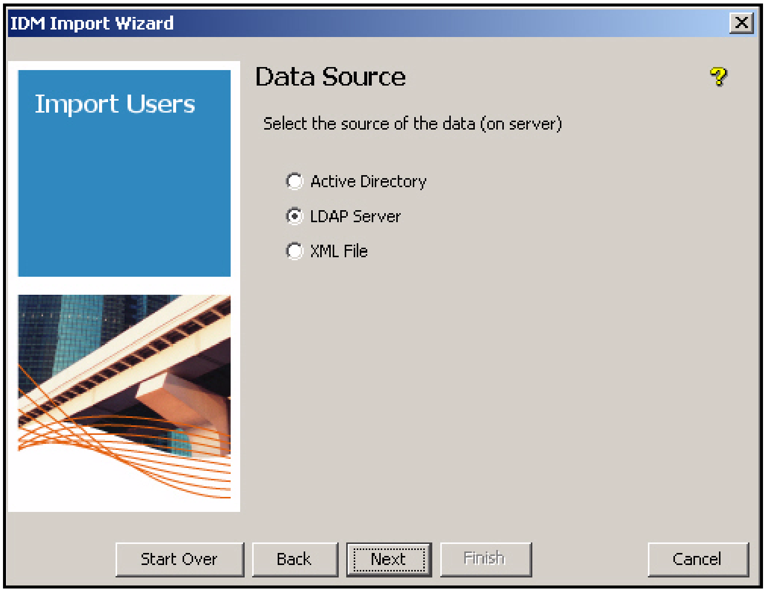
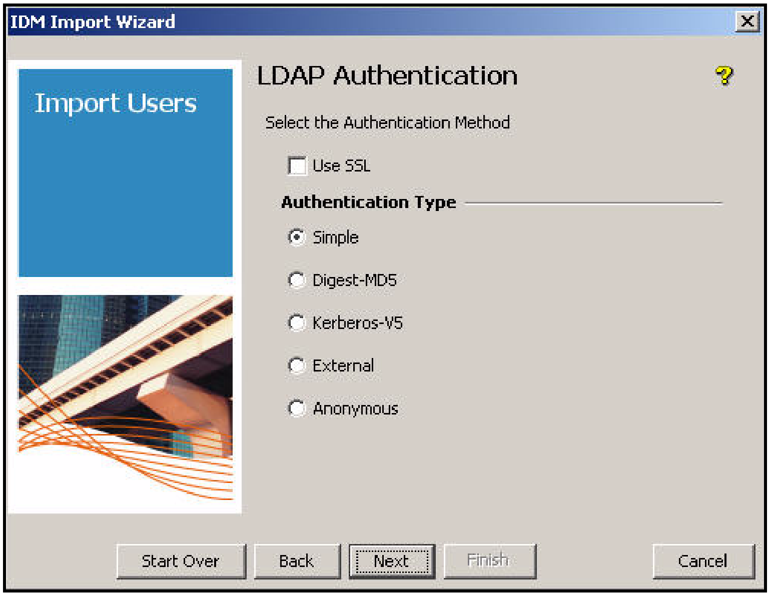


Figure 5-52. Data Source Page

3. Select **LDAP Server** as the data source and click **Next**. The **LDAP Authentication** page is displayed.



LDAP Authentication

Select the Authentication Method

☐ Use SSL

Authentication Type

● Simple

○ Digest-MD5

○ Kerberos-V5

○ External

○ Anonymous

Figure 5-53. LDAP Authentication Page

4. Select the **Use SSL** check box. (You must first load the OpenLDAP's CA certificate as explained in "Install the OpenLDAP Server's CA Certificate on PCM+" on page 5-109.)

5. Then select the LDAP authentication type to be used. Table 5-15 lists authentication methods that IDM supports. Note that you cannot select **External** if you have already selected the **Use SSL** check box.

Table 5-15. Authentication Methods

Authentication	Description
Simple	This method if not very secure. The fully qualified DN of the client (user) and the client's password are sent in clear text.
Digest-MD5	The server generates a challenge, and the client responds with a shared secret (password).
Kerberos-V5	This method is used with either a password or a smart card for interactive logon.
External (TLS)	This method uses authentication services provided by lower-level network services such as TLS.
Anonymous	No authentication is required by the OpenLDAP server.

6. Click **Next**. The authentication information you type varies slightly, depending on the authentication method you select. For all authentication methods, however, you must type the following information:
   - **Server**—The IP Address or DNS name (fully qualified domain name) of the OpenLDAP server. The IP address can be used for:
     – Simple
     – Anonymous
     – Kerberos-V5 authentication in non-SSL mode
   - **Domain**—The domain name that will be used to create the realm in IDM.
   - **Base DN**—The Base DN, or the location in the directory where the search for users and groups will begin. For the domain MedCenter, the base DN entry would be:

     o=MedCenter.com

     Your base DN might be:

     dc=<*MyCompany*>,dc=com

     Select the authentication type you want to use and then continue with the appropriate instructions, as listed in Table 5-16.

Table 5-16. instructions

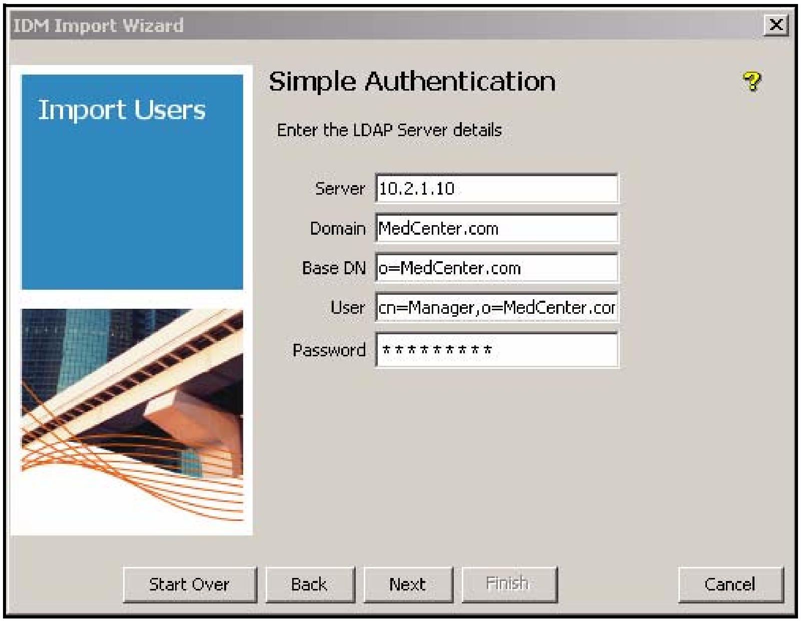
Authentication	Instructions
Simple	"Using Simple Authentication" on page 5-115
Digest-MD5	"Using Digest-MD5 Authentication" on page 5-116
Kerberos-V5	"Using Kerberos-V5 Authentication" on page 5-117
External-TLS	"Using External Authentication" on page 5-118
Anonymous	"Using Anonymous Authentication" on page 5-120

Using Simple Authentication

If you choose simple authentication, complete these steps:

1. In the **Server** box, type the IP address of the OpenLDAP server.
2. In the **Domain** box, type a name that you have chosen for the IDM realm into which you will import the users.
3. In the **Base DN** box, type the DN of the container in which you want IDM to begin to look to import users.
4. In the **User** box, type the DN for the root admin account.

5. In the **Password** box, type the password for the user that you designated in the **User** box.



Enter the LDAP Server details

Server 10.2.1.10
Domain MedCenter.com
Base DN o=MedCenter.com
User cn=Manager,o=MedCenter.cor
Password *********

Figure 5-54. IDM Import Wizard—Simple Authentication Page

6. Click **Next**. The **Extract Users and Groups** page is displayed.
7. Continue with "Extracting User and Group Information" on page 5-121.

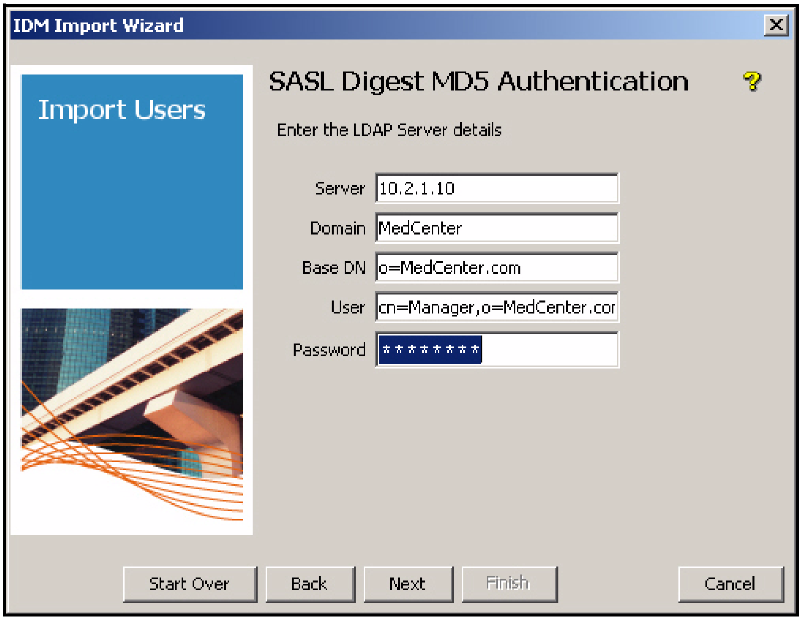
Using Digest-MD5 Authentication

The SASL Digest MD5 authentication window is used to define the LDAP data source for Digest-MD5. In Digest-MD5, the server generates a challenge and the client responds with a shared secret (password). Values for these options can be obtained from the LDAP server administrator.

To configure the IDM Import Wizard to use Digest MD5 authentication, complete the following steps:

1. In the **Server** box, type the DNS name of the LDAP server.
2. In the **Domain** box, type the domain name, which is used to create a realm in IDM.
3. Optionally, in the **Base DN** box, type the Base DN. IDM will search only for users and groups from this node of a directory tree.

4. In the **User** box, type the user DN used to access the LDAP server.
5. In the **Password** box, type the password associated with the user.



Enter the LDAP Server details

Server 10.2.1.10
Domain MedCenter
Base DN o=MedCenter.com
User cn=Manager,o=MedCenter.cor
Password ********

Figure 5-55. SASL Digest MD5 Authentication Page

6. Click **Next**. The **Extract Users and Groups** page is displayed.
7. Continue with “Extracting User and Group Information” on page 5-121.

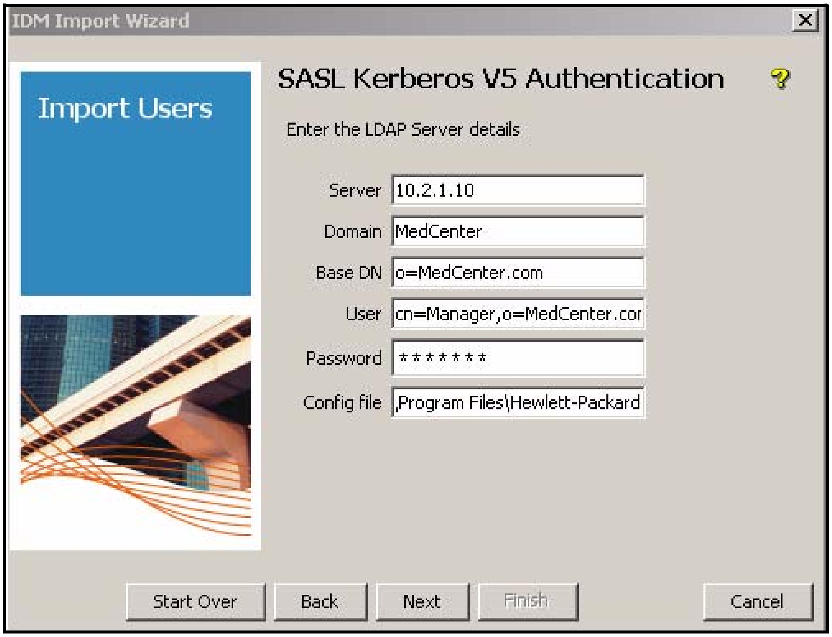
Using Kerberos-V5 Authentication

The SASL Kerberos V5 authentication window is used to define the LDAP data source for Kerberos. Kerberos V5 authentication requires that your OpenLDAP server is set up with a Key Distribution Center (KDC). If you are not the OpenLDAP administrator, contact him or her to determine if your OpenLDAP server has a KDC.

To set up Kerberos V5 authentication, complete the following steps:

1. In the **Server** box, type the IP address or DNS name of the LDAP server.
2. In the **Domain** box, type the domain name. It will be used to create a realm in IDM.
3. Optionally, in the **Base DN** box, type the Base DN. IDM will search only for users and groups from this node of a directory tree.

4. In the **User** box, type the user name used to access the LDAP server.
5. In the **Password** box, type the password associated with the user.
6. In the **Config file** box, type the complete path and filename of the configuration file that identifies the domain of the KDC.



IDM Import Wizard

SASL Kerberos V5 Authentication

Enter the LDAP Server details

Server: 10.2.1.10
Domain: MedCenter
Base DN: o=MedCenter.com
User: cn=Manager,o=MedCenter.cor
Password: *******
Config file: ,Program Files\Hewlett-Packard

Figure 5-56. SASL Kerberos V5 Authentication Page

7. Click **Next**. The **Extract Users and Groups** page is displayed.
8. Continue with “Extracting User and Group Information” on page 5-121.

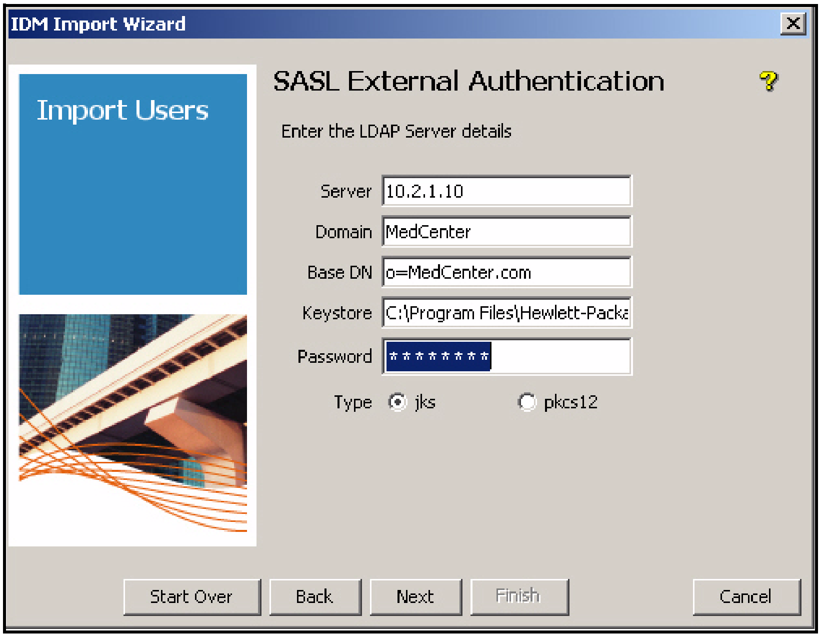
Using External Authentication

The **SASL External authentication** window is used to define the external LDAP data source. External authentication uses an X509 certificate for user authentication. The LDAP X509 User Certificate must be installed in a keystore on the IDM server, and the LDAP server’s certificate must be stored in the trust store under your JRE installation on the IDM server.

See “Install the OpenLDAP Server’s CA Certificate on PCM+” on page 5-109 for details on importing LDAP X509 User certificates for use with IDM.

To set up external authentication, complete the following steps:

1. In the **Server** box, type the DNS name of the LDAP server.
2. In the **Domain** box, type the domain name. It is used to create a realm in IDM.
3. Optionally, in the **Base DN** box, type the Base DN. IDM will search only for users and groups from this section of the directory tree.
4. In the **Keystore** box, type the keystore file name. For JKS, the Keystore is the location on the IDM server where you installed the keystore. (For example: **c:\idmuser\mykeystore**.) For PKCS12, type the PKCS certificate in the **Keystore** box.
5. In the **Password** box, type the password. For JKS, type the password of the keystore on the IDM Server. For PKCS12, type the PKCS12 key in the **Password** box
6. Select the **Type**: either **jks**, or **pkcs12**.


IDM Import Wizard

SASL External Authentication

Enter the LDAP Server details

Server 10.2.1.10
Domain MedCenter
Base DN o=MedCenter.com
Keystore C:\Program Files\Hewlett-Packa
Password ********
Type ● jks ○ pkcs12

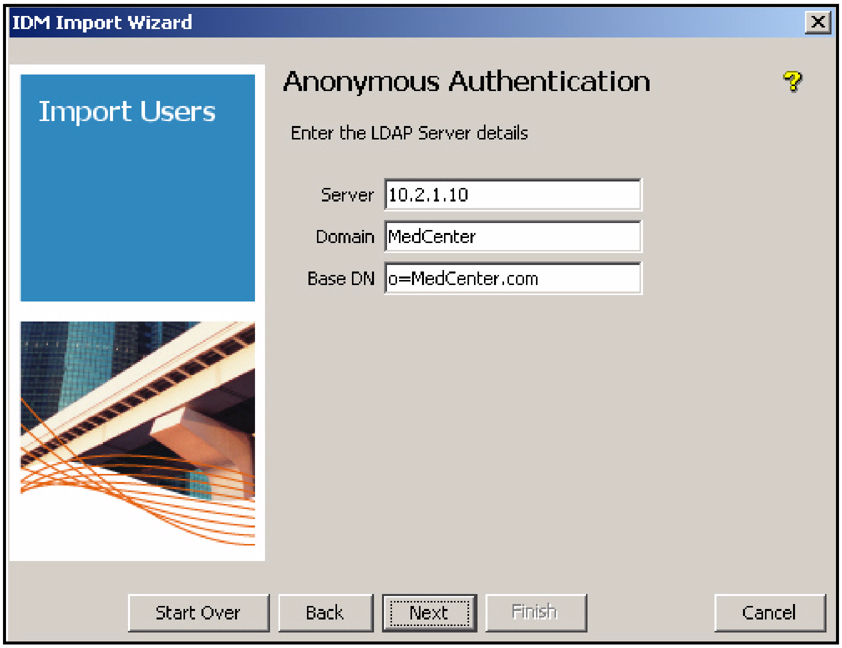
Figure 5-57. SASL Authentication Page

7. Click **Next**. The **Extract Users and Groups** page is displayed.
8. Continue with “Extracting User and Group Information” on page 5-121.

Using Anonymous Authentication

To configure anonymous authentication, complete the following steps:

1. In the **Server** box, type the IP address of the OpenLDAP server.
2. In the **Domain** box, type a name that you have chosen for the IDM realm into which you will import the users.
3. In the **Base DN** box, type the DN of the directory in which you want IDM to begin to look to import users.



IDM Import Wizard

Anonymous Authentication

Enter the LDAP Server details

Server 10.2.1.10

Domain MedCenter

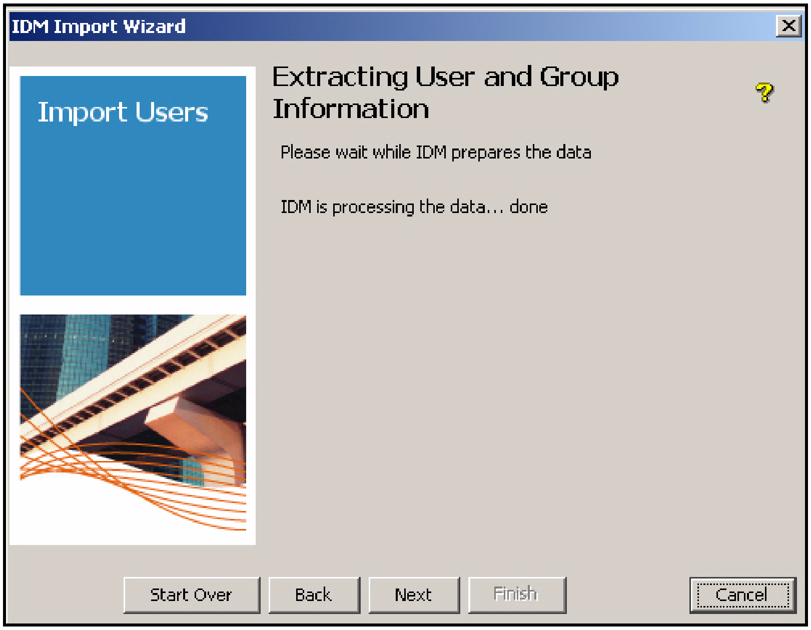
Base DN o=MedCenter.com

Figure 5-58. Anonymous Authentication Page

4. Click **Next**. The **Extract Users and Groups** page is displayed.
5. Continue with “Extracting User and Group Information” on page 5-121.

Extracting User and Group Information

When the **Extracting User and Group Information** page is displayed, continue with the steps that follow:



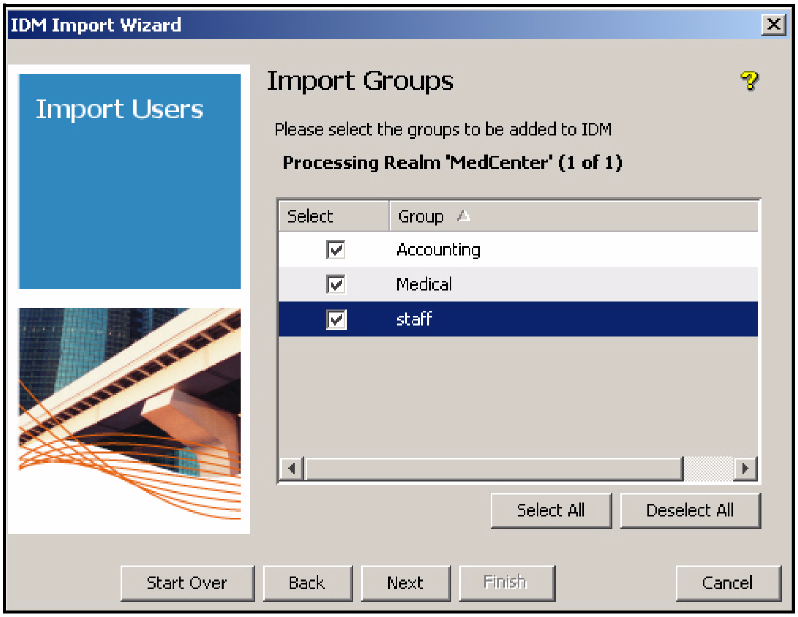
Extracting User and Group Information

Please wait while IDM prepares the data

IDM is processing the data... done

Figure 5-59. IDM Import Wizard—Extracting User and Group Information Page

1. When the phrase “IDM is processing the data... done” is displayed, click **Next**.



IDM Import Wizard

Import Groups

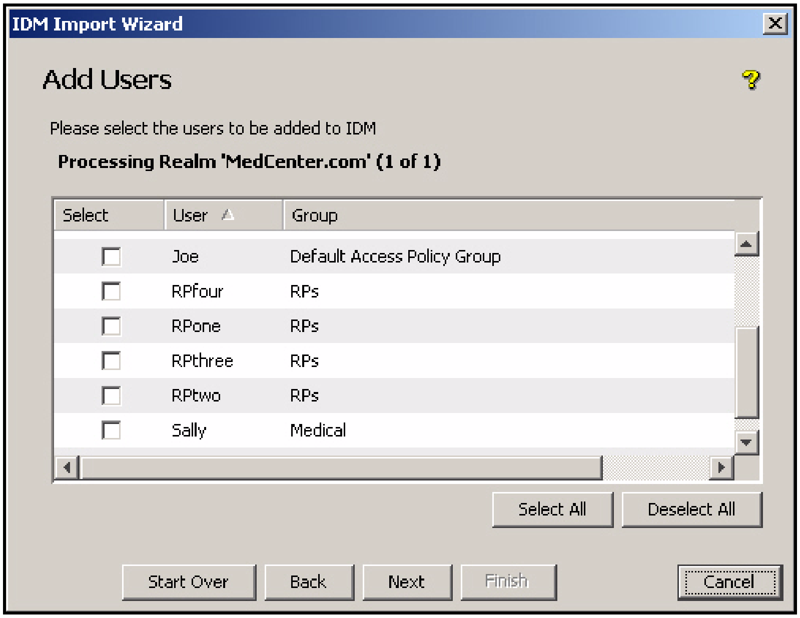
Please select the groups to be added to IDM

Processing Realm 'MedCenter' (1 of 1)

Select	Group
☑	Accounting
☑	Medical
☑	staff

Figure 5-60. Import Groups Page

2. On the **Import Groups** page, select all of the groups that you want to import or click **Select All**. Then, click **Next**.



IDM Import Wizard

Add Users

Please select the users to be added to IDM

Processing Realm 'MedCenter.com' (1 of 1)

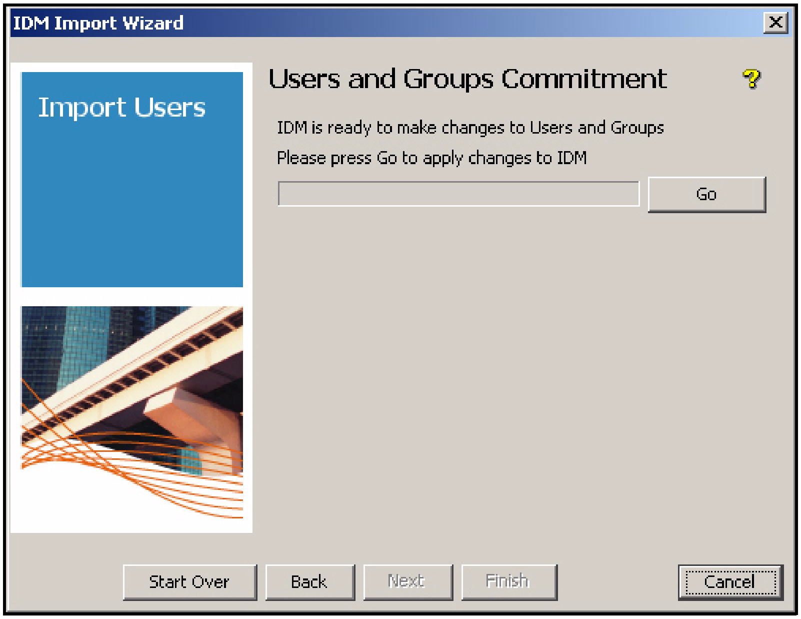
Select	User	Group
□	Joe	Default Access Policy Group
□	RPfour	RPs
□	RPone	RPs
□	RPthree	RPs
□	RPtwo	RPs
□	Sally	Medical

Figure 5-61. Add Users Page

3. On the **Add Users** page, select the users you want to add or click **Select All**. Then, click **Next**.

4. On the **Remove Users** page, select any users that you want to delete from IDM. This page might be populated if you have imported user and groups from OpenLDAP in the past. IDM will compare the information you downloaded before to the information you are currently downloading. If a user or group exists on IDM but not on the OpenLDAP server, IDM will list it on this page. You then have the option of deleting it or keeping it.

   Click **Next**.



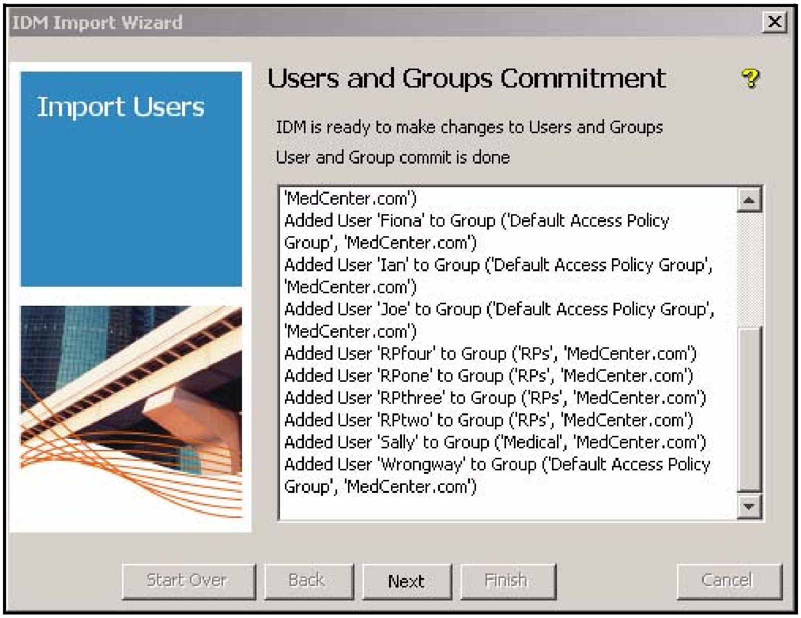
Users and Groups Commitment

IDM is ready to make changes to Users and Groups

Please press Go to apply changes to IDM

Figure 5-62. Users and Groups Commitment Page

5. When the **Users and Groups Commitment** page is displayed, click **Go** to begin the actual import process. Then click **Next**.



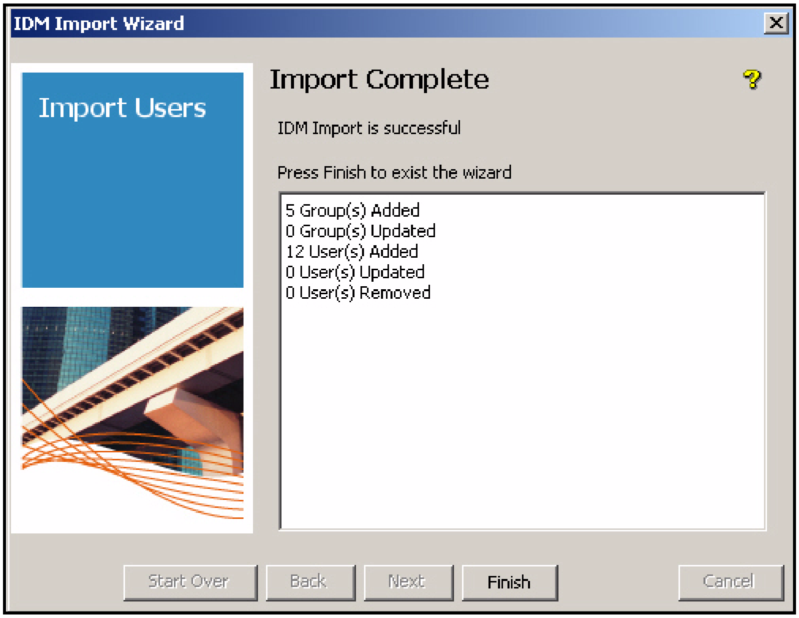
IDM is ready to make changes to Users and Groups

User and Group commit is done

```
'MedCenter.com')
Added User 'Fiona' to Group ('Default Access Policy
Group', 'MedCenter.com')
Added User 'Ian' to Group ('Default Access Policy Group',
'MedCenter.com')
Added User 'Joe' to Group ('Default Access Policy Group',
'MedCenter.com')
Added User 'RPfour' to Group ('RPs', 'MedCenter.com')
Added User 'RPone' to Group ('RPs', 'MedCenter.com')
Added User 'RPthree' to Group ('RPs', 'MedCenter.com')
Added User 'RPtwo' to Group ('RPs', 'MedCenter.com')
Added User 'Sally' to Group ('Medical', 'MedCenter.com')
Added User 'Wrongway' to Group ('Default Access Policy
Group', 'MedCenter.com')
```

Figure 5-63. IDM Import Wizard—Users and Groups Commitment Page

6. Review the changes that IDM will make. If you approve of the changes, click **Next.**



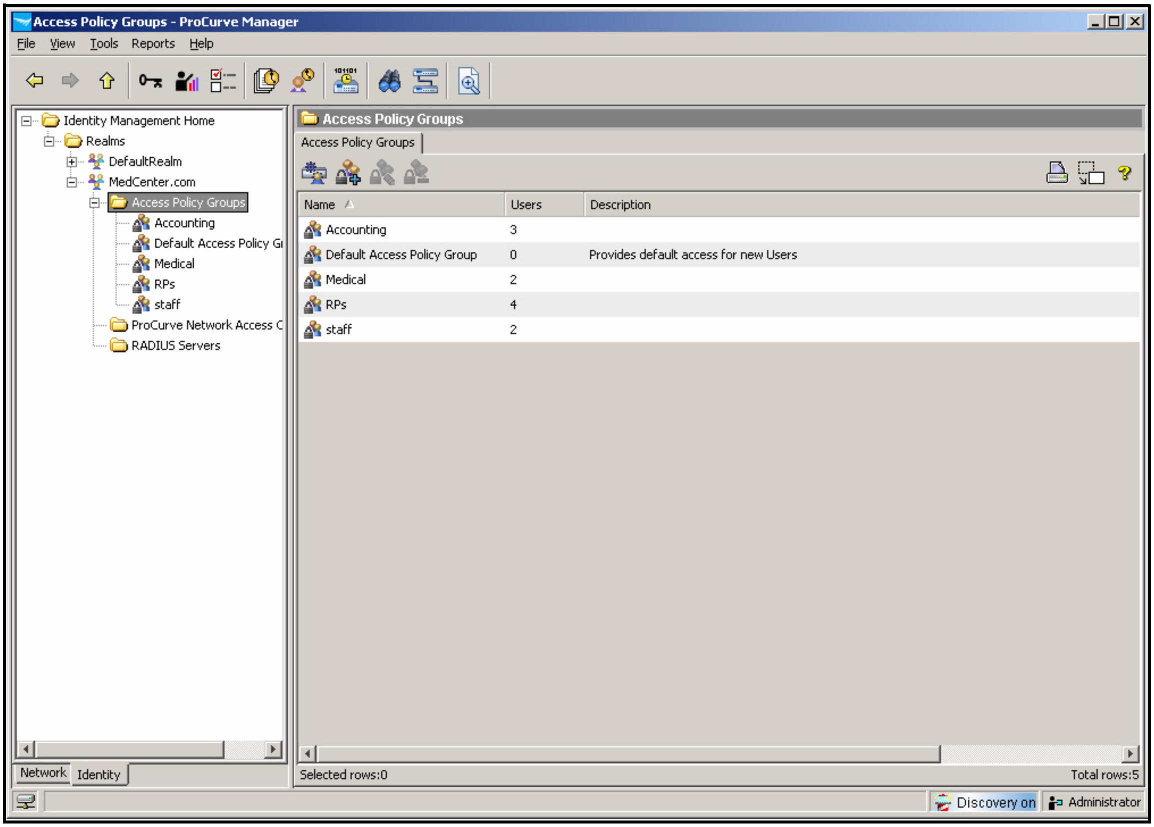
IDM Import is successful

Press Finish to exist the wizard

```
5 Group(s) Added
0 Group(s) Updated
12 User(s) Added
0 User(s) Updated
0 User(s) Removed
```

Figure 5-64. IDM Import Wizard—Import Complete Page

7. The **Import Complete** page shows you how many users and groups were imported. Click **Finish**.
8. Click the **Identity** tab in the left pane of the PDM+ interface.
9. Expand **Realms >** ***<myrealm>*** **> Access Policy Groups**. You should see your user groups from OpenLDAP in the right pane along with the right number of users in each group.



Name	Users	Description
Accounting	3	
Default Access Policy Group	0	Provides default access for new Users
Medical	2	
RPs	4	
staff	2	

Figure 5-65. IDM Access Policy Groups Window

Define Resources

You must define every resource that you want to control. These can include:

- A single device—an IP address
- Applications (such as DHCP, DNS, and HTTP)—TCP or UDP ports
- Applications on a single device—an IP address and TCP or UDP ports
- A VLAN—a subnet network address

Table 5-17 shows the resources for the example network.

Table 5-17. Medical Center Resources

Resource	VLAN ID	IP Address	Protocol	Port or Ports
Management VLAN	2	10.2.0.0./16	IP	Any
Server VLAN	4	10.4.0.0/16	IP	Any
Medical Server VLAN	5	10.5.0.0/16	IP	Any
Accounting VLAN	6	10.6.0.0/16	IP	Any
Medical VLAN (doctors and nurses)	8	10.8.0.0/16	IP	Any
Staff VLAN	12	10.12.0.0/16	IP	Any
Accounting VLAN	16	10.16.0.0/16	IP	Any
Patients VLAN	32	10.32.0.0/16	IP	Any
DHCP, DNS, Web		Any	UDP	53, 67, 80, 443

To define resources, complete these steps:

1. In the PCM+, click the **Identity** tab.
2. Select your realm (MedCenter.com in the example).
3. Under the **Properties** tab, click the **Configure Identity Management** button.

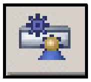
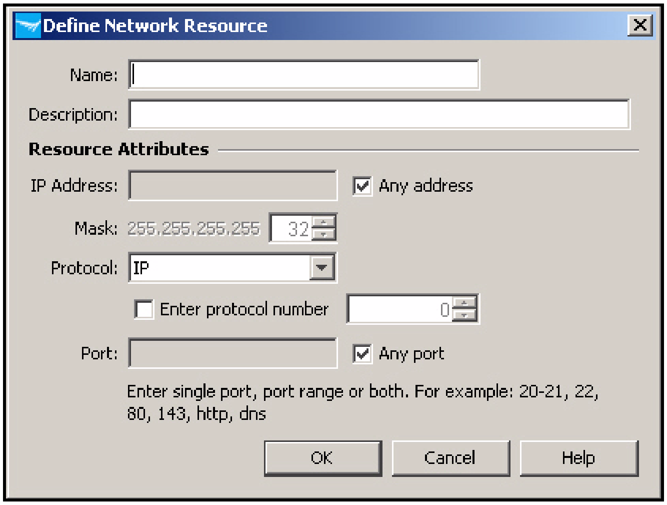


Figure 5-66. PCM+ Console, IDM Interface—Configure Identity Management Button

4. Select **Network Resources** in the left pane.
5. Click the **Create a new Network Resource** button in the right pane.



Define Network Resource

Name:

Description:

Resource Attributes

IP Address: ☑ Any address

Mask: 255.255.255.255 32

Protocol: IP

□ Enter protocol number 0

Port: ☑ Any port

Enter single port, port range or both. For example: 20-21, 22, 80, 143, http, dns

Figure 5-67. PCM+ Console, IDM Interface—Define Network Resource Window

6. To set up a resource that is an entire VLAN, follow these steps:

   a. In the **Define Network Resource** window, type a string in the **Name** box to identify the VLAN (in this example, **Management VLAN**).

   b. In the **Description** box, type a description, if desired.

   c. Clear the **Any address** check box.

   d. For the **IP Address**, type the network address of the subnet associated with the VLAN (in this example, **10.2.0.0**).

   e. For the **Mask**, type or select the prefix length for the subnet (in this example, **16**).

   f. Leave **IP** for the **Protocol**.

   g. Click **OK**.

7. Follow these steps to set up a resource that is an application type such as DHCP:

   a. In the **Define Network Resource** window, type a string in the **Name** box to identify the application or applications. For example: **DHCP, DNS, and Web**.

Note

In this example, the network administrators have grouped these three applications because they are all necessary for the most basic level of access. Depending on your environment, you might create a different resource for each.

b. In the **Description** box, type a description if you want.

c. Select the **Any address** check box.

You could clear the check box and restrict users to accessing this application on a particular device or subnet. In this case, type the appropriate IP address for the **IP Address and Mask.**

d. From the **Protocol** list, select the protocol: **TCP** or **UDP** (in this example, **UDP**).

e. Clear the **Any port** check box and type the appropriate values for the **Port**. You can type ranges of ports or multiple, non-consecutive ports, separated by a comma (in this example: **53, 67, 80, 443**).

f. Click **OK**.

8. Follow these steps to set up a resource that is a single device:

   a. In the **Define Network Resource** window, type a string in the **Name** box to identify the device (in this example, **VLAN 4**).

   b. In the **Description** box, type a description, if desired.

   c. Clear the **Any address** check box.

   d. For the **IP Address**, type the device's IP address.

   e. For the **Mask**, type or select the prefix length.

   f. From the **Protocol** list, select the protocol (**IP** is the default and allows all IP traffic).

   g. To allow any traffic to this device, select the **Any port** check box. If you want to restrict access to one or several single applications, clear the **Any port** check box and type the appropriate values for the **Port**.

   h. Click **OK**.

9. Repeat step 5, 8, 7, or 6 to set up each resource for your network.

Configure Locations

IDM allows you to control the locations from which users log in to the network. For example, the Medical Center network administrators want the Accounting department employees to log in only from their workstations in their area of the building. Physical access to this area of the building is restricted, so that patients or other employees cannot look over the shoulder of an Accounting employee and view a patient's confidential financial information.

Table 5-18. Define Locations from Which Users Can Access the Network

Name	Description	Device Group	Device	IP Address	Ports
Acctg_area	3rd floor west side	Wired	5400zl	10.2.0.3	C1-C24

Doctors and nurses, on the other hand, must be allowed to access information from many locations in the Medical Center. The network administrators will not limit their access to a certain location.

The support staff are also mobile. For example, receptionists often fill in for one another, moving to different areas in the building as needed.

You can use Table 5-19 to list your users and the location from which they should log in.

Table 5-19. Locations

Name	Description	Device Group	Device	IP Address	Ports

1. Click the **Identity** tab.
2. Click your realm (MedCenter.com in the example).
3. Click the **Configure Identity Management** button.
4. Click the **Locations** folder.

5. Click the **New Locations** button.

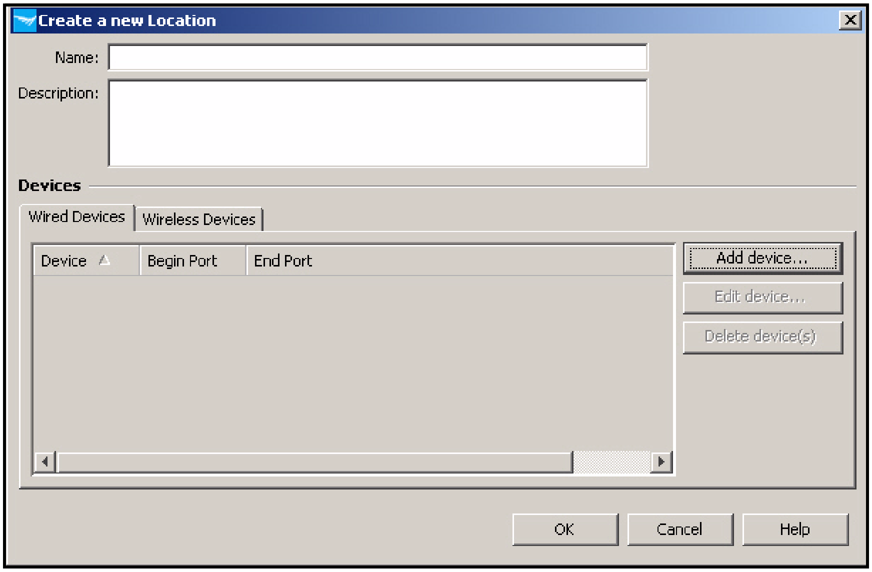


Figure 5-68. New Locations Button

6. From the **Select Device Group** list, select a device group.
7. In the **Name** box, type a name for the location. For the example network, enter **Accounting floor.**
8. You must add at least one device. Click **Add device**.
9. From the **Select Device Group** list, select a device group. In the example, you would select the edge switch that connects to the Accounting users' workstations.
10. From the **Select Device** list, select the IP address of the device or check the **Manually enter device address** check box and type the IP or DNS name in the box below.
11. Select **Any port** or **Select Ports**. If you select the latter, select the beginning and ending ports from the **Begin port** and **End port** lists. For example, the Accounting users' workstations might connect to ports B2 to B24 and C2 to C10.
12. Click **OK**. If you need to add more ports, click **Add device** again and repeat steps.

Configure Times

With IDM you can specify times when an access policy group is active. For example, you might want to specify that the users who connect to the accounting databases can access the network only during business hours on weekdays. As an added security measure, the example organization—Medical Center—wants to limit the times when the accounting department can access the accounting database. The accounting department can access the database only during business hours, which the Medical Center defines as 7:30 a.m. to 6:30 p.m.

Other users, however, may need to access the network after business hours. The Medical Center, for example, must ensure that doctors and nurses can access patient records 24 hours a day, seven days a week.

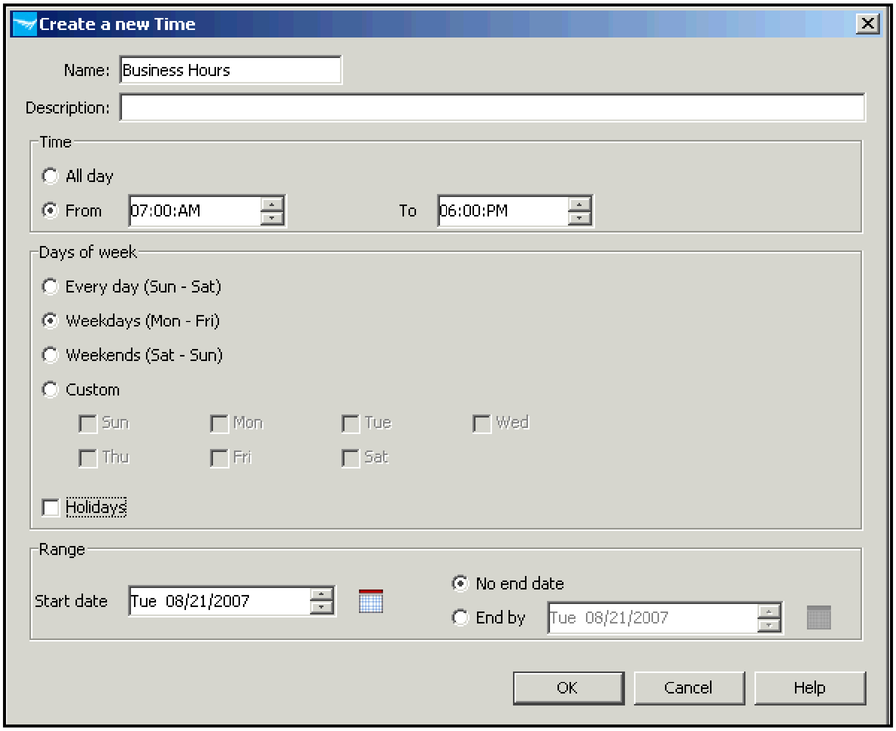
Note

If you restrict the times when users can access the network, you should also force them to re-authenticate periodically. Otherwise, a user could log in to the network before the restricted time and remain logged in. In the example network, an accounting user could log in at 6:50 p.m. and remain logged past 7 p.m.—the time that should be off-limits to accounting users.

Table 5-20. Times

Name	Description	Time	Days of Week	Holidays	Start Date	End Date
Business Hours	Regular hours of operation	from 6:30 AM to 7:00 PM	weekdays	yes	default	no end date
After Hours	Non-business hours	from 6:00 PM to 7:00 AM	all	yes	default	no end date

1. Click the **Identity** tab.
2. Click your realm (MedCenter.com).
3. Click the **Configure Identity Management** button.
4. Click the **Times** folder.
5. Click the **Create a new Time** button.



Name: Business Hours

Description:

Time

○ All day

● From 07:00:AM To 06:00:PM

Days of week

○ Every day (Sun - Sat)

● Weekdays (Mon - Fri)

○ Weekends (Sat - Sun)

○ Custom

□ Sun □ Mon □ Tue □ Wed

□ Thu □ Fri □ Sat

□ Holidays

Range

Start date Tue 08/21/2007

● No end date

○ End by Tue 08/21/2007

Figure 5-69. Create a new Time Window

6. In the **Name** box, type a name for the time. Type a description in the **Description** box.
7. In the **Time** section, select **All day** or **From**. If you select **From**, select start and ending times. For the example network, you would type 6:30 a.m. for **From** and 7 p.m. for **To**.
8. In the **Days of week** section, select the days when this time applies. If you want this time to apply on holidays as well, check the **Holidays** check box.
9. In the **Range** section, accept the default (today) or click the calendar icon to select a day on which the time policy will be enforced.
10. Select **No end date** or **End by**. If you select **End by**, click the calendar icon to select a day on which the policy will stop being enforced.
11. Click **OK**.

Configure Holidays

You can configure holidays on which the Times can be activated. For example, you might want to activate the Business Hours time on holidays.

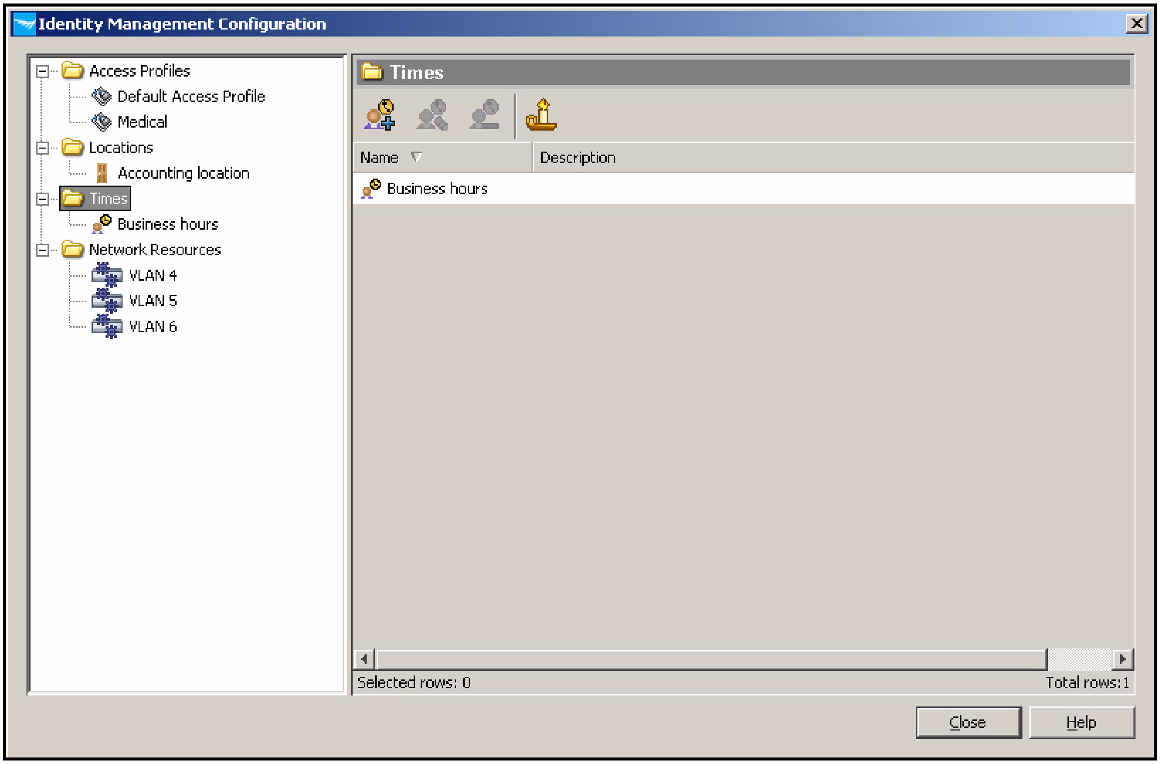


Figure 5-70. Configure Holidays Button

1. Click the **Holiday** button.

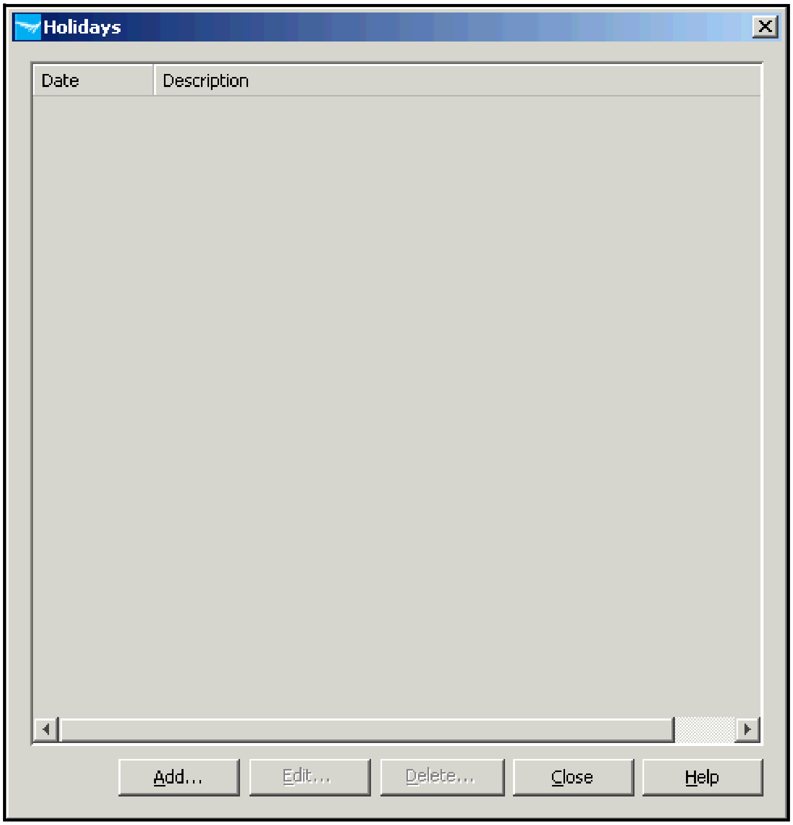
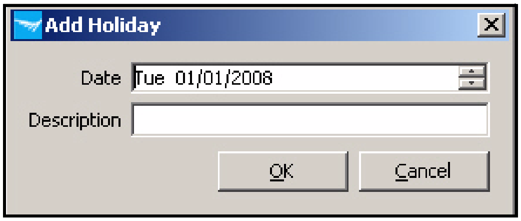


Figure 5-71. Holidays List

2. Click **Add**.

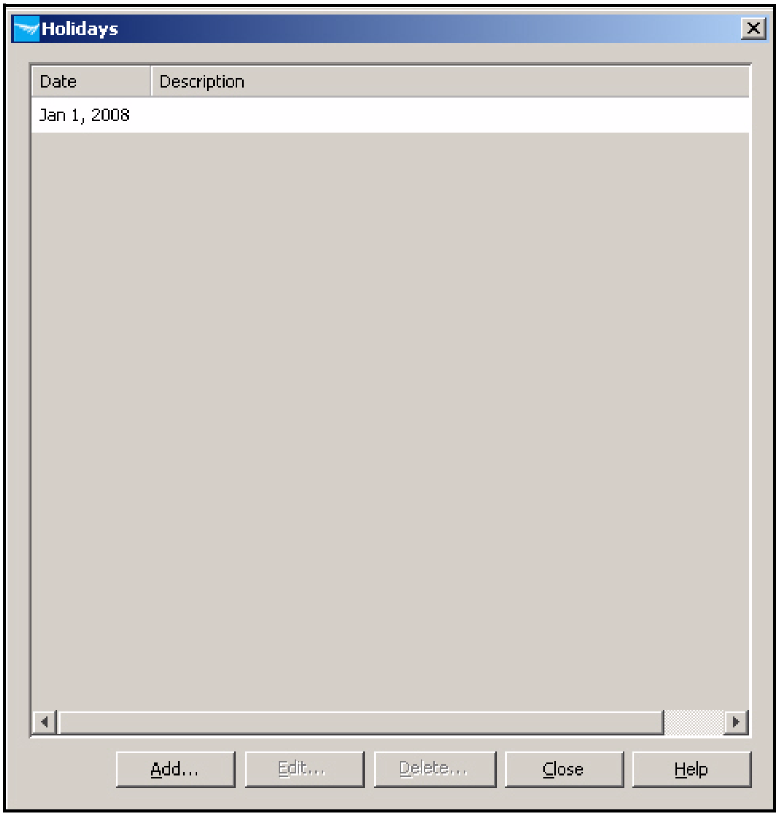


Date Tue 01/01/2008

Description

Figure 5-72. Add Holiday Window

3. In the **Date** box, type the day of the holiday. If you do not know the day of the week, type the mm/dd/yyyy portion and the day will be selected automatically. In this example, type **1/1/200X,** replacing X with the appropriate number for next year.
4. In the **Description** box, type the name of the holiday.
5. Click **OK**.



Date	Description
Jan 1, 2008	

Figure 5-73. Holiday Added

Create Access Profiles

A profile defines a set of rights including:

- VLAN assignment
- Quality-of-service (QoS) settings
- Rate limit
- Resources allowed and resources denied

Note

For each profile, you can also choose whether, by default, all resources not specifically defined are denied or whether they are allowed. This is called the default access option. In this example, you will allow specific resources and deny all others; the default access option is deny.

Although you can create several profiles for a single group of users—and then assign those profiles under various circumstances—in this example, each user group requires only one profile for normal access.

The example profiles that you will learn how to create in this section are displayed in Table 5-21.

Table 5-21. Network Resource Assignments per Access Profile

Access Profile	VLAN ID	QoS	Ingress Rate-Limit	Allowed Resources	Default Access
Network_Admins	2	Don't override	Don't override	• DHCP, DNS, and Web • Server VLAN • Medical Server VLAN • Accounting Server VLAN • Management VLAN • Medical VLAN • Accounting VLAN • Staff VLAN • Patients VLAN • Radio Port VLAN	Deny
Medical	8	Don't override	Don't override	• DHCP, DNS, and Web • Server VLAN • Medical Server VLAN • Medical VLAN	Deny
Staff	12	Don't override	1000 Kbps	• DHCP, DNS, and Web • Server VLAN • Staff VLAN	Deny
Accounting	16	Don't override	1000 Kbps	• DHCP, DNS, and Web • Server VLAN • Accounting Server VLAN • Accounting VLAN	Deny
Patients	32	Don't override	1000 Kbps	• DHCP, DNS, and Web	Deny
RPs	2100	Don't override	Don't override	All	Allow

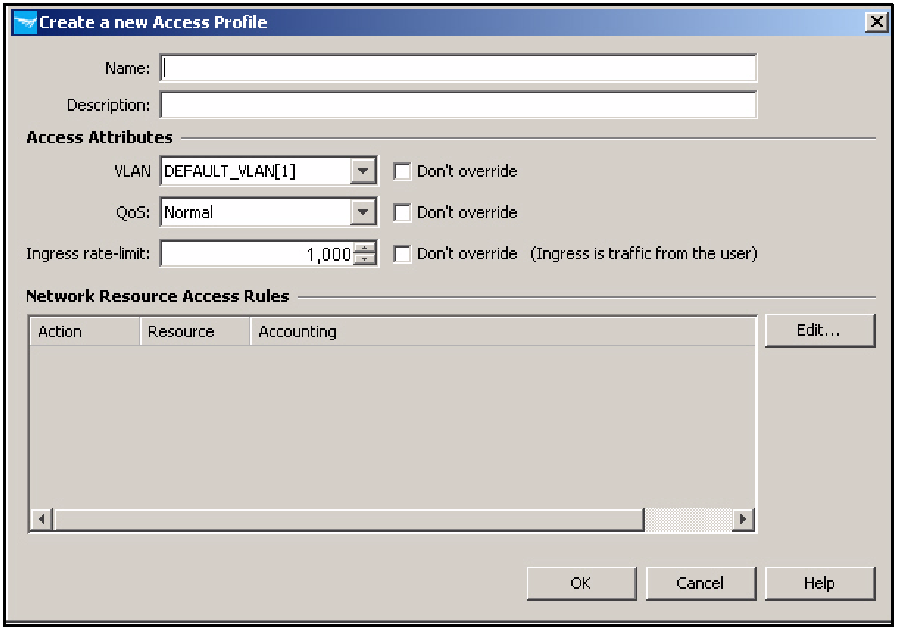
Follow these steps to create the profiles:

1. In the PCM+ console, click the **Identity** tab.
2. Select your realm (MedCenter.com).

3. Under the **Properties** tag, click the **Configure Identity Management** button.

4. Select the **Access Profiles** folder.

5. Click **Create a new Access Profile**.


Create a new Access Profile

Name:

Description:

Access Attributes

VLAN DEFAULT_VLAN[1] □ Don't override

QoS: Normal □ Don't override

Ingress rate-limit: 1,000 □ Don't override (Ingress is traffic from the user)

Network Resource Access Rules

Action	Resource	Accounting

Figure 5-74. PCM+ Console, IDM Interface—Create a new Access Profile

6. In the **Name** box, type the name of the access profile. In this example, you are creating the profile for the Network_Admins group under normal circumstances. You name the profile **Network_Admins**.

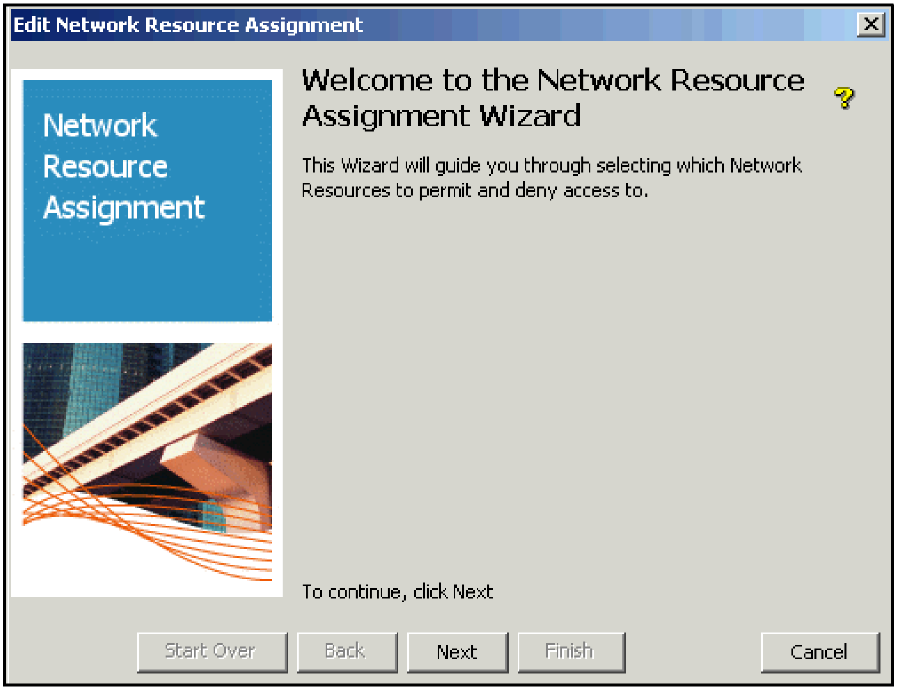
7. In the **Description** box, type a description, if desired.

8. From the **VLAN** list, select the proper VLAN (in this example, **2**).

9. For the **QoS**, either select the QoS level from the list or select the **Don't override** check box.

10. For the **Ingress rate-limit**, either type the rate limit in Kbps or select the **Don't override** check box.

11. In the **Network Resource Access Rules** area, click **Edit**.


Edit Network Resource Assignment

Welcome to the Network Resource Assignment Wizard

This Wizard will guide you through selecting which Network Resources to permit and deny access to.

To continue, click Next

Figure 5-75. Edit Network Resource Assignment Wizard—Welcome Page

12. In the **Welcome to the Network Resource Assignment Wizard** page, click **Next**.

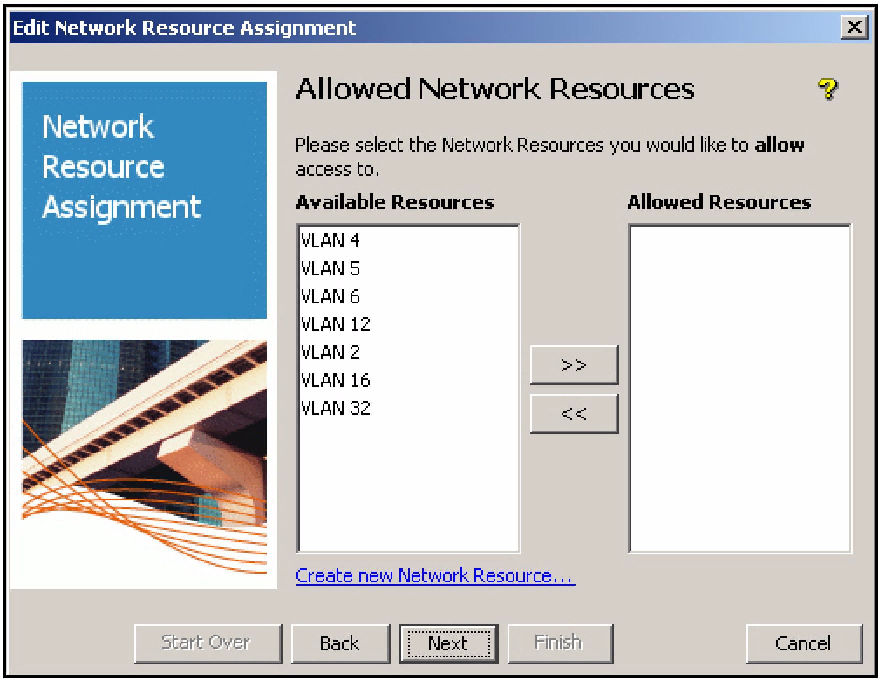
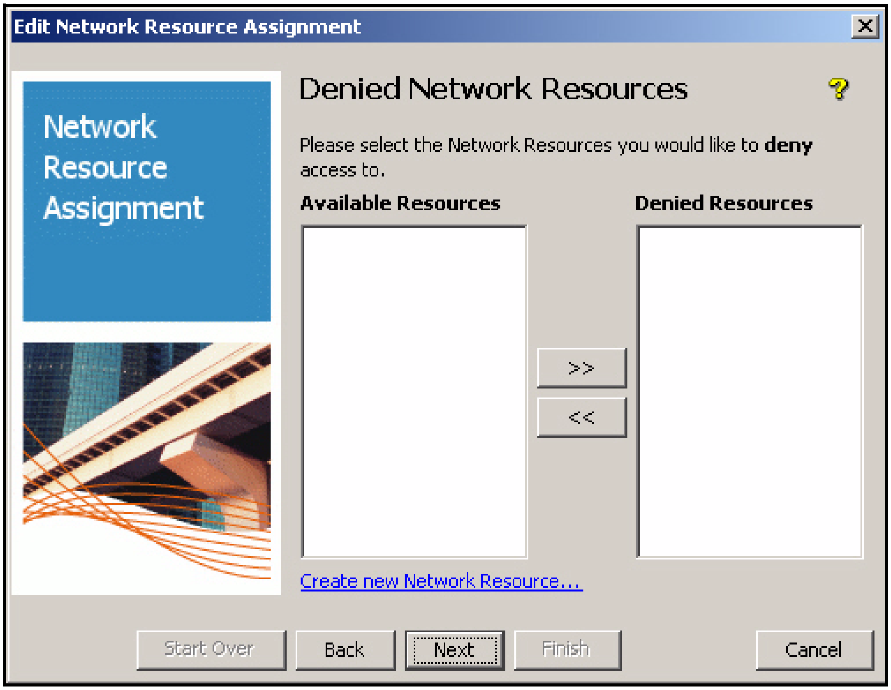

Edit Network Resource Assignment
Network Resource Assignment
Allowed Network Resources
Please select the Network Resources you would like to **allow** access to.
Available Resources
Allowed Resources
VLAN 4
VLAN 5
VLAN 6
VLAN 12
VLAN 2
VLAN 16
VLAN 32
>>
<<
Create new Network Resource...
Start Over
Back
Next
Finish
Cancel

Figure 5-76. Edit Network Resource Assignment Wizard—Allowed Network Resources Page

13. From the **Available Resources** pane, select a resource and click the **>>** button. Repeat for each network resource that you want to assign to this profile.

14. When all of the desired resources are in the **Allowed Resources** pane, click **Next**.



Denied Network Resources

Please select the Network Resources you would like to **deny** access to.

Create new Network Resource...

Figure 5-77. Edit Network Resource Assignment Wizard—Denied Network Resources Page

15. If you would like to deny the group access to any other resources, repeat the previous step for resources that you want to deny. If not, click **Next**.

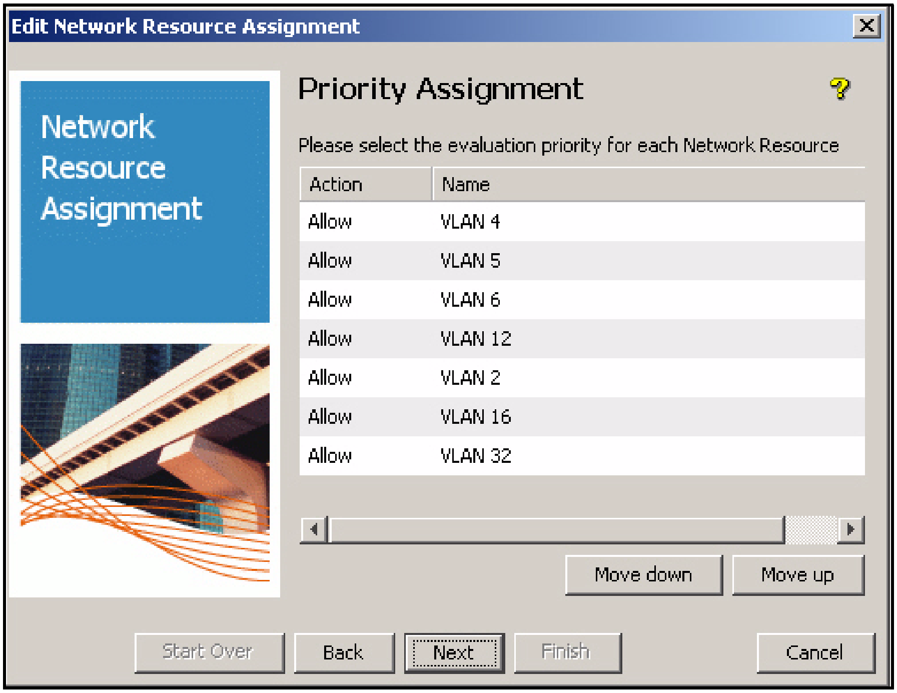
    You might need to deny resources when:

    - A resource is a subset of an allowed resource

      For example, you can grant users access to an entire VLAN, but deny them access to a single server in that VLAN.

    - You use the strategy of allowing all resources, by default

    Neither condition applies to this access profile, so you click **Next**.



Priority Assignment

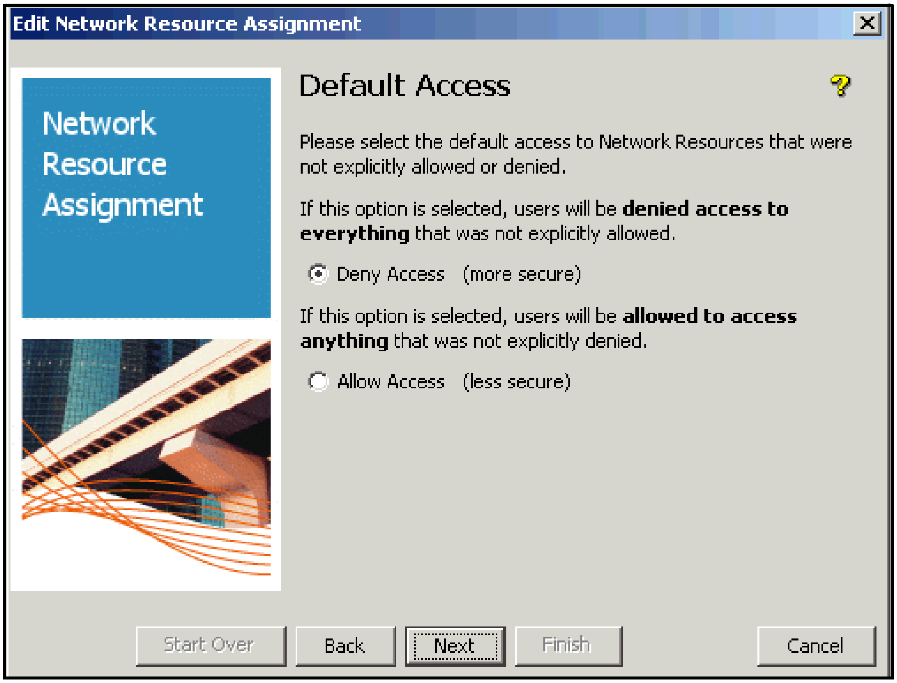
Please select the evaluation priority for each Network Resource

Action	Name
Allow	VLAN 4
Allow	VLAN 5
Allow	VLAN 6
Allow	VLAN 12
Allow	VLAN 2
Allow	VLAN 16
Allow	VLAN 32

Figure 5-78. Edit Network Resource Assignment Wizard—Priority Assignment Page

16. If you would like to assign any of theallow or deny actions a priority, select the resource whose order you would like to modify. Then click either **Move down** or **Move up** until it is in the desired order. Click **Next**.

    You only need to complete this step if the defined resources include overlapping resources. The more-specific rule should have a higher priority.



Default Access

Please select the default access to Network Resources that were not explicitly allowed or denied.

If this option is selected, users will be **denied access to everything** that was not explicitly allowed.

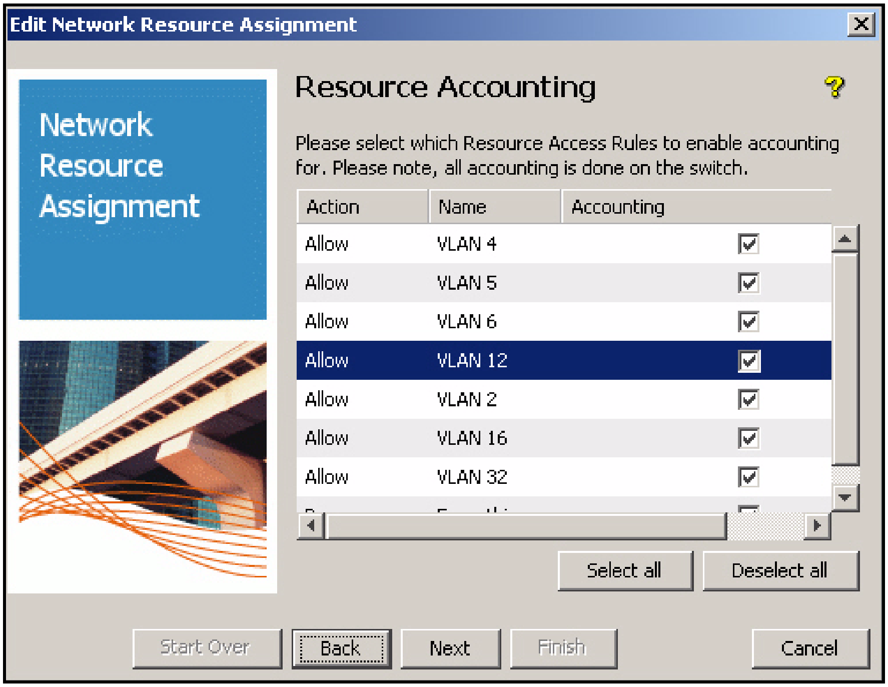
● Deny Access (more secure)

If this option is selected, users will be **allowed to access anything** that was not explicitly denied.

○ Allow Access (less secure)

Figure 5-79. Edit Network Resource Assignment Wizard—Default Access Page

17. In the **Default Access** window, select **Deny Access** or **Allow Access** for any resources that were not explicitly allowed or denied. The more secure option is **Deny Access**. Click **Next**.



Please select which Resource Access Rules to enable accounting for. Please note, all accounting is done on the switch.

Action	Name	Accounting
Allow	VLAN 4	☑
Allow	VLAN 5	☑
Allow	VLAN 6	☑
Allow	VLAN 12	☑
Allow	VLAN 2	☑
Allow	VLAN 16	☑
Allow	VLAN 32	☑

Figure 5-80. Edit Network Resource Assignment Wizard—Resource Accounting Page

18. In the **Resource Accounting** window, select the check box next to resources for which you would like to enable accounting. For this example, click **Select all**. Click **Next**.

19. Click **Finish**; then click **OK**.

20. Repeat steps 5 through 19 for each profile that you designed for your network.

Configure Access Policy Groups

The Accounting users will have their access controlled by two criteria in addition to group:

- Time
- Location

Other support staff and the doctors, nurses, and other patient care employees who are part of the medical group will be able to access the network any time from any location.

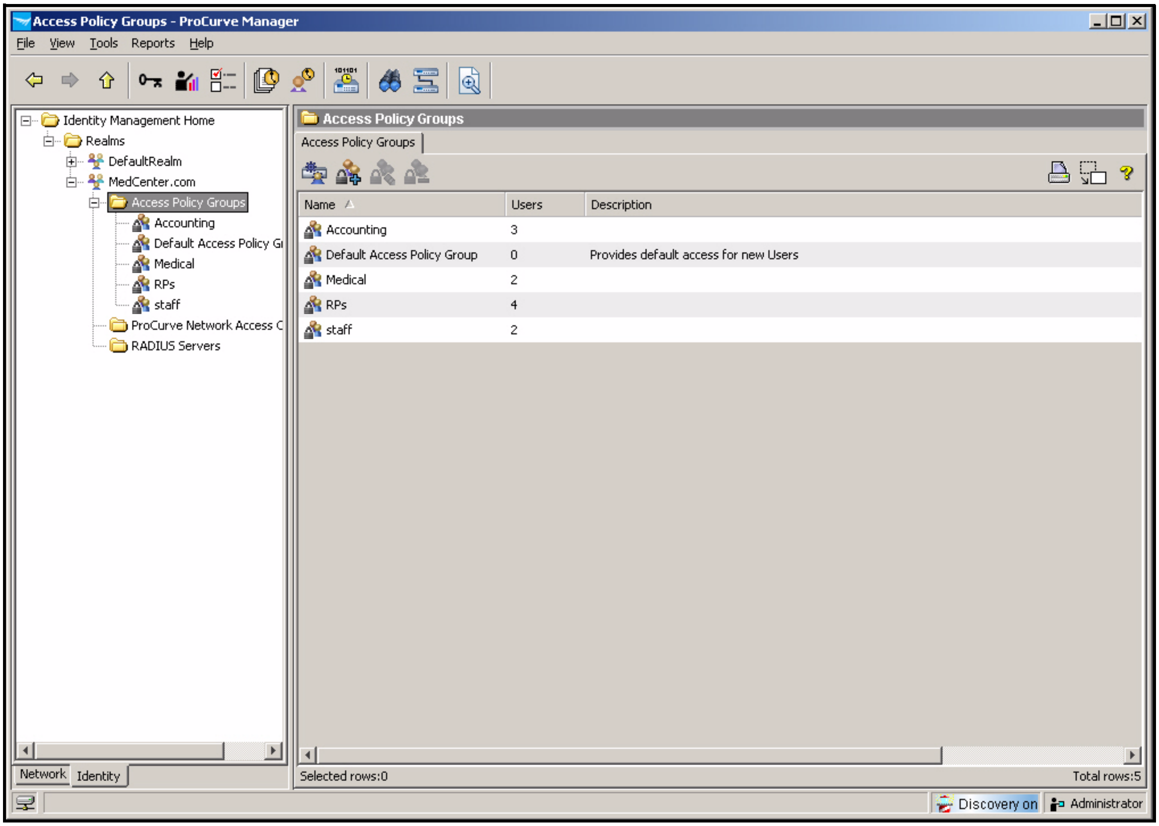
Table 5-22. Access Policy Groups

Group	Rule	Time	WLAN	Profile
Administrator	1	ANY	Medical	Administrator
Medical	1	ANY	Medical	Medical
Accounting	1	6:30 a.m. to 7 p.m.	None	Accounting staff
Staff	1	ANY	Staff	Staff
Patients	1	Normal	Patients	Patients

Configure Access Policy Group Rules

An access policy group rule specifies the profile that an authenticated user in that group receives, given a particular set of criteria. Follow these steps to configure access policy group rules:

1. In the PCM+ console, click the **Identity** tab.
2. Expand your realm.
3. Expand **Access Policy Groups** in the left pane.



Name	Users	Description
Accounting	3	
Default Access Policy Group	0	Provides default access for new Users
Medical	2	
RPs	4	
staff	2	

Figure 5-81. PCM+ Console, IDM Interface—Access Policy Groups

4. Under **Access Policy Groups**, the groups synchronized with OpenLDAP are displayed. Select the group for which you want to set up access policy rules.

5. Click the **Modify Access Policy Group** button.

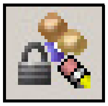
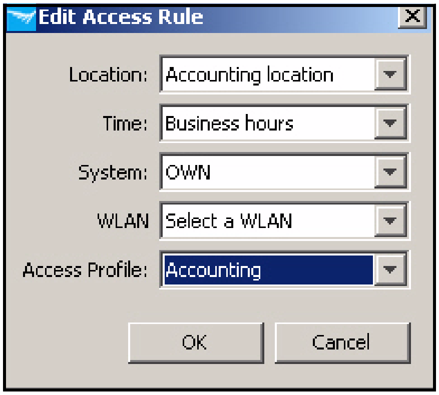


Figure 5-82. PCM+ Console, IDM Interface—Modify Access Policy Group Button

6. By default, the access policy group includes a rule that grants default access under all conditions. You must change this rule to specify the access profile that you set up for this group. Select the default rule and click **Edit**.



Edit Access Rule

Location: Accounting location

Time: Business hours

System: OWN

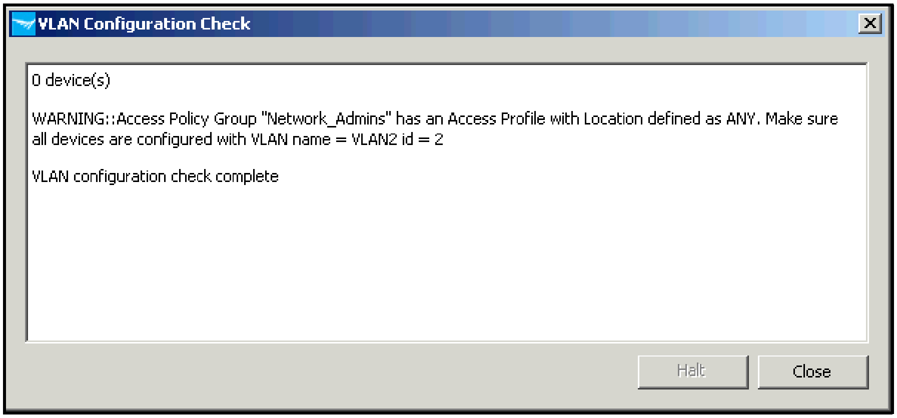
WLAN Select a WLAN

Access Profile: Accounting

Figure 5-83. PCM+ Console, IDM Interface— Edit Access Rule Window

7. Set your criteria for users in this group:
   a. For the **Location**, select a location or **ANY**.
   b. For the **Time**, select a time or **ANY**.
   c. For the **System**, select **OWN** (the endpoint associated with the user) or **ANY** (any endpoint).
   d. For the **Endpoint Integrity**, select **PASS**.

      In this example, criteria such as location and time do not affect access.
   e. For the **Access Profile**, select the access profile that you created for this group. For example, if you are configuring the Faculty access policy group, select the Faculty access profile.
8. Click **OK**.



```
0 device(s)

WARNING::Access Policy Group "Network_Admins" has an Access Profile with Location defined as ANY. Make sure
all devices are configured with VLAN name = VLAN2 id = 2

VLAN configuration check complete
```

Figure 5-84. PCM+ Console, IDM Interface—VLAN Configuration Check Window

9. IDM verifies that all the locations to which these users can connect support the VLAN that was specified in the access profile.

10. If necessary, add the VLAN to the ports on switches (or the uplink port of a Wireless Edge Services Module) that must carry traffic from the VLAN. Click **Close**.

11. Repeat steps 4 to 10 for each access policy group in your environment.

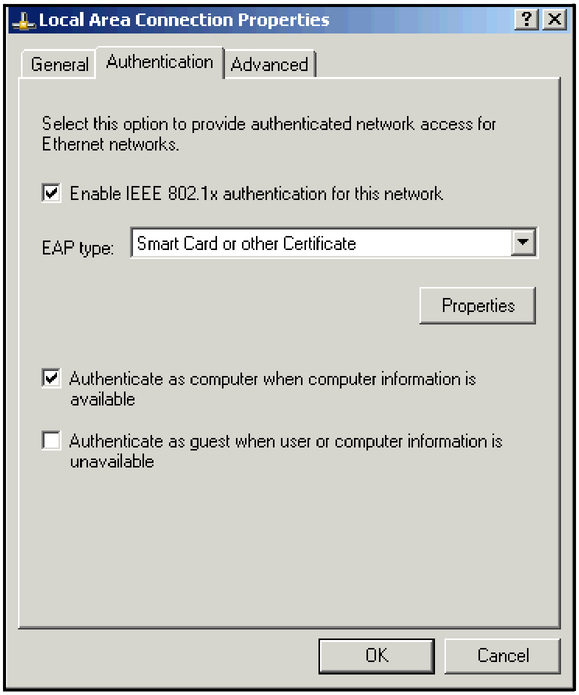
Configure Endpoints

In this section, you will learn how to configure the Microsoft Wireless Zero Configuration (WZC) utility, which enables 802.1X for both wired and wireless access on a Windows workstation.

Configuring the Wireless Zero Configuration Utility for Wired Access

To configure Wireless Zero Configuration utility for wired access, complete the following steps:

1. From the Windows **Start** menu, click **Settings** > **Network Connections**.
2. Right-click **Local Area Connection** and select **Properties**.
3. Click the **Authentication** tab.



Local Area Connection Properties

Select this option to provide authenticated network access for Ethernet networks.

☑ Enable IEEE 802.1x authentication for this network

EAP type: Smart Card or other Certificate

☑ Authenticate as computer when computer information is available

□ Authenticate as guest when user or computer information is unavailable

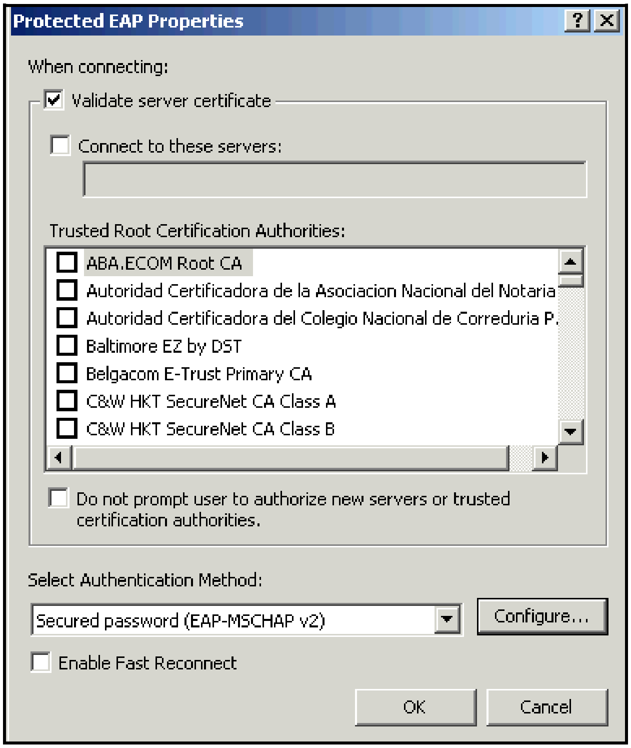
Figure 5-85. Local Area Connection Properties Window on a Windows XP Endpoint

Note

If the **Authentication** tab is not displayed, you may have one of two problems:

- The endpoint does not support 802.1X. Download the most recent Windows service pack (SP).
- Wireless Zero Configuration (WZC) is not running. (This service enables 802.1X for both wired and wireless connections.) See “Enable WZC” on page 5-158 to fix the problem.

4. Select the **Enable IEEE 802.1X authentication for this network** check box.
5. Use the **EAP type** list to select one of the following:
   - **Smart Card or other Certificate**—If you select this option, complete the steps outlined in *Chapter 2: Implementing 802.1X with ProCurve IDM and Endpoint Integrity.*
   - **Protected EAP (PEAP)**—If you select this option, continue with step 6.
   - **MD5-Challenge**—If you select this option, continue with step 7.
6. Configure PEAP settings.
   a. Under **EAP type**, click **Properties**.



Protected EAP Properties

When connecting:

☑ Validate server certificate

□ Connect to these servers:

Trusted Root Certification Authorities:

- □ ABA.ECOM Root CA
- □ Autoridad Certificadora de la Asociacion Nacional del Notaria
- □ Autoridad Certificadora del Colegio Nacional de Correduria P.
- □ Baltimore EZ by DST
- □ Belgacom E-Trust Primary CA
- □ C&W HKT SecureNet CA Class A
- □ C&W HKT SecureNet CA Class B

□ Do not prompt user to authorize new servers or trusted certification authorities.

Select Authentication Method:

Secured password (EAP-MSCHAP v2)

□ Enable Fast Reconnect

Figure 5-86. Protected EAP Properties Window in the Windows XP Supplicant

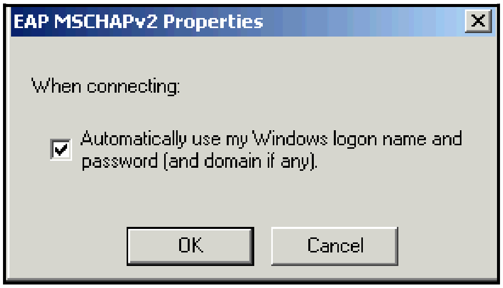
b. If you want, select the **Validate server certificate**. This is optional, but even if you clear this option, the server must have a certificate.

c. Under **Trusted Root Certification Authorities**, select the certificate you want to trust.

d. If you want, select the **Do not prompt user to authorize new servers or trusted certification authorities** check box. Otherwise, users will be prompted to authorize new servers and CAs.

e. Under **Select Authentication Method**, ensure that **Secured password (EAP-MSCHAP v2)** is selected.

f. Click **Configure**.



EAP MSCHAPv2 Properties

When connecting:

☑ Automatically use my Windows logon name and password (and domain if any).

Figure 5-87. EAP MSCHAPv2 Properties Window in the Windows XP Supplicant

g. Ensure the **Automatically use my Windows logon name and password (and domain if any)** check box is selected if this is how you authenticate to the network. Clear the check box if you use a different username and password. Because the example network is using OpenLDAP, the users would clear this option.

h. Click **OK.**

i. Click **OK.**

7. On the **Local Area Connection Properties** window, select or clear these options:

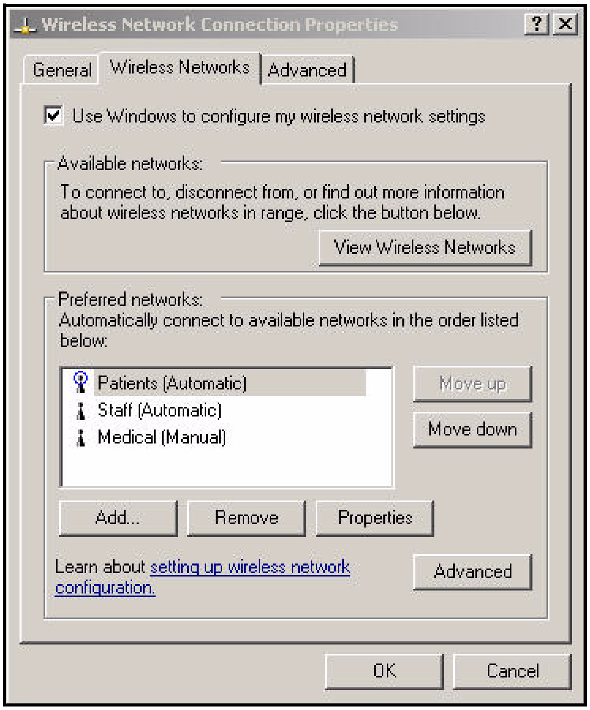
   - **Authenticate as computer when computer information is available**—Select this option if you are authenticating the endpoint in addition to authenticating the user.
   - **Authenticate as guest when user or computer information is unavailable**—Select this option if you have configured a guest account for users that do not have a valid network account.

8. Click **OK**.

Configuring the Wireless Zero Configuration Utility for Wireless Access

Complete the following steps to configure Wireless Zero Configuration client for wireless access:

1. Select **Start** > **Settings** > **Network Connections**
2. Right-click **Wireless Network Connection** and select **Properties**.
3. Click the **Wireless Networks** tab.



☑ Use Windows to configure my wireless network settings

Available networks:
To connect to, disconnect from, or find out more information about wireless networks in range, click the button below.

Preferred networks:
Automatically connect to available networks in the order listed below:

Patients (Automatic)
Staff (Automatic)
Medical (Manual)

Learn about setting up wireless network configuration.

Figure 5-88. Wireless Network Connection Status—Wireless Network Connection Properties—Wireless Networks Tab

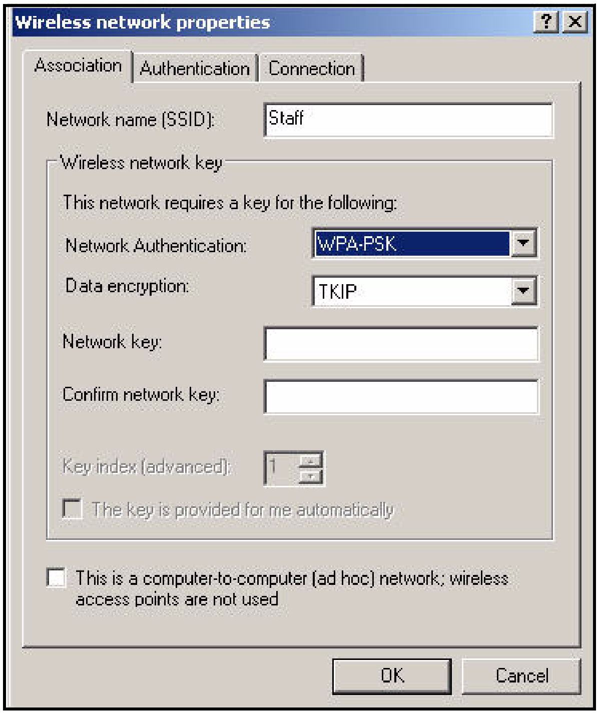
Note

If the wireless interface has been disabled, the **Wireless Networks** tab will not be displayed.

4. Click **Add**.
5. In the **Network name (SSID)** box, type the Service Set Identifier (SSID) for your WLAN. For example: **Medical, Staff,** or **Patients**.
6. For **Network Authentication**, select one of the following:
   - **Open**
   - **Shared**
   - **WPA**
   - **WPA2** (if the endpoint supports it)
   - **WPA-PSK**

For the Medical WLAN, you would select **WPA**. For the Staff WLAN, you would select **WPA-PSK**, and for the Patients WLAN, you would select **Open**.

7. Select the **Data encryption** option. The options available depend on the **Network Authentication** option you selected. For the example network, you would select **TKIP** or **AES** for both the Medical WLAN and the Staff WLAN. For the Patients WLAN, you would select **Disabled**.



Wireless network properties

Network name (SSID): Staff

Wireless network key

This network requires a key for the following:

Network Authentication: WPA-PSK

Data encryption: TKIP

Network key:

Confirm network key:

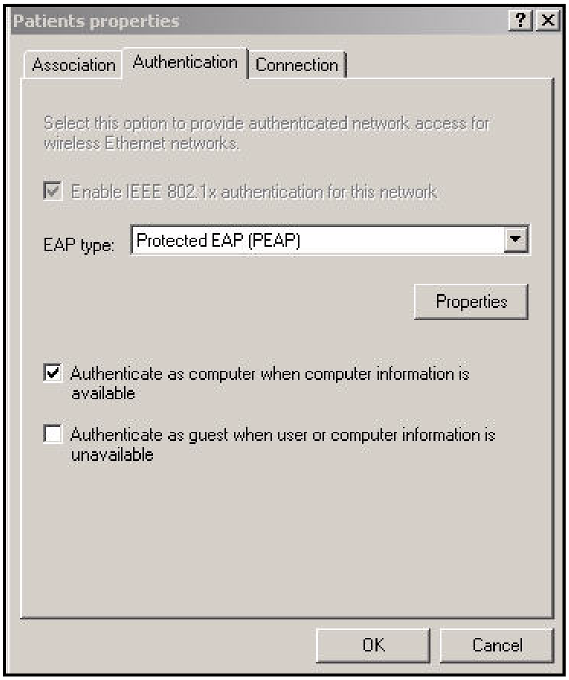
Key index (advanced): 1

□ The key is provided for me automatically

□ This is a computer-to-computer (ad hoc) network; wireless access points are not used

Figure 5-89. Wireless Network Connection Status—Wireless network properties Window—Association Tab

8. If you did not select **WPA-PSK** for **Network Authentication** or disable **Data Encryption**, select the **Authentication** tab.



Patients properties

Select this option to provide authenticated network access for wireless Ethernet networks.

☑ Enable IEEE 802.1x authentication for this network

EAP type: Protected EAP (PEAP)

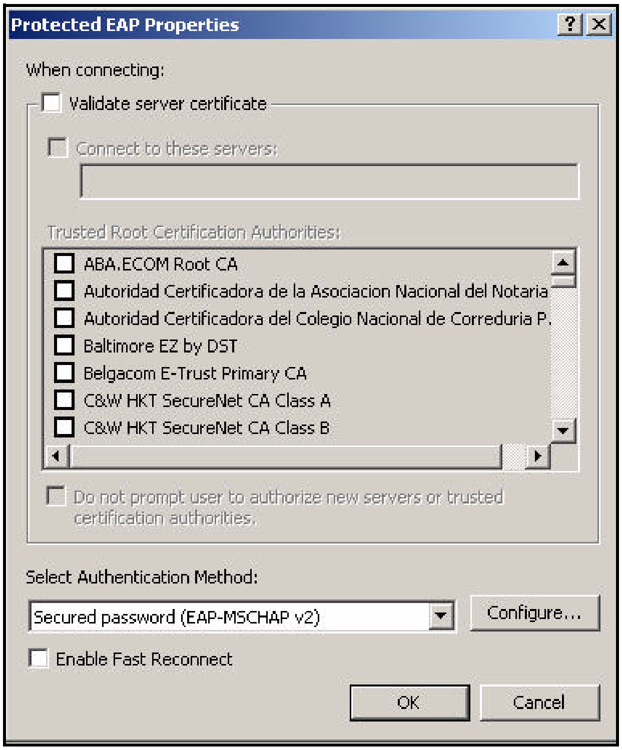
☑ Authenticate as computer when computer information is available

□ Authenticate as guest when user or computer information is unavailable

Figure 5-90. Wireless Network Connection Status—<*SSID*> properties Window—Authentication Tab

9. Select **Protected EAP (PEAP)** for the **EAP type.** This network solution does not incorporate smart cards or certificates for stations.

10. Click **Properties**.



Protected EAP Properties

When connecting:

□ Validate server certificate

□ Connect to these servers:

Trusted Root Certification Authorities:

- □ ABA.ECOM Root CA
- □ Autoridad Certificadora de la Asociacion Nacional del Notaria
- □ Autoridad Certificadora del Colegio Nacional de Correduria P.
- □ Baltimore EZ by DST
- □ Belgacom E-Trust Primary CA
- □ C&W HKT SecureNet CA Class A
- □ C&W HKT SecureNet CA Class B

□ Do not prompt user to authorize new servers or trusted certification authorities.

Select Authentication Method:

Secured password (EAP-MSCHAP v2)

□ Enable Fast Reconnect

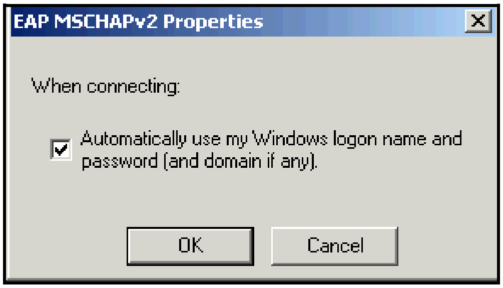
Figure 5-91. Wireless Network Connection Status—<*EAP type*> Properties Window

11. If you want, select the **Validate server certificate** check box.

12. From the **Trusted Root Certification Authorities** list, select the check box for your CA.

13. For **Select Authentication Method**, select **Secured password (EAP-MSCHAP v2)**.

    a. Click **Configure**.



EAP MSCHAPv2 Properties

When connecting:

☑ Automatically use my Windows logon name and password (and domain if any).

Figure 5-92. EAP MSCHAPv2 Properties Window in the Windows XP Supplicant

b. Ensure the **Automatically use my Windows logon name and password (and domain if any)** check box is selected if this is how you authenticate to the network. Clear the check box if you use a different username and password. Because the example network is using OpenLDAP, the network administrators would clear this option.

c. Click **OK.**

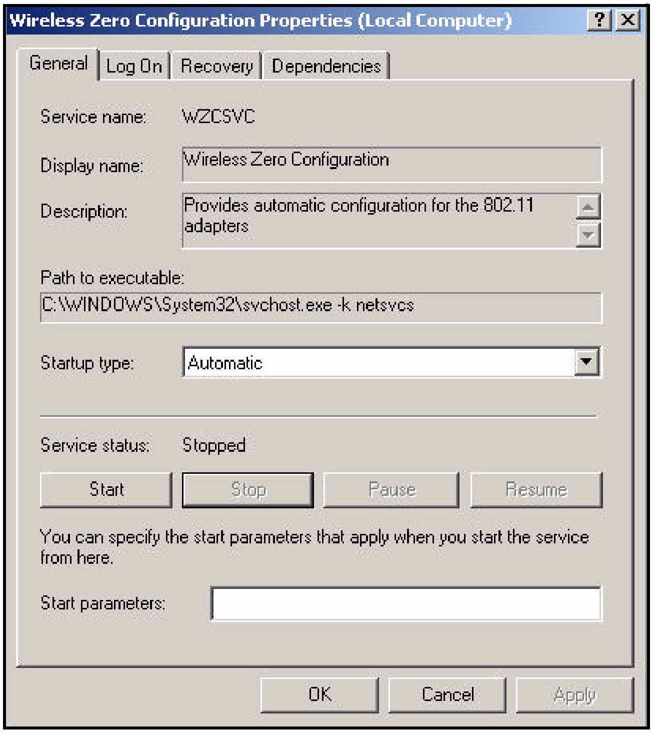
14. Click **OK** to close all open windows.

Enable WZC

Typically, the WZC service starts automatically. However, sometimes a wireless card comes with a vendor client that disables WZC. You can use the vendor client or re-enable WZC.

If you choose to re-enable WZC, follow these steps:

1. In the **Start** menu, select **Control Panel**.
2. Select **Administrative Tools** > **Services**.
3. Scroll to and double-click the WZC service.



Wireless Zero Configuration Properties (Local Computer)

Service name: WZCSVC

Display name: Wireless Zero Configuration

Description: Provides automatic configuration for the 802.11 adapters

Path to executable:
C:\WINDOWS\System32\svchost.exe -k netsvcs

Startup type: Automatic

Service status: Stopped

You can specify the start parameters that apply when you start the service from here.

Start parameters:

Figure 5-93. Wireless Zero Configuration Properties Window—General Tab

4. For the **Startup type**, select **Automatic**.
5. Click **Start**.
6. Click **OK**.

Enforcing Endpoint Integrity without Port Authentication

Contents

Introduction

This chapter explains how to implement endpoint integrity in a network that does not enforce port authentication.

The example organization highlighted in this chapter uses Novell eDirectory to control users' access to network resources. At this time, the organization has not opted for the higher security of port authentication. However, it does want to test endpoints and verify that they are free from viruses and meet basic security requirements.

The best endpoint integrity deployment method for such an organization is Dynamic Host Configuration Protocol (DHCP). This chapter explains how to place the NAC 800 for a DHCP deployment—between the DHCP servers and the rest of the network. The NAC 800 can then test endpoints and assign noncompliant endpoints IP addresses in a quarantine subnet.

The DHCP deployment method is less secure than the 802.1X or inline deployment method. A knowledgeable user could assign his or her endpoint a static IP address to avoid endpoint integrity checking. To prevent users from circumventing endpoint integrity checking in this way, you can set up DHCP snooping and ARP protection—if your switches support these features. (The ProCurve Switch 3500yl, 5400zl, 6200yl, and 8200zl Series all support these features.) When DHCP snooping and ARP protection are properly configured, endpoints must receive dynamic IP addresses before they can transmit traffic on the network. The traffic from endpoints with static IP addresses is dropped. (You can configure the switches to transmit traffic from servers with static IP addresses.)

In this chapter, you will learn how to configure, from beginning to end, all of the components of a network for such an organization:

- ProCurve Network Access Controller (NAC) 800 (functioning as a combination server, or CS)
- DHCP server on Novell eDirectory
- ProCurve Access Point (AP) 530s
- Wired endpoints
- Wireless endpoints

In addition, this chapter provides the startup-configs for:

- Routing switch
- Server switch
- Edge switch

Network Layout

Because this organization primarily controls access to resources with the directory, its VLAN design is quite simple:

- **Management VLAN**—for managing network infrastructure devices

  The example network uses ProCurve's secure management VLAN, so network administrators require IP addresses in the management VLAN. Their Ethernet ports are statically assigned to this VLAN.

- **Server VLAN**—for all directory servers and other network resources
- **User VLAN**—for all users

On the user VLAN, you will set up a quarantine subnet within the existing subnet. You will not actually create another VLAN and subnet for the quarantined endpoints. Instead, you will designate an unused segment of the existing subnet for quarantined endpoints. You'll learn more about how to do so as you complete the instructions in this chapter.

Table 6-1 displays the example network's VLAN settings.

Table 6-1. VLANs

Name	VLAN	Subnet
Management	2	• 10.2.0.0/16 • 10.2.240.0/20—quarantine segment
Server	4	10.4.0.0/16
User	8	• 10.8.0.0/16 • 10.8.128.0/17—quarantine segment

Note

In this solution, the network administrators' endpoints on VLAN 2 require endpoint integrity checks. For this reason, the solution features quarantining on the management VLAN. Otherwise, only the user VLAN would require quarantining.

Figure 6-1 shows a high-level network design.

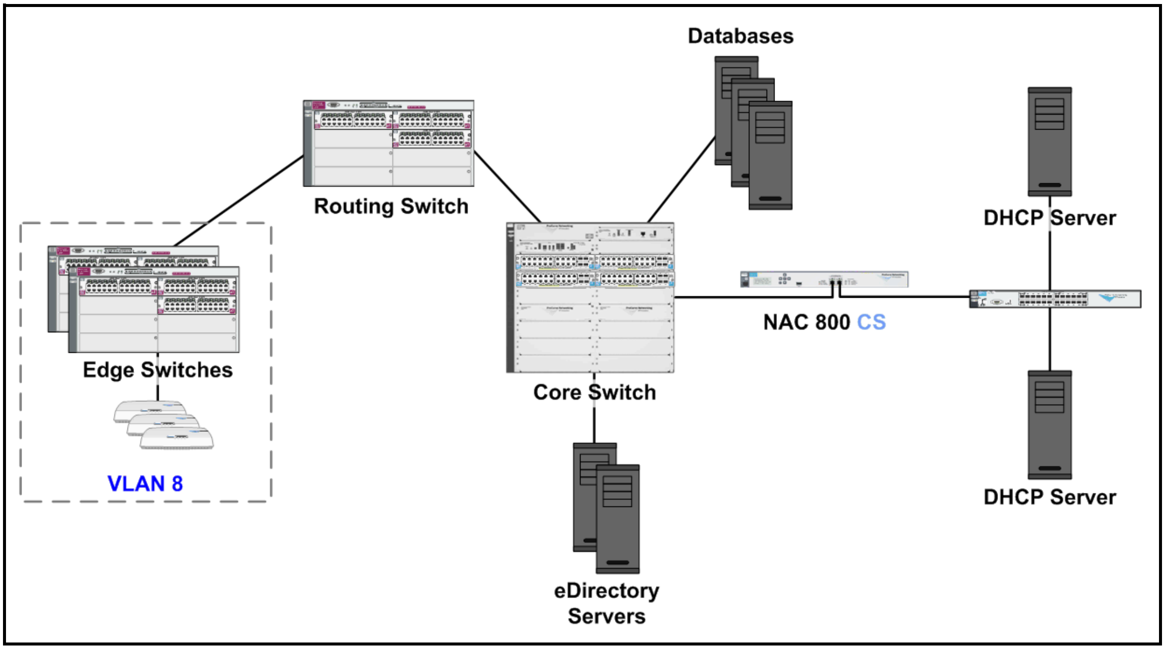


Figure 6-1. High-Level Network Design

You can use Table 6-2 to record the VLANs for your own network.

Table 6-2. My VLANs

Type	Name	ID	Subnet
Management			Production:
			Optional quarantine segment:
Server			
User			Production:
			Quarantine segment:
			Production:
			Quarantine segment:
			Production:
			Quarantine segment:

The instructions in this chapter sometimes call for typing a specific IP address. Table 6-3 lists IP addresses for the example network. Fill in your devices' IP addresses and VLANs in the rightmost columns. You can then easily replace the IP address given in the instructions with the correct address in your environment.

Table 6-3. Example IP Addresses

Device	IP Address	VLAN ID	My IP Address	My VLAN ID
eDirectory servers	10.4.4.1 10.4.8.1	4 4		
DNS servers	10.4.8.1	4		
DHCP servers	10.4.4.1	4		
Company Web server	10.4.6.30	4		
Email server	10.4.6.40	4		
Financial database	10.4.7.45	4		
Routing Switch	10.2.0.1 10.4.0.1 10.8.0.1	2 4 8		
Edge Switch	10.2.0.3	2		
AP 530 A	10.2.0.10	2		
AP 530 B	10.2.0.20	2		
AP 530 C	10.2.0.30	2		
NAC 800 CS	10.4.4.40	4		

DHCP and DNS Services

You must have a functioning DHCP server and DNS server, properly configured for your network environment. For the example network, the network administrators have configured the DHCP scopes listed in Table 6-4.

Table 6-4. DHCP Scopes

Scope	VLAN	Subnet	Range	Default Gateway	DNS Server
Management	2	10.2.0.0/17	10.2.0.60- 10.2.0.200	10.2.0.1 10.2.0.2	10.4.8.1
Users	8	10.8.0.0/17	10.8.16.0- 10.8.19.254	10.8.0.1 10.8.0.2	10.4.4.40

In addition, the network administrators have configured their DNS servers with the following reverse lookup zones:

- 10.2.0.0/16
- 10.4.0.0/16
- 10.8.0.0/16

Configure ProCurve Switches

This section includes examples of the most basic configurations necessary for for ProCurve switches to establish the network. Specifically, you must configure:

- Management IP address
- Default gateway
- VLANs:
  - Management VLAN untagged on uplink ports and ports connected to AP 530s
  - User and Server VLANs tagged on uplink ports
  - User VLAN tagged on ports connected to AP 530s
  - User VLAN untagged on ports connecting to user endpoints
  - Server VLAN untagged on ports connecting to servers
- Passwords for local device security—for example:
  - manager = procurveswitch
  - operator = operatorswitch

Routing switches require these additional settings:

- IP addresses for all VLANs
- IP routing enabled
- On the User VLAN, IP helper addresses to:
  - The network DHCP servers
  - The NAC 800

Note

In this example, network administrators receive IP addresses on the management VLAN, so that VLAN requires the same helper addresses as the User VLAN.

The following sections show example configurations for:

- A routing switch, which connects only to other switches
- A server switch, which connects to servers; the uplink port is A1
- An edge switch, which connects to endpoints and APs; the uplink port is A1

Refer to the configurations as you set up your network. If you need step-by-step instructions, you should refer to the documentation for your switch.

Routing Switch startup-config

The following is the startup-config for the routing switch used to test this network.

```
; J8692A Configuration Editor; Created on release #K.12.XX

hostname "Routing_Switch"
module 1 type J86xxA
ip routing
vlan 1
   name "DEFAULT_VLAN"
   no untagged 1-20
   no ip address
   exit
vlan 2
   name "Management"
   untagged 1-20
   ip helper-address 10.4.4.1 //IP addresses of the DHCP
   server//
   ip helper-address 10.4.4.40 //IP addresses of the
   NAC 800//
   ip address 10.2.0.1 255.255.0.0
   exit
vlan 4
   name "Server"
   ip address 10.4.0.1 255.255.0.0
   tagged 11-20
   exit
vlan 8
   name "Users"
   ip helper-address 10.4.4.1 //IP addresses of the DHCP
      server//
   ip helper-address 10.4.4.40 //IP addresses of the
     NAC 800//
   ip address 10.8.0.1 255.255.0.0
   tagged 1-10
   exit
ip authorized-managers 10.2.0.0 255.255.0.0
ip authorized-managers 10.4.4.40 255.255.255.255
ip dns domain-name "procurveu.edu"
ip dns server-address 10.4.8.1
password manager
password operator
```

Server Switch startup-config

The following is the startup-config for the server switch used to test this network.

```
; J8697A Configuration Editor; Created on release #K.12.XX

hostname "Server_Switch"
web-management management-url ""
module 1 type J8702A
module 2 type J8702A
ip default-gateway 10.2.0.1
vlan 1
   name "DEFAULT_VLAN"
   no untagged A1-A24, B1-B24
   no ip address
   exit
vlan 2
   name "Management"
   untagged A1,B1
   ip address 10.2.0.3 255.255.0.0
   exit
vlan 4
   name "Server"
   untagged B2-B24
   tagged A1,B1
   no ip address
   exit
ip authorized-managers 10.2.0.0 255.255.0.0
ip authorized-managers 10.4.4.40 255.255.255.255
ip dns domain-name "procurveu.edu"
ip dns server-address 10.4.8.1
password manager
```

Edge Switch startup-config

Your network will probably include many edge switches; this is the configuration for a 5400zl.

```
; J8697A Configuration Editor; Created on release #K.12.XX
hostname "Edge Switch"
module 1 type J8702A
module 2 type J8702A
web-management management-url ""
ip default-gateway 10.2.0.1
vlan 1
   name "DEFAULT_VLAN"
   no untagged A1,B1
   no ip address
   no untagged A2-A24,B2-B24
   exit
vlan 2
   name "Management"
   untagged A1,B2-B4,B21-B24 //A1 is the uplink port.
  B1-B3 connect to AP 530s. B21-B24 connect to management
   stations//
   ip address 10.2.0.5 255.255.0.0
   exit
vlan 8
   name "Users"
   tagged A1,B1-B3 //A1 is the uplink port. B1-B3 connect
   to AP 530s.//
   untagged A2-A24,B4-B20
   exit
ip authorized-managers 10.2.0.0 255.255.0.0
ip authorized-managers 10.4.4.40 255.255.255.255
dhcp-snooping
dhcp-snooping authorized-server 10.4.4.1
dhcp-snooping authorized-server 10.4.4.40
dhcp-snooping vlan 2 8
ip dns domain-name "procurveu.edu"
ip dns server-address 10.4.8.1
interface A1
   dhcp-snooping trust
   exit
arp-protect
arp-protect trust A1,B1-B3 //The ports that connect to
the APs must send ARP packets, so they must be trusted.//
arp-protect vlan 2 8
password manager
password operator
```

Configure the AP 530 to Establish the Wireless Network

This section provides basic configuration steps for an AP 530:

- Initial settings:
  - Manager password
  - IP settings
  - Country code
- Wireless LAN (WLAN) that enforces WPA/WPA2-PSK
- Radio settings

Configure Initial Settings

Before installing an AP 530 in its final location, you should configure some basic settings that allow you to access it remotely.

1. Connect the AP 530 to a power source.

   The AP 530 can receive Power over Ethernet (PoE) or plug into an external power supply using the cable shipped with it.

2. Use a serial cable to connect the COM port on your management station to the console port on the back of the AP 530.

3. On the management station, use a terminal session application to open a session with the AP 530, using the following settings:
   - COM1 (or other console port) for the port
   - 9600 baud
   - 8-bit data
   - No parity
   - 1-bit stop
   - No flow control

4. When prompted for your username and password, type **admin** for both. You should change this default password as soon as possible.

5. Move to the global configuration mode context:

```
ProCurve AP 530# config
ProCurve AP 530(config)#
```

6. Set a new management password:

Syntax: password manager <*password*>

Replace **<password>** *with a string that meets your security requirements for a secure password.*

For example:

```
ProCurve AP 530(config)# password manager procurveAP!
```

7. Specify the AP 530's hostname:

Syntax: hostname <*hostname*>

Replace **<hostname>** *with a string that matches the string mapped to the AP 530's IP address on the DNS server.*

---

8. Move to the Ethernet interface configuration mode context:

```
ProCurve AP 530(config)# interface ethernet
```

9. Assign the Ethernet interface a static IP address:

Syntax: ip address <*A.B.C.D*>/<*prefix length*>

Replace **<A.B.C.D>/<prefix length>** *with an IP address for the AP 530 and the correct prefix length for the AP 530's subnet.*

For example:

```
ProCurve AP 530(ethernet)# ip address 10.2.0.10/16
```

10. Specify the AP 530's default gateway:

Syntax: ip default-gateway <*A.B.C.D*>

Replace **<A.B.C.D>** *with the IP address of the AP 530's default router.*

For example:

```
ProCurve AP 530(ethernet)# ip default-gateway 10.2.0.1
```

11. Exit to the global configuration mode.

```
ProCurve AP 530(ethernet)# exit
```

12. If you are configuring an AP 530ww or an AP 530na in Canada or Mexico, you must specify the country code. (By default, the code is **us** on the AP 530na.)

Type your country code:

Syntax: country <*code*>

Replace ***<code>*** *with the two-digit code for the country in which you are operating the AP 530. If you do not know this code, you can get a list by typing* **country ?**.

For example:

```
ProCurve AP 530(config)# country fr
```

13. Ping the default router to ensure network connectivity:

Syntax: ping <*A.B.C.D*>

Sends an ICMP echo request to the specified IP address. Replace ***<A.B.C.D>*** *with the IP address of the device to which you want to test connectivity.*

14. Save your configuration.

```
ProCurve AP 530(config)# write memory
```

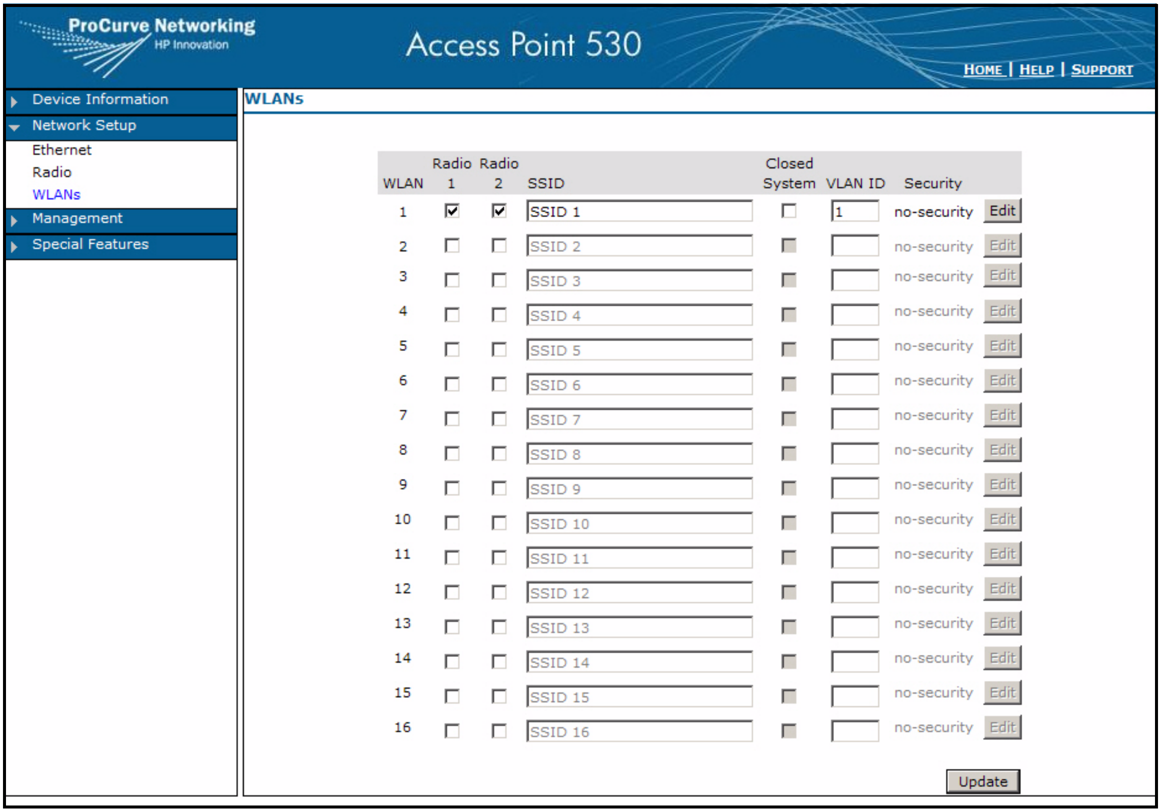
15. Close the terminal session.

You can now install each AP 530 in its final location. (See the *ProCurve Access Point 530 Hardware Installation Guide*.) You will complete further configurations through the AP 530s' Web browser interface.

Establish the WLANs

Complete these steps to access the AP 530's Web browser interface and establish the WLAN for the example organization:

1. On your management station, open a Web browser. Type the AP 530's IP address or hostname for the URL.
2. Log in to the AP 530's Web browser interface:
   - For the **User name**, type **admin**.
   - For the **Password**, type the password you set in step 6 on page 6-12.
3. Select **Network Setup** > **WLANs.**



WLAN	Radio 1	Radio 2	SSID	Closed System	VLAN ID	Security	
1	☑	☑	SSID 1	□	1	no-security	Edit
2	□	□	SSID 2	□		no-security	Edit
3	□	□	SSID 3	□		no-security	Edit
4	□	□	SSID 4	□		no-security	Edit
5	□	□	SSID 5	□		no-security	Edit
6	□	□	SSID 6	□		no-security	Edit
7	□	□	SSID 7	□		no-security	Edit
8	□	□	SSID 8	□		no-security	Edit
9	□	□	SSID 9	□		no-security	Edit
10	□	□	SSID 10	□		no-security	Edit
11	□	□	SSID 11	□		no-security	Edit
12	□	□	SSID 12	□		no-security	Edit
13	□	□	SSID 13	□		no-security	Edit
14	□	□	SSID 14	□		no-security	Edit
15	□	□	SSID 15	□		no-security	Edit
16	□	□	SSID 16	□		no-security	Edit

Figure 6-2. AP 530 Web Interface—Network Setup > WLANs

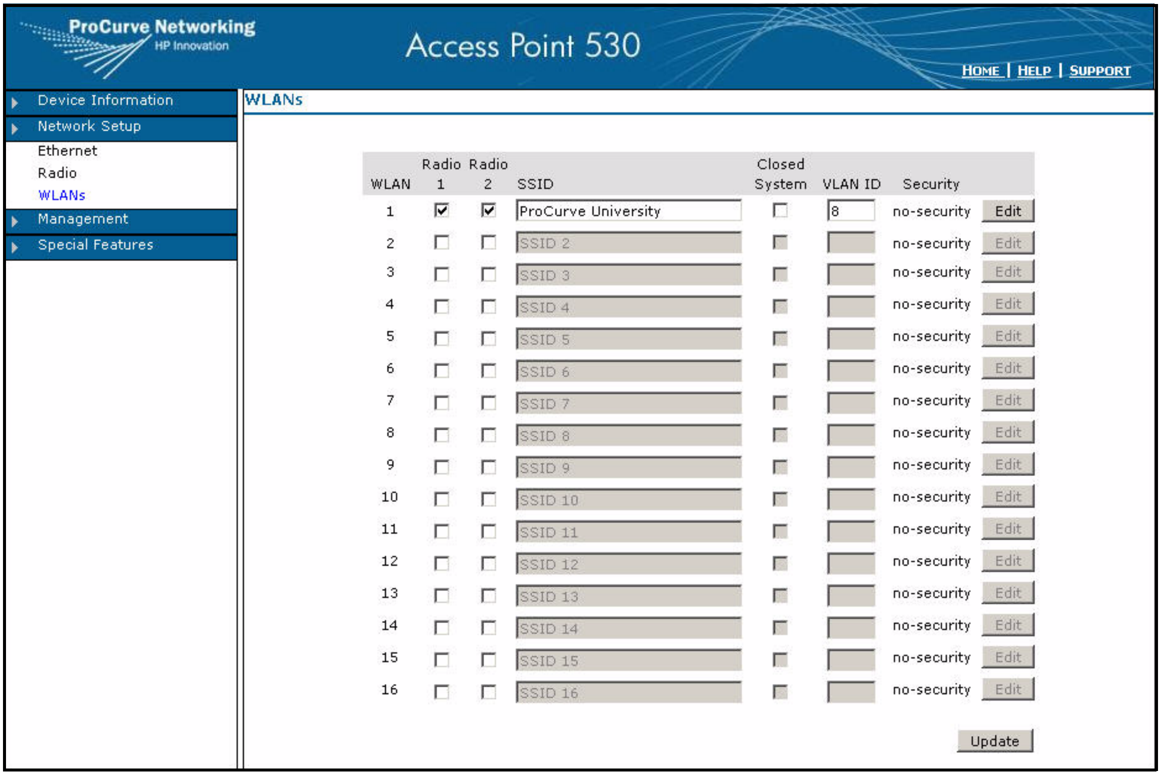
4. In the **SSID** box for WLAN 1, type a name for your WLAN. In this example: **ProCurve University**.

5. In the **VLAN ID** box, type the VLAN for wireless users. In this example, network administrators place users in the same VLAN as wired users, **8**. However, you might want to separate wired and wireless users.

6. The **Radio 1** and **Radio 2** check boxes should be selected.

   Optionally, clear one of the boxes to use only one of the AP 530's radios.

7. Click **Update**.



WLAN	Radio 1	Radio 2	SSID	Closed System	VLAN ID	Security	
1	☑	☑	ProCurve University	□	8	no-security	Edit
2	□	□	SSID 2	□		no-security	Edit
3	□	□	SSID 3	□		no-security	Edit
4	□	□	SSID 4	□		no-security	Edit
5	□	□	SSID 5	□		no-security	Edit
6	□	□	SSID 6	□		no-security	Edit
7	□	□	SSID 7	□		no-security	Edit
8	□	□	SSID 8	□		no-security	Edit
9	□	□	SSID 9	□		no-security	Edit
10	□	□	SSID 10	□		no-security	Edit
11	□	□	SSID 11	□		no-security	Edit
12	□	□	SSID 12	□		no-security	Edit
13	□	□	SSID 13	□		no-security	Edit
14	□	□	SSID 14	□		no-security	Edit
15	□	□	SSID 15	□		no-security	Edit
16	□	□	SSID 16	□		no-security	Edit

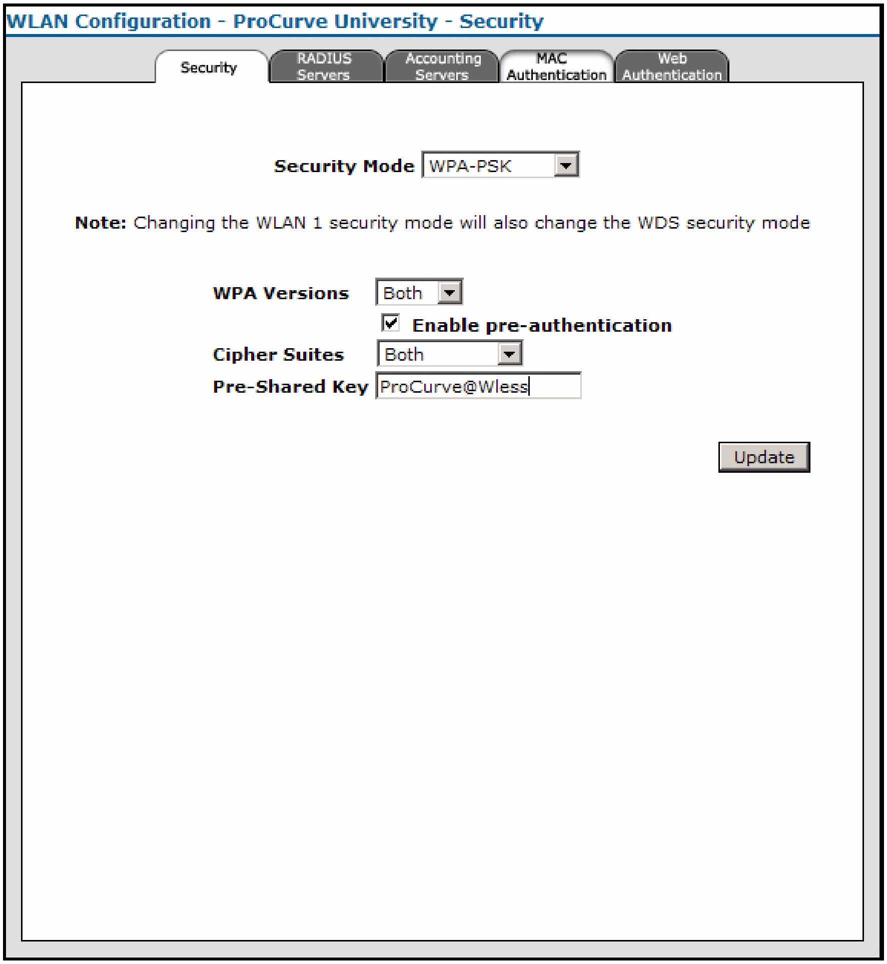
Figure 6-3. AP 530 Web Interface—Network Setup > WLANs

8. Click **Edit** in the WLAN 1 row.

9. For **Security Mode**, select **WPA-PSK**.

10. For **Cipher Suites**, select **TKIP** (wider support), **CCMP (AES)** (higher security), or **Both**.

11. In the **Preshared key** box, type a string of at least 8 characters, which is the password for your wireless network. For example: **ProCurve@Wless**.



WLAN Configuration - ProCurve University - Security

Security Mode WPA-PSK

Note: Changing the WLAN 1 security mode will also change the WDS security mode

WPA Versions Both

☑ **Enable pre-authentication**

Cipher Suites Both

Pre-Shared Key ProCurve@Wless

Figure 6-4. AP 530 Web Interface—Network Setup > WLANs > Edit

12. Click **Update**.
13. A warning is displayed, telling you that your wireless settings will be updated and wireless clients might be disconnected. Click **OK**.
14. Press **[Alt]** + **[F4]** to close the **WLAN Configuration Security** screen.

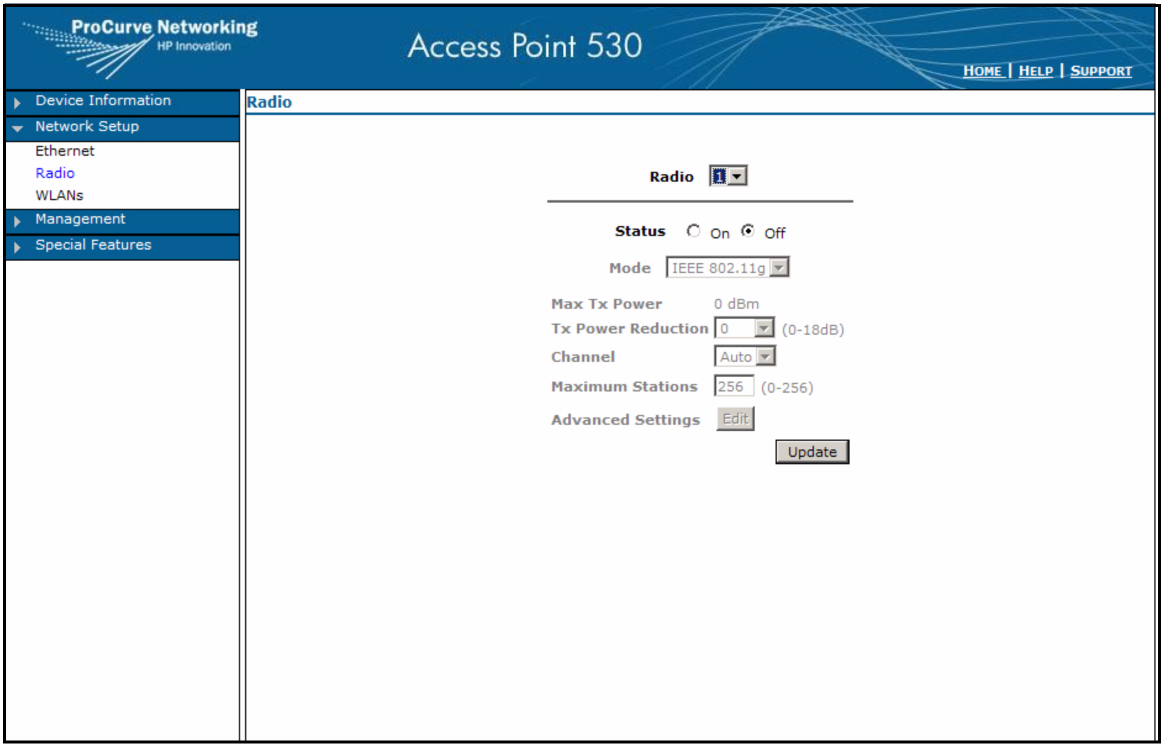
Enable the Radios

The AP 530 has two built-in radios:

- Radio 1—802.11bg
- Radio 2—802.11a/bg

Details on configuring radio settings are beyond the scope of this guide. (For example, it is often a good idea to manually set channels on nearby APs to non-overlapping channels. Or you might want to configure your radios for external antennas. See the product documentation.) The following instructions, however, give you the most basic steps for enabling radios:

1. Click **Network Setup** > **Radio**.



Radio 1

Status ○ On ● Off

Mode IEEE 802.11g

Max Tx Power 0 dBm

Tx Power Reduction 0 (0-18dB)

Channel Auto

Maximum Stations 256 (0-256)

Advanced Settings Edit

Update

Figure 6-5. AP 530 Web Interface—Network Setup > Radio

2. Ensure that **1** is selected for **Radio**.

3. For **Status**, select **On**.

4. Verify that **Mode** is **IEEE 802.11g**.

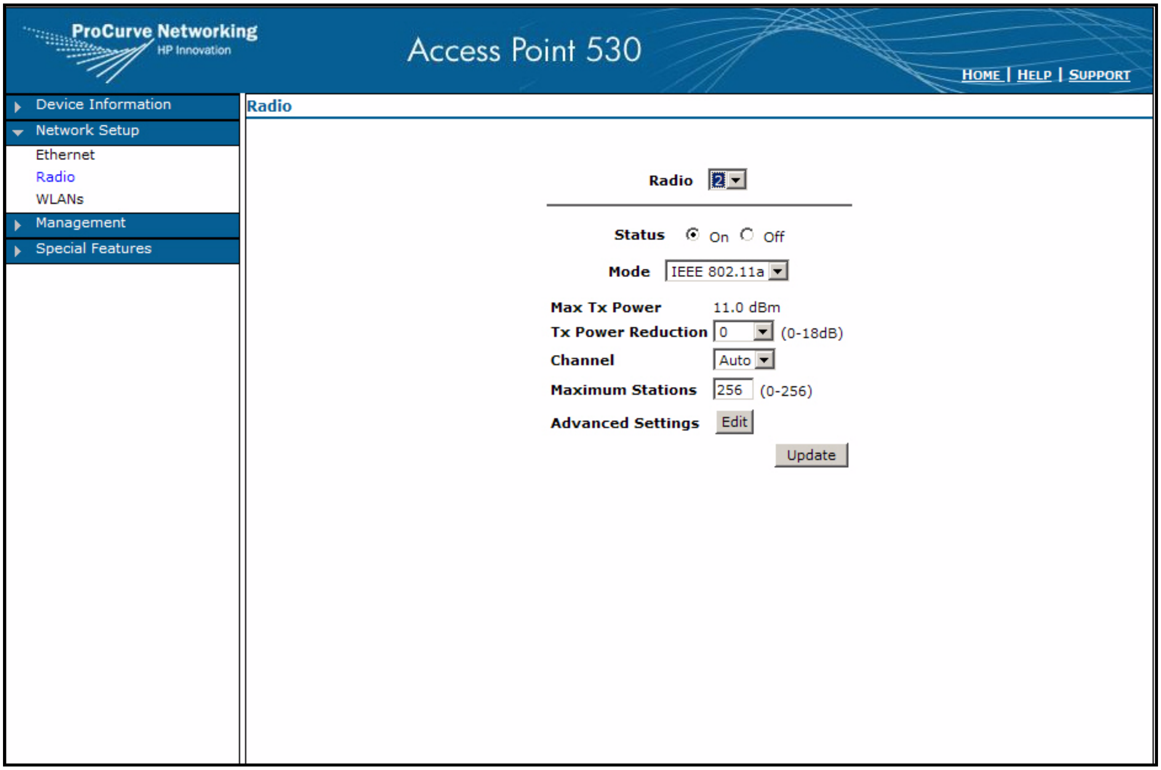
Note

By default, the **IEEE 802.11g** mode supports 802.11g and 802.11b wireless endpoints.

5. Click **Update**.
6. A warning is displayed, telling you that your wireless settings will be updated and wireless clients might be disconnected. Click **OK.**
7. Select **2** from the **Radio** box.
8. For **Status**, select **On**.
9. Verify that **Mode** is **IEEE 802.11a**.

Note

Radio 2 supports 802.11bg mode as well as 802.11a. However, only one internal radio on the AP 530 is allowed to operate in 802.11bg mode. If you want both radios to operate in 802.11bg, you must install an external antenna on one of the radios.



Radio

Radio 2

Status ● On ○ Off

Mode IEEE 802.11a

Max Tx Power 11.0 dBm

Tx Power Reduction 0 (0-18dB)

Channel Auto

Maximum Stations 256 (0-256)

Advanced Settings Edit

Figure 6-6. AP 530 Web Interface—Network Setup > Radio

10. Click **Update**.
11. A warning is displayed, telling you that your wireless settings will be updated and wireless clients might be disconnected. Click **OK.**

Set Up the NAC 800

You will now learn how to install and configure a NAC 800 that enforces endpoint integrity with the DHCP deployment method.

The instructions below apply to a network that requires only one NAC 800, a CS. If your network requires multiple NAC 800s—one Management Server (MS) and multiple Enforcement Servers (ESs)—you can follow the same instructions for the most part. However, you must configure the initial settings on both the MS and the ESs. You must also create an enforcement cluster and add the ESs to it. (See "Create an Enforcement Cluster and Add ESs" on page 2-146 of Chapter 2: "Implementing 802.1X with ProCurve IDM and Endpoint Integrity" for more information about creating an enforcement cluster). Then you can complete the remaining tasks in the Web browser interface of the MS.

Configure Basic Settings and Install the NAC 800s

Before you install the NAC 800 (or NAC 800s) in its final location, access it through a console session. Log in with the **admin** username and default password (**procurve**). Then configure the settings shown in Table 6-5. For step-by-step instructions, see "Configure Basic Settings on the NAC 800s" on page 2-135 of Chapter 2: "Implementing 802.1X with ProCurve IDM and Endpoint Integrity."

Table 6-5. NAC 800 Basic Settings

Server Type	Menu Interface Password	IP Address	Subnet Mask	Default Gateway
Combination Server	procurvenac9	10.4.4.40	255.255.0.0	10.4.0.1

Note

The NAC 800 requires an IP address on the same subnet as the DHCP server.

Install the NAC 800

The NAC 800 in this solution enforces quarantining by intercepting DHCP requests. For a DHCP deployment, you must install the NAC 800 between the DHCP server and the rest of the network.

On its port 1, the NAC 800 connects to a switch (typically, the one to which the DHCP server would otherwise connect); the NAC 800 connects to the DHCP server on its port 2. Figure 6-7 shows an example installation.

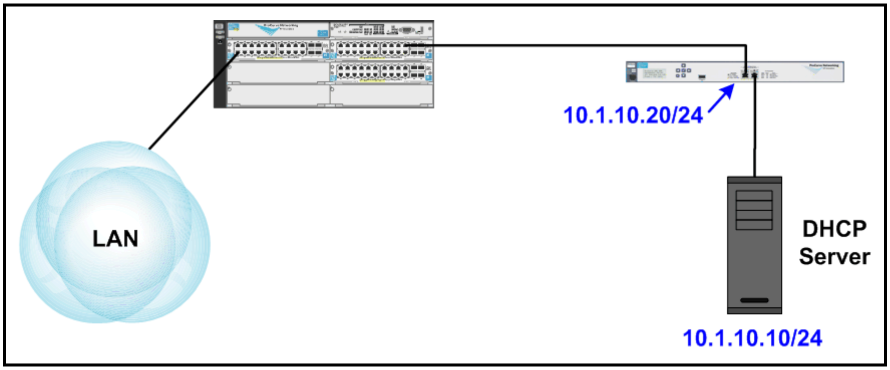


Figure 6-7. DHCP Deployment Method—Single DHCP Server

Figure 6-8 shows a design for a network with multiple DHCP servers. On its port 2, the NAC 800 connects to a switch to which the DHCP servers connect. (For a network with more 3000 endpoints, you could also attach other NAC 800s to the DHCP servers' switch and configure the NAC 800s as ESs in a cluster. You would also need one NAC 800 that functions as an Management Server [MS] installed somewhere on the network.)

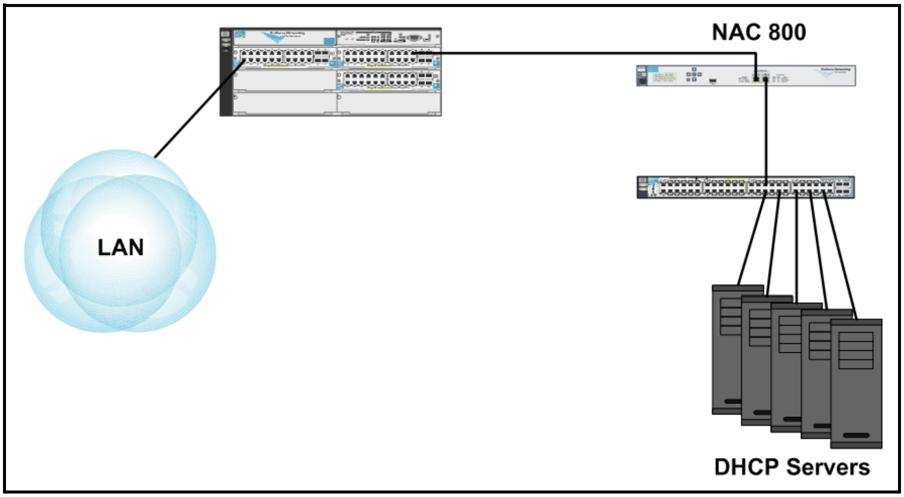


Figure 6-8. DHCP Deployment Method—Multiple DHCP Servers

Refer to the *Network Access Controller 800 Hardware Installation Guide* for detailed mounting and installation instructions.

Access the NAC 800 Web Browser Interface

To access the NAC 800 Web browser interface, open a Web browser and type the NAC 800's IP address or hostname for the URL.

The first time that you access the NAC 800's Web browser interface, you must complete some basic setup. For example, PCU network administrators configure the settings shown in Table 6-6. See Chapter 2: "Implementing 802.1X with ProCurve IDM and Endpoint Integrity" for step-by-step instructions.

Table 6-6. NAC 800 Initial Web Browser Setup

Root Password	Hostname	Time Zone	Time Servers	DNS Server	Web Administrator Username	Web Administrator Password
procurvenac9	CS.procurveu.edu	GMT -8	Default	10.4.8.1	admin	procurvenac9

Configure Quarantining

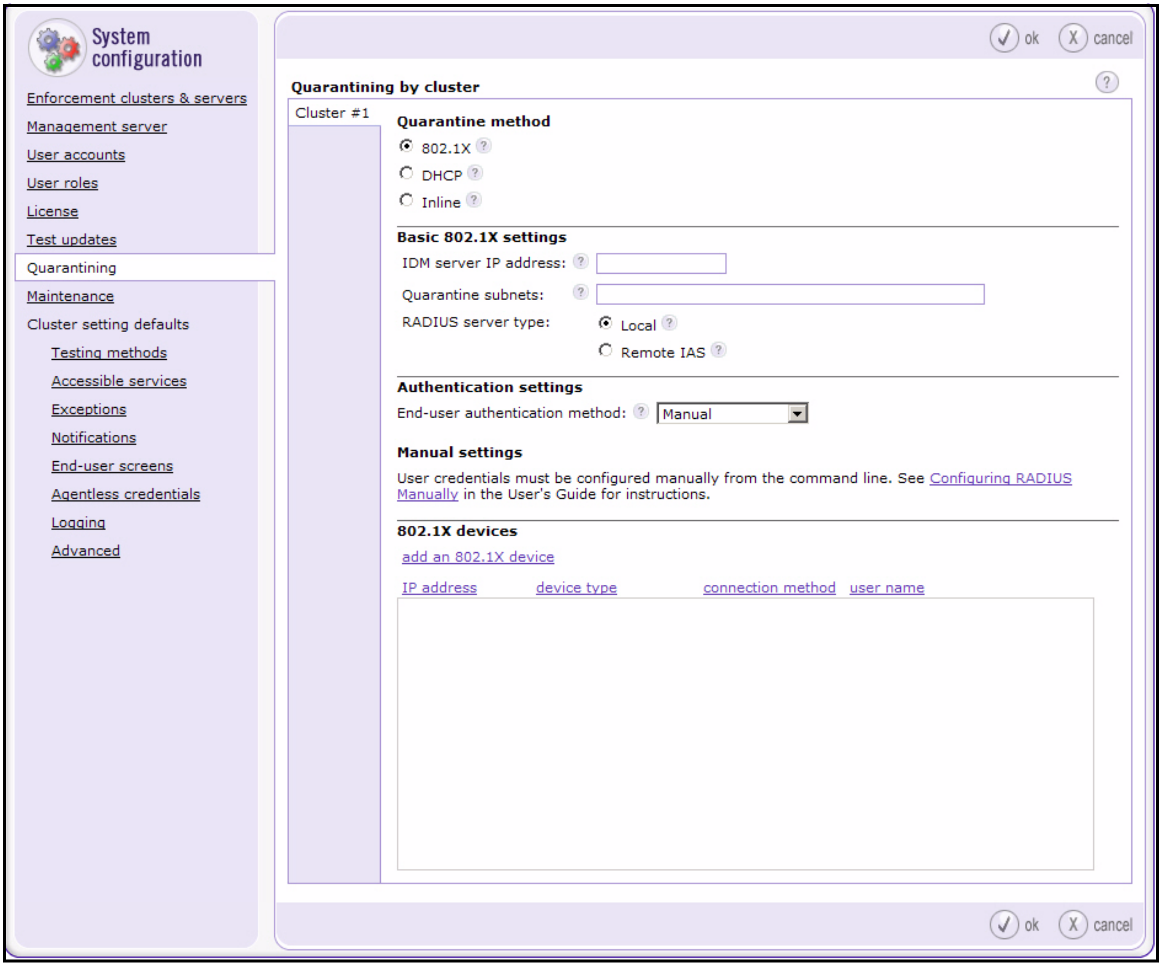
The DHCP quarantine method requires you to set up a quarantine area for each subnet (VLAN) with endpoints that will be tested and controlled. The areas for the example are shown in Table 6-7. Note that just as a DHCP range is often smaller than the complete subnet, the current DHCP range for the quarantine segment is smaller than that segment. Administrators can later add addresses to the range if necessary.

Table 6-7. Quarantine Areas

Quarantine Area	Non-quarantined Subnets	Quarantine Segment	DHCP Range for the Quarantine Segment	Default Gateway	Domain Suffix	DHCP Quarantine Option
VLAN 2 (Management and Servers)	10.2.0.0/17 10.2.128.0/18 10.2.192.0/19 10.2.224.0/20	10.2.240.0/20	10.2.240.0–10.2.240.255	10.2.0.1	procurveu.edu	Static routes
VLAN 4 (Users)	10.8.0.0/17	10.8.128.0/17	10.8.128.0–10.8.131.255	10.8.0.1	procurveu.edu	Static routes

Follow these steps to configure the DHCP quarantine method:

1. Select **Home** > **System configuration** > **Quarantining**.



Quarantining by cluster

Cluster #1

Quarantine method

● 802.1X
○ DHCP
○ Inline

Basic 802.1X settings

IDM server IP address:

Quarantine subnets:

RADIUS server type: ● Local ○ Remote IAS

Authentication settings

End-user authentication method: Manual

Manual settings

User credentials must be configured manually from the command line. See Configuring RADIUS Manually in the User's Guide for instructions.

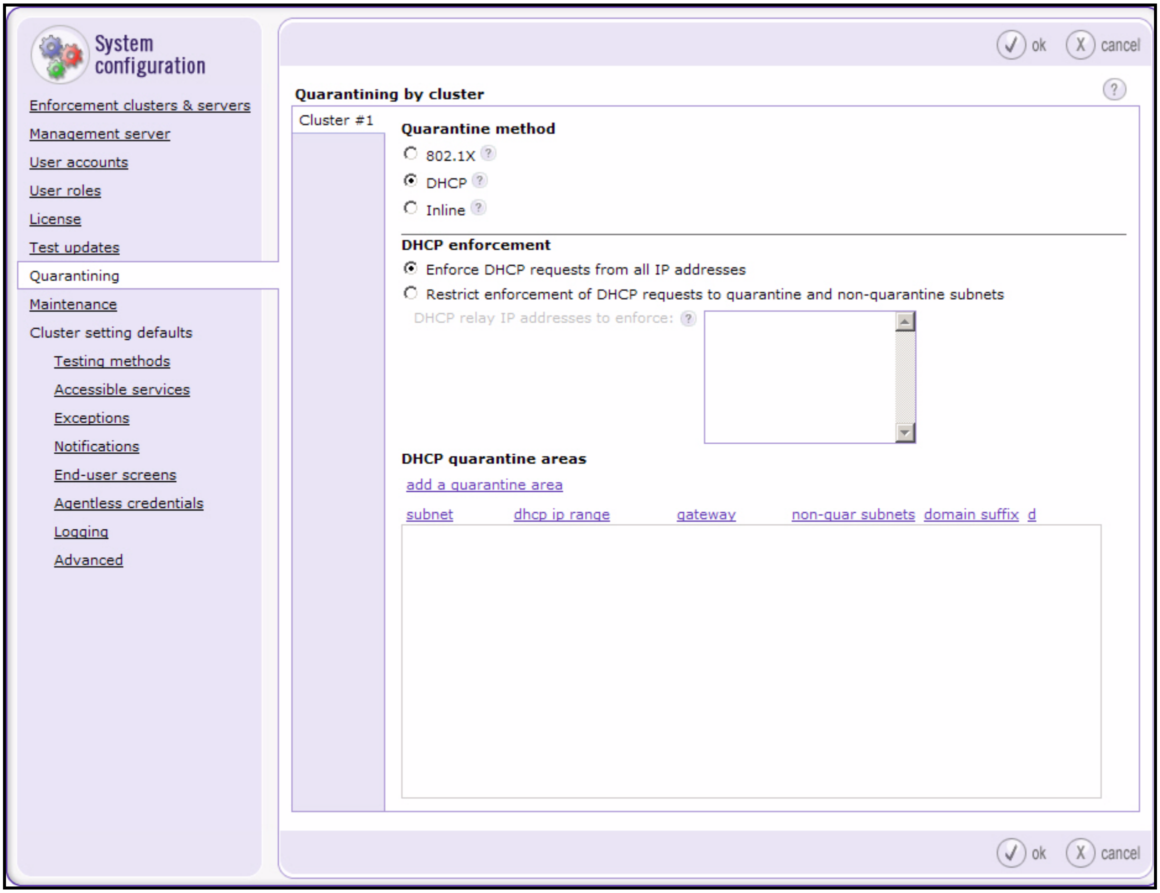
802.1X devices

add an 802.1X device

IP address	device type	connection method	user name

Figure 6-9. Home > System configuration > Quarantining

2. Select **DHCP** as the **Quarantine method**.



Quarantining by cluster

Quarantine method

○ 802.1X

● DHCP

○ Inline

DHCP enforcement

● Enforce DHCP requests from all IP addresses

○ Restrict enforcement of DHCP requests to quarantine and non-quarantine subnets

DHCP relay IP addresses to enforce:

DHCP quarantine areas

Figure 6-10. Home > System configuration > Quarantining

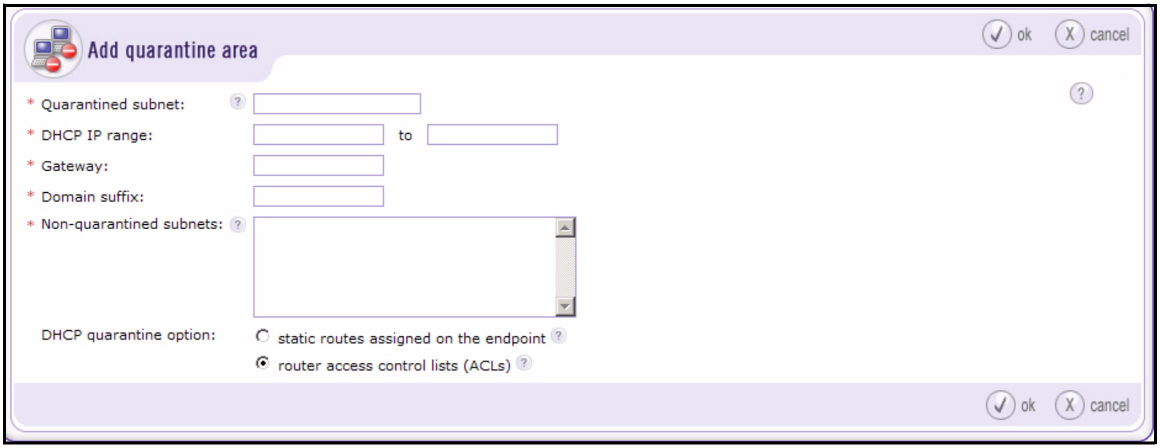
3. In the **DHCP enforcement** area, keep the default setting: **Enforce DHCP requests from all IP addresses**.

Note

You would select a different option if you had a subnet with endpoints that you did *not* want to quarantine but that request DHCP addresses. For example, you might not want to quarantine network administrator endpoints. In this case, select **Restrict enforcement of DHCP requests to quarantine and non-quarantine subnets**. Do not add a quarantine area that specifies the subnet in question in the **Non-quarantined subnets** box.

The NAC 800 will still test the endpoints. You can configure an exception to change this behavior.

4. Click **add a quarantine area**.


Add quarantine area

* Quarantined subnet:

* DHCP IP range: to

* Gateway:

* Domain suffix:

* Non-quarantined subnets:

DHCP quarantine option:
○ static routes assigned on the endpoint
● router access control lists (ACLs)

Figure 6-11. Home > System configuration > Quarantining > Add quarantine area

5. In the **Quarantined subnet** box, type the IP address of the subnet you have chosen for quarantining endpoints. For example, you would add the following for the 10.2.0.0 subnet:

   10.2.240.0/20

   For the 10.8.0.0 subnet, you would add the following:

   10.8.128.0/17

6. In the **DHCP IP range** boxes, type the first and last IP addresses in a range of addresses within the quarantined subnet.

   For example, you would add the following for the 10.2.0.0 subnet:

   10.2.240.0 and **10.2.240.255**.

For example, you would add the following for the 10.8.0.0 subnet:

10.8.128.0 and **10.8.131.255**.

7. In the **Default gateway** box, specify the IP address of the default gateway. For example: **10.2.0.1** or **10.8.0.1**.

8. In the **Domain suffix** box, type your company's domain name. For example: **procurveu.edu**.

9. In the **Non-quarantine subnets** box, specify the non-quarantined segment of the subnet. This segment must not overlap with the quarantine segment, so you *cannot* simply type the IP address of the entire production subnet.

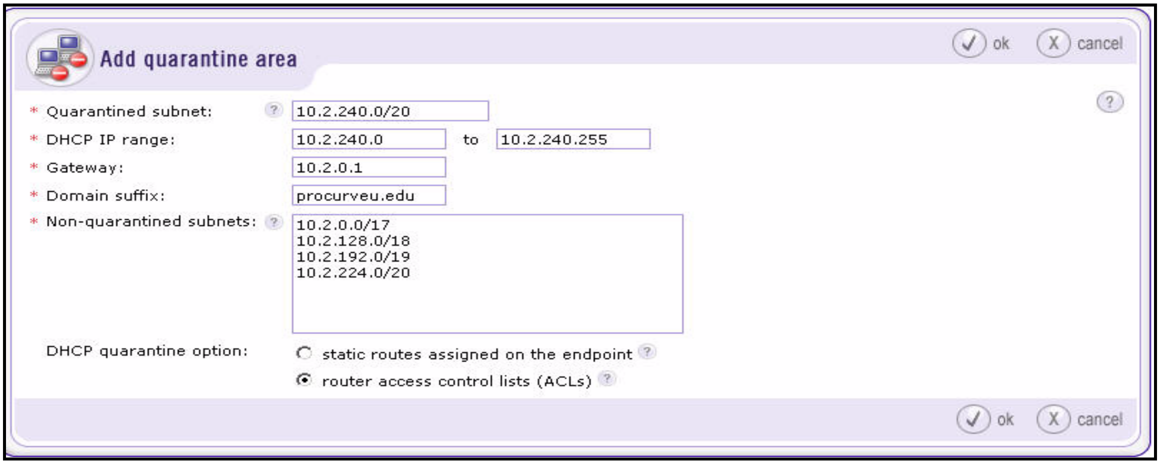
   Specifying the non-quarantine subnet is easy when you divide the production subnet evenly—half for non-quarantined endpoints and half for quarantined endpoints. For example, in the 10.8.0.0/16 subnet, 10.8.128.0/17 is the quarantine subnet. For the single non-quarantine subnet, type:

   10.8.0.0/17

   On the other hand, you might select a smaller range of IP addresses for quarantined than for non-quarantined endpoints. In this case, you must type multiple network IP addresses in the **Non-quarantine subnets** box in order to specify the entire non-quarantine range.

   For example, in the 10.2.0.0/16 subnet, 10.2.240.0/20 is the quarantine subnet. The rest of the subnet (non-quarantined) is specified by the following network addresses:

   - **10.2.0.0/17**
   - **10.2.128.0/18**
   - **10.2.192.0/19**
   - **10.2.224.0/20**



Add quarantine area

* Quarantined subnet: 10.2.240.0/20

* DHCP IP range: 10.2.240.0 to 10.2.240.255

* Gateway: 10.2.0.1

* Domain suffix: procurveu.edu

* Non-quarantined subnets:
10.2.0.0/17
10.2.128.0/18
10.2.192.0/19
10.2.224.0/20

DHCP quarantine option:
○ static routes assigned on the endpoint
● router access control lists (ACLs)

Figure 6-12. Home > System configuration > Quarantining > Add quarantine area

10. For the **DHCP quarantine option**, select **static routes assigned on the endpoint**.
11. Click **ok**.
12. To configure quarantining of endpoints on another VLAN, repeat steps 4 through 11.
13. Click **ok** in the **Home** > **System configuration** > **Quarantining** window.

Configure Testing Methods

The NAC 800 supports three testing methods:

- NAC EI agent
- ActiveX
- Agentless testing

Initially, the NAC 800 tries to test an endpoint in the background:

1. The NAC 800 tries to test the endpoint with the NAC EI agent.
2. If no agent is installed on the endpoint, the NAC 800 tries to install the ActiveX agent.
3. If the ActiveX installation fails and if credentials for the endpoint or domain exist, the NAC 800 tries to use agentless testing.

To ensure that the NAC 800 can successfully test the endpoints in the background, you must set up your network to support the testing methods you want to use.

In this section, you will learn how to set up the network to use the two testing methods chosen for the example network—the NAC EI agent and ActiveX. Because ProCurve University is using Novell eDirectory, the agentless testing method, which functions best in a Windows domain, is not a good fit.

NAC EI Agent

In this example, the network has a small IT staff. Rather than pre-installing the NAC EI agent on endpoints, network administrators will allow the NAC 800 to interact with users to download the NAC EI agent automatically. (See "Select the Backup Testing Methods Suggested by the NAC 800" on page 6-29.)

The NAC EI agent and the NAC 800 communicate on TCP and UDP ports 1500. In most cases, the agent can automatically open the correct ports through the endpoints' firewall.

Note

This rule has one exception. You must manually open port 1500 on an endpoint that meets all of these three conditions:

- Is unmanaged
- Runs Windows XP
- Uses a non-SP2 firewall such as Norton

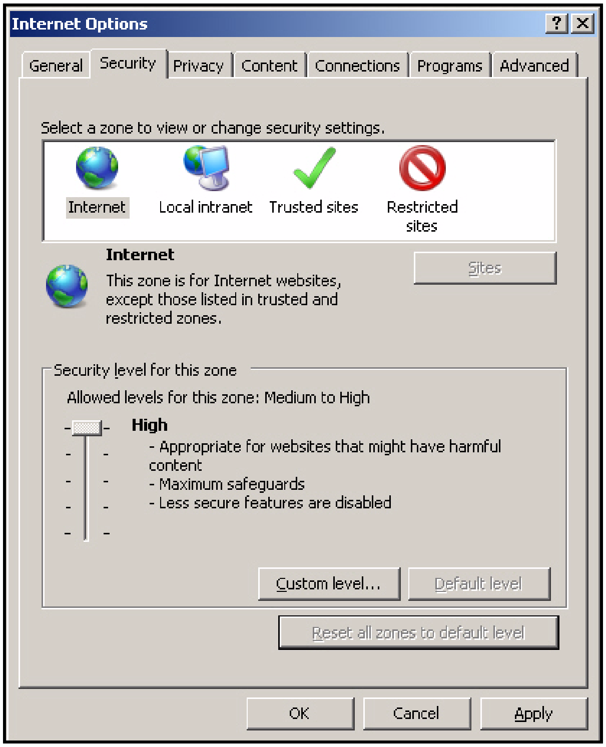
ActiveX Testing Method

ActiveX testing requires the endpoint's Web browser to be open for every test. The Web browser must be Internet Explorer version 5.0 or 6.0. The ActiveX agent uses ActiveX content and Java script. The endpoint's browser security settings must allow such content from the NAC 800.

If a user closes IE after his or her endpoint has gained access, the NAC 800 cannot retest the endpoint. The user can continue to connect to the network—even if the endpoint becomes non-compliant—for as long as IE is closed.

ActiveX testing works best when IE's default security settings are used:

- Internet – High
- Local Intranet – Medium-Low
- Trusted Sites – Medium
- Restricted Sites – High



Select a zone to view or change security settings.

Internet

This zone is for Internet websites, except those listed in trusted and restricted zones.

Security level for this zone

Allowed levels for this zone: Medium to High

High

- Appropriate for websites that might have harmful content
- Maximum safeguards
- Less secure features are disabled

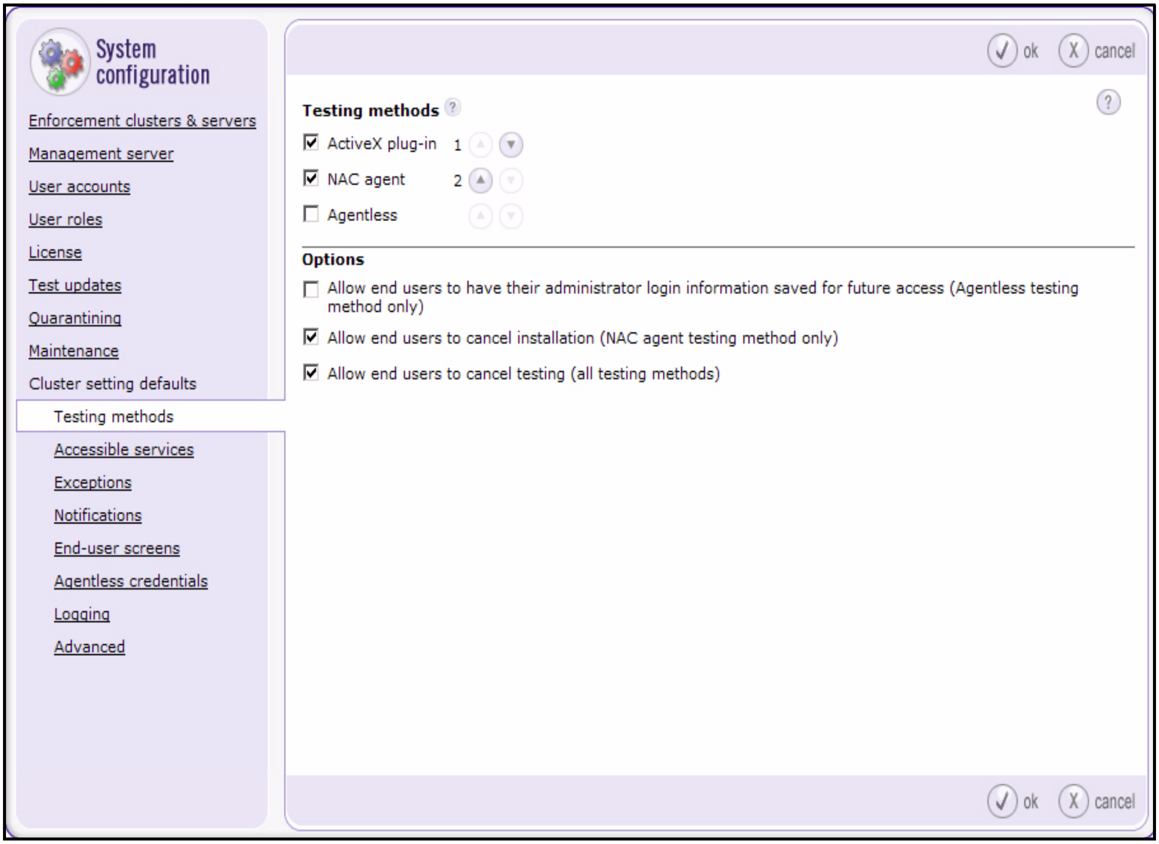
Figure 6-13. Microsoft IE—Tools > Internet Options > Security Tab

Like the NAC EI agent, ActiveX requires port 1500 to be open, but typically the ActiveX agent can automatically open the correct ports through the endpoints' firewall.

Select the Backup Testing Methods Suggested by the NAC 800

If the background testing fails, the NAC 800 can display end-user access windows that instruct the user how to allow the testing to succeed. Follow these steps to albw the NAC800 to automatically download the NAC EI agent to an end-user's endpoint:

1. Log in to the Web browser interface on the NAC 800 MS.
2. Select **System configuration** > **Cluster settings defaults** > **Testing methods**.
3. Select the **NAC agent** and **ActiveX plug-in** check boxes.
4. Clear the **Agentless** check box.



Testing methods

☑ ActiveX plug-in 1

☑ NAC agent 2

☐ Agentless

Options

☐ Allow end users to have their administrator login information saved for future access (Agentless testing method only)

☑ Allow end users to cancel installation (NAC agent testing method only)

☑ Allow end users to cancel testing (all testing methods)

Figure 6-14. NAC 800 Web Interface—Home > System configuration > Cluster setting defaults > Testing methods

5. Under options, clear the following:

   Allow end users to cancel installation (NAC agent testing method only)

   Allow end users to cancel testing (all testing methods)

6. Click **ok**.

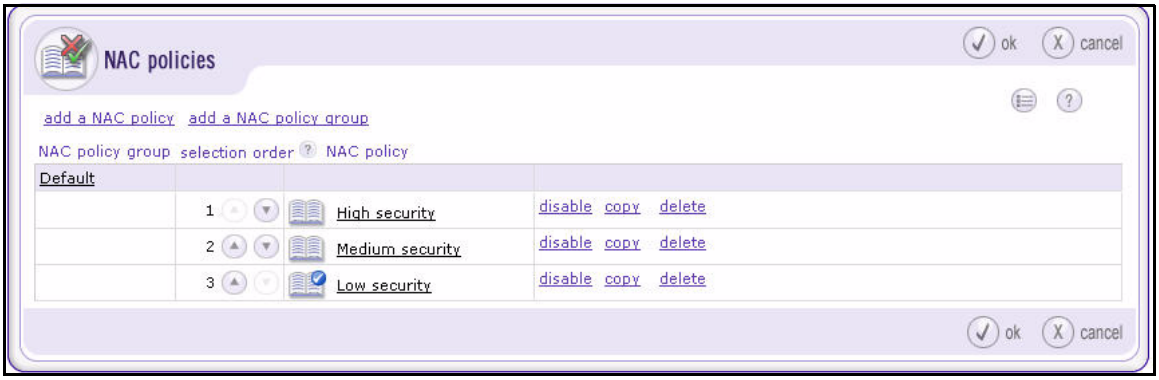
Configure NAC Policies

The NAC 800 has three default policies for testing endpoint integrity. By default, the Low security NAC policy applies to all endpoints. This section teaches you how to:

- Create new NAC policies for your environment
- Assign the policies to the correct endpoints

Complete these steps:

1. Open your Web browser and log on to the CS.
2. Select **NAC policies**.



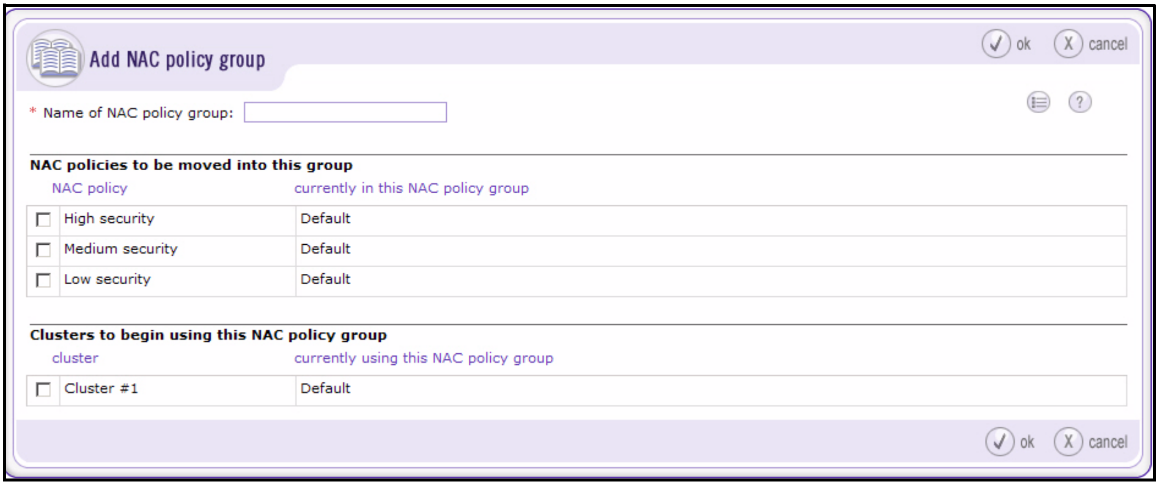
NAC policies

add a NAC policy   add a NAC policy group

NAC policy group	selection order	NAC policy	
Default			
	1	High security	disable copy delete
	2	Medium security	disable copy delete
	3	Low security	disable copy delete

Figure 6-15. NAC 800 Web Interface—Home > NAC policies Window

3. Click **add a NAC policy group**.



* Name of NAC policy group:

NAC policies to be moved into this group

	NAC policy	currently in this NAC policy group
□	High security	Default
□	Medium security	Default
□	Low security	Default

Clusters to begin using this NAC policy group

	cluster	currently using this NAC policy group
□	Cluster #1	Default

Figure 6-16. NAC 800 Web Interface—Home > NAC policies > Add NAC policy group

4. For **Name of NAC policy group**, type the name (in this example, **PCUPolicies**).

5. Under **Clusters to begin using this NAC policy group**, select the cluster you want to use this policy group. Because this example network uses a CS, only one cluster will be listed with the default name of **Cluster #1**. Select the check box for this cluster.

6. Click **ok**.

7. Create the NAC policy for network administrators' endpoints. This policy will be based on the Medium security policy but will include several more tests. Click the**copy** link next to **Medium security** in the **Home** > **NAC policies** window.

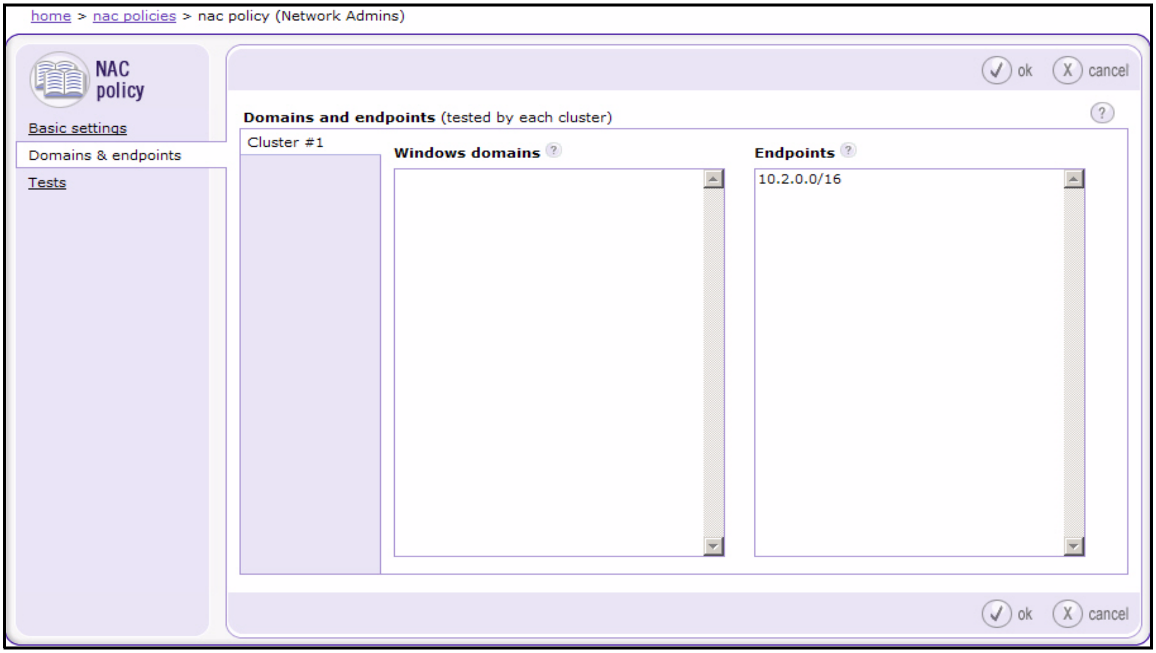
8. In the **Policy name** box, type **Network Admins**.

9. From the **NAC policy group** list, select **PCUPolicies**.

10. Click **Domains & endpoints** in the left pane.

11. In the **Endpoints** box, type the subnets for users—both the production and the quarantine segments. In this example:

    10.2.0.0/16



home > nac policies > nac policy (Network Admins)

Domains and endpoints (tested by each cluster)

Cluster #1

Windows domains

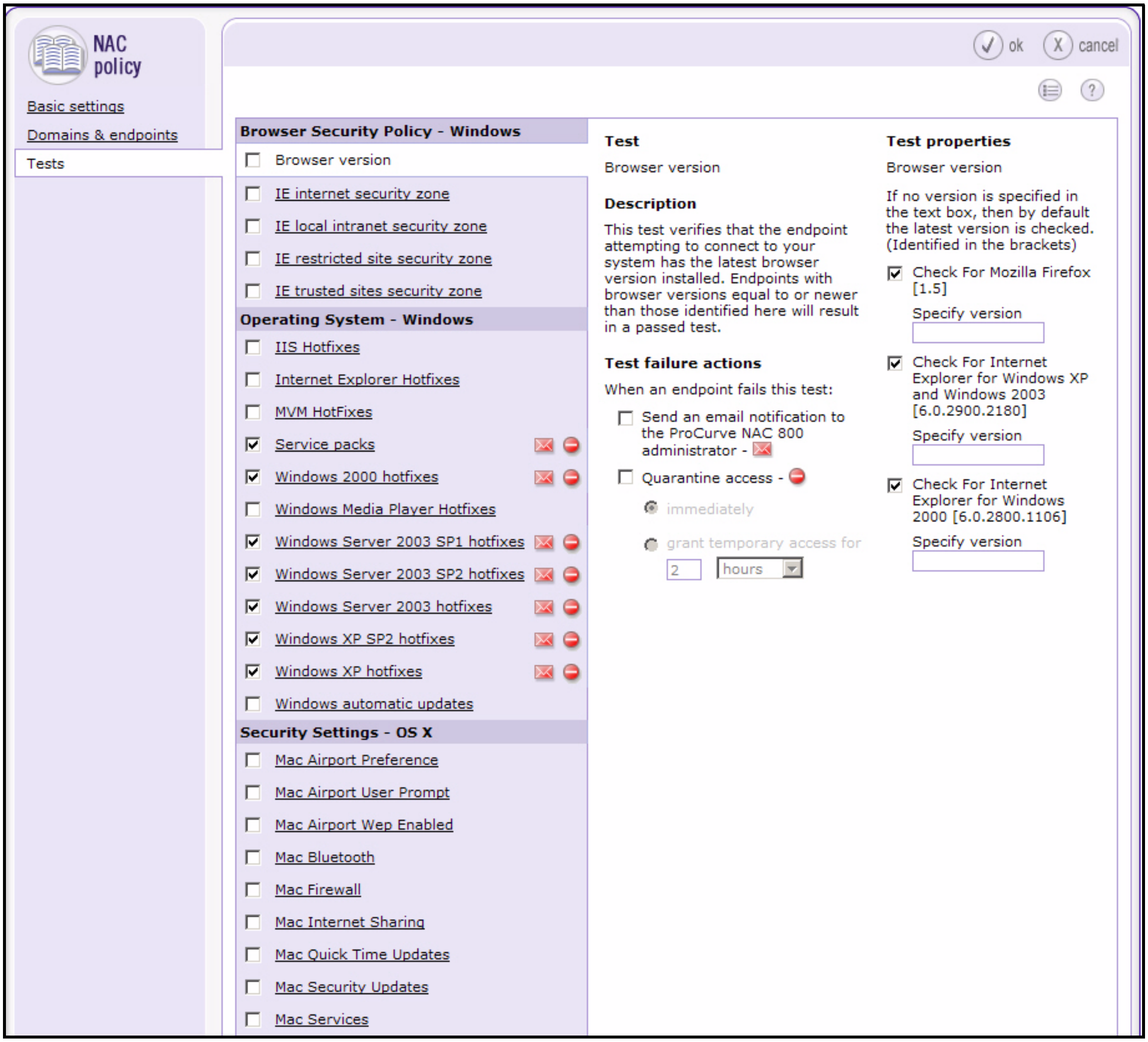
Endpoints

10.2.0.0/16

Figure 6-17. NAC 800 Web Interface—Home > NAC policies > *<NAC policy>* > Domains & endpoints

12. Click **Tests** in the left pane.

    The steps below show you how to configure additional tests that are not included in the default Medium security policy. These tests are just examples. Refer to the *ProCurve Access Control Design Guide* for help in designing your company's policies.



NAC policy

Basic settings

Domains & endpoints

Tests

ok cancel

Browser Security Policy - Windows

- ☐ Browser version
- ☐ IE internet security zone
- ☐ IE local intranet security zone
- ☐ IE restricted site security zone
- ☐ IE trusted sites security zone

Operating System - Windows

- ☐ IIS Hotfixes
- ☐ Internet Explorer Hotfixes
- ☐ MVM HotFixes
- ☑ Service packs ✉ ⛔
- ☑ Windows 2000 hotfixes ✉ ⛔
- ☐ Windows Media Player Hotfixes
- ☑ Windows Server 2003 SP1 hotfixes ✉ ⛔
- ☑ Windows Server 2003 SP2 hotfixes ✉ ⛔
- ☑ Windows Server 2003 hotfixes ✉ ⛔
- ☑ Windows XP SP2 hotfixes ✉ ⛔
- ☑ Windows XP hotfixes ✉ ⛔
- ☐ Windows automatic updates

Security Settings - OS X

- ☐ Mac Airport Preference
- ☐ Mac Airport User Prompt
- ☐ Mac Airport Wep Enabled
- ☐ Mac Bluetooth
- ☐ Mac Firewall
- ☐ Mac Internet Sharing
- ☐ Mac Quick Time Updates
- ☐ Mac Security Updates
- ☐ Mac Services

Test

Browser version

Description

This test verifies that the endpoint attempting to connect to your system has the latest browser version installed. Endpoints with browser versions equal to or newer than those identified here will result in a passed test.

Test failure actions

When an endpoint fails this test:

☐ Send an email notification to the ProCurve NAC 800 administrator - ✉

☐ Quarantine access - ⛔

● immediately

○ grant temporary access for

2 hours

Test properties

Browser version

If no version is specified in the text box, then by default the latest version is checked. (Identified in the brackets)

☑ Check For Mozilla Firefox [1.5]

Specify version

☑ Check For Internet Explorer for Windows XP and Windows 2003 [6.0.2900.2180]

Specify version

☑ Check For Internet Explorer for Windows 2000 [6.0.2800.1106]

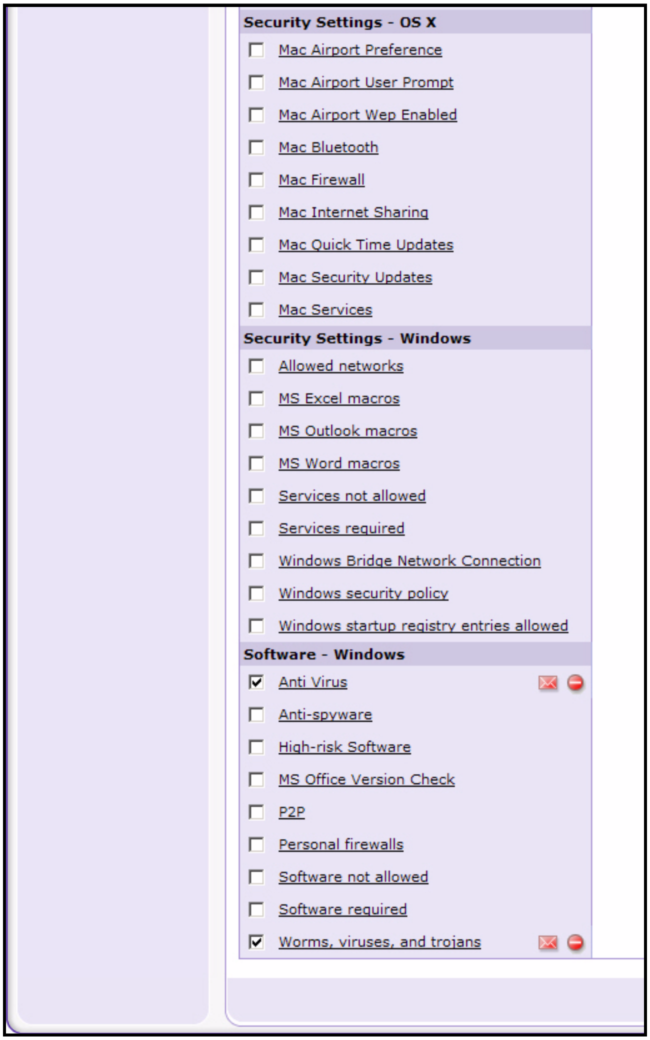
Specify version

Figure 6-18. NAC 800 Web Interface—Home > NAC policies > *<NAC policy>* > Tests

13. Select the **Browser Version** check box. Use the default settings for the version number or specify a different version in the boxes provided. You can specify a version for Mozilla Firefox, Internet Explorer on Windows 2003, or Internet Explorer on Windows 2000.

14. Under **Operating System –Windows**, select the **Internet Explorer Hotfixes** check box.

15. Under **Operating System –Windows**, select the **Windows Automatic Updates** check box.



Security Settings - OS X

☐ Mac Airport Preference
☐ Mac Airport User Prompt
☐ Mac Airport Wep Enabled
☐ Mac Bluetooth
☐ Mac Firewall
☐ Mac Internet Sharing
☐ Mac Quick Time Updates
☐ Mac Security Updates
☐ Mac Services

Security Settings - Windows

☐ Allowed networks
☐ MS Excel macros
☐ MS Outlook macros
☐ MS Word macros
☐ Services not allowed
☐ Services required
☐ Windows Bridge Network Connection
☐ Windows security policy
☐ Windows startup registry entries allowed

Software - Windows

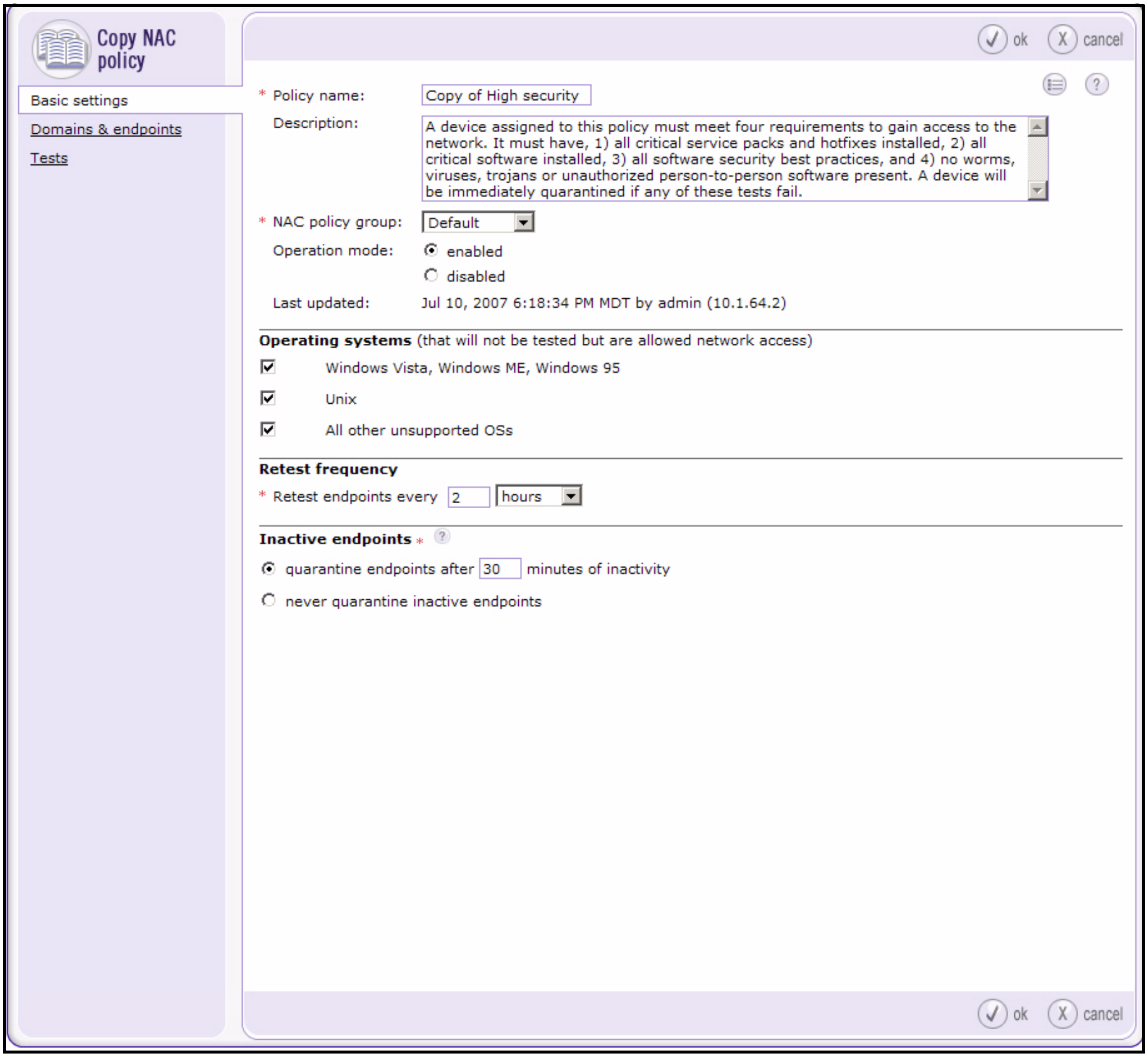
☑ Anti Virus
☐ Anti-spyware
☐ High-risk Software
☐ MS Office Version Check
☐ P2P
☐ Personal firewalls
☐ Software not allowed
☐ Software required
☑ Worms, viruses, and trojans

Figure 6-19. NAC 800 Web Interface—Home > NAC policies > *<NAC policy>* > Tests

16. Under **Software—Windows**, select the **Anti-spyware** and **Personal firewalls** check boxes.

17. Click ok. You are returned to the **Home** > **NAC policies** window.

18. Next, you will create a NAC policy for testing the endpoints of ProCurve University users. This policy will be based on the High security policy. Begin by clicking the **copy** link next to **High security**.



* Policy name: Copy of High security

Description: A device assigned to this policy must meet four requirements to gain access to the network. It must have, 1) all critical service packs and hotfixes installed, 2) all critical software installed, 3) all software security best practices, and 4) no worms, viruses, trojans or unauthorized person-to-person software present. A device will be immediately quarantined if any of these tests fail.

* NAC policy group: Default

Operation mode: ● enabled ○ disabled

Last updated: Jul 10, 2007 6:18:34 PM MDT by admin (10.1.64.2)

Operating systems (that will not be tested but are allowed network access)

☑ Windows Vista, Windows ME, Windows 95

☑ Unix

☑ All other unsupported OSs

Retest frequency

* Retest endpoints every 2 hours

Inactive endpoints *

● quarantine endpoints after 30 minutes of inactivity

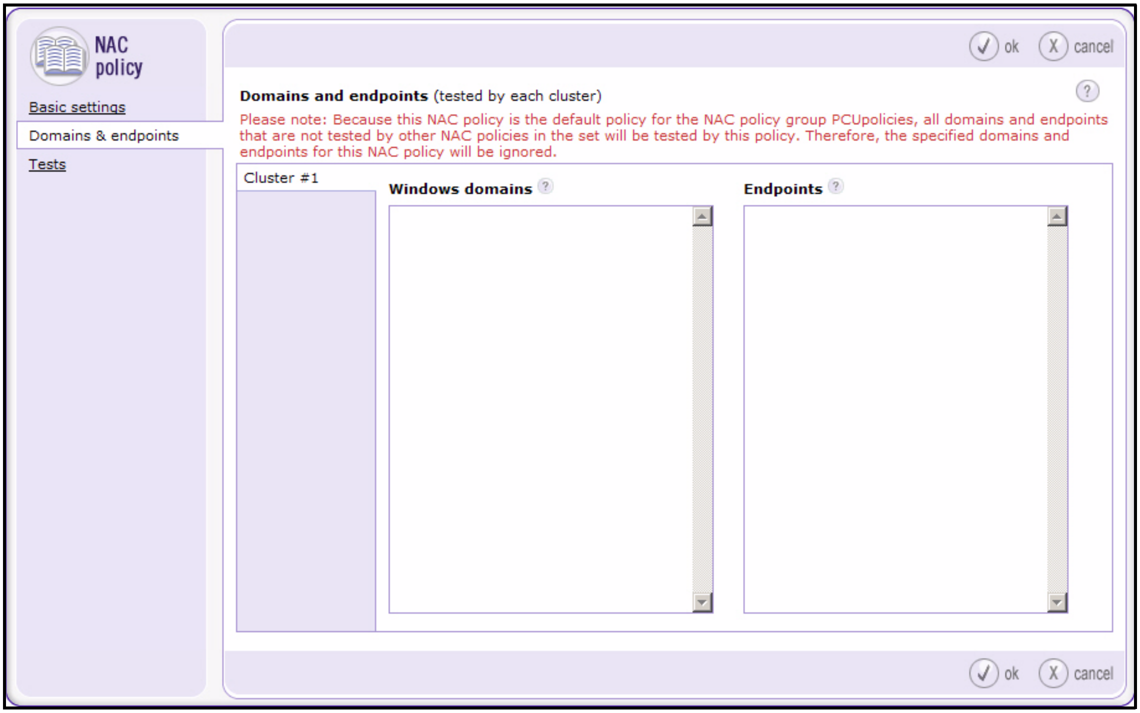
○ never quarantine inactive endpoints

Figure 6-20. NAC 800 Web Interface—Home > NAC policies > Copy NAC policy Window—Basic settings tab.

19. For the **Policy name**, type the name (in this example, **PCU**).

20. From the **NAC policy group** list, select **PCUPolicies**.

21. Click **Domains & endpoints** in the left pane. Because you have defined this policy last, the NAC 800 makes it the default policy for this policy group and displays the message shown in Figure 6-21. If the NAC 800 detects an endpoint that is not in the subnets or domains that you defined for other policies in this policy group, it will use the default policy. You can change this default setting on the **Home > NAC policies** window, by using the Arrows next to the policy name.



Domains and endpoints (tested by each cluster)

Please note: Because this NAC policy is the default policy for the NAC policy group PCUpolicies, all domains and endpoints that are not tested by other NAC policies in the set will be tested by this policy. Therefore, the specified domains and endpoints for this NAC policy will be ignored.

Figure 6-21. NAC 800 Web Interface—Home > NAC policies > *<NAC policy>* > Domains & endpoints

22. As long as this policy is the default policy, you do not need to complete this step. If you decide to make another policy the default policy, type the subnets for users (both the quarantine and non-quarantine segments) in the **Endpoints** box. In this example:

    10.8.0.0/16

23. Click **ok**.

24. Click **ok**.

Prevent Users from Circumventing Endpoint Integrity Checking

More knowledgeable users may try to circumvent endpoint integrity checking by assigning themselves a static IP address. If you have a switch that supports DCHP snooping and ARP protection, you can close this security hole and allow traffic from the static IP addresses you specify. The ProCurve 3500yl, 5400zl, 6200yl, and 8200zl Switches support these features.

DHCP Snooping

DHCP snooping is designed to protect your network against DHCP attacks. When you enable DHCP snooping, the switch takes the role of a security guard, overseeing DHCP exchanges and ensuring that endpoints behave as they should.

With DHCP snooping, the switch distinguishes between trusted and untrusted ports. You define the ports that connect to your trusted devices, such as DHCP servers, as trusted ports. The switch then allows DHCP packets to flow freely on these ports. All other ports are, by default, untrusted. On these ports, the switch filters DHCP packets and determines whether they are allowed.

For example, DHCP server packets should not originate from untrusted ports, so if the switch detects these types of packets, it immediately discards them. The switch also verifies information in the DHCP client header and packet before allowing the packet onto the network. For example, the switch drops packets in which the source MAC address does not match the DHCP MAC address—a sign of spoofing.

This verify MAC check is enabled by default when you activate DHCP snooping. You can disable this check if you no longer want the switch to perform it. (Type the **no dhcp-snooping verify mac** command.)

Enable DHCP Snooping

You first enable DHCP snooping globally on the switch. Move to the global configuration mode context and type:

```
ProCurve Switch(config)# dhcp-snooping
```

The switch will begin to build a DHCP snooping table (or database).

You must then enable the DHCP snooping feature for particular VLANs by typing:

Syntax: dhcp-snooping vlan <*vlan_range*>

Enables DHCP snooping on the VLAN.

Replace ***<vlan-range>*** *with the VLAN ID (number or name). Use a hyphen to specify a range. To specify multiple, non-contiguous VLANs, separate the IDs with spaces.*

For example:

```
ProCurve Switch(config)# dhcp-snooping vlan 2 8
```

Configure Trusted Ports for DHCP Snooping

Stations that are connected to untrusted ports should not be transmitting DHCP server packets, but your DHCP server must be able to send these packets. You must define trusted ports so that the switch does not disable DHCP entirely.

To define trusted ports, type:.

Syntax: dhcp-snooping trust <*ports*>

Specifies which ports are trusted.

Replace ***<ports>*** *with the ID of the trusted port. Use a hyphen to specify a range. To specify multiple, non-contiguous ports, separate the IDs with commas.*

For example, you would designate an uplink port and the port that connects to a DHCP server as trusted ports. When you define a trusted port, the switch does not filter any DHCP packets on that port.

For a DHCP endpoint integrity deployment, you define the switch port that connects to the NAC 800 as a trusted port. You also define the uplink port, as shown below:

```
ProCurve (config)# dhcp-snooping trust a1,b1
```

Define Authorized DHCP Servers

In addition to defining trusted ports, you can define the authorized DHCP servers on your network. In this case, the switch allows a DHCP server packet only if it meets two criteria: the packet is from an authorized DHCP server, and it is transmitted from a trusted port.

To define an authorized server, type the following command from the global configuration mode context. If you have more than one DHCP server, type the command multiple times:

Syntax: dhcp-snooping authorized-server <*A.B.C.D*>

Identifies the DHCP server.

Replace ***<A.B.C.D>*** *with IP address of the DHCP server.*

For example:

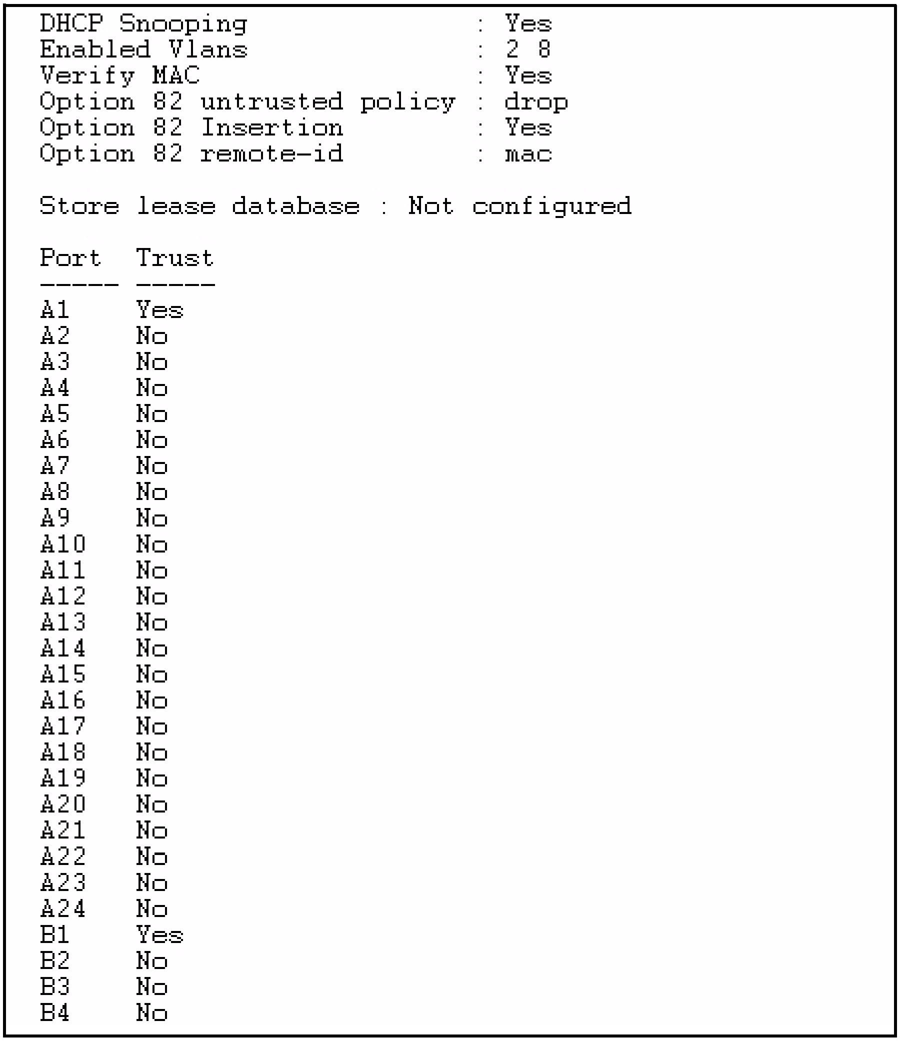
```
ProCurve (config)# dhcp-snooping authorized-server
10.4.8.1
```

View DHCP Snooping Settings

To determine if DHCP snooping is enabled, type:

```
ProCurve Switch# show dhcp-snooping
```

This command also lists the VLANs for which DHCP snooping is enabled, and you can see which ports are trusted or untrusted.



```
DHCP Snooping               : Yes
Enabled Vlans               : 2 8
Verify MAC                  : Yes
Option 82 untrusted policy : drop
Option 82 Insertion         : Yes
Option 82 remote-id         : mac

Store lease database : Not configured

Port  Trust
----- -----
A1    Yes
A2    No
A3    No
A4    No
A5    No
A6    No
A7    No
A8    No
A9    No
A10   No
A11   No
A12   No
A13   No
A14   No
A15   No
A16   No
A17   No
A18   No
A19   No
A20   No
A21   No
A22   No
A23   No
A24   No
B1    Yes
B2    No
B3    No
B4    No
```

Figure 6-22. show dhcp-snooping

ARP Protection

DHCP snooping allows the 3500yl, 5400zl, and 6200yl Switches to protect your network from other attacks as well. It does so by capitalizing on the information it learns while filtering DHCP packets. The switch builds and maintains a DHCP snooping table, which tracks the MAC address, IP address, lease time, binding type, VLAN number, and interface information that corresponds to each DHCP lease through an untrusted port.

You can add to this table any static bindings that you have. For example, you can add the IP address and MAC address of servers that have a static IP address.

Using this table to verify IP-to-MAC bindings, the switch determines which IP addresses should legitimately send traffic on which ports and detects malicious hosts that try to spoof ARP packets. It can also detect users who try to assign their workstation a static IP address to avoid integrity checking. Whether such traffic originates from a malicious host or a devious user, the switch does not allow it on the network. It drops the traffic.

Enable ARP Protection

You first enable ARP protection globally on the switch. Move to the global configuration mode context and type:

```
ProCurve Switch(config)# arp-protect
```

You must then enable ARP protection for a particular VLAN or for multiple VLANs.

To enable ARP protection, type:

Syntax: arp-protect <*vlan-range*>

Activates ARP protection on the switch.

Replace **<vlan-range>** *with the VLAN ID (number or name). Use a hyphen to specify a range. To specify multiple, non-contiguous VLANs, separate the IDs with spaces.*

For example:

```
ProCurve Switch(config)# arp-protect vlan 2 8
```

Configure Trusted Ports for ARP

By default, all ports are untrusted in the context of ARP protection. This means that the switch will check the ARP requests and responses received on all the ports that are members of the protected VLANs.

To ensure that the switch can exchange ARP traffic with other switches on the network, you should define the uplink port as trusted for ARP. The switch will not check the ARP requests and responses that it receives on the trusted port. Type:

Syntax: arp-protect trust <*port*>

Specifies which ports are trusted.

Replace ***<ports>*** *with the ID of the trusted port. Use a hyphen to specify a range. To specify multiple, non-contiguous ports, separate the IDs with commas.*

For example:

```
ProCurve Switch(config)# arp-protect trust a1,b1
```

Configure Static IP-to-MAC Address Bindings

You can type static IP-to-MAC address bindings if your network does not use DHCP or if some devices have fixed, manually assigned, IP addresses. The switch uses the bindings you type for both DHCP snooping and dynamic ARP protection.

To configure a static IP-to-MAC address binding, type:

Syntax: ip source-binding <*vlan-ID*> <*A.B.C.D*> <*MAC_address*> <*port*>

Adds a static IP-to-MAC address binding to the DHCP snooping table.

Replace ***<vlan-ID>*** *with the number or name of the VLAN.*

Replace ***<A.B.C.D>*** *with the static IP address of the device.*

Replace ***<MAC_address>*** *with the MAC address of the device that has the static IP address.*

Replace ***<port>*** *with the ID of the trusted port.*

For example, to configure a binding for the DNS server on the example network, type:

```
ProCurve Switch(config)# ip source-binding 4 10.4.8.1
0011436668CC a8
```

Note

You only need to add IP-to-MAC address bindings for devices on VLANs on which the switch enforces ARP protection. In the example network, the switch does not run ARP protection on the Server VLAN (VLAN 4), so the binding is not necessary. The command is included for your reference only.

View Information about ARP Protection

To view your ARP protection settings, type:

```
ProCurve Switch(config)# show arp-protect
```

To view statistics related to ARP protection, type:

Syntax: show arp-protect statistics <*vlan-ID*>

Shows statistics related to ARP protection on a VLAN. Statistics include the number of packets dropped and the reason.

Replace **<vlan-ID>** *with the number or name of the VLAN.*

For example:

```
ProCurve Switch(config)# show arp-protect statistics 8
```

Set Up Endpoints

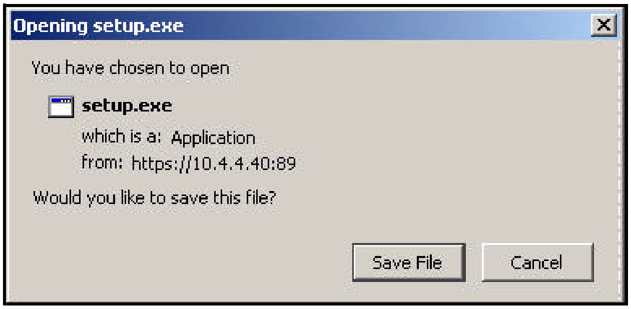
This section covers some minimal configurations on endpoints to ready them for endpoint integrity and wireless access.

Pre-install the NAC EI Agent Manually

In this solution, pre-installing NAC EI agent is optional. However, you might encourage users to download and install the agent during the trial period (before you activate quarantining). Explain that this easy task will help everyone connect to the network more smoothly when endpoint integrity is enforced. Although some users may choose not to install the agent, they will receive another chance the first time that the NAC 800 attempts to test them.

Give users the following instructions:

1. Open a Web browser and type the following for the URL: **https://<NAC IP address>:89/setup.exe**.



Opening setup.exe

You have chosen to open

setup.exe

which is a: Application

from: https://10.4.4.40:89

Would you like to save this file?

Figure 6-23. NAC 800 Web Interface—Home > System configuration > Quarantining (802.1X quarantine method) > add an 802.1X device

2. A window such as the one in Figure 6-23 is displayed. Click **Save File**.
3. After the file is downloaded, open it and allow it to run.

Note

Users may want to pre-install the NAC EI agent on endpoints that cannot reach the NAC 800—for example, laptops that they only sometimes bring to work. You can, of course, obtain the **setup.exe** file from the NAC 800 and copy it, for interested users, to a CD or removable flash device.

Open Ports on Non-Windows Firewalls

Typically, the NAC EI agent (and the ActiveX agent) automatically open all necessary ports on the endpoint's personal firewall. However, tell users to open ports manually if both of the following are true:

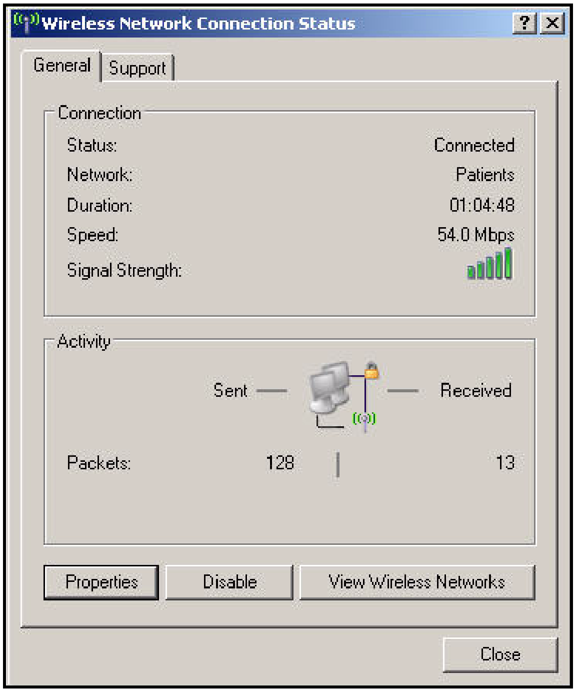
- Their endpoint runs Windows XP.
- They use a non-Windows firewall.

The users should refer to the documentation for their firewall and open TCP and UDP ports 1500.

Configure the Wireless Zero Configuration Utility for Wireless Access

Complete the following steps to configure the Wireless Zero Configuration client for wireless access:

1. Select **Start** > **Settings** > **Network Connections** > **Wireless Network Connection**.



Connection

Status: Connected
Network: Patients
Duration: 01:04:48
Speed: 54.0 Mbps
Signal Strength:

Activity

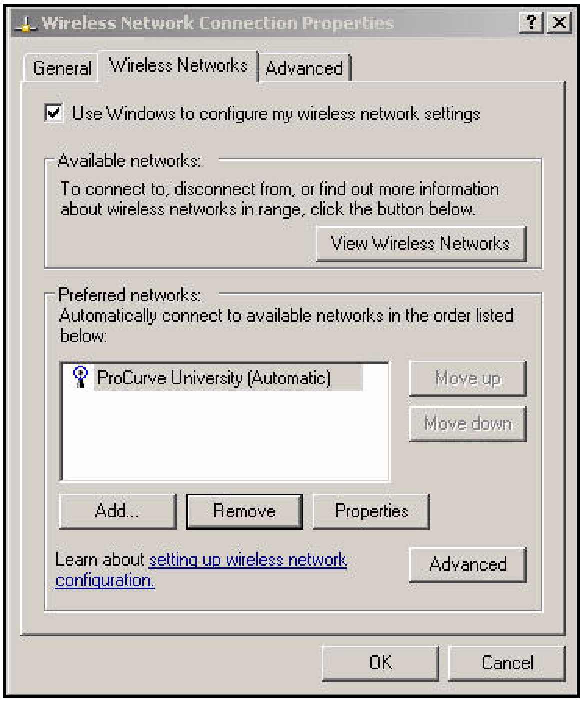
Sent — — Received

Packets: 128 | 13

Figure 6-24. Start > **Settings** > **Network Connections** > **Local Area Connection > Wireless Network Connection Status Window—General Tab**

2. Click **Properties**.

3. Click the **Wireless Networks** tab.



Wireless Network Connection Properties

☑ Use Windows to configure my wireless network settings

Available networks:

To connect to, disconnect from, or find out more information about wireless networks in range, click the button below.

Preferred networks:

Automatically connect to available networks in the order listed below:

ProCurve University (Automatic)

Learn about setting up wireless network configuration.

Figure 6-25. Wireless Network Connection Status—Wireless Network Connection Properties—Wireless Networks Tab

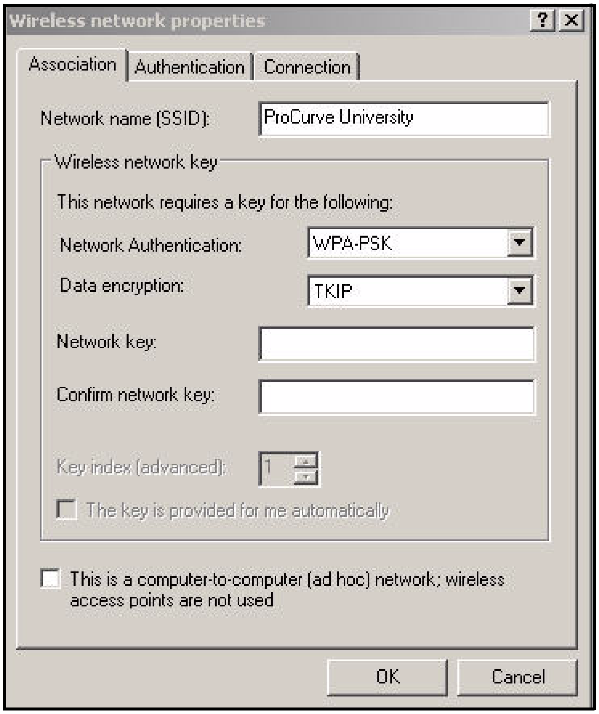
4. Click **Add**.

5. In the **Network name (SSID)** box, type the Service Set Identifier (SSID) for your WLAN. For example: **ProCurve University**.

6. For **Network Authentication**, select **WPA-PSK.**

7. Select the **Data encryption** option. The options available depend on the Network Authentication option you selected. For the example network, you would select **TKIP** or **AES**, if your wireless NIC supports it.

8. Type and re-type the network key.



Network name (SSID): ProCurve University

Wireless network key

This network requires a key for the following:

Network Authentication: WPA-PSK

Data encryption: TKIP

Network key:

Confirm network key:

Key index (advanced): 1

□ The key is provided for me automatically

□ This is a computer-to-computer (ad hoc) network; wireless access points are not used

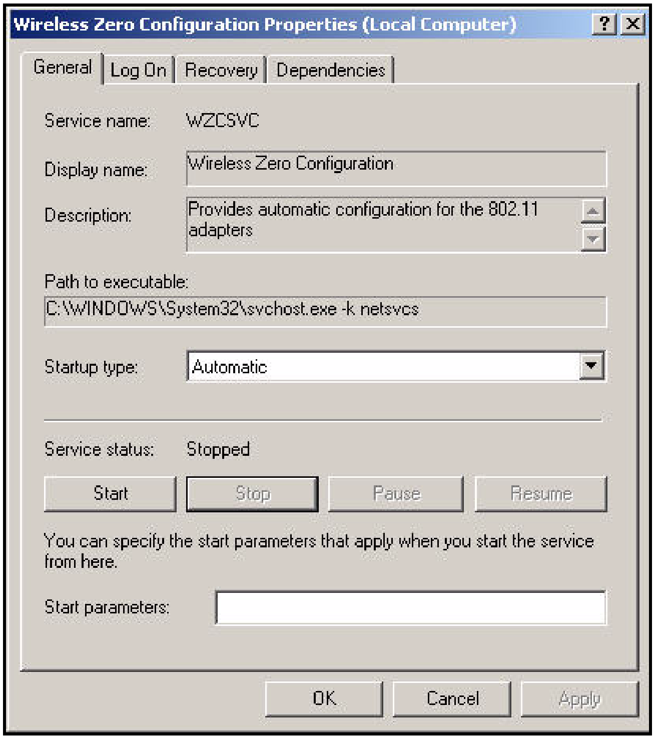
Figure 6-26. Wireless Network Connection Status— Wireless network properties Window— Association Tab

9. Click **OK**.

Enable WZC. Typically, the WZC service starts automatically. However, sometimes a wireless card comes with a vendor client that disables WZC. You can use the vendor client or re-enable WZC.

If you choose to re-enable WZC, follow these steps:

1. In the **Start** menu, select **Control Panel**.
2. Select **Administrative Tools** > **Services**.
3. Scroll to and double-click the WZC service.



Service name: WZCSVC

Display name: Wireless Zero Configuration

Description: Provides automatic configuration for the 802.11 adapters

Path to executable:
C:\WINDOWS\System32\svchost.exe -k netsvcs

Startup type: Automatic

Service status: Stopped

You can specify the start parameters that apply when you start the service from here.

Start parameters:

Figure 6-27. Wireless Zero Configuration Properties Window—General Tab

4. For the **Startup type**, select **Automatic**.
5. Click **Start**.
6. Click **OK**.

Appendix A: Using IDM with eDirectory

Contents

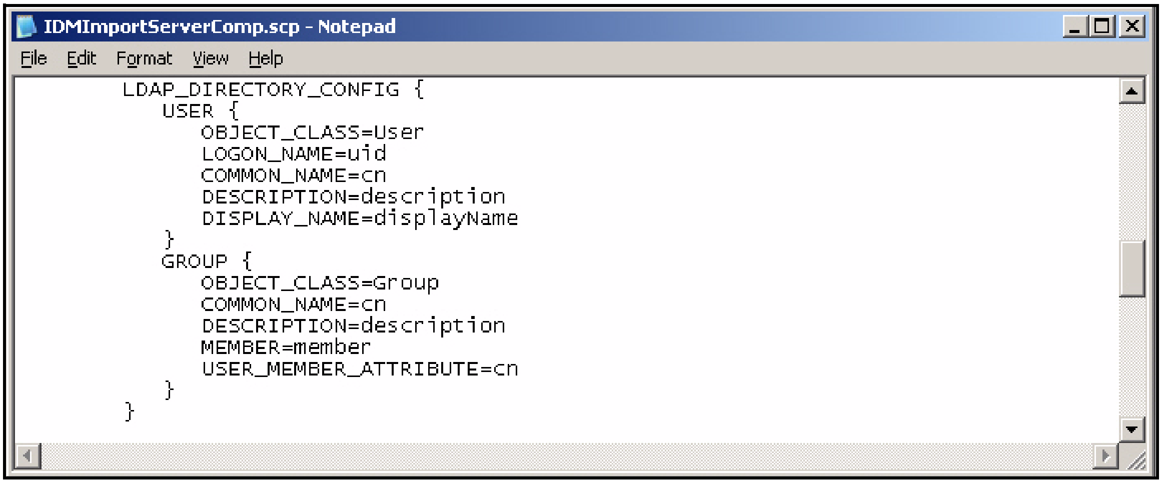
Synchronize IDM and Novell eDirectory

If you are using the ProCurve Network Access Controller (NAC) 800 in an 802.1X deployment and you want to use Novell eDirectory as the datastore for authentication and ProCurve Identity Manager (IDM) to manage access, you will need to bind eDirectory to IDM.

Modify the IDMImportServerComp.scp File

To import user accounts from eDirectory, you will need to modify the LDAP directory settings in **~Program Files\Hewlett-Packard\PNM\server\config\IDMImportServerComp.scp** on the server that runs IDM.

1. Open the file **IDMImportServerComp.scp** in a text editor.



```
        LDAP_DIRECTORY_CONFIG {
           USER {
              OBJECT_CLASS=User
              LOGON_NAME=uid
              COMMON_NAME=cn
              DESCRIPTION=description
              DISPLAY_NAME=displayName
           }
           GROUP {
              OBJECT_CLASS=Group
              COMMON_NAME=cn
              DESCRIPTION=description
              MEMBER=member
              USER_MEMBER_ATTRIBUTE=cn
           }
        }
```

Figure A-1. IDMImportServerComp.scp file

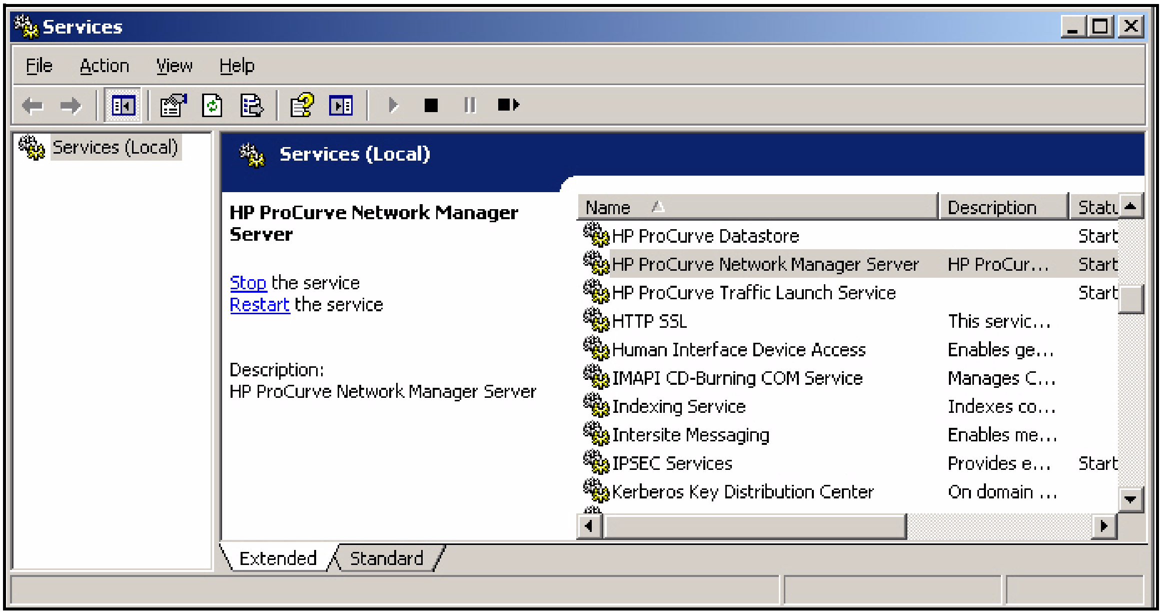
2. Scroll down to the LDAP_DIRECTORY_CONFIG section.
3. Change the LOGON_NAME line as follows:

   `LOGON_NAME=uid`

4. Save and close the file.

5. Restart PCM+.

   a. Select **Start > Administrative Tools > Services**.



HP ProCurve Network Manager Server

Stop the service
Restart the service

Description:
HP ProCurve Network Manager Server

Name	Description	Statu
HP ProCurve Datastore		Start
HP ProCurve Network Manager Server	HP ProCur...	Start
HP ProCurve Traffic Launch Service		Start
HTTP SSL	This servic...	
Human Interface Device Access	Enables ge...	
IMAPI CD-Burning COM Service	Manages C...	
Indexing Service	Indexes co...	
Intersite Messaging	Enables me...	
IPSEC Services	Provides e...	Start
Kerberos Key Distribution Center	On domain ...	

Figure A-2. Start > Administrative Tools > Services

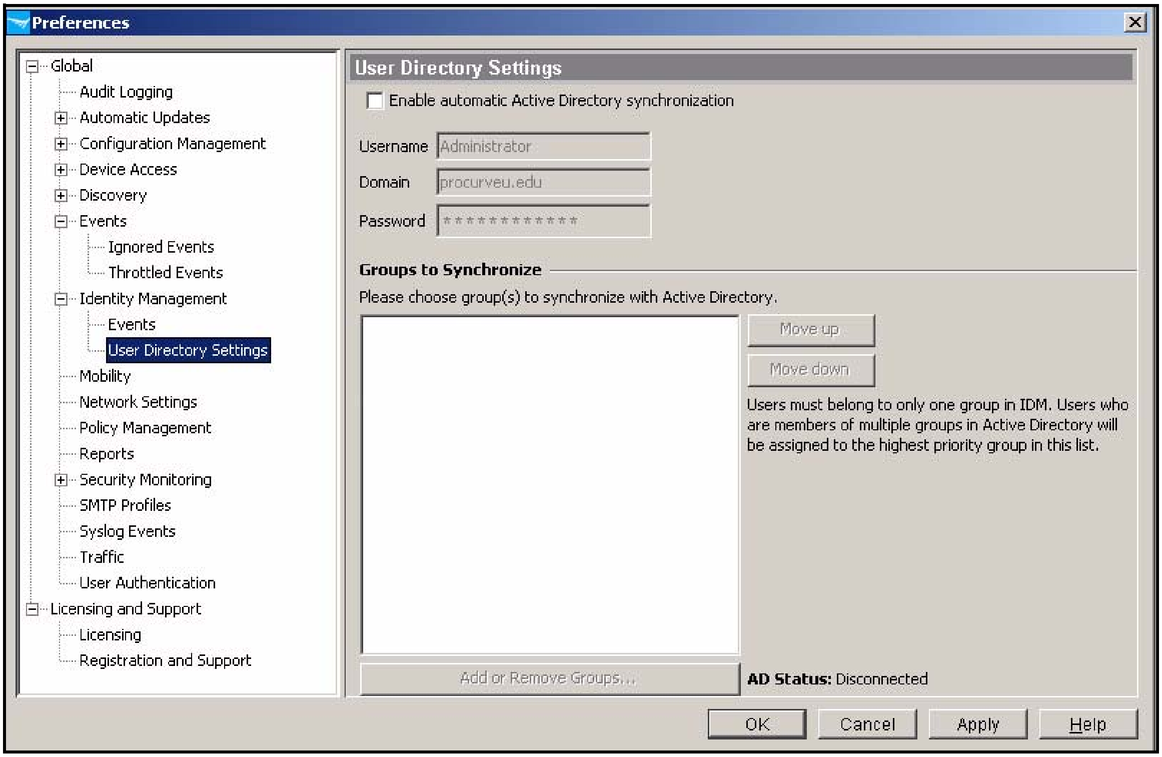
   b. Scroll down to **HP ProCurve Network Manager Server**.

   c. Click **Restart the service**.

Disable Active Directory Synchronization

If Active Directory synchronization has been enabled on IDM, you must disable it before you can import eDirectory users.

1. In the PCM+ console, select **Tools > Preferences**.



User Directory Settings

□ Enable automatic Active Directory synchronization

Username: Administrator

Domain: procurveu.edu

Password: ************

Groups to Synchronize

Please choose group(s) to synchronize with Active Directory.

Users must belong to only one group in IDM. Users who are members of multiple groups in Active Directory will be assigned to the highest priority group in this list.

AD Status: Disconnected

Figure A-3.

2. Expand **Identity Management** and select **User Directory Settings**.
3. Clear the **Enable automatic Active Directory synchronization** check box.
4. Click **OK**.

Import eDirectory Users

Follow these steps to synchronize IDM with eDirectory:

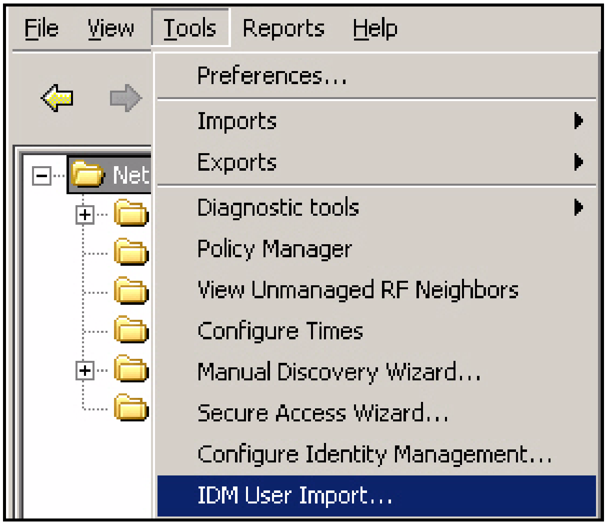
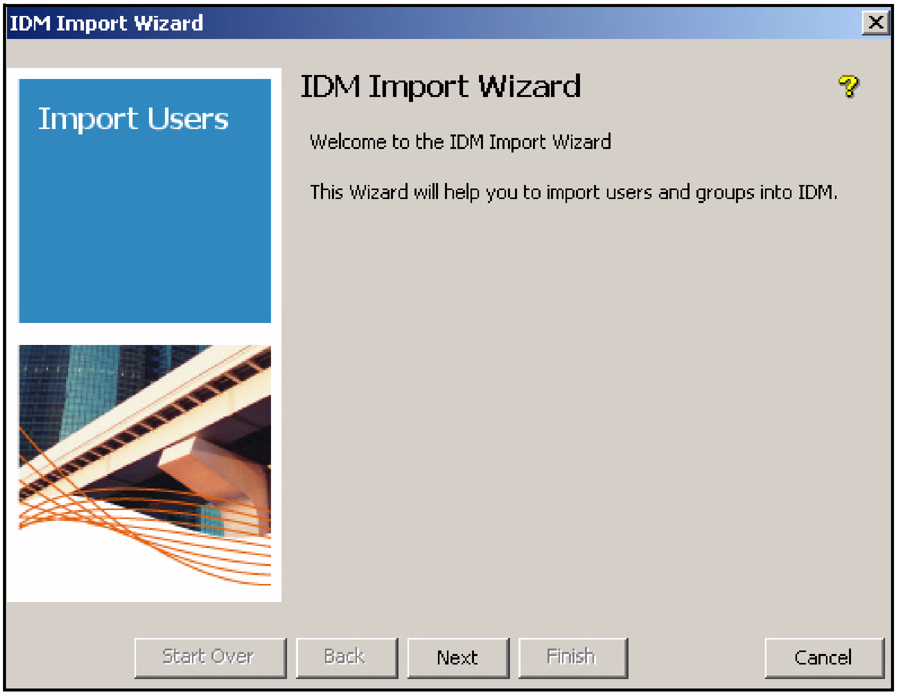


Figure A-4. Tools > IDM User Import

1. In the PCM+ interface, select **Tools > IDM User Import**.
2. The **IDM User Import** wizard opens.



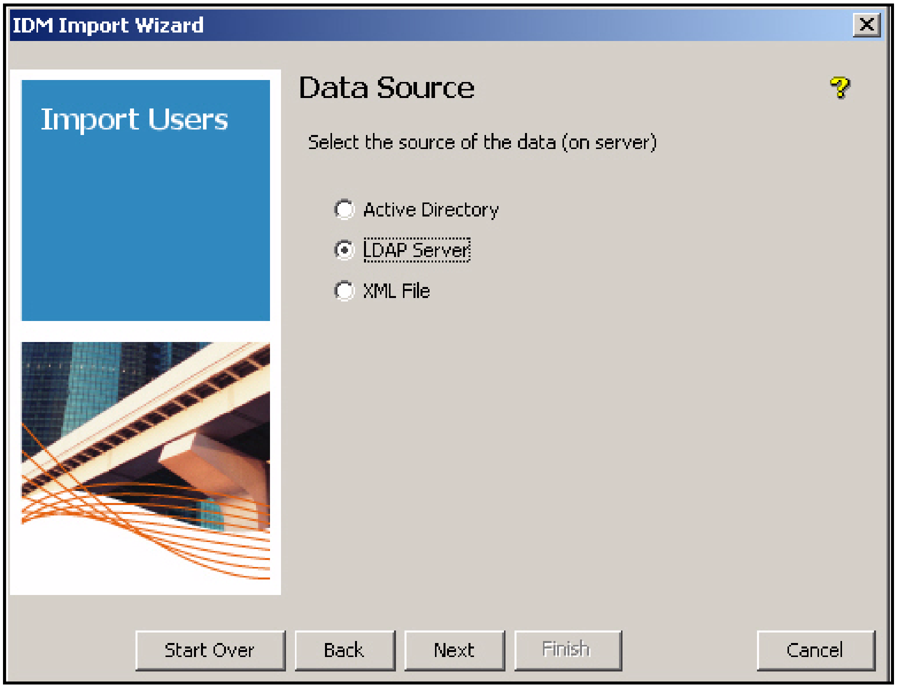
IDM Import Wizard

Welcome to the IDM Import Wizard

This Wizard will help you to import users and groups into IDM.

Figure A-5. IDM Import Wizard—Welcome Page

3. Click **Next**.



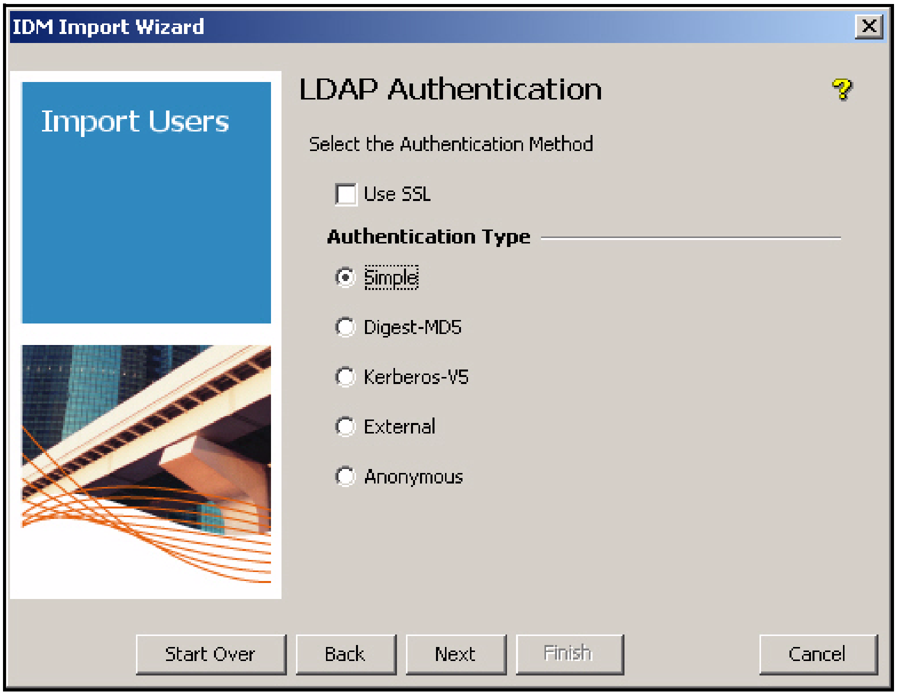
Data Source

Select the source of the data (on server)

○ Active Directory
● LDAP Server
○ XML File

Figure A-6. IDM Import Wizard—Data Source Page

4. On the **Data Source** page, select **LDAP Server** and click **Next**.



IDM Import Wizard

Import Users

LDAP Authentication

Select the Authentication Method

☐ Use SSL

Authentication Type

● Simple

○ Digest-MD5

○ Kerberos-V5

○ External

○ Anonymous

Figure A-7. IDM Import Wizard—LDAP Authentication Page

5. On the **LDAP Authentication** page, select the type of authentication that you have configured for your NetWare server.

Table A-1. Authentication Methods

Authentication	Description
Simple	Not very secure, it sends the eDirectory the fully qualified DN of the client (user) and the client's clear-text password.
Digest-MD5	The server generates a challenge and the client responds with a shared secret (password).
Kerberos-V5	Used with either a password or a smart card for interactive logon.
External-TLS	Uses authentication services provided by lower-level network services such as TLS.
Anonymous	No authentication is required by eDirectory server.

The authentication details will vary based on the authentication type selected. See the sections below for details.

Using SSL

To use SSL, ensure that the X.509 certificate for your eDirectory server is installed in your Java trust store on the server that runs PCM.

1. Put the certificate somewhere on the PCM server.

2. If PCM is installed under **Program Files\Hewlett-Packard**, for example, type the following in the command interface:

   ```
   C:> cd c:\Program Files\Hewlett-Packard\PNM\jre\lib
   \security
   ```

3. Type the following:

Syntax: ..\..\bin\keytool -import -file <ldapcertfile> -alias myldapcert -keystore cacerts -keypass <certificatepassword> -trustcacerts -storepass <keystorepassword>

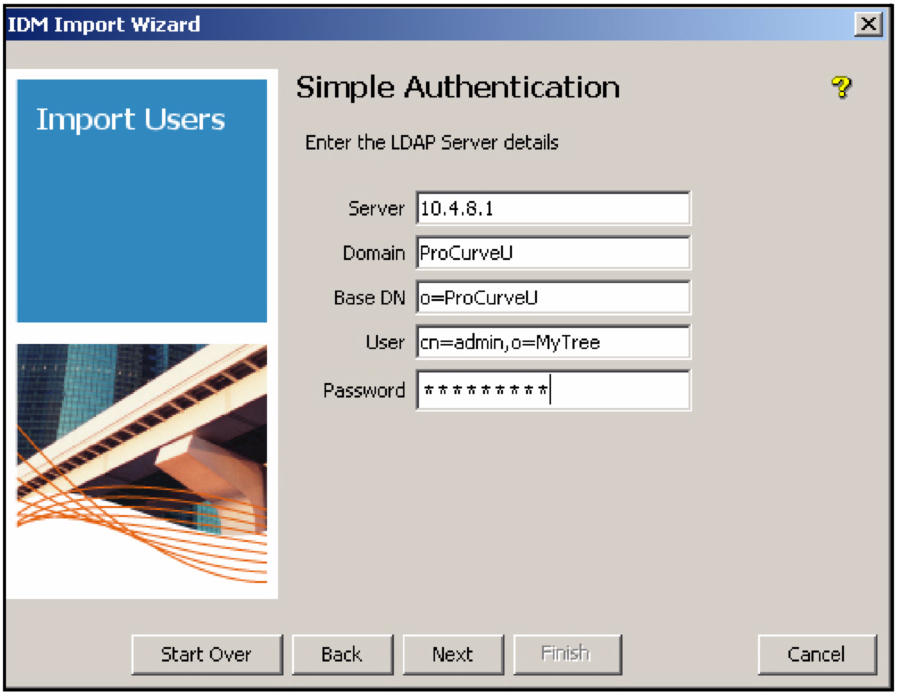
Installs the certificate in the Java trust store.

Replace **<ldapcertfile>** *with the path and filename of the eDirectory certificate, replace* **<certificatepassword>** *with the certificate's password, if any, and replace* **<keystorepassword>** *with the password for the keystore (default:* ***changeit****).*

4. Restart the PCM server before attempting to synchronize IDM with eDirectory.

Using Simple Authentication

If you choose simple authentication, complete the page as shown below:



Simple Authentication

Enter the LDAP Server details

Server 10.4.8.1

Domain ProCurveU

Base DN o=ProCurveU

User cn=admin,o=MyTree

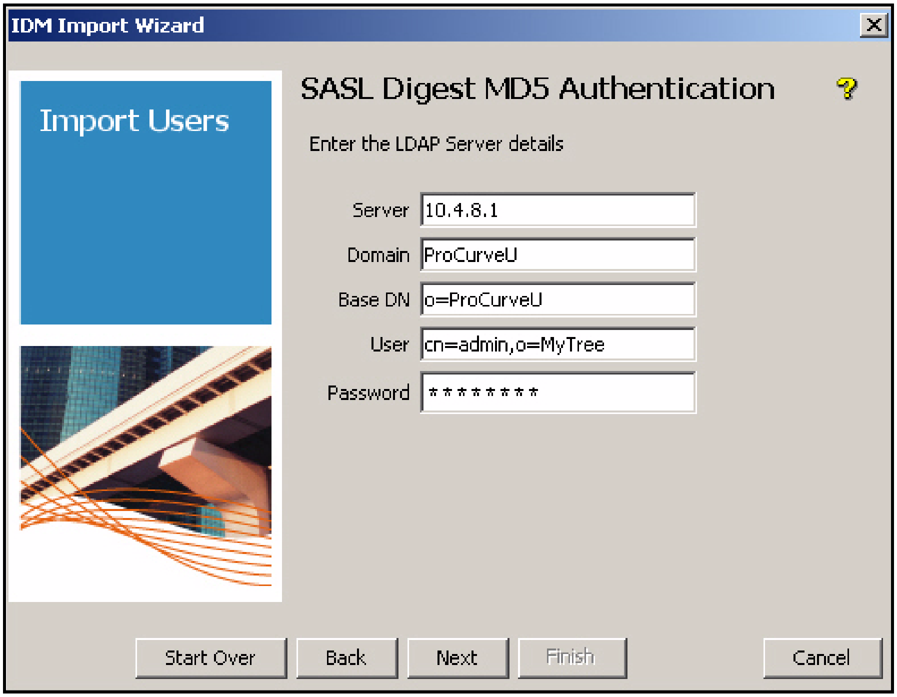
Password *********

Figure A-8. IDM Import Wizard—Simple Authentication Page

1. In the **Server** box, type the IP address of the NetWare server that hosts eDirectory.
2. In the **Domain** box, type a name that you have chosen for the IDM realm into which you will import the users.
3. In the **Base DN** box, type the distinguished name of the container in which you want IDM to begin to look to import users.
4. In the **User** box, type the distinguished name for the root admin account.
5. In the **Password** box, type the password for the user that you designated in the **User** box.
6. Click **Next** and go to page A-15.

Using Digest-MD5 Authentication

In Digest-MD5, the server generates a challenge and the client responds with a shared secret (password).



IDM Import Wizard

SASL Digest MD5 Authentication

Enter the LDAP Server details

Server 10.4.8.1

Domain ProCurveU

Base DN o=ProCurveU

User cn=admin,o=MyTree

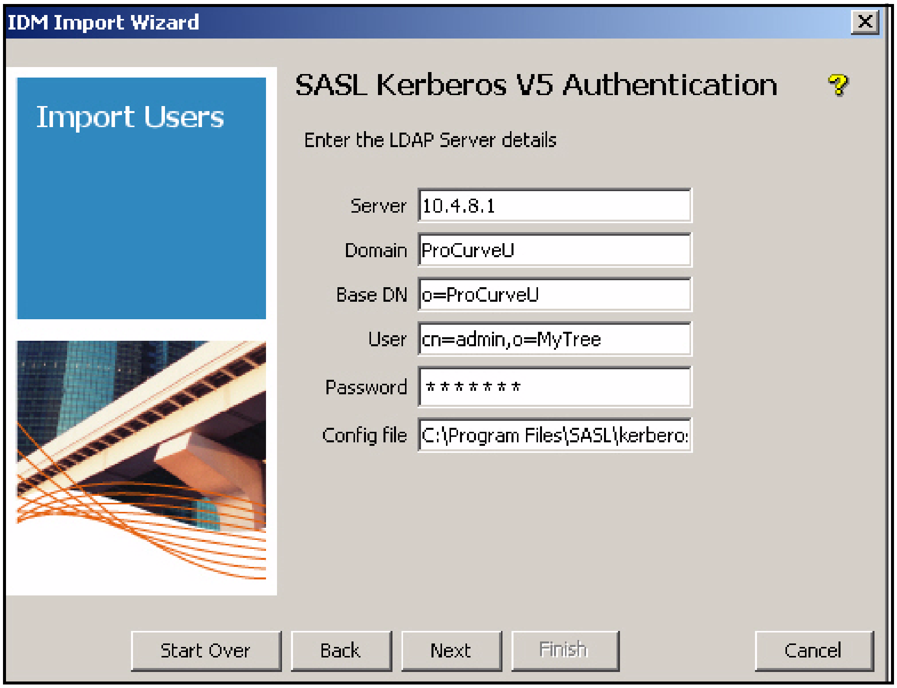
Password ********

Figure A-9. IDM Import Wizard—SASL Digest MD5 Authentication Page

1. In the **Server** box, type the IP address of the NetWare server that hosts eDirectory.
2. In the **Domain** box, type a name that you have chosen for the IDM realm into which you will import the users.
3. In the **Base DN** box, type the distinguished name of the container in which you want IDM to begin to look to import users.
4. In the **User** box, type the distinguished name for the root admin account.
5. In the **Password** box, type the password for the user that you designated in the **User** box.
6. Click **Next** and go to page A-15.

Using Kerberos-V5 Authentication

Kerberos-V5 authentication requires that your eDirectory server be set up with a key distribution center.



SASL Kerberos V5 Authentication

Enter the LDAP Server details

Server 10.4.8.1

Domain ProCurveU

Base DN o=ProCurveU

User cn=admin,o=MyTree

Password *******

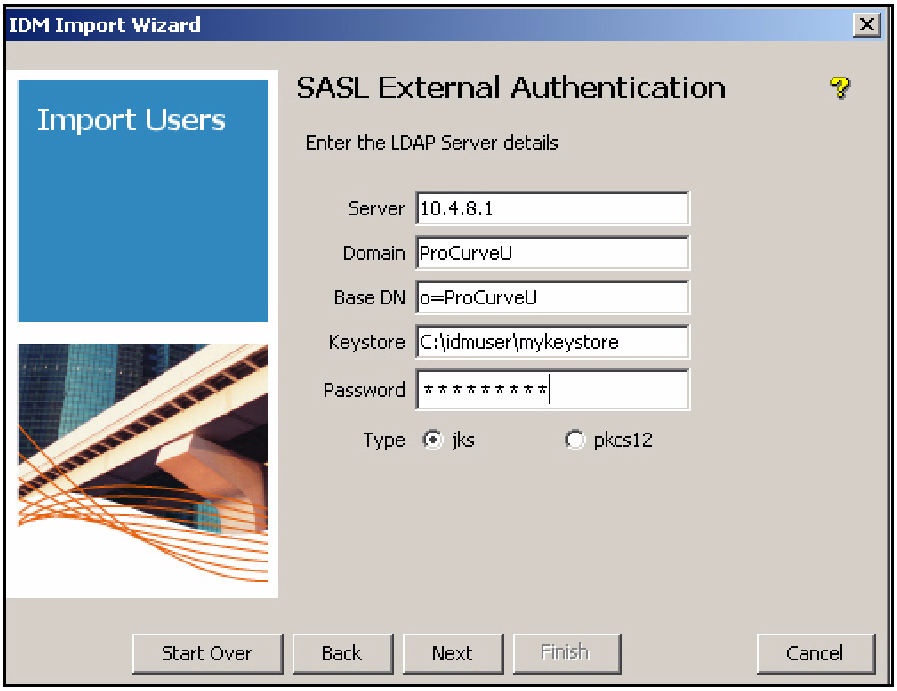
Config file C:\Program Files\SASL\kerbero:

Figure A-10. IDM Import Wizard—SASL Kerberos V5 Authentication Page

1. In the **Server** box, type the IP address of the NetWare server that hosts eDirectory.
2. In the **Domain** box, type a name that you have chosen for the IDM realm into which you will import the users.
3. In the **Base DN** box, type the distinguished name of the container in which you want IDM to begin to look to import users.
4. In the **User** box, type the distinguished name for the root admin account.
5. In the **Password** box, type the password for the user that you designated in the **User** box.
6. In the **Config file** box, type the complete path and filename of the configuration file that identifies the domain of the key distribution center.
7. Click **Next** and go to page A-15.

Using External Authentication

External authentication uses an X.509 certificate for user authentication. The LDAP X.509 user certificate must be installed in a keystore on the IDM server, and the LDAP server's certificate must be stored in the trust store under your JRE installation on the IDM server. To import X.509 certificates for use with IDM, see "Importing X.509 User Certificates into a Keystore" on page A-22.



IDM Import Wizard

SASL External Authentication

Enter the LDAP Server details

Server: 10.4.8.1

Domain: ProCurveU

Base DN: o=ProCurveU

Keystore: C:\idmuser\mykeystore

Password: *********

Type: ● jks ○ pkcs12

Figure A-11. IDM Import Wizard—SASL External Authentication Page

1. In the **Server** box, type the IP address of the NetWare server that hosts eDirectory.

2. In the **Domain** box, type a name that you have chosen for the IDM realm into which you will import the users.

3. In the **Base DN** box, type the distinguished name of the container in which you want IDM to begin to look to import users.

4. In the **Keystore** box, type the keystore file name:

   For JKS, the keystore is the location on the IDM server where you installed the keystore, for example: `c:\idmuser\mykeystore`

   For PKCS12, enter the PKCS certificate name in the **Keystore** box.

5. In the **Password** box, type the password:

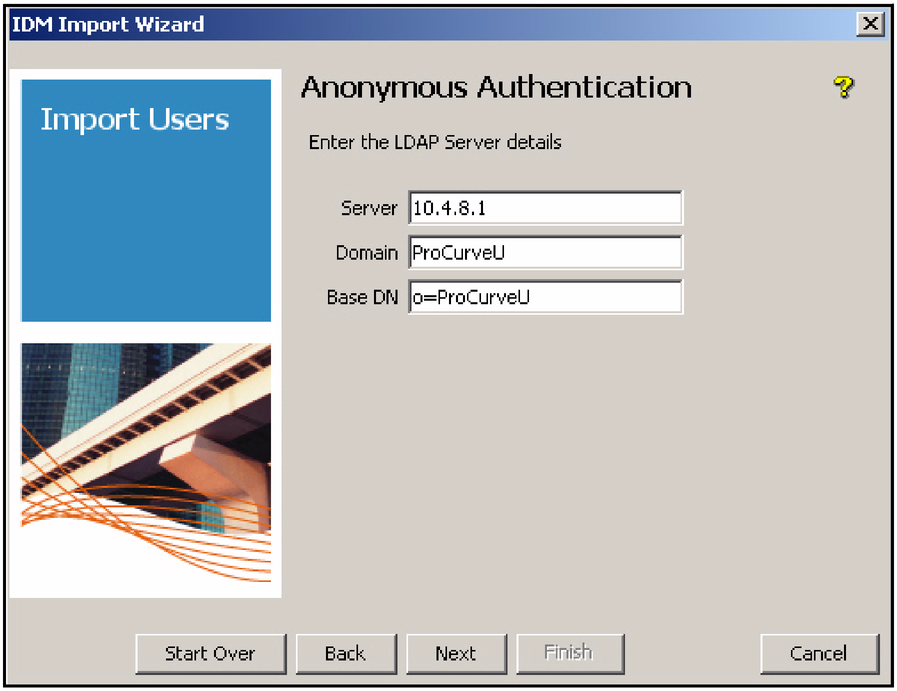
   For JKS, enter the password of the keystore on the IDM server.

   For PKCS12, enter the PKCS12 key in the **Password** box

6. For **Type**, select **jks** or **pkcs12**.

7. Click **Next** and go to page A-15.

Using Anonymous Authentication


IDM Import Wizard

Anonymous Authentication

Enter the LDAP Server details

Server 10.4.8.1

Domain ProCurveU

Base DN o=ProCurveU

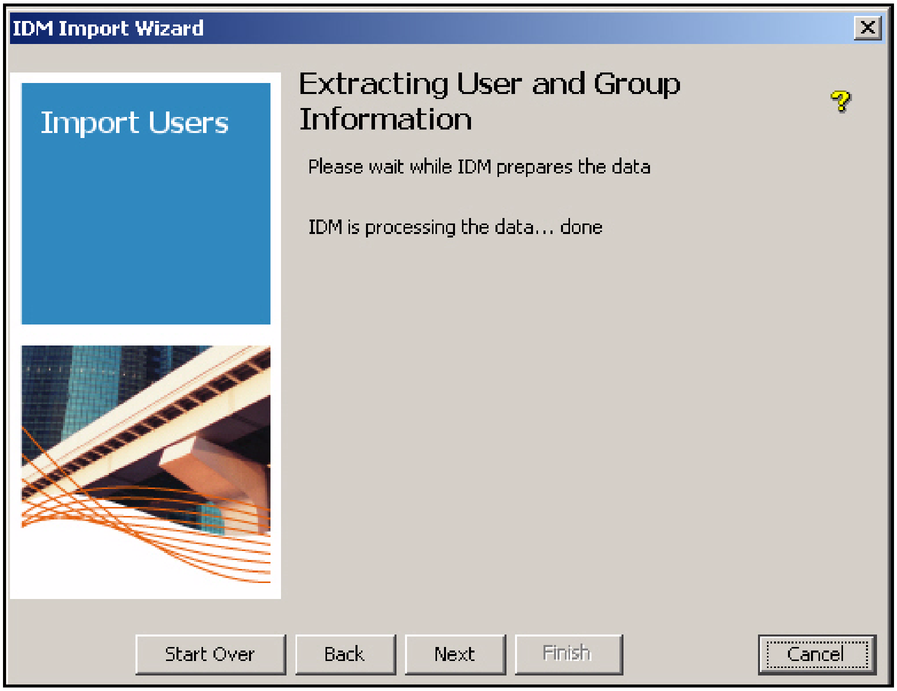
Figure A-12. IDM Import Wizard—Anonymous Authentication Page

1. In the **Server** box, type the IP address of the NetWare server that hosts eDirectory.

2. In the **Domain** box, type a name that you have chosen for the IDM realm into which you will import the users.

3. In the **Base DN** box, type the distinguished name of the container in which you want IDM to begin to look to import users.

4. Click **Next**.



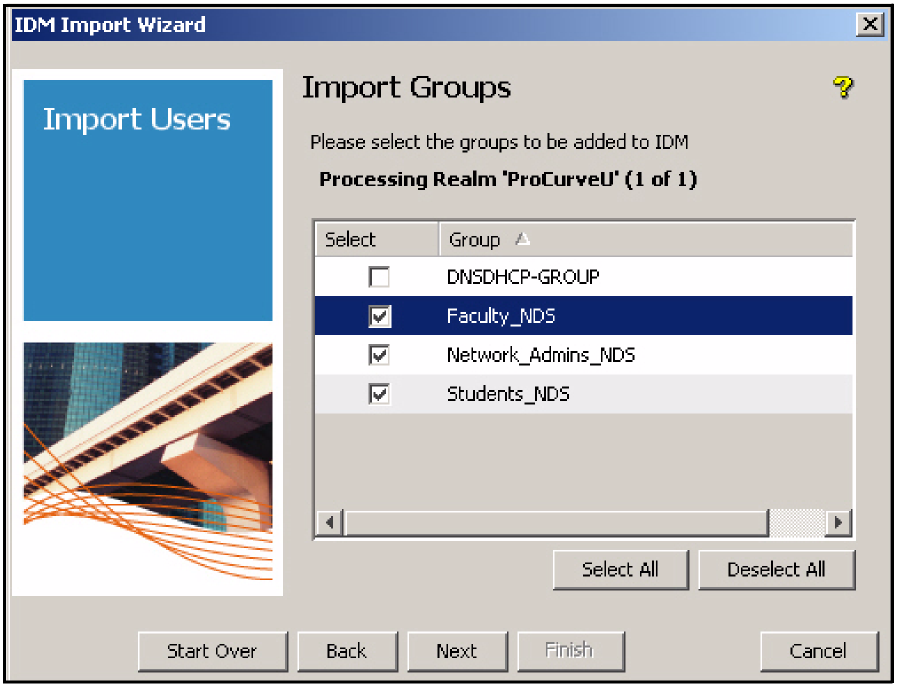
Extracting User and Group Information

Please wait while IDM prepares the data

IDM is processing the data… done

Figure A-13. IDM Import Wizard—Extracting User and Group Information Page

5. When the phrase "IDM is processing the data... done" appears, click **Next**.



IDM Import Wizard

Import Groups

Please select the groups to be added to IDM

Processing Realm 'ProCurveU' (1 of 1)

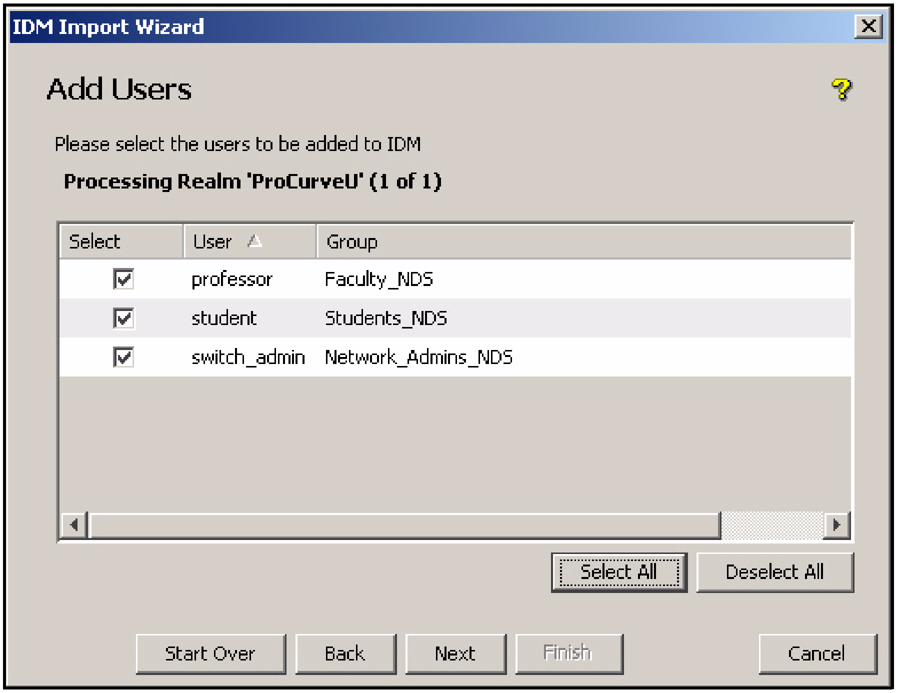
Select	Group
□	DNSDHCP-GROUP
☑	Faculty_NDS
☑	Network_Admins_NDS
☑	Students_NDS

Figure A-14. IDM Import Wizard—Import Groups Page

6. On the **Import Groups** page, select all of the groups that you want to import and click **Next**.

Note

It is not necessary to import the group DNSDHCP-GROUP.



IDM Import Wizard

Add Users

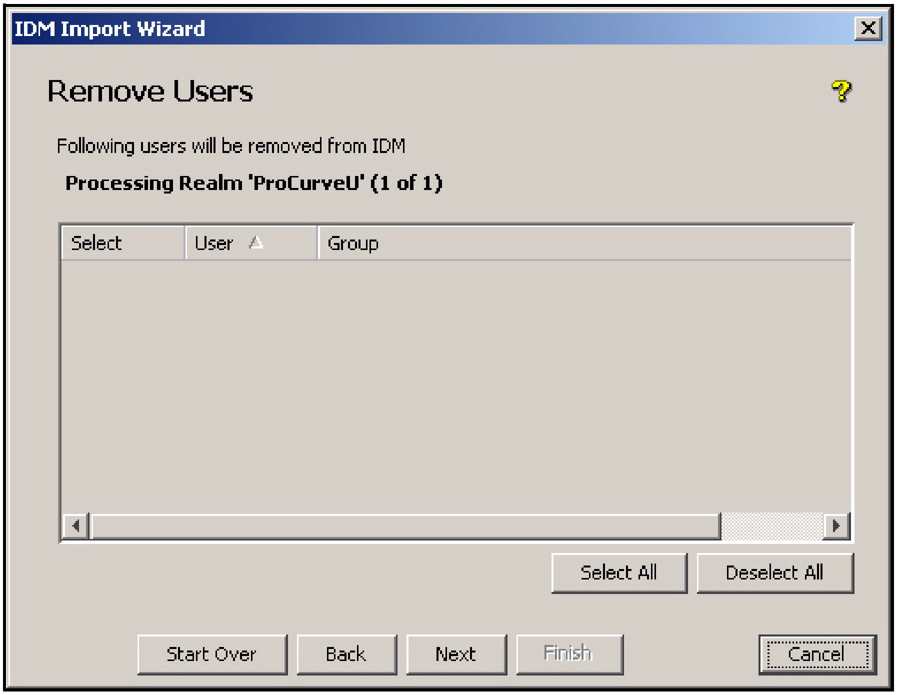
Please select the users to be added to IDM

Processing Realm 'ProCurveU' (1 of 1)

Select	User	Group
☑	professor	Faculty_NDS
☑	student	Students_NDS
☑	switch_admin	Network_Admins_NDS

Figure A-15. IDM Import Wizard—Add Users Page

7. On the **Add Users** page, click **Select All** and click **Next**.



Remove Users

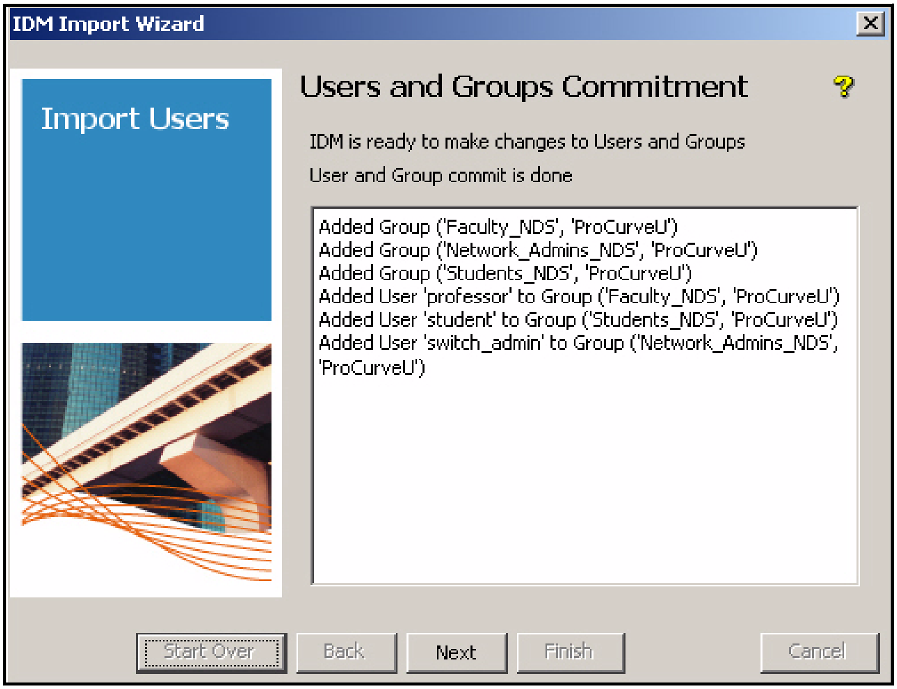
Following users will be removed from IDM

Processing Realm 'ProCurveU' (1 of 1)

Select	User	Group

Figure A-16. IDM Import Wizard—Remove Users Page

8. On the **Remove Users** page, click **Next**.



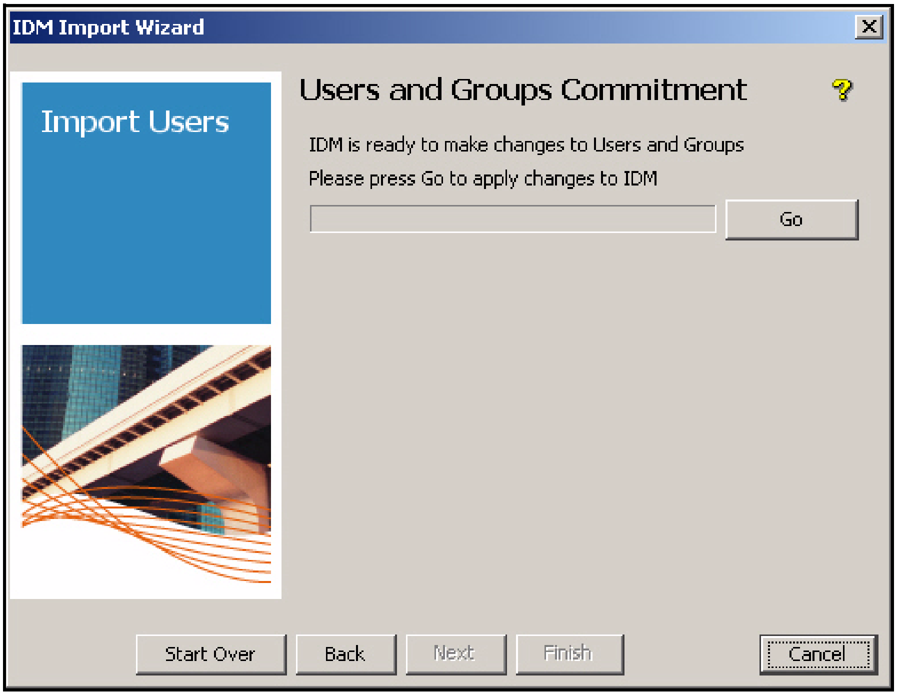
IDM is ready to make changes to Users and Groups

User and Group commit is done

```
Added Group ('Faculty_NDS', 'ProCurveU')
Added Group ('Network_Admins_NDS', 'ProCurveU')
Added Group ('Students_NDS', 'ProCurveU')
Added User 'professor' to Group ('Faculty_NDS', 'ProCurveU')
Added User 'student' to Group ('Students_NDS', 'ProCurveU')
Added User 'switch_admin' to Group ('Network_Admins_NDS',
'ProCurveU')
```

Figure A-17. IDM Import Wizard—Users and Groups Commitment Page

9. When the phrase “User and Group commit is done” appears, click **Next**.



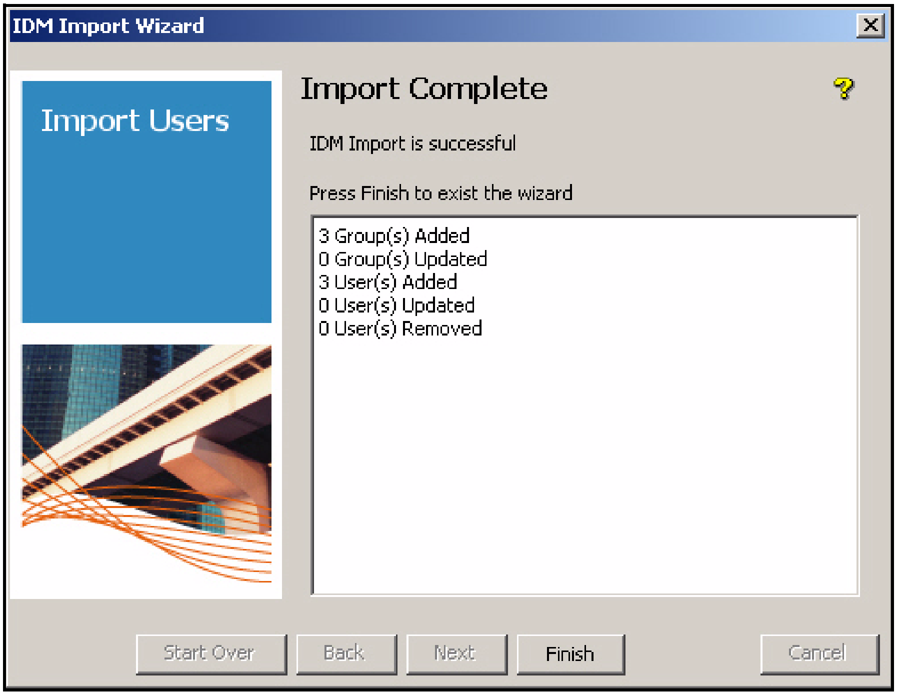
Users and Groups Commitment

IDM is ready to make changes to Users and Groups

Please press Go to apply changes to IDM

Figure A-18. IDM Import Wizard—Users and Groups Commitment Page

10. On the second **Users and Groups Commitment** page, click **Go**.



Import Complete

IDM Import is successful

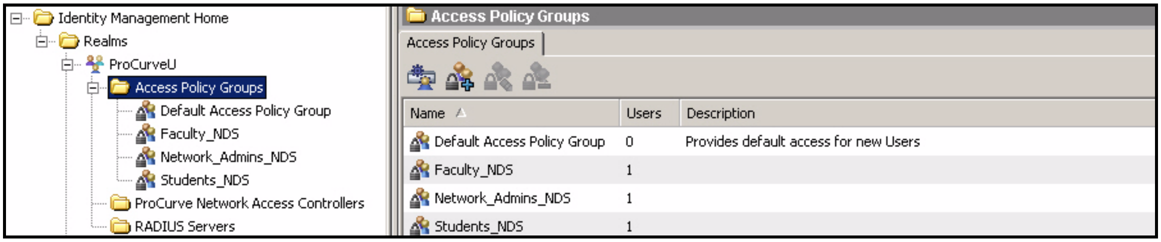
Press Finish to exist the wizard

```
3 Group(s) Added
0 Group(s) Updated
3 User(s) Added
0 User(s) Updated
0 User(s) Removed
```

Figure A-19. IDM Import Wizard—Import Complete Page

11. The **Import Complete** page shows you how many users and groups were imported. Click **Finish**.

12. Click the **Identity** tab in the left pane of the PDM+ interface.



Name	Users	Description
Default Access Policy Group	0	Provides default access for new Users
Faculty_NDS	1	
Network_Admins_NDS	1	
Students_NDS	1	

Figure A-20. PCM+ Console, IDM Interface—Realms > *<myrealm>* > Access Policy Groups

13. Expand **Realms > *<myrealm>* > Access Policy Groups**. You should see your user groups from eDirectory in the right pane along with the right number of users in each group.

Importing X.509 User Certificates into a Keystore

You can use SSL to secure the communications between the PCM+ server and the eDirectory server. If you are not the eDirectory administrator, contact the appropriate person. Ensure that your eDirectory server supports SSL and request the CA certificate that the eDirectory server is using. Then complete the following steps:

1. Copy the certificate to the PCM+ Java trust store. If PCM is installed under Program Files\Hewlett-Packard, the Java trust store is in the following directory:

   ```
   C:\Program files\Hewlett-Packard\PNM\jre\
   lib\security
   ```

2. Access the command prompt and move to this directory. Type:

Syntax:

```
C:> ..\..\bin\keytool -import -file <ldapcertfile>
-alias myldapcert -keystore cacerts -keypass <certificate_password> -
trustcacerts -storepass <keystore_password>
```

Replace ***<ldapcertfile>*** *with the name of the CA certificate on your eDirectory server.*

Replace ***<certificate_password>*** *with the password assigned to the CA certificate.*

Replace ***<keystore_password>*** *with the password assigned to the PCM+ keystore. The default keystore password is* ***changeit****.*

3. During the process of loading the certificate, PCM+ displays a prompt, asking you if you want to trust this certificate. Answer Yes.
4. Restart the PCM+ server.

Appendix B: Glossary

Numeric

3DES A version of **DES**, also called “Triple DES” (TDES), in which three encryption phases are applied. For more information, see NIST Special Publication 800-67 at *http://csrc.nist.gov/publications/nistpubs/800-67/SP800-67.pdf*.

802.11 The standard for wireless LANs. For more information, see IEEE 802.11 at *http://standards.ieee.org/getieee802/802.11.html* for all 802.11 standards.

802.11a A version of **802.11** that broadcasts at 5 GHz and provides a maximum speed of 54 Mbps.

802.11b A version of **802.11** that broadcasts at 2.4 GHz and provides a maximum speed of 11 Mbps.

802.11g A version of **802.11** that broadcasts at 2.4 GHz and provides a maximum speed of 54 Mbps.

802.1X A port-based **authentication** standard for 802.1. 802.1X forces **endpoints** to authenticate, establishing a point-to-point connection if authentication succeeds or blocking the connection if authentication fails. By basing authentication on secure **EAP** methods, 802.1X authentication can prevent eavesdroppers from reading intercepted messages. The 802.1X standard requires three components: the **supplicant**, which runs on the endpoint device; the **authenticator**, which is typically a switch or **AP**; and the **authentication server**, which is usually a **RADIUS server**. For more information, see IEEE 802.1X at *http://www.ieee802.org/1/pages/802.1x.html*.

802.1X deployment method The **deployment method** that corresponds to the **802.1X quarantine method**. In this method, the NAC 800 is connected to a switch via both its **Ethernet ports**. Port 1 receives **authentication** requests, and port 2 receives mirrored **DHCP** traffic. *See also* **DHCP deployment method** and **inline deployment method**.

802.1X quarantine method One of the NAC 800's three methods for quarantining **endpoints** that fail to comply with the **NAC policy**. This method draws on the **authentication** and authorization component of **802.1X**, assigning end-users to a **VLAN** based not just on identity but also on endpoint **integrity posture**. The NAC 800 can enforce 802.1X quarantining by working with an existing **RADIUS server** or by acting as a RADIUS server itself. *See also* **inline quarantine method** and **DHCP quarantine method**.

802.1X device The **authenticator** in the **802.1X** framework, which forwards **authentication** requests from **endpoints** to the NAC 800 that is acting as a **RADIUS server**. When enforcing endpoint integrity, the NAC 800 sends a **VLAN** assignment for an endpoint to the 802.1X device based on the endpoint's **integrity posture**; the 802.1X device enforces the assignment.

A

AAA *Authentication, Authorization, and Accounting.* Processes that are used to control network access and enforce security policies. For more information, see RFC 2989 at *http://www.ietf.org/rfc/rfc2989.txt*. *See also* **authentication**, **authorization**, and **accounting**.

access control The ability to determine which **endpoints** can access the network and the level of access they receive. Access can be controlled based on an endpoint's compliance with network standards, for example, or on other configurable settings.

access control status The label that the NAC 800 gives to an **endpoint** to define its ability to access the network. Access control status are further defined by the rule that produced the status.

access control zone A physical area of an organization that is defined by the way that users (public or private) will access the network (wired or wireless). For example, a foyer where non-employees access the network through a wireless connection is a public wireless zone, whereas the internal offices where employees use wired workstations is a private wired zone.

access method The way in which an endpoint connects to the network. Options include VPN, dial-up, wireless, or Ethernet.

access mode An option that controls whether NAC 800s in a particular **enforcement cluster** quarantine **endpoints** or allow them access to the network. Three settings are possible: **normal**, **allow all**, or **quarantine all**. **Normal** grants access to all endpoints that pass the NAC tests, **allow all** permits access to all endpoints regardless of test results, and **quarantine all** isolates all endpoints regardless of test results.

access point *See* **AP**.

accessible services Those services that are made available to quarantined **endpoints** so that they can perform **remediation**. Services include access to Web sites with service patch downloads or plug-ins. The network administrator can configure which services are available to **quarantined** endpoints.

accounting The process of collecting information about how resources are used. The collected information can then be used for trend analysis, billing, auditing, or regulatory compliance. The NAC 800 can provide **RADIUS** accounting services.

ACE *Access Control Entry.* A single rule that determines which endpoints or users can access a network resource. An **ACL** comprises a list of ACEs.

ACL *Access Control List*. A set of rules (**ACE**s) that network edge devices such as routers, switches, and wireless APs use to control access to network resources and to identify packets that require special handling such as **QoS** or **NAT**. An ACL can be configured to select packets according to values in their headers, such as IP protocol, source and destination IP address, and source and destination **TCP** or **UDP** ports.

Active Directory An **LDAP**-based directory service created by Microsoft that is included with all Microsoft network servers.

ActiveX A Microsoft technology that enables interactive Web content. An **endpoint** must accept ActiveX content from the NAC 800 to be tested via the ActiveX plug-in. For more information, see the Microsoft Developer Center library at *http://msdn2.microsoft.com/en-us/library/aa751968.aspx*.

ActiveX test method An **endpoint integrity**-testing method that relies on the ActiveX control operation of signed and safe controls. The NAC 800 uses ActiveX to download a temporary agent to the endpoint. All versions of the Windows operating system are supported, and no ports on an endpoint's personal Windows firewall need to be opened. As long as the firewall allows Internet Explorer access and Internet Explorer settings allow ActiveX, the endpoint can be tested. However, non-Internet Explorer browsers are not supported, and the endpoints cannot be retested after **end-users** close their browsers.

ADSL *Asymmetric Digital Subscriber Line.* A technology that permits the user to connect to an Internet service provider over the existing telephone infrastructure. Data is transmitted on unused frequencies that are not used in a voice telephone call.

AES *Advanced Encryption Standard.* The successor to **DES**, a block cipher that was adopted as an encryption standard. It is often used in **symmetric key** cryptology. The key length in bits is specified as AES-128, AES-192, and AES-256. For more information, see FIPS PUB 197 at *http://www.csrc.nist.gov/publications/fips/fips197/fips-197.pdf.*

agent *See* **NAC EI agent**.

agent testing method An endpoint integrity-testing method that employs the **NAC EI agent**, which is installed once onto the endpoint and periodically updated. This method is supported by Windows OS versions 98 and later and by Mac OSX 10.3.7 and later. The agent can be used through a firewall. *See also* **NAC EI agent**.

agentless test method A testing method that does not require that an agent be installed on the **endpoint**. Using the Windows **RPC** service, agentless testing allows the NAC 800 to begin testing, provide test results, and grant access to compliant endpoints without any interaction from the user. Of the three testing methods, agentless testing is the easiest to deploy, requiring less administrative effort and no memory on the endpoint. However, you cannot use this test method with legacy Windows operating systems (Windows 95, ME, and earlier) or non-Windows endpoints. Agentless testing requires that file and print sharing be enabled on the endpoint, that ports 137, 138, 139, and 445 be open on the endpoint's firewall, that the endpoint's browser security settings allow Java scripting, and that administrator credentials be known for the endpoint.

AH *Authentication Header.* A part of the **IPsec** protocol suite that guarantees connectionless integrity and data origin **authentication** of IP packets. For more information, see RFC 4302 at *http://tools.ietf.org/html/rfc4302. Also see* **ESP**.

allow all An **access mode** that permits all **endpoints** to access the network regardless of test results.

AMI *Alternate Mark Inversion.* A type of bipolar encoding that is used on T1 lines. *See also* **HDB3**.

AP *Access Point.* A network component that receives and sends **WLAN** signals to wireless network cards through its anntena(s). An AP is functionally equivalent to a switch.

ARP *Address Resolution Protocol.* A protocol that is used to map MAC addresses to IP addresses. For more information, see RFC 2390 at *http://tools.ietf.org/html/rfc2390*.

ARP protection Technology to prevent attackers from populating a device's **ARP** cache with unsolicited ARP replies that list the attacker's device as a subnet gateway.

authentication The process of confirming an **endpoint**'s or an end-user's identity before granting a network connection. Authentication can be implemented through the use of passwords, keys, or digital **certificates**. A **RADIUS** or **TACACS+** server can handle authentication for the entire network.

authentication protocols Protocols that allow the peers in a connection to verify each other's identity. In the **PPP** protocol suite, **authentication** protocols include **PAP**, **CHAP**, and **EAP**.

authentication server A server whose function it is to authenticate end-users and endpoints. In the **802.1X** framework, the component that decides whether to grant an end-user access.

authenticator The component of the **802.1X** framework that enforces **authentication** and **authorization**. When an **endpoint** connects to the authenticator, the authenticator forces it to authenticate to the network. The authenticator passes the endpoint's **supplicant** messages to the **authentication server** and enforces the decisions made by that server. These decisions include whether the endpoint is allowed any access at all as well as the level of access. Also called the **802.1X device** (in the NAC 800 Web browser interface) and **NAS** (in the RADIUS protocol). *See also* **802.1X device** and **NAS**.

authorization The process of controlling the network resources and services that an end-user can access, usually based on the end-user's identity; with the NAC 800, authorization is also based on **endpoint integrity**. A **RADIUS** or **TACACS+** server or a NAC 800 can act as an **authorization server**. Authorization is sometimes called "access control" although access control is properly broader than authorization alone.

authorization server A device to make **authorization** decisions that are enforced by other infrastructure devices.

C

CA *Certificate Authority.* A trusted third party that verifies the identity of parties that want to communicate with one another. CAs are responsible for generating, distributing, and revoking digital authentication **certificate**s, which uniquely identify the owner of the certificate and the owner's data. *See also* **certificate**.

CBC *Cipher Block Chaining.* A block cipher mode of operation wherein the previous encrypted block is used to transform the next block, prior to its encryption. For more information, see NIST Special Publication 800-38A at *http://csrc.nist.gov/publications/nistpubs/800-38a/sp800-38a.pdf.*

certificate An electronic document that contains a **public key** and is digitally signed by a third-party issuer such as a **CA**. Digital certificates are used for network **authentication**. They contain the certificate holder's name or other identifying information, a serial number, the expiration date, and a copy of the certificate holder's public key, which validates data signed by the corresponding **private key**.

certificate authority *See* **CA**.

CHAP *Challenge Handshake Authentication Protocol.* An **authentication** protocol that is supported by **PPP** and also incorporated in **RADIUS**. With **CHAP**, the authenticator sends the client a "challenge" text. The client creates a **hash** value from its pre-shared password and the text. The authenticator also creates a hash value from the same text. The authenticator compares the hash values. If they match, authentication succeeds and the link is established. For more information, see RFC 2759 at *http://www.ietf.org/rfc/rfc2759.txt.*

CIDR *Classless Inter-Domain Routing.* A method of interpreting IP addresses that allows for blocks of addresses to appear in a single routing table entry. For example, 10.2.0.40 /24 indicates a 24-bit subnet mask, or 255.255.255.0. For more information, see RFC 1518 at *http://tools.ietf.org/html/rfc1518.*

CLI *Command-Line Interface.* An interface that requires that the user manually type commands at a command prompt, one line at a time.

cluster *See* **enforcement cluster**.

combination server *See* **CS**.

community name In **SNMP**, a **shared secret** that is used for the **authentication** of SNMP clients.

credentials A username and its corresponding password.

CRL *Certificate Revocation List.* In **PKI**, a list of **certificate**s that are no longer valid or that have been revoked. For more information, see RFC 3280 *at http://tools.ietf.org/html/rfc3280.*

crypto commands In ProCurve routers, a set of commands that manage encryption functions.

crypto map In ProCurve routers, something that binds the assorted crypto parameters with a specific remote gateway.

CS *Combination Server*. A NAC 800 that functions as both an **ES** and an **MS** and acts as a stand-alone device.

CSR *Certificate Signing Request*. In **PKI** systems, a request for a digital **certificate** that is sent to a **CA** by an applicant.

D

Data Encryption Standard *See* **DES**.

data store The location where an **endpoint**'s **credentials** are stored. Possible data stores are: a local database of users, a Windows **domain controller** that runs **AD**, an **LDAP** server such as **OpenLDAP** or Novell **eDirectory**, or another **RADIUS** server (accessed via proxy requests).

deployment method Sometimes called "deployment option," the way in which the NAC 800 is connected to the LAN relative to other components such as routers, switches, **DHCP** servers, and the Internet. The deployment method is determined by the **quarantine method** and the **access method** that the network will employ. The NAC 800 supports three deployment methods: **802.1X deployment**, **inline deployment**, and **DHCP deployment**.

DER *Distinguished Encoding Rules*. A method for encoding data objects. For more information, see ITU-T X.690 at *http://www.itu.int/ITU-T/studygroups/com17/languages/X.690-0207.pdf*.

DES *Data Encryption Standard*. A published encryption algorithm that uses a 56-bit **symmetric** key to encrypt data in 64-bit blocks. **IPSec**, the industry standard for **VPN**s, supports **3DES**. For more information, see FIPS PUB 46-3 at *http://csrc.nist.gov/publications/fips/fips46-3/fips46-3.pdf*.

DHCP *Dynamic Host Configuration Protocol*. A protocol that allows network administrators to set up a server to manage IP addresses, automatically assigning IP addresses to devices on the network. DHCP simplifies IP management, eliminating the need to manually assign IP addresses to devices and then track those addresses. For more information, see RFC 2131 at *http://www.ietf.org/rfc/rfc2131.txt*.

DHCP deployment method A **deployment method** for networks that are not **802.1X** compatible. In this method, the NAC 800 is placed between a switch and a **DHCP** server and intercepts DHCP requests from non-tested or non-compliant endpoints. *See also* **DHCP quarantine method**.

DHCP enforcement An option to configure when employing the **DCHP quarantine method**. The NAC 800 can either examine, and possible intercept, all **DHCP** requests or only those requests forwarded by particular devices.

DHCP quarantine method A **quarantine method** that gives non-compliant **endpoints** an IP address in a quarantine subnet, where they have access only to **remediation** services.

DHCP quarantine option An option that determines how endpoints in the quarantine subnet are controlled when employing the **DCHP quarantine method**. Options are **static routes** and **router ACLs**.

DHCP snooping A security feature that differentiates between trusted and untrusted ports, builds and maintains a DHCP snooping table, and filters DHCP requests received on an untrusted port.

Diffie-Hellman key exchange A cryptographic protocol that was developed by Whitfield Diffie and Martin Hellman in 1976, which allows two devices that have no prior knowledge of each other to establish a shared **key** over a non-secure communications channel. For more information, see RFC 2631 at *http://tools.ietf.org/html/rfc2631*.

digital certificate *See* **certificate**.

distinguished name *See* **DN**.

DN *Distinguished Name*. In **LDAP**, a unique identifier for each object in a **domain**, such as servers, printers, and end-user accounts. The format requires that each subdomain to which the object belongs be identified, for example, DC=engineering, DC=ProCurveU, DC=com, O=UNIX, OU=BSD4.

DNS *Domain Name System*. A service that associates Internet **domain** names (such as www.abccompany.com) with their corresponding IP addresses.

domain In **LDAP**, a logical grouping of devices that allows the network administrator to manage all of the objects in a domain at the same time, for example, to control who has access to the objects in the domain. Also, the name of a virtual host on the Internet, designated with a name and a suffix: procurveu.edu.

domain controller A Microsoft Windows server that controls activities such as end-user access in an **LDAP domain**.

domain name system *See* **DNS**.

DSA *Digital Signature Algorithm*. A standard for digital signatures that is part of the **DSS**. For more information, see FIPS PUB 186-2 at *http://csrc.nist.gov/publications/fips/fips186-2/fips186-2-change1.pdf*.

DSS *Digital Signature Standard*. A method for key generation, signing, and verifying. For more information, see FIPS PUB 186-2 at *http://csrc.nist.gov/publications/fips/fips186-2/fips186-2-change1.pdf*.

Dynamic Host Configuration Protocol *See* **DHCP**.

E

EAP *Extensible Authentication Protocol*. A protocol that allows **PPP** to use **authentication** protocols that are not part of the PPP suite. For more information, see RFC 3748 at *http://www.ietf.org/rfc/rfc3748.txt*. *See also* **CHAP** and **PAP**

EAP-TLS ***EAP** with **TLS***. An implementation of EAP that provides mutual **certificate authentication** between client and server. For more information, see RFC 2716 at *http://tools.ietf.org/html/rfc2716*.

eDirectory An **LDAP**-based directory service from Novell that can interoperate with NetWare, AIX, HP-UX, Solaris, Windows, and Linux-based network servers.

EI *See* **endpoint integrity**.

endpoint A device that connects to a network, such as a desktop computer, a laptop computer, or a server.

endpoint integrity The functionality that examines all **endpoint**s that attempt to attach to the network and prohibits unsafe or non-compliant endpoints from gaining access. Endpoint integrity ensures that an endpoint that attaches to the edge of the network is clean and meets configured criteria (antivirus program present and running with current signatures, for example) before allowing it to access network resources.

end-user screen NAC 800 message windows that appear on the end-user's monitor; they show information such as the endpoint's **test status** and **remediation** steps, permitting the user to download an agent, cancel testing, and get more information about why a test failed.

enforcement cluster A logical group of one or more **ES**s that are controlled by an **MS**. Each cluster can support only one **deployment method**, but an **MS** can control multiple **ES**s, each supporting a different deployment method.

enforcement server *See* **ES**.

ES *Enforcement Server.* In a multiple-NAC 800 installation, the ES applies the **NAC policies** that are defined on the **MS** and enforces quarantining.

ESP *Encapsulating Security Protocol.* A part of the **IPsec** protocol suite that provides confidentiality protection, origin authenticity, and integrity for packets. For more information, see RFC 4303 at *http://tools.ietf.org/html/rfc4303*. *See also* **AH**.

Ethernet ports On the NAC 800, port 1 connects to the LAN and provides inband management. The use of port 2 varies, depending on the deployment method. For the **inline deployment method**, port 2 might connect to a **VPN** or **RAS**. For the **DCHP deployment method**, port 2 connects to a **DHCP** server. For the **802.1X development method**, port 2 connects to a port configured to mirror the **DHCP server** connection.

exception A rule that exempts a particular **endpoint** or group of endpoints from testing. You can specify that the excepted endpoints be either always or never granted access.

Extensible Authentication Protocol *See* **EAP**.

F

FR *Full Rate.* A digital speech encoding standard used in **GSM** phones.

FQDN *Fully Qualified Domain Name.* In **DNS**, an unambiguous, unique name for an object that designates exactly where an object belongs in the DNS tree, for example: **engineering.ProCurveU.com.**

H

hash A number generated by running a string of text through an algorithm. The hash is substantially smaller than the text itself and is unique, because algorithms transform data in such a way that it is extremely unlikely that some other text will produce the same hash value. The hash is also irreversible: the encryption cannot be reversed to obtain the original text.

HDB3 *High-Density Bipolar of order 3 code*. A telecommunications line code used mainly in Australia, Europe, and Japan. It is similar to **AMI**.

headless A device that does not have a user interface that accepts credentials, such as a printer or fax machine.

HMAC *keyed-Hash* ***MAC***. A type of MAC that is calculated with a hash function and a secret key. It can be used to verify both data integrity and authenticity. For more information, see RFCs 2104 and 2202 at *http://tools.ietf.org/html*.

I

IANA *Internet Assigned Numbers Authority.* An organization whose purpose is to assign IP addresses, manage **DNS** root zones, and make other IP assignments.

IAS *Internet Authentication Services*. The Microsoft implementation of **RADIUS**.

ICMP *Internet Control Message Protocol*. Part of the core IP suite, a service used to tell networked computers whether a particular service is available. For more information, see RFC 792 at *http://tools.ietf.org/html/rfc792*.

IDM *Identity Driven Manager.* A ProCurve networking application that provides management of user-based profiles (including **ACL**s, **QoS** settings, and rate limits). IDM assigns various profiles to end-users based on their identity (community), access time, access location, and endpoint integrity posture.

IE Microsoft's *Internet Explorer* browser.

IIS *Internet Information Services*. A Microsoft Windows-based Web server.

IKE *Internet Key Exchange*. A protocol that is used to set up an **SA** in the **IPsec** protocol suite.

inline deployment method The NAC 800 is placed between a "choke point" and the rest of the network such that all traffic to be quarantined passes through the NAC 800. *See also* **inline quarantine method**.

inline quarantine method A **quarantine method** that relies on the NAC 800's placement in the network. The NAC 800 functions as a layer-2 bridge that imposes a firewall between its **Ethernet port** 1 and port 2. Only traffic from **endpoints** whose **integrity posture** is "Healthy" or "Check-Up" can pass through the NAC 800.

integrity posture The state of an **endpoint** in terms of its compliance with **NAC policies**. The integrity posture is used to determine an endpoint's **access control state** along with other factors such as an **exception**, **access grace period**, and **access mode**. *See* Appendix C, "Integrity Postures."

inter-station blocking see p. 4-59 of ProCurve WLAN system. xxx

IPsec *Internet Protocol security.* A suite of protocols that are used to establish a **VPN** tunnel between devices that communicate over the Internet, thereby protecting their data. For more information, see the IPsec Working Group home page at *http://www.ietf.org/html.charters/OLD/ipsec-charter.html.*

K

KDC *Key Distribution Center.* In cryptography, a service that authenticates users, then permits them to use a particular service.

Kerberos A network **authentication** protocol that was developed at Massachusetts Institute of Technology to provide secure authentication. It uses symmetric keys and requires a trusted third party. For more information, see the Kerberos page at *http://web.mit.edu/kerberos*.

key In cryptography, a key is a unique value or string of text that is used to encrypt data when that data is run through an encryption or **hash** algorithm. To decrypt or dehash the data, a device must apply the correct key to the encrypted data. The length of a key generally determines how difficult it will be to decrypt the data. Keys can be either **symmetric** or **asymmetric**.

keyname A user-defined name for a **keypair** that is generated by a **CA**.

keypair The set of two keys that are used in **asymmetric** encryption. A keypair consists of a **public key** and **private key**. The public key decrypts data encrypted by the private key and vice versa.

L

LCD *Liquid Crystal Display.* On the NAC 800, a display that is located on the front panel of the chassis and that shows both information about the device and error messages. The LCD also displays a menu interface; you can use the **panel buttons** to configure basic settings—such as IP address and gateway—for the device.

LDAP *Lightweight Directory Access Protocol.* A set of protocols that allow a host to look up and access directory services. For more information, see RFC 2251 at *http://www.ietf.org/rfc/rfc2251.txt.*

LDIF ***LDAP*** *Directory Interchange Format.* A standard format to represent LDAP data and queries. For more information, see RFC 2849 at *http://tools.ietf.org/html/rfc2849*.

lightweight directory access protocol *See* **LDAP**.

LLDP *Link-Layer Discovery Protocol.* A layer-2 protocol that permits a network device to broadcast its identity and capabilities on a LAN. For more information, see IEEE 802.1AB-2005 at *http://standards.ieee.org/getieee802/download/802.1AB-2005.pdf.*

load balancing Distribution of integrity checking among two or more devices. The NAC 800 distributes the testing of **endpoints** across all **ES**s in a cluster. The NAC 800 uses a hashing algorithm based on MAC or IP addresses to distribute the endpoints between the ESs.

local mirroring Copying all traffic transmitted on one port (the monitored port) to another port on the same device (the mirror port).

M

MAC *Message Authentication Code.* In encryption, a short piece of information that is used to authenticate a message.

MAC-Auth *MAC Authentication.* **Authentication** that is based on the endpoint's media access control (MAC) address rather than on the user's credentials. MAC-Auth does not require device configuration or end-user interaction; instead, the authenticator sends the MAC address to the authentication server to be checked against black lists and white lists.

malware Software designed to infiltrate or damage a computer system. The term encompasses computer viruses, worms, Trojans, spyware, and adware. In law, malware is sometimes known as a computer contaminant. Malware is *not* defective software that has a legitimate purpose but contains errors or bugs.

management server *See* **MS**.

MD5 *Message-Digest algorithm 5*. A **hash** algorithm used to create digital signatures. MD5 is a one-way hash function that transforms and condenses data into a fixed string of digits called a message digest. A variety of protocols use MD5 to check a message's data integrity as well as authenticate the sender. Some protocols, such as EAP-MD5, require passwords to be transmitted as hashes rather than in plaintext. For more information, see RFC 1321 at *http://tools.ietf.org/html/rfc1321*.

mirroring, local *See* **local mirroring**.

mirroring, remote *See* **remote mirroring**.

MS *Management Server*. When using a NAC 800 in a multiple-server installation, the server that is used for managing and controlling the **ES**s.

MS-CHAP *Microsoft CHAP*. The Microsoft implementation of **CHAP**. For more information, see RFC 2759 at *http://tools.ietf.org/html/rfc2759*.

N

NAC *Network Access Controller*. The generic term for any device that controls network access, particularly based on compliance with network policies (endpoint integrity).

NAC EI agent A ProCurve-developed **agent** that is installed permanently on an **endpoint** to enable testing. The agent runs as a new Windows service.

NAC agent test method Also called "agent test method," a **test method** that requires a one-time interaction from end-users. After end-users download and install the **NAC EI agent**, the endpoint is always available for retesting, and the agent is automatically updated when a new version of the agent is available. All versions of **Windows** are supported by this testing method.

NAC policy A collection of tests that evaluate the security status of **endpoints** that attempt to access the network. A policy includes a list of activated tests, their properties, and actions, as well as a list of endpoints to which the policy applies. In addition, the policy defines how to handle endpoints that run OSs that the NAC 800 does not support, retest frequency, and how to handle inactive endpoints. Three default NAC policies are provided: high, medium, and low. You can also define your own policies.

NAC policy group A logical set of **NAC policies** that applies to one or more **enforcement cluster**s. Each cluster uses only one NAC policy group.

NAC test actions The procedures that the NAC 800 performs when an **endpoint** fails the test. The failure actions can be: send a notification email to the network administrator, quarantine the endpoint, or grant temporary access before quarantining.

NAC test properties The criteria that an **endpoint** must meet to pass a particular test. For example, the NAC 800 can test for the presence of certain prohibited applications. If the endpoint has one of the prohibited applications, the endpoint fails the test. The NAC test properties for that test is the list of prohibited software.

NAC tests Used to determine if an **endpoint** complies with your company's network policies. Test categories are Windows security settings, security settings on other OSs, Windows software, Windows operating system, and Windows browser security policies.

NAS *Network Access Server*. A server that provides **endpoint**s with network access and that enforces the decisions of **AAA** servers, thereby guarding access to the Internet, printers, phone networks, or other protected resources. While a NAS does not contain information about which endpoints and end-users can connect, it does send an end-user's credentials to the AAA server, which processes them and directs the NAS how to proceed.

NAT *Network Address Translation*. A method of reusing IP addresses wherein endpoints inside the network have IP addresses that are different from those that are presented to the Internet. For more information, see RFC 3022 at *http://tools.ietf.org/html/rfc3022*.

NAT-T ***NAT**-Traversal*. An **IKE** method for **UDP** encapsulation of **ESP** packets so that they pass better through firewalls. For more information, see RFC 3947 at *http://tools.ietf.org/html/rfc3947* and RFC 3948 at *http://tools.ietf.org/html/rfc3948*.

NDS *Novell Directory Services*. An old name for **eDirectory**. Some eDirectory modules and files still use this abbreviation.

network access control A security implementation that attempts to control access to a network by enforcing security policies, restricting prohibited traffic types, identifying and containing end-users that break rules or are noncompliant with policies, and stopping and mitigating security threats.

network access controller *See* **NAC**.

network access server *See* **NAS**.

NIC *Network Interface Card.* A printed circuit board that includes a cable jack or an antenna to give a computing device access to a network. Every NIC has an address (MAC address) that is unique to that card.

NMAS *Novell Modular Authentication Service.* A NetWare service that provides different ways to authenticate to **eDirectory**.

normal An **access mode** that mandates that **endpoint**s' network access be subject to the results of endpoint integrity testing. *See also* **quarantine**.

NTLM *NT LAN Manager.* A Microsoft **authentication** protocol that is used with **SMB**. It is similar to **MS-CHAP**.

NTP *Network Time Protocol.* A protocol to synchronize a computer or server's internal clock with Coordinated Universal Time (UTC). For more information, see the NTP status pages at *http://tools.ietf.org/wg/ntp*.

O

OBDC *Open DataBase Connectivity.* An application programming interface standard for database management systems that is designed to be independent of programming languages and platforms.

OpenLDAP A free, open-source version of **LDAP** that is platform-independent. For more information, see the official Web site at *http://www.openldap.org*.

OpenSSL *Open* ***SSL***. An open-source implementation of SSL and **TLS** protocols that runs on most UNIX-derived platforms such as Solaris, Linux, Mac OS X and the four open source **BSD** operating systems, as well as OpenVMS and Microsoft Windows For more information, see the project Web site at *http://www.openssl.org*.

opportunistic key caching A fast-roaming technique that permits a wireless station to **authenticate** to a new **AP** with the same **PMK** that it used to authenticate to another AP on the same subnet (or another **RP** that is controlled by the same **Wireless Edge Services Module**) without **pre-authenticat**ing. Also called "proactive key caching."

OSPF *Open Shortest Path First.* A layer-3 router protocol that uses Dijkstra's algorithm to calculate the shortest path across routers to a destination. For more information, see the IETF OSPF working group at *http://www.ietf.org/html.charters/ospf-charter.html.*

P

P2P *Peer-to-Peer.* A P2P network is comprised of peer nodes rather than clients and servers. P2P software allows end-users to connect directly to other end-users and is used for file sharing. Many P2P software packages are considered **spyware**, and their use can be discouraged or even prohibited by corporate policies.

PAP *Password Authentication Protocol.* A protocol used to authenticate a client to a remote server or an Internet service provider. PAP transmits usernames and passwords in unencrypted plaintext, making it unsecure. For more information, see RFC 1334 at *http://www.ietf.org/rfc/rfc1334.txt.*

PCM *ProCurve Manager.* ProCurve's **SNMP** solution. The current version is PCM Plus (PCM+).

PEAP *Protected **EAP**.* A transport mechanism that was developed to provide much of the security of **EAP-TLS** without forcing **endpoint**s to use digital **certificate**s, thereby drastically cutting the work to implement the protocol. PEAP requires only a server-side **PKI** certificate to create a secure **TLS** tunnel to protect end-user **authentication**.

peer-to-peer *See* **P2P**.

PEM *Privacy Enhanced Mail.* An IETF proposal to secure emails with **public key**s. PEM depends on prior distribution of a hierarchical **PKI** with a single root. For more information, see RFCs 1421–1424 at *http://www.ietf.org/rfc.html.*

PFS *Perfect Forward Secrecy.* A **key**-establishment protocol that is used to secure **VPN** connections, wherein the key that was used to protect the transmission of data is not used to derive any additional keys.

PKI *Public Key Infrastructure.* A system of digital **certificates**, **CA**s, and other registration authorities that verify and authenticate each party in an Internet transaction. PKI enables devices to privately exchange data using a public infrastructure such as the Internet by managing **key**s and certificates. From a trusted CA, an end-user obtains a certificate, which includes the user's identification information, a **public key**, and the CA's signature. The end-user also obtains the corresponding **private key**. The user authenticates with the certificate. In addition, devices can encrypt messages destined to the user with the user's public key, which the user's endpoint then decrypts with the private key. *See also* **DSS**.

PMK *Pairwise Master Key.* A symmetric key that is derived by the **802.1X supplicant** and the **authentication server** and that is bound to that particular session between the supplicant and the authenticator.

PMK caching A fast-roaming technique that permits a wireless station to reauthenticate to an **AP** or **RP** after it has disassociated from it by using the same **key** as in its previous session.

post-connect testing NAC 800 tests that are run on **endpoint**s after they have already connected successfully to the network. The network administrator configures the length of the **retest frequency**. If a device has become infected or no longer complies with an organization's security policies, the NAC 800 **quarantine**s it.

posture *See* **integrity posture**.

PPP *Point-to-Point Protocol.* A layer-2 protocol that connects a device such as a personal computer to a server through a phone line. PPP uses a serial interface and is sometimes considered part of the TCP/IP protocol suite. For more information, see RFC 1661 at *http://tools.ietf.org/html/rfc1661*.

pre-authentication A fast-roaming technique that speeds up the time it takes for a station to roam to a new AP for the first time. While the station is authenticated and associated with an AP, it can complete the 802.1X pre-authentication process to another AP, establish a security association, and cache the security association. If the station subsequently roams to the other AP, the station already has a security association with that AP, reducing the time it takes the station to re-authenticate. (Forthe Wireless Edge Services Module, pre-authentication is used when stations roam to an RP that is controlled by a different Wireless Edge Services Module.)

pre-connect testing Testing performed by the NAC 800 *before* an **endpoint** is granted access to the network. *See also* **post-connect testing**.

pre-shared key *See* **PSK**.

private key One of a pair of **keys** that is generated from a single, large random number. The private key is kept secret, not distributed, and is used to decrypt a message that was encrypted using the **public key**. If used to encrypt a message, it “signs” that message as originating from the private key’s owner.

PSCP ***PuTTY*** *with* ***SCP***.

PSK *Pre-Shared Key.* An alphanumeric character string agreed upon by two parties in advance. In **IKE** negotiations, peers can exchange a pre-shared key that is between 8 and 255 characters long to authenticate each other before opening the IKE **SA**.

public key One of a pair of **keys** that is generated from a single, large random number. The public key is distributed widely and is used to encrypt a message that can be decrypted using only the **private key**. The public key also verifies data signed by the private key.

public key infrastructure *See* **PKI**.

PuTTY A terminal emulation program that combines **Telnet** and **SSH** for Win32 and Unix platforms. For more information, see *http://www.chiark.greenend.org.uk/~sgtatham/putty*.

Q

quarantine The isolation of **endpoint**s or systems to prevent potential infection of other endpoints or systems. The NAC 800 determines whether to quarantine an endpoint by applying the following policies in this order: **access mode**, temporarily quarantine/grant access setting, **exception**s, **NAC policies** (the results of tests in the policy).

quarantine all An **access mode** that mandates that all **endpoint**s be quarantined regardless of test results.

quarantine area *See* **quarantine subnet**.

quarantine method The way in which non-compliant endpoints are quarantined. The NAC 800 supports three methods: **802.11X quarantine method**, **inline quarantine method**, and **DHCP quarantine method**. The quarantine method must be the same as the **deployment method**.

quarantine subnet A tightly controlled subnet that is isolated from the rest of the network. Quarantined **endpoint**s are assigned to this subnet where the endpoints cannot access network resources except those that are defined by the network administrator.

QoS *Quality of Service.* A service provided by some network protocols such that the network prioritizes traffic or guarantees a particular level of performance to a type of data flow.

R

radio port *See* **RP**.

RADIUS *Remote Authentication Dial-In User Service.* An **AAA** protocol that allows a server to store all of the security information for a network in a single, central database. The server stores and manages end-user information so that it can authenticate the end-users. The server also maps end-users to the services that they are allowed to access. For more information, see RFC 2865 at *http://www.ietf.org/rfc/rfc2865.txt*.

RADIUS server A common type of **AAA** server. The RADIUS server authenticates end-users, using protocols such as **PAP**, **CHAP**, and **EAP**. If the end-user passes **authentication**, the server authorizes access to the network based on policies such as valid access times. The server can also authorize the end-user for a specific level of access by sending dynamic settings for the **NAS** to enforce. As an accounting server, the RADIUS server can also be notified when a session starts and stops.

RAS *Remote Access Server.* A server that is dedicated to handling end-users that are not on a LAN but need remote access to it. The RAS allows end-users to gain access to files and print services on the LAN from a remote location.

redundancy group A group of two modules: a **Wireless Edge Services Module** and a Redundant Wireless Edge Services Module. The group is configured for failover between the two modules.

remediation The process by which a non-compliant **endpoint** is made compliant. For example, if a Windows service pack is missing on an endpoint, the end-user must install the service pack before being allowed network access. The NAC 800 would send an **end-user screen** to give the end-user instructions for running Windows Update.

remote access server *See* **RAS**.

remote mirroring Technology that enables you to send mirrored traffic from network devices to a remote analyzer using the network infrastructure rather than a dedicated line.

remote procedure call *See* **RPC**.

reverse lookup zone In Domain Name System (DNS), a reverse lookup zone is used to find host names based on their IP address. Typically, reverse lookup zones are used to identify the subnets in a domain.

RIP *Routing Information Protocol.* A protocol that allows routers to tell other routers which routers they can reach and how far away those routers are. For more information, see RFC 1058 for version 1 at *http://tools.ietf.org/html/rfc1058* or RFC 2453 for version 2 at *http://tools.ietf.org/html/rfc2453*.

RP *Radio Port*. A "thin" **AP** that has an antenna and transceiver but that does not store an **ACL** or other configuration information. RPs are controlled centrally from a **Wireless Edge Services Module**.

RPC *Remote Procedure Call.* A procedure where arguments or parameters are sent to a program on a remote system. The remote program executes and returns the results. RPC can be used as an alternative to an **agent** for NAC testing.

RSA *Rivest-Shamir-Adleman.* A **public-key** encryption technology that was developed by RSA Data Security, Inc. The RSA algorithm is based on the fact that there is no efficient way to factor very large numbers. Deducing an RSA **key**, therefore, requires an extraordinary amount of computer processing power and time. RSA supports keys between 1024 and 2048 bits long. RSA keys can be used for signing digital certificates. For more information, see the RSA Cryptography Standard at *http://www.rsa.com/rsalabs/node.asp?id=2125*.

S

SA *Security Association*. Secure communication between two network devices that is created from shared security information. A SA is used in **IKE**. For more information, see RFC 4306 *at http://tools.ietf.org/html/rfc4306*.

SASL *Simple Authentication and Security Layer.* A framework for **authentication** and data security in Internet protocols. For more information, see RFC 4422 at *http://tools.ietf.org/html/rfc4422*.

SCEP *Simple Certificate Enrollment Protocol.* A **PKI** communication protocol to provide secure issuance of **certificate**s in a scalable manner. For more information, see the Internet Draft at *http://www.ietf.org/internet-drafts/draft-nourse-scep-15.txt.*

scope A range of IP addresses that is grouped for special use by the **DHCP** service. Also called a "pool."

SCP *Secure Copy Protocol.* Encrypts data packets over an **SSH** connection.

SHA-1 *Secure Hash Algorithm One.* One of five cryptographic **hash** functions that were designated by the National Security Agency. SHA-1 is used in **TLS**, **SSL**, and **IPsec** and is considered to be a successor to **MD5**. For more information, see RFC 3174 at *http://tools.ietf.org/html/rfc3174.*

shared secret Any **authentication** information such as a password that is "known" by two or more network devices. The shared secret is identical on both devices.

slapd *standalone **LDAP** daemon.* An LDAP directory server that runs on various UNIX platforms.

smart card A plastic card that has integrated circuits embedded in it that can process information. The card is either run through or placed near a reader, which reads the data that is stored in the integrated circuits.

SNMP *Simple Network Management Protocol.* An application-layer protocol that supports the exchange of management information between network devices. An SNMP network consists of agents, managed devices, and network-management systems. Hierarchically organized information about network devices is stored in and accessed from a **MIB**. The NAC 800 supports SNMPv2, which controls access based on community. For example, a server that knows the NAC 800's read-only **community name** can read. For more information, see RFC 1157 at *http://www.ietf.org/rfc/rfc1157.txt.*

SSH *Secure SHell.* A program/network protocol that allows an end-user to log on to another computer over a network, execute commands in the remote machine's OS, and move files from one machine to another. SSH provides strong **authentication**. It secures communications over unsecured channels and can be used when tunneling. For more information, see the SSH Internet Draft at *http://www.free.lp.se/fish/rfc.txt.*

SSID *Service Set IDentifier.* A user-defined name for a **WLAN** subnet. All of the devices on the same wireless subnet use the same SSID. When a wireless network card searches for a WLAN, the SSID for each detected network is displayed.

SSL *Secure Sockets Layer.* A protocol that was developed by Netscape for securing the transmission of messages over the Internet. SSL works by using **asymmetric keys** to encrypt message data. For more information, see *http://wp.netscape.com/eng/ssl3/draft302.txt.*

supplicant The component of **802.1X** that requests access to a network. It communicates with the **RADIUS server** to submit an end-user's **credentials** (and also to authenticate the RADIUS server to the **endpoint**). An endpoint must have an 802.1X supplicant to connect to a segment of the network that enforces 802.1X quarantining. Supplicants supported by the NAC 800 include native supplicants on Windows Vista, XP SP2, and 2000 SP4; MAC OS 10.3; as well as Juniper Odyssey 4.2 and Open1X Xsupplicant 1.2.8.

T

TDM *Time Division Multiplexing.* A method of sending two or more digital bitstreams over one communications channel.

Telnet *TELephone NETwork.* A TCP/IP protocol that provides a fairly general, bidirectional, 8-bit, byte-oriented communications facility. It is typically used to provide user-oriented command-line login sessions between hosts on the Internet. The name "Telnet" came about because the protocol was designed to emulate a single terminal attached to the other computer. For more information, see RFC 854 at *http://www.ietf.org/rfc/rfc0854.txt.*

temporary access period The time during which an **endpoint** is allowed access to the network, overriding the endpoint's quarantine status. The network administrator configures the length of this period.

testing methods Methods that the NAC 800 uses to perform tests. The NAC 800 supports three testing methods: **agent test method**, **ActiveX test method**, and **agentless test method**.

test properties *See* **NAC test properties**.

test status The status in which an **endpoint** is categorized during and after the testing process.

test updates ProCurve periodically updates the NAC 800 tests to check for new hot fixes and virus definitions. The NAC 800 automatically updates its testing software and database by querying MyProCurve Web servers for these updates.

TFTP *Trivial File Transfer Protocol.* A protocol that uses **UDP** to transmit and receive files and provides no security features. TFTP is often used by servers to boot diskless workstations, X-terminals, and routers. It can also be used as a file server. For more information, see RFC 1350 at *http://www.ietf.org/rfc/rfc1350.txt.*

TKIP *Temporal Key Integrity Protocol.* A link-layer security protocol that is used in WPA to correct deficiencies in WEP. For more information, see *http://standards.ieee.org/getieee802/download/802.11i-2004.pdf.*

TLS *Transport Layer Security.* The successor to **SSL**. It prevents eavesdropping on communications between Internet client and server. For more information, see RFC 2240 at *http://www.ietf.org/rfc/rfc2246.txt.*

transform set An acceptable combination of security protocols and algorithms.

trustpoint In **PKI**, a **CA** that is implicitly trusted without verification from a third party.

U

UDP *User Datagram Protocol.* A stateless protocol that is part of the IP protocol suite. Using UDP, programs on network computers can send datagrams to one another. UDP does not provide the reliability and ordering guarantees that TCP does; datagrams may arrive out of order or go missing without notice. However, UDP is faster and more efficient for many lightweight or time-sensitive programs. For more information, see RFC 768 at *http://www.ietf.org/rfc/rfc0768.txt.*

unmanaged endpoint A device that is not under the company’s administrative control. Examples include a guest’s computer or a contractor’s computer. Such a device is still subject to the company’s network security policies.

untestable endpoint A device that is running an operating system that the NAC 800 does not currently support or whose Internet Explorer security setting is “High.

V

vi A display-oriented interactive text editor that was created for Unix systems. For more information, see the original document at *http://webauth.stanford.edu/protocol.html.*

virus A computer program that can copy itself and damage a computer system. A virus cannot self-propagate as a **worm** can but is spread via infected removable media (floppy disks, zip drives, USB drives) or by sending it over a network. Viruses can be programmed to do all kinds of damage, such as erasing hard drives, deleting files, or corrupting executables, or they can be relatively benign (showing text or a graphic), but even the benign viruses use up computer resources such as hard drive space, memory, and processor cycles. Like biological viruses, they can modify themselves upon replication to avoid easy detection.

VLAN *Virtual Local Area Network*. A standard that enables network administrators to group end-users by logical function rather than by physical location. VLANs are created on switches to segment networks into smaller broadcast **domain**s, enhance network security, and simplify network management. For more information, see IEEE 802.1Q at *http://www.ieee802.org/1/pages/802.1Q.html*.

VoIP *Voice over Internet Protocol*. Also called "IP telephony," the routing of voice conversations via packets over an IP network such as the Internet.

VPN *Virtual Private Network*. A network that is tunneled through another network, often a connection to a private network over the Internet. The tunneling is usually achieved through authentication and encryption.

W

WZC *Wireless Zero Configuration*. A service that is included with Windows XP or later that dynamically selects a **WLAN** to connect to based on user preferences and default settings.

Web-Auth A method for authenticating end-users that does not require a client utility on the endpoints. The NAS redirects end-users to a Web page in which the end-users submit their credentials. The **NAS** retrieves the credentials and submits them to an **authentication** server.

WEP *Wired Equivalent Privacy*. A protocol that is part of the IEEE 802.11 suite of protocols for wireless LANs. Its purpose is to provide security equivalent to an unsecured wired LAN. It has been superseded by **WPA** and **IEEE 802.11i**. For more information, see IEEE 802.11 at *http://standards.ieee.org/getieee802/802.11.html*.

WINS *Windows Internet Name Service*. Microsoft's implementation of NetBIOS Name Server on Windows.

Wireless Edge Services Module A ProCurve product that is used to manage **WLAN**s. The module, which is installed in a switch, controls multiple **RP**s (coordinated **AP**s).

WPA *Wi-Fi Protected Access*. A standard created by IEEE and the Wi-Fi Alliance to address the security weaknesses in **WEP**. For more information, see the Wi-Fi Alliance white paper at *http://www.wi-fi.org/white_papers/whitepaper-042903-wpa*.

WPA-PSK ***WPA*** *using a Preshared Key.* PSK refers to a key that is shared between two stations before it needs to be used, such as over a secured channel or non-electronically (the end-user is told the correct key).

X

X.509 A strong **authentication** standard for **PKI**. One of its functions is to specify a standard format for **public key** certificates and a path for certification validation. For more information, see ITU Recommendation X.509 at *http://www.itu.int/rec/T-REC-X.509/en*.

Xauth *eXtended authentication.* An **IKE** extension that permits the use of legacy protocols such as **RADIUS**, SecurID, and **OTP**. For more information, see the Internet Draft at *http://www.vpnc.org/ietf-xauth/draft-beaulieu-ike-xauth-02.txt*.

Addendum: ProCurve Access Control Solution 2.1 Update

Contents

Introduction

This addendum is designed to be used in conjunction with the *ProCurve Access Control Security Design Guide*, which describes a process for designing an access control solution for your company. In specific, this addendum shows how to implement the ProCurve Access Control Solution 2.1, which is described in the *Addendum to the ProCurve Access Control Security Design Guide*. The addendum to the design guide covers the main enhancements provided bythe ProCurve Access Control Solution 2.1 and descrbes Microsoft Network Access Protection (NAP), explaining how the ProCurve Access Control Solution integrates with NAP.

This addendum to the *ProCurve Access Control Security Implementation* provides step-by-step instructions for implementing an access control solution that is designed to control access for both wired and wireless zones. (For more information about wired and wireless zones, see the *ProCurve Access Control Security Design Guide*.) This access control solution uses the following security controls:

- 802.1X as the access control method for wired access
- Wi-Fi Protected Access (WPA) and WPA2 with 802.1X for wireless access
- Web authentication (Web-Auth) for wireless guest access
- Web-Users who can create guest accounts on the Wireless Module's internal RADIUS database

In this addendum, you will learn how to configure, the following components, which are used to build this solution

- ProCurve Manager Plus (PCM+) and ProCurve Identity Driven Manager (IDM), which simplify many of the management tasks required for implementing both 802.1X and endpoint integrity.
- ProCurve Wireless Edge Services zl Module, which controls multiple Radio Ports (RPs) that set up the wireless network and provides RADIUS authentication for wireless guest users
- ProCurve intelligent edge switches, which help enforce the policies set up in IDM and NAP
- Microsoft NAP, the integrity-checking solution thatis included with Microsoft Windows Server 2008

  The Microsoft Network Policy Server (NPS), which is a component of the NAP architecture, also provides RADIUS authentication for domain users.

- Windows domain controller, which runs:
  - Microsoft Active Directory
  - Domain Name System (DNS) services
  - Dynamic Host Configuration Protocol (DHCP) servers

Although your network environment is probably not identical to this environment, the instructions should help you understand the processes involved so that you can then modify the instructions as needed to meet your organization's unique requirements.

To help you, the instructions include examples, which will be based on a example network for a university called *ProCurve University*. The instructions also include tables and worksheets that you can use to record information for your company's network.

ProCurve University includes three user groups:

- Network administrators
- Faculty
- Students

The network is divided into virtual local area networks (VLANs) that allow users to access the resources that they require. Table AD-1 shows one approach to designing the VLANs.

Table AD-1. VLANs for the Example Network

VLAN Category	Name	ID	Subnet
Management VLAN	Management	2	10.2.0.0/16
Server VLAN	Servers	4	10.4.0.0/16
	Faculty_Databases	5	10.5.0.0/16
User VLAN	Faculty	8	10.8.0.0/16
	Students	10	10.10.0.0/16
Guest VLAN	Guests	11	10.11.0.0/16
Computer VLAN	Computers	9	10.9.0.0/16
Quarantine VLAN (for non-compliant endpoints)	Quarantine	32	10.32.0.0/16

The VLANs are divided into these general categories:

- **Management VLAN**—for infrastructure devices and the network administrators that manage them

Note

This solution does not use the securemanagement VLAN feature. Instead, switches are configured with the **ip authorized-managers** command to allow management traffic only from sources within the management VLAN or the NAC 800s.

- **Server VLANs**—for servers

  In this example, servers are placed in different VLANs according to which users need to access them. All users need the services in VLAN 4, which includes DHCP servers and DNS servers. However, only the faculty should be able to reach data stored in VLAN 5.

- **User VLANs**—one for each user group

  You could create more VLANs and place users into different VLANs according to when and how they connect to the network. For example, you could create a Faculty_Wireless VLAN. In this example, however, a particular user always receives the same VLAN assignment—unless his or her endpoint is non-compliant.

- **Guest VLAN**—a VLAN for guest users who are allowed limited network access
- **Computer VLAN**—a VLAN for users computers

  When users access the network, their computers will first be authenticated. Then, they will be prompted to enter their user credentials to log in to the domain. In the brief period between when the computer connects and when the user logs in, the computer have an IP address in the computer VLAN. After the user logs in, the computer will receive a new VLAN assignment.

- **Quarantine VLAN—**one for all endpoints that are not compliant with NAP policies

You can use Table AD-2 to record information about your organization's VLANs. You can then refer to this table as you read theinstructions that follow.

Table AD-2. My VLANs

Type	Name	ID	Subnet
Management			
Server			
User			
Computer			
Quarantine			
Guest			

Configuring the Windows Domain Controller

This section explains how to install Windows Server 2008 and set up the server as a domain controller. By the end of the section, you will have installed both Active Directory and DNS services. You will also have configured the groups and users necessary for your access control solution.

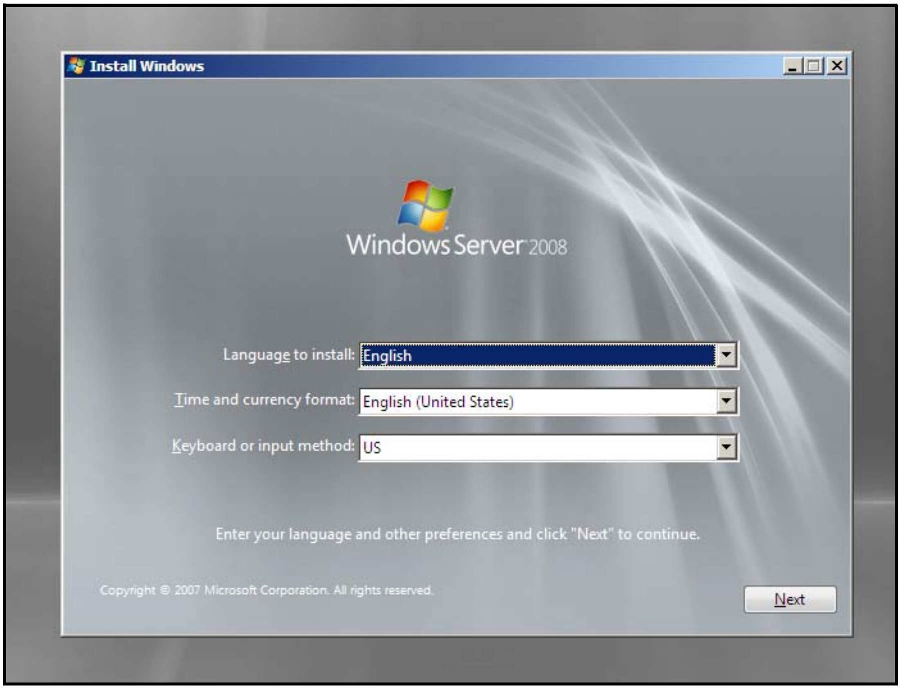
Groups and users for the example solution are displayed in Table AD-3. Of course, a production network would include many more users and computers.

Table AD-3. Windows Domain Groups

Group	Member	Username	Password
Administrators (a default Windows group)	AD Administrator	Administrator	ProCurve0
Network_Admins	Switch Administrator	adminswitch	ProCurve1
Network_Admins	Wireless Administrator	adminwireless	ProCurve2
Faculty	Pauline Professor	professor	ProCurve3
Students	Sam Student	student	ProCurve4
NAP client computers	Endpoints	n/a	n/a

Installing Windows Server 2008

1. Insert Windows Server 2008 CD or DVD. The **Install Windows** window is displayed.



Install Windows

Language to install: English

Time and currency format: English (United States)

Keyboard or input method: US

Enter your language and other preferences and click "Next" to continue.

Copyright © 2007 Microsoft Corporation. All rights reserved.

Figure AD-1.Windows Server 2008 Install Windows Window

2. Select the language to install, time and currency format, an keyboard or input method. For this example, leave the default settings.
3. Click **Next**. The **Install Now** window is displayed.

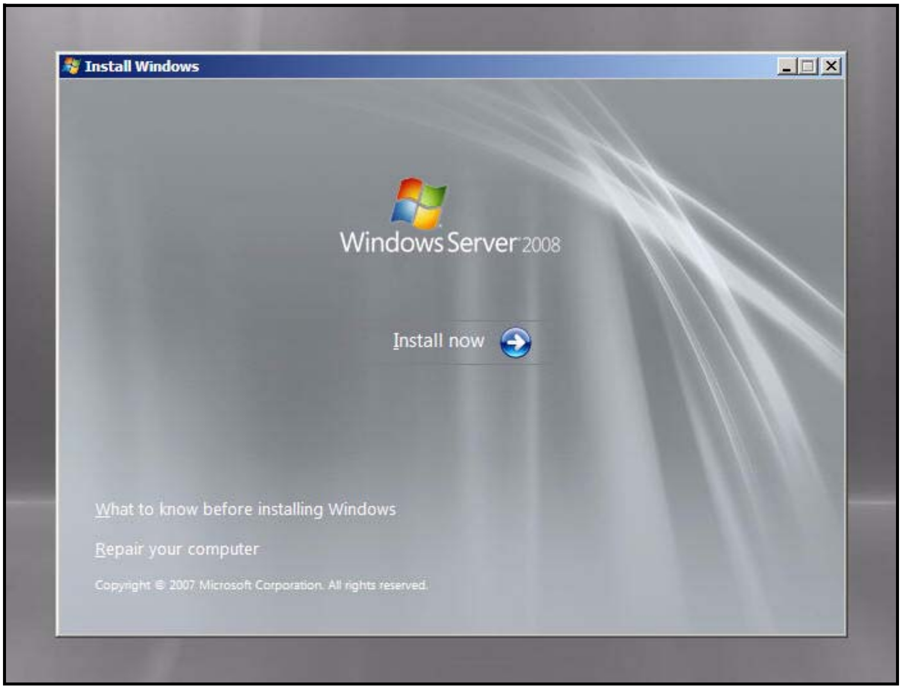
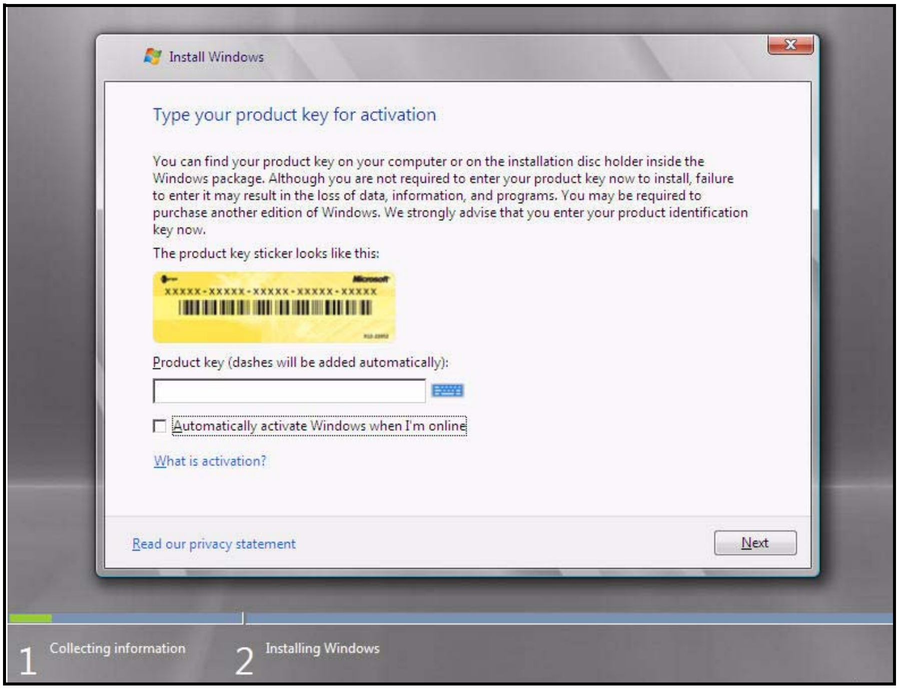

Install Windows
Windows Server 2008
Install now
What to know before installing Windows
Repair your computer
Copyright © 2007 Microsoft Corporation. All rights reserved.

Figure AD-2.Windows Server 2008 Install Windows—Install Now Window

4. Click **Install now**. A **Please Wait** message is displayed for a few minutes. Then, the following window is displayed.



Install Windows

Type your product key for activation

You can find your product key on your computer or on the installation disc holder inside the Windows package. Although you are not required to enter your product key now to install, failure to enter it may result in the loss of data, information, and programs. You may be required to purchase another edition of Windows. We strongly advise that you enter your product identification key now.

The product key sticker looks like this:

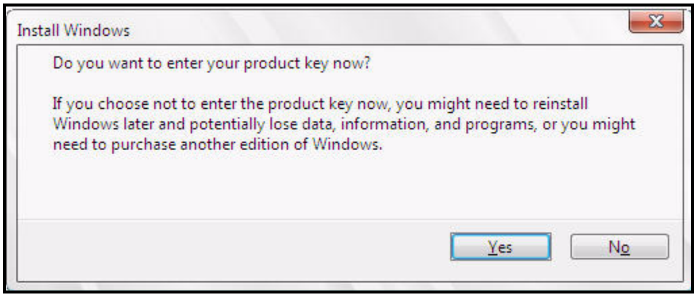
Product key (dashes will be added automatically):

□ Automatically activate Windows when I'm online

Figure AD-3.Windows Server 2008 Install Windows—Product Key Activation Window

5. Type the product key. The server must be connected to the Internet. (Enter only the alpha-numerics—dashes are added automatically.) Optionally select or clear the **Automatically activate Windows when I'm online** check box. Click **Next**. If you entered a product key, continue with step 8.

   If you chose not to enter the product key, a window is displayed, asking if you want to enter your product key now.



Install Windows

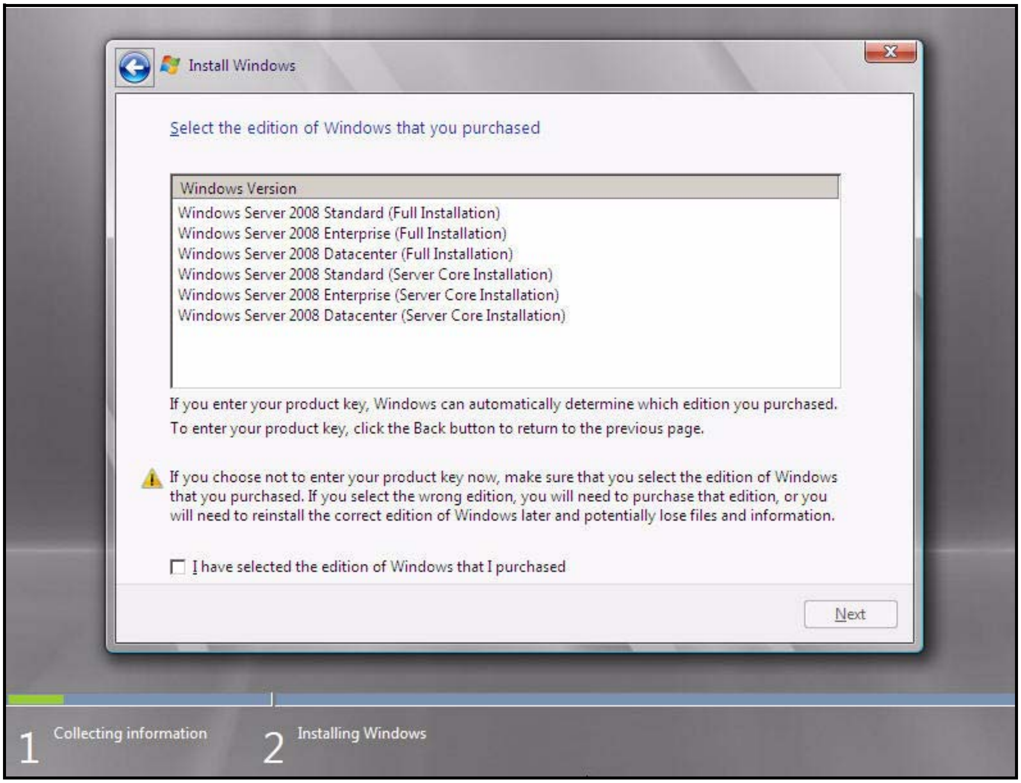
Do you want to enter your product key now?

If you choose not to enter the product key now, you might need to reinstall Windows later and potentially lose data, information, and programs, or you might need to purchase another edition of Windows.

Figure AD-4.Product Key Warning Window

Click **Yes** or **No**.

6. If you again chose not to enter the product key the **Select edition** window is displayed.



Select the edition of Windows that you purchased

Windows Version
Windows Server 2008 Standard (Full Installation)
Windows Server 2008 Enterprise (Full Installation)
Windows Server 2008 Datacenter (Full Installation)
Windows Server 2008 Standard (Server Core Installation)
Windows Server 2008 Enterprise (Server Core Installation)
Windows Server 2008 Datacenter (Server Core Installation)

If you enter your product key, Windows can automatically determine which edition you purchased. To enter your product key, click the Back button to return to the previous page.

If you choose not to enter your product key now, make sure that you select the edition of Windows that you purchased. If you select the wrong edition, you will need to purchase that edition, or you will need to reinstall the correct edition of Windows later and potentially lose files and information.

□ I have selected the edition of Windows that I purchased

Figure AD-5.Windows Server 2008 Install Windows—Select Edition Window

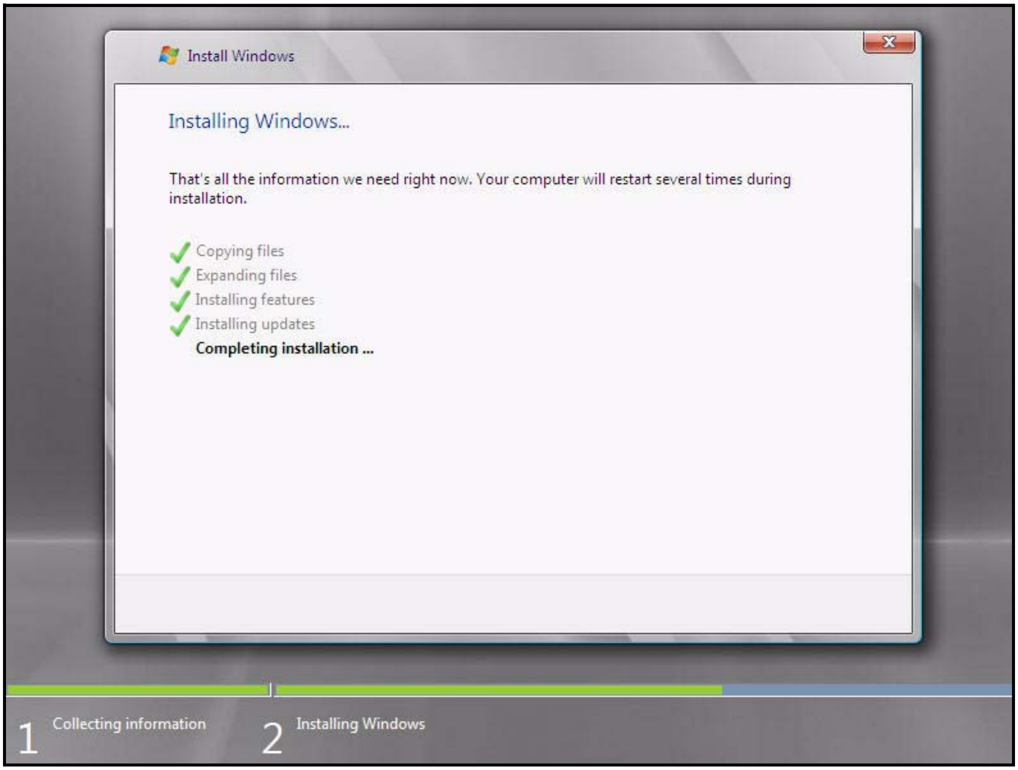
7. You must complete these steps:
   a. Select the version of Windows Server 2008 that you purchased.
   b. Select the **I have selected the edition of Windows that I purchased** check box.
   c. Click **Next**.
8. On the **Licensing agreement** window, select **I accept the license terms** and click **Next**. The **Select Installation Type** window is displayed.
9. Select an installation type. For this example, select **Custom (advanced)**.

10. Select where you want to install Windows Server 2008 and click **Next**.

    If you are installing Windows Server 2008 on a computer that is already running another version of Windows, a warning message is displayed, telling you that the hard drive or partition you selected already has files from a previous installation. Click **OK** to proceed.

    Windows Server 2008 will automatically begin installing everything you need. This process will take several minutes.

    Your computer will automatically reboot to complete the installation. After the computer has rebooted, the window in Figure AD-6 is displayed.



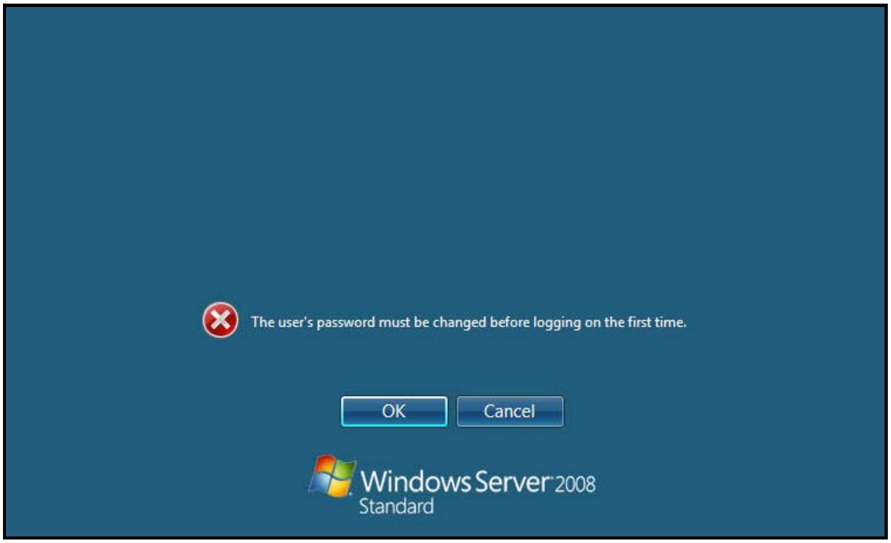
Installing Windows...

That's all the information we need right now. Your computer will restart several times during installation.

✓ Copying files
✓ Expanding files
✓ Installing features
✓ Installing updates
Completing installation ...

Figure AD-6.Windows Server 2008 Install Windows—Completing Installation Window

11. After the **Completing Installation** taskis finished, your computer will reboot again. The following window is displayed.



The user's password must be changed before logging on the first time.

Figure AD-7.Windows Server 2008 Create Password Warning Window

12. You must reset the administrative password before logging in to the Windows Server 2008 for the first time. Click **OK**.

13. In the two fields below the Administrator icon, type a new password, and then retype the password. For this example, type **!@ProCurve**.

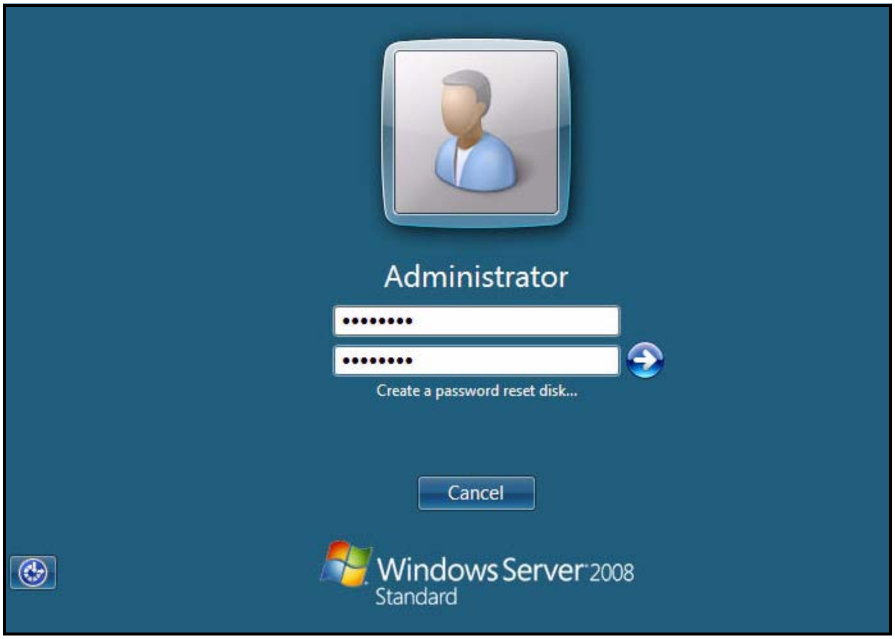


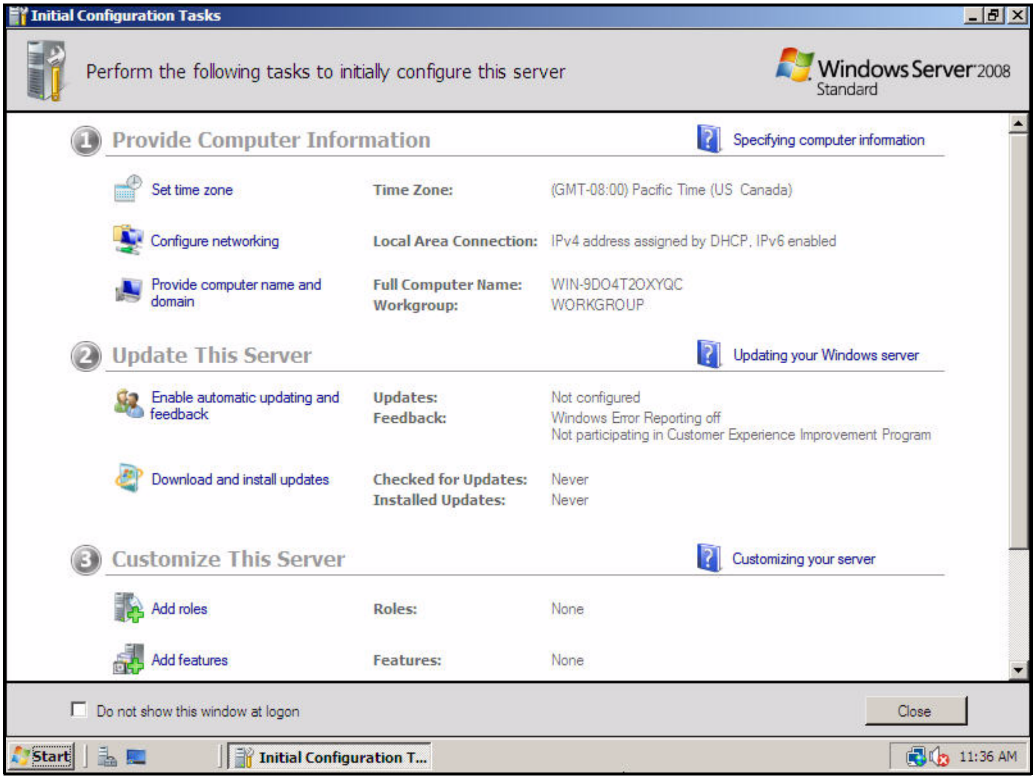
Figure AD-8.Windows Server 2008 Log In Window

14. Click the arrow icon or press **[Enter]**.

    Your password must include both capital and lower case letters as well as either a number or a symbol character. If you do not meet these rules, a warning will be displayed, and you will be forced to choose another password.

15. A window is displayed that confirms your password change. Click **OK**. A message informs you that your desktop is being prepared. Then the **Log In** window is displayed.

16. Type your new password and click the right arrow or press **[Enter]**. The **Initial Configuration Tasks** window is displayed.



Initial Configuration Tasks

Perform the following tasks to initially configure this server

Windows Server 2008 Standard

1 Provide Computer Information — Specifying computer information

Set time zone	Time Zone:	(GMT-08:00) Pacific Time (US Canada)
Configure networking	Local Area Connection:	IPv4 address assigned by DHCP, IPv6 enabled
Provide computer name and domain	Full Computer Name: Workgroup:	WIN-9DO4T2OXYQC WORKGROUP

2 Update This Server — Updating your Windows server

Enable automatic updating and feedback	Updates: Feedback:	Not configured Windows Error Reporting off Not participating in Customer Experience Improvement Program
Download and install updates	Checked for Updates: Installed Updates:	Never Never

3 Customize This Server — Customizing your server

Add roles	Roles:	None
Add features	Features:	None

☐ Do not show this window at logon

Figure AD-9.Windows Server 2008—Initial Configuration Tasks Window

You have now installed Windows Server 2008. Before you can begin assigning roles to the server, you must configure some initial settings.

Configure Initial Settings

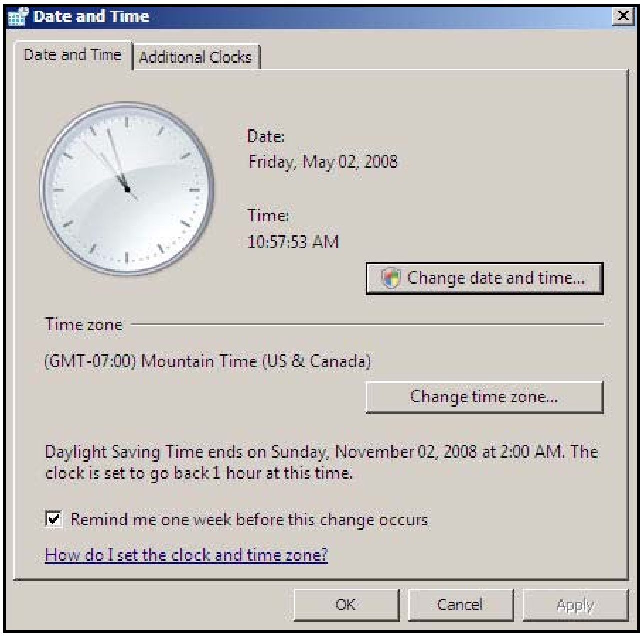
Before you can begin assigning roles to the server, you must configure some initial settings:

- Time zone
- Static IP settings

Set the Time Zone

1. From the **Initial Configuration Tasks** window, click **Set Time zone**. The **Date and Time** window is displayed.

   Or you can access the control panel and double-click **Date and Time**.



Date:
Friday, May 02, 2008

Time:
10:57:53 AM

Time zone

(GMT-07:00) Mountain Time (US & Canada)

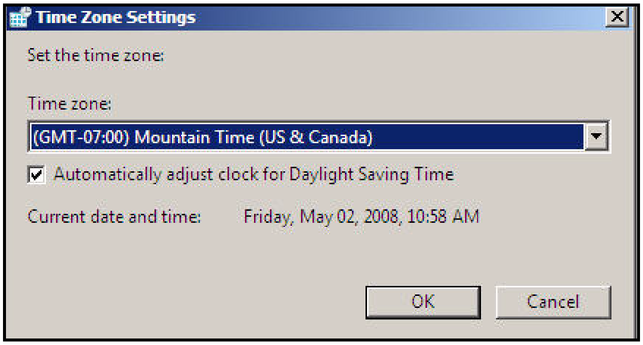
Daylight Saving Time ends on Sunday, November 02, 2008 at 2:00 AM. The clock is set to go back 1 hour at this time.

☑ Remind me one week before this change occurs

Figure AD-10.Windows Server 2008—Date and Time Window

2. The **Date and Time** tab should be selected. Ensure that the time, date, and time zone are correct:

   a. To change the time zone, dick **Change time zone**. Select your time zone from the list and click **OK**.



Set the time zone:

Time zone:
(GMT-07:00) Mountain Time (US & Canada)

☑ Automatically adjust clock for Daylight Saving Time

Current date and time: Friday, May 02, 2008, 10:58 AM

Figure AD-11.Windows Server 2008—Time Zone Settings Window

   b. To change the current date and time, dick **Change date and time**. Make any adjustments needed and then click **OK**.

3. Click **OK**.

Set Static IP Settings

Windows Server 2008 requires you to set both static IPv4 and IPv6 addresses even if you plan to disable IPv6. Complete the following steps:

1. Access the **Network Connections** window from one of the following two locations:
   - The **Initial Configuration Tasks** window
     i. In the **Initial Configuration Tasks** window, click **Configure networking**.
     ii. The **Network Connections** window is displayed.
   - The **Server Manager** window
     i. Click **Start > Administrative Tools > Server Manager**.
     ii. In the **Server Manager** window, under **Server Summary**, click **View Network Connections**.
     iii. The **Network Connections** window is displayed.

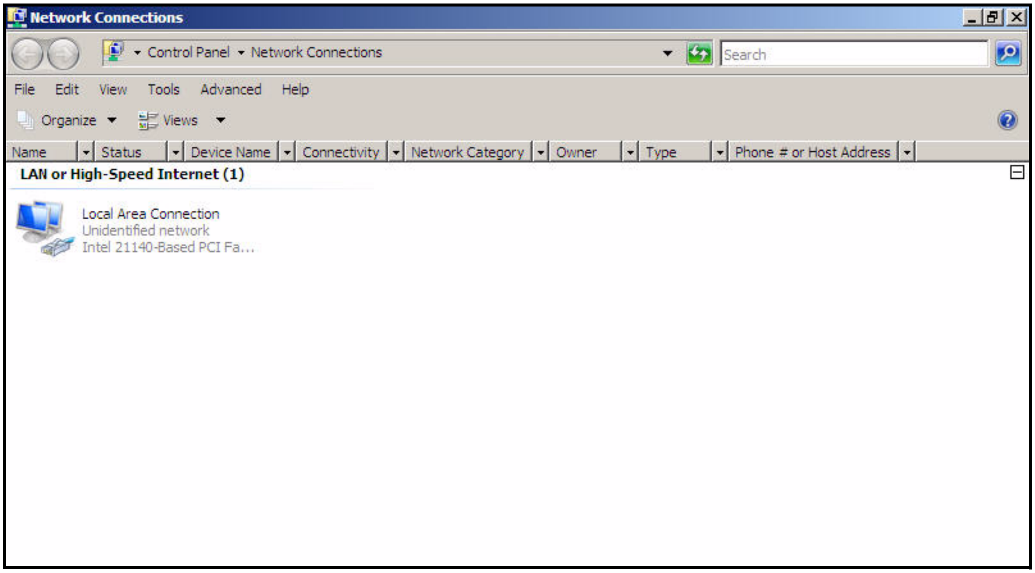
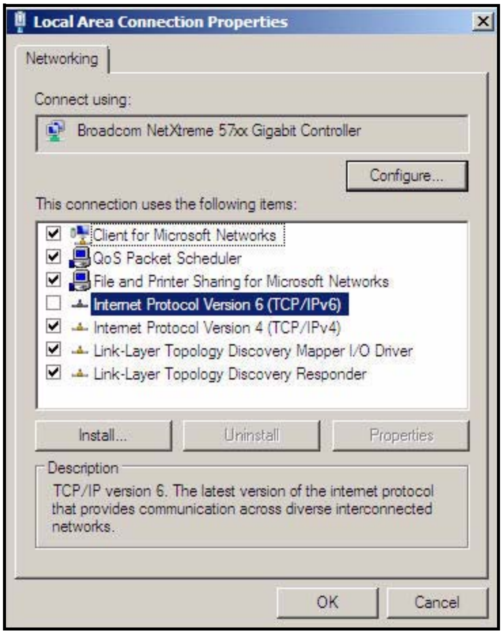

Network Connections
Control Panel ▸ Network Connections
Search
File Edit View Tools Advanced Help
Organize ▾ Views ▾
Name | Status | Device Name | Connectivity | Network Category | Owner | Type | Phone # or Host Address
LAN or High-Speed Internet (1)
Local Area Connection
Unidentified network
Intel 21140-Based PCI Fa...

Figure AD-12.Windows Server 2008—Network Connections Window

     iv. Right-click **Local Area Connection**.
     v. Click **Properties**. The **Local Area Connection Properties** window is displayed.
     vi. In this implementation, the network uses IPv4 addresses. Clear the **Internet Protocol Version 6 (TCP/IPv6)** check box.



Connect using:

Broadcom NetXtreme 57xx Gigabit Controller

This connection uses the following items:

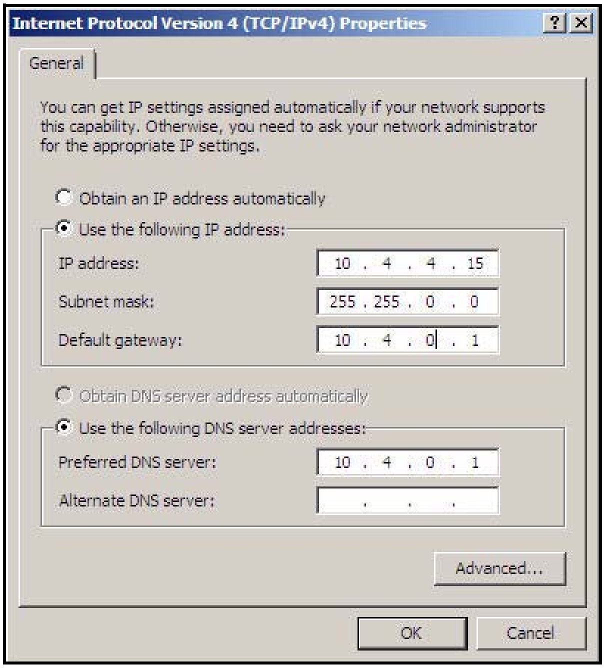
- ☑ Client for Microsoft Networks
- ☑ QoS Packet Scheduler
- ☑ File and Printer Sharing for Microsoft Networks
- ☐ Internet Protocol Version 6 (TCP/IPv6)
- ☑ Internet Protocol Version 4 (TCP/IPv4)
- ☑ Link-Layer Topology Discovery Mapper I/O Driver
- ☑ Link-Layer Topology Discovery Responder

Description

TCP/IP version 6. The latest version of the internet protocol that provides communication across diverse interconnected networks.

Figure AD-13.Windows Server 2008—Local Area Connection Properties Window

2. Select **Internet Protocol Version 4 (TCP/IPv4)** and click **Properties**. The **Internet Protocol Version 4 (TCP/IPv4) Properties** window is displayed.



Internet Protocol Version 4 (TCP/IPv4) Properties

General

You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

○ Obtain an IP address automatically

● Use the following IP address:

IP address: 10 . 4 . 4 . 15

Subnet mask: 255 . 255 . 0 . 0

Default gateway: 10 . 4 . 0 . 1

○ Obtain DNS server address automatically

● Use the following DNS server addresses:

Preferred DNS server: 10 . 4 . 0 . 1

Alternate DNS server: . . .

Figure AD-14.Windows Server 2008—Internet Protocol Version 4 (TCP/IPv4) Properties Window

3. Select **Use the following address**.
4. For **IP address**, type an IPv4 address. In the example, type **10.4.4.15**.
5. For **Subnet mask**, type the appropriate mask for your address. In this example, type **255.255.0.0**.
6. For **Default gateway**, type the appropriate prefix length for your address. In this example, type **10.4.0.1**.
7. Select **Use the following DNS server addresses**.
8. For **Preferred DNS server**, type the IPv4 address of your DNS server. In this example, the Windows Server 2008 will serve as its own DNS server.

   You can type the address that you set in the **IP address** box or the loopback address (**127.0.0.1**).
9. Click **OK**.
10. Click **Close**.
11. Press **[Alt]** + **[F4]**.

You are now ready to add roles to your Windows Server 2008.

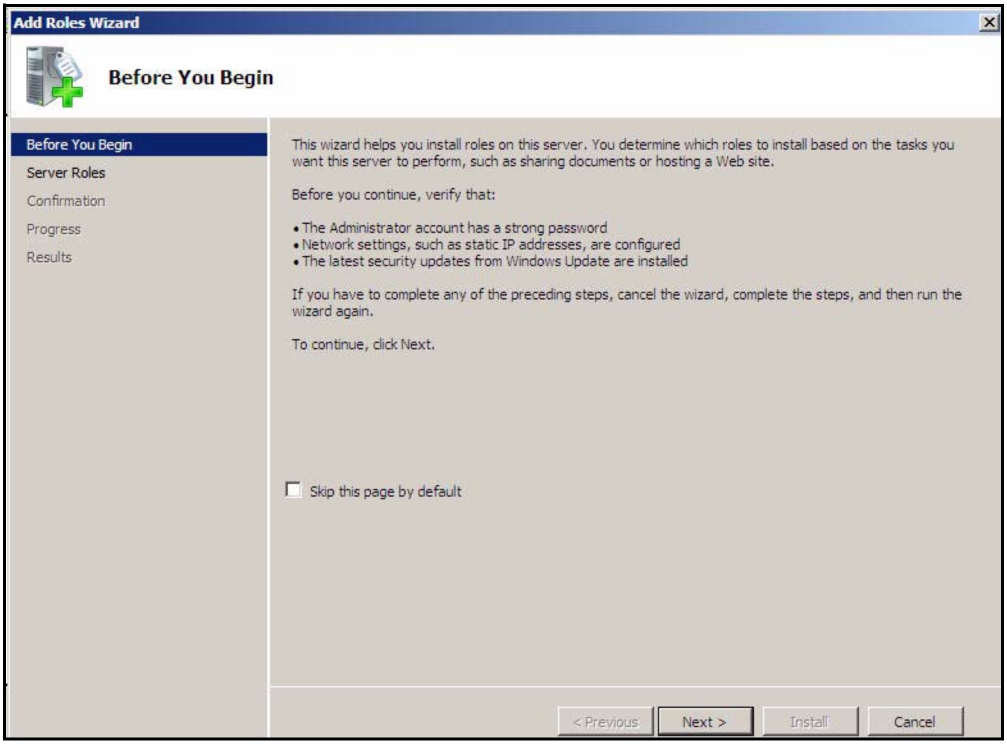
Install Active Directory

After you install Windows Server 2008, the server is a standalone server without membership in a domain. To make the server a domain controller, configure Active Directory on the new server:

1. If you have not yet connected the server to the network infrastructure, connect it now.

   For services to run properly, the server requires an active network connection. In the example network, the domain controller connects to the core routing switch.

2. Access the **Add Roles Wizard**. There are two ways to access the wizard:
   - From hetl**Initial Configuration Tasks** window, complete this step:
     i. Under **Customize this Server**, click **Add Roles**.
   - From the Server Manager window, complete these steps:
     i. Click **Start > Administrative Tools > Server Manager**. The **Server Manager** window is displayed.
     ii. In the left pane, click **Roles**.
     iii. In the right pane, click **Add Roles**.



This wizard helps you install roles on this server. You determine which roles to install based on the tasks you want this server to perform, such as sharing documents or hosting a Web site.

Before you continue, verify that:

- The Administrator account has a strong password
- Network settings, such as static IP addresses, are configured
- The latest security updates from Windows Update are installed

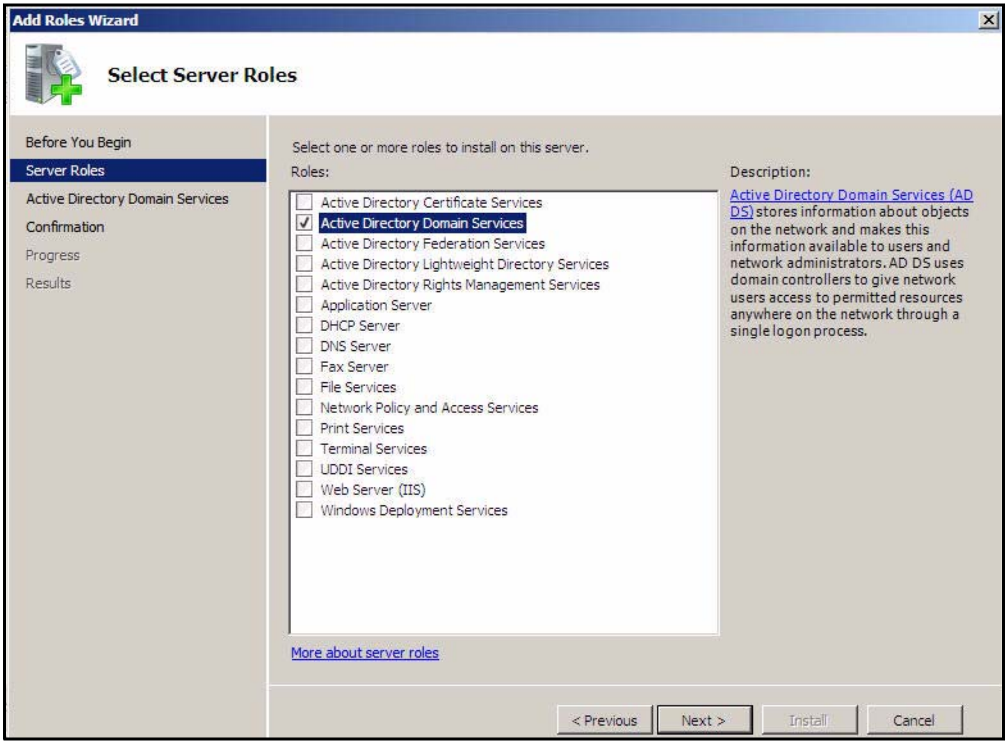
If you have to complete any of the preceding steps, cancel the wizard, complete the steps, and then run the wizard again.

To continue, click Next.

☐ Skip this page by default

Figure AD-15.Add Roles Wizard—Before You Begin Page

3. In the **Before You Begin** page, select **Skip this page by default** check box.
4. Click **Next**.



Select one or more roles to install on this server.

Roles:

- □ Active Directory Certificate Services
- ☑ Active Directory Domain Services
- □ Active Directory Federation Services
- □ Active Directory Lightweight Directory Services
- □ Active Directory Rights Management Services
- □ Application Server
- □ DHCP Server
- □ DNS Server
- □ Fax Server
- □ File Services
- □ Network Policy and Access Services
- □ Print Services
- □ Terminal Services
- □ UDDI Services
- □ Web Server (IIS)
- □ Windows Deployment Services

Description:

Active Directory Domain Services (AD DS) stores information about objects on the network and makes this information available to users and network administrators. AD DS uses domain controllers to give network users access to permitted resources anywhere on the network through a single logon process.

Figure AD-16.Add Roles Wizard—Server Roles Page

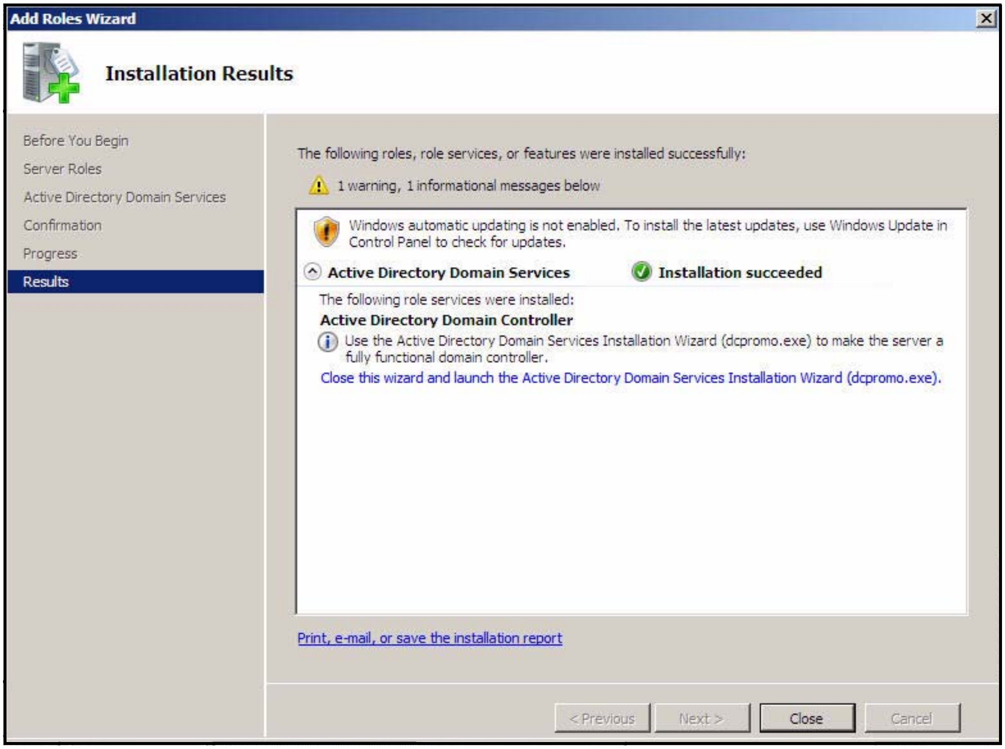
5. Select the **Active Directory Domain Services** check box on the **Select Server Roles** page.

   All other roles build on the Active Directory Domain Services role, so you must add this role first.

6. Click **Next**.

7. In the **Introduction to Active Directory Domain Services** page, click **Next**.

8. In the **Confirm Installation Selections** page, click **Install**. The Active Directory Domain Services role is installed. This process can take several minutes.



The following roles, role services, or features were installed successfully:

1 warning, 1 informational messages below

Windows automatic updating is not enabled. To install the latest updates, use Windows Update in Control Panel to check for updates.

Active Directory Domain Services — Installation succeeded

The following role services were installed:

Active Directory Domain Controller

Use the Active Directory Domain Services Installation Wizard (dcpromo.exe) to make the server a fully functional domain controller.

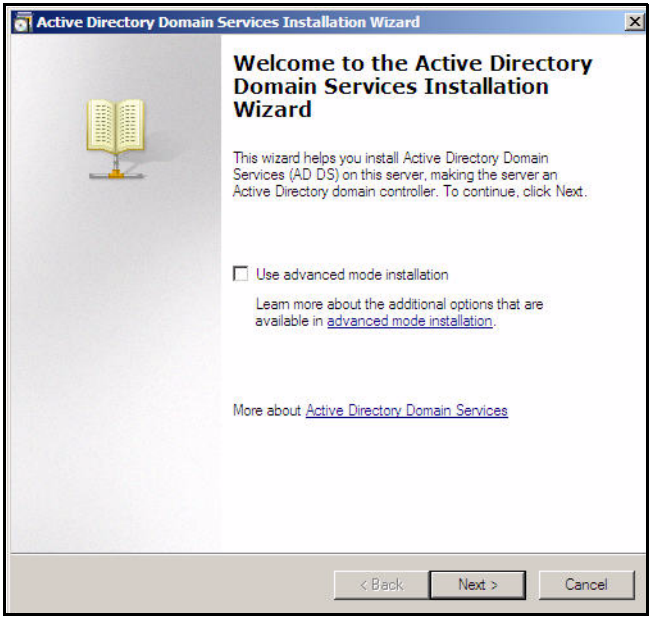
Close this wizard and launch the Active Directory Domain Services Installation Wizard (dcpromo.exe).

Figure AD-17.Add Roles Wizard—Installation Results Page

9. Click **Close.**

10. Launch the Active Directory Domain Services Installation Wizard.

    a. Click the **Close this wizard and launch the Active Directory Domain Services Installation Wizard (dcpromo.exe)** link. The **Active Directory Domain Services Installation Wizard** is displayed.



Active Directory Domain Services Installation Wizard

Welcome to the Active Directory Domain Services Installation Wizard

This wizard helps you install Active Directory Domain Services (AD DS) on this server, making the server an Active Directory domain controller. To continue, click Next.

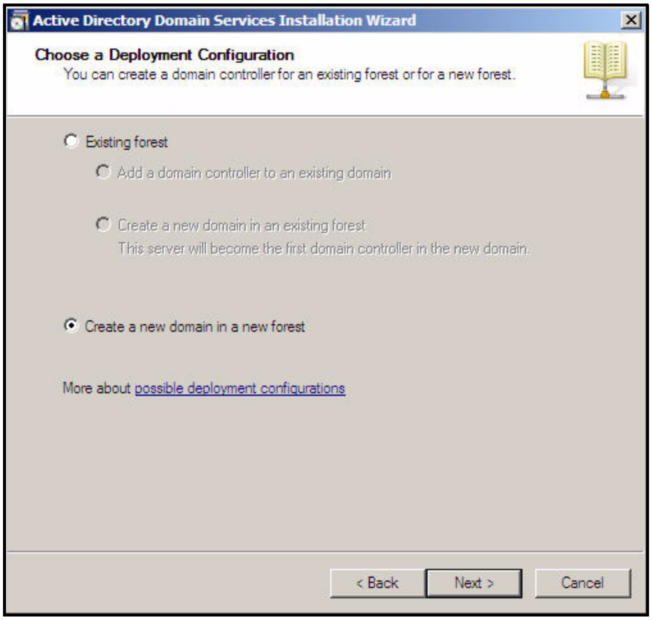
□ Use advanced mode installation

Learn more about the additional options that are available in advanced mode installation.

More about Active Directory Domain Services

Figure AD-18.Active Directory Domain Services Installation Wizard—Welcome Page

11. On the **Welcome** page, click **Next**.
12. On the **Operating System Compatibility** page, click **Next**.



Active Directory Domain Services Installation Wizard

Choose a Deployment Configuration
You can create a domain controller for an existing forest or for a new forest.

○ Existing forest

○ Add a domain controller to an existing domain

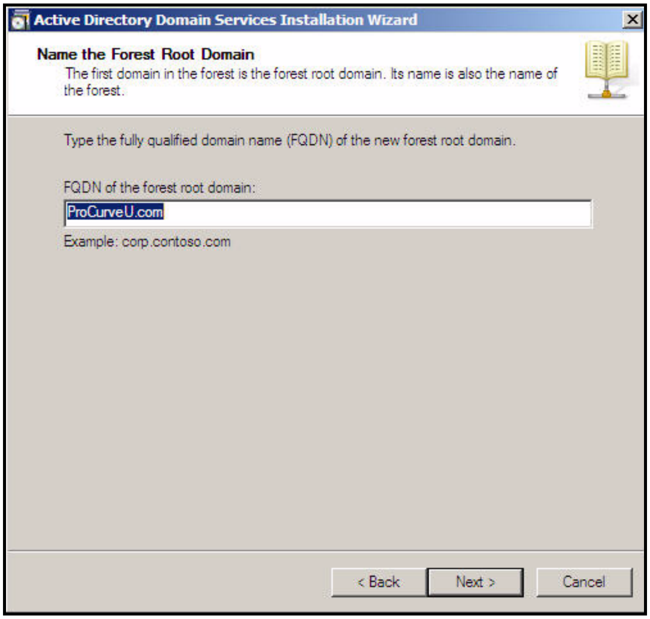
○ Create a new domain in an existing forest
This server will become the first domain controller in the new domain.

● Create a new domain in a new forest

More about possible deployment configurations

Figure AD-19.Active Directory Domain Services Installation Wizard—Deployement Configuration Page

13. In the **Choose a Deployment Configuration** page, select **Create a new domain in a new forest** and click **Next**.



Active Directory Domain Services Installation Wizard

Name the Forest Root Domain

The first domain in the forest is the forest root domain. Its name is also the name of the forest.

Type the fully qualified domain name (FQDN) of the new forest root domain.

FQDN of the forest root domain:

ProCurveU.com

Example: corp.contoso.com

Figure AD-20.Active Directory Domain Services Installation Wizard—New Domain Name Page

14. Type your organization’s domain name in the **FQDN of the forest root domain:** box. Type **ProCurveU.com** and click **Next**. The server checks that the forest name is not already in use.

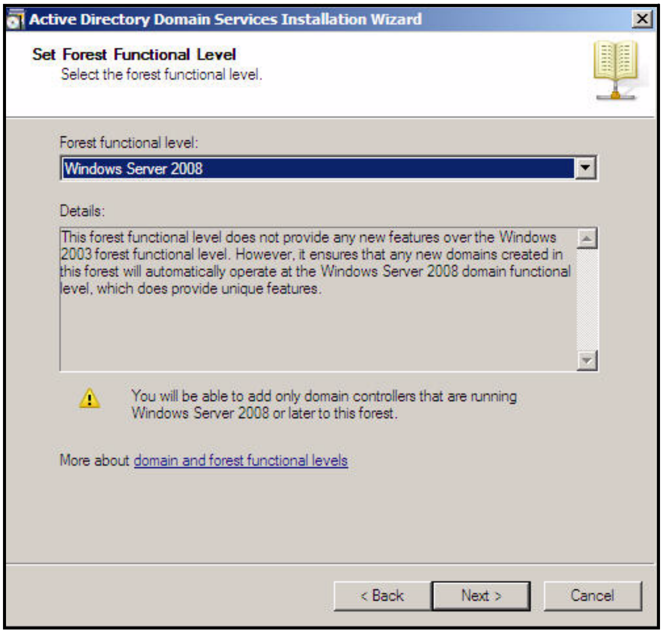
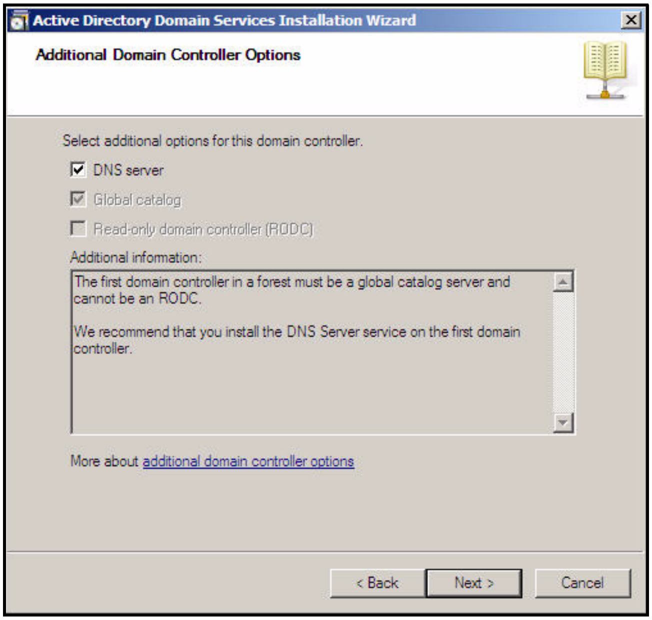

Active Directory Domain Services Installation Wizard
Set Forest Functional Level
Select the forest functional level.
Forest functional level:
Windows Server 2008
Details:
This forest functional level does not provide any new features over the Windows 2003 forest functional level. However, it ensures that any new domains created in this forest will automatically operate at the Windows Server 2008 domain functional level, which does provide unique features.
You will be able to add only domain controllers that are running Windows Server 2008 or later to this forest.
More about domain and forest functional levels
< Back
Next >
Cancel

Figure AD-21.Active Directory Domain Services Installation Wizard—Forest Functional Level Page

15. From the **Forest functional level** list, select **Windows Server 2008**.
16. Click **Next**.



Active Directory Domain Services Installation Wizard

Additional Domain Controller Options

Select additional options for this domain controller.

☑ DNS server

☑ Global catalog

☐ Read-only domain controller (RODC)

Additional information:

The first domain controller in a forest must be a global catalog server and cannot be an RODC.

We recommend that you install the DNS Server service on the first domain controller.

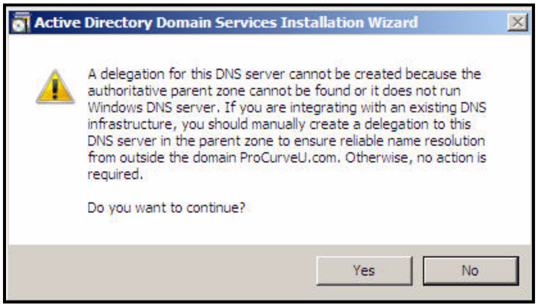
More about additional domain controller options

Figure AD-22.Active Directory Domain Services Installation Wizard—Additional Domain Controller Options Page

17. Select the **DNS server** check box.

    Active Directory relies on DNS, so you often set up DNS on the same server.

18. Click **Next**. A warning may be displayed.



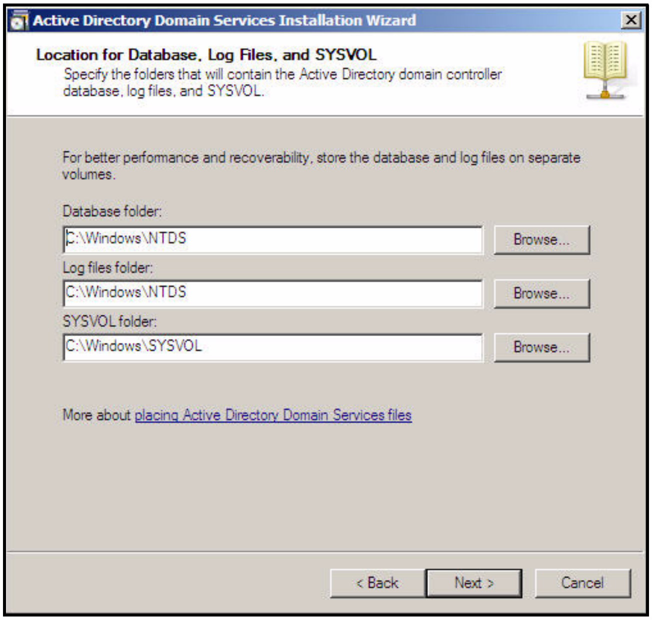
Active Directory Domain Services Installation Wizard

A delegation for this DNS server cannot be created because the authoritative parent zone cannot be found or it does not run Windows DNS server. If you are integrating with an existing DNS infrastructure, you should manually create a delegation to this DNS server in the parent zone to ensure reliable name resolution from outside the domain ProCurveU.com. Otherwise, no action is required.

Do you want to continue?

Figure AD-23.Active Directory Domain Services Installation Wizard—DNS Warning Window

19. If the warning is displayed, click **Yes**.



Active Directory Domain Services Installation Wizard

Location for Database, Log Files, and SYSVOL

Specify the folders that will contain the Active Directory domain controller database, log files, and SYSVOL.

For better performance and recoverability, store the database and log files on separate volumes.

Database folder: C:\Windows\NTDS

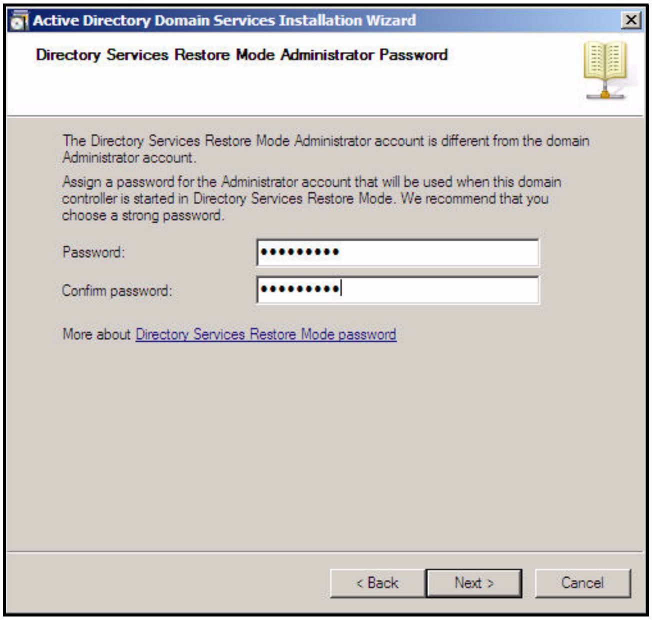
Log files folder: C:\Windows\NTDS

SYSVOL folder: C:\Windows\SYSVOL

More about placing Active Directory Domain Services files

Figure AD-24.Active Directory Domain Services Installation Wizard—Locations Page

20. Accept the default folder locations for all three settings and click **Next**.



Active Directory Domain Services Installation Wizard

Directory Services Restore Mode Administrator Password

The Directory Services Restore Mode Administrator account is different from the domain Administrator account.

Assign a password for the Administrator account that will be used when this domain controller is started in Directory Services Restore Mode. We recommend that you choose a strong password.

Password: ••••••••••

Confirm password: ••••••••••

More about Directory Services Restore Mode password

Figure AD-25.Active Directory Domain Services Installation Wizard—Administrator Password Page

21. In the **Password** and **Confirm password** fields, type an administrator password for the **Directory Services Restore mode**. In this example, type **ProCurve0** and click **Next**.

    Best practice dictates that this password be different from the Windows Server 2008 administrator password. Your password must include both capitol and lower case letters as well as either a number or a symbol character. If you do not meet these rules, a warning will be displayed, and you will be forced to choose another password.

22. In the **Summary** page, click **Next**.

23. Select the **Reboot on completion** check box.

24. In the **Completing Active Directory Domain Services Installation Wizard** page, click **Finish**.

Configure Windows Domain Groups

You must create groups for the users who are authorized to access your network. When a RADIUS server authenticates a user, it can check the user's group membership and use that information to apply the correct policies to the user's network access.

By default, Active Directory includes a number of groups such as the Domain Admins and Domain Users groups. You can use these default groups and also create new groups for your specific network. For the example ProCurve University network, the network administrators have decided to create three additional groups for users:

- Network_Admins
- Faculty
- Students

Users can have more than one group membership. For example, all members of the groups listed above will also be members of the Domain Users group. The groups listed above, however, are the groups that IDM will use to determine which rights to grant users.

In addition, you must create a NAP client computers group, which includes all the endpoints with which users access the network. Other devices such as servers are members of the Domain Computers group.

Note

In this solution, the network provides wireless guest access. However, accounts for guests are configured on the Wireless Edge Services Module rather than in Active Directory.

Complete these steps to configure the AD groups:

1. From the Windows **Start** menu, click **Administrative Tools > Active Directory Users and Computers**.
2. Expand the domain.

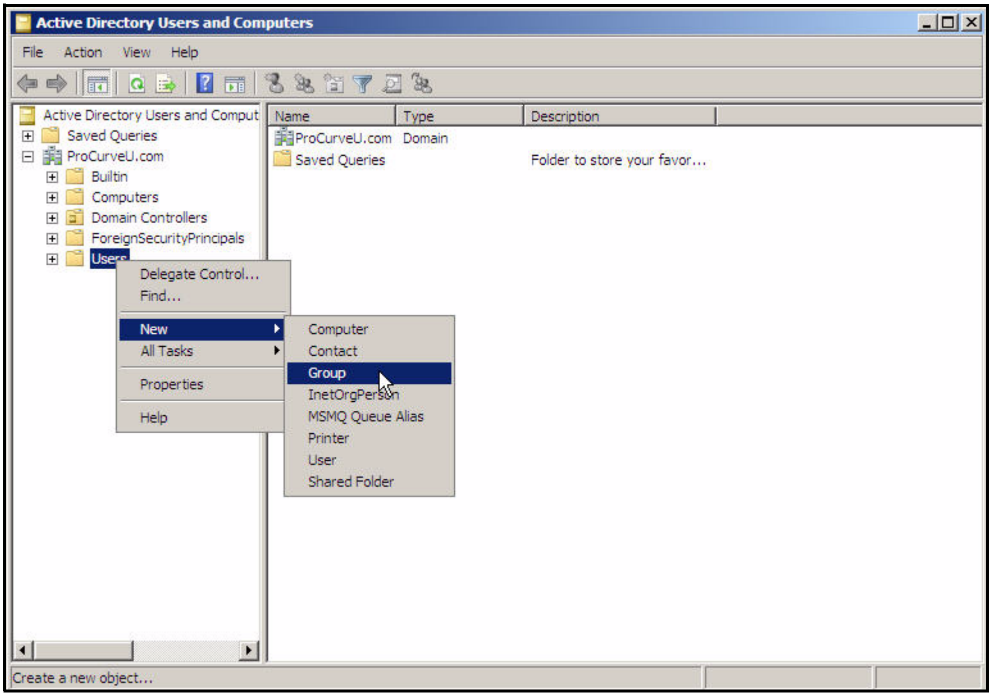
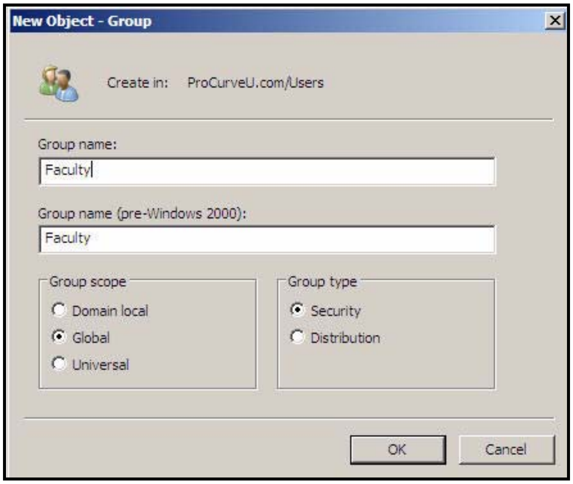


Figure AD-26.Windows Server 2008—Active Directory Users and Computers Window (Add New Group)

3. In the left pane, right-click **Users** and select **New > Group**.



New Object - Group

Create in: ProCurveU.com/Users

Group name:
Faculty

Group name (pre-Windows 2000):
Faculty

Group scope
○ Domain local
● Global
○ Universal

Group type
● Security
○ Distribution

Figure AD-27.Windows Server 2008—New Object – Group Window

4. For **Group name**, type the group name. In this example, type **Faculty**.

5. Accept the default setting of **Global** for the **Group scope** and **Security** for the **Group type**.

   The **Global** setting ensures that the groupapplies to the entire domain. The group can contain only members of its own domain, but it can be granted permissions to other domains in the same Microsoft forest.

   The **Security** setting allows you to create groups that will control privileges for users. Any group that affects network access should be a security group. (The **Distribution** setting, on the other hand, is used for email distribution lists.) Formore information about these settings, refer toyour Microsoft documentation.

6. Click **OK**.

7. Repeat steps 3 to 6 to create additional groups.

   For the example ProCurve University network, you would create these additional groups:

   - Network_Admins
   - Students

Configure Windows Domain Users

Next, you should create users and assign the users to the appropriate groups. Table AD-4 shows several users for the example ProCurve University network. Of course, you would create many more users for a production network.

Table AD-4. Windows Domain Users

First Name	Last Name	Logon Name (Username)	Password	Group Membership
Administrator	—a default user	Administrator	ProCurve0	Domain Admins
Switch	Administrator	adminswitch	ProCurve1	Network_Admins
Wireless	Administrator	adminwireless	ProCurve2	Network_Admins
Pauline	Professor	professor	ProCurve3	Faculty
Sam	Student	student	ProCurve4	Students

Note

The passwords listed in Table AD-4 are for a test network only. The passwords are easy to remember, but they do not meet the security requirements for a production network. For your network, you should create passwords that meet stringent security requirements. For example, passwords should not include dictionary words, you should always change default passwords, and you should include numerals and special characters.

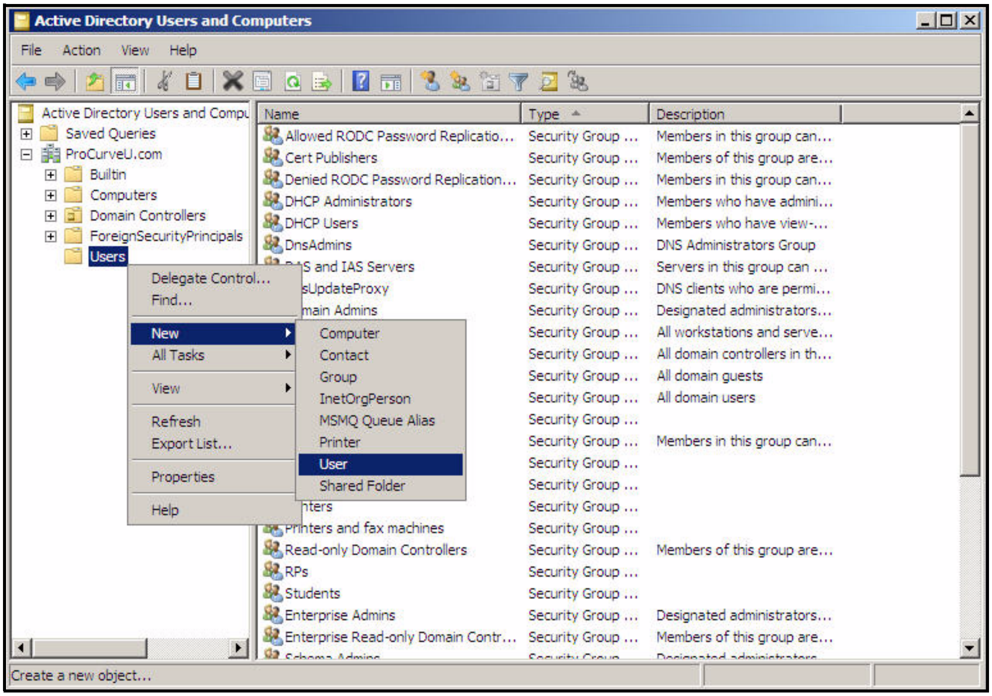
You can enter information about your users in Table AD-5.

Table AD-5. My Windows Domain Users

First Name	Last Name	Logon Name (Username)	Password	Group Membership

Follow these steps to add a user:

1. From the Windows **Start** menu, select **Administrative Tools > Active Directory Users and Computers**.
2. Expand your domain.

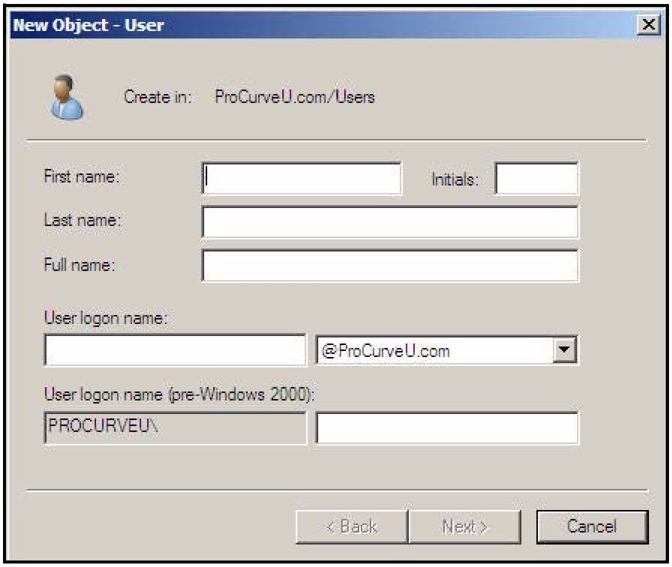


Name	Type	Description
Allowed RODC Password Replicatio...	Security Group ...	Members in this group can...
Cert Publishers	Security Group ...	Members of this group are...
Denied RODC Password Replication...	Security Group ...	Members in this group can...
DHCP Administrators	Security Group ...	Members who have admini...
DHCP Users	Security Group ...	Members who have view-...
DnsAdmins	Security Group ...	DNS Administrators Group
S and IAS Servers	Security Group ...	Servers in this group can ...
sUpdateProxy	Security Group ...	DNS clients who are permi...
main Admins	Security Group ...	Designated administrators...
	Security Group ...	All workstations and serve...
	Security Group ...	All domain controllers in th...
	Security Group ...	All domain guests
	Security Group ...	All domain users
	Security Group ...	
	Security Group ...	Members in this group can...
	Security Group ...	
	Security Group ...	
nters	Security Group ...	
Printers and fax machines	Security Group ...	
Read-only Domain Controllers	Security Group ...	Members of this group are...
RPs	Security Group ...	
Students	Security Group ...	
Enterprise Admins	Security Group ...	Designated administrators...
Enterprise Read-only Domain Contr...	Security Group ...	Members of this group are...
Schema Admins	Security Group	Designated administrators

Create a new object...

Figure AD-28.Windows Server 2008—Active Directory Users and Computers Window (Add New User)

3. In the left pane, right-click the **Users** folder and select **New > User**.



Create in: ProCurveU.com/Users

@ProCurveU.com

PROCURVEU\

Figure AD-29.Windows Server 2008—New Object—User Name Window

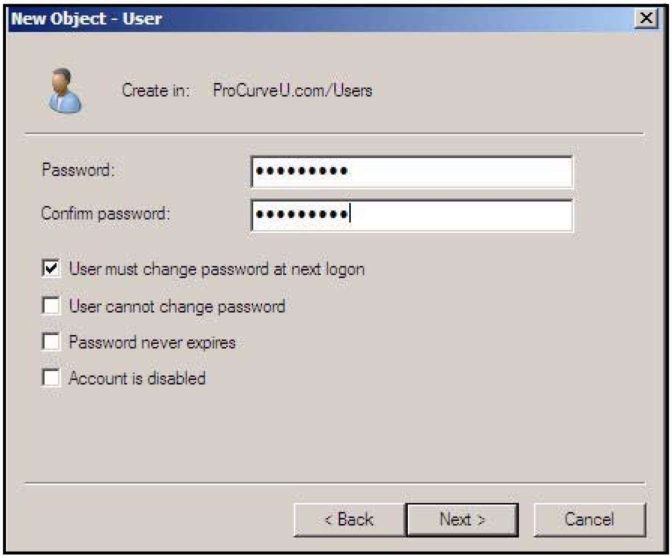
4. For **First name**, type the user's first name.

5. For **Last name**, type the user's last name.

6. For **User logon name**, type the user's username.

   This is the name that the user (or supplicant on a device) submits as part of 802.1X authentication.

7. Click **Next**.



New Object - User

Create in: ProCurveU.com/Users

Password: ••••••••••

Confirm password: ••••••••••

☑ User must change password at next logon

□ User cannot change password

□ Password never expires

□ Account is disabled

Figure AD-30.Windows Server 2008—New Object—User Password Window

8. In the **Password** and **Confirm password** boxes, type the user's (or device's) password.

   Select any password requirements.

   Typically, a user should be forced to change the password the first time that he or she logs in (so that no one else knows the password) and every few weeks after that.

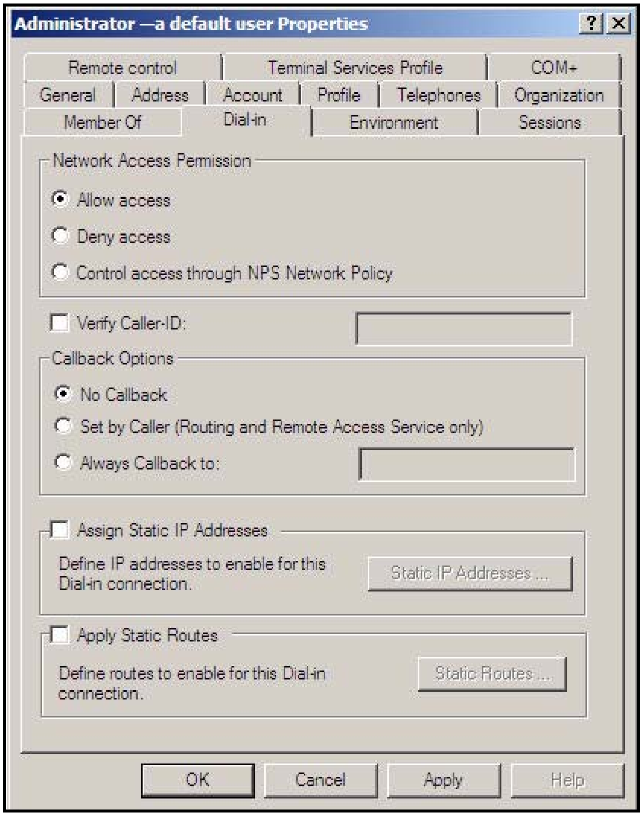
   If you are defining password requirements for a device instead of a user, do not select the **User must change password at next logon** check box, and select the **Password never expires** check box.

9. Click **Next**.

10. Click **Finish** on the **Summary** page.

11. In the right pane of the **Active Directory Users and Computers** window, right-click the newly created user and click **Properties**.

12. Click the **Dial-in** tab.



Administrator —a default user Properties

Network Access Permission

● Allow access

○ Deny access

○ Control access through NPS Network Policy

□ Verify Caller-ID:

Callback Options

● No Callback

○ Set by Caller (Routing and Remote Access Service only)

○ Always Callback to:

□ Assign Static IP Addresses

Define IP addresses to enable for this Dial-in connection.

□ Apply Static Routes

Define routes to enable for this Dial-in connection.

Figure AD-31.Windows Server 2008—*<username>* Properties Window—Dial-in Tab

13. For **Network Access Permission**, select **Control access through NPS Network Policy**.

14. Click the **Member Of** tab and click **Add**.

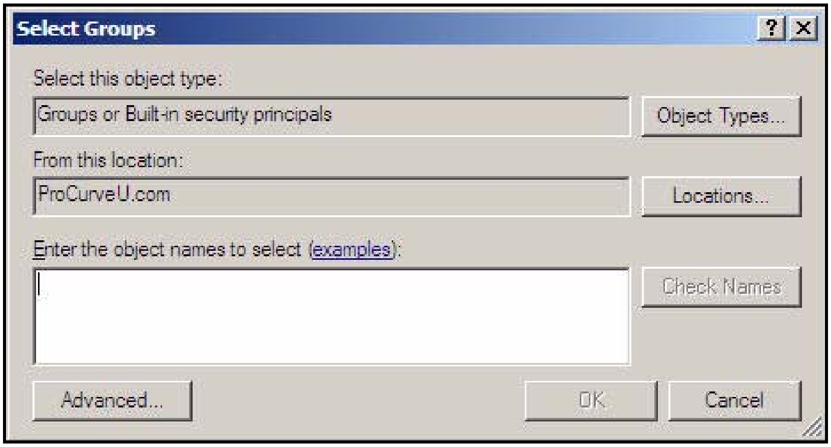


Figure AD-32.Windows Server 2008—*<username>* Properties—Select Groups Window

15. In the **Enter the object names to select** field, type the name of the appropriate group. For example, for Pauline Professor in the PCU network, you would type **Faculty**.
16. Click **Check Names**. If the group name is valid, it will be underlined.
17. Click **OK**.
18. The group is displayed in the **Member Of** window. Click **OK** to apply the changes.
19. Press **[Alt] + [F4]** to close the **Active Directory Users and Computers** window.

Configure DNS Services

Active Directory relies on DNS for several services. For example, endpoints send DNS requests to locate the domain controllers. This section describes how to configure the DNS services necessary for Active Directory. Specifically, you will create reverse lookup zones for each subnet in your network. Table AD-6 displays the zones for the example network.

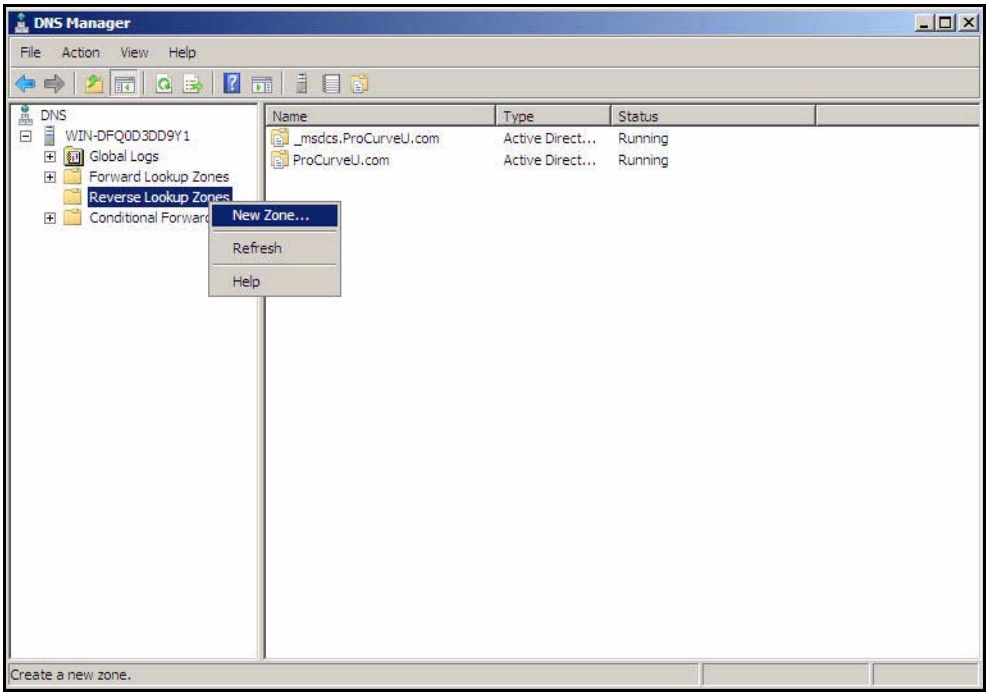
Note that when you type a reverse lookup zone in the Windows New Zone Wizard, you type it in non-reversed form. For example, for subnet 10.2.0.0/16, you type 10.2. The wizard automatically reverses the zone.

Table AD-6. Reverse Lookup Zones

VLAN	Subnet	Reverse Lookup Zone
2	10.2.0.0/16	10.2
4	10.4.0.0/16	10.4
5	10.5.0.0/16	10.5
8	10.8.0.0/16	10.8
9	10.9.0.0/16	10.9
10	10.10.0.0/16	10.10
12	10.12.0.0/16	10.12
32	10.32.0.0/16	10.32

Complete these steps on the Windows 2008 Server that acts as domain controller:

1. From the Windows **Start** menu, click **Administrative Tools > DNS**.



Name	Type	Status
_msdcs.ProCurveU.com	Active Direct...	Running
ProCurveU.com	Active Direct...	Running

Figure AD-33.Windows Server 2008—DNS Manager Window

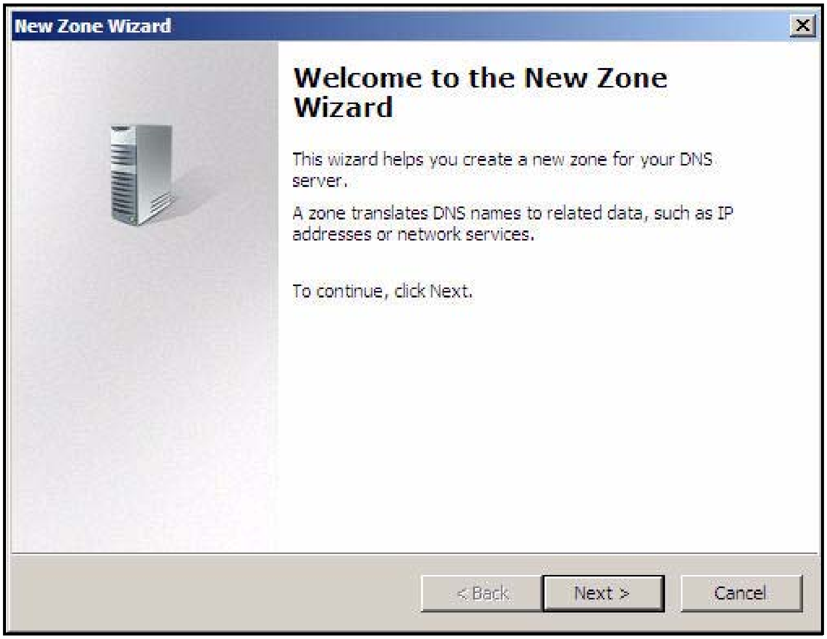
2. In the left pane, expand your server.
3. In the left pane, click.
4. Right-click **Reverse Lookup Zones** and click **New Zone**.

Note

If **New Zones** is not an available option, check that the DNS service is running by clicking **Forward Lookup Zones** in the left pane. The **Status** column for your domain should list **Running**.

If the service is not running:

a. Right-click the domain name.
b. Select **All Tasks** > **Start**.



New Zone Wizard

Welcome to the New Zone Wizard

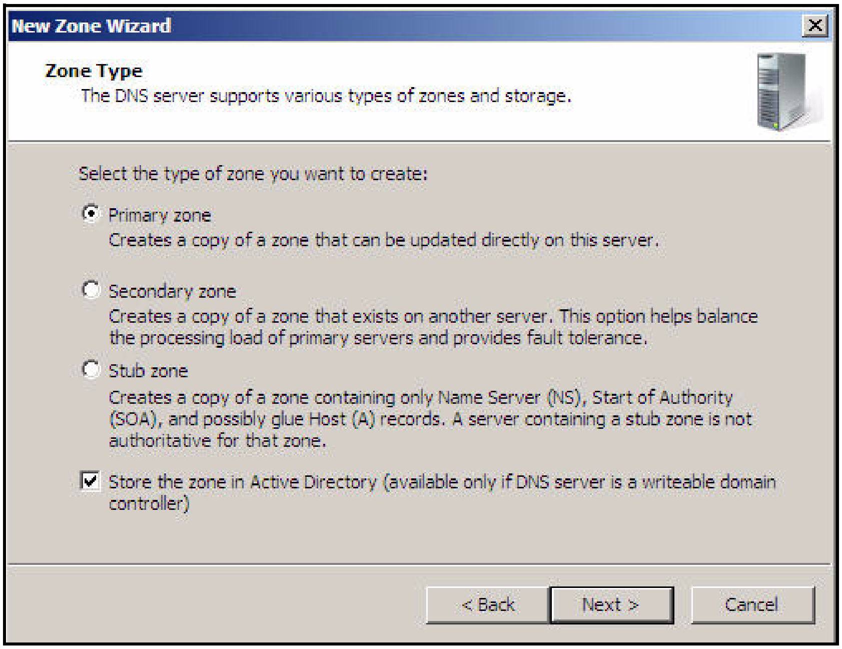
This wizard helps you create a new zone for your DNS server.

A zone translates DNS names to related data, such as IP addresses or network services.

To continue, click Next.

Figure AD-34.New Zone Wizard—Welcome to the New Zone Wizard Page

5. On the **Welcome to the New Zone Wizard** page, click **Next**.



Zone Type
The DNS server supports various types of zones and storage.

Select the type of zone you want to create:

● Primary zone
Creates a copy of a zone that can be updated directly on this server.

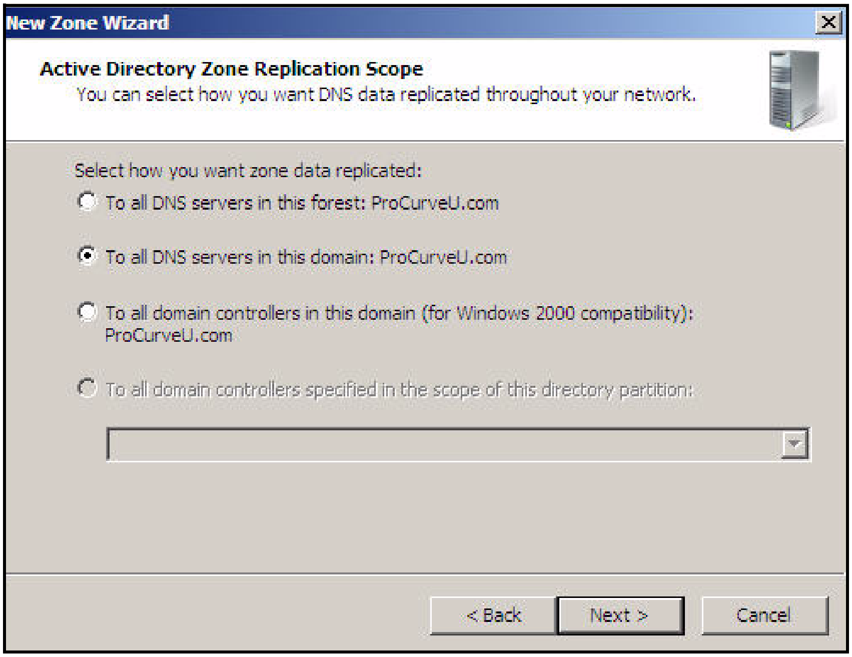
○ Secondary zone
Creates a copy of a zone that exists on another server. This option helps balance the processing load of primary servers and provides fault tolerance.

○ Stub zone
Creates a copy of a zone containing only Name Server (NS), Start of Authority (SOA), and possibly glue Host (A) records. A server containing a stub zone is not authoritative for that zone.

☑ Store the zone in Active Directory (available only if DNS server is a writeable domain controller)

Figure AD-35.New Zone Wizard—Zone Type Page

6. Verify that **Primary zone** is selected and that the **Store the zone in Active Directory** check box is selected. Click **Next**.



New Zone Wizard

Active Directory Zone Replication Scope

You can select how you want DNS data replicated throughout your network.

Select how you want zone data replicated:

○ To all DNS servers in this forest: ProCurveU.com

● To all DNS servers in this domain: ProCurveU.com

○ To all domain controllers in this domain (for Windows 2000 compatibility): ProCurveU.com

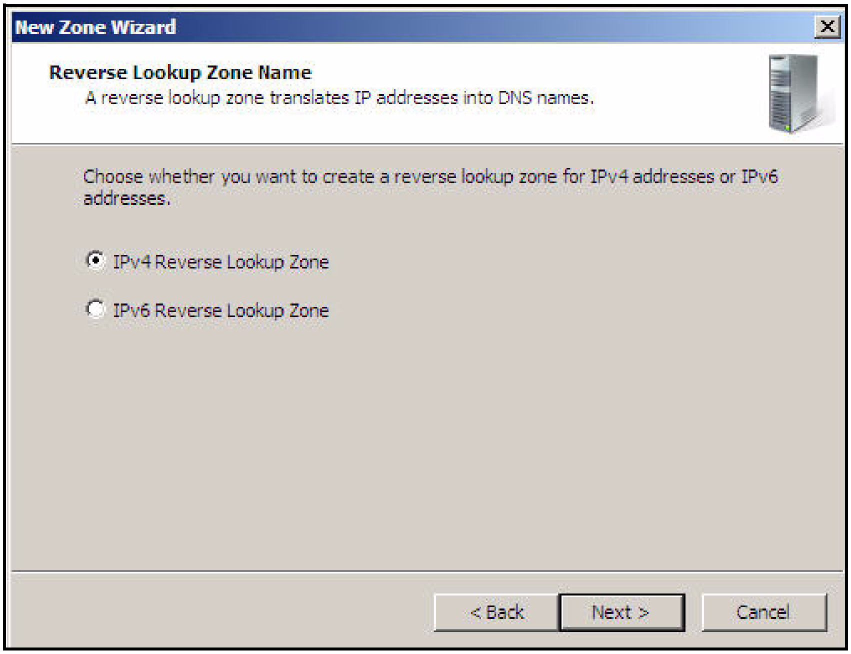
○ To all domain controllers specified in the scope of this directory partition:

Figure AD-36.New Zone Wizard—Active Directory Zone Replication Scope Page

7. Select **To all DNS servers in this domain**.

   If your domain includes Windows 2000 domain controllers, select **To all domain controllers in this domain (for Windows 2000 compatibility): <name>**

8. Click **Next**.



Reverse Lookup Zone Name

A reverse lookup zone translates IP addresses into DNS names.

Choose whether you want to create a reverse lookup zone for IPv4 addresses or IPv6 addresses.

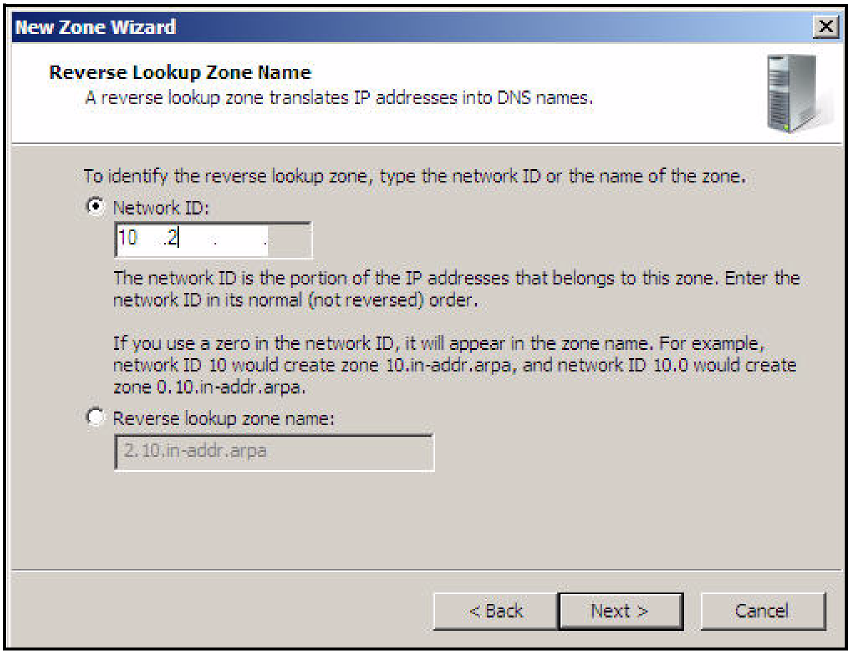
● IPv4 Reverse Lookup Zone

○ IPv6 Reverse Lookup Zone

Figure AD-37.New Zone Wizard—Reverse Lookup Zone Name Page

9. Select the IPversion for thereverse lookup zone. If youplan to offer both IPv4 and IPv6 access to your network, you will need to create a reverse lookup zone for each version. In this example, select **IPv4 Reverse Lookup Zone**.

10. Click **Next**.



New Zone Wizard

Reverse Lookup Zone Name
A reverse lookup zone translates IP addresses into DNS names.

To identify the reverse lookup zone, type the network ID or the name of the zone.

● Network ID:
10 .2 . .

The network ID is the portion of the IP addresses that belongs to this zone. Enter the network ID in its normal (not reversed) order.

If you use a zero in the network ID, it will appear in the zone name. For example, network ID 10 would create zone 10.in-addr.arpa, and network ID 10.0 would create zone 0.10.in-addr.arpa.

○ Reverse lookup zone name:
2.10.in-addr.arpa

Figure AD-38.New Zone Wizard—Reverse Lookup Zone Name Page

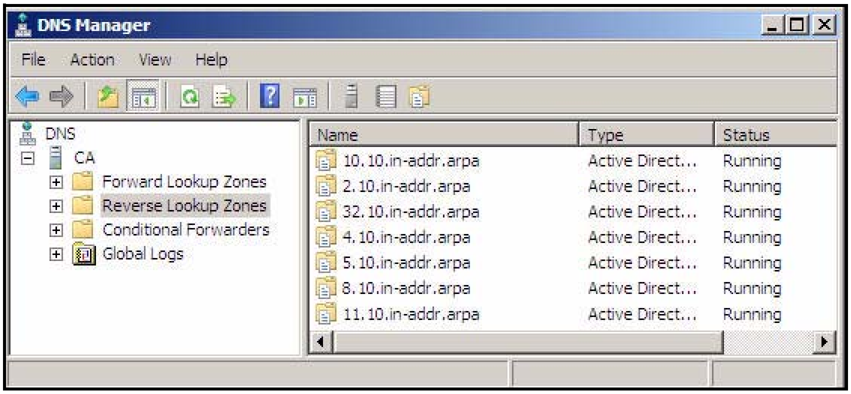
11. Type the significant portion of the network address in the **Network ID** box.

    The significant portion of the address includes the network (as opposed to the host) portion of the address—typically, the non-zero octets. For example, the first two octets are significant in a /16 subnet (255.255.0.0). The first three octets are significant in a /24 (255.255.255.0) subnet.

    Leave the space for octets that are not significant blank. Do not enter 0s.

12. Click **Next**.
13. Select **Allow only secure dynamic updates** and click **Next**.
14. Click **Finish**.
15. Repeat steps 5 to 14 for each subnet in your domain.

    Figure AD-39 displays the reverse lookup zones for the example network.



Name	Type	Status
10.10.in-addr.arpa	Active Direct...	Running
2.10.in-addr.arpa	Active Direct...	Running
32.10.in-addr.arpa	Active Direct...	Running
4.10.in-addr.arpa	Active Direct...	Running
5.10.in-addr.arpa	Active Direct...	Running
8.10.in-addr.arpa	Active Direct...	Running
11.10.in-addr.arpa	Active Direct...	Running

Figure AD-39.Windows Server 2008—DNS Manager > Reverse Lookup Zones Page (Zones Added)

16. Press [**Alt**]+[**F4**] to close the **DNS Manager** window.

Configuring the DHCP Server

Your DHCP server (or servers) must include scopes (also called pools) for each subnet for which devices request dynamic IP addresses. For this solution, these subnets include:

- User VLANs
- Computer VLAN
- The VLAN for non-compliant endpoints

For security purposes, the management VLAN does not use dynamic IP addresses. If a network administrator wants to connect to the management VLAN, he or she must configure a static IP address on their management station. All servers in the example network have static addresses, so VLANs 4 and 5 do not require DHCP scopes either.

Table AD-7 displays settings for DHCP scopes in this network. Note that the range of IP addresses in each scope does not include all IP addresses available in the corresponding subnet. Some addresses are statically assigned to various network devices; others are reserved for future use.

Note also that the DHCP scope for the Computer VLAN has the shortest possible lease time (here, 1 minute). This setting ensures that the computer will obtain an IP address in the dynamic VLAN assigned to the computer after the user logs in.

Table AD-7. DHCP Scopes

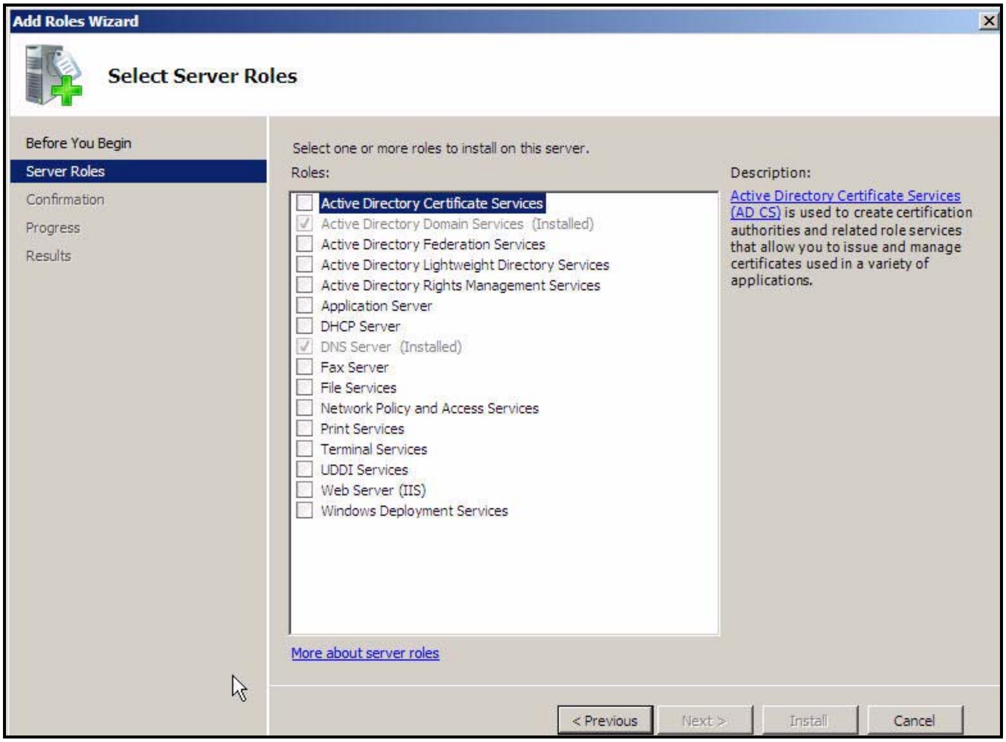
Scope	VLAN	Subnet	Range	Lease	Default Gateway	DNS Server	Other Options
Faculty	8	10.8.0.0/16	10.8.1.1–10.8.10.254	8 days	10.8.0.1	10.4.4.15	domain name= procurveu.edu
Computer	9	10.9.0.0/16	10.9.1.1-10.9.20.254	1 minute	10.9.0.1	10.4.4.15	domain name= procurveu.edu
Students	10	10.10.0.0/16	10.10.1.1–10.10.10.254	8 days	10.10.0.1	10.4.4.15	domain name= procurveu.edu
Guests	11	10.11.0.0/16	10.11.1.1–10.11.10.254	8 days	10.11.0.1	10.4.4.15	domain name= procurveu.edu
Quarantine	32	10.32.0.0/16	10.32.1.1–10.32.2.254	8 days	10.32.0.1	10.4.4.15	domain name= procurveu.edu

You can configure the scopes on any DHCP server. The following sections describe how to set up a Windows Server 2008 DHCP server.

Install the DHCP Service

Follow these steps to install the DHCP service on Windows Server 2008:

1. Access the **Add Roles Wizard**. See step 2 on page AD-21.



Select one or more roles to install on this server.

Roles:

- □ Active Directory Certificate Services
- ☑ Active Directory Domain Services (Installed)
- □ Active Directory Federation Services
- □ Active Directory Lightweight Directory Services
- □ Active Directory Rights Management Services
- □ Application Server
- □ DHCP Server
- ☑ DNS Server (Installed)
- □ Fax Server
- □ File Services
- □ Network Policy and Access Services
- □ Print Services
- □ Terminal Services
- □ UDDI Services
- □ Web Server (IIS)
- □ Windows Deployment Services

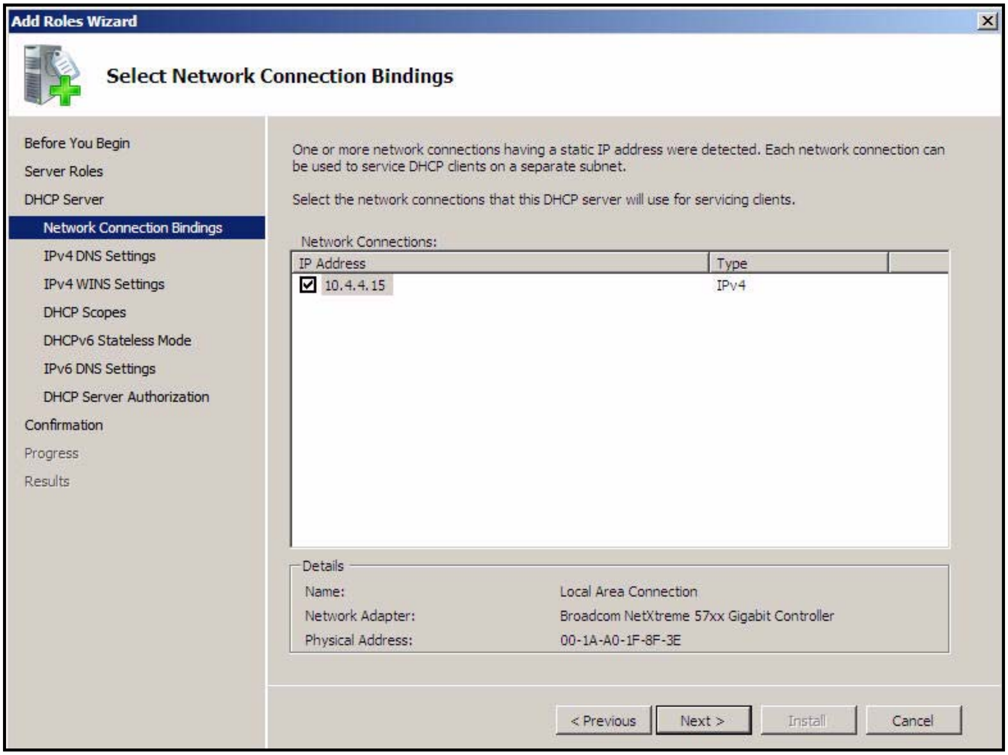
Description:

Active Directory Certificate Services (AD CS) is used to create certification authorities and related role services that allow you to issue and manage certificates used in a variety of applications.

Figure AD-40.Add Roles Wizard—Select Server Roles

2. Select the **DHCP Server** check box and click **Next**.

3. In the **Introduction to DHCP Server** page, click **Next**.



Add Roles Wizard

Select Network Connection Bindings

One or more network connections having a static IP address were detected. Each network connection can be used to service DHCP clients on a separate subnet.

Select the network connections that this DHCP server will use for servicing clients.

Network Connections:

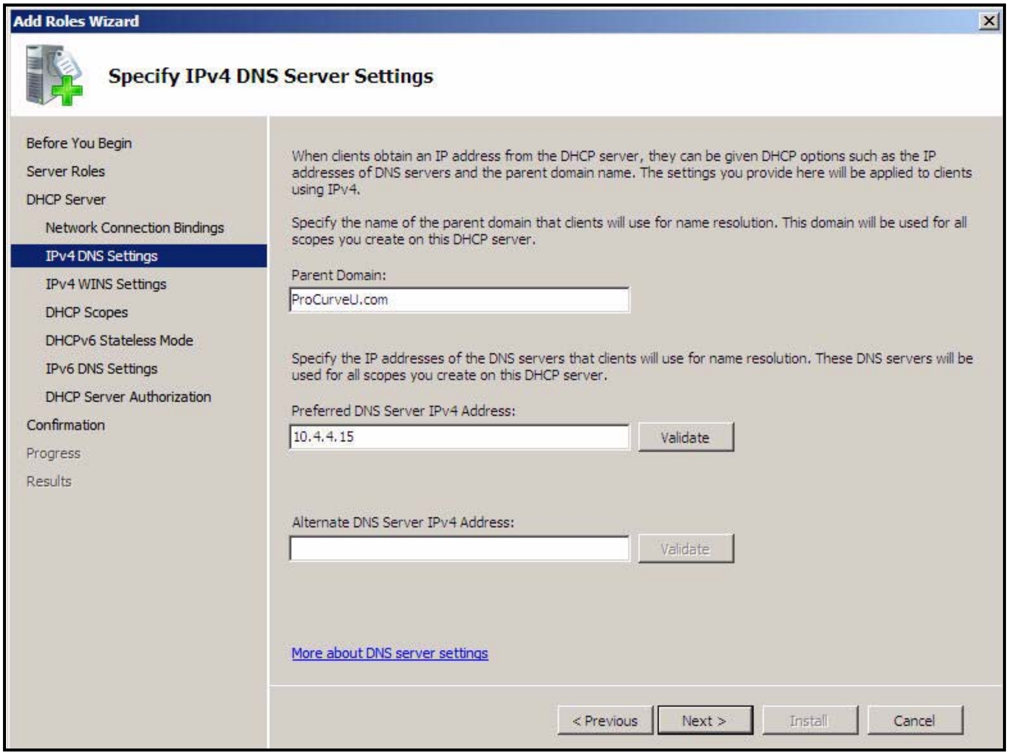
IP Address	Type
☑ 10.4.4.15	IPv4

Details

Name:	Local Area Connection
Network Adapter:	Broadcom NetXtreme 57xx Gigabit Controller
Physical Address:	00-1A-A0-1F-8F-3E

Figure AD-41.Add Roles Wizard—Select Network Connection Bindings Page

4. Verify that the selected IP address is the address your DHCP server will use. Click **Next**.



When clients obtain an IP address from the DHCP server, they can be given DHCP options such as the IP addresses of DNS servers and the parent domain name. The settings you provide here will be applied to clients using IPv4.

Specify the name of the parent domain that clients will use for name resolution. This domain will be used for all scopes you create on this DHCP server.

Parent Domain: ProCurveU.com

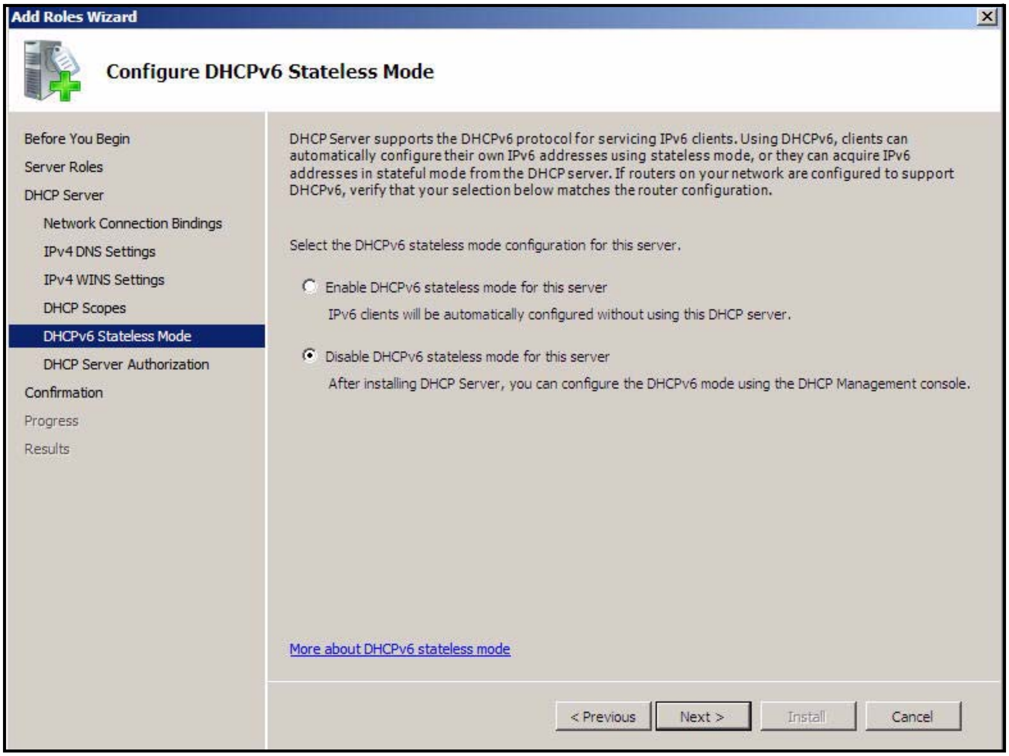
Specify the IP addresses of the DNS servers that clients will use for name resolution. These DNS servers will be used for all scopes you create on this DHCP server.

Preferred DNS Server IPv4 Address: 10.4.4.15

Alternate DNS Server IPv4 Address:

Figure AD-42.Add Roles Wizard—Specify IPv4 DNS Server Settings

5. Verify that the **Parent Domain** and **Preferred DNS Server IPv4 Address** settings are correct. Click **Next**.
6. In the **Specify IPv4 WINS Server Settings** page, select **WINS is not required for applications on this network** and click **Next**.
7. In the **Add or Edit DHCP Scopes** page, click **Next**. Scopes can be added from this page, but you will add them later in the chapter.



DHCP Server supports the DHCPv6 protocol for servicing IPv6 clients. Using DHCPv6, clients can automatically configure their own IPv6 addresses using stateless mode, or they can acquire IPv6 addresses in stateful mode from the DHCP server. If routers on your network are configured to support DHCPv6, verify that your selection below matches the router configuration.

Select the DHCPv6 stateless mode configuration for this server.

○ Enable DHCPv6 stateless mode for this server
IPv6 clients will be automatically configured without using this DHCP server.

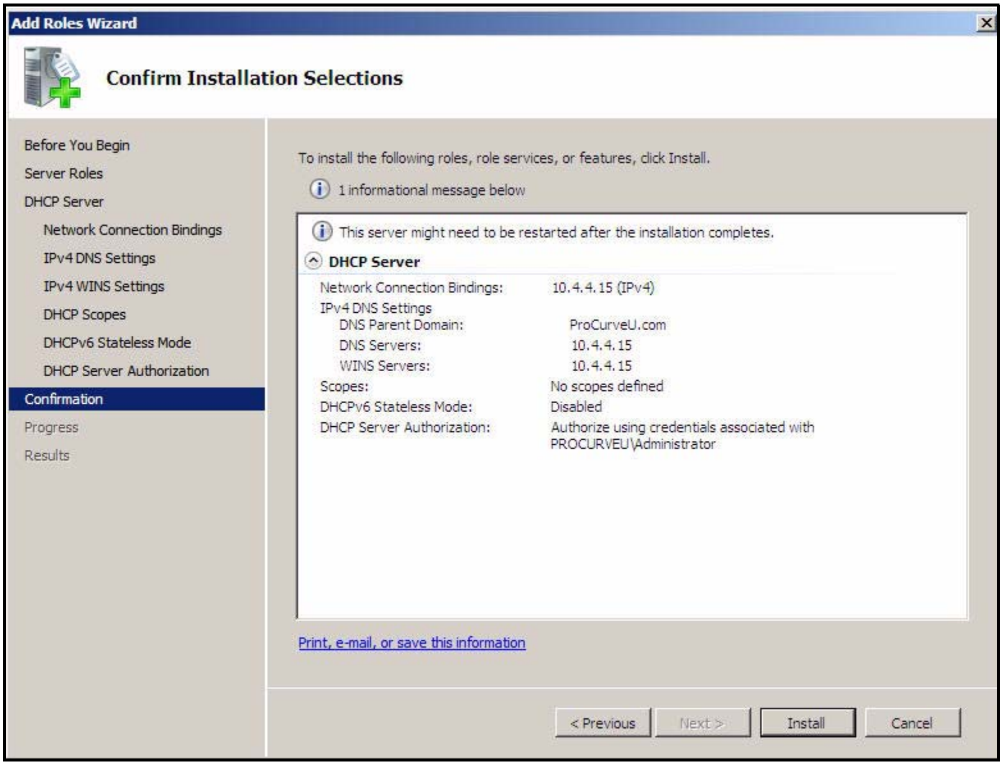
● Disable DHCPv6 stateless mode for this server
After installing DHCP Server, you can configure the DHCPv6 mode using the DHCP Management console.

Figure AD-43.Add Roles Wizard—Configure DHCPv6 Stateless Mode Page

8. Enable or disable DHCPv6 stateless mode for this server. For this example, select **Disable DHCPv6 stateless mode for this server**.

9. Click **Next**.

10. In the **Authorize DHCP Server** page, accept the default **Use the current credentials** and click **Next**.



To install the following roles, role services, or features, click Install.

1 informational message below

This server might need to be restarted after the installation completes.

DHCP Server

```
Network Connection Bindings:      10.4.4.15 (IPv4)
IPv4 DNS Settings
    DNS Parent Domain:               ProCurveU.com
    DNS Servers:                     10.4.4.15
    WINS Servers:                    10.4.4.15
Scopes:                           No scopes defined
DHCPv6 Stateless Mode:            Disabled
DHCP Server Authorization:        Authorize using credentials associated with
                                  PROCURVEU\Administrator
```

Print, e-mail, or save this information

Figure AD-44.Add Roles Wizard—Confirm Installation Selections

11. Verify the installation selections and click **Install**.
12. Press [**Alt**]+[**F4**] to close the **Add or Remove Programs** window.

Configure the DHCP Server

Follow these steps to authorize the DHCP in Active Directory and create the DHCP scopes:

1. From the **Start** menu, click **Administrative Tools > DHCP**.

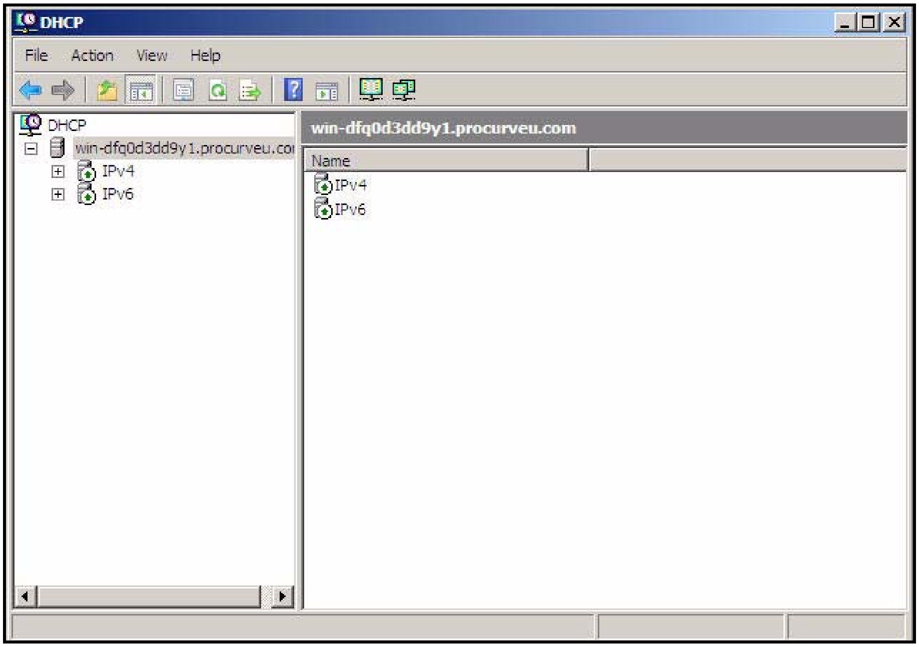
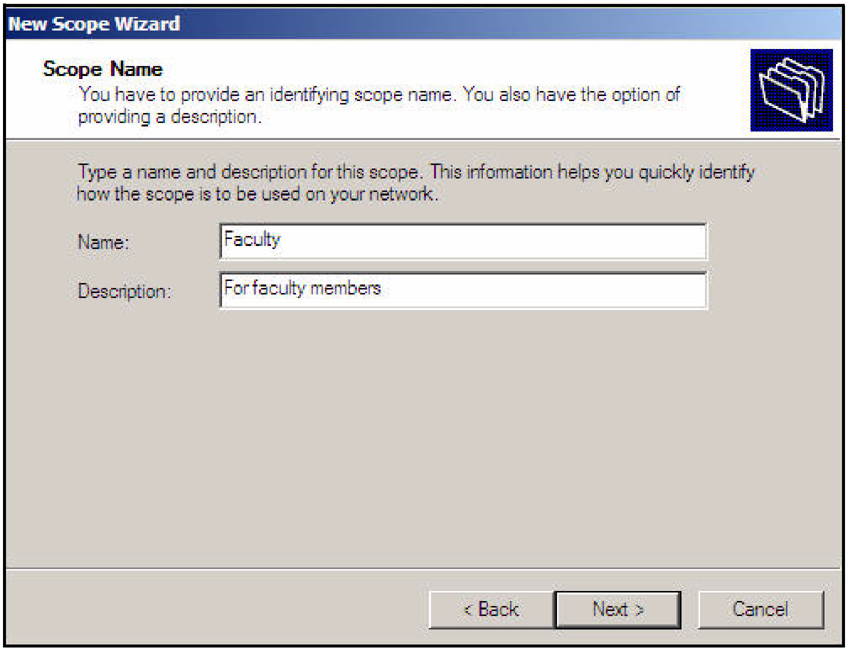


Figure AD-45.Windows Server 2008—DHCP Manager

2. Expand the server name

3. Right-click IPv4 or IPv6 and select **New Scope**. In this example, right-click **IPv4**. The New Scope Wizard is displayed.

4. In the **Welcome to the New Scope Wizard** page, click **Next**.



New Scope Wizard

Scope Name

You have to provide an identifying scope name. You also have the option of providing a description.

Type a name and description for this scope. This information helps you quickly identify how the scope is to be used on your network.

Name: Faculty

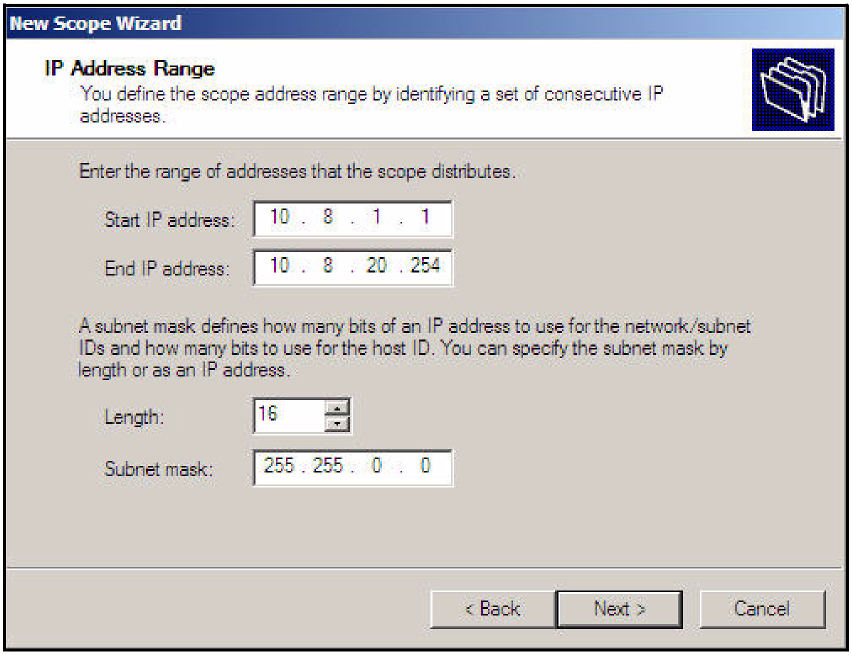
Description: For faculty members

Figure AD-46.New Scope Wizard—Scope Name Page

5. For **Name**, type a name for the scope. For example, to configure the first scope shown above, type **Faculty**.

6. If desired, describe the function of this scope in the **Description** box. For example, you might type **For faculty members**.

7. Click **Next**.



New Scope Wizard

IP Address Range

You define the scope address range by identifying a set of consecutive IP addresses.

Enter the range of addresses that the scope distributes.

Start IP address: 10 . 8 . 1 . 1

End IP address: 10 . 8 . 20 . 254

A subnet mask defines how many bits of an IP address to use for the network/subnet IDs and how many bits to use for the host ID. You can specify the subnet mask by length or as an IP address.

Length: 16

Subnet mask: 255 . 255 . 0 . 0

Figure AD-47.New Scope Wizard—IP Address Range Page

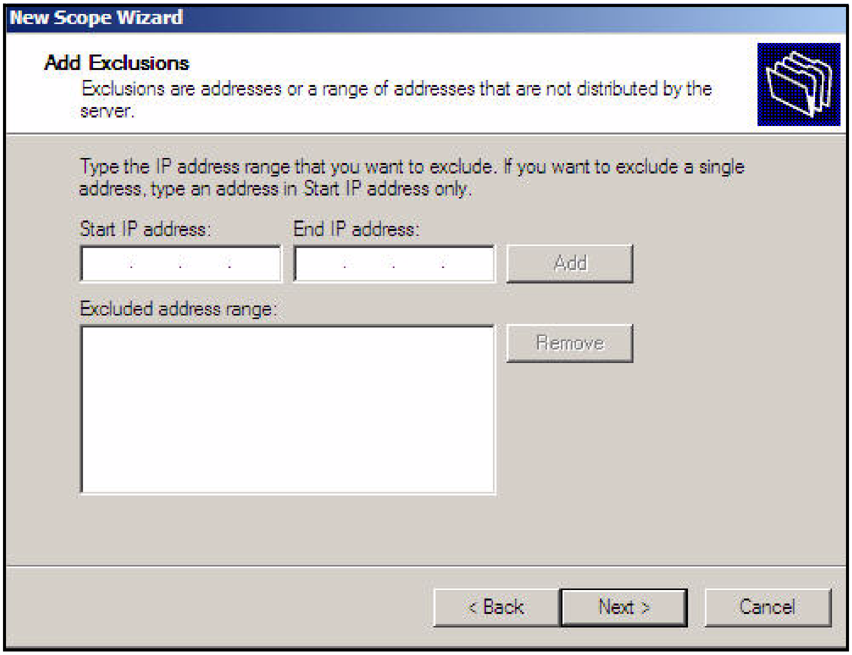
8. Type the range of IP addresses in the **Start IP address** and **End IP address** boxes. For the example network, type **10.8.1.1** and **10.8.20.254**.

9. Type the subnet prefix length in the **Length** box. For this example, type **16**.

   The **Subnet mask** box automatically fills with the correct value (here, **255.255.0.0**).

10. Click **Next**.

11. If the range you specified includes IP addresses that are assigned to devices statically, you must add exclusions in the **Add Exclusions** page.



New Scope Wizard

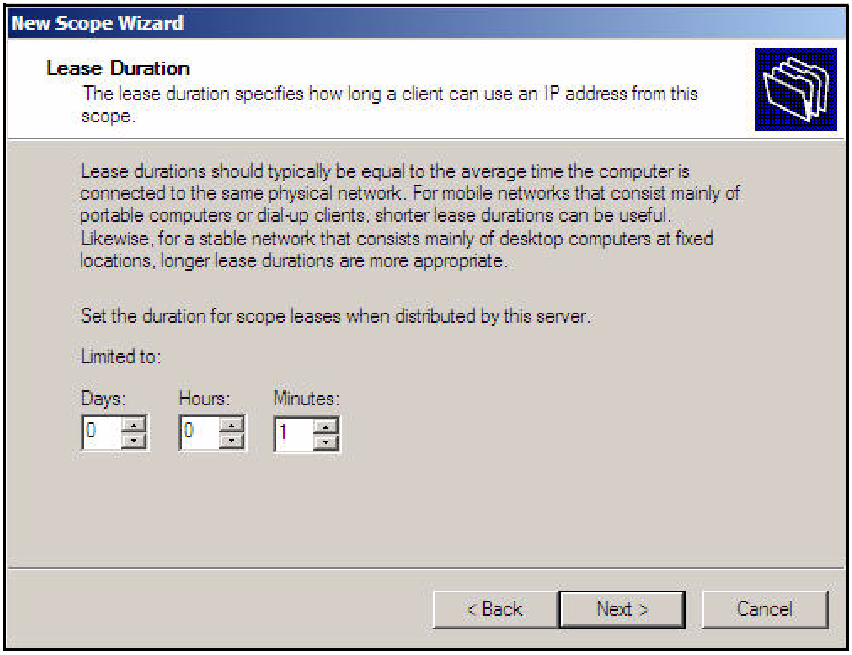
Add Exclusions

Exclusions are addresses or a range of addresses that are not distributed by the server.

Type the IP address range that you want to exclude. If you want to exclude a single address, type an address in Start IP address only.

Figure AD-48.New Scope Wizard—IP Exclusions Page

In this example scope, the range does not include the IP addresses assigned to network devices statically; therefore, you can click **Next**.


New Scope Wizard

Lease Duration

The lease duration specifies how long a client can use an IP address from this scope.

Lease durations should typically be equal to the average time the computer is connected to the same physical network. For mobile networks that consist mainly of portable computers or dial-up clients, shorter lease durations can be useful. Likewise, for a stable network that consists mainly of desktop computers at fixed locations, longer lease durations are more appropriate.

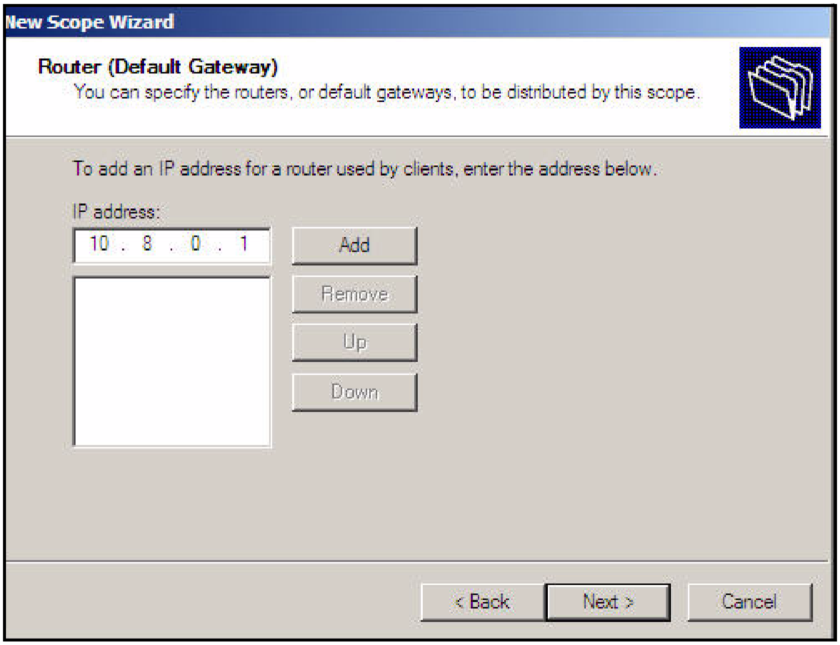
Set the duration for scope leases when distributed by this server.

Limited to:

Days: 0 Hours: 0 Minutes: 1

Figure AD-49.New Scope Wizard—Lease Duration Page

12. On the **Lease Duration** page, you can set how long a device can retain its IP address without renewing it. For the computer VLAN—VLAN 11 in this example—configure a short lease duration, such as 1 minute. For the other VLANs, accept the default setting of eight days.
13. Click **Next**.
14. Select **Yes, I want to configure these options now** and click **Next**.



New Scope Wizard

Router (Default Gateway)

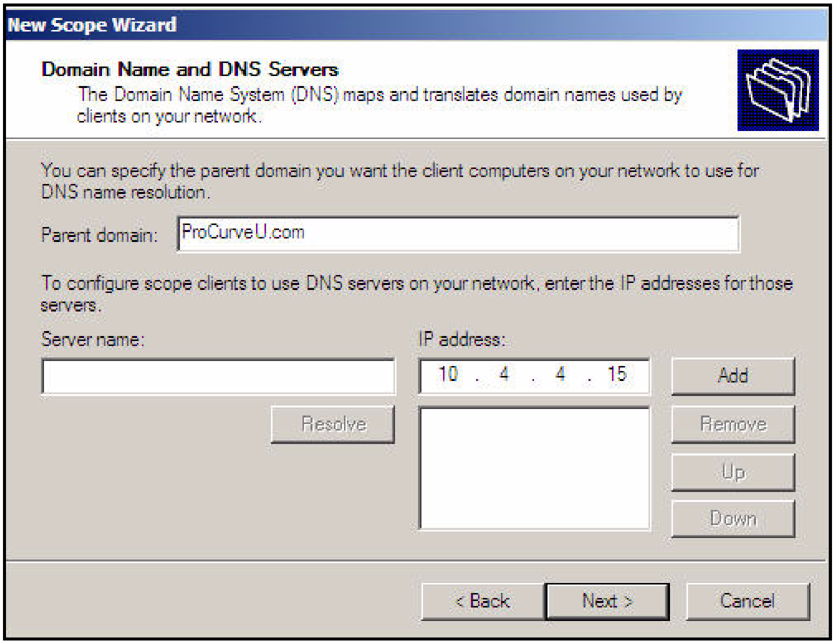
You can specify the routers, or default gateways, to be distributed by this scope.

To add an IP address for a router used by clients, enter the address below.

IP address: 10 . 8 . 0 . 1

Figure AD-50.New Scope Wizard—Router (Default Gateway) Page

15. For **IP address**, type the IP address of the subnet’s default router. For this example, type **10.8.0.1**.
16. Click **Add.**
17. Click **Next**.



New Scope Wizard

Domain Name and DNS Servers

The Domain Name System (DNS) maps and translates domain names used by clients on your network.

You can specify the parent domain you want the client computers on your network to use for DNS name resolution.

Parent domain: ProCurveU.com

To configure scope clients to use DNS servers on your network, enter the IP addresses for those servers.

Server name:

IP address: 10 . 4 . 4 . 15

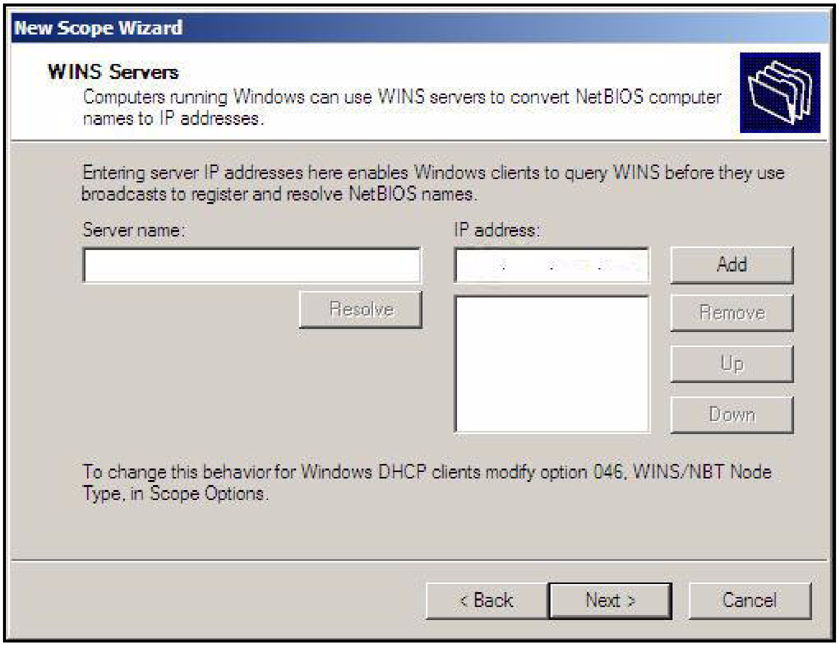
Figure AD-51.New Scope Wizard—Domain Name and DNS Servers Page

18. For **Parent domain**, type your organization’s domain name. For this example, type **ProCurveU.com**.

19. For **IP address**, type the IP address of the DNS server and click **Add**. For this example, type **10.4.4.15**.

    Repeat this step to add a secondary DNS server.

20. Click **Next**.



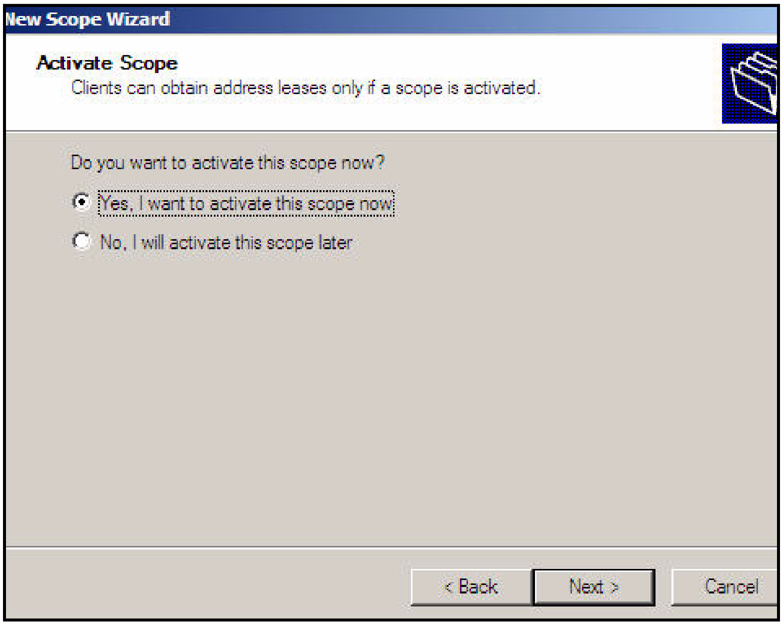
Computers running Windows can use WINS servers to convert NetBIOS computer names to IP addresses.

Entering server IP addresses here enables Windows clients to query WINS before they use broadcasts to register and resolve NetBIOS names.

To change this behavior for Windows DHCP clients modify option 046, WINS/NBT Node Type, in Scope Options.

Figure AD-52.New Scope Wizard—WINS Servers Page

21. Type the IP address of your network's WINS server (if any) in the **WINS server** box. Click **Add** and then click **Next**. In this example, the network does not use WINS.



New Scope Wizard

Activate Scope

Clients can obtain address leases only if a scope is activated.

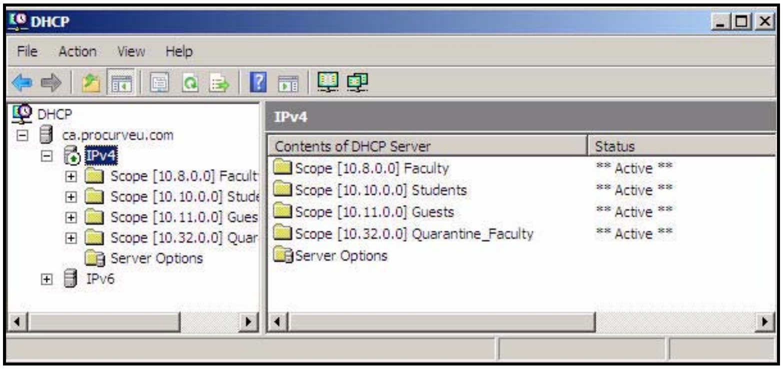
Do you want to activate this scope now?

● Yes, I want to activate this scope now

○ No, I will activate this scope later

Figure AD-53.New Scope Wizard—Activate Scope Page

22. Select **Yes, I want to activate this scope now** and click **Next**.



DHCP
- ca.procurveu.com
  - IPv4
    - Scope [10.8.0.0] Facult
    - Scope [10.10.0.0] Stude
    - Scope [10.11.0.0] Gues
    - Scope [10.32.0.0] Quar
    - Server Options
  - IPv6

IPv4

Contents of DHCP Server	Status
Scope [10.8.0.0] Faculty	** Active **
Scope [10.10.0.0] Students	** Active **
Scope [10.11.0.0] Guests	** Active **
Scope [10.32.0.0] Quarantine_Faculty	** Active **
Server Options	

23. **New Scope Wizard—WINS Servers Page**

24. Click **Finish**.

25. Repeat steps 3 to 24 for each scope that your network requires.

26. Close the **DHCP Manager** window.

Configuring Certificate Services

This section describes how to establish a PKI, which issues digital certificates for your organization's servers and users. Users can then complete EAP-Transport Layer Security (TLS) authentication and establish secure communications with your private servers.

You have several options for your PKI:

- Three tier:
  - A root CA, which is the ultimate trusted entity, and for security is kept offline (standalone)
  - Multiple intermediate CAs, which receive certificates from the root CA and issue certificates to issuing CAs; typically kept offline as well
  - Multiple issuing CAs, which are online (enterprise) and which issue certificates to servers, endpoints, and end-users
- Two tier:
  - A standalone root CA
  - Multiple issuing enterprise CAs
- One tier:
  - A root CA, which also issues certificates to servers, endpoints, and end-users; must be kept online (enterprise root CA)

A multi-tiered approach offers higher security but requires a more complex deployment.

This guide provides the steps for deploying a PKI using theone-tier approach. Certificate services run on a Windows Server 2008 server that is an online member of the Windows domain but is *not* a domain controller.

This section provides steps for:

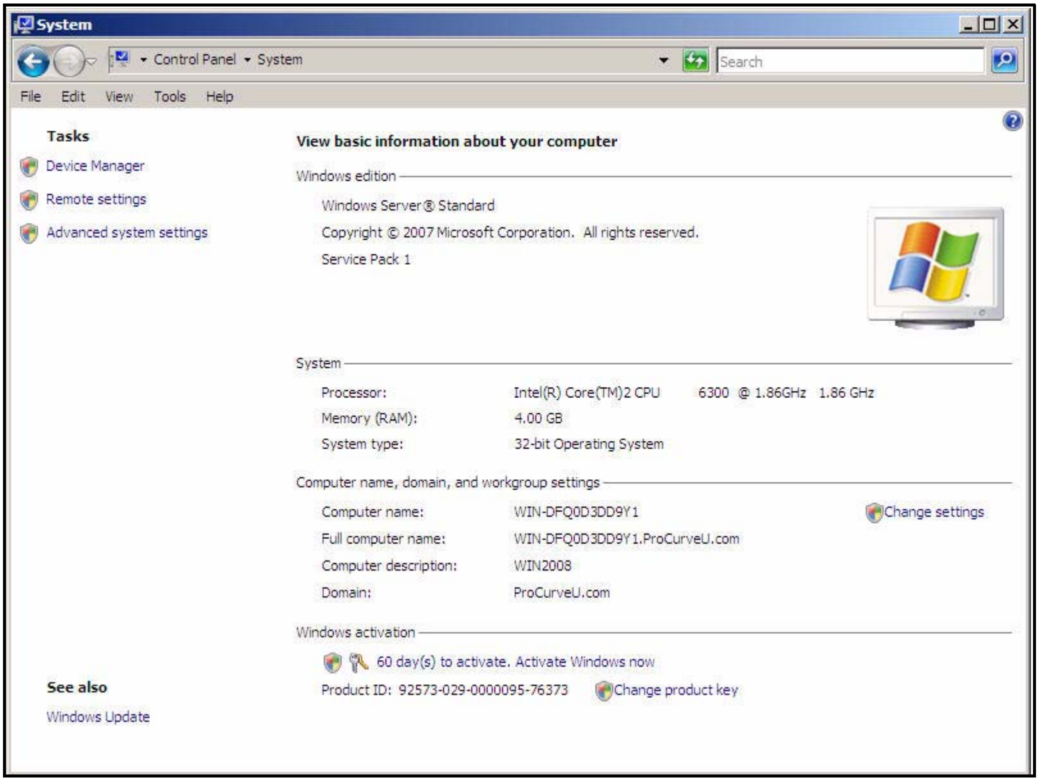
- Joining a server to a domain
- Installing Internet Information Services (IIS) on Windows Server 2008
- Installing certificate services on Windows Server 2008
- Exporting the CA root certificate

A subsequent section explains how to create a certificate request on the Wireless Edge Services Module. At that point, the guide explains how to submit the request to your domain CA and generate the server certificate. See "Obtain a Server Certificate for the Wireless Module" on page AD-145.

Join the Windows Server 2008 Server to the Domain

This solution calls for an enterprise CA server, which must be a member of the domain. Follow these steps to join the server to the domain:

1. On the server that you selected to run CA services, click **Start > Control Panel > System**.



View basic information about your computer

Windows edition

Windows Server® Standard
Copyright © 2007 Microsoft Corporation. All rights reserved.
Service Pack 1

System

Processor:	Intel(R) Core(TM)2 CPU 6300 @ 1.86GHz 1.86 GHz
Memory (RAM):	4.00 GB
System type:	32-bit Operating System

Computer name, domain, and workgroup settings

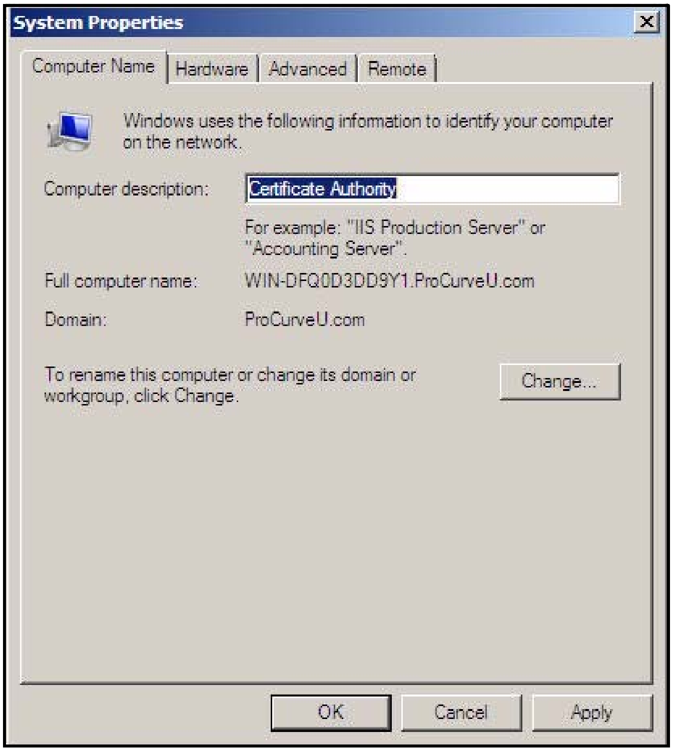
Computer name:	WIN-DFQ0D3DD9Y1
Full computer name:	WIN-DFQ0D3DD9Y1.ProCurveU.com
Computer description:	WIN2008
Domain:	ProCurveU.com

Windows activation

60 day(s) to activate. Activate Windows now
Product ID: 92573-029-0000095-76373

Figure AD-54.Windows Server 2008—Control Panel > System Window

2. Under **Computer name, domain, and workgroup settings**, click the **Change settings**.The **Computer Name** tab is selected.



Windows uses the following information to identify your computer on the network.

Computer description: Certificate Authority

For example: "IIS Production Server" or "Accounting Server".

Full computer name: WIN-DFQ0D3DD9Y1.ProCurveU.com

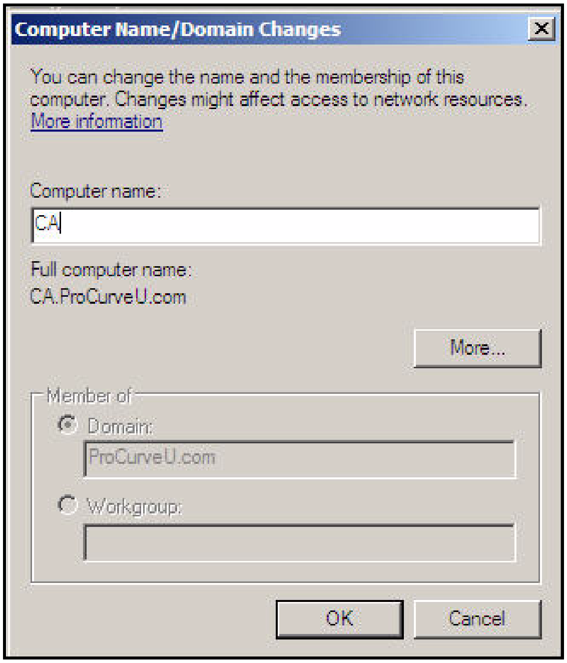
Domain: ProCurveU.com

To rename this computer or change its domain or workgroup, click Change.

Figure AD-55.Windows Server 2008—System Properties > Computer Name Tab

3. In the **Computer** description field, type a meaningful description for your server. In this example, type **Certificate Authority**.

4. Click **Change**.


Computer Name/Domain Changes

You can change the name and the membership of this computer. Changes might affect access to network resources. More information

Computer name: CA

Full computer name:
CA.ProCurveU.com

Figure AD-56.Windows Server 2008—Computer Name/Domain Changes Window

5. Type a meaningful name for the **Computer name**. In this example: **CA**.
6. Click **OK.** A window is displayed that tells you that you must restart your computer before any changes will take place. Click **OK**.
7. Click **Close** in the **System Properties** window. A window is displayed which reminds you that no changes wll take place until yourestart the computer.
8. Click **Restart Now**.

Install IIS and the Certificate Services

If the CA server runs IIS and ASP, it can present users with Web pages to help them enroll for certificates. The Web enrollment pages are located at *<CA server IP address>/certsrv*. Note that ASP can open security vulnerabilities, so you might chose not to use this feature.

All IIS services are not necessary. You must install:

- Application Server Foundation
- Web Server (IIS) Support
- HTTP Activation

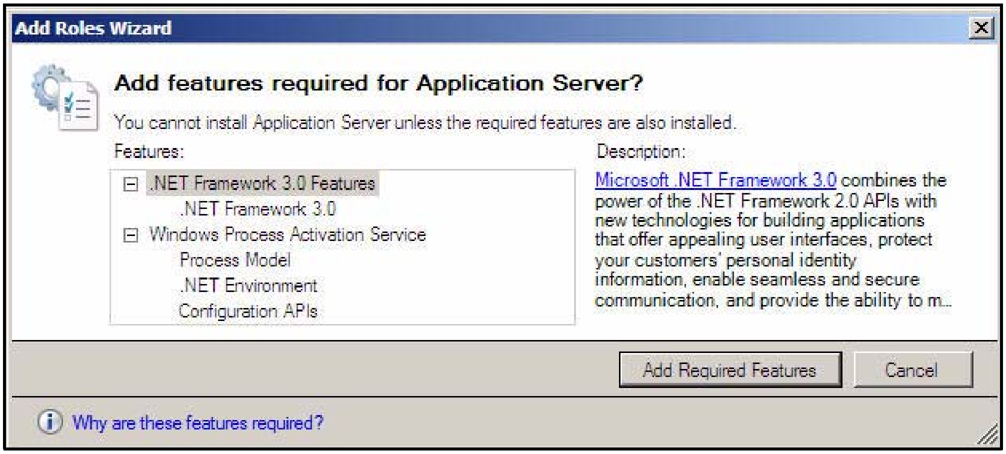
You will install the Certificate Services at the same time as you install IIS.

Note

Installing Certificate Services bindsthe server toits current name and domain. Before completing the steps below, you must join the server to the domain as described in the previous section.

Follow these steps to install the IIS on the Windows Server 2008:

1. Access the **Add Roles Wizard**. See step 2 on page AD-21.
2. Select the **Application Server** check box. A window is displayed which offers you the required features for this role.



Add Roles Wizard

Add features required for Application Server?

You cannot install Application Server unless the required features are also installed.

Features:

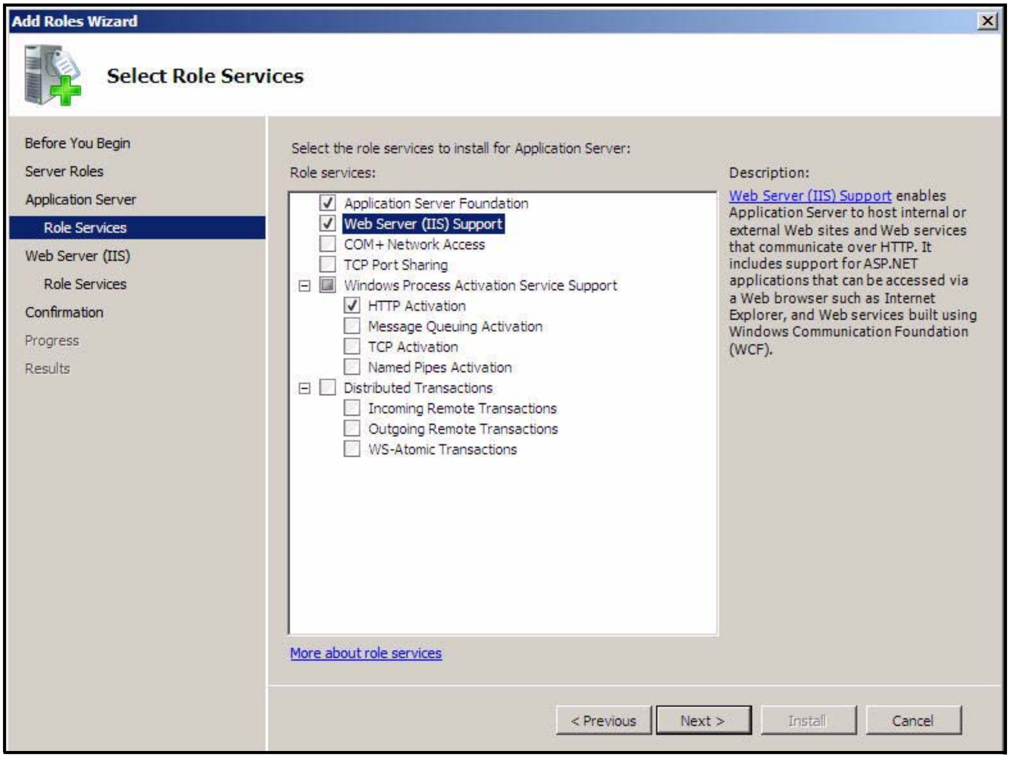
- .NET Framework 3.0 Features
  - .NET Framework 3.0
- Windows Process Activation Service
  - Process Model
  - .NET Environment
  - Configuration APIs

Description:

Microsoft .NET Framework 3.0 combines the power of the .NET Framework 2.0 APIs with new technologies for building applications that offer appealing user interfaces, protect your customers' personal identity information, enable seamless and secure communication, and provide the ability to m...

Figure AD-57.Add Roles Wizard—Add Required Features Window

3. Click **Add Required Features**.
4. Select the **Web Server (IIS)** and **Active Directory Certificate Services** check boxes.
5. Click **Next**.
6. In the **Introduction to Application Server** page, click **Next**.



Select the role services to install for Application Server:

Role services:

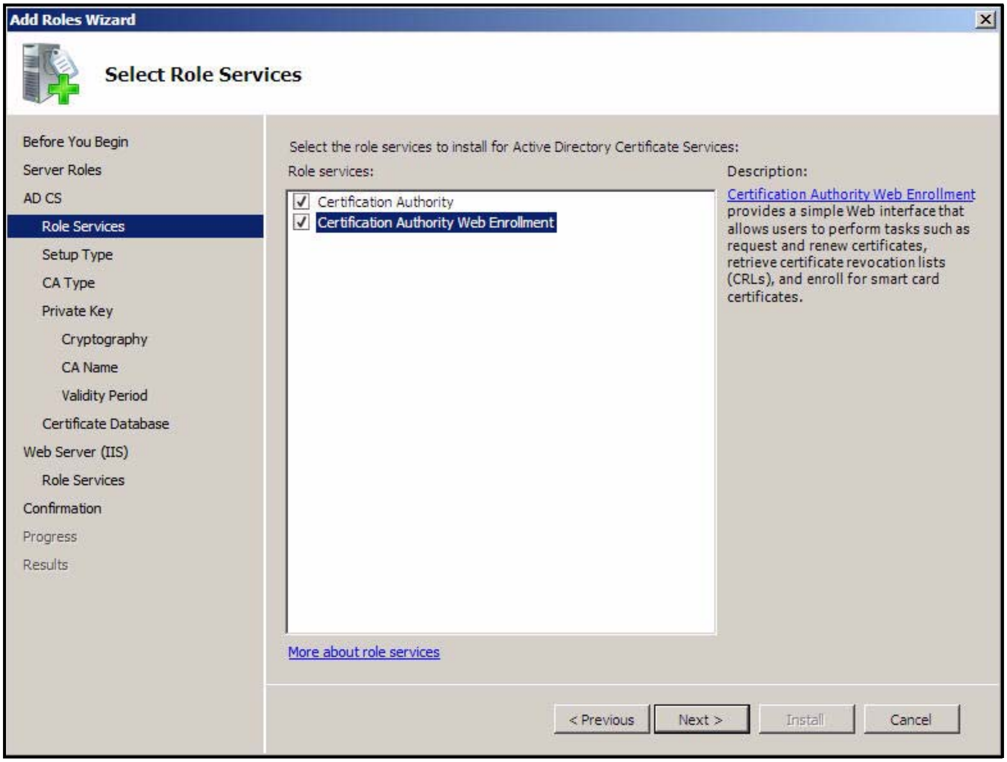
- ☑ Application Server Foundation
- ☑ Web Server (IIS) Support
- □ COM+ Network Access
- □ TCP Port Sharing
- ⊟ ▣ Windows Process Activation Service Support
  - ☑ HTTP Activation
  - □ Message Queuing Activation
  - □ TCP Activation
  - □ Named Pipes Activation
- ⊟ □ Distributed Transactions
  - □ Incoming Remote Transactions
  - □ Outgoing Remote Transactions
  - □ WS-Atomic Transactions

Description:

Web Server (IIS) Support enables Application Server to host internal or external Web sites and Web services that communicate over HTTP. It includes support for ASP.NET applications that can be accessed via a Web browser such as Internet Explorer, and Web services built using Windows Communication Foundation (WCF).

Figure AD-58.Add Roles Wizard—Select Role Services Page

7. Select the **Web Server (IIS) Support** check box.
8. Click **Add Required Role Services** in the window that is displayed.
9. In the **Select Role Services** page, verify that these services are selected:
   - **Application Server Foundation**
   - **Web Server (IIS) Support**
   - **HTTP Activation**
10. Click **Next**.
11. In the **Introduction to Active Directory Certificate Services** page, click **Next**.



Select the role services to install for Active Directory Certificate Services:

Role services:

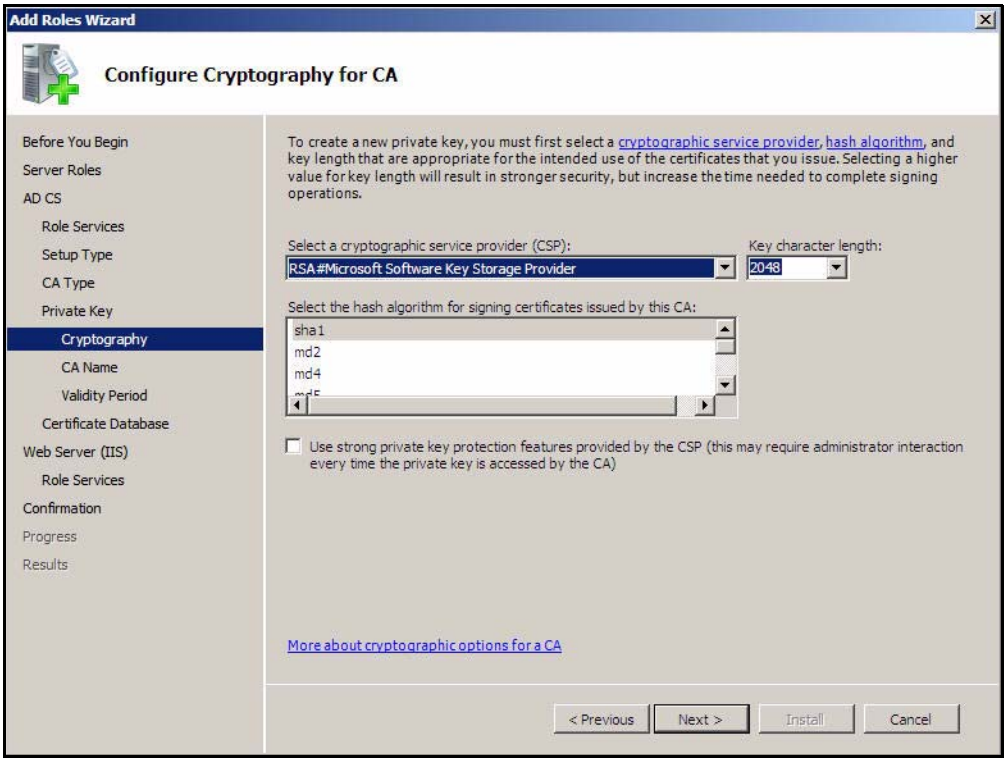
☑ Certification Authority
☑ Certification Authority Web Enrollment

Description:

Certification Authority Web Enrollment provides a simple Web interface that allows users to perform tasks such as request and renew certificates, retrieve certificate revocation lists (CRLs), and enroll for smart card certificates.

Figure AD-59.Add Roles Wizard—Select Role Services Page

12. Select the **Certification Authority Web Enrollment** check box.
13. In the next window that is displayed, click **Add Required Role Services**.
14. Click **Next**.
15. Select the **Active Directory Certificate Services** check box and click **Next**.
16. In the **Specify Setup Type** page, select **Enterprise** and click **Next**.
17. In the **Specify CA Type** page, select **Root CA** and click **Next**.



Add Roles Wizard

Configure Cryptography for CA

To create a new private key, you must first select a cryptographic service provider, hash algorithm, and key length that are appropriate for the intended use of the certificates that you issue. Selecting a higher value for key length will result in stronger security, but increase the time needed to complete signing operations.

Select a cryptographic service provider (CSP): RSA#Microsoft Software Key Storage Provider

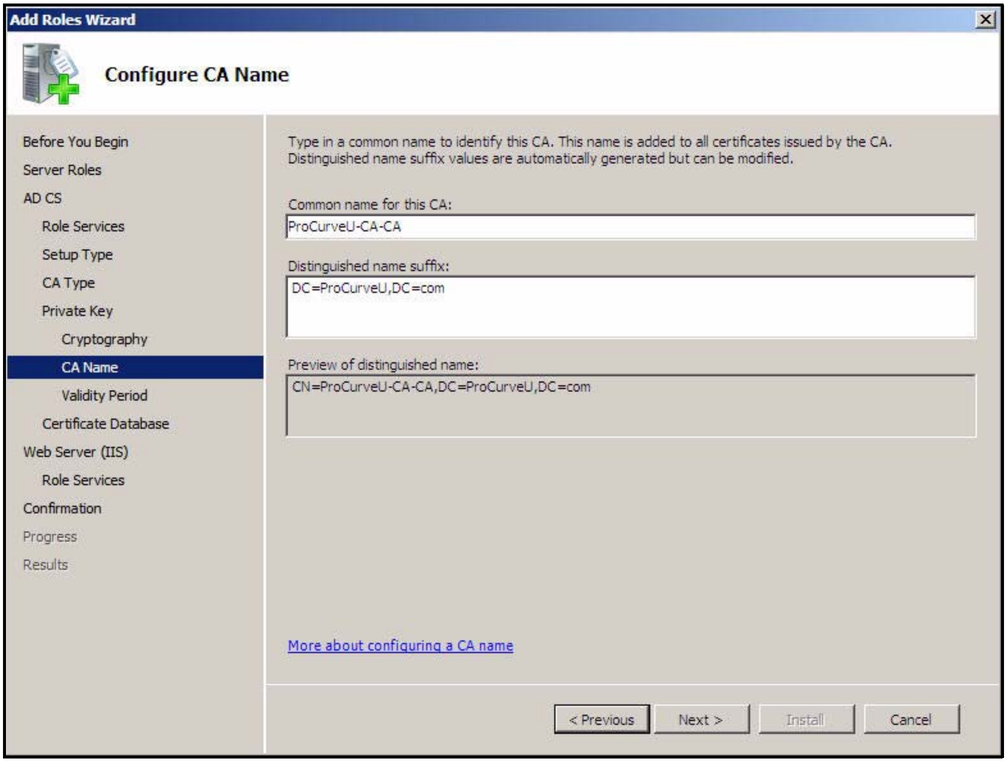
Key character length: 2048

Select the hash algorithm for signing certificates issued by this CA: sha1

□ Use strong private key protection features provided by the CSP (this may require administrator interaction every time the private key is accessed by the CA)

Figure AD-60.Add Roles Wizard—Configure Cryptography for CA Page

18. In the **Configure Cryptography for CA** page, accept the default settings and click **Next**.



Type in a common name to identify this CA. This name is added to all certificates issued by the CA. Distinguished name suffix values are automatically generated but can be modified.

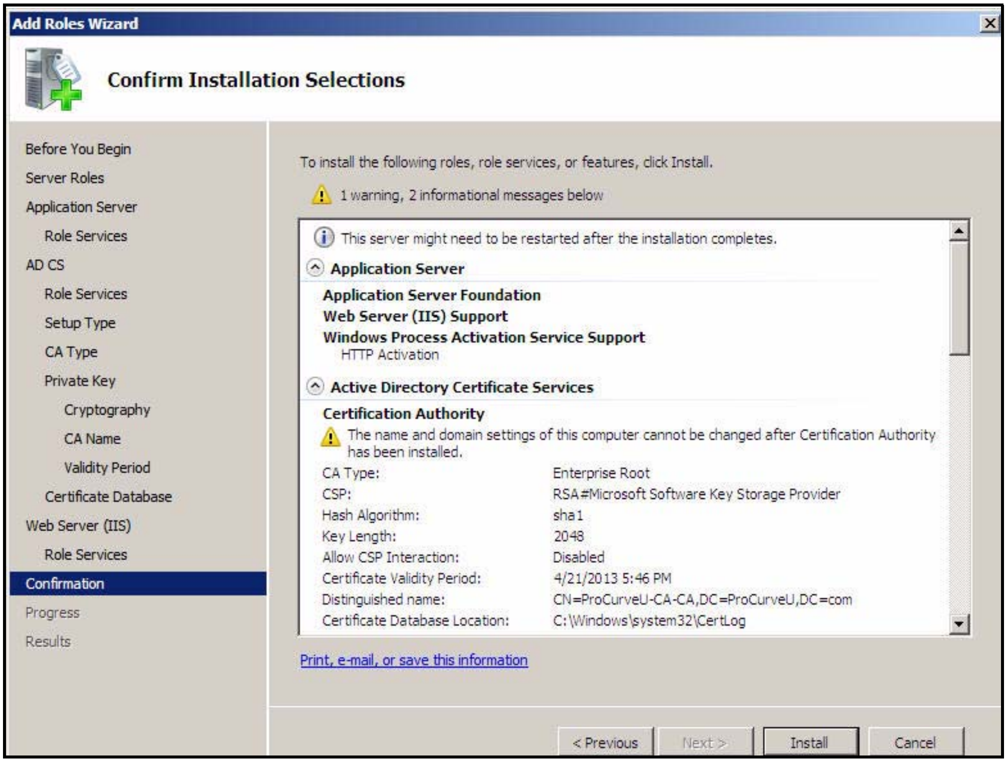
Common name for this CA: ProCurveU-CA-CA

Distinguished name suffix: DC=ProCurveU,DC=com

Preview of distinguished name: CN=ProCurveU-CA-CA,DC=ProCurveU,DC=com

Figure AD-61.Add Roles Wizard—Configure CA Name Page

19. In the **Configure CA Name** page, accept the default settings and click **Next.**
20. In the **Set Validity Period** Page, accept the default setting of 5 years and click **Next**.
21. In the **Introduction to Web Server (IIS)** page, click **Next**.
22. Accept the default role services and click **Next**.



To install the following roles, role services, or features, click Install.

⚠ 1 warning, 2 informational messages below

ⓘ This server might need to be restarted after the installation completes.

Application Server

Application Server Foundation
Web Server (IIS) Support
Windows Process Activation Service Support
HTTP Activation

Active Directory Certificate Services

Certification Authority
⚠ The name and domain settings of this computer cannot be changed after Certification Authority has been installed.

CA Type:	Enterprise Root
CSP:	RSA#Microsoft Software Key Storage Provider
Hash Algorithm:	sha1
Key Length:	2048
Allow CSP Interaction:	Disabled
Certificate Validity Period:	4/21/2013 5:46 PM
Distinguished name:	CN=ProCurveU-CA-CA,DC=ProCurveU,DC=com
Certificate Database Location:	C:\Windows\system32\CertLog

Figure AD-62.Add Roles Wizard—Confirm Installation Selections Page

23. Verify that the installation settings are correct. Then click **Install**.

24. In the **Installation Results** page, click **Close**.

Export the CA Root Certificate

Users and computers receive the CA root certificate when they automatically enroll for their certificates. However, you will need to manually import a certificate to Wireless Edge Services Modules. The steps below explain how to export your CA root certificate to a file. See “Obtain a Server Certificate for the Wireless Module” on page AD-145 for instructions on importing the certificate to the Wireless Edge Services Modules.

1. From the **Start** menu of the CA server, click **Administrative Tools** > **Certificate Authority**.

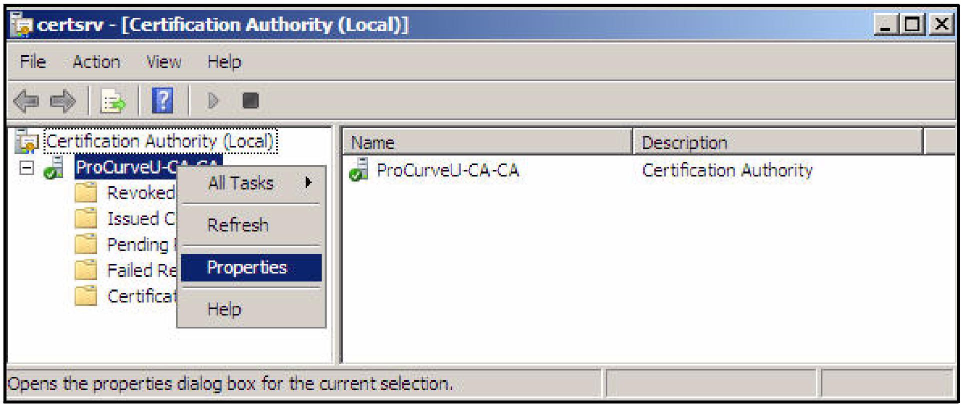
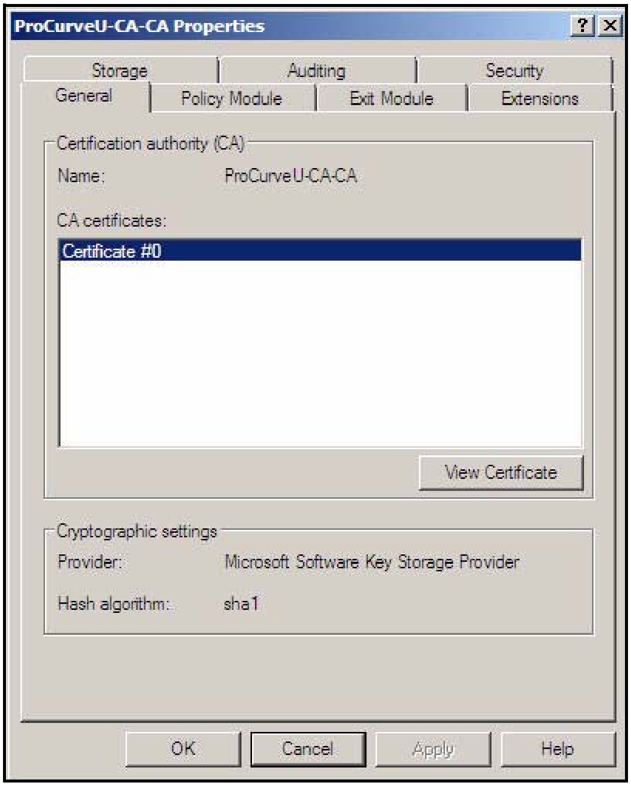


Figure AD-63.Windows Server 2008—Certification Authority (Local) Window

2. Expand **Certification Authority**.

3. Right-click the CA server name and click **Properties**.



ProCurveU-CA-CA Properties

Certification authority (CA)

Name: ProCurveU-CA-CA

CA certificates:

Certificate #0

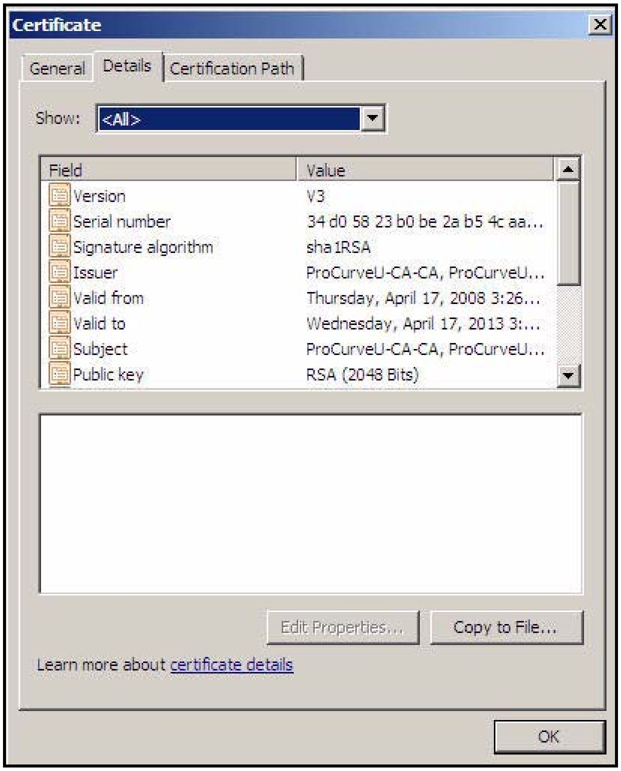
Cryptographic settings

Provider: Microsoft Software Key Storage Provider

Hash algorithm: sha1

Figure AD-64.Windows Server 2008 Management Console—<*MyCA*> Properties Window

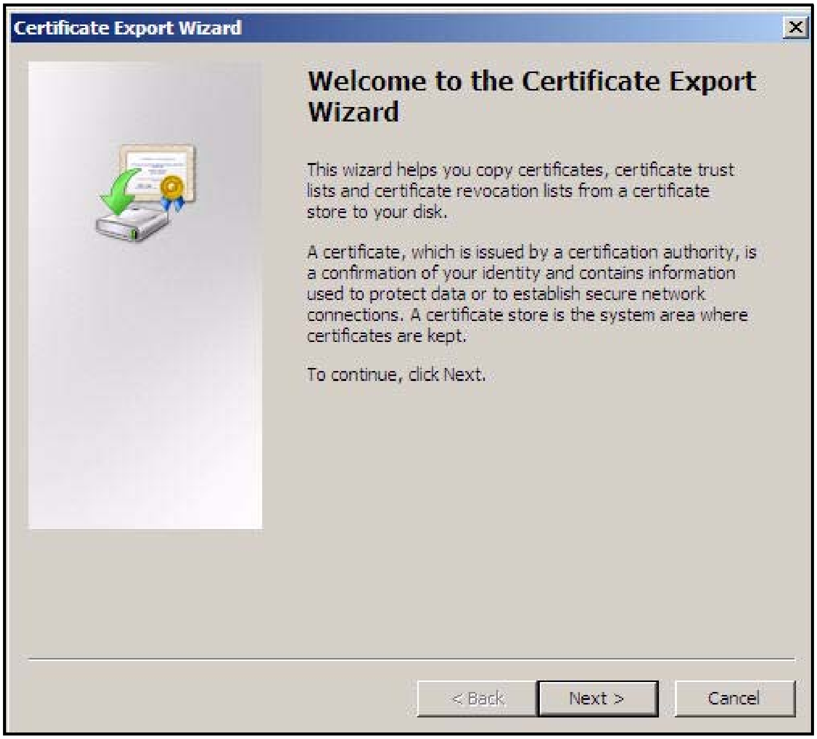
4. At the **General** tab, click **View Certificate**.
5. Click the **Details** tab.



Field	Value
Version	V3
Serial number	34 d0 58 23 b0 be 2a b5 4c aa...
Signature algorithm	sha1RSA
Issuer	ProCurveU-CA-CA, ProCurveU...
Valid from	Thursday, April 17, 2008 3:26...
Valid to	Wednesday, April 17, 2013 3:...
Subject	ProCurveU-CA-CA, ProCurveU...
Public key	RSA (2048 Bits)

Figure AD-65.Windows Server 2008—<*MyCA*> Properties > Details Window

6. Click **Copy to File**. The **Certificate Export Wizard** is displayed.



Welcome to the Certificate Export Wizard

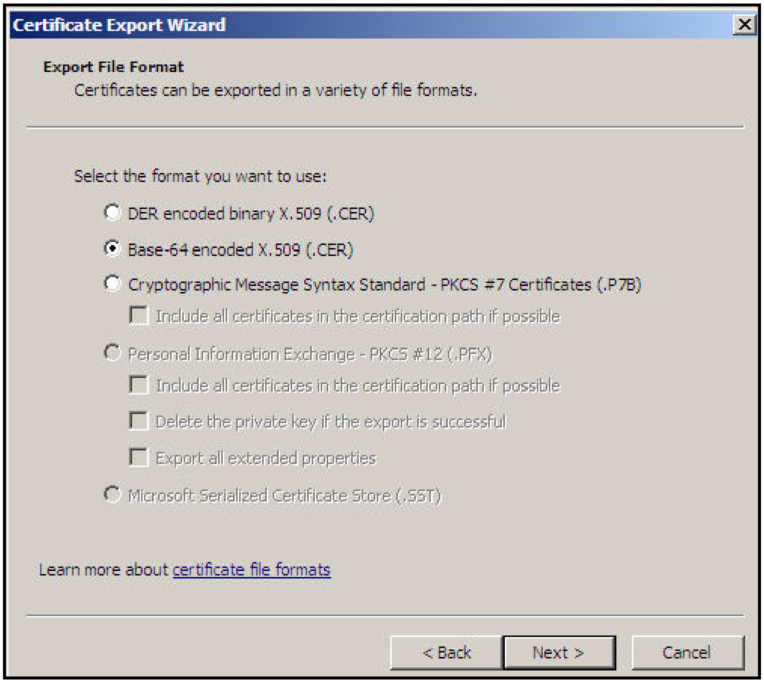
This wizard helps you copy certificates, certificate trust lists and certificate revocation lists from a certificate store to your disk.

A certificate, which is issued by a certification authority, is a confirmation of your identity and contains information used to protect data or to establish secure network connections. A certificate store is the system area where certificates are kept.

To continue, click Next.

Figure AD-66.Certificate Export Wizard—Welcome Page

7. Click **Next**.



Certificate Export Wizard

Export File Format

Certificates can be exported in a variety of file formats.

Select the format you want to use:

○ DER encoded binary X.509 (.CER)

● Base-64 encoded X.509 (.CER)

○ Cryptographic Message Syntax Standard - PKCS #7 Certificates (.P7B)

□ Include all certificates in the certification path if possible

○ Personal Information Exchange - PKCS #12 (.PFX)

□ Include all certificates in the certification path if possible

□ Delete the private key if the export is successful

□ Export all extended properties

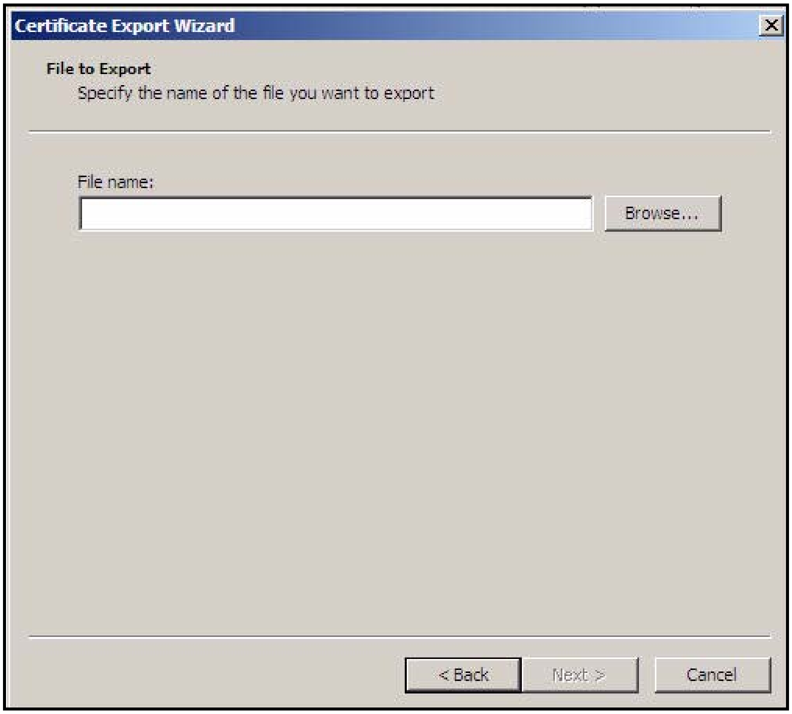
○ Microsoft Serialized Certificate Store (.SST)

Learn more about certificate file formats

Figure AD-67.Certificate Export Wizard—Export File Format Page

8. Select a format supported by your devices. In this example, select **Base-64 encoded X.509 (.CER)**.

9. Click **Next**.



Certificate Export Wizard

File to Export

Specify the name of the file you want to export

File name:

Figure AD-68.Certificate Export Wizard—File to Export Page

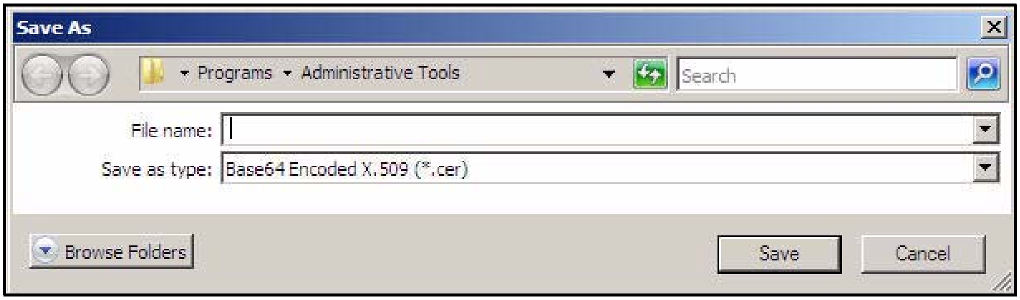
10. In the **File to Export** page, specify the filename. Either:
    - Type the name, including the path, in the **File name** box (for example, **C:\Certs\procurve_ca_cert**).
    - Browse for the folder in which the certificate should be saved:

      i. Click **Browse**.

      ii. Navigate to the desired folder.

      iii. Navigate to the location where you want to save the CA root certificate.

      iv. For **File name**, type a name for the certificate (for example, **procurve_ca_cert**).



Save As

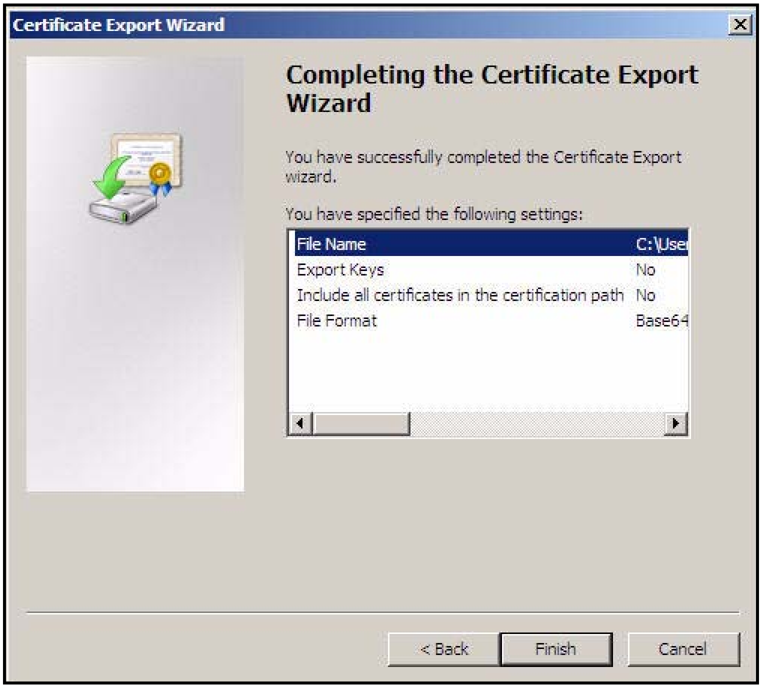
File name:

Save as type: Base64 Encoded X.509 (*.cer)

Figure AD-69.Certificate Export Wizard—Save As Window

v. Click **Save**.

11. On the **File to Export** page, click **Next**.



Certificate Export Wizard

Completing the Certificate Export Wizard

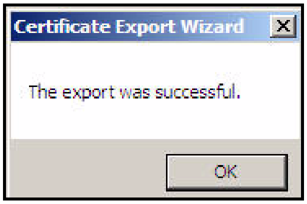
You have successfully completed the Certificate Export wizard.

You have specified the following settings:

File Name	C:\Use
Export Keys	No
Include all certificates in the certification path	No
File Format	Base64

Figure AD-70.Certificate Export Wizard—Saving the CA Root Certificate Page

12. Check the information displayed in the **Completing the Certificate Export Wizard** page. If it is correct, click **Finish**.



The export was successful.

Figure AD-71.Certificate Export Wizard Window

13. Click **OK**.
14. Click **OK** in the **Certificate Details** and **<*MyCA*> Properties** windows.
15. Press **[Alt]+[F4]** to close the **Certification Authority (Local)** window.

Configuring the NPS Server

This section explains how to configure the NPS server, which will provide RADIUS services for the network. The NPS server will authenticate both wired and wireless users and computers.

To configure the NPS, you must follow these steps:

1. Install Windows Server 2008.

   See "Installing Windows Server 2008" on page AD-9.

2. Set the time.

   See "Set the Time Zone" on page AD-16.

3. Set the static IP settings.

   See "Set Static IP Settings" on page AD-18.

   Use these settings:

   - IPv4
     – IP address: 10.4.4.16
     – Subnet mask: 255.255.0.0
     – Default gateway: 10.4.0.1
     – Preferred DNS server: 10.4.4.15
   - IPv6
     – IP address: 2001:db8::3
     – Subnet prefix length: 32
     – Default gateway: 2001:db8::1
     – Preferred DNS server: 2001:db8::2

4. Join the server to the ProCurveU.com domain.

   See "Join the Server to the Domain" on page AD-83.

5. Install the NPS server role.

   See "Install the NPS Server Role" on page AD-86.

6. Install the Group Policy Management role.

   See "Install the Group Policy Management Feature" on page AD-87.

7. Obtain a computer certificate for the NPS server.

   See "Obtain a Computer Certificate on the NPS Server" on page AD-90.

8. Configure the NPS policies.

   See “Configure 802.1X NAP Enforcement Using the NAP Configuration Wizard” on page AD-94.

9. Configure System Health Validators (SHVs).

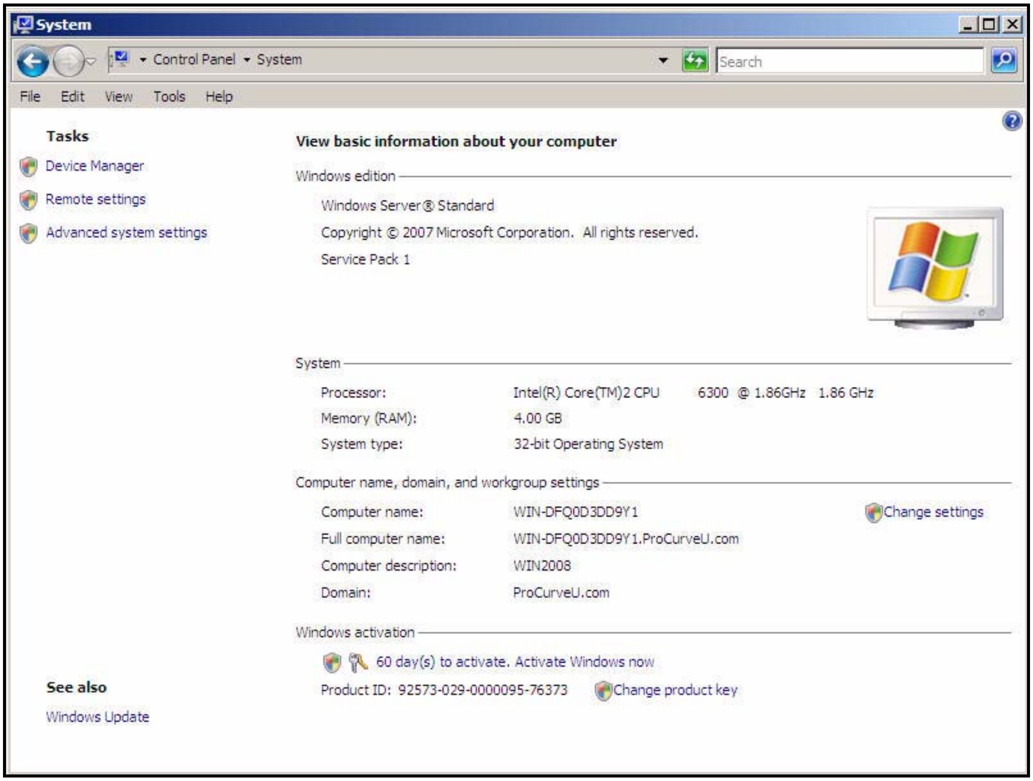
   See “Configure System Health Validators (SHVs)” on page AD-106.

10. Configure NAP client settings in a group policy.

    See “Configure NAP Client Settings in Group Policy” on page AD-110.

Join the Server to the Domain

1. On the server that you selected to run NAP services, click **Start > Control Panel > System**.



View basic information about your computer

Windows edition

Windows Server® Standard
Copyright © 2007 Microsoft Corporation. All rights reserved.
Service Pack 1

System

Processor: Intel(R) Core(TM)2 CPU 6300 @ 1.86GHz 1.86 GHz
Memory (RAM): 4.00 GB
System type: 32-bit Operating System

Computer name, domain, and workgroup settings

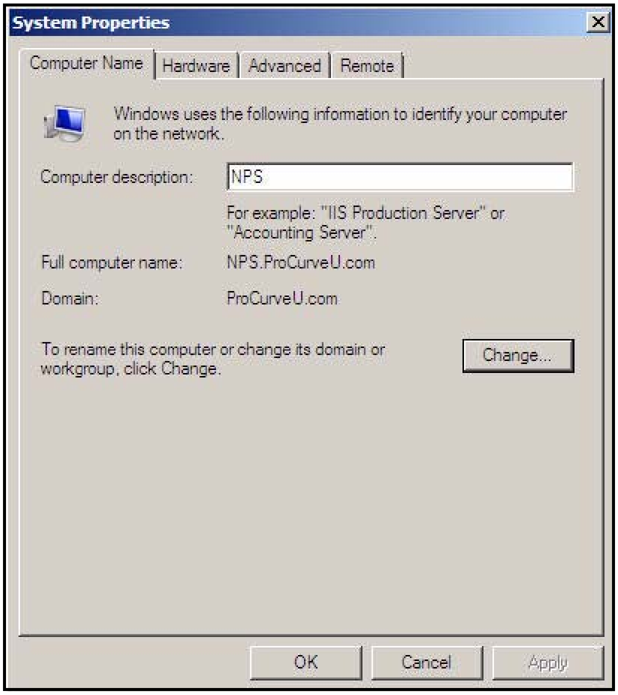
Computer name: WIN-DFQ0D3DD9Y1 Change settings
Full computer name: WIN-DFQ0D3DD9Y1.ProCurveU.com
Computer description: WIN2008
Domain: ProCurveU.com

Windows activation

60 day(s) to activate. Activate Windows now
Product ID: 92573-029-0000095-76373 Change product key

Figure AD-72.Windows Server 2008—Control Panel > System Window

2. Under **Computer name, domain, and workgroup settings**, click the **Change settings**.The **Computer Name** tab is selected.



Windows uses the following information to identify your computer on the network.

Computer description: NPS

For example: "IIS Production Server" or "Accounting Server".

Full computer name: NPS.ProCurveU.com

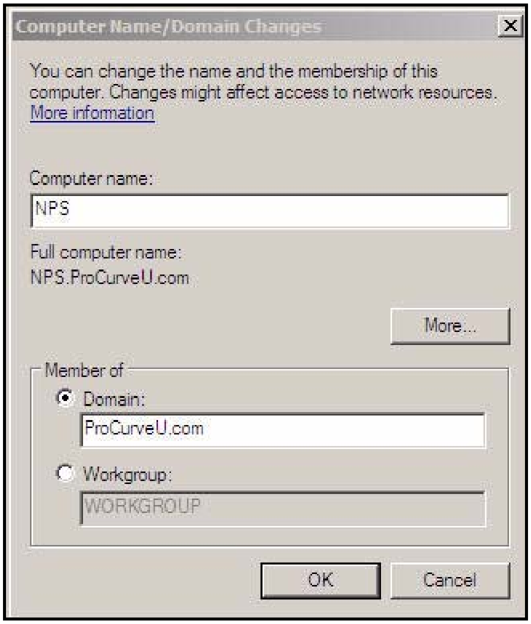
Domain: ProCurveU.com

To rename this computer or change its domain or workgroup, click Change.

Figure AD-73.NPS Server—System Properties Window

3. In the **Computer description** field, type a meaningful name for your server. In this example, type **NPS**.

4. Click **Change**.



Computer Name/Domain Changes

You can change the name and the membership of this computer. Changes might affect access to network resources. More information

Computer name: NPS

Full computer name:
NPS.ProCurveU.com

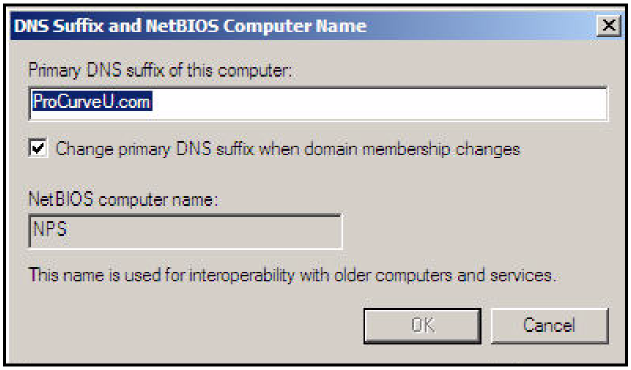
Member of
● Domain: ProCurveU.com
○ Workgroup: WORKGROUP

Figure AD-74.NPS Server—Computer Name/Domain Changes Window

5. In the **Computer name** field, type a name for your server. In this example, type **NPS**.

6. Under **Member of**, select **Domain**.

7. For **Domain**, type **ProCurveU.com**. Click **More**.



DNS Suffix and NetBIOS Computer Name

Primary DNS suffix of this computer: ProCurveU.com

☑ Change primary DNS suffix when domain membership changes

NetBIOS computer name: NPS

This name is used for interoperability with older computers and services.

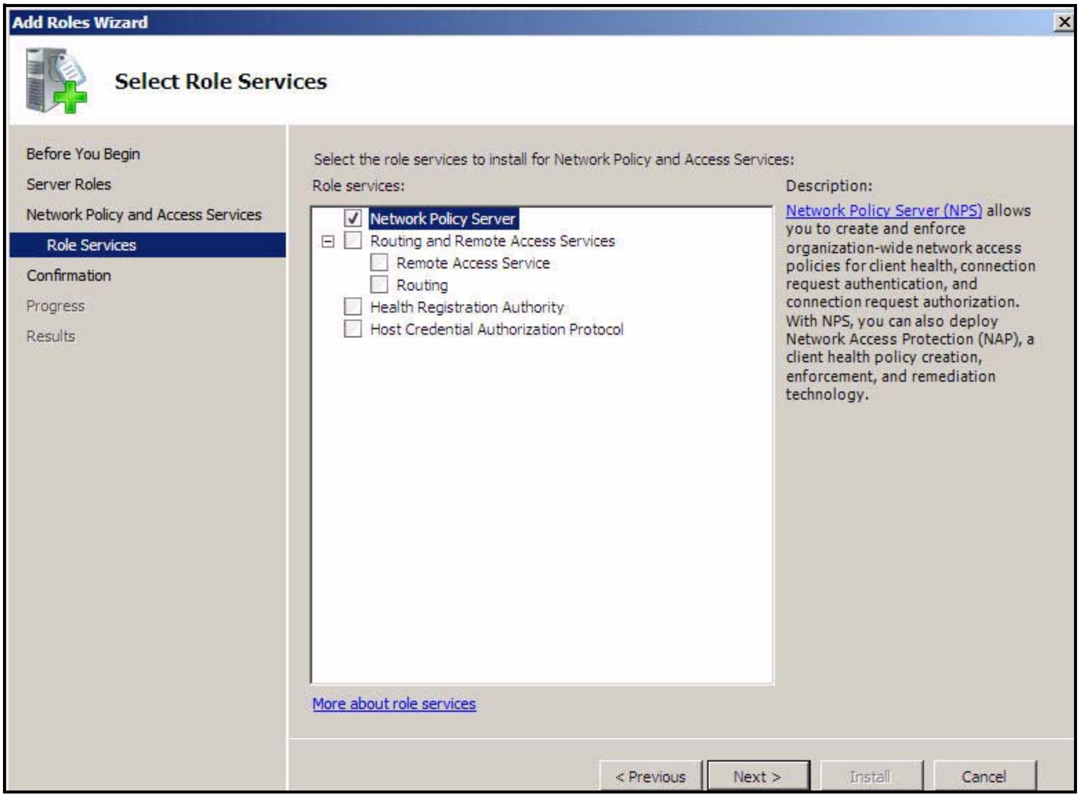
Figure AD-75.NPS Server—DNS Suffix and NetBIOS Computer Name Window

8. For **Primary DNS suffix of this computer**, type the name of your domain. In this example, type **ProCurveU.com**.
9. Select **Change primary DNS suffix when domain membership changes**.
10. Click **OK** to return to the **Computer Name/Domain Changes** window.
11. Click **OK**. A warning telling you that you must restart your computer before your changes can take place is displayed. Click **OK**.
12. A window should be displayed, welcoming you to the domain.
13. Click **Close**. A window is displayed, informing you that must restart your computer before your changes can take place.
14. Click **Restart Now**.

Install the NPS Server Role

You will now install the NPS server role. Follow these steps.

1. Access the **Add Roles Wizard**. There are two ways to access the wizard:
   - From hetl**Initial Configuration Tasks** window, complete this step:
     i. Under **Customize this Server**, click **Add Roles**.
   - From the Server Manager window, complete these steps:
     i. Click **Start > Administrative Tools > Server Manager**. The **Server Manager** window is displayed.
     ii. In the left pane, click **Roles**.
     iii. In the right pane, click **Add Roles**.
2. In the **Select Server Roles** page, select the **Network Policy and Access Services** check box.
3. Click **Next** twice.



Add Roles Wizard

Select Role Services

Select the role services to install for Network Policy and Access Services:

Role services:

- ☑ Network Policy Server
- ☐ Routing and Remote Access Services
  - ☐ Remote Access Service
  - ☐ Routing
- ☐ Health Registration Authority
- ☐ Host Credential Authorization Protocol

Description:

Network Policy Server (NPS) allows you to create and enforce organization-wide network access policies for client health, connection request authentication, and connection request authorization. With NPS, you can also deploy Network Access Protection (NAP), a client health policy creation, enforcement, and remediation technology.

Figure AD-76.Add Roles Wizard—Select Role Services Page

4. Select the **Network Policy Server** check box, click **Next**.

5. In the **Confirm Installation Selections** page, click **Install**.

6. In the **Installation Results** page, click **Close** to close the **Add Roles Wizard** window.

Install the Group Policy Management Feature

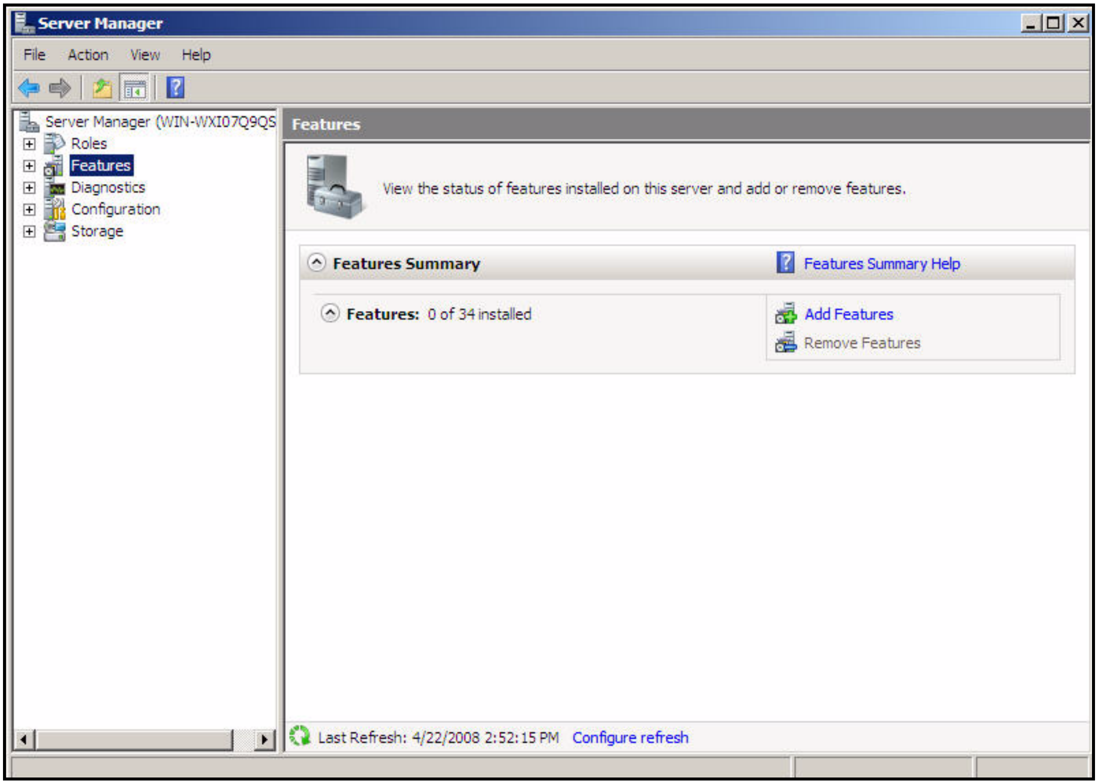
Endpoints that are running the following operating systems include the NAP agent, which is necessary for connectingto a network that enforces NACwith Microsoft NAP:

- Windows Vista
- Windows XP SP3

Although the endpoints include the NAP agent by default, you might need to configure several settings to ensure that the endpoint can connect successfully. The next section explains how to use a Group Policy to configure NAP client settings on all endpoints in the domain. To do so, you must first install the Group Policy Management feature on the NPS server. Follow these steps:

1. In the **Start** menu, click **Administrative Tools > Server Manager**.

2. In the right pane of the **Server Manager** window, click **Features**.



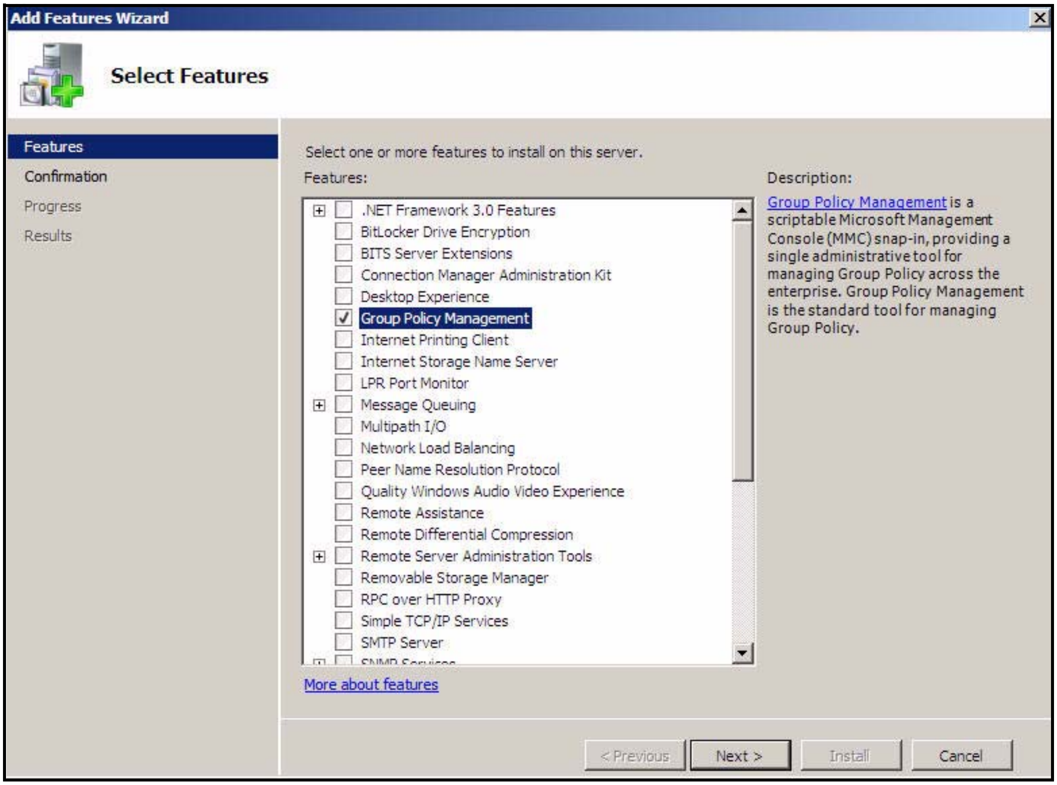
View the status of features installed on this server and add or remove features.

Features: 0 of 34 installed

Last Refresh: 4/22/2008 2:52:15 PM

Figure AD-77.NPS Server—Server Manager > Features

3. Under **Feature Summary**, click **Add Features**.



Add Features Wizard

Select Features

Select one or more features to install on this server.

Features:

- ☐ .NET Framework 3.0 Features
- ☐ BitLocker Drive Encryption
- ☐ BITS Server Extensions
- ☐ Connection Manager Administration Kit
- ☐ Desktop Experience
- ☑ Group Policy Management
- ☐ Internet Printing Client
- ☐ Internet Storage Name Server
- ☐ LPR Port Monitor
- ☐ Message Queuing
- ☐ Multipath I/O
- ☐ Network Load Balancing
- ☐ Peer Name Resolution Protocol
- ☐ Quality Windows Audio Video Experience
- ☐ Remote Assistance
- ☐ Remote Differential Compression
- ☐ Remote Server Administration Tools
- ☐ Removable Storage Manager
- ☐ RPC over HTTP Proxy
- ☐ Simple TCP/IP Services
- ☐ SMTP Server
- ☐ SNMP Services

Description:

Group Policy Management is a scriptable Microsoft Management Console (MMC) snap-in, providing a single administrative tool for managing Group Policy across the enterprise. Group Policy Management is the standard tool for managing Group Policy.

More about features

Figure AD-78.Add Features Wizard—Select Features

4. In the **Select Features** page, select the **Group Policy Management** check box.

5. Click **Next**.

6. In the **Confirm Installation Selections** page, click **Install**.

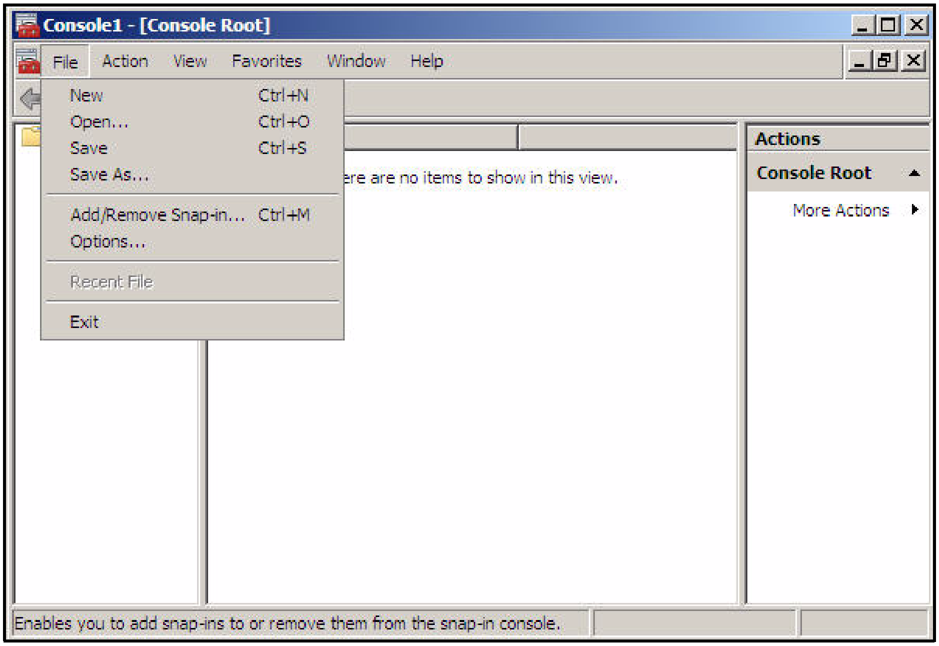
7. After the feature has been installed, click **Close** to close the **Add Features Wizard** dialog box.

8. Close the **Server Manager** window.

Obtain a Computer Certificate on the NPS Server

In this solution, the NPS server authenticates users using PEAP with MSCHAPv2. This EAP method requires the server to authenticate to clients with a digital certificate, which is stored in the server's local computer certificate store. Follow these steps to obtain a certificate from your domain CA:

1. Click **Start > Run.**
2. Type **mmc** at the prompt and click **OK**.

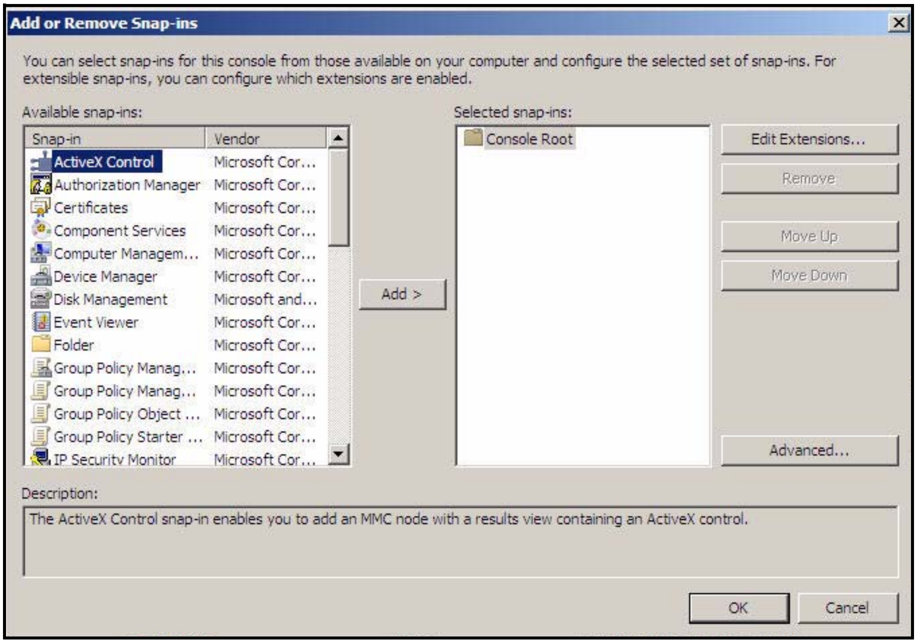


ere are no items to show in this view.

Enables you to add snap-ins to or remove them from the snap-in console.

Figure AD-79.NPS Server—Consol1 Window

3. In the **File** menu, click **Add/Remove Snap-in**.



You can select snap-ins for this console from those available on your computer and configure the selected set of snap-ins. For extensible snap-ins, you can configure which extensions are enabled.

Available snap-ins:

Snap-in	Vendor
ActiveX Control	Microsoft Cor...
Authorization Manager	Microsoft Cor...
Certificates	Microsoft Cor...
Component Services	Microsoft Cor...
Computer Managem...	Microsoft Cor...
Device Manager	Microsoft Cor...
Disk Management	Microsoft and...
Event Viewer	Microsoft Cor...
Folder	Microsoft Cor...
Group Policy Manag...	Microsoft Cor...
Group Policy Manag...	Microsoft Cor...
Group Policy Object ...	Microsoft Cor...
Group Policy Starter ...	Microsoft Cor...
IP Security Monitor	Microsoft Cor...

Selected snap-ins:

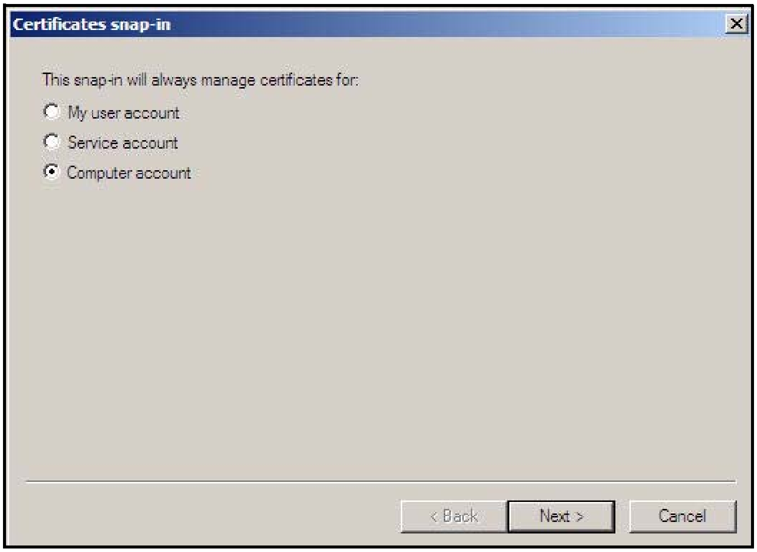
Console Root

Description:

The ActiveX Control snap-in enables you to add an MMC node with a results view containing an ActiveX control.

Figure AD-80.NPS Server—Console1 > Add or Remove Snap-ins Window

4. In the **Add or Remove Snap-ins** window, click **Certificates** and then click **Add>**. The **Certificates snap-in** window is displayed.



Certificates snap-in

This snap-in will always manage certificates for:

○ My user account

○ Service account

● Computer account

Figure AD-81.NPS Server—Console 1 > Add or Remove Snap-ins > Certificates snap-in Window

5. Select **Computer account** and click **Next**.

6. Accept the default setting **Local computer** (the computer on which this console is running) and click **Finish**.

7. **Certificates (Local Computer)** is now displayed below **Selected snap-ins**. Click **OK** to close the **Add or Remove Snap-ins** window.

8. In the left pane of the **Console1** window, double-click **Certificates (Local Computer)**.

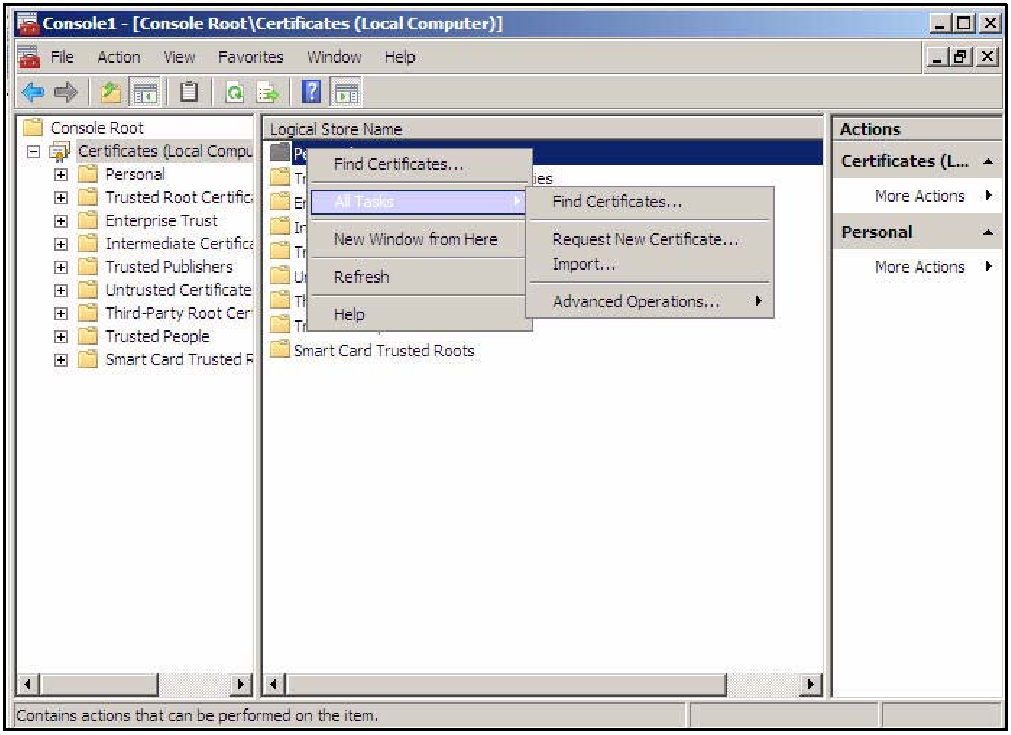


Figure AD-82.NPS Server—Console1 Window

9. In the center pane, right-click **Personal** and click **All Tasks > Request New Certificate**. The **Certificate Enrollment** window is displayed.

10. Click **Next**.

11. Select the **Computer** check box and click **Enroll**.

12. Verify that the status of the certificate installation is **Succeeded** and click **Finish**.

13. Close the **Console1** window.

14. Click **No** when prompted to save console settings.

Configure 802.1X NAP Enforcement Using the NAP Configuration Wizard

The NAP configuration wizard helps you set up the NPS server as a NAP health policy server. When you select one of the 802.1X options, the wizard also helps you to set up the NPS server as a RADIUS server. After you run the wizard, you will have configured the basic policies necessary to control endpoints in *your* environment. With the 802.1X deployment option, you will have created these policies:

- A connection request policy

  A connection request policy specifies the type of requests to which the NPS RADIUS server responds. In this solution, the NPS server authenticates endpoints seeking wired or wireless access. Because the wizard only allows you to set up one type of access initially, you will edit the policy after you complete the wizard.

- Three network policies

  A network policy specifies the settings for a connection, customizing the access based on criteria such as the user's identity and the endpoint's health state.

  The wizard creates three network policies:

  - One policy for compliant endpoints
  - One policy for non-compliant endpoints
  - One policy for endpoints that are not NAP-capable and cannot be tested

  In this solution, you will leave the network policies empty. IDM will manage policies for access rights.

- Two health policies

  Health policies define compliance and non-compliance:

  - One health policy defines compliant endpoints

    This policy specifies that endpoints that meet the requirements of all selected SHVs are compliant.

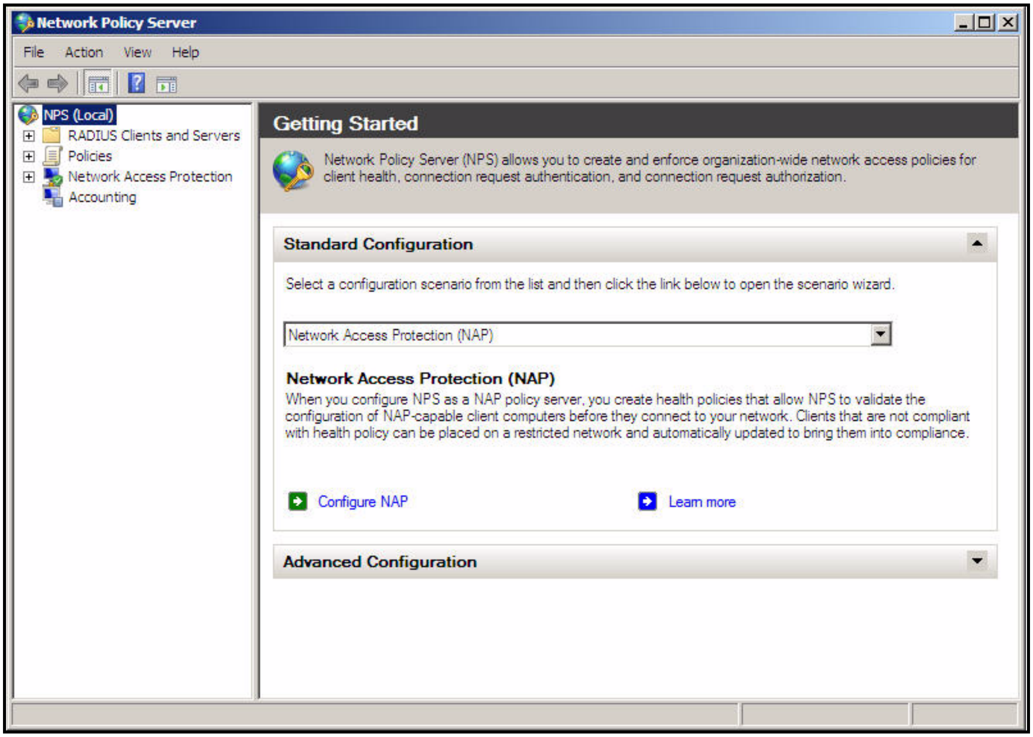
  - One health policy defines non-compliant endpoints

    This policy specifies that endpoints that fail to meet one or more of the requirements of any of the selected SHVs are non-compliant.

  You will configure SHVs a bit later.

You can access the NAP configuration wizard from the NPS console. To use the wizard to configure NAP, follow these steps:

1. On your NPS server, click **Start > Administrative Tools > Network Policy Server**.



Network Policy Server (NPS) allows you to create and enforce organization-wide network access policies for client health, connection request authentication, and connection request authorization.

Select a configuration scenario from the list and then click the link below to open the scenario wizard.

Network Access Protection (NAP)

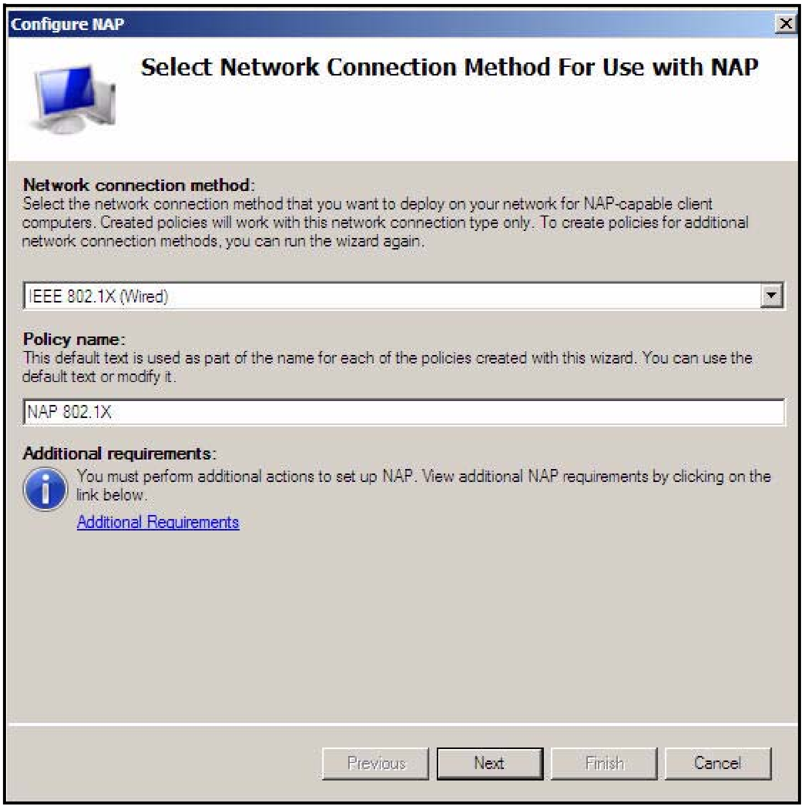
Network Access Protection (NAP)

When you configure NPS as a NAP policy server, you create health policies that allow NPS to validate the configuration of NAP-capable client computers before they connect to your network. Clients that are not compliant with health policy can be placed on a restricted network and automatically updated to bring them into compliance.

Figure AD-83.NPS Server—Network Policy Server Window

2. In the left pane of the **Network Policy Server** window, click **NPS (Local)**.

3. In the right pane, under **Standard Configuration**, click **Configure NAP**. The **Configure NAP Wizard** is displayed.



Select Network Connection Method For Use with NAP

Network connection method:
Select the network connection method that you want to deploy on your network for NAP-capable client computers. Created policies will work with this network connection type only. To create policies for additional network connection methods, you can run the wizard again.

IEEE 802.1X (Wired)

Policy name:
This default text is used as part of the name for each of the policies created with this wizard. You can use the default text or modify it.

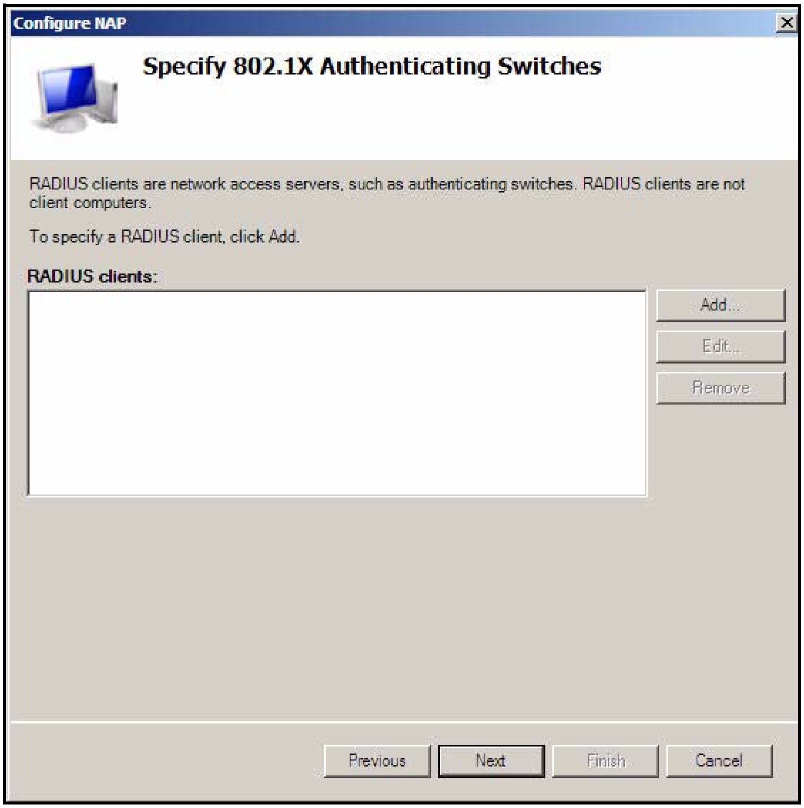
NAP 802.1X

Additional requirements:
You must perform additional actions to set up NAP. View additional NAP requirements by clicking on the link below.
Additional Requirements

Figure AD-84.Configure NAP Wizard—Select Network Connection Method For Use with NAP Page

4. From the **Network connection method** list, select **IEEE 802.1X (Wired)**.

5. Under **Policy name**, type a descriptive name for your policy. For example, if you plan to expand the policy to include wireless users, alter the name to reflect that plan. In this example, type **NAP 802.1X** and click **Next**.



Specify 802.1X Authenticating Switches

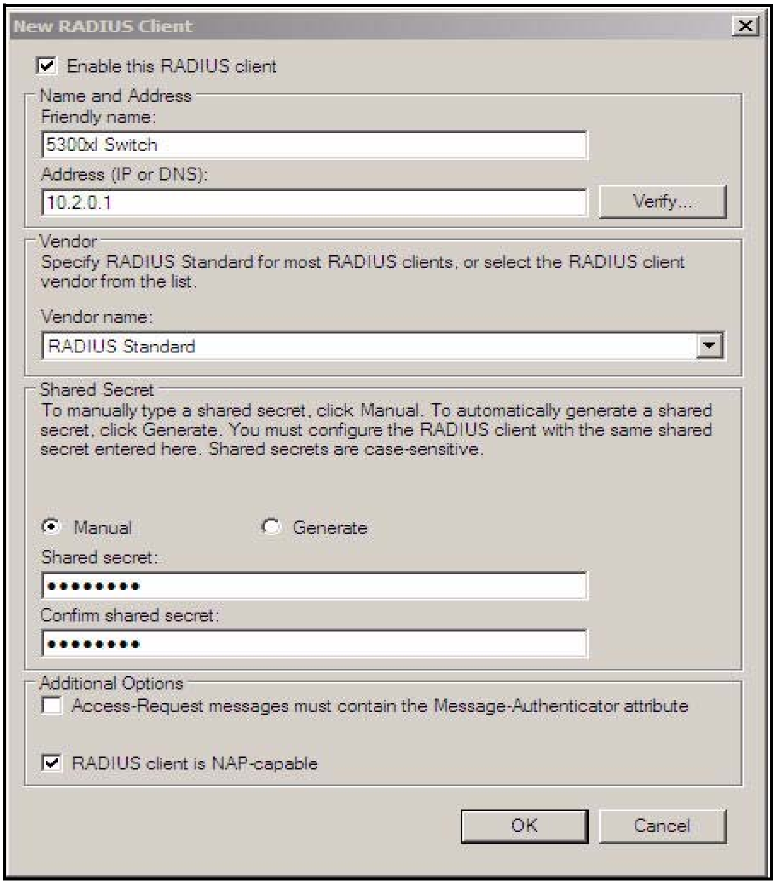
RADIUS clients are network access servers, such as authenticating switches. RADIUS clients are not client computers.

To specify a RADIUS client, click Add.

RADIUS clients:

Figure AD-85.Configure NAP Wizard—Specify the 802.1X Authenticating Switches Page

6. In the **Specify 802.1X Authenticating Switches** page, click **Add**.



☑ Enable this RADIUS client

Name and Address

Friendly name: 5300xl Switch

Address (IP or DNS): 10.2.0.1

Vendor

Specify RADIUS Standard for most RADIUS clients, or select the RADIUS client vendor from the list.

Vendor name: RADIUS Standard

Shared Secret

To manually type a shared secret, click Manual. To automatically generate a shared secret, click Generate. You must configure the RADIUS client with the same shared secret entered here. Shared secrets are case-sensitive.

● Manual ○ Generate

Shared secret: •••••••••

Confirm shared secret: •••••••••

Additional Options

□ Access-Request messages must contain the Message-Authenticator attribute

☑ RADIUS client is NAP-capable

Figure AD-86.Configure NAP Wizard—Specify the 802.1X Authenticating Switches Page > New RADIUS Client Window

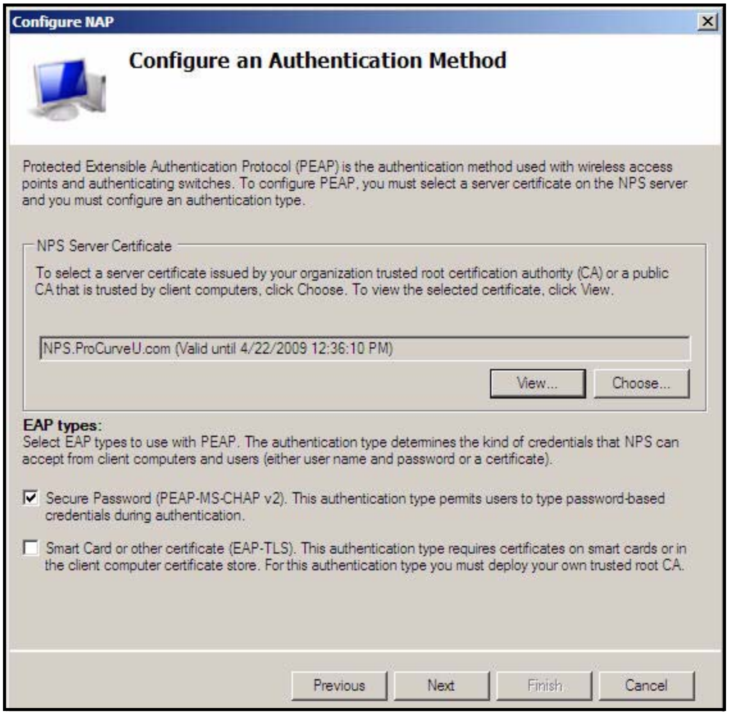
7. For **Friendly name**, type a descrptive name for a device that offers network access such as a switch, AP, or Wireless Edge Services Module. In this example, type **Wireless Module**.

   At this point, the wizard is configuring the NPS server to respond only to requests for wired access. However, you plan to add wireless access, so you add the wireless RADIUS clients as well.

8. For **Address (IP or DNS)**, type the IP address or resolvable DNS name of the switch, AP, or Wireless Module. In this example, type **10.2.0.20**.

9. Under **Shared Secret**, accept the default selection, **Manual**.

10. In the **Shared secret** and **Confirm the shared secret** fields, type the shared secret that you configured on the device. In this example, type **procurve**.
11. Select the **RADIUS client is NAP-capable** check box. This alows the NPS to send endpoint integrity status to IDM.
12. Click **OK** to return to the **Specify 802.1X Authenticating Switches** page.
13. Click **Next**.
14. In the **Configure User Groups and Machine Groups** page, click **Next**.



Configure NAP

Configure an Authentication Method

Protected Extensible Authentication Protocol (PEAP) is the authentication method used with wireless access points and authenticating switches. To configure PEAP, you must select a server certificate on the NPS server and you must configure an authentication type.

NPS Server Certificate

To select a server certificate issued by your organization trusted root certification authority (CA) or a public CA that is trusted by client computers, click Choose. To view the selected certificate, click View.

NPS.ProCurveU.com (Valid until 4/22/2009 12:36:10 PM)

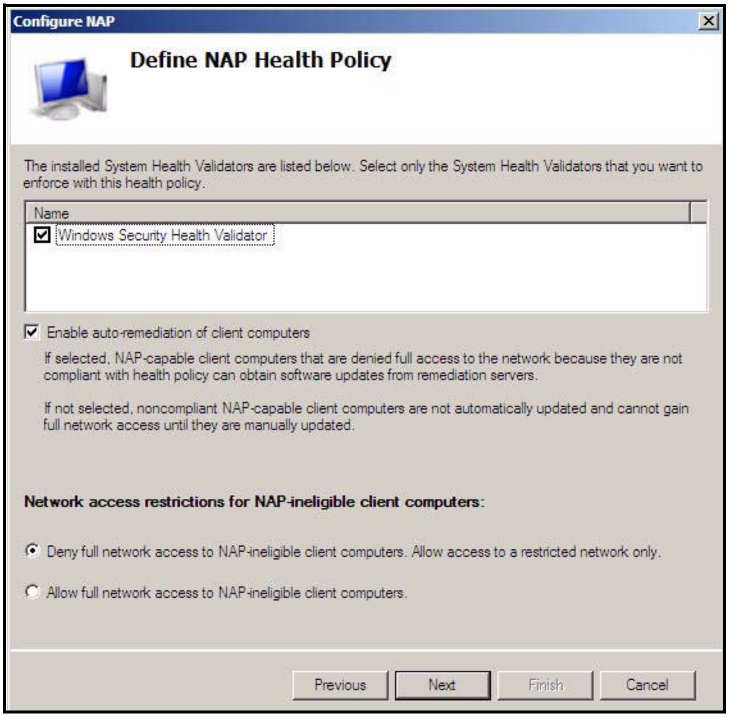
EAP types:
Select EAP types to use with PEAP. The authentication type determines the kind of credentials that NPS can accept from client computers and users (either user name and password or a certificate).

☑ Secure Password (PEAP-MS-CHAP v2). This authentication type permits users to type password-based credentials during authentication.

☐ Smart Card or other certificate (EAP-TLS). This authentication type requires certificates on smart cards or in the client computer certificate store. For this authentication type you must deploy your own trusted root CA.

Figure AD-87.Configure NAP Wizard—Configure an Authentication Method Page

15. In the **Configure an Authentication Method** page, accept the default setting of **Secure Password (PEAP-MSCHAP v2)** and click **Next**.
16. The next page allows you to configure dynamic VLAN assignments. For this solution, do not configure VLANS as part of your Windows policy. You will use IDM to configure VLANS. Click **Next**.


Configure NAP

Define NAP Health Policy

The installed System Health Validators are listed below. Select only the System Health Validators that you want to enforce with this health policy.

Name

☑ Windows Security Health Validator

☑ Enable auto-remediation of client computers

If selected, NAP-capable client computers that are denied full access to the network because they are not compliant with health policy can obtain software updates from remediation servers.

If not selected, noncompliant NAP-capable client computers are not automatically updated and cannot gain full network access until they are manually updated.

Network access restrictions for NAP-ineligible client computers:

● Deny full network access to NAP-ineligible client computers. Allow access to a restricted network only.

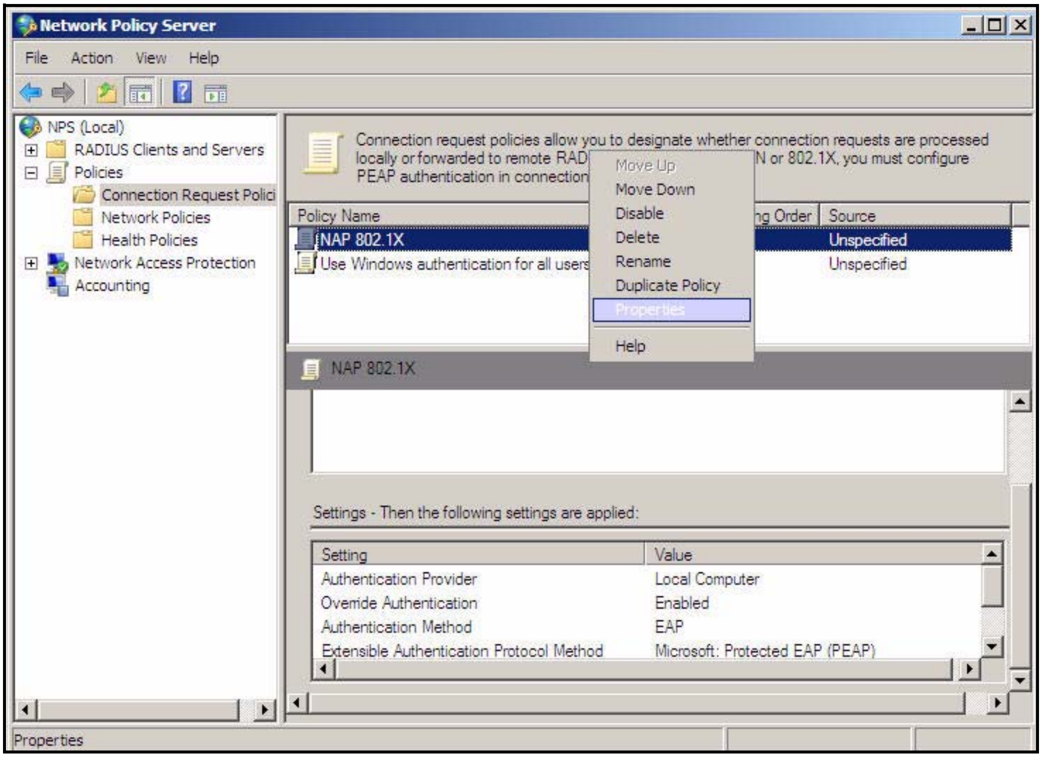
○ Allow full network access to NAP-ineligible client computers.

Figure AD-88.Configure NAP Wizard—Define NAP Health Policy Page

17. In the **Define NAP Health Policy** page, verify that **Windows Security Health Validator** and **Enable auto-remediation of client computers** check boxes are selected. Ensure that the **Deny full network access to NAP-ineligible client computers** check box is selected. Click **Next**.

18. In the **Completing NAP Enforcement Policy and RADIUS Client Configuration** page, click **Finish**.

19. In the left pane of the **Network Policy Server** window, expand **Policies** and click **Connection Request Policies**.



Connection request policies allow you to designate whether connection requests are processed locally or forwarded to remote RAD N or 802.1X, you must configure PEAP authentication in connection

Policy Name	ng Order	Source
NAP 802.1X		Unspecified
Use Windows authentication for all users		Unspecified

Settings - Then the following settings are applied:

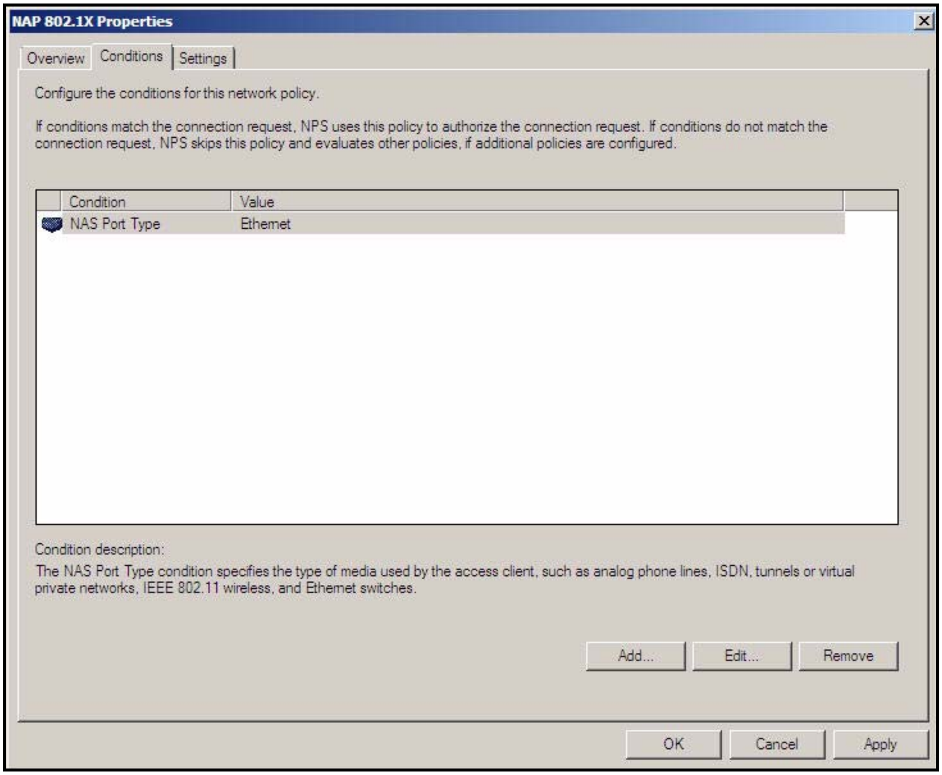
Setting	Value
Authentication Provider	Local Computer
Override Authentication	Enabled
Authentication Method	EAP
Extensible Authentication Protocol Method	Microsoft: Protected EAP (PEAP)

Figure AD-89.NPS Server—Network Policy Server Window

20. Verify that the policy that you just created, **NAP 802.1X**, is listed first. If it is not, right-click the policy name and click **Move Up**.

21. Right-click the policy name and click **Properties**.

22. Click the **Conditions** tab.



NAP 802.1X Properties

Configure the conditions for this network policy.

If conditions match the connection request, NPS uses this policy to authorize the connection request. If conditions do not match the connection request, NPS skips this policy and evaluates other policies, if additional policies are configured.

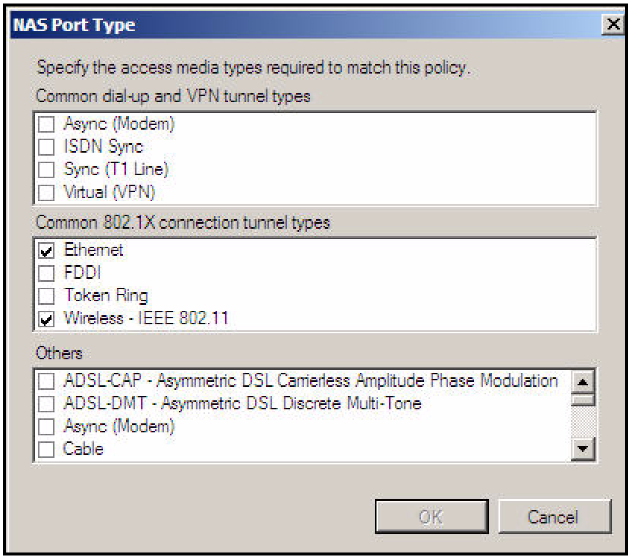
Condition	Value
NAS Port Type	Ethernet

Condition description:
The NAS Port Type condition specifies the type of media used by the access client, such as analog phone lines, ISDN, tunnels or virtual private networks, IEEE 802.11 wireless, and Ethernet switches.

Figure AD-90.NPS Server—NAP 802.1X Properties Window

The **NAS Port Type** condition is displayed.

23. Select **NAS Port Type** and click **Edit**.



NAS Port Type

Specify the access media types required to match this policy.

Common dial-up and VPN tunnel types

□ Async (Modem)
□ ISDN Sync
□ Sync (T1 Line)
□ Virtual (VPN)

Common 802.1X connection tunnel types

☑ Ethernet
□ FDDI
□ Token Ring
☑ Wireless - IEEE 802.11

Others

□ ADSL-CAP - Asymmetric DSL Carrierless Amplitude Phase Modulation
□ ADSL-DMT - Asymmetric DSL Discrete Multi-Tone
□ Async (Modem)
□ Cable

Figure AD-91.NPS Server—NAS Port Type Window

24. In the **NAS Port Type** window, under **Common 802.1X connection tunnel types**, select the **Wireless - IEEE 802.11** check box. Leave the **Ethernet** check box selected.

25. Click **OK**.

26. Verify that the **NAS Port Type** condition displays both conditions. The NPS server will now allow requests that match either of these conditions. In other words, it will grant network access to authenticated wired and wireless users.

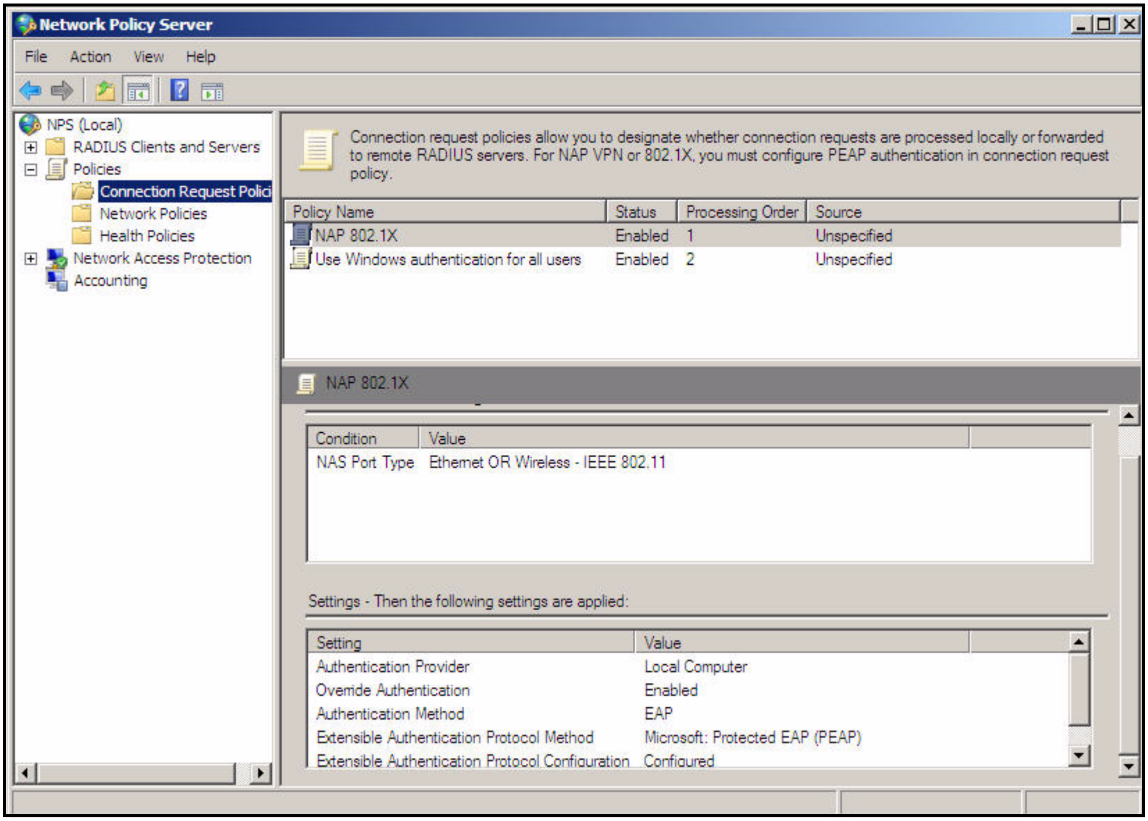
27. Click **OK** to close the **NAP 802.1X Properties** window.

Verify NAP Policies

As discussed previously, the NAP configuration wizard automatically creates several policies. However, the policies are given a lower priority than default policies. You must verify that the new policies are enabled and place them in the correct order. Follow these steps.

1. You should be in the **Network Policy Server** window. If you are not, click **Start > Administrative Tools > Network Policy Server**.

2. In the left pane of the **Network Policy Server** window, expand **Policies**, and then click **Connection Request Policies**.



Connection request policies allow you to designate whether connection requests are processed locally or forwarded to remote RADIUS servers. For NAP VPN or 802.1X, you must configure PEAP authentication in connection request policy.

Policy Name	Status	Processing Order	Source
NAP 802.1X	Enabled	1	Unspecified
Use Windows authentication for all users	Enabled	2	Unspecified

Condition	Value
NAS Port Type	Ethernet OR Wireless - IEEE 802.11

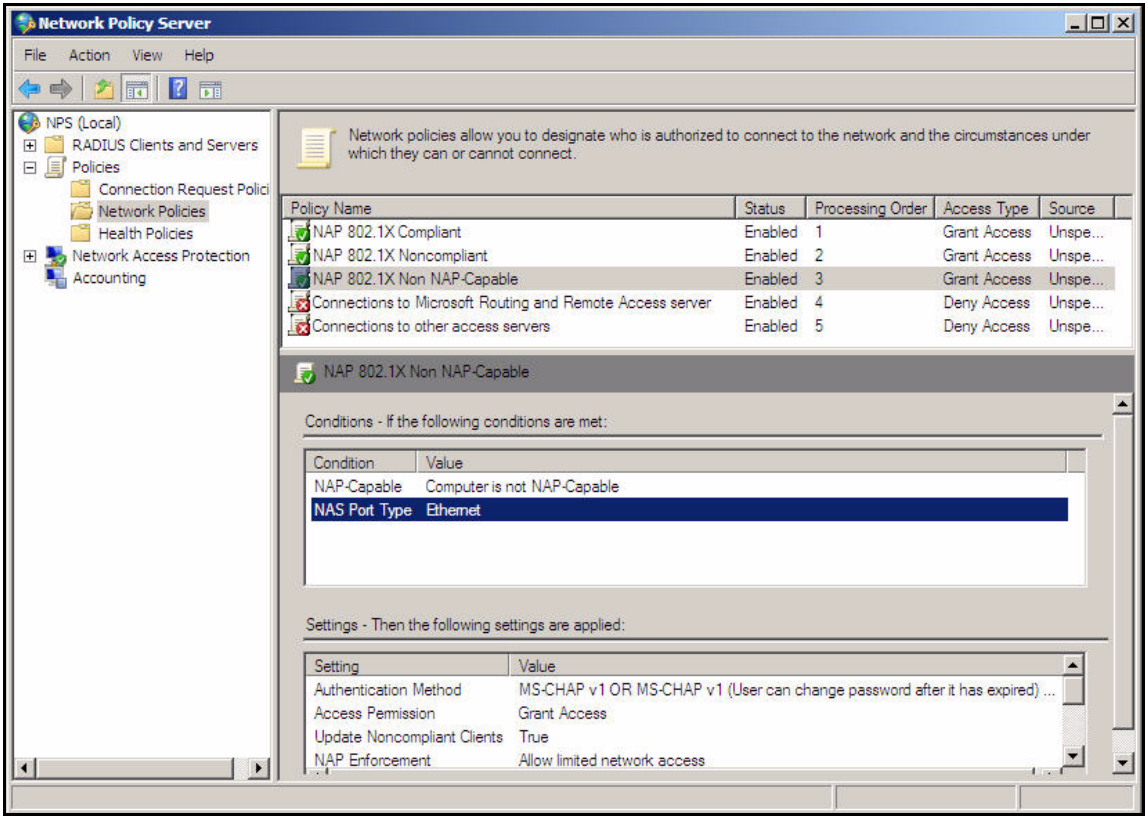
Settings - Then the following settings are applied:

Setting	Value
Authentication Provider	Local Computer
Override Authentication	Enabled
Authentication Method	EAP
Extensible Authentication Protocol Method	Microsoft: Protected EAP (PEAP)
Extensible Authentication Protocol Configuration	Configured

Figure AD-92.NPS Server—Netowrk Policy Server > Connection Request Polices Window

3. The list in the center pane shows the order in which the policies are processed. The first policy listed is the first policy processed. In the previous task, you moved the policy that you created to the top of the list, as shown in Figure AD-92. Also check the **Status** column; verify that the status of your policy is **Enabled**.

4. In the left pane of the **Network Policy Server** window, click **Network Policies**.



Network policies allow you to designate who is authorized to connect to the network and the circumstances under which they can or cannot connect.

Policy Name	Status	Processing Order	Access Type	Source
NAP 802.1X Compliant	Enabled	1	Grant Access	Unspe...
NAP 802.1X Noncompliant	Enabled	2	Grant Access	Unspe...
NAP 802.1X Non NAP-Capable	Enabled	3	Grant Access	Unspe...
Connections to Microsoft Routing and Remote Access server	Enabled	4	Deny Access	Unspe...
Connections to other access servers	Enabled	5	Deny Access	Unspe...

NAP 802.1X Non NAP-Capable

Conditions - If the following conditions are met:

Condition	Value
NAP-Capable	Computer is not NAP-Capable
NAS Port Type	Ethernet

Settings - Then the following settings are applied:

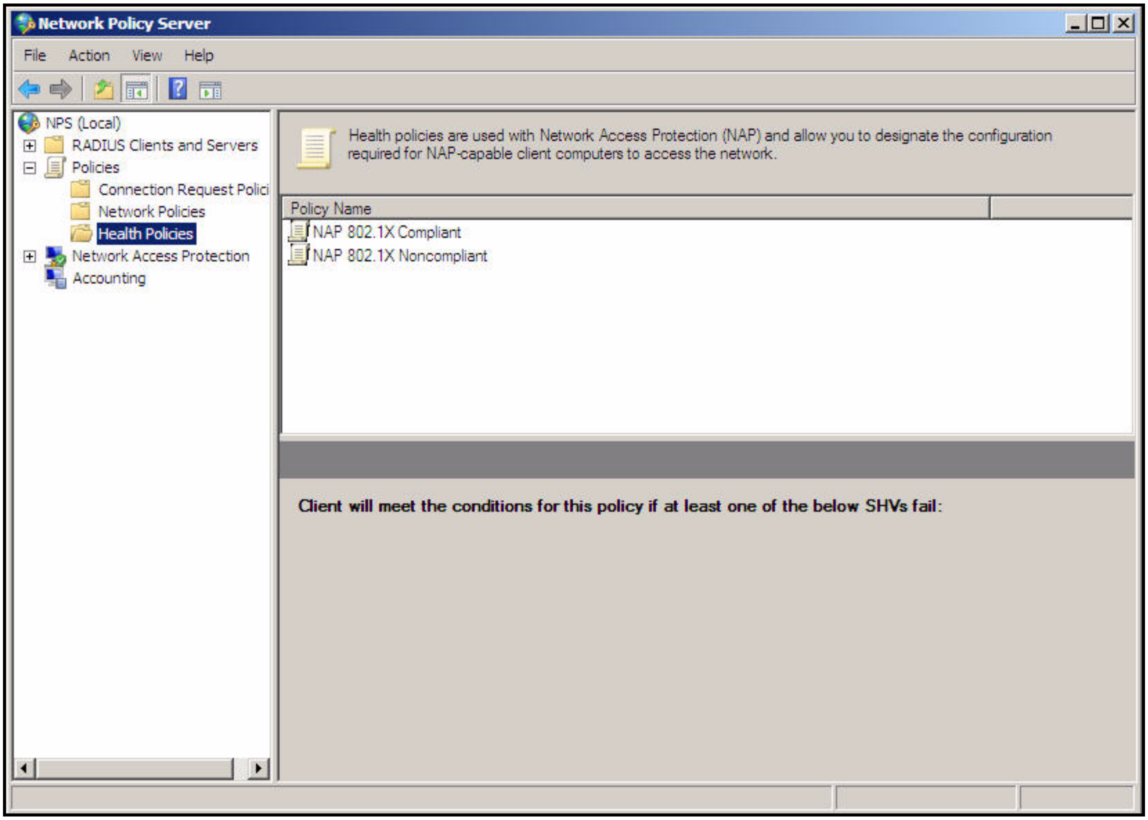
Setting	Value
Authentication Method	MS-CHAP v1 OR MS-CHAP v1 (User can change password after it has expired) ...
Access Permission	Grant Access
Update Noncompliant Clients	True
NAP Enforcement	Allow limited network access

Figure AD-93.NPS Server—Network Policy Server > Policies > Network Policies Window

5. Again verify that the network policies that you created are listed first and that the status of these policies is **Enabled**. The NAP configuration wizard assigns the three network policies these default names:
   - ***<policy name>*** **Compliant**
   - ***<policy name>*** **Noncompliant**
   - ***<policy name>*** **Non NAP-Capable**

   If you need to change the order of a policy, right-click the policy and click **Move Up**.

6. In the left pane of the **Network Policy Server** window, click **Health Policies**.



Health policies are used with Network Access Protection (NAP) and allow you to designate the configuration required for NAP-capable client computers to access the network.

Policy Name
NAP 802.1X Compliant
NAP 802.1X Noncompliant

Client will meet the conditions for this policy if at least one of the below SHVs fail:

Figure AD-94.NPS Server—Network Policy Server > Health Policies Window

7. Verify that two policies were created. These policies should be named:

   - ***<policy name>*** **Compliant**
   - ***<policy name>*** **Noncompliant**

   In a new installation, the policies created by the wizard are the only policies listed.

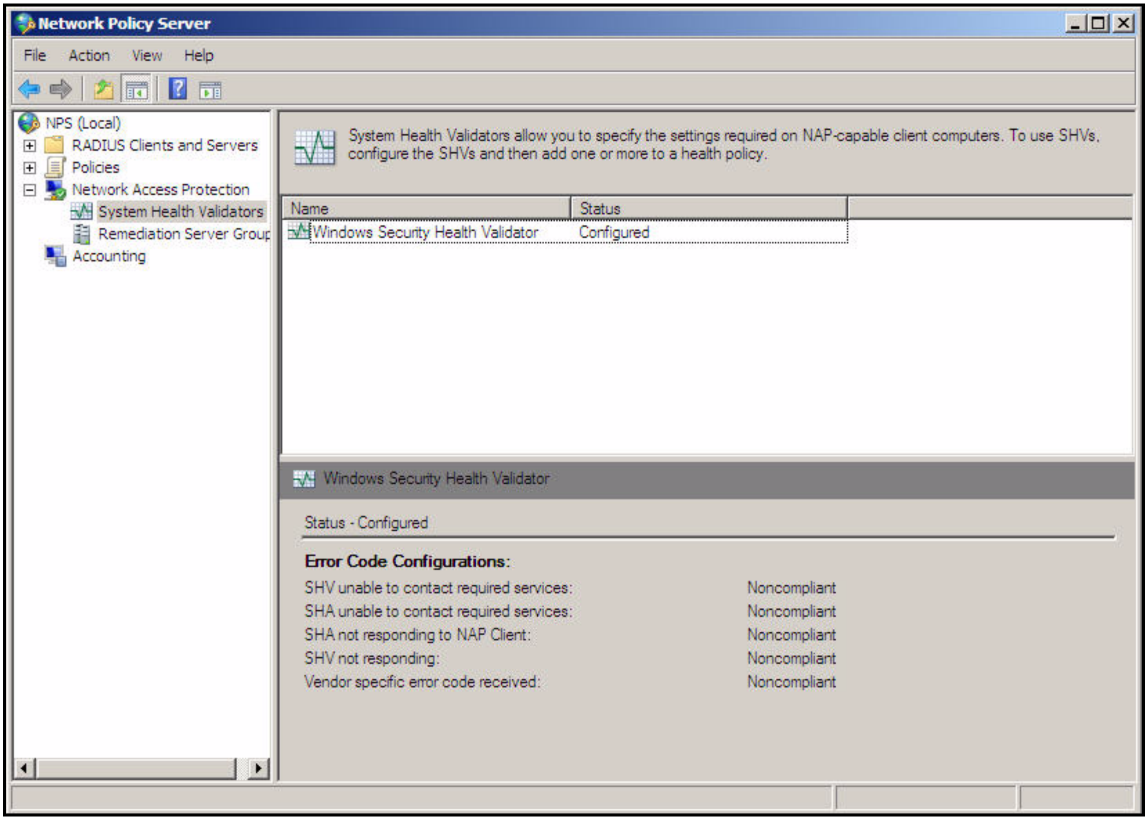
Configure System Health Validators (SHVs)

You will now configure an SHV. The SHV defines the tests with which your NPS server checks endpoints that attempt to authenticate and access the network. For example, an SHV can include a requirement that the endpoint's firewall is enabled.

Follow these steps to configure a SHV:

1. Access the **Network Policy Server** window.

2. In the left pane, expand **Network Access Protection** and click **System Health Validators**.



System Health Validators allow you to specify the settings required on NAP-capable client computers. To use SHVs, configure the SHVs and then add one or more to a health policy.

Name	Status
Windows Security Health Validator	Configured

Windows Security Health Validator

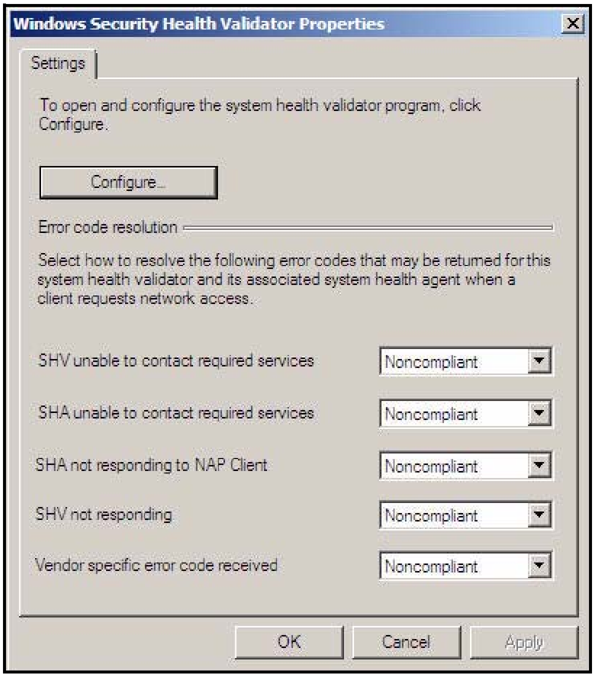
Status - Configured

Error Code Configurations:

SHV unable to contact required services:	Noncompliant
SHA unable to contact required services:	Noncompliant
SHA not responding to NAP Client:	Noncompliant
SHV not responding:	Noncompliant
Vendor specific error code received:	Noncompliant

Figure AD-95.NPS Server—Network Policy Server (System Health Validators) Window

3. In the right pane, right-click **Windows Security Health Validator** and click **Properties**.



To open and configure the system health validator program, click Configure.

Error code resolution

Select how to resolve the following error codes that may be returned for this system health validator and its associated system health agent when a client requests network access.

SHV unable to contact required services: Noncompliant

SHA unable to contact required services: Noncompliant

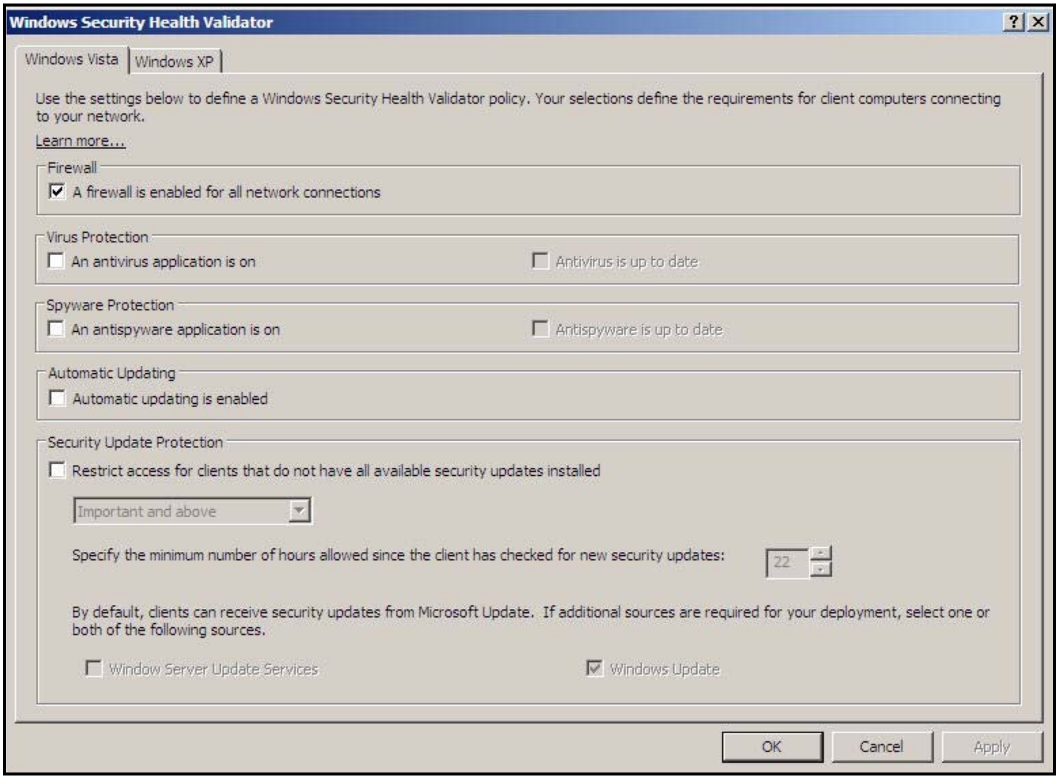
SHA not responding to NAP Client: Noncompliant

SHV not responding: Noncompliant

Vendor specific error code received: Noncompliant

Figure AD-96.NPS Server—Windows Security Health Validator Properties Window

4. In the **Windows Security Health Validator Properties** window, click **Configure**.



Windows Security Health Validator

Windows Vista | Windows XP

Use the settings below to define a Windows Security Health Validator policy. Your selections define the requirements for client computers connecting to your network.

Learn more...

Firewall

☑ A firewall is enabled for all network connections

Virus Protection

□ An antivirus application is on □ Antivirus is up to date

Spyware Protection

□ An antispyware application is on □ Antispyware is up to date

Automatic Updating

□ Automatic updating is enabled

Security Update Protection

□ Restrict access for clients that do not have all available security updates installed

Important and above

Specify the minimum number of hours allowed since the client has checked for new security updates: 22

By default, clients can receive security updates from Microsoft Update. If additional sources are required for your deployment, select one or both of the following sources.

□ Window Server Update Services ☑ Windows Update

Figure AD-97.NPS Server—Windows Security Health Validator Window

5. Click the **Windows XP** tab and configure requirements for endpoints that run Windows XP SP3:

   a. To require endpoints to use the Windows firewall, select the check box under **Firewall**.

   b. To require endpoints to run an antivirus application, select the check box under **Virus Protection**. To ensure that endpoints are running the latest software and virus signatures, select **Antivirus is up to date**.

   c. To require endpoints to use Windows Automatic Updates, select the check box under **Automatic Updating**.

d. To require endpoints to have patches, hotfixes, and other security updates, select the check box under **Security Update Protection**.

You can select which updates are required. You can select one of the following settings:

- **Critical only**
- **Important updates and above**
- **Moderate and above**
- **Low and above**
- **All**

The default requirement is for important updates and above.

You can also configure how often the endpoint checks for updates. The default setting is **22** hours.

In this example, dear all check boxes except the check box under **Firewall**.

6. Click the **Windows Vista** tab and configure requirements for endpoints that run Vista. Follow the same steps as for step 5. Note that there is an additional option for Vista endpoints: You can require Vista endpoints to run antisypware.
7. Click **OK** to close the **Windows Security Health Validator** window.
8. Click **OK** to close the **Windows Security Health Validator Properties** window.
9. Close the **Network Policy Server** window.

Configure NAP Client Settings in Group Policy

As mentioned earlier, endpoints require several settings and services for NAP to function correctly. In this section, you create a Group Policy object that configures the correct settings on domain endpoints. The settings include:

- **Network Access Protection Agent service**—collects information about the endpoint's settings and generates the System State of Health (SSoH). You will configure this service to start automatically.
- **Wired Autoconfig service**—helps the endpoint to successfully complete 802.1X authentication on the wired connection. You will configure this service to start automatically.
- **NAP enforcement clients**—requests access to thenetwork and submits the SSoH tothe NAP enforcement server. Inthis solution, the enforcement option is 802.1X, so you will enable the 802.1X EAP enforcement client.
- **Security Center user interface**—helps users activate security features such as firewalls and antivirus software so that the can make their endpoint compliant. You will enable this interface.

- **Automatic Certificate Request**—configures the computer to automatically obtain a certificate the first time that it joins the domain so that it can later authenticate itself with 802.1X

Follow these steps:

1. Click **Start > Run**.
2. Type **gpme.m**sc at the prompt and click **OK**.

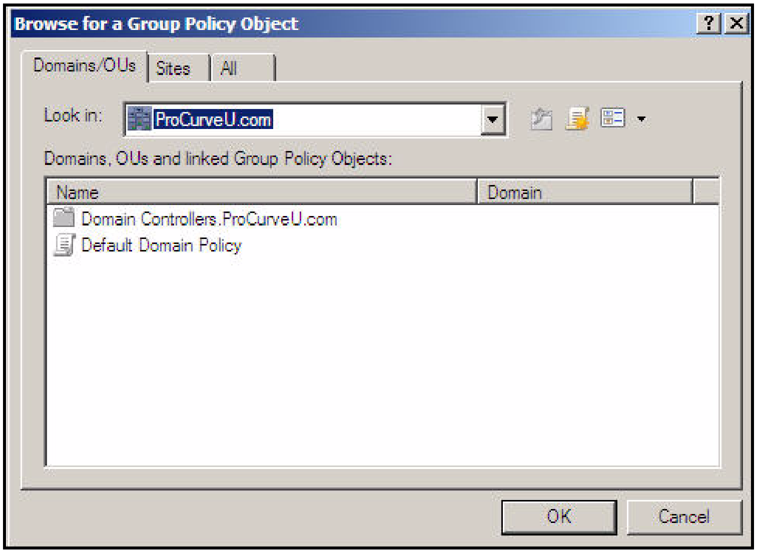

Browse for a Group Policy Object
Domains/OUs
Sites
All
Look in:
ProCurveU.com
Domains, OUs and linked Group Policy Objects:
Name
Domain
Domain Controllers.ProCurveU.com
Default Domain Policy
OK
Cancel

Figure AD-98.NPS Server—Browse for a Group Policy Object Window

3. In the **Browse for a Group Policy Object** window, click the New Group icon.

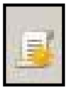
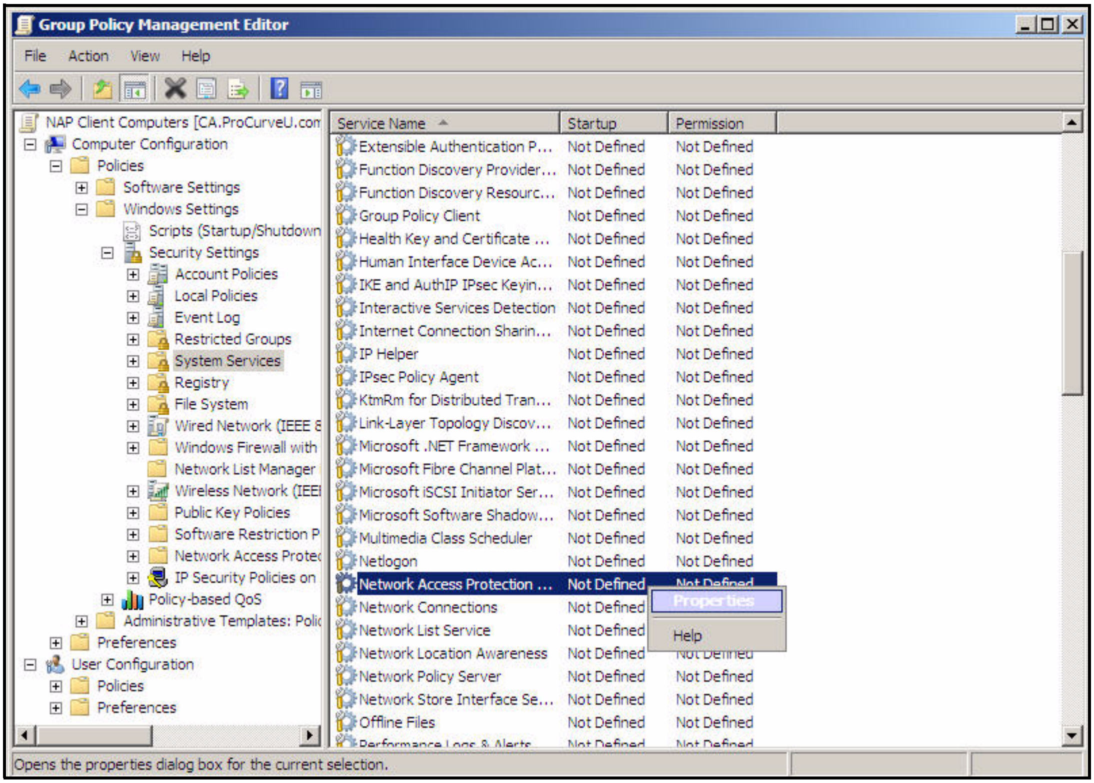


Figure AD-99.NPS Server—New Group Icon

4. Type the name of the new Group Policy object and click **OK**. In this example, type **NAP client computers**. The **Group Policy Management Editor** window is displayed.
5. In the left pane, click **Computer Configuration > Policies > Windows Settings > Security Settings > System Services**.

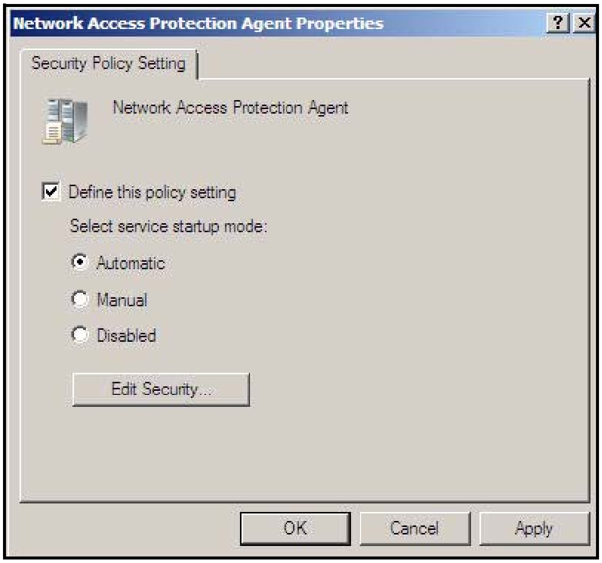


Service Name	Startup	Permission
Extensible Authentication P...	Not Defined	Not Defined
Function Discovery Provider...	Not Defined	Not Defined
Function Discovery Resourc...	Not Defined	Not Defined
Group Policy Client	Not Defined	Not Defined
Health Key and Certificate ...	Not Defined	Not Defined
Human Interface Device Ac...	Not Defined	Not Defined
IKE and AuthIP IPsec Keyin...	Not Defined	Not Defined
Interactive Services Detection	Not Defined	Not Defined
Internet Connection Sharin...	Not Defined	Not Defined
IP Helper	Not Defined	Not Defined
IPsec Policy Agent	Not Defined	Not Defined
KtmRm for Distributed Tran...	Not Defined	Not Defined
Link-Layer Topology Discov...	Not Defined	Not Defined
Microsoft .NET Framework ...	Not Defined	Not Defined
Microsoft Fibre Channel Plat...	Not Defined	Not Defined
Microsoft iSCSI Initiator Ser...	Not Defined	Not Defined
Microsoft Software Shadow...	Not Defined	Not Defined
Multimedia Class Scheduler	Not Defined	Not Defined
Netlogon	Not Defined	Not Defined
Network Access Protection ...	Not Defined	Not Defined
Network Connections	Not Defined	
Network List Service	Not Defined	
Network Location Awareness	Not Defined	Not Defined
Network Policy Server	Not Defined	Not Defined
Network Store Interface Se...	Not Defined	Not Defined
Offline Files	Not Defined	Not Defined
Performance Logs & Alerts	Not Defined	Not Defined

Opens the properties dialog box for the current selection.

Figure AD-100.NPS Server—Group Policy Management Editor Window

6. In the right pane, right-click **Network Access Protection Agent** and click **Properties**.



Network Access Protection Agent Properties

Security Policy Setting

Network Access Protection Agent

☑ Define this policy setting

Select service startup mode:

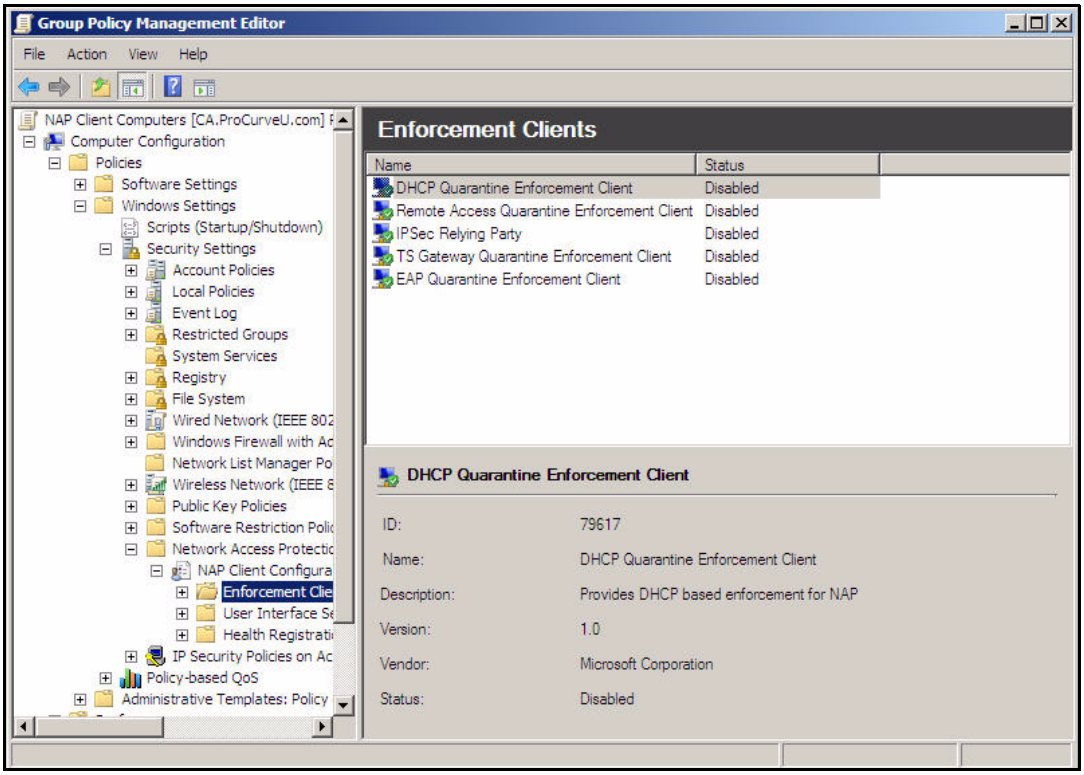
● Automatic

○ Manual

○ Disabled

Figure AD-101.NPS Server—Network Access Protection Agent Properties Window

7. In the **Network Access Protection Agent Properties** window, select the **Define this policy setting** check box.
8. For **Select service startup mode**, choose **Automatic** and click **OK**.
9. In the right pane, scroll to **Wired AutoConfig**. Repeat steps 6 to 8.
10. In the left pane of the **Group Policy Management Editor** window, click **Network Access Protection** and click **NAP Client Configuration > Enforcement Clients**.



Enforcement Clients

Name	Status
DHCP Quarantine Enforcement Client	Disabled
Remote Access Quarantine Enforcement Client	Disabled
IPSec Relying Party	Disabled
TS Gateway Quarantine Enforcement Client	Disabled
EAP Quarantine Enforcement Client	Disabled

DHCP Quarantine Enforcement Client

ID:	79617
Name:	DHCP Quarantine Enforcement Client
Description:	Provides DHCP based enforcement for NAP
Version:	1.0
Vendor:	Microsoft Corporation
Status:	Disabled

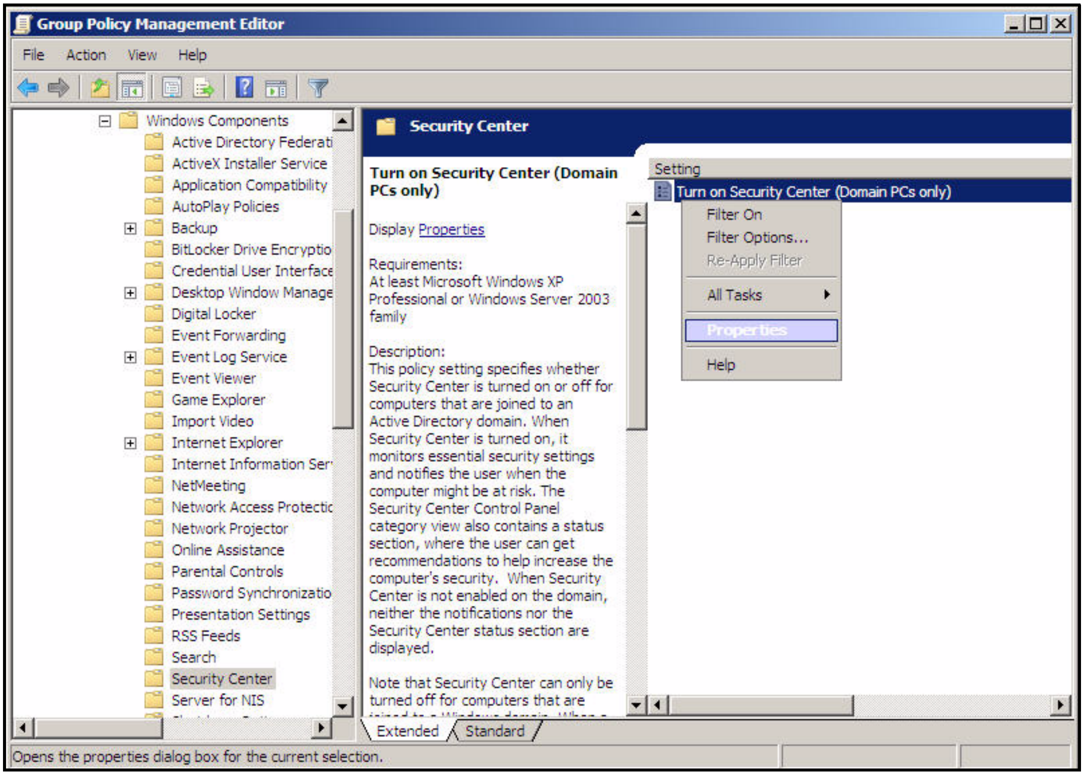
Figure AD-102.NPS Server—Group Policy Management Editor Window

11. In the right pane, right-click **EAP Quarantine Enforcement Client** and click **Enable**.

12. In the left pane, right-click **NAP Client Configuration** and click **Apply**.

13. In the left pane, navigate to **Computer Configuration > Policies > Administrative Templates > Windows Components > Security Center**.

14. In the right pane, right-click **Turn on Security Center (Domain PCs only)** and click **Properties**.



Turn on Security Center (Domain PCs only)

Display Properties

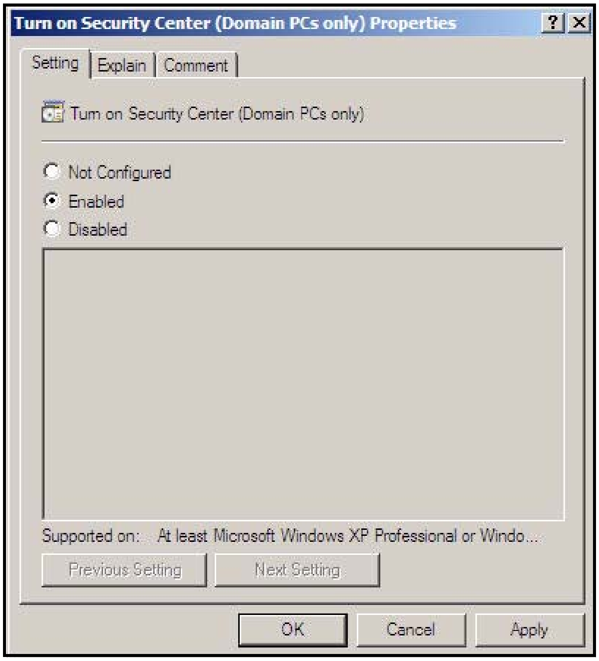
Requirements:
At least Microsoft Windows XP Professional or Windows Server 2003 family

Description:
This policy setting specifies whether Security Center is turned on or off for computers that are joined to an Active Directory domain. When Security Center is turned on, it monitors essential security settings and notifies the user when the computer might be at risk. The Security Center Control Panel category view also contains a status section, where the user can get recommendations to help increase the computer's security. When Security Center is not enabled on the domain, neither the notifications nor the Security Center status section are displayed.

Note that Security Center can only be turned off for computers that are

Opens the properties dialog box for the current selection.

Figure AD-103.NPS Server—Group Policy Management Editor Window



Turn on Security Center (Domain PCs only) Properties

Turn on Security Center (Domain PCs only)

○ Not Configured
● Enabled
○ Disabled

Supported on: At least Microsoft Windows XP Professional or Windo...

Figure AD-104.NPS Server—Turn on Security Center (Domain PCs only) Properties Window

15. Select **Enabled** and click **OK**.

16. In the left pane, navigate to **Computer Configuration > Policies > Windows Settings** > **Security Settings > Public Key Policies**.

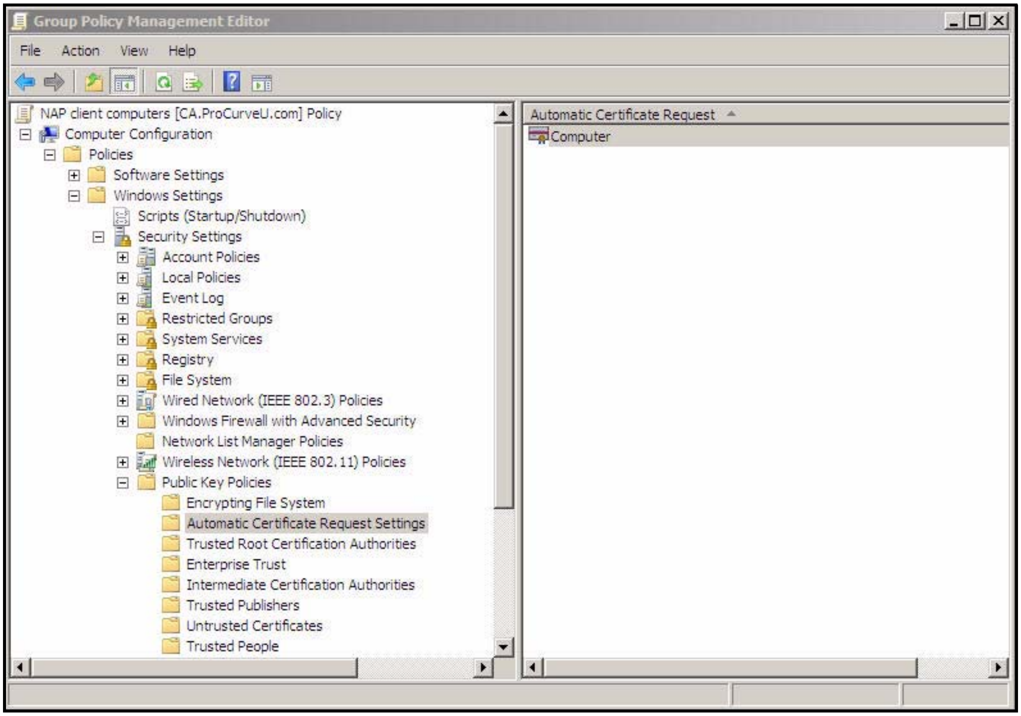
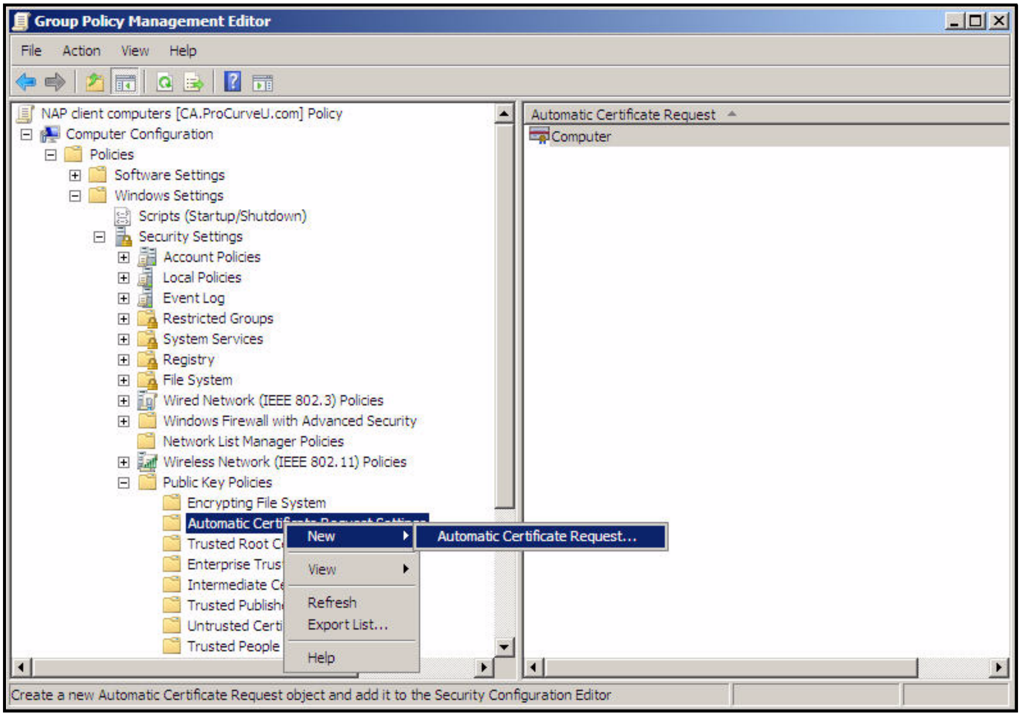

Group Policy Management Editor
File
Action
View
Help
NAP client computers [CA.ProCurveU.com] Policy
Computer Configuration
Policies
Software Settings
Windows Settings
Scripts (Startup/Shutdown)
Security Settings
Account Policies
Local Policies
Event Log
Restricted Groups
System Services
Registry
File System
Wired Network (IEEE 802.3) Policies
Windows Firewall with Advanced Security
Network List Manager Policies
Wireless Network (IEEE 802.11) Policies
Public Key Policies
Encrypting File System
Automatic Certificate Request Settings
Trusted Root Certification Authorities
Enterprise Trust
Intermediate Certification Authorities
Trusted Publishers
Untrusted Certificates
Trusted People
Automatic Certificate Request
Computer

Figure AD-105.Group Policy Management Editor

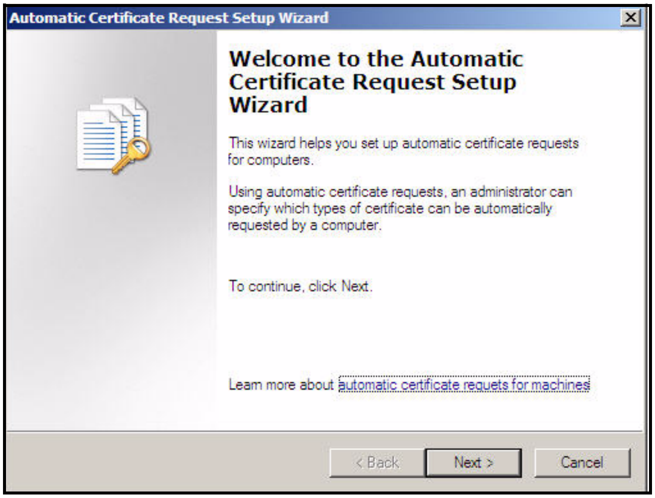
17. Right-click **Automatic Certificate Request Settings** and click **New > Automatic Certificate Request**.



Create a new Automatic Certificate Request object and add it to the Security Configuration Editor

Figure AD-106.Group Policy Management Editor—Opening the Automatic Certificate Request Wizard

The Automatic Certificate Request Setup Wizard opens.



Automatic Certificate Request Setup Wizard

Welcome to the Automatic Certificate Request Setup Wizard

This wizard helps you set up automatic certificate requests for computers.

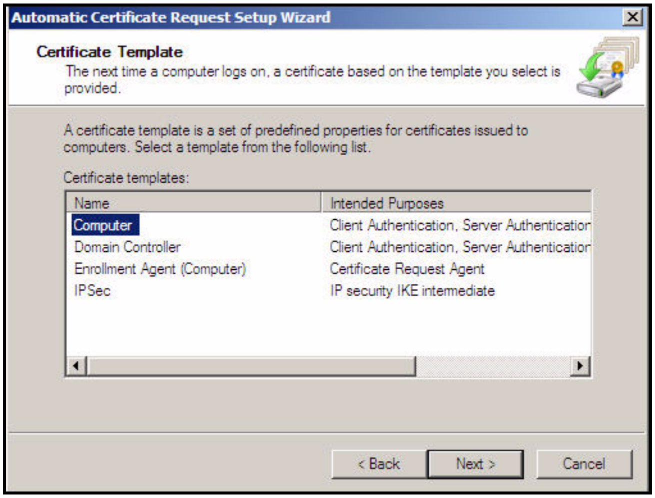
Using automatic certificate requests, an administrator can specify which types of certificate can be automatically requested by a computer.

To continue, click Next.

Learn more about automatic certificate requets for machines

Figure AD-107.Automatic Certificate Request Setup Wizard— Welcome Page

18. Click **Next**.



Automatic Certificate Request Setup Wizard

Certificate Template

The next time a computer logs on, a certificate based on the template you select is provided.

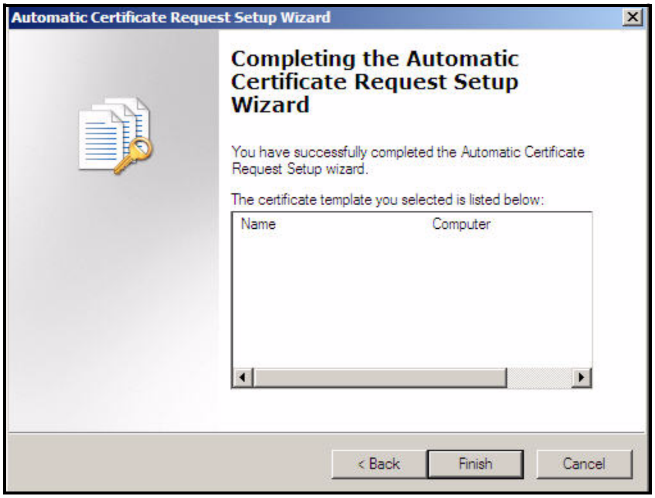
A certificate template is a set of predefined properties for certificates issued to computers. Select a template from the following list.

Certificate templates:

Name	Intended Purposes
Computer	Client Authentication, Server Authenticatior
Domain Controller	Client Authentication, Server Authenticatior
Enrollment Agent (Computer)	Certificate Request Agent
IPSec	IP security IKE intermediate

Figure AD-108.Automatic Certificate Request Setup Wizard— Certificate Template Page

19. Select **Computer** and click **Next**.


Automatic Certificate Request Setup Wizard

Completing the Automatic Certificate Request Setup Wizard

You have successfully completed the Automatic Certificate Request Setup wizard.

The certificate template you selected is listed below:

Name	Computer

Figure AD-109.Automatic Certificate Request Setup Wizard— Completion Page

20. On the **Completing the Automatic Certificate Request Setup Wizard** page, click **Finish**.

21. Close the **Group Policy Management Editor** window.

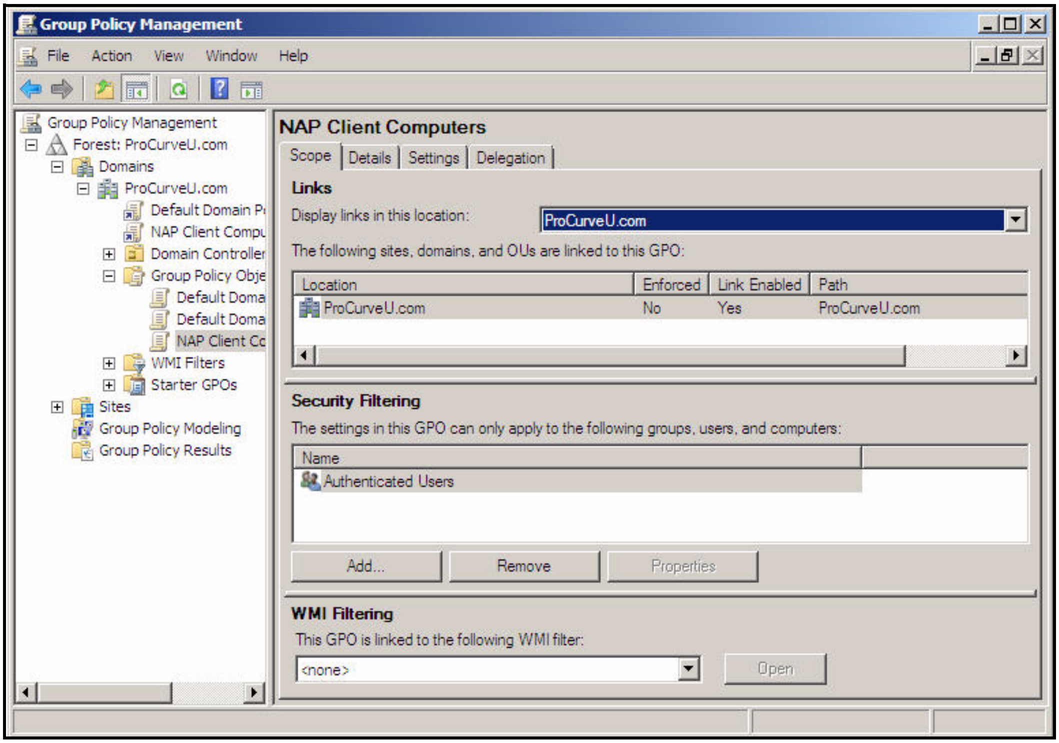
22. If you are prompted to apply settings, click **Yes**.

Configure Security Filters for the NAP Client Settings

Security filters control which domain endpoints receive the settings that you established in the Group Policy object. You must configure security filters so that NAP client settings are not applied to domain servers.

To configure security filters, complete the steps:

1. In the Windows **Start** menu, click **Administrative Tools** > **Group Policy Management**.



NAP Client Computers

Links

Display links in this location: ProCurveU.com

The following sites, domains, and OUs are linked to this GPO:

Location	Enforced	Link Enabled	Path
ProCurveU.com	No	Yes	ProCurveU.com

Security Filtering

The settings in this GPO can only apply to the following groups, users, and computers:

Name
Authenticated Users

WMI Filtering

This GPO is linked to the following WMI filter:

<none>

Figure AD-110.NPS Server—Group Policy Management Window

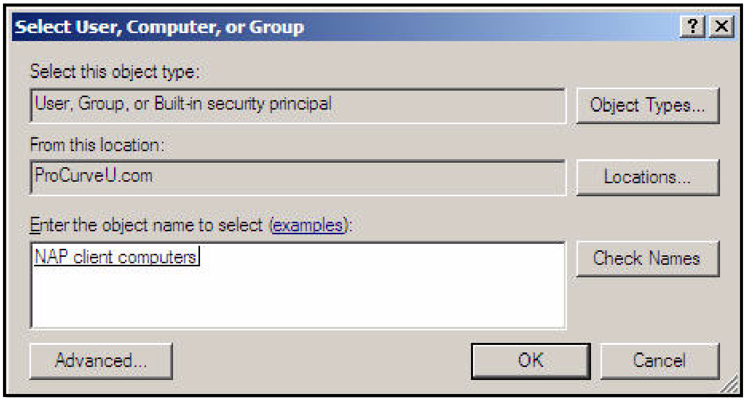
2. In the left pane of the **Group Policy Management** window, expand **Forest:ProCurveU.com > Domains >** *Your Domain Name* **> Group Policy Objects. NAP client computers**.

3. In the right pane, under **Security Filtering**, click **Authenticated Users**.

4. Click **Remove**.

5. When prompted to confirm this action, click **OK**.

6. Click **Add**.



Select this object type:
User, Group, or Built-in security principal

From this location:
ProCurveU.com

Enter the object name to select (examples):
NAP client computers

Figure AD-111.NPS Server—Select User, Computer, or Group Window

7. In the **Select User, Computer, or Group** window, in the **Enter the object name to select** field, type **NAP client computers**.
8. Click **Check Names**. If the server can verify the name of the group it will become underlined.
9. Click **OK**.
10. Close the **Group Policy Management** window.

Configuring the Wireless Edge Services Modules

The network in this access control solution provides wireless connectivity with these devices:

- ProCurve Wireless Edge Services Module
- ProCurve Redundant Wireless Services Module
- Twelve ProCurve RPs

This section explains how to configure these devices to implement the access control solution, beginning at installation. You must complete each task on both modules.

Install the Wireless Edge Services Modules

You must install a Wireless Edge Services zl Module in a ProCurve Switch 5400zl or 8200zl. After the module is installed, the switch is then referred to as a *wireless services-enabled switch*. (For detailed instructions to install the module into the switch, see the *ProCurve Switch zl Module Installation Guide*.)

Note

Alternatively, you can purchase a Wireless Edge Services xl Module and install it in a ProCurve Switch 5300xl Series. Configuring an xl module is almost exactly the same as configuring a zl module; however, the xl module has less processing power and supports fewer RPs (up to 48 instead of up to 156).

The example network for ProCurve University includes two 5400zl Switches. To provide redundancy for the wireless network, the university has installed one module in each switch.

Configure Initial Settings onthe Wireless Edge Services Modules

Before you can access the Web browser interface on a Wireless Edge Services Module, you must configure its IP settings through the wireless services-enabled switch.

Follow these steps:

1. Access the wireless services-enabled switch's command-line interface (CLI) (through a console, Telnet, or Secure Shell <SSH> session).
2. Move to the wireless-services context with this command:

Syntax: wireless-services <*slot letter*>

Moves to the wireless-services context on the wireless services-enabled switch.

Replace ***<slot letter>*** *with the letter for the chassis slot in which the module is installed.*

For example:

```
ProCurve# wireless-services c
```

Note

The following instructions assume that the Wireless Edge Services Module is at factory default settings. If it is not, return it to those settings by entering **erase startup-config**. Afterthe module reboots, access the wireless-services context and continue following the instructions below.

3. Move to the global configuration mode context of the wireless-services context:

```
ProCurve(wireless-services-C)# configure terminal
```

4. Move to the configuration mode context for the VLAN that you chose for infrastructure devices:

Syntax: interface vlan<*ID*>

Moves to a VLAN configuration mode context.

Replace ***<ID>*** *with a number between 1 and 4094.*

In this example, the VLAN for infrastructure devices is 2. Enter:

```
ProCurve(wireless-services-C)(config)# interface
vlan2
```

5. Assign the VLAN an IP address.

Syntax: ip address <*A.B.C.D*>/<*prefix length*>

Assigns the interface an IP address.

Replace **<*A.B.C.D*>** *with the IP address and replace* **<*prefix length*>** *with the Classless Inter-Domain Routing (CIDR) notation for the subnet mask.*

For the example network, the Wireless Edge Services Module's IP address for VLAN 2 is 10.2.0.20 with a mask of 255.255.0.0. Enter:

```
ProCurve(wireless-services-C)(config-if)# ip address
10.2.0.20/16
```

6. Define this VLAN as the management VLAN.

```
ProCurve(wireless-services-C) (config-if)# management
```

7. Exit to the global configuration mode context:

```
ProCurve(wireless-services-C)(config-if)# exit
```

8. Specify the default router:

Syntax: ip default-gateway <*A.B.C.D*>

Specifies the IP address for the default router.

Replace **<*A.B.C.D*>** *with the IP address.*

For the example network, type:

```
ProCurve(wireless-services-C)(config)# ip default-
gateway 10.2.0.1
```

9. Save the configuration:

Syntax: write memory

Saves the configuration changes to the startup-config.

10. Before closing your session with the switch, you must tag the Wireless Module's uplink port for the management VLAN. From the switch's global configuration context, enter this command:

Syntax: vlan <*VLAN ID*> tagged <*slot*>up

Tags the Wireless Module's uplink port for the specified VLAN.

Replace **<VLAN ID>** *with the ID for the VLAN. Replace* **<slot>** *with the letter for the slot in which the module is installed.*

In this example, enter:

```
ProCurve(config)# vlan 2 tagged bup
```

11. You can optionally enable secure management, which restricts the module to accepting management traffic that arrives on its management VLAN:

Syntax: management secure

Forces the module to accept management traffic only on the management VLAN.

However, in this example, the setting is not necessary because the Wireless Edge Services Module has only one IP address, the management address.

12. Save the configuration:

Syntax: write memory

Saves the configuration changes to the startup-config.

You can now access the module's Web browser interface, which you will use to complete all remaining settings.

Configure WLAN Settings

This section explains how to set up a wireless LAN (WLAN) on the Wireless Edge Services Module through its Web browser interface.

In a network that enforces 802.1X quarantining, you must set the WLAN authentication to 802.1X. You can choose either Wired Equivalent Privacy (WEP) or Wi-Fi Protected Access (WPA) for the encryption; however, WPA is the much preferred option, and the one used in this example. (For more information about the options for setting up WLAN security on the Wireless Edge Services Module, see the *ProCurve Access Control Security Design Guide*.)

Part of setting up the WLAN is specifying the RADIUS servers—in this case, the NPS.

To configure the WLANs on the Wireless Edge Services Module, complete these steps:

1. Open the Web browser interface on your management station. For the URL, type the IP address that you configured on the module. In this example: **10.2.0.20**.

   Your station must have the Java Runtime Environment (JRE).

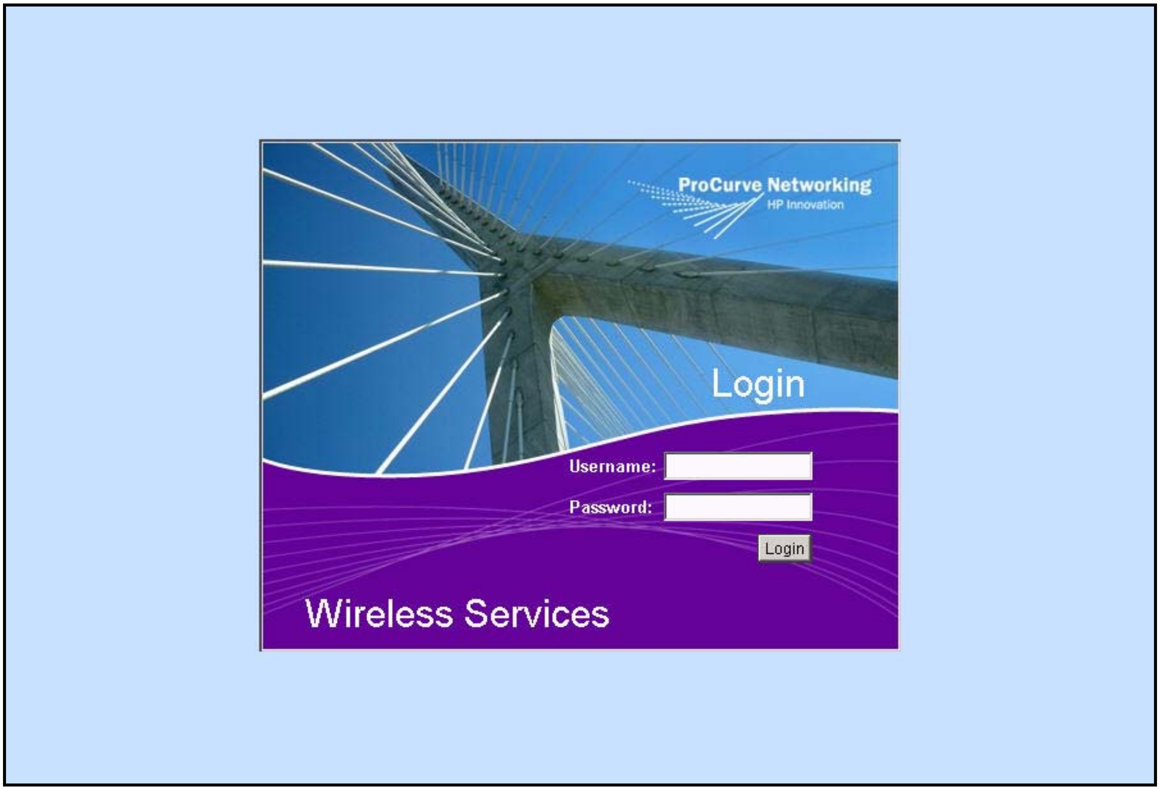
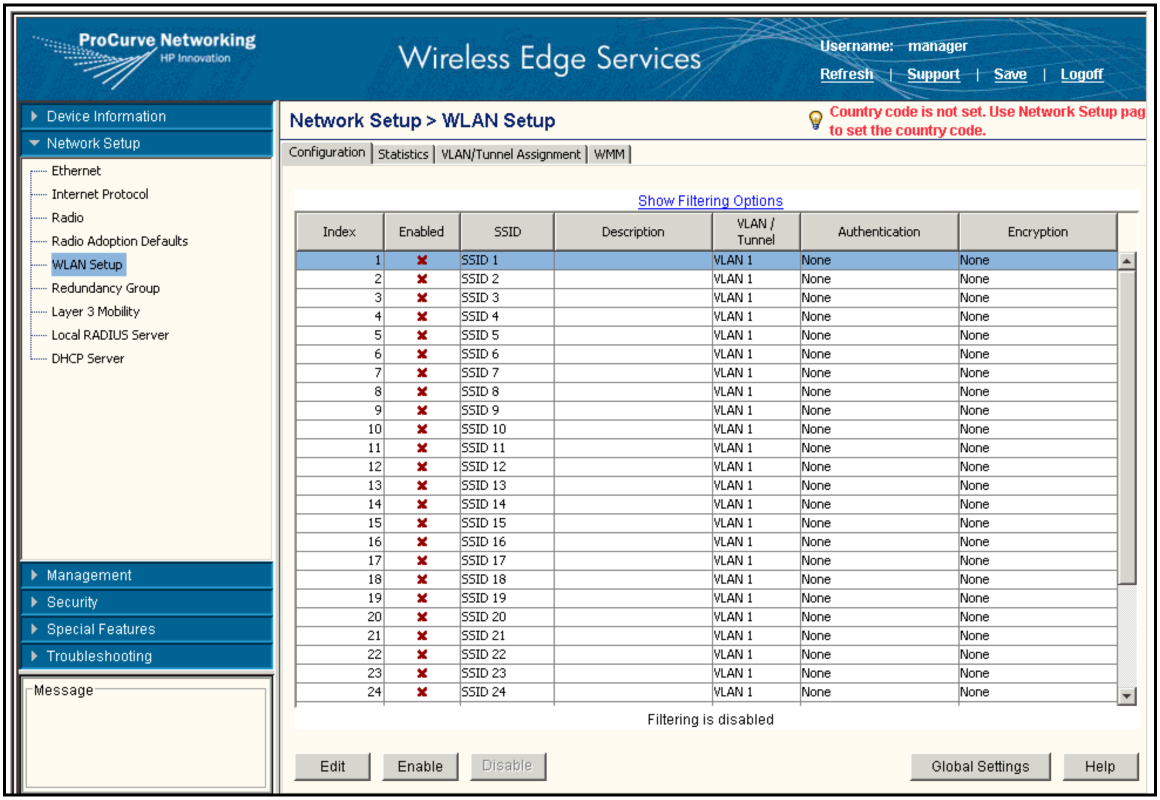


Figure AD-112.Wireless Services Login Page

2. Log in with the default manager credentials:
   - **Username** = **manager**
   - **Password** = **procurve**
3. Click **Network Setup > WLAN Setup**.



Country code is not set. Use Network Setup pag to set the country code.

Index	Enabled	SSID	Description	VLAN / Tunnel	Authentication	Encryption
1	✘	SSID 1		VLAN 1	None	None
2	✘	SSID 2		VLAN 1	None	None
3	✘	SSID 3		VLAN 1	None	None
4	✘	SSID 4		VLAN 1	None	None
5	✘	SSID 5		VLAN 1	None	None
6	✘	SSID 6		VLAN 1	None	None
7	✘	SSID 7		VLAN 1	None	None
8	✘	SSID 8		VLAN 1	None	None
9	✘	SSID 9		VLAN 1	None	None
10	✘	SSID 10		VLAN 1	None	None
11	✘	SSID 11		VLAN 1	None	None
12	✘	SSID 12		VLAN 1	None	None
13	✘	SSID 13		VLAN 1	None	None
14	✘	SSID 14		VLAN 1	None	None
15	✘	SSID 15		VLAN 1	None	None
16	✘	SSID 16		VLAN 1	None	None
17	✘	SSID 17		VLAN 1	None	None
18	✘	SSID 18		VLAN 1	None	None
19	✘	SSID 19		VLAN 1	None	None
20	✘	SSID 20		VLAN 1	None	None
21	✘	SSID 21		VLAN 1	None	None
22	✘	SSID 22		VLAN 1	None	None
23	✘	SSID 23		VLAN 1	None	None
24	✘	SSID 24		VLAN 1	None	None

Filtering is disabled

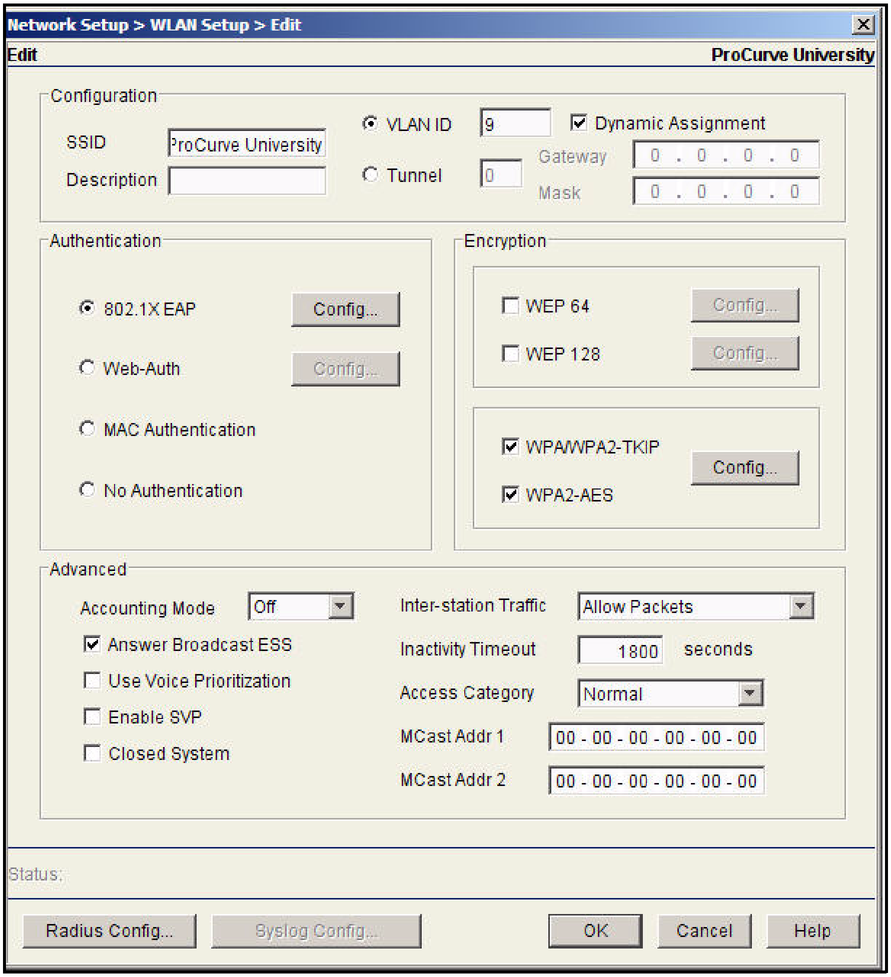
Figure AD-113.Wireless Edge Services Module Web Interface—Network Setup > WLAN Setup Window

4. Select the first WLAN.

5. Click **Edit**.

6. Under **Configuration**, in the **SSID** box, type a name for the wireless network (in this example, **ProCurve University**).

7. In the **VLAN ID** box, specify the static VLAN, which, in this implementation, is the temporary VLAN for computers (pre-user-login). In this example, type **9**.



Network Setup > WLAN Setup > Edit

Edit — ProCurve University

Configuration

SSID: ProCurve University

Description:

● VLAN ID: 9 ☑ Dynamic Assignment

○ Tunnel: 0 Gateway: 0 . 0 . 0 . 0 Mask: 0 . 0 . 0 . 0

Authentication

● 802.1X EAP [Config...]

○ Web-Auth [Config...]

○ MAC Authentication

○ No Authentication

Encryption

□ WEP 64 [Config...]

□ WEP 128 [Config...]

☑ WPA/WPA2-TKIP [Config...]

☑ WPA2-AES

Advanced

Accounting Mode: Off

☑ Answer Broadcast ESS

□ Use Voice Prioritization

□ Enable SVP

□ Closed System

Inter-station Traffic: Allow Packets

Inactivity Timeout: 1800 seconds

Access Category: Normal

MCast Addr 1: 00 - 00 - 00 - 00 - 00 - 00

MCast Addr 2: 00 - 00 - 00 - 00 - 00 - 00

Status:

Figure AD-114.Wireless Edge Services Module Web Interface—Network Setup > WLAN Setup > Edit Window

8. The **Dynamic Assignment** check box should be selected.

9. Under **Encryption**, select the **WPA/WPA2-TKIP** and the **WPA2-AES** check boxes.

10. Under **Authentication**, select **802.1X EAP**.

11. Click **Radius Config** at the bottom of the window. The **Radius Configuration** window is displayed.

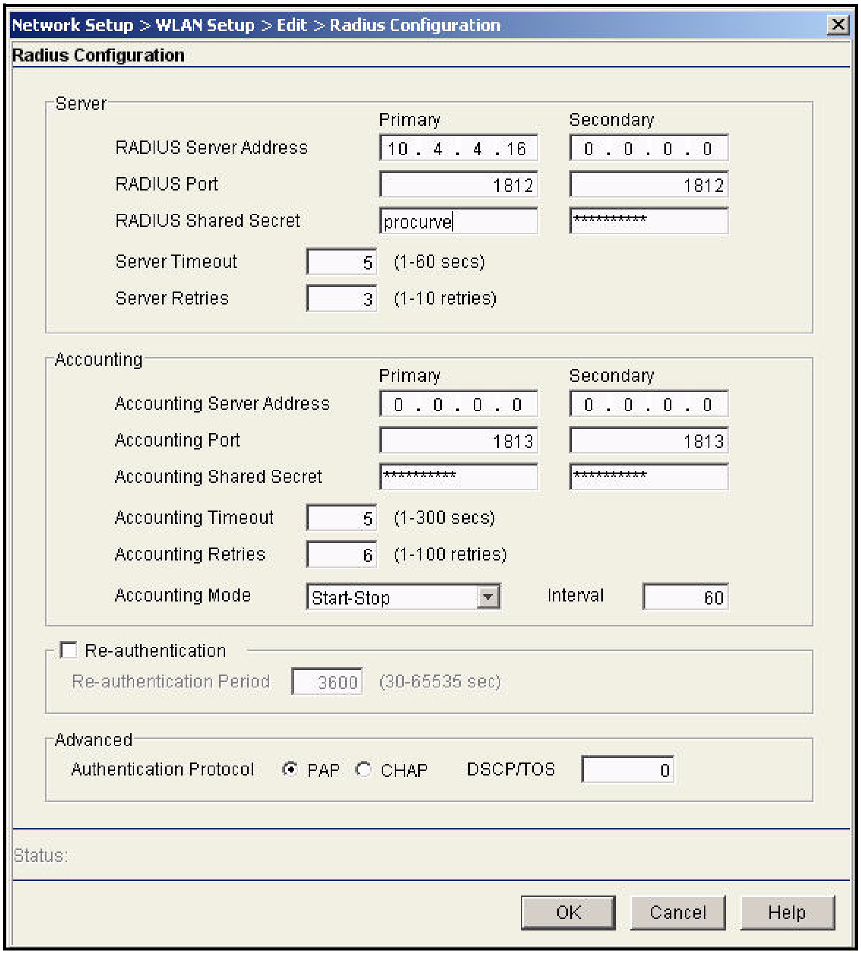
12. Under **Server**, specify your NPS server:

    Type the settings for one NPS setting in the **Primary** column:

    a. In the **RADIUS Server Address** box, type the IP address of the NPS. In this example, type **10.4.4.16**.

    b. Leave the **RADIUS Port** at the default value, **1812**.

    c. In the **RADIUS Shared Secret** box, type the secret that you configured for the module on the NPS. In this example, type **procurve**.



Network Setup > WLAN Setup > Edit > Radius Configuration

Radius Configuration

Server

	Primary	Secondary
RADIUS Server Address	10 . 4 . 4 . 16	0 . 0 . 0 . 0
RADIUS Port	1812	1812
RADIUS Shared Secret	procurve	**********

Server Timeout 5 (1-60 secs)

Server Retries 3 (1-10 retries)

Accounting

	Primary	Secondary
Accounting Server Address	0 . 0 . 0 . 0	0 . 0 . 0 . 0
Accounting Port	1813	1813
Accounting Shared Secret	**********	**********

Accounting Timeout 5 (1-300 secs)

Accounting Retries 6 (1-100 retries)

Accounting Mode Start-Stop Interval 60

□ Re-authentication

Re-authentication Period 3600 (30-65535 sec)

Advanced

Authentication Protocol ● PAP ○ CHAP DSCP/TOS 0

Status:

Figure AD-115.Wireless Edge Services Module Web Interface—Radius Configuration Window

13. Click **OK**.

14. Click **OK** in the **Network Setup > WLAN Setup > Edit** window.

15. In the **Network Setup > WLAN Setup** window, verify that the WLAN you just configured is selected. Click **Enable**.

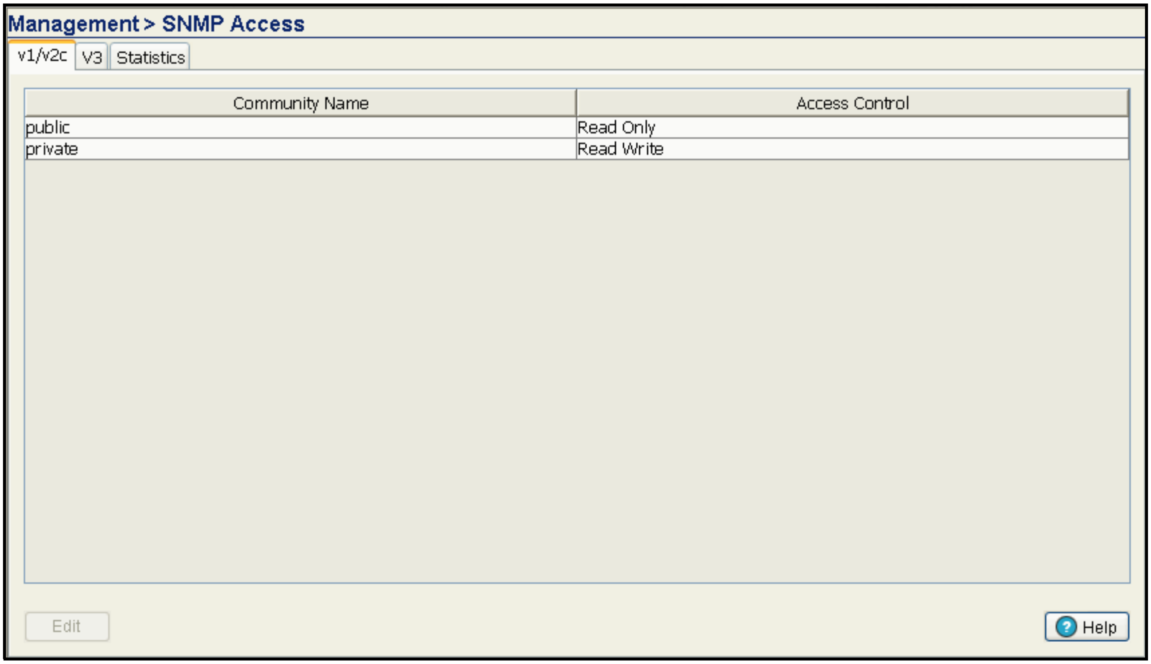
Configure SNMP on the Wireless Edge Services Modules

You must configure the Wireless Edge Services Modules' SNMP settings to allow PCM+ to manage it.

Follow these steps to configure SNMP:

1. You should be in the Wireless Edge Services Module's Web browser interface.

2. Click **Management > SNMP Access**. You begin at the **v1/v2c** tab.

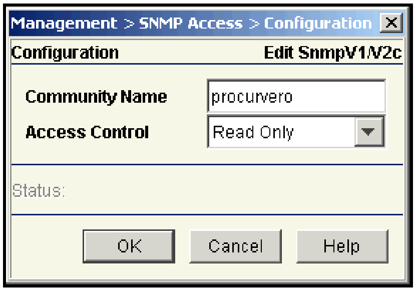


Community Name	Access Control
public	Read Only
private	Read Write

Figure AD-116.Wireless Edge Services Module Web Interface—Management > SNMP Access > V1/V2c Tab

3. Select **public** and click **Edit**. The **Edit SnmpV1/V2c** window is displayed.

4. For the **Community Name**, type the new name for the read-only community. In this example, type **procurvero**.



Management > SNMP Access > Configuration

Configuration — Edit SnmpV1/V2c

Community Name: procurvero

Access Control: Read Only

Status:

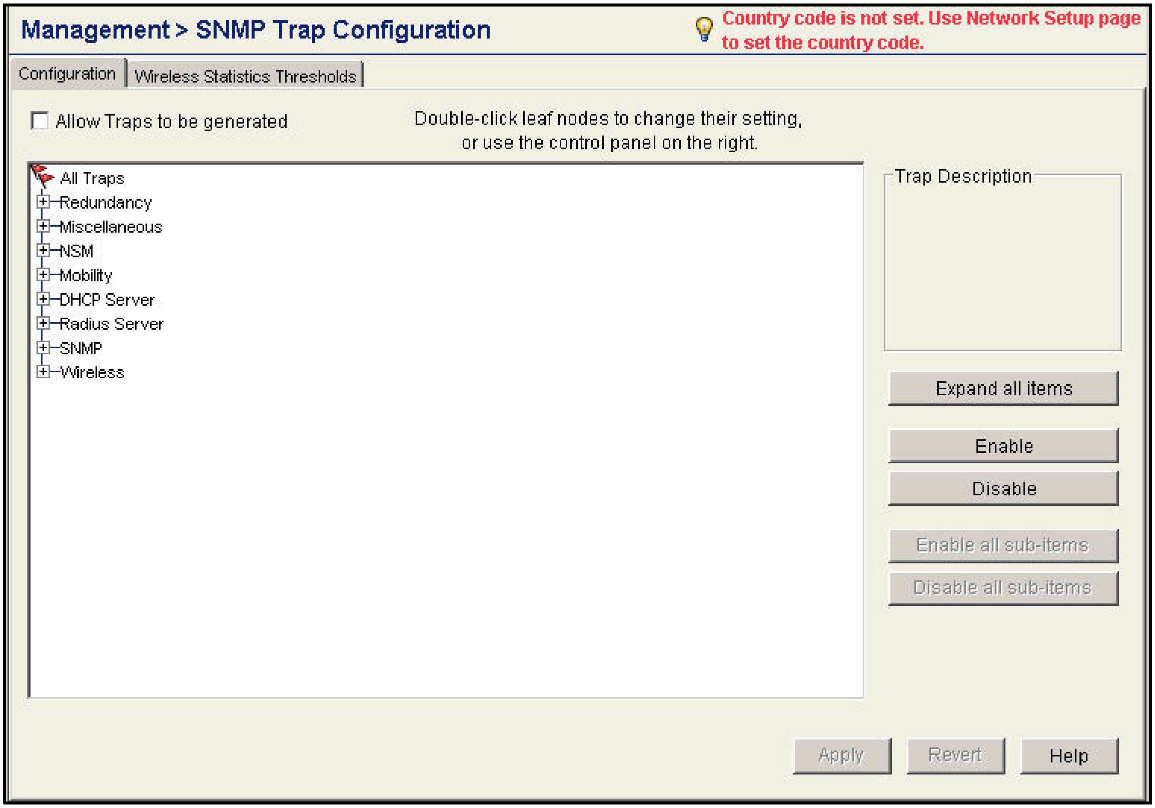
Figure AD-117.Wireless Edge Services Module Web Interface—Edit SnmpV1/V2c Window

5. For **Access Control**, keep the default setting, **Read Only**.
6. Click **OK**.
7. Select **private** and click **Edit**.
8. In the **Community Name** box, type the new name for the read-write community. In this example, type **procurverw**.
9. For **Access Control**, keep the default setting, **Read Write**.
10. Click **OK**.

Note

You can also configure SNMPv3 settings by clicking the **V3** tab in the **Management > SNMP Access** window. For this example, we will not use SNMPv3.

11. Select **Management > SNMP Trap Configuration**.



Management > SNMP Trap Configuration

Country code is not set. Use Network Setup page to set the country code.

□ Allow Traps to be generated

Double-click leaf nodes to change their setting, or use the control panel on the right.

Figure AD-118.Wireless Edge Services Module Web Interface—Management > SNMP Trap Configuration > Configuration Tab

12. Select the **Allow Traps to be generated** check box.

13. To view the SNMP traps in a category, expand the category. To view the SNMP traps in all categories, click **Expand all items**.

14. To enable all the traps, select **All Traps** and click **Enable all sub-items**.

15. To enable all the SNMP traps in a category, select the category and click **Enable all sub-items**.

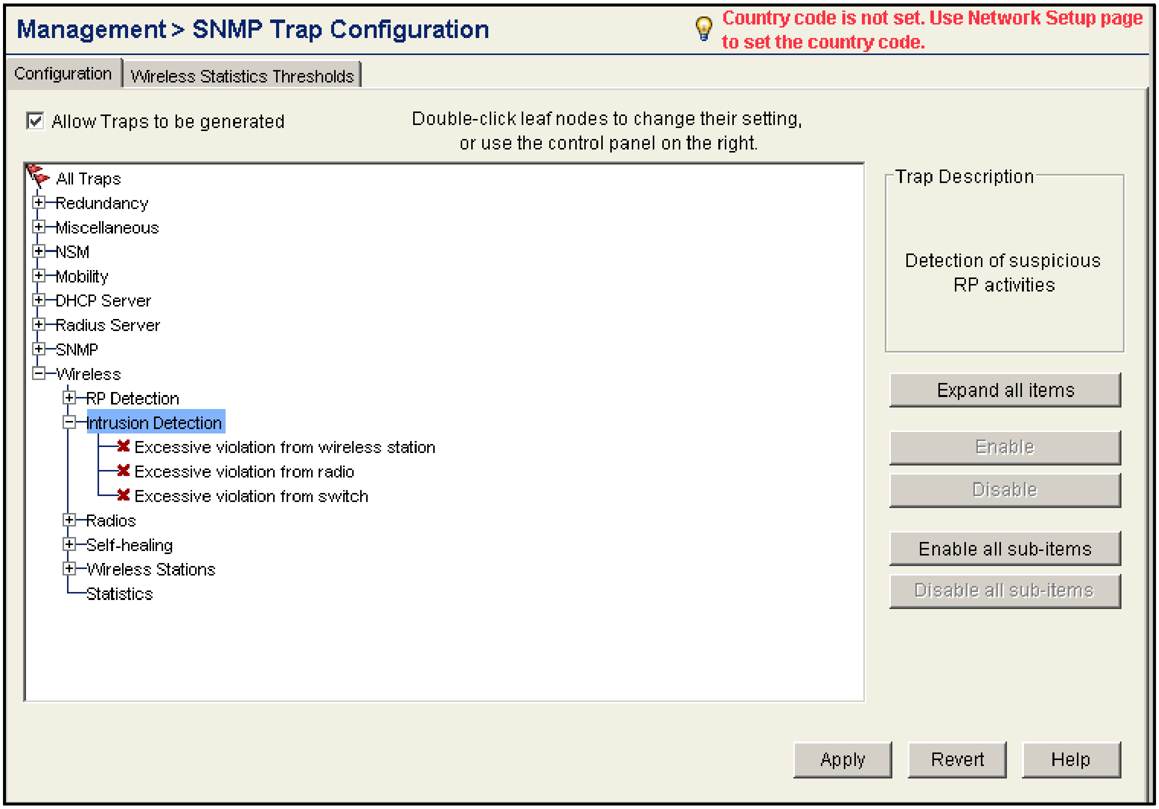

Management > SNMP Trap Configuration
Country code is not set. Use Network Setup page to set the country code.
Configuration
Wireless Statistics Thresholds
☑ Allow Traps to be generated
Double-click leaf nodes to change their setting, or use the control panel on the right.
All Traps
Redundancy
Miscellaneous
NSM
Mobility
DHCP Server
Radius Server
SNMP
Wireless
RP Detection
Intrusion Detection
✗ Excessive violation from wireless station
✗ Excessive violation from radio
✗ Excessive violation from switch
Radios
Self-healing
Wireless Stations
Statistics
Trap Description
Detection of suspicious RP activities
Expand all items
Enable
Disable
Enable all sub-items
Disable all sub-items
Apply
Revert
Help

Figure AD-119.Wireless Edge Services Module Web Interface—Management > SNMP Trap Configuration > Configuration Tab

16. To enable a specific SNMP trap, select the trap and dick **Enable** or double-click the trap. A green check mark is displayed next to enabled traps. A red x is displayed next to disabled traps.

17. Click **Apply**.

Change Web-User Passwords

The Web-Users are users who are allowed to log in to the Wireless Module's Web browser interface. By default, the module has two Web-Users: manager, who has complete read-write access, and operator, who has read-only access. In this section, you will change the passwords for the default users. In a later section, you will learn about creating other Web-Users.

Follow these steps to change the passwords:

1. Click **Management** > **Web-Users**. The **Local Users** tab should be selected.

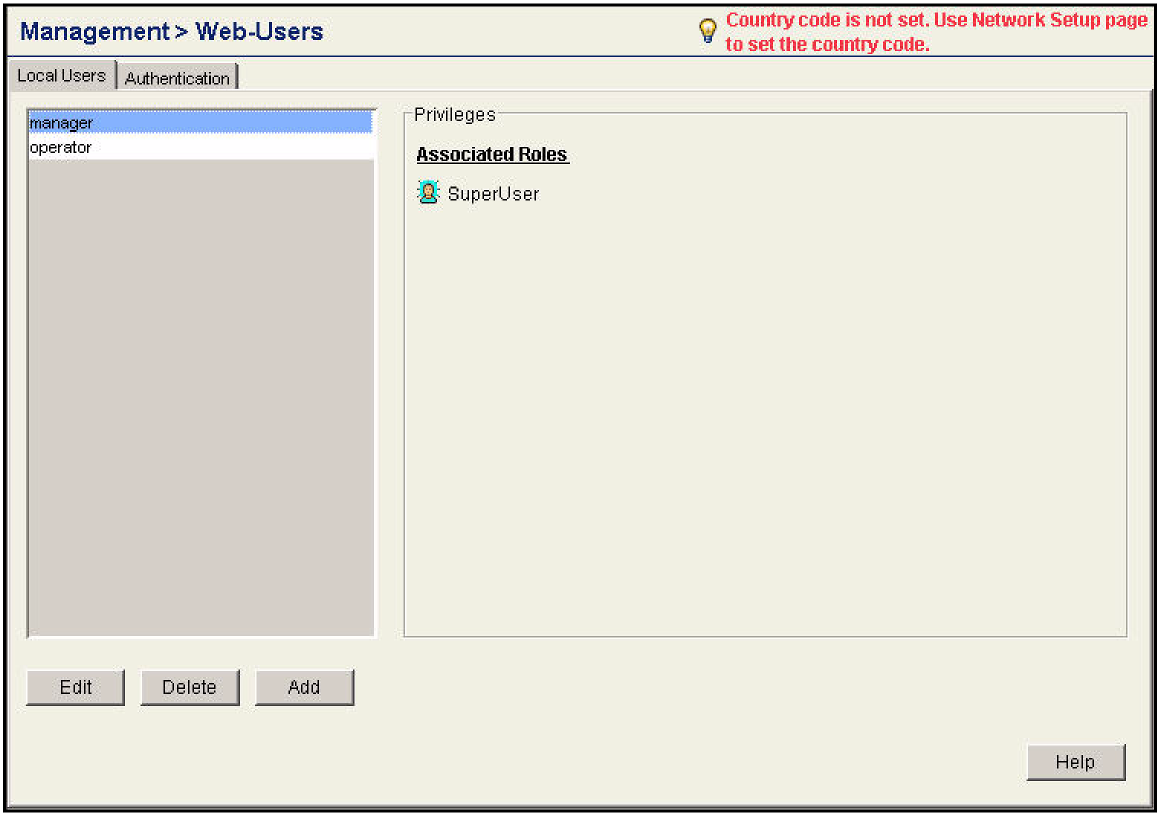
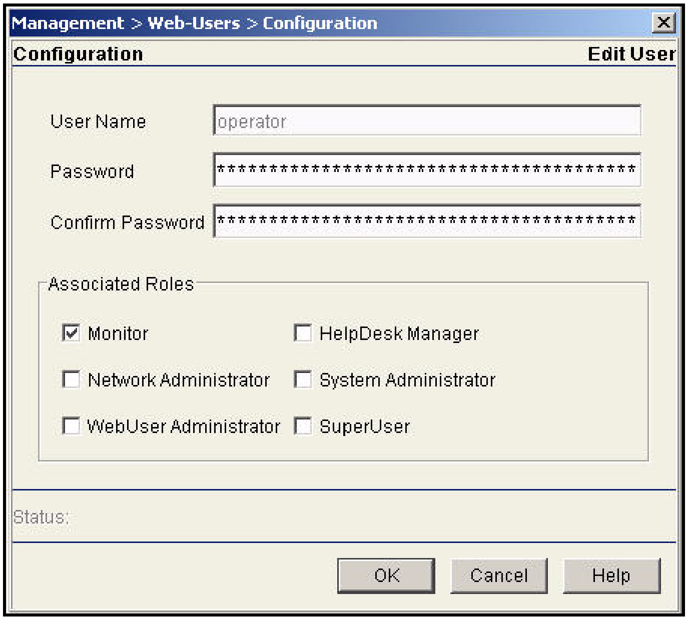


Figure AD-120.Wireless Edge Services Module Web Interface—Management > Web-Users

2. Select **operator** and click **Edit**.



Management > Web-Users > Configuration

Configuration

Edit User

User Name: operator

Password: **

Confirm Password: **

Associated Roles

☑ Monitor
□ HelpDesk Manager
□ Network Administrator
□ System Administrator
□ WebUser Administrator
□ SuperUser

Status:

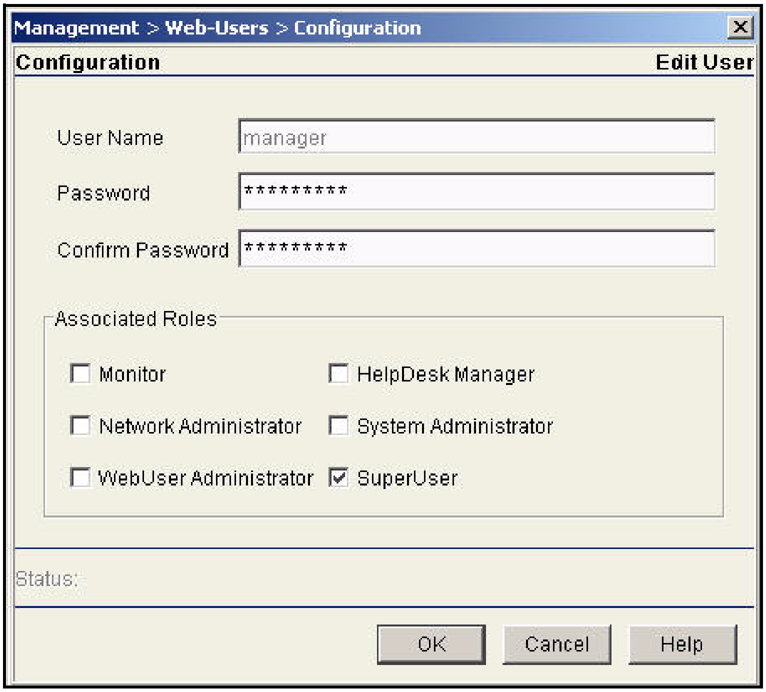
Figure AD-121.Wireless Edge Services Module Web Interface—Management > Web-Users > Configuration (operator)

3. In the **Password** and **Confirm Password** boxes, type the new password (in this example, **procurve**).

4. Under **Associated Roles**, the **Monitor** check box is selected. Keep this default setting.

5. Click **OK**.

6. Select **manager** and click **Edit**.



Management > Web-Users > Configuration

Configuration — Edit User

User Name: manager

Password: *********

Confirm Password: *********

Associated Roles

□ Monitor　□ HelpDesk Manager

□ Network Administrator　□ System Administrator

□ WebUser Administrator　☑ SuperUser

Status:

Figure AD-122.Wireless Edge Services Module Web Interface—Management > Web-Users > Configuration (manager)

7. In the **Password** and **Confirm Password** boxes, type the new password (in this example, **procurve**).

8. Under **Associated Roles**, the **SuperUser** check box is selected. Keep this default setting.

9. Click **OK**.

Note

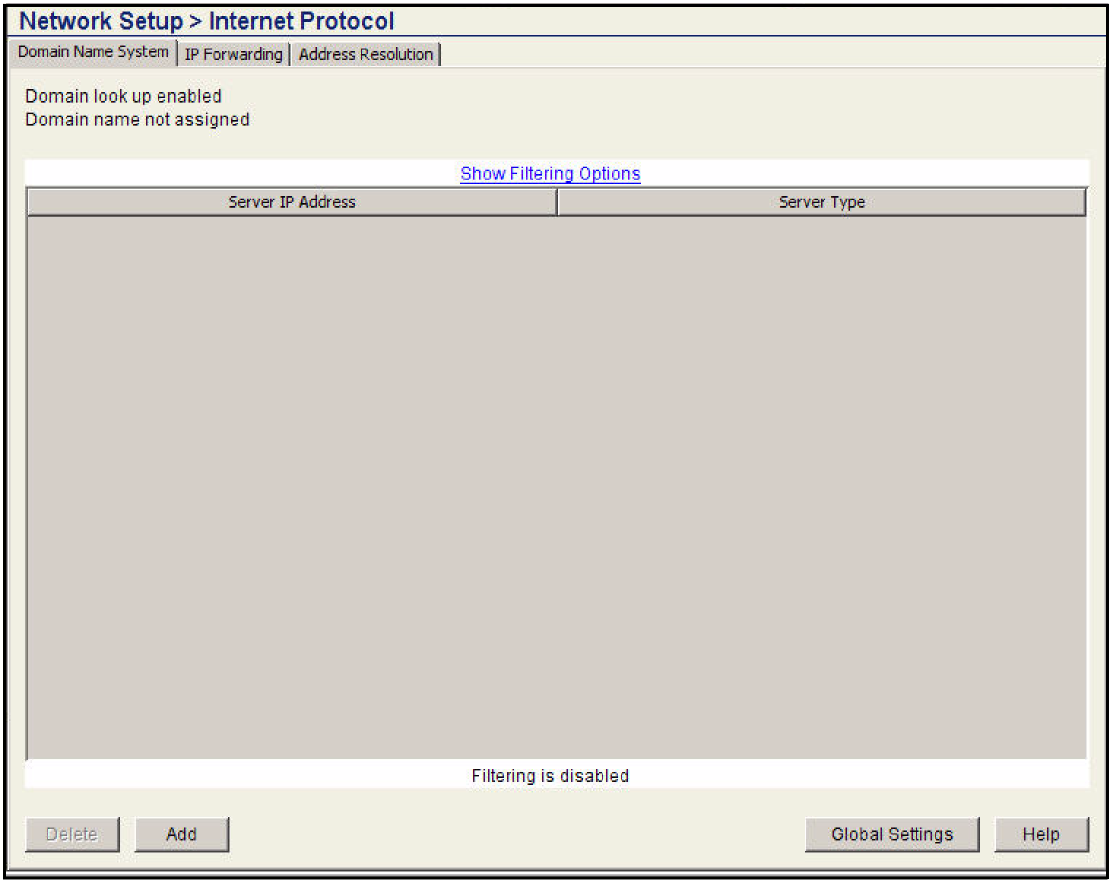
You must enter this new password the next time you log in to the Web browser interface.

Specify the Wireless Module's DNS Server

You should specify a DNS server for the Wireless Module. Having a valid DNS server is important particularly when the module enforces Web-Auth on a WLAN.

Follow these steps:

1. You should be in the module's Web browser interface.
2. Click **Network Setup** > **Internet Protocol**. The **Domain Name System** tab should be selected.

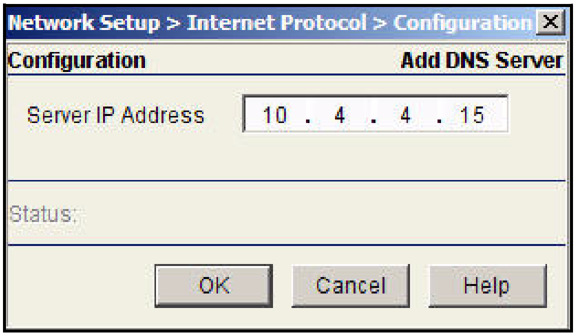


Domain look up enabled
Domain name not assigned

Filtering is disabled

Figure AD-123.Wireless Edge Services Module Web Interface—Network Setup > Internet Protocol > Domain Name System Window

3. Click **Add**.



Network Setup > Internet Protocol > Configuration

Configuration

Add DNS Server

Server IP Address 10 . 4 . 4 . 15

Status:

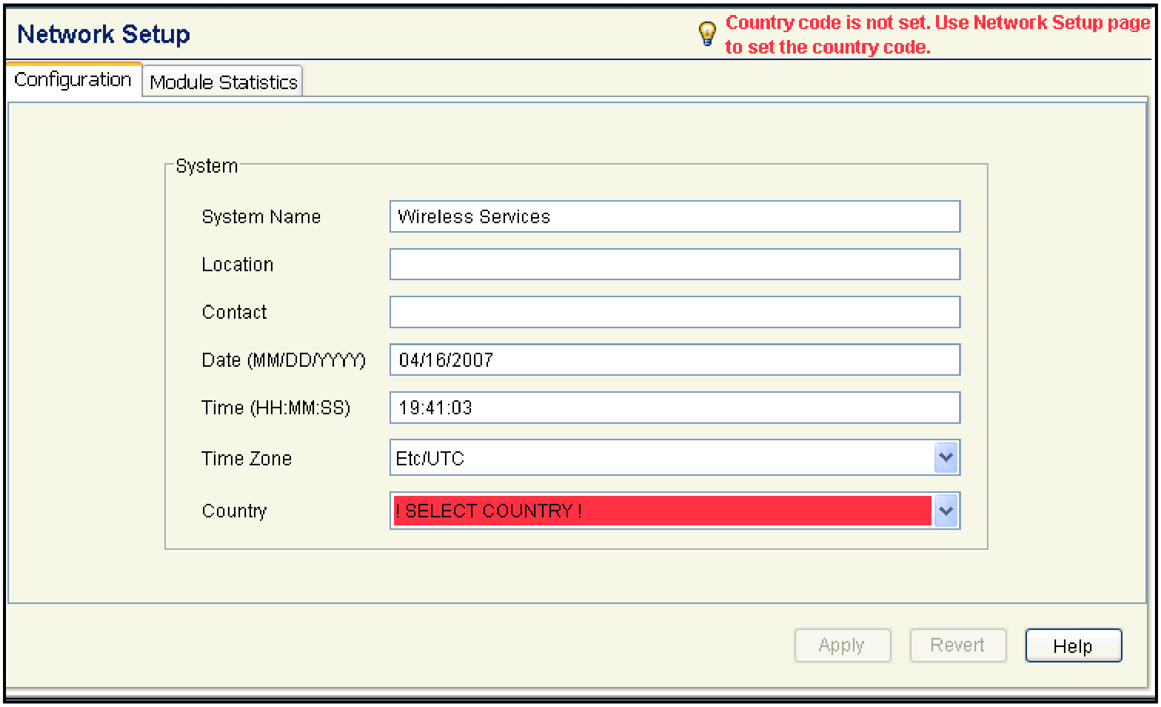
Figure AD-124.Wireless Edge Services Module Web Interface—Add DNS Server Window

4. Type the IP address of the DNS server. In this example, type **10.4.4.15**.
5. Click **OK**.

Configure the Time

Network devices check timestamps as apart of the authentication process (as well as other processes). It is important that all your network devices keep the same clock. Follow these steps to configure the time on the Wireless Edge Services Module:

1. You should be in the module's Web browser interface.
2. Click **Network Setup**. You should be at the **Configuration** tab.



Network Setup

Country code is not set. Use Network Setup page to set the country code.

System Name: Wireless Services

Location:

Contact:

Date (MM/DD/YYYY): 04/16/2007

Time (HH:MM:SS): 19:41:03

Time Zone: Etc/UTC

Country: ! SELECT COUNTRY !

Figure AD-125.Wireless Edge Services Module Web Interface—Network Setup > Configuration Window

3. Select your time zone from the **Time Zone** list.
4. Click **Apply**.
5. Click **Special Features > Secure NTP**.
6. Click the **NTP Neighbor** tab.

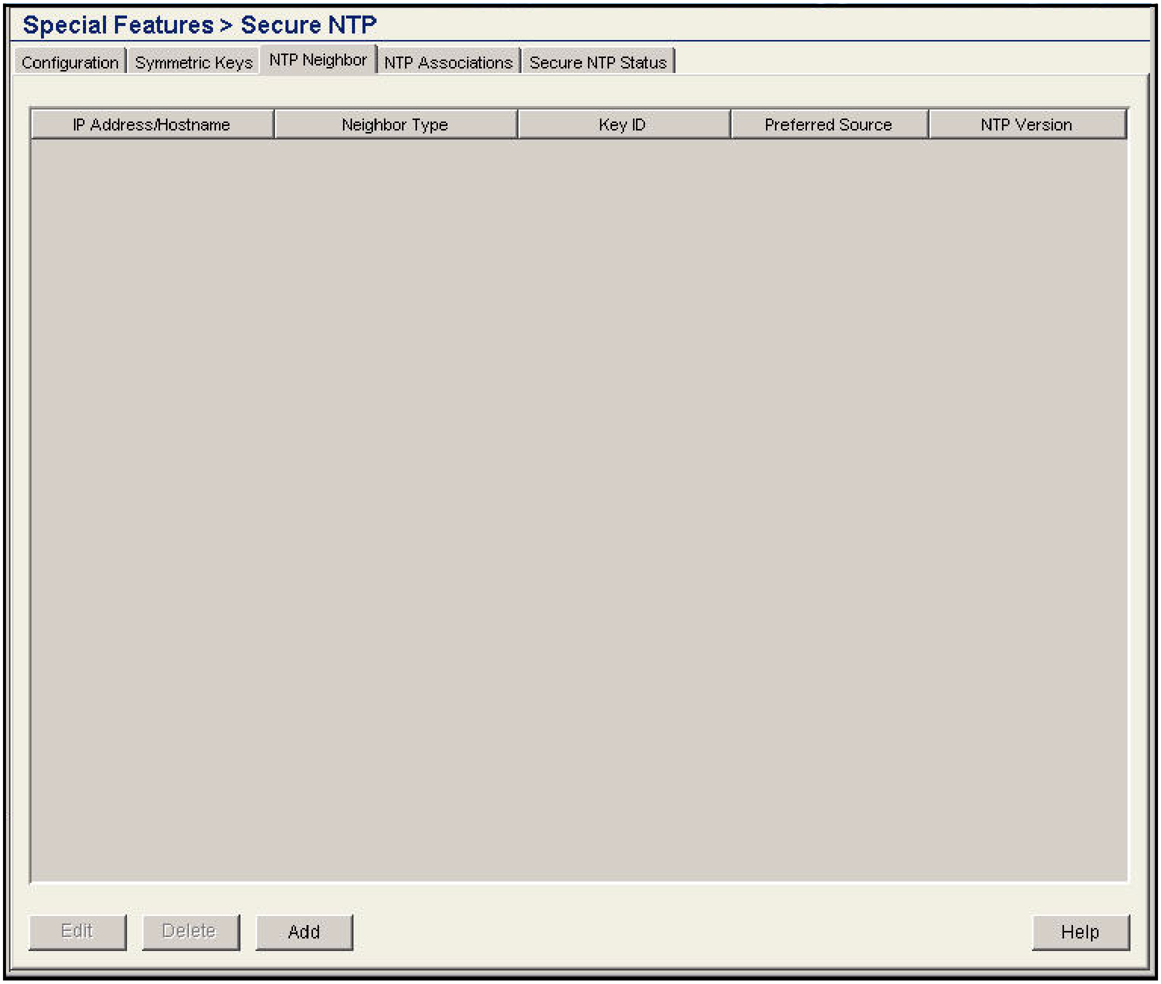
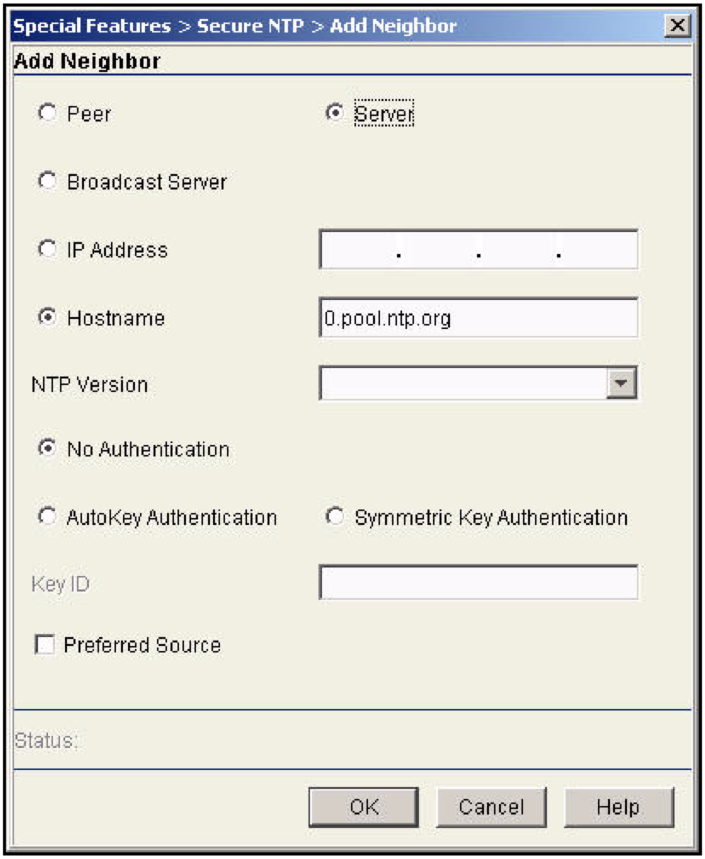


Figure AD-126.Wireless Edge Services Module Web Interface—Special Features > Secure NTP > NTP Neighbor Window

7. Click **Add**.

8. Click **Server**.

9. Select **IP Address** or **Hostname** and specify your NTP server. In this example, the domain is using a public NTP server.



Special Features > Secure NTP > Add Neighbor

Add Neighbor

○ Peer ● Server

○ Broadcast Server

○ IP Address . . .

● Hostname 0.pool.ntp.org

NTP Version

● No Authentication

○ AutoKey Authentication ○ Symmetric Key Authentication

Key ID

□ Preferred Source

Status:

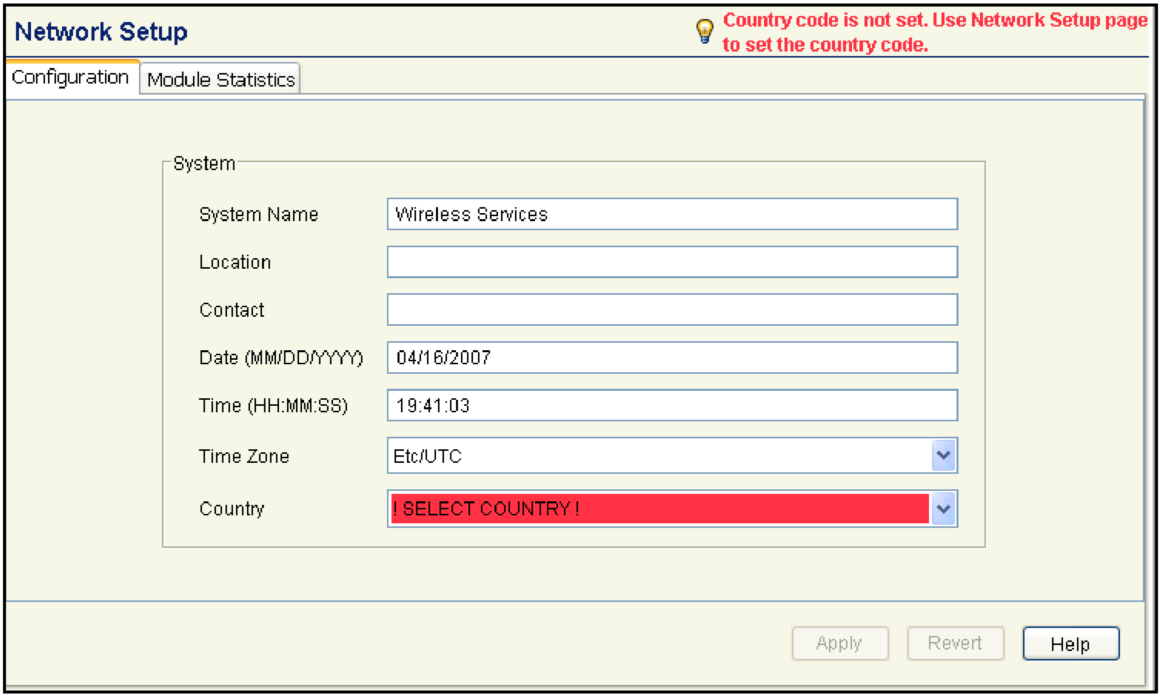
Figure AD-127.Wireless Edge Services Module Web Interface— Special Features > Secure NTP > Add Neighbor Window

10. Click **OK**.

Set the Country Code

You must set the country codeto enable the Wireless Edge Service Module to adopt RPs. Follow these steps:

1. Click **Network Setup**. You should be at the **Configuration** tab.



Network Setup

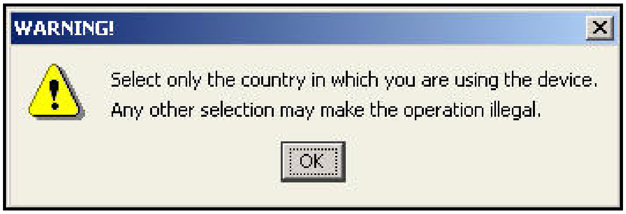
Country code is not set. Use Network Setup page to set the country code.

System

System Name	Wireless Services
Location	
Contact	
Date (MM/DD/YYYY)	04/16/2007
Time (HH:MM:SS)	19:41:03
Time Zone	Etc/UTC
Country	! SELECT COUNTRY !

Figure AD-128.Wireless Edge Services Module Web Interface—Network Setup > Configuration Window

2. From the **Country** box, select your country. A **Warning** window is displayed.



WARNING!

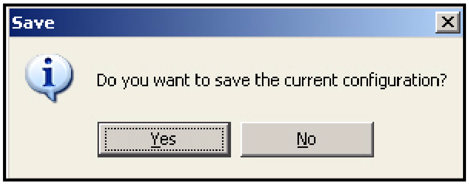
Select only the country in which you are using the device.
Any other selection may make the operation illegal.

Figure AD-129.Wireless Edge Services Module Web Interface—Warning Window

3. Click **OK**.
4. Click **Apply**.
5. Click **Save** at the top of the Web browser interface.

Note

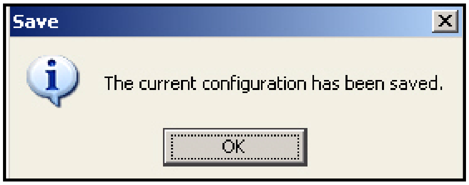
You must remember to click **Save** to preserve your configurations in the Wireless Module's startup-config.


Save

Do you want to save the current configuration?

Figure AD-130.Wireless Module—Save Window

6. Click **Yes** to confirm the save.


Save

The current configuration has been saved.

Figure AD-131.Wireless Module—Second Save Window

7. Click **OK**.

Note

Future instructions in this guide may remind you to save your configuration. However, they will assume thatyou can complete the final two steps (clicking **Yes** and **OK**) without explicit instructions.

Obtain a Server Certificate for the Wireless Module

The Wireless Edge Services Module uses digital certificates for several purposes. In this solution, the module uses a certificate to authenticate and encrypt HTTPS sessions to the Web browser interface.

The module has a default self-signed certificate, which it can use for HTTPS. However, you should install a certificate that has been signed by your domain CA and is automatically trusted by your endpoints.

This section explains how to obtain such a certificate:

1. Create a certificate request on Wireless Module.
2. Submit the request to your domain CA and generate the server certificate.
3. Install the CA root certificate on the Wireless Module.
4. Install the server certificate on the Wireless Module.
5. Configure the module's HTTPS server to use the new certificate.

Create a Certificate Request on the Wireless Edge Services Module

Follow these steps to create a certificate request using the Wireless Edge Services Module's Certificates Wizard:

1. On your management workstation, open a Web browser.
2. Type the module's IP address or DNS name for the URL. In this example: **10.2.0.20**.

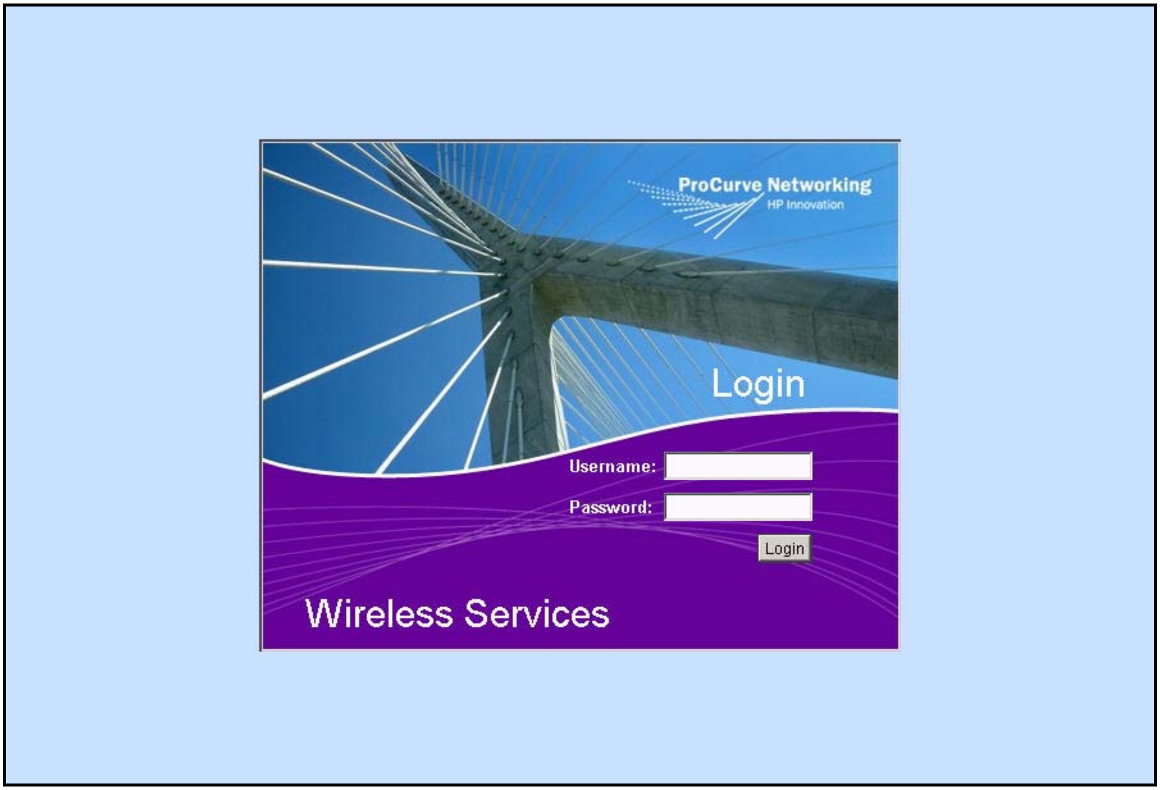
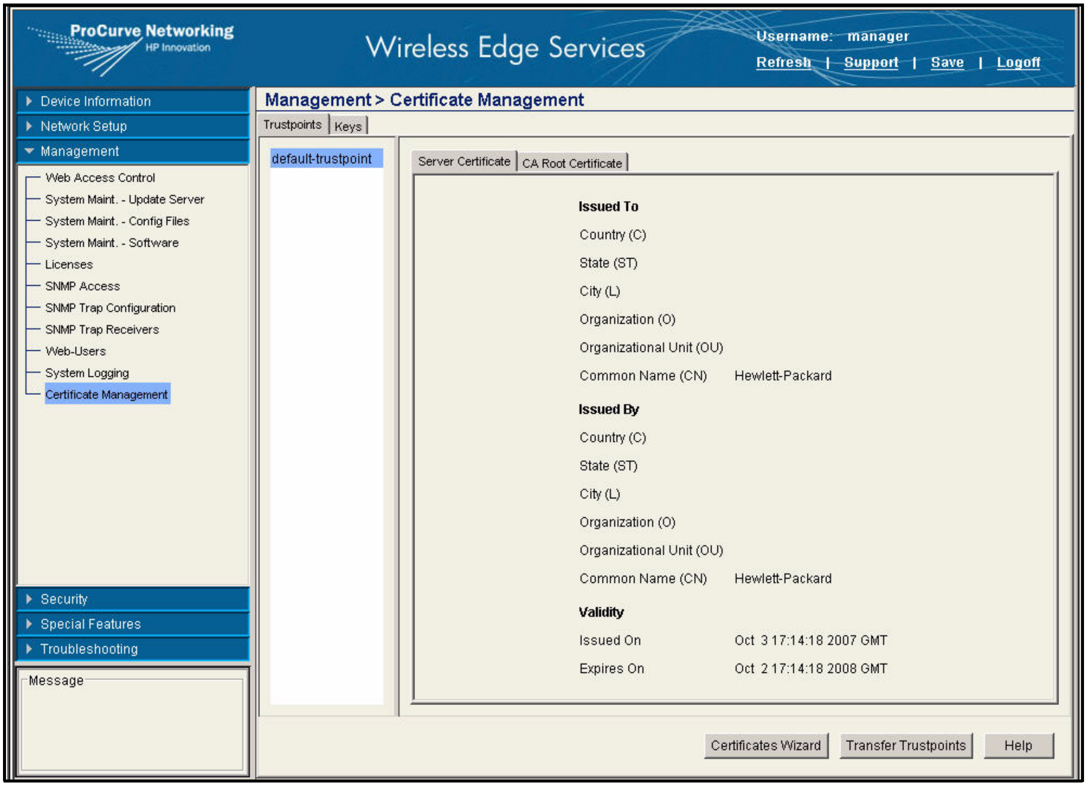


Figure AD-132.Wireless Services Login Page

3. Log in the Web browser interface with the manager password that you set earlier. (See step 7 on page AD-137.)

4. Select **Management > Certificate Management**.



Issued To

Country (C)
State (ST)
City (L)
Organization (O)
Organizational Unit (OU)
Common Name (CN) Hewlett-Packard

Issued By

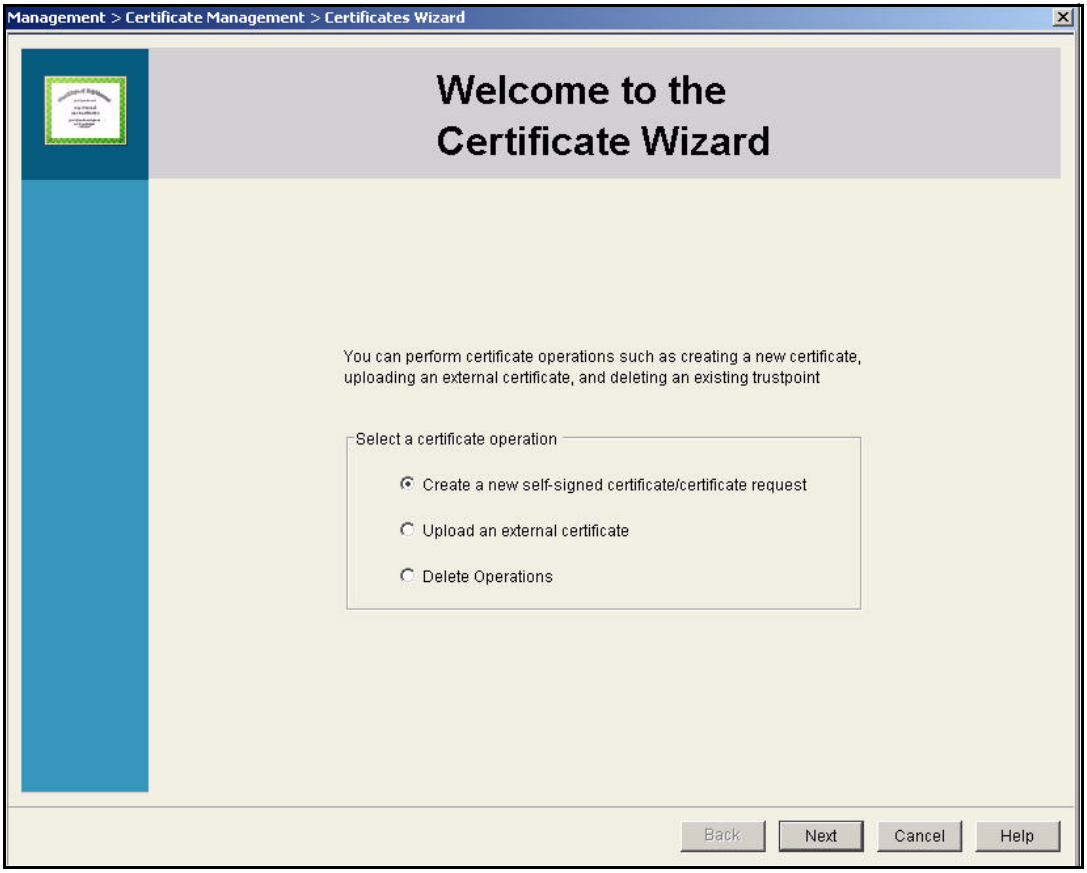
Country (C)
State (ST)
City (L)
Organization (O)
Organizational Unit (OU)
Common Name (CN) Hewlett-Packard

Validity

Issued On Oct 3 17:14:18 2007 GMT
Expires On Oct 2 17:14:18 2008 GMT

Figure AD-133.Wireless Edge Services Module Web Browser Interface— Management > Certificate Management Window

5. Click **Certificates Wizard**.


Management > Certificate Management > Certificates Wizard
Welcome to the Certificate Wizard
Back
Next
Cancel
Help

You can perform certificate operations such as creating a new certificate, uploading an external certificate, and deleting an existing trustpoint

Select a certificate operation

● Create a new self-signed certificate/certificate request

○ Upload an external certificate

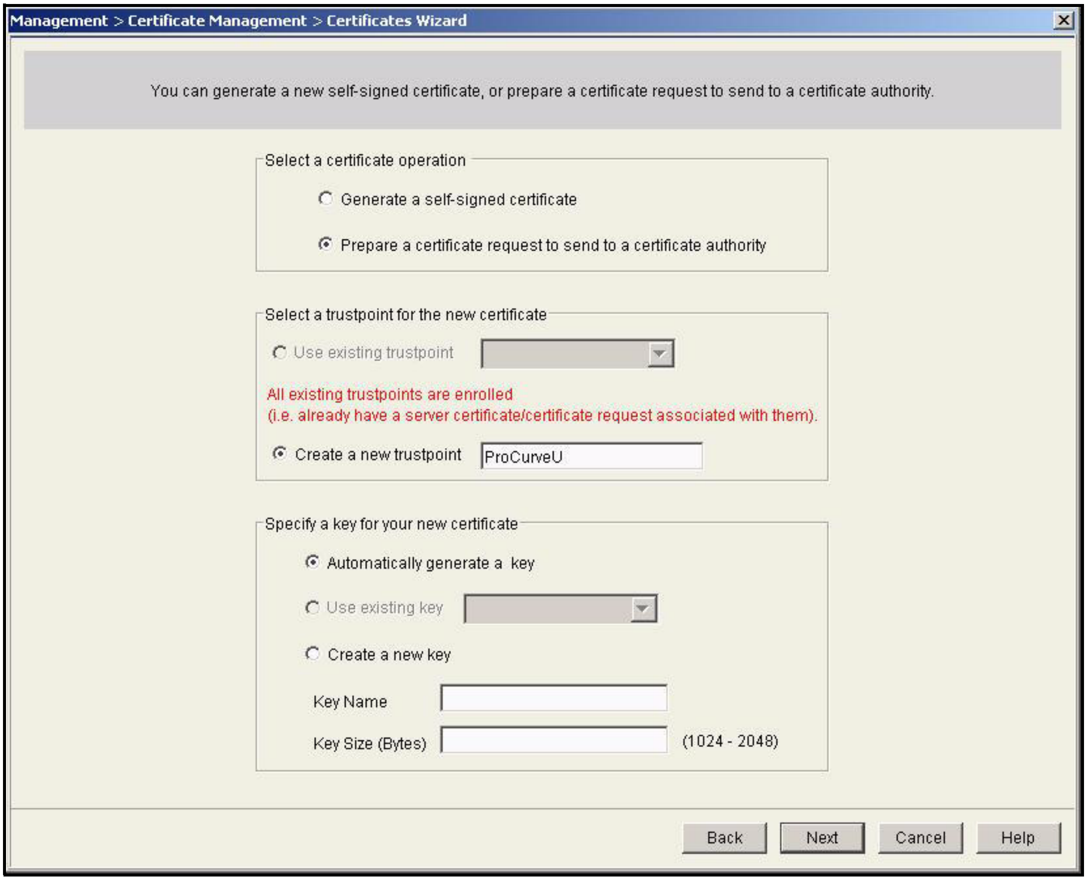
○ Delete Operations

Figure AD-134.Wireless Edge Services Module Web Browser Interface—Welcome to the Certificate Wizard

6. On the **Welcome to the Certificate Wizard** window, select **Create a new self-signed certificate/certificate request**.
7. Click **Next**. The window shown in Figure AD-135 is displayed.
8. In the **Select a certificate operation** section, select **Prepare a certificate request to send to a certificate authority**.

9. In the **Select a trustpoint for the new certificate** section, select **Create a new trustpoint**.

10. Type a descriptive name for trustpoint name in the box on the right—typically, a name that identifies the CA. In this example, type **ProCurveU**.



Management > Certificate Management > Certificates Wizard

You can generate a new self-signed certificate, or prepare a certificate request to send to a certificate authority.

Select a certificate operation

○ Generate a self-signed certificate

● Prepare a certificate request to send to a certificate authority

Select a trustpoint for the new certificate

○ Use existing trustpoint

All existing trustpoints are enrolled
(i.e. already have a server certificate/certificate request associated with them).

● Create a new trustpoint ProCurveU

Specify a key for your new certificate

● Automatically generate a key

○ Use existing key

○ Create a new key

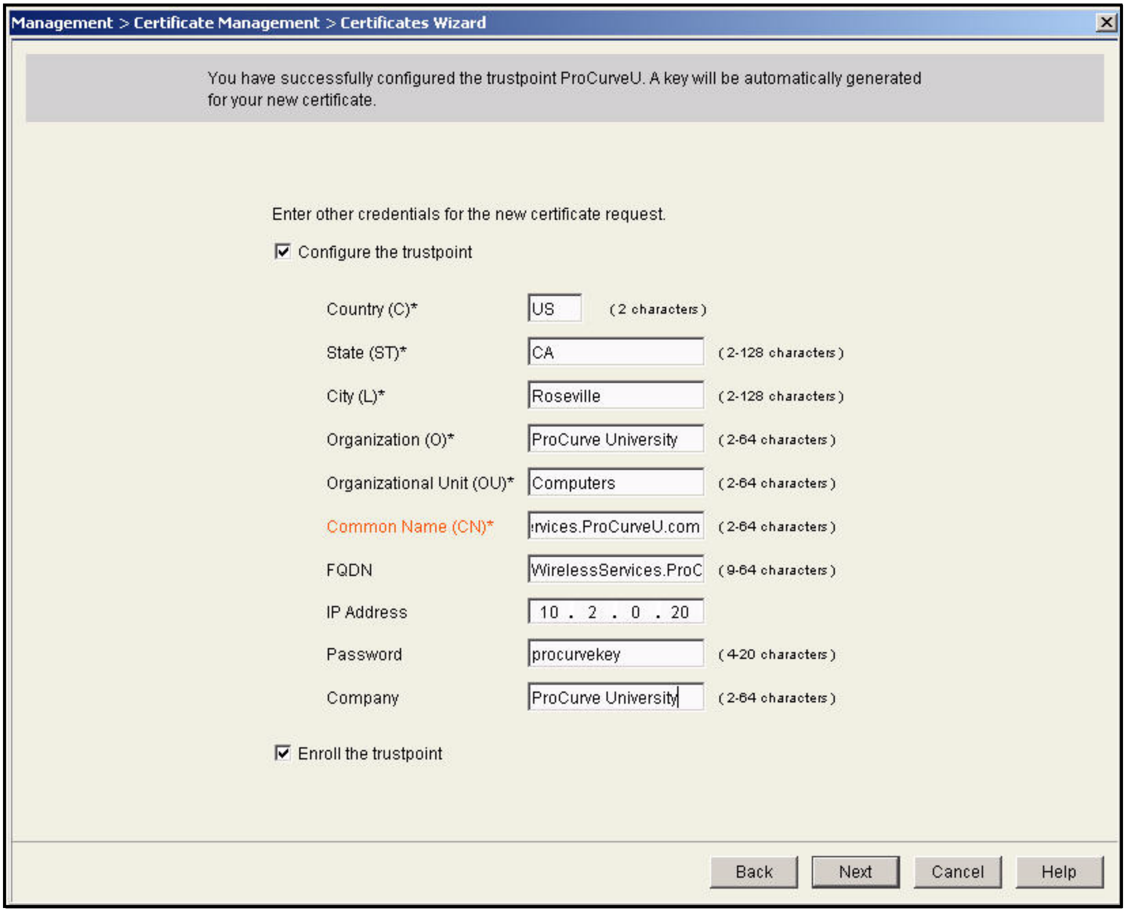
Key Name

Key Size (Bytes) (1024 - 2048)

Figure AD-135.Wireless Edge Services Module Web Browser Interface—Certificates Wizard—Select Certificate Operation

11. Leave the **Automatically generate a key** option selected.

12. Click **Next**.



You have successfully configured the trustpoint ProCurveU. A key will be automatically generated for your new certificate.

Enter other credentials for the new certificate request.

☑ Configure the trustpoint

Country (C)*	US	(2 characters)
State (ST)*	CA	(2-128 characters)
City (L)*	Roseville	(2-128 characters)
Organization (O)*	ProCurve University	(2-64 characters)
Organizational Unit (OU)*	Computers	(2-64 characters)
Common Name (CN)*	›rvices.ProCurveU.com	(2-64 characters)
FQDN	WirelessServices.ProC	(9-64 characters)
IP Address	10 . 2 . 0 . 20	
Password	procurvekey	(4-20 characters)
Company	ProCurve University	(2-64 characters)

☑ Enroll the trustpoint

Figure AD-136.Wireless Edge Services Module Web Browser Interface—Certificates Wizard—Configure Trustpoint

13. Select the **Configure the trustpoint** check box and type the following credentials for the certificate:
    - **Country**—the two-character country code (abbreviation) for your country
    - **State**—the state or province in which the module operates
    - **City**—the city in which the module operates
    - **Organization**—your organization (typically your company name)
    - **Organizational Unit**—the module's organizational unit

- **Common Name**—the module's exact FQDN, the URL at which the module's Web browser interface is accessed. The common name (CN) cannot include spaces or special characters other than periods (.) and hyphens (-). In this example, the CN is **WirelessServices.procurveu.edu**.

Note

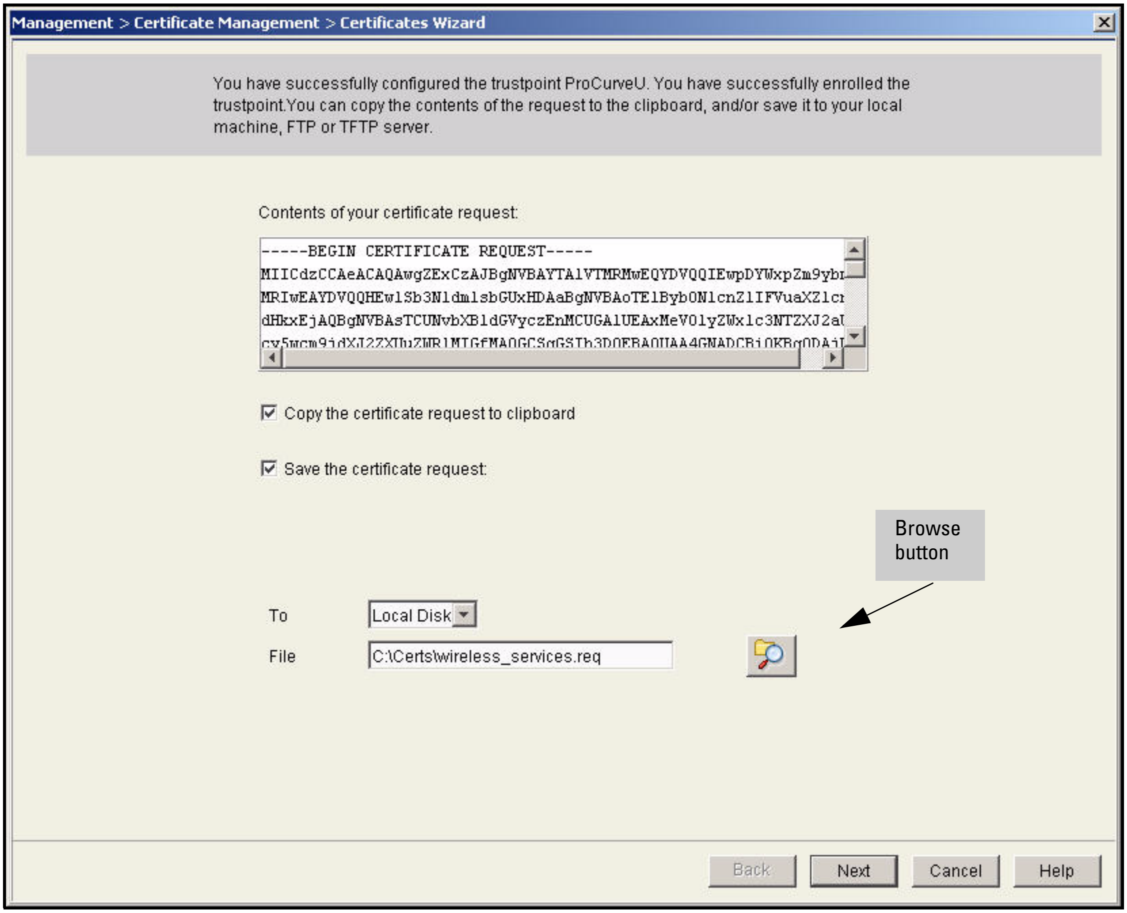
Alternatively, type the Wireless Edge Services Module's IP address.

- **FQDN**—the module's FQDN. This field is optional.
- **IP Address**—the IP address for the wireless module or for the device that wants the certificate. This field is optional but recommended.
- **Password**—a password that must be entered to install the certificate. This field is optional.
- **Company**—the name of the company. It can be the same as the organization.

14. Select the **Enroll the trustpoint** check box.
15. Click **Next**. The window shown in Figure AD-137 is displayed.
16. The window shows the certificate request, which is in Base 64-encoded Public Key Cryptography Standard #10 (PKCS#10) format. You have several options for saving the certificate request. In this example, you will save it to the hard disk on the management station.

    a. Select the **Save the certificate request** check box. From the **To** list, select **Local Disk**.

    b. For the **File**, type a name for the request, including a valid path. For example: **C:\Certs\wireless_services.req**. Alternatively, click the browse button and browse for the directory in which to save the request.



You have successfully configured the trustpoint ProCurveU. You have successfully enrolled the trustpoint.You can copy the contents of the request to the clipboard, and/or save it to your local machine, FTP or TFTP server.

Contents of your certificate request:

```
-----BEGIN CERTIFICATE REQUEST-----
MIICdzCCAeACAQAwgZExCzAJBgNVBAYTAlVTMRMwEQYDVQQIEwpDYWxpZm9ybı
MRIwEAYDVQQHEwlSb3NldmlsbGUxHDAaBgNVBAoTElByb0NlcnZlIFVuaXZlcı
dHkxEjAQBgNVBAsTCUNvbXBldGVyczEnMCUGA1UEAxMeV0lyZWxlc3NTZXJ2aL
cy5wcm9jdXJ2ZXJuZWRlMIGfMA0GCSqGSIb3DQEBAQUAA4GNADCBiQKBgQDAjI
```

☑ Copy the certificate request to clipboard

☑ Save the certificate request:

To: Local Disk

File: C:\Certs\wireless_services.req

Figure AD-137.Wireless Edge Services Module Web Browser Interface—Certificates Wizard—Copy Request

17. Click **Next**. A completion window summarizes the certificate request operation that you have performed.

18. Click **Finish**.

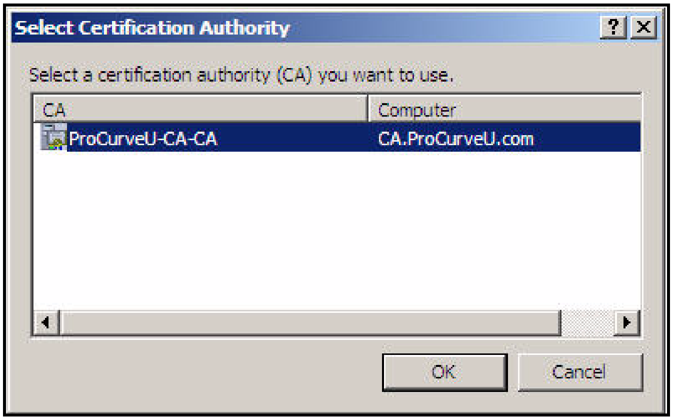
Submit the Request to the CA and Create the Certificate

Follow these steps to submit the request to the CA and create the certificate using the Web Server template:

1. In the previous section, you saved the certificate request from the Wireless Edge Services Module to the management station. Now copy the request to the CA server.
2. Access the command line on the CA server:
   a. From the Windows **Start** menu, select **Run.**
   b. Type **cmd** at the prompt and click **OK**.
3. Move to the directory in which you saved the certificate request.
4. Enter this command:

Syntax: certreq -submit -attrib "CertificateTemplate:WebServer" <*request_filename*>

*Replace **<request_filename>** with the name of the certificate request that you transferred to the CA server.*



Select Certification Authority

Select a certification authority (CA) you want to use.

CA	Computer
ProCurveU-CA-CA	CA.ProCurveU.com

Figure AD-138.Select Certification Authority Window

5. In the window that is displayed, select the name of your CA and click **OK**.
6. In the **Save Certificate** window navigate to the location where you want to save the certificate. Type a name for the certificate file.

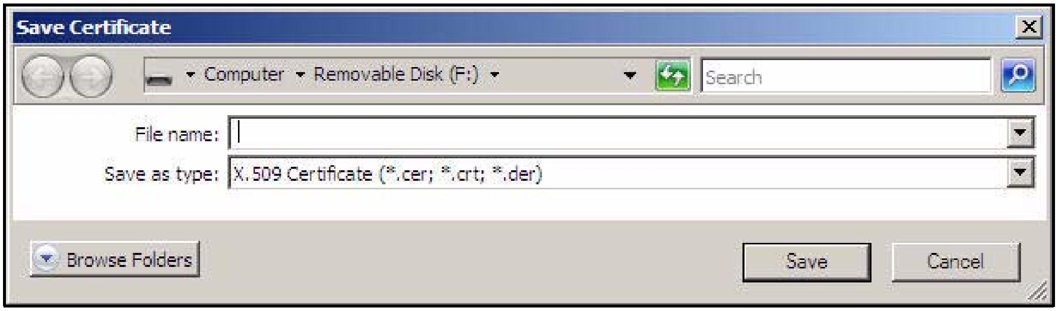


Figure AD-139.Save Certificate Window

7. Click **Save**.

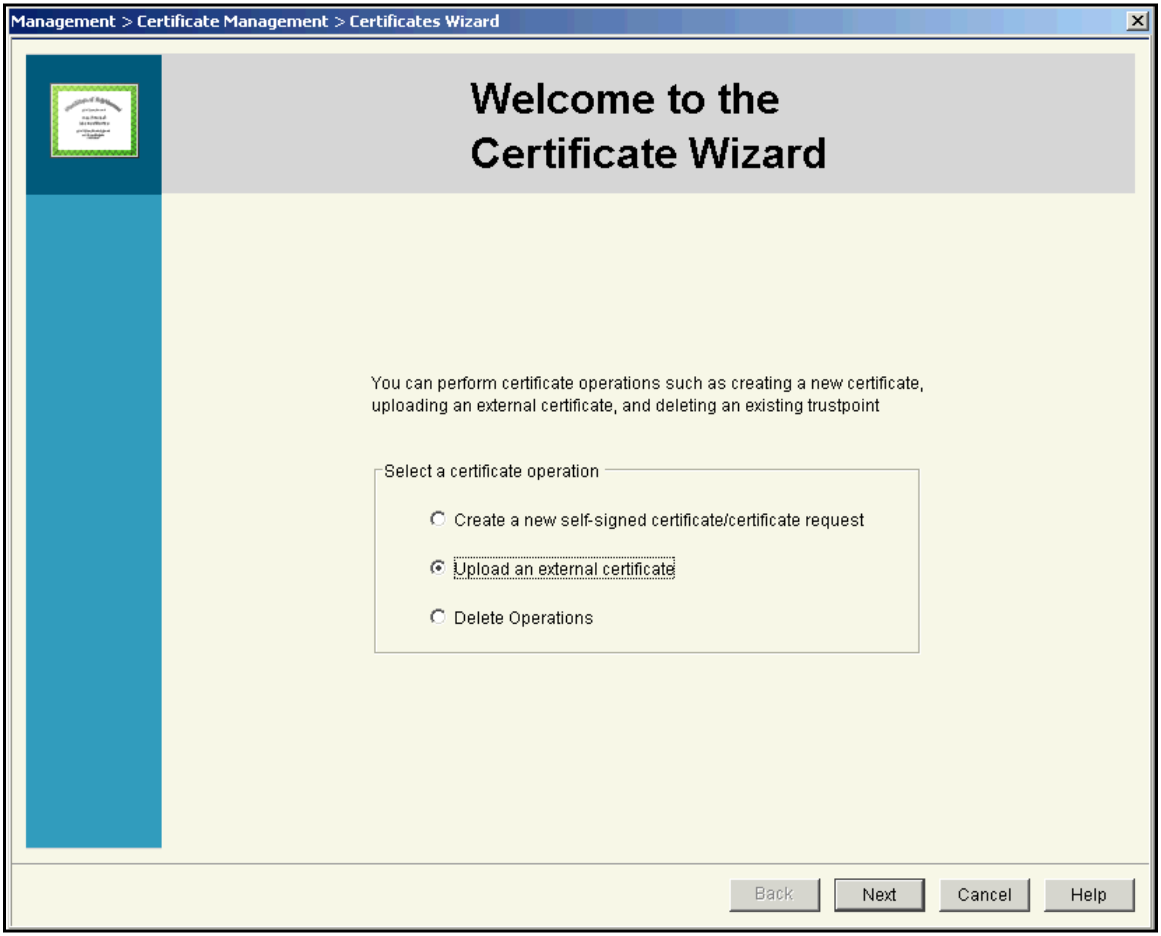
Install the Certificate on a Wireless Edge Services Module

In the last task, you saved the Wireless Edge Services Module's certificate as a file on the hard drive of the CA server. In "Export the CA Root Certificate" on page AD-73, you exported the CA root certificate to a file. Copy both certificates to one of these locations:

- File Transfer Protocol (FTP) server
- Trivial FTP (TFTP) server
- Management station's hard drive

Follow these steps to install the certificate:

1. Open the Web browser on your management station and navigate to the Wireless Edge Services Module's IP address.
2. Log in with a manager username and password.
3. Select **Management > Certificate Management**.
4. Click the **Trustpoints** tab.
5. Click **Certificates Wizard**.
6. In the **Welcome to the Certificate Wizard** window, select **Upload an external certificate**.



Management > Certificate Management > Certificates Wizard

Welcome to the Certificate Wizard

You can perform certificate operations such as creating a new certificate, uploading an external certificate, and deleting an existing trustpoint

Select a certificate operation

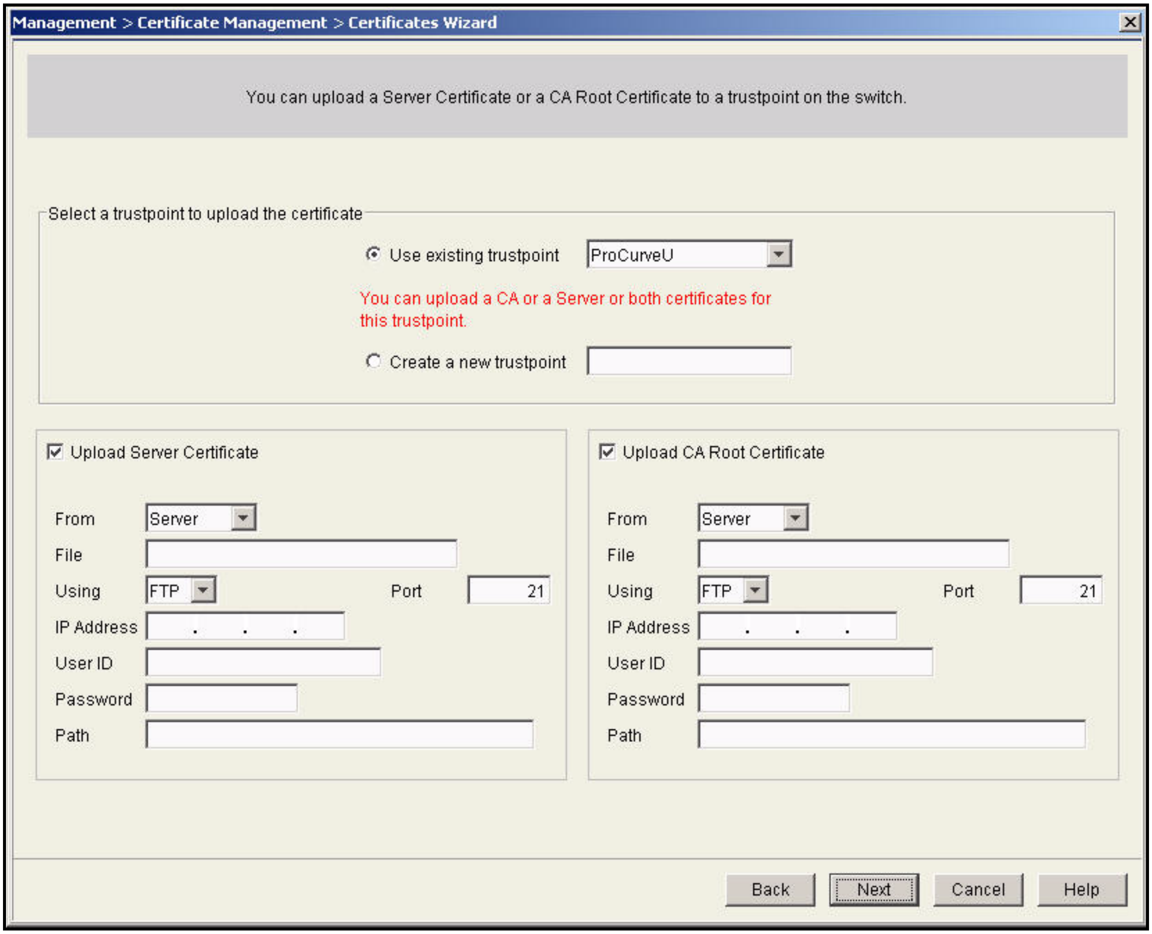
○ Create a new self-signed certificate/certificate request

● Upload an external certificate

○ Delete Operations

Figure AD-140.Wireless Edge Services Module Web Browser Interface—Welcome to the Certificate Wizard

7. Click **Next**.



Management > Certificate Management > Certificates Wizard

You can upload a Server Certificate or a CA Root Certificate to a trustpoint on the switch.

Select a trustpoint to upload the certificate

● Use existing trustpoint: ProCurveU

You can upload a CA or a Server or both certificates for this trustpoint.

○ Create a new trustpoint

☑ Upload Server Certificate

From: Server
File:
Using: FTP
Port: 21
IP Address: . . .
User ID:
Password:
Path:

☑ Upload CA Root Certificate

From: Server
File:
Using: FTP
Port: 21
IP Address: . . .
User ID:
Password:
Path:

Figure AD-141.Wireless Edge Services Module Web Browser Interface—Certificates Wizard—Upload Certificates

8. From the **Use existing trustpoint** list, select the trustpoint you created in "Create a Certificate Request on the Wireless Edge Services Module" on page AD-145. In this example: **ProCurveU**.
9. Clear the **Upload Server Certificate** check box.
10. Select the **Upload CA Root Certificate** check box.

11. Specify the file source for the certificate that you exported in "Export the CA Root Certificate" on page AD-73:

    To upload the certificate from the workstation running the Web browser, follow these steps:

    a. From the **From** list, select **Local Disk**.

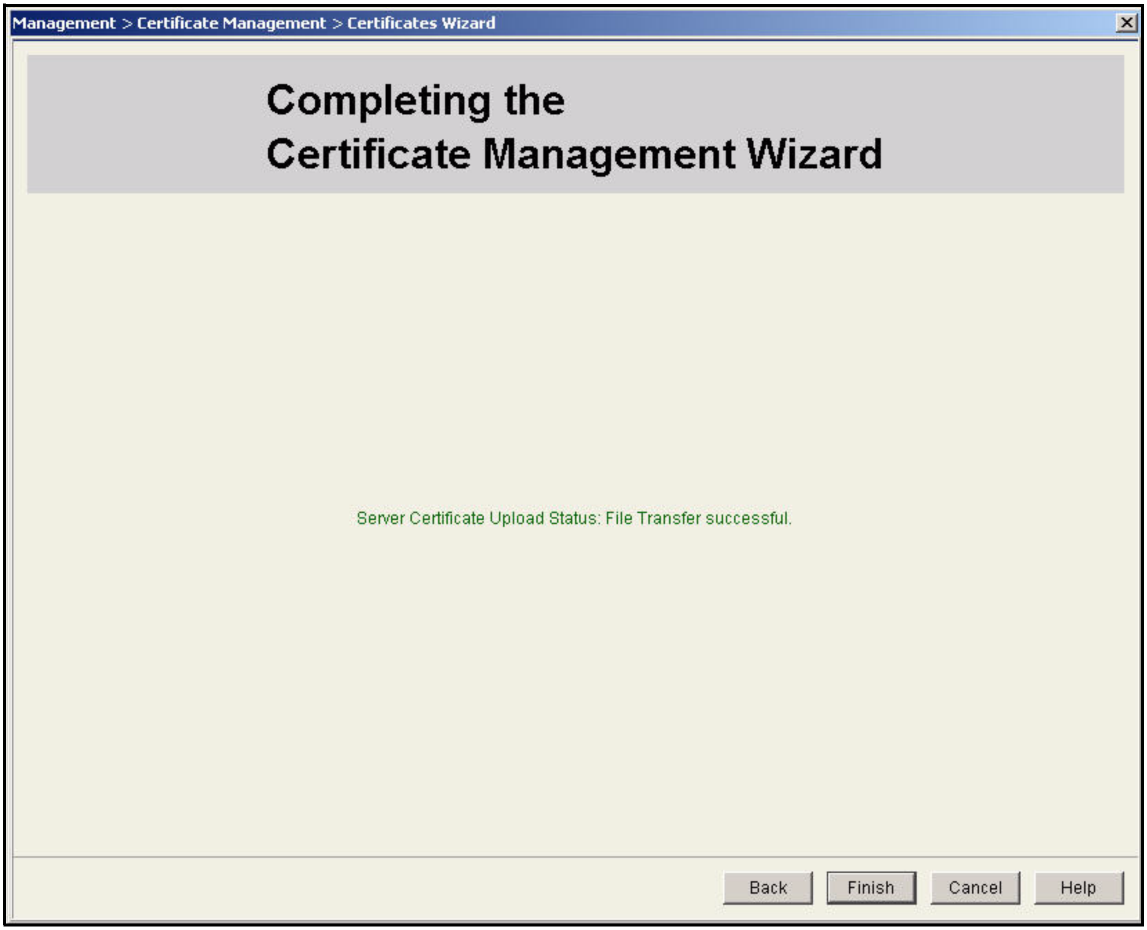
    b. In the **File** box, type the certificate filename with a valid path (for example, **C:\Certs\procurveu_ca_cert.cer**).

       Alternatively, click the browse button and browse for the certificate. (See Figure AD-139.) Click the certificate name and click **Open**.

12. Click **Next**. The completion window summarizes the certificate upload operation that you have performed.

13. Click **Finish**.

14. Repeat steps 5 to 13, this time selecting the **Upload Server Certificate** box in step 10 and using the certificate you created in "Submit the Request to the CA and Create the Certificate" on page AD-153.


Management > Certificate Management > Certificates Wizard
Completing the
Certificate Management Wizard
Back
Finish
Cancel
Help

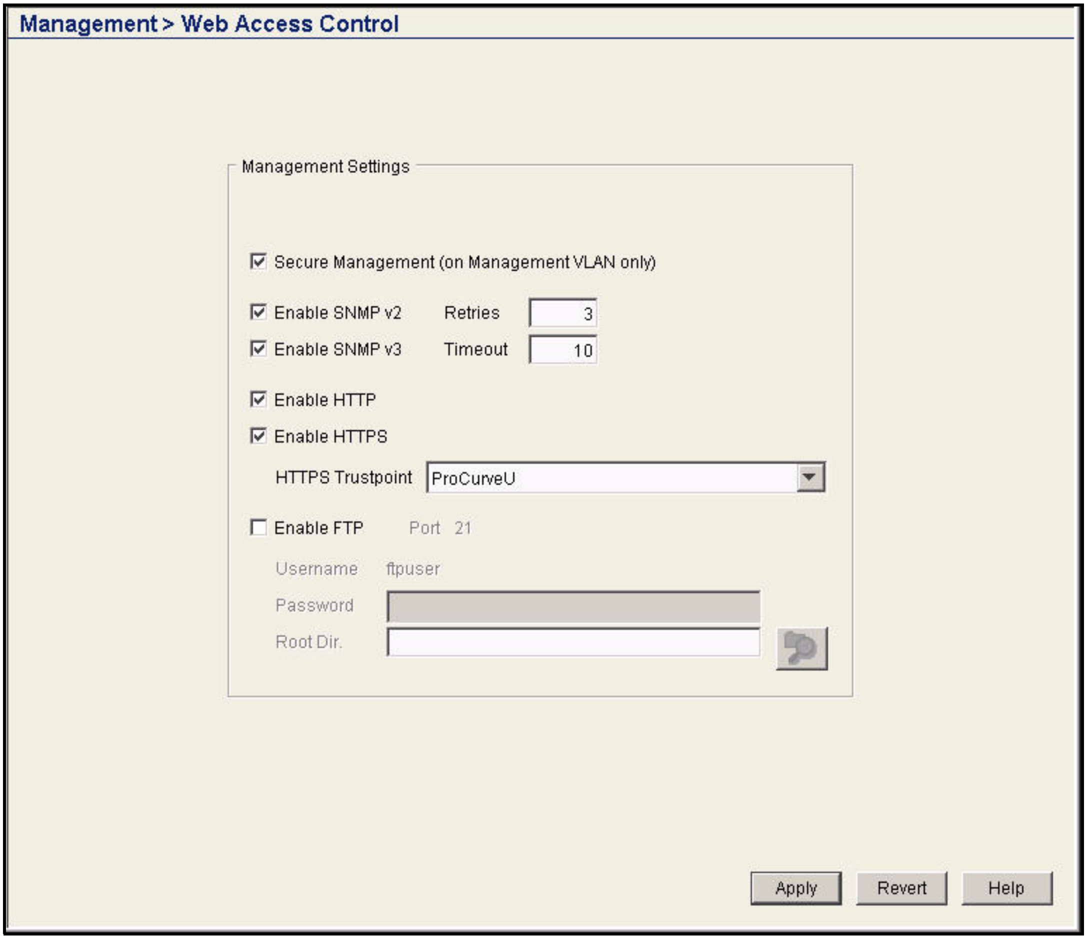
Server Certificate Upload Status: File Transfer successful.

Figure AD-142.Wireless Edge Services Module Web Browser Interface—Completing the Certificate Management Wizard

Enable the Certificate on the Wireless Edge Services Module's HTTPS Server

To have the Wireless Edge Services Module use the new certificate for its HTTPS server, follow these steps

1. Access the module's Web browser interface.
2. Select **Management > Web Access Control**.
3. Make sure that the **Enable HTTPS** check box is selected. From the **HTTPS Trustpoint** list, select the trustpoint you just created.



Management > Web Access Control

Management Settings

☑ Secure Management (on Management VLAN only)

☑ Enable SNMP v2 Retries 3

☑ Enable SNMP v3 Timeout 10

☑ Enable HTTP

☑ Enable HTTPS

HTTPS Trustpoint ProCurveU

□ Enable FTP Port 21

Username ftpuser

Password

Root Dir.

Figure AD-143.Wireless Edge Services Module Web Browser Interface—Management > Web Access Control Window

4. Click **Apply**.
5. Click **Save**.

Configure the Endpoints

This section describes how to configure a Windows Vista computer so that it can be tested by NAP before being granted access to the network.

You will complete these steps:

- Enable **Run** on the **Start** menu.
- Join the Windows Vista computer to the domain.
- Add the computer to the NAP client computers group and then restart the computer.
- Verify Group Policy settings.
- Configure authentication methods.

Note

The instructions in this section are for Vista computers that are using the Vista view (rather than the Classic view).

Enable Run on the Start Menu

By default, the **Start** menu may not include **Run**. Add this option so that you can complete the tasks that follow:

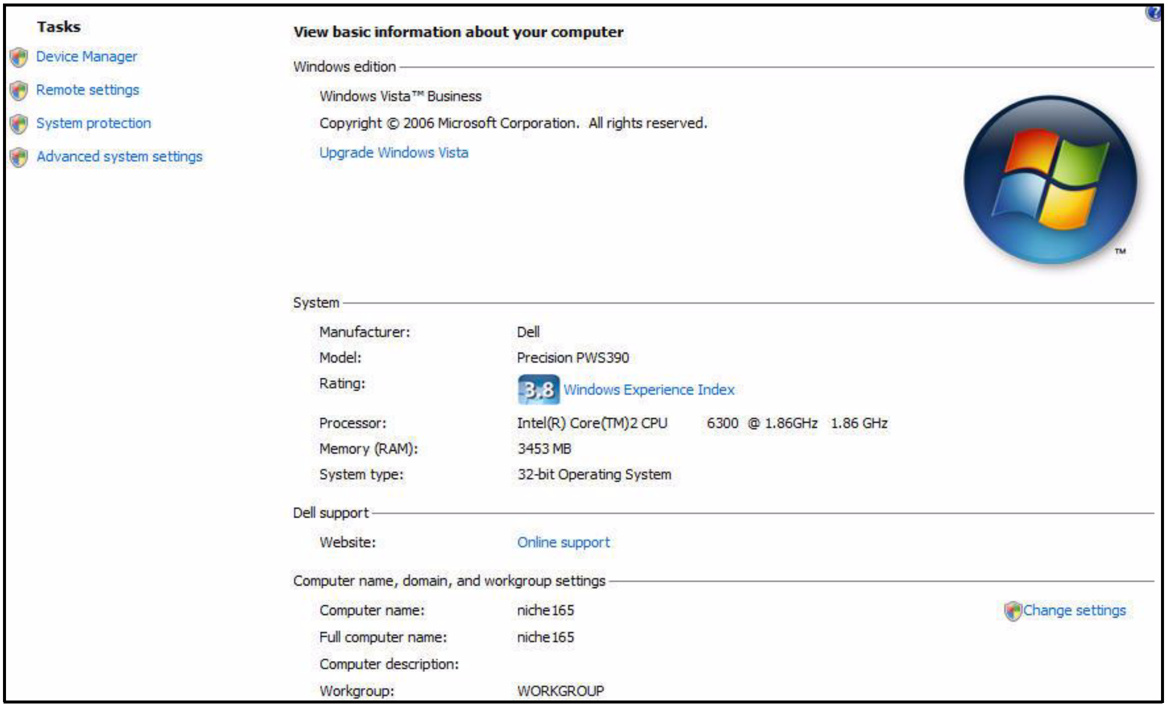
1. On the Windows Vista computer, right-click **Start** and click **Properties**.
2. In the **Taskbar and Start Menu Properties** window, select **Start** menu and click **Customize**.
3. In the **Customize Start Menu** window, select the **Run command** check box.
4. Click **OK** twice.

Join the Windows Vista Computer to the Domain

Before the Windows Vista computer can be tested, it must join your organization's domain.

Complete these steps.

1. Click **Start**, right-click **Computer**, and then click **Properties**.



Tasks

View basic information about your computer

Windows edition

Windows Vista™ Business

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System

Manufacturer:	Dell
Model:	Precision PWS390
Rating:	3.8 Windows Experience Index
Processor:	Intel(R) Core(TM)2 CPU 6300 @ 1.86GHz 1.86 GHz
Memory (RAM):	3453 MB
System type:	32-bit Operating System

Dell support

Website:	Online support

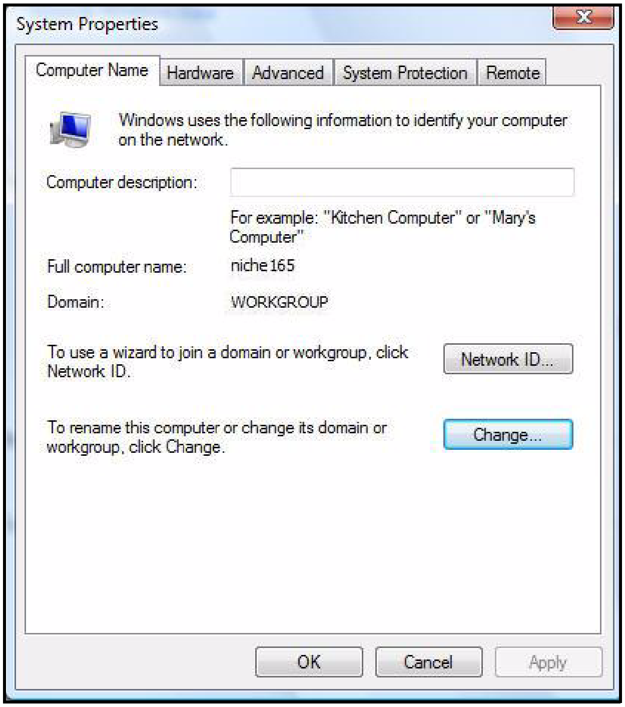
Computer name, domain, and workgroup settings

Computer name:	niche165
Full computer name:	niche165
Computer description:	
Workgroup:	WORKGROUP

Figure AD-144.Windows Vista Endpoint—Computer Properties Window

2. Click **Change settings**.

3. In the **System Properties** window, the **Computer Name** tab should be selected.



System Properties

Windows uses the following information to identify your computer on the network.

Computer description:

For example: "Kitchen Computer" or "Mary's Computer"

Full computer name: niche165

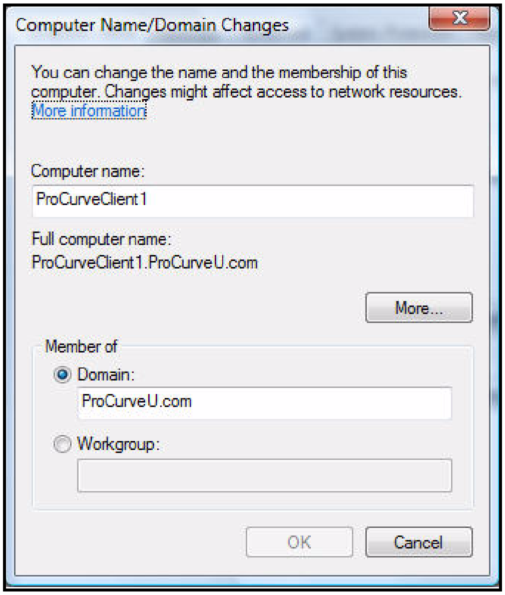
Domain: WORKGROUP

To use a wizard to join a domain or workgroup, click Network ID.

To rename this computer or change its domain or workgroup, click Change.

Figure AD-145.Windows Vista Endpoint—System Properties > Computer Name Window

4. Click **Change**. The **Computer Name/Domain Changes** window is displayed.



Computer Name/Domain Changes

You can change the name and the membership of this computer. Changes might affect access to network resources. More information

Computer name: ProCurveClient1

Full computer name: ProCurveClient1.ProCurveU.com

Member of

● Domain: ProCurveU.com

○ Workgroup:

Figure AD-146.Windows Vista Endpoint—Computer Name/Domain Changes Window

5. For **Computer** name, type the name of the endpoint. For this example, type **ProCurveClient1**.
6. Under **Member of**, select **Domain** and then type your organization’s domain name. In this example, type **ProCurveU.com**.
7. Click **More**. Under the **Preferred DNS suffix of this computer**, type your organization’s domain name, and then click **OK** twice.
8. When prompted for a user name and password, type a valid username and password and click **Submit**. If you enter a valid username and password, a window is displayed, welcoming you to the domain.
9. Click **OK**. A window is displayed, telling you that you must restart the computer to apply changes.
10. Click **OK**.
11. On the **System Properties** window, click **Close**. A dialog box is displayed, prompting you to restart the computer.
12. Click **Restart Later**. You must first add the Windows Vista computer to the NAP client computers group so that it will receive NAP client settings from the group policy.

Add the Windows Vista Computer to the NAP Client Computers Group

You must now add the computer to the NAP client computers security group so that it can receive NAP client settings.

Complete these steps.

1. On the Windows domain controller, click **Start,** click **Administrative Tools**, and then click **Active Directory Users and Computers**.
2. In the console tree, click your organization's domain name.
3. In the details pane, double-click **NAP client computers**.
4. In the **NAP client computers Properties** dialog box, click the **Members** tab, and then click **Add**.
5. Under **Select this object type**, click **Object Types**, select the **Computers** check box, and then click **OK**.
6. Under **Enter the object names to select (examples)**, type the computer name and click **OK**.
7. Verify that the computer name is displayed below **Members** and then click **OK**.
8. Click **OK** to close the **Active Directory Users and Computers** console.
9. Restart the Windows Vista computer to apply the new security group membership.
10. When you log in to the computer, make sure to log in to the domain (as a user that has administrative rights to this computers).

Note

If you log in as a different user, your desktop and **Start** menu settings may change. If necessary, again complete the steps in "Enable Run on the Start Menu" on page AD-160.

Verify Group Policy Settings

When the Windows Vista computer is restarted, it should receive the group policy settings, which enable the NAP Agent service and EAP enforcement client.

To verify that the computer received these settings, complete these settings.

1. Click **Start** and click **Command Prompt**.

2. In the command window, type **netsh nap client show grouppolicy** and press **[Enter]**.
3. In the output, look under **Enforcement clients** and verify that the Admin status of the EAP Quarantine Enforcement Client is enabled.
4. In the command window, type **netsh nap client show state** and press **[Enter]**.
5. In the output, look under **Enforcement client state** and verify that the initialized status of the **EAP Quarantine Enforcement Client** is **yes**.
6. Close the command window.

Configure Authentication Methods

You must now enable NAP health checks in the authentication methods for the local area connection and for the wireless connection.

Note

You can also configure NAP client settings as part of the group policy using the Wired Network (IEEE 802.3) Policiesnode in the**Group Policy Management Editor** window. If you are using a Windows 2003 domain controller, however, you must update the Active Directory schema before you can configure the NAP client settings in this way. (The schema controls the structure of a directory service, essentially setting up the "rules" for directory service. It controls, forexample, the type of objects that can be added and the properties each object supports.) Extending the AD schema is outside the scope of this guide. For information about extending the AD schema, see Active Directory Schema Extensions for Windows Vista Wired and Wired Group Policy Enhancements (http://go.microsoft.com/fwlink/?LinkId=70195).

Configure the Local Area Connection

To enable the NAP agent to perform health checks on the wired connection, follow these steps:

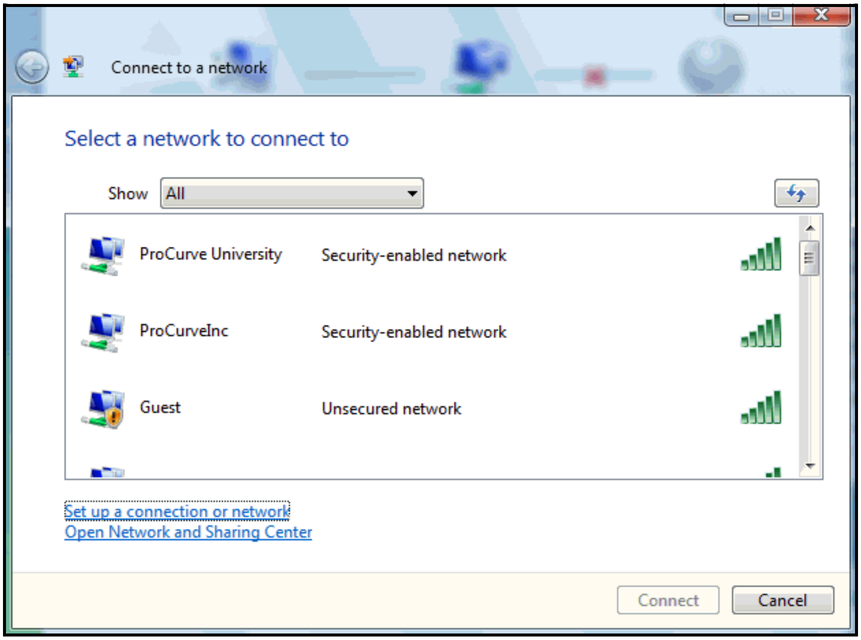
1. Click **Start**, right-click **Network**, and then click **Properties**.
2. Click **Manage network connections**.
3. Right-click **Local Area Connection** and then click **Properties**.
4. Click the**Authentication** tab and verify that**Enable IEEE 802.1X authentication** is selected.
5. Click **Settings**.

6. In the **Protected EAP Properties** dialog box, clear the **Enable Fast Reconnect** check box and verify that only the following check boxes are selected, as shown in the following example:
   - **Validate server certificate**
   - **Enable Quarantine checks**
7. Click **Configure**, verify that **Automatically use my Windows logon name and password (and domain if any)** is selected, and then click **OK**.
8. Click **OK** twice.

Configure the Wireless Connection

To enable the NAP agent to perform health checks on the wireless connection, follow these steps:

1. In the **Start** menu, click **Connect to**.



Connect to a network

Select a network to connect to

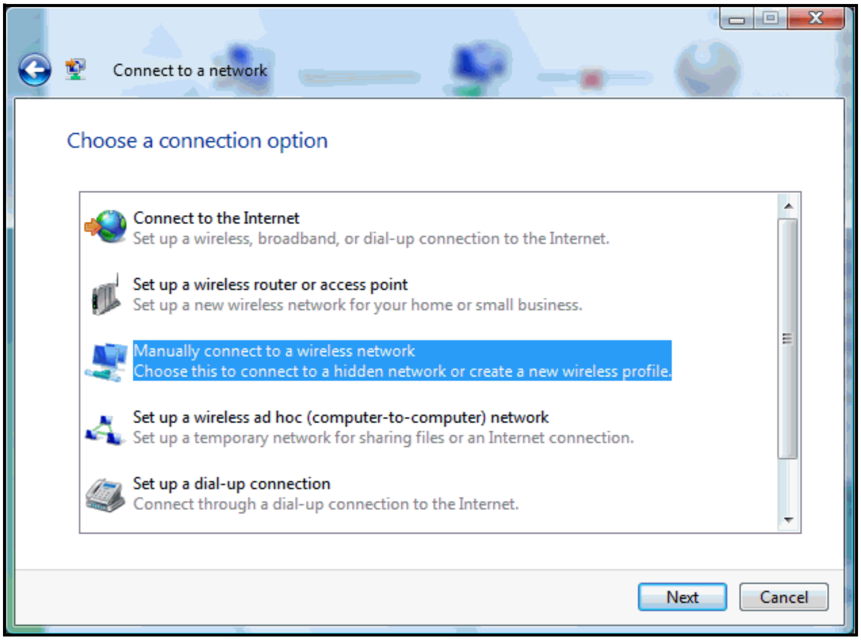
Show: All

ProCurve University	Security-enabled network	
ProCurveInc	Security-enabled network	
Guest	Unsecured network	

Set up a connection or network
Open Network and Sharing Center

Figure AD-147.Windows Vista Endpoint—Connect to a network Window

2. Click the **Set up a connection or network** link.



Connect to a network

Choose a connection option

Connect to the Internet
Set up a wireless, broadband, or dial-up connection to the Internet.

Set up a wireless router or access point
Set up a new wireless network for your home or small business.

Manually connect to a wireless network
Choose this to connect to a hidden network or create a new wireless profile.

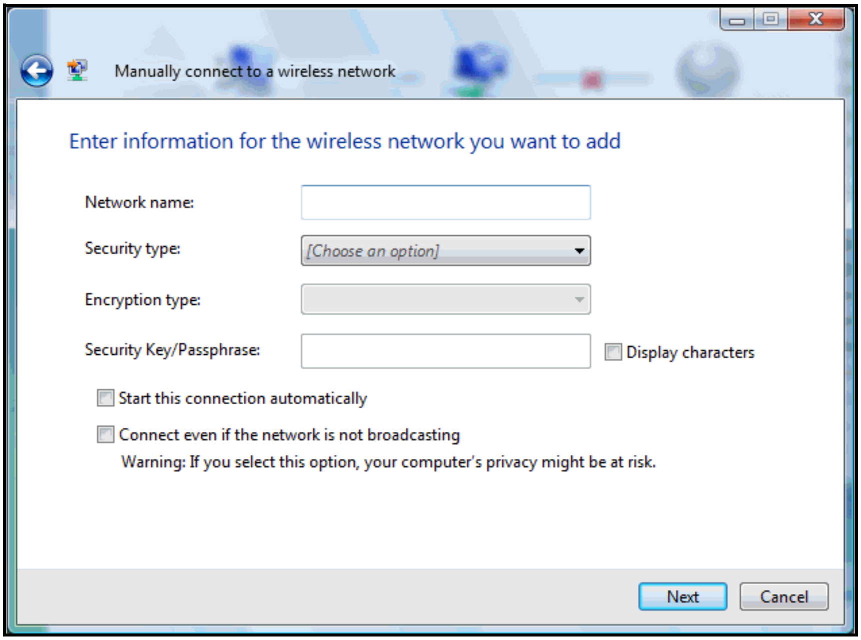
Set up a wireless ad hoc (computer-to-computer) network
Set up a temporary network for sharing files or an Internet connection.

Set up a dial-up connection
Connect through a dial-up connection to the Internet.

Figure AD-148.Windows Vista Endpoint—Connect to a network Window (Choose a connection option)

3. In the **Choose a connection option** window, click **Manually connect to a wireless network**.

4. Click **Next**.



Manually connect to a wireless network

Enter information for the wireless network you want to add

Network name:

Security type: [Choose an option]

Encryption type:

Security Key/Passphrase:

□ Display characters

□ Start this connection automatically

□ Connect even if the network is not broadcasting

Warning: If you select this option, your computer's privacy might be at risk.

Figure AD-149.Windows Vista Endpoint—Manually connect to a wireless network Window

5. In **Manually connect to a wireless network** window, enter settings for your WLAN:

   a. For **Network name**, type the SSID. In this example, type **ProCurve University**.

   b. From the **Security type** list, select the security option configured on this WLAN.In this example, select **WPA-Enterprise**, which is WPA with 802.1X authentication.

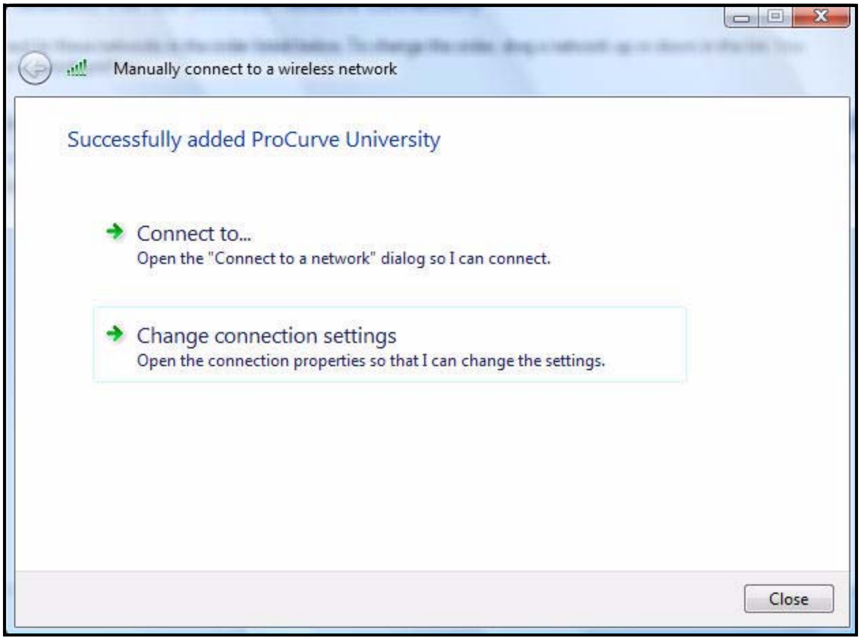
   c. For **Encryption** type, select the encryption enforced on the WLAN. In this example, select **TKIP**.

   d. Select the two check boxes:

      – **Start this connection automatically**

      – **Connect even if the network is not broadcasting**

6. Click **Next**.

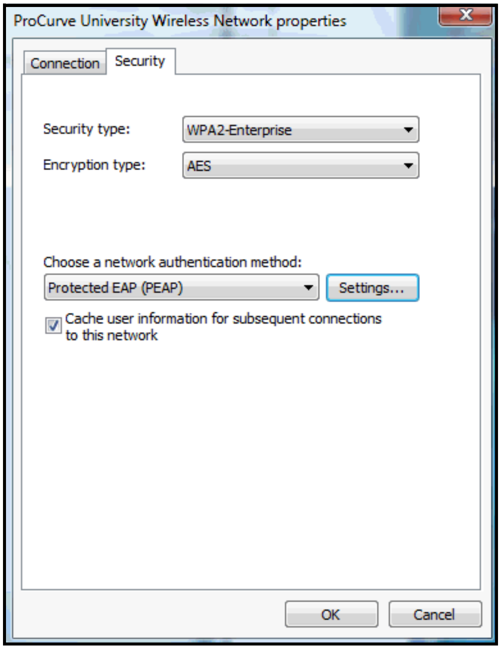

Manually connect to a wireless network

Successfully added ProCurve University

Connect to...
Open the "Connect to a network" dialog so I can connect.
Change connection settings
Open the connection properties so that I can change the settings.
Close

Figure AD-150.Windows Vista Endpoint—Manually connect to a wireless network Window (Successfully added <*WLAN*>)

7. Click **Change connection settings**.



ProCurve University Wireless Network properties

Security type: WPA2-Enterprise

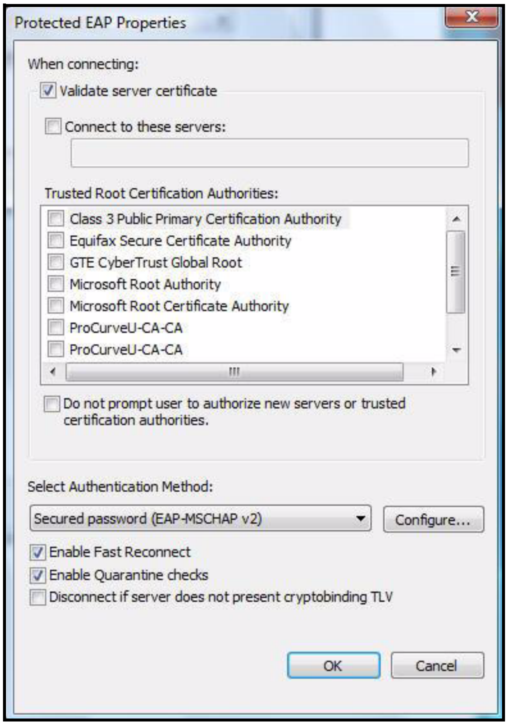
Encryption type: AES

Choose a network authentication method: Protected EAP (PEAP)

☑ Cache user information for subsequent connections to this network

Figure AD-151.Windows Vista Endpoint—<*WLAN*> Wireless Network properties Window

8. In the **Wireless Network properties** window for your WLAN, verify that you are at the **Security** tab. Click **Settings** next to **Protected EAP (PEAP)**.



Protected EAP Properties

When connecting:

☑ Validate server certificate

□ Connect to these servers:

Trusted Root Certification Authorities:

□ Class 3 Public Primary Certification Authority
□ Equifax Secure Certificate Authority
□ GTE CyberTrust Global Root
□ Microsoft Root Authority
□ Microsoft Root Certificate Authority
□ ProCurveU-CA-CA
□ ProCurveU-CA-CA

□ Do not prompt user to authorize new servers or trusted certification authorities.

Select Authentication Method:

Secured password (EAP-MSCHAP v2)

☑ Enable Fast Reconnect
☑ Enable Quarantine checks
□ Disconnect if server does not present cryptobinding TLV

Figure AD-152.Windows Vista Endpoint—Protected EAP Properties Window

9. In the **Protected EAP Properties** window, verify that these check boxes are selected:
   - **Validate server certificate**
   - **Enable Quarantine checks**
10. Click **Configure**, verify that **Automatically use my Windows logon name and password (and domain if any)** is selected, and then click **OK**.
11. Click **OK** in the other windows until you have closed all windows.

Configuring Network Access Control with IDM

In this implementation, IDM controls users' access to thenetwork, integrating with Microsoft NAP to do so. The NPS server authenticates users and checks endpoints' health state (integrity). IDM manages policies that control authenticated users and compliant and non-compliant endpoints. It configuresthese policies on the NPS server automatically so that you do not have to configure them manually.

In this section, you will learn how to use IDM to perform these functions:

- Assign rights to successfully authenticated users
- Quarantine endpoints that fail to comply with NAP's health requirements

Note

After you complete the tasks below, NAP will be activated. Do not complete the tasks until all endpoints in your network have had a chance to receive the proper settings for NAP from the domain (see "Configure the Endpoints" on page AD-160).

You must:

1. Install IDM on a server that runs PCM+.

   See "Install IDM" on page AD-173. You can also install PCM+ and IDM at the same time.

2. Add the NPS server to the list of devices allowed to access the PCM+/IDM server.

   See "Add the NPS Server to the Access.txt File" on page AD-179.

3. Install the IDM agent on the NPS server.

   See "Install the IDM Agent on the NPS Server" on page AD-180.

4. Configure IDM:

   a. Enable endpoint integrity.

      See "Enable Endpoint Integrity" on page AD-190.

   b. Add access policy groups and users.

      See "Add Access Policy Groups and Users" on page AD-193.

   c. Define resources to be controlled.

      See "Define Network Resources" on page AD-199.

d. Create profiles (sets of rights):

For this solution, you will create these profiles:

- One profile for normal access for each user group (authenticated users with compliant endpoints)
- One profile for non-compliant endpoints

See "Create Access Profiles" on page AD-206.

e. Configure access policy group rules to assign profiles to users based on various conditions.

For this solution, you will assign profiles based on user group and endpoint compliance.

See "Configure Access Policy Groups" on page AD-217.

f. Deploy the access policies to the NPS server.

"Deploy Policies to the NPS Server" on page AD-224.

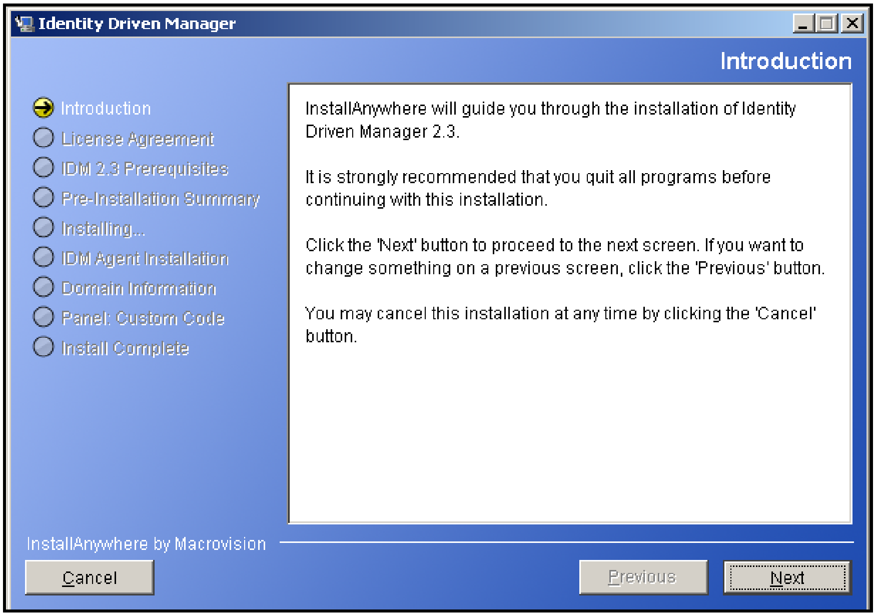
Note

In the following sections, the server that runs PCM+ with IDM is called the IDM server.

Install IDM

ProCurve Identity Driven Manager (IDM) is a plug-in to ProCurve Manager Plus (PCM+), which, it is assumed in this example implementation, already runs in your network. It is also assumed that ProCurve Mobility Manager (PMM) is already installed.

1. Launch the installation executable. The **InstallAnywhere progress** window is displayed; then the Identity Driven Manager Installation Wizard is displayed.



InstallAnywhere will guide you through the installation of Identity Driven Manager 2.3.

It is strongly recommended that you quit all programs before continuing with this installation.

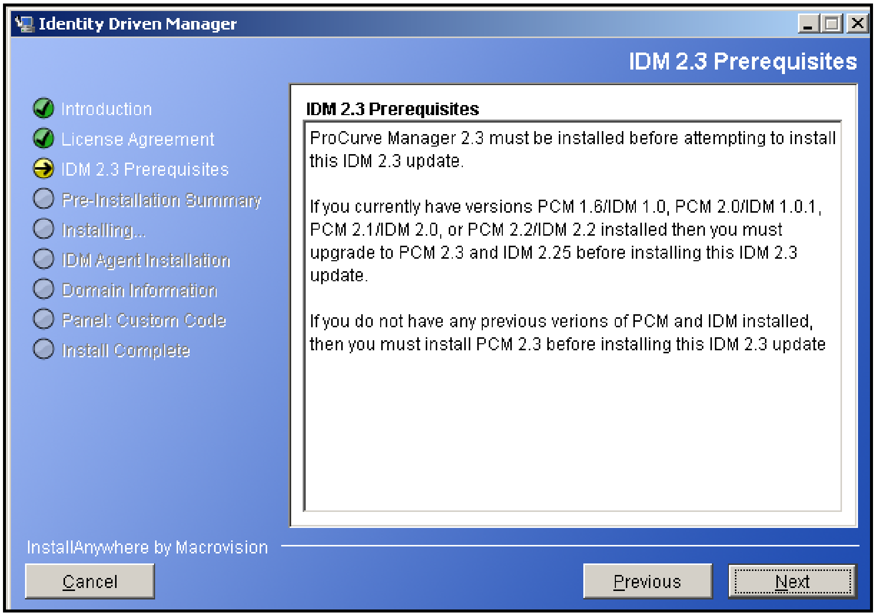
Click the 'Next' button to proceed to the next screen. If you want to change something on a previous screen, click the 'Previous' button.

You may cancel this installation at any time by clicking the 'Cancel' button.

Figure AD-153.Identity Driven Manager Wizard—Introduction Page

2. On the **Introduction** page, click **Next**.

3. On the **License Agreement** page, select **I accept the terms of the License Agreement**, and then click **Next**.



IDM 2.3 Prerequisites

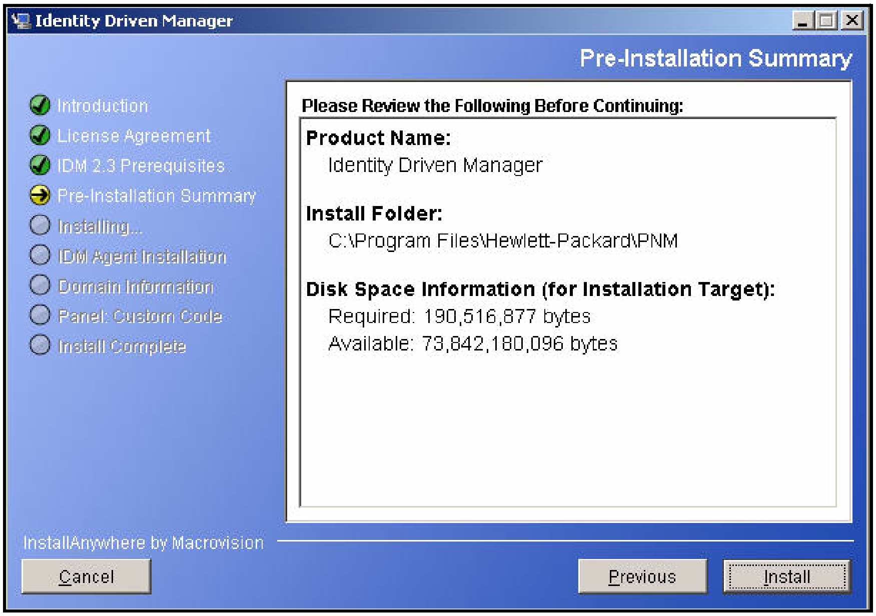
ProCurve Manager 2.3 must be installed before attempting to install this IDM 2.3 update.

If you currently have versions PCM 1.6/IDM 1.0, PCM 2.0/IDM 1.0.1, PCM 2.1/IDM 2.0, or PCM 2.2/IDM 2.2 installed then you must upgrade to PCM 2.3 and IDM 2.25 before installing this IDM 2.3 update.

If you do not have any previous verions of PCM and IDM installed, then you must install PCM 2.3 before installing this IDM 2.3 update

Figure AD-154.Identity Driven Manager Wizard—IDM 2.3 Prerequisites Page

4. On the **IDM 2.3 Prerequisites Page**, click **Next**.



Please Review the Following Before Continuing:

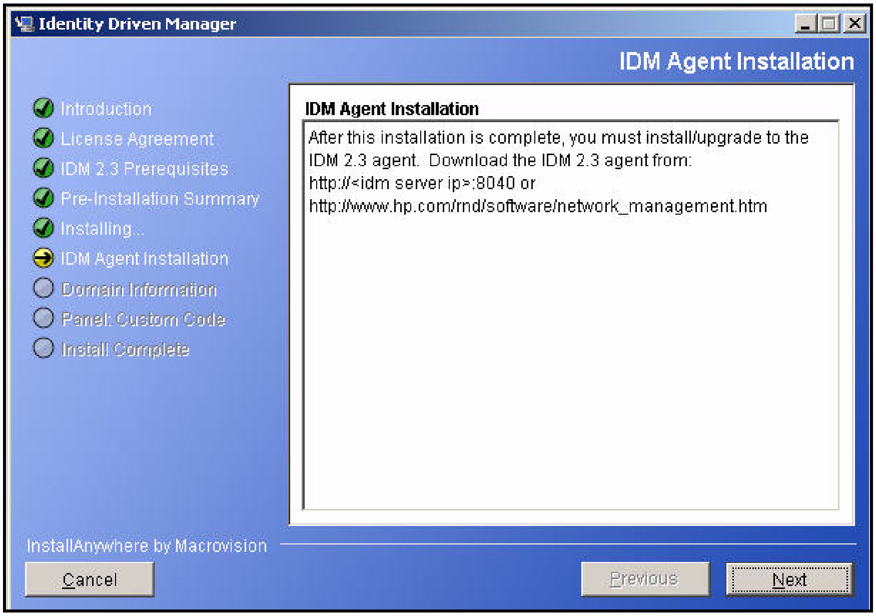
Product Name:
Identity Driven Manager

Install Folder:
C:\Program Files\Hewlett-Packard\PNM

Disk Space Information (for Installation Target):
Required: 190,516,877 bytes
Available: 73,842,180,096 bytes

Figure AD-155.Identity Driven Manager Wizard—Pre-Installation Summary Page

5. On the **Pre-Installation Summary** page, click **Install**. IDM will now be installed. This process may take several minutes. During this time, several windows will be displayed and closed. After this process is finished, the **IDM Agent Installation** page is displayed.

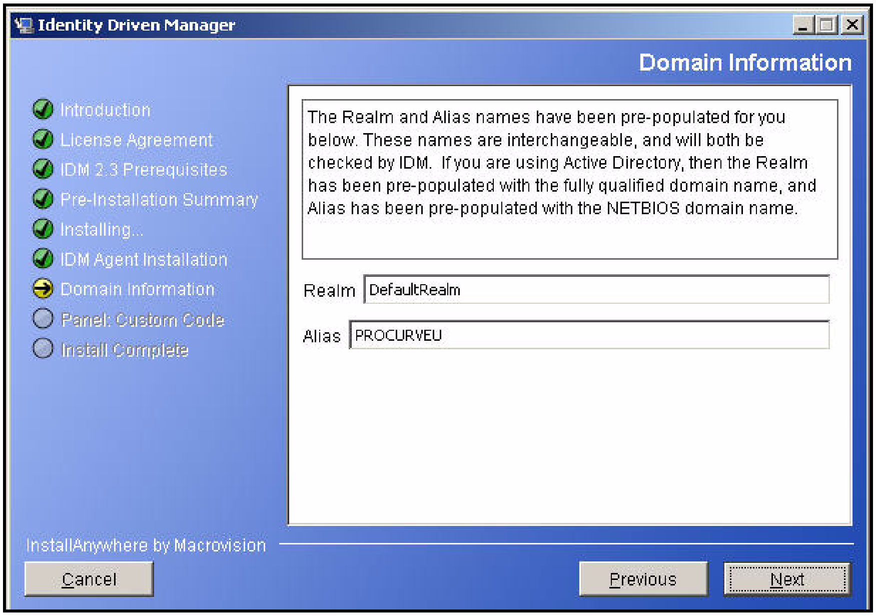


IDM Agent Installation

After this installation is complete, you must install/upgrade to the IDM 2.3 agent. Download the IDM 2.3 agent from:
http://<idm server ip>:8040 or
http://www.hp.com/rnd/software/network_management.htm

Figure AD-156.Identity Driven Manager Wizard—IDM Agent Installation Page

6. In the **IDM Agent Installation** page, click **Next**.



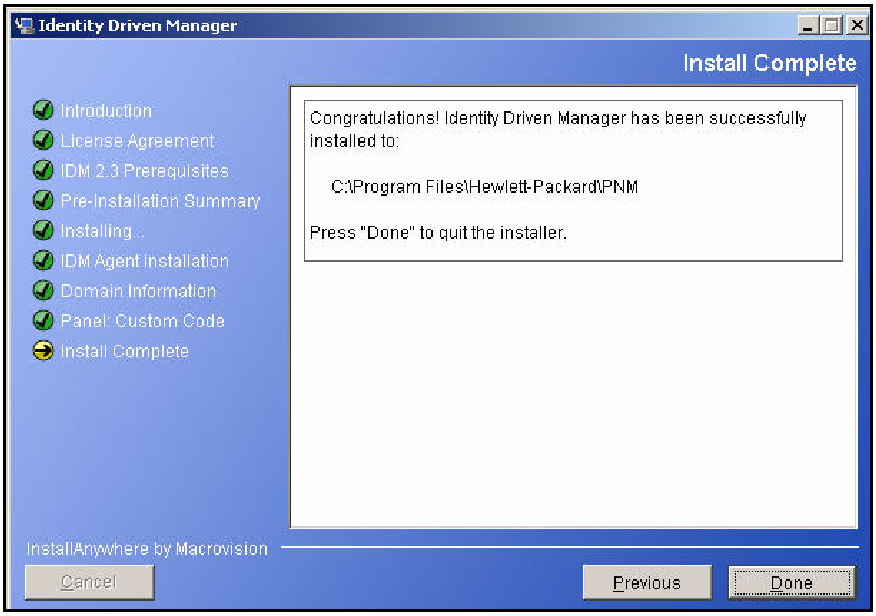
The Realm and Alias names have been pre-populated for you below. These names are interchangeable, and will both be checked by IDM. If you are using Active Directory, then the Realm has been pre-populated with the fully qualified domain name, and Alias has been pre-populated with the NETBIOS domain name.

Realm DefaultRealm

Alias PROCURVEU

Figure AD-157.Identity Driven Manager Wizard—Domain Information Page

7. In the **Domain Information** page, accept the default settings and click **Next**.
8. In the **Database Migration** page, click Next.



Congratulations! Identity Driven Manager has been successfully installed to:

C:\Program Files\Hewlett-Packard\PNM

Press "Done" to quit the installer.

Figure AD-158.Identity Driven Manager Wizard—Install Complete Page

9. In the **Install Complete** page, click **Done**.

Add the NPS Server to the Access.txt File

IDM will not add a NPS server to its managed devices unless the server's IP address is listed in PCM+'s **access.txt** file.

Follow these steps:

1. On the IDM server, open **<*PCM+ installation folder*>\server\config\access.txt.**

   You chose the installation folder when you installed it. The default location is: **C:\Program Files\Hewlett-Packard\PNM\server\config\access.txt**.

   Open the file in a text-based editor such as Notepad or Wordpad.

2. Type the NPS server's IP address or hostname. If you have multiple NPS servers, type the address of each server on its own line. In this example, type **10.4.4.16**.

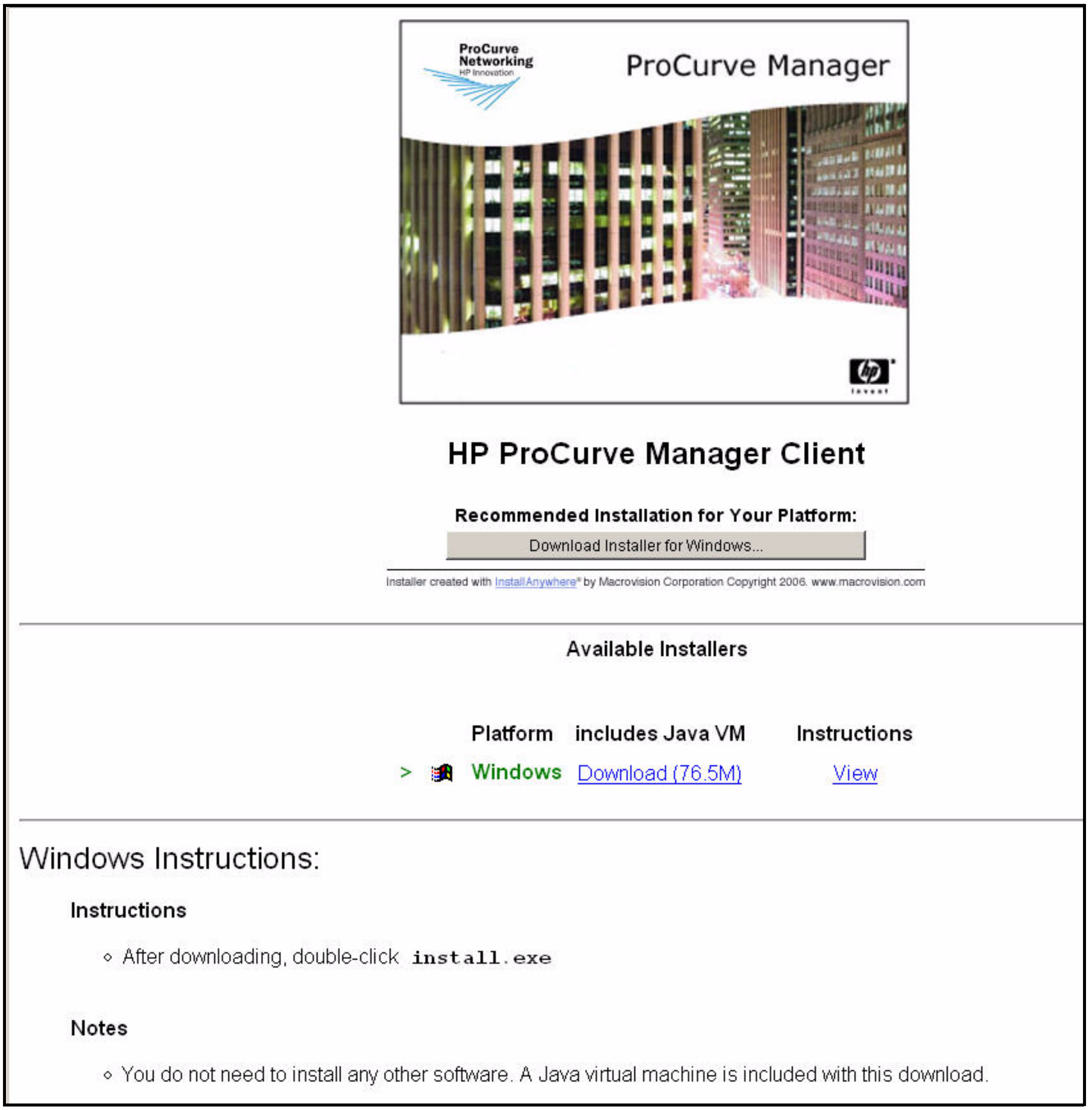
3. Save and close the file.

Install the IDM Agent on the NPS Server

You can now install the IDM agent client on the NPS serverFollow these steps:

1. On the NPS server, open a Web browser such as Internet Explorer.

2. For the URL, type the IP address of the PCM+ server followed by a colon and port 8040. In this example, you would type **10.2.1.50:8040**.



HP ProCurve Manager Client

Recommended Installation for Your Platform:

Installer created with InstallAnywhere® by Macrovision Corporation Copyright 2006. www.macrovision.com

Available Installers

	Platform	includes Java VM	Instructions
>	Windows	Download (76.5M)	View

Windows Instructions:

Instructions

- After downloading, double-click `install.exe`

Notes

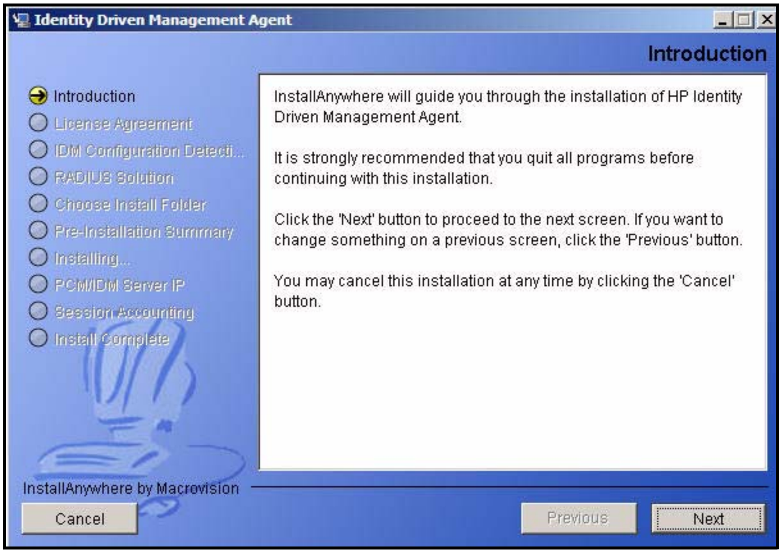
- You do not need to install any other software. A Java virtual machine is included with this download.

Figure AD-159.HP ProCurve Manager Client Download (PCM+ Server:8040)

3. Click the download link.

4. Save the *install.exe* file on the server.

5. When the file has downloaded, double-click it tostart the installation. The Identity Driven Management Agent installation is launched.



Identity Driven Management Agent

Introduction

InstallAnywhere will guide you through the installation of HP Identity Driven Management Agent.

It is strongly recommended that you quit all programs before continuing with this installation.

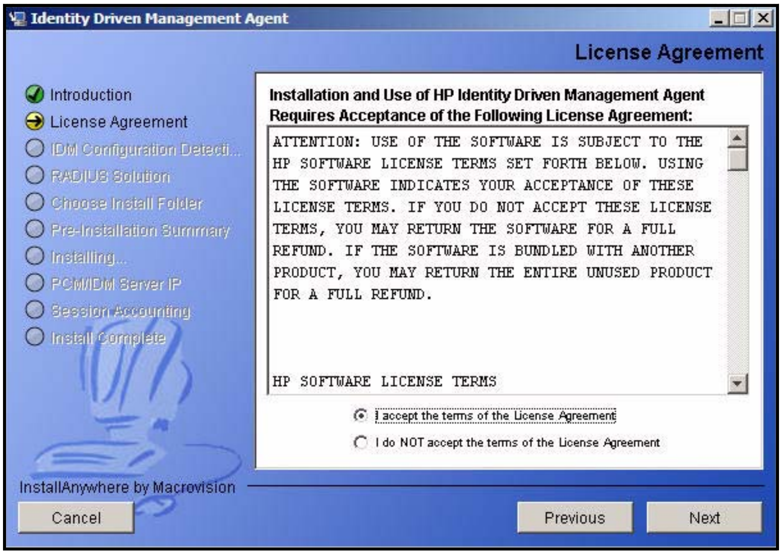
Click the 'Next' button to proceed to the next screen. If you want to change something on a previous screen, click the 'Previous' button.

You may cancel this installation at any time by clicking the 'Cancel' button.

Figure AD-160.Identity Driven Management Agent—Introduction Page

6. In the **Introduction** page, click **Next**.

7. In the **License Agreement** page, select **I accept the terms of the License Agreement**.



Installation and Use of HP Identity Driven Management Agent Requires Acceptance of the Following License Agreement:

```
ATTENTION: USE OF THE SOFTWARE IS SUBJECT TO THE
HP SOFTWARE LICENSE TERMS SET FORTH BELOW. USING
THE SOFTWARE INDICATES YOUR ACCEPTANCE OF THESE
LICENSE TERMS. IF YOU DO NOT ACCEPT THESE LICENSE
TERMS, YOU MAY RETURN THE SOFTWARE FOR A FULL
REFUND. IF THE SOFTWARE IS BUNDLED WITH ANOTHER
PRODUCT, YOU MAY RETURN THE ENTIRE UNUSED PRODUCT
FOR A FULL REFUND.


HP SOFTWARE LICENSE TERMS
```

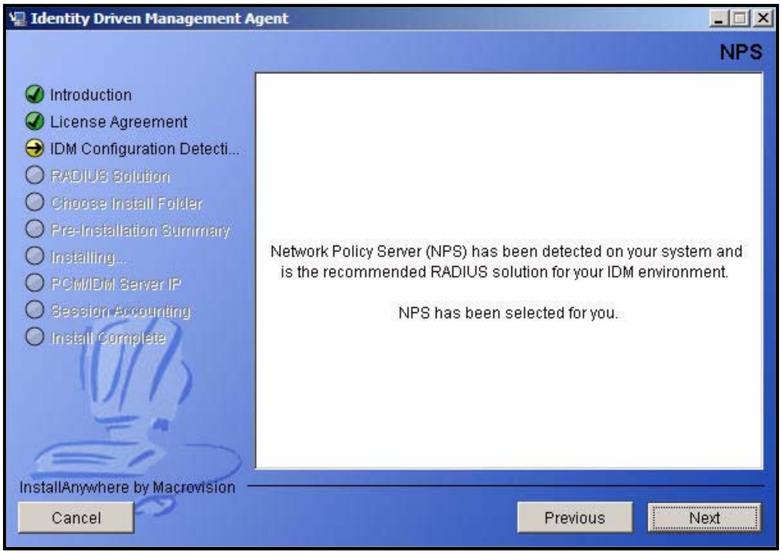
● I accept the terms of the License Agreement

○ I do NOT accept the terms of the License Agreement

Figure AD-161.Identity Driven Management Agent—License Agreement Page

8. Click **Next**.

9. In the **IDM Configuration Detection** page, click **Next**.

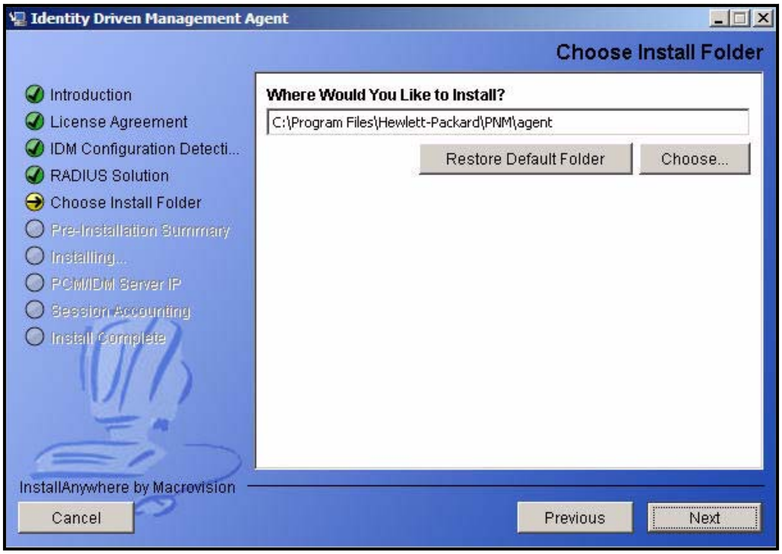


Network Policy Server (NPS) has been detected on your system and is the recommended RADIUS solution for your IDM environment.

NPS has been selected for you.

Figure AD-162.Identity Driven Management Agent—NPS Page

10. The installation application detects that this server runs NPS. In the **NPS** page, click **Next**.

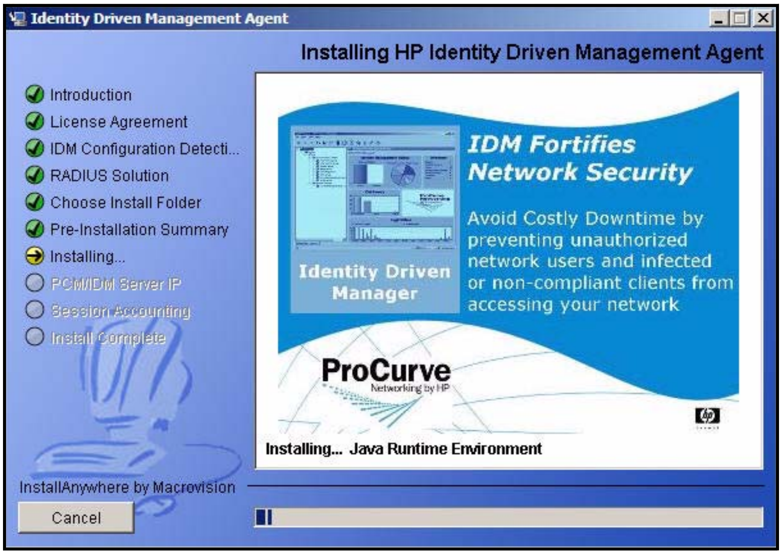


Where Would You Like to Install?

C:\Program Files\Hewlett-Packard\PNM\agent

Figure AD-163.Identity Driven Management Agent—Choose Install Folder Page

11. In the **Choose Install Folder** page, keep the default folder. Click **Next**.
12. In the **Pre-Installation Summary** page, click **Install**.
13. The page shown in Figure AD-164 is displayed. Wait while the agent installs.

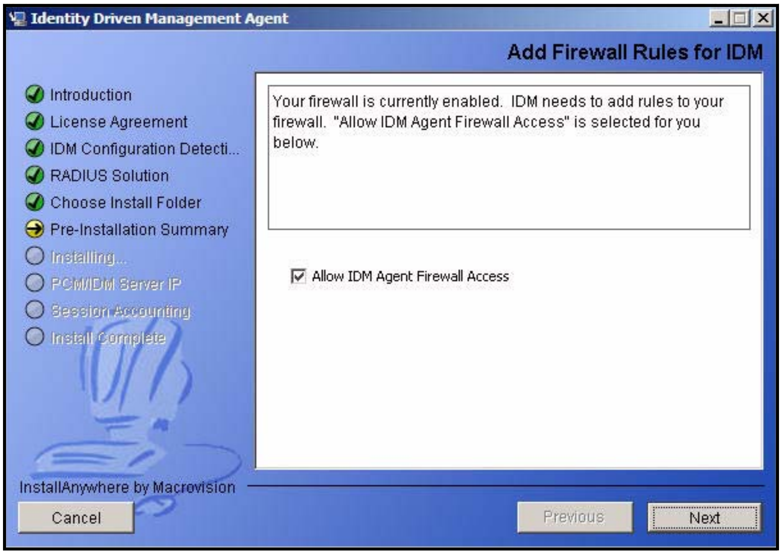


Identity Driven Management Agent
Installing HP Identity Driven Management Agent
Introduction
License Agreement
IDM Configuration Detecti...
RADIUS Solution
Choose Install Folder
Pre-Installation Summary
Installing...
PCM/IDM Server IP
Session Accounting
Install Complete
IDM Fortifies Network Security
Avoid Costly Downtime by preventing unauthorized network users and infected or non-compliant clients from accessing your network
Identity Driven Manager
ProCurve
Networking by HP
InstallAnywhere by Macrovision
Cancel

Installing... Java Runtime Environment

Figure AD-164.Identity Driven Management Agent—Installing HP Identity Driven Management Page

14. If the firewall is enabled on the NPS server (the default setting), the page shown in Figure AD-164 is displayed. Verify that the **Allow IDM Agent Firewall Access** check box is selected.



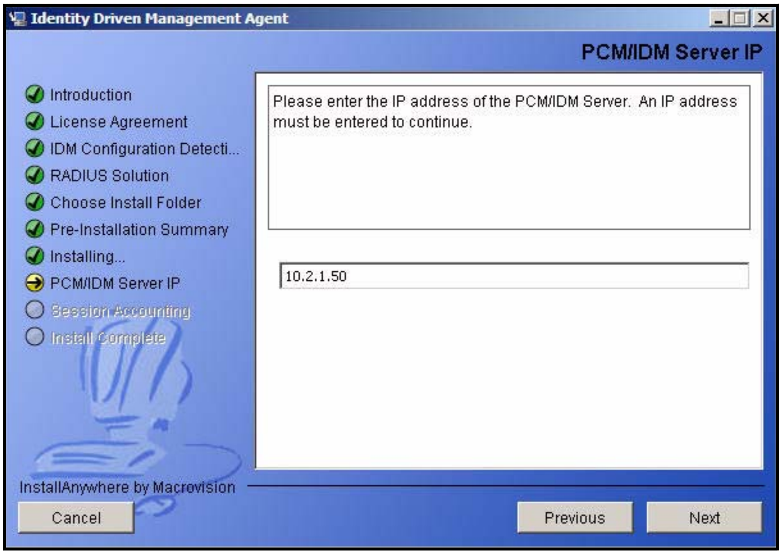
Your firewall is currently enabled. IDM needs to add rules to your firewall. "Allow IDM Agent Firewall Access" is selected for you below.

☑ Allow IDM Agent Firewall Access

Figure AD-165.Identity Driven Management Agent—Add Firewall Rules for IDM Page

15. Click **Next**.

16. In the **PCM/IDM Server IP** page, type the IP address of the server that runs PCM+/IDM. In this example, type **10.2.1.50**.



Please enter the IP address of the PCM/IDM Server. An IP address must be entered to continue.

10.2.1.50

Figure AD-166.Identity Driven Management Agent—PCM/IDM Server IP Page

17. Click **Next**.
18. In the **Install Complete** page, click **Done**.

Verify That IDM Detects the NPS Server

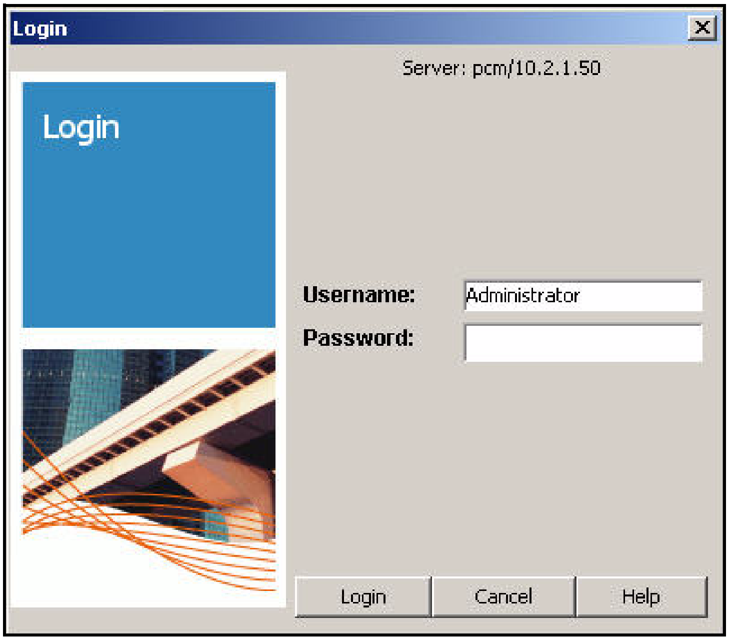
You should that IDM detects the NPS server and adds it as a RADIUS server:

1. Open the PCM+ client, which is automatically installed on thePCM+/IDM server.

   The first time that you access the client, you must choose the server.

2. Click the server displayed in the **Management servers found** box and click **Connect**.

   Or enter the IP address of the PCM+ server in the **Direct Address** box.



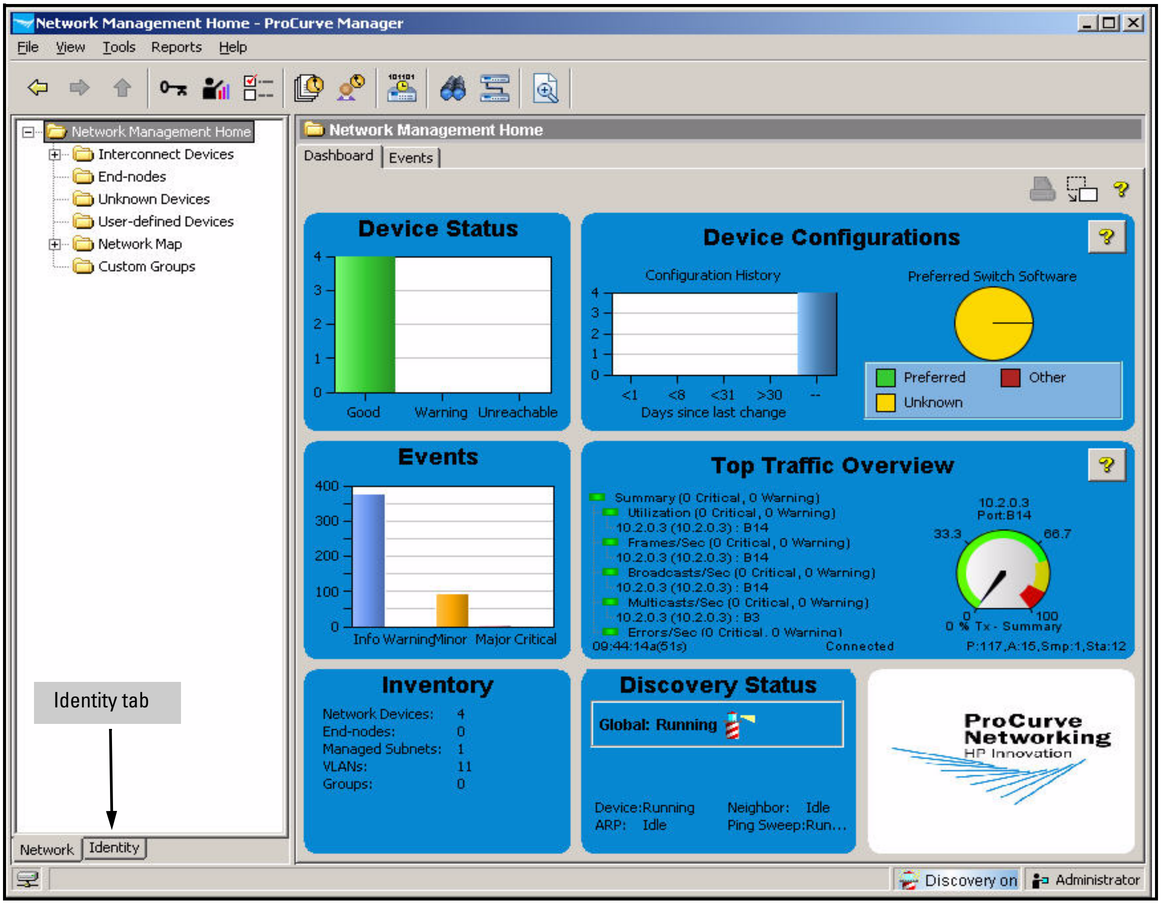
Server: pcm/10.2.1.50

Username: Administrator

Password:

Figure AD-167.ProCurve Manager Login Window

3. In the **Login** window, enter the Administrator credentials that you set up when you installed PCM+.



Summary (0 Critical, 0 Warning)
Utilization (0 Critical, 0 Warning)
10.2.0.3 (10.2.0.3) : B14
Frames/Sec (0 Critical, 0 Warning)
10.2.0.3 (10.2.0.3) : B14
Broadcasts/Sec (0 Critical, 0 Warning)
10.2.0.3 (10.2.0.3) : B14
Multicasts/Sec (0 Critical, 0 Warning)
10.2.0.3 (10.2.0.3) : B3
Errors/Sec (0 Critical, 0 Warning)
09:44:14a(51s) Connected P:117,A:15,Smp:1,Sta:12

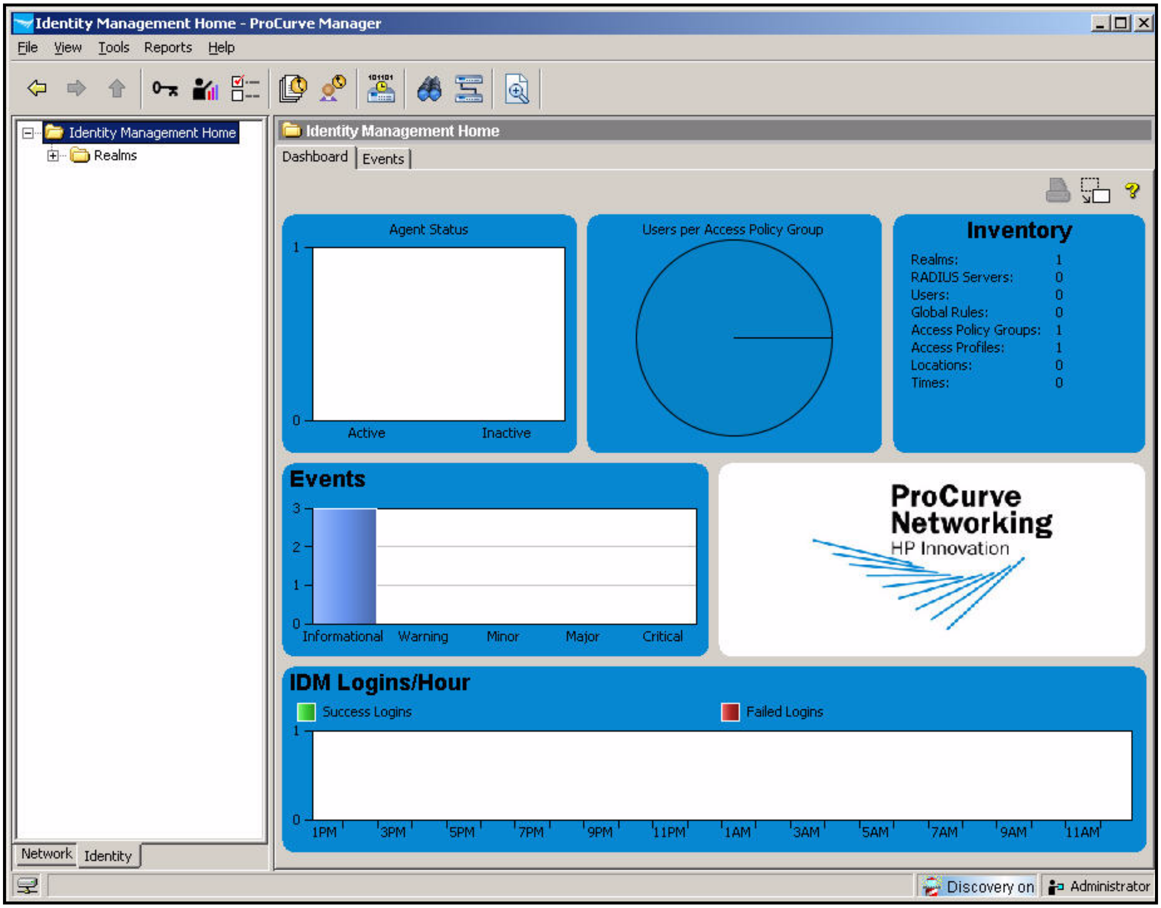
Network Devices: 4
End-nodes: 0
Managed Subnets: 1
VLANs: 11
Groups: 0

Global: Running

Device:Running Neighbor: Idle
ARP: Idle Ping Sweep:Run...

Figure AD-168.ProCurve Manager—Network Management Home Window

4. To open the **Identity Management Home** window, click the **Identity** tab at the bottom of the navigation tree.



Realms:	1
RADIUS Servers:	0
Users:	0
Global Rules:	0
Access Policy Groups:	1
Access Profiles:	1
Locations:	0
Times:	0

Figure AD-169.ProCurve Manager—Identity Management Home Window

5. In the IDM navigation tree, expand **Realms**.

6. Expand your realm. In this example, expand **ProCurveU.com**).

7. Expand the **RADIUS Servers** folder.

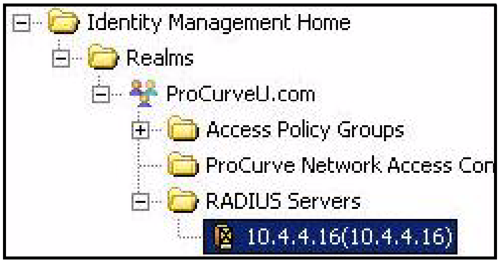


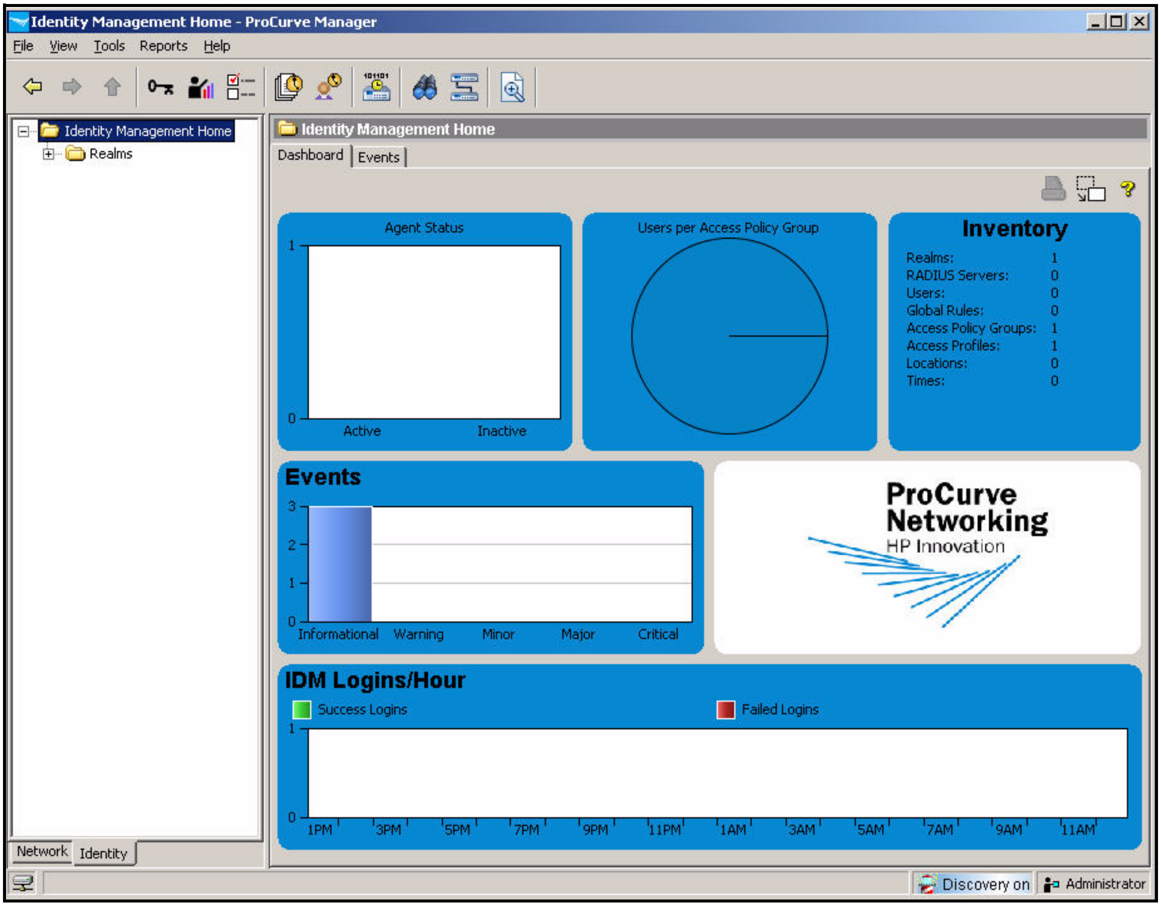
Figure AD-170.PCM+ Console, IDM Interface—Realms > *<myrealm>* > ProCurve Network Access Controllers

8. Verify that the NPS server is displayed in the **RADIUS Servers** folder.

Enable Endpoint Integrity

Later you will set up access policy rules to quarantine endpoints that do not comply with the NAP health requirements. First, however, you must enable endpoint integrity in IDM. Follow these steps:

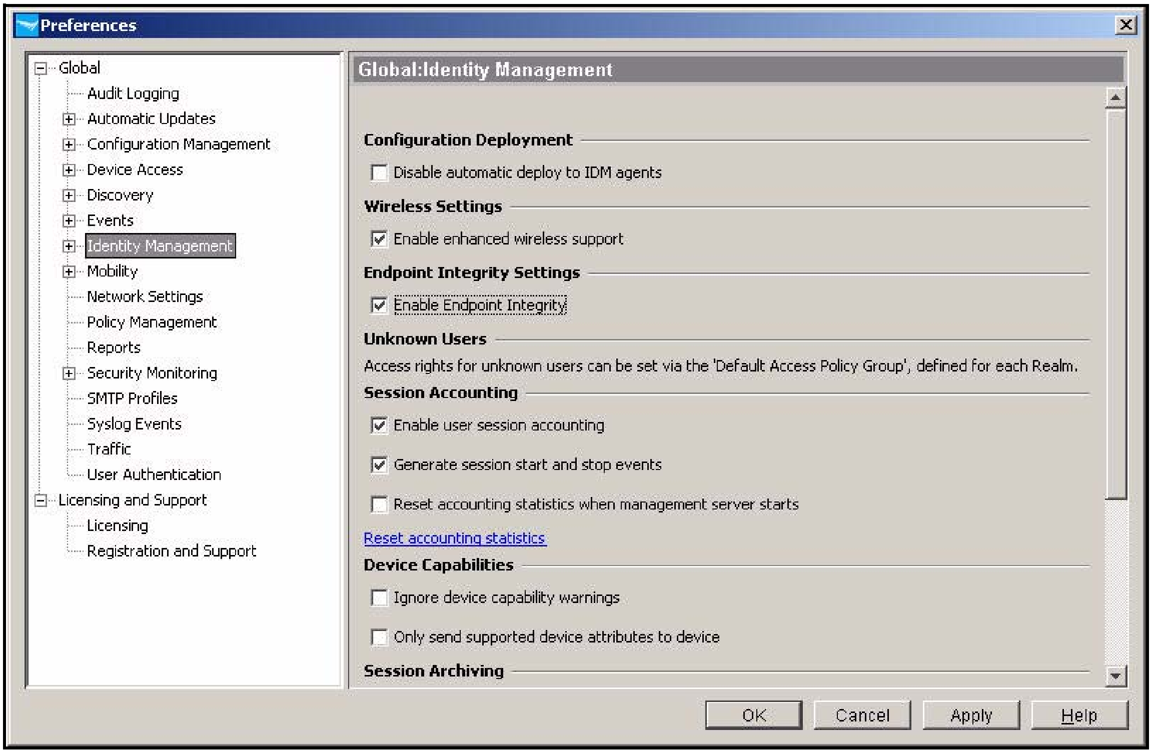
1. You should be in the **Identity Management Home** window of PCM+.



Realms:	1
RADIUS Servers:	0
Users:	0
Global Rules:	0
Access Policy Groups:	1
Access Profiles:	1
Locations:	0
Times:	0

Figure AD-171.ProCurve Manager—Identity Management Home Window

2. In the **Tools** menu, click **Preferences**. (Or click the **Preferences** button.)
3. Select **Identity Management**.



Configuration Deployment

□ Disable automatic deploy to IDM agents

Wireless Settings

☑ Enable enhanced wireless support

Endpoint Integrity Settings

☑ Enable Endpoint Integrity

Unknown Users

Access rights for unknown users can be set via the 'Default Access Policy Group', defined for each Realm.

Session Accounting

☑ Enable user session accounting

☑ Generate session start and stop events

□ Reset accounting statistics when management server starts

Reset accounting statistics

Device Capabilities

□ Ignore device capability warnings

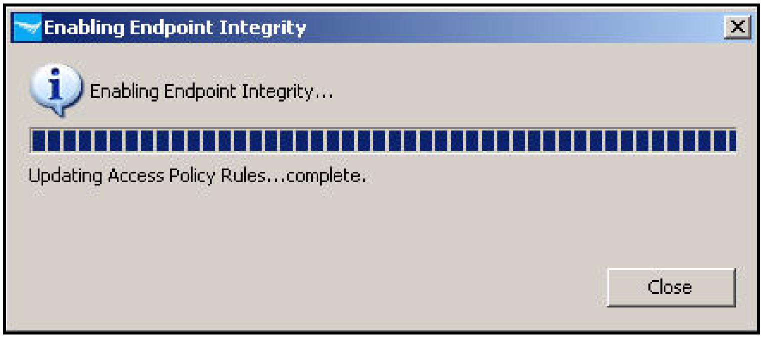
□ Only send supported device attributes to device

Session Archiving

Figure AD-172.ProCurve Manager—Preferences > Global > Identity Management Window

4. Select the **Enable Endpoint Integrity** check box.

5. Click **OK**.



Enabling Endpoint Integrity...

Updating Access Policy Rules...complete.

Figure AD-173.ProCurve Manager—Enabling Endpoint Integrity Window

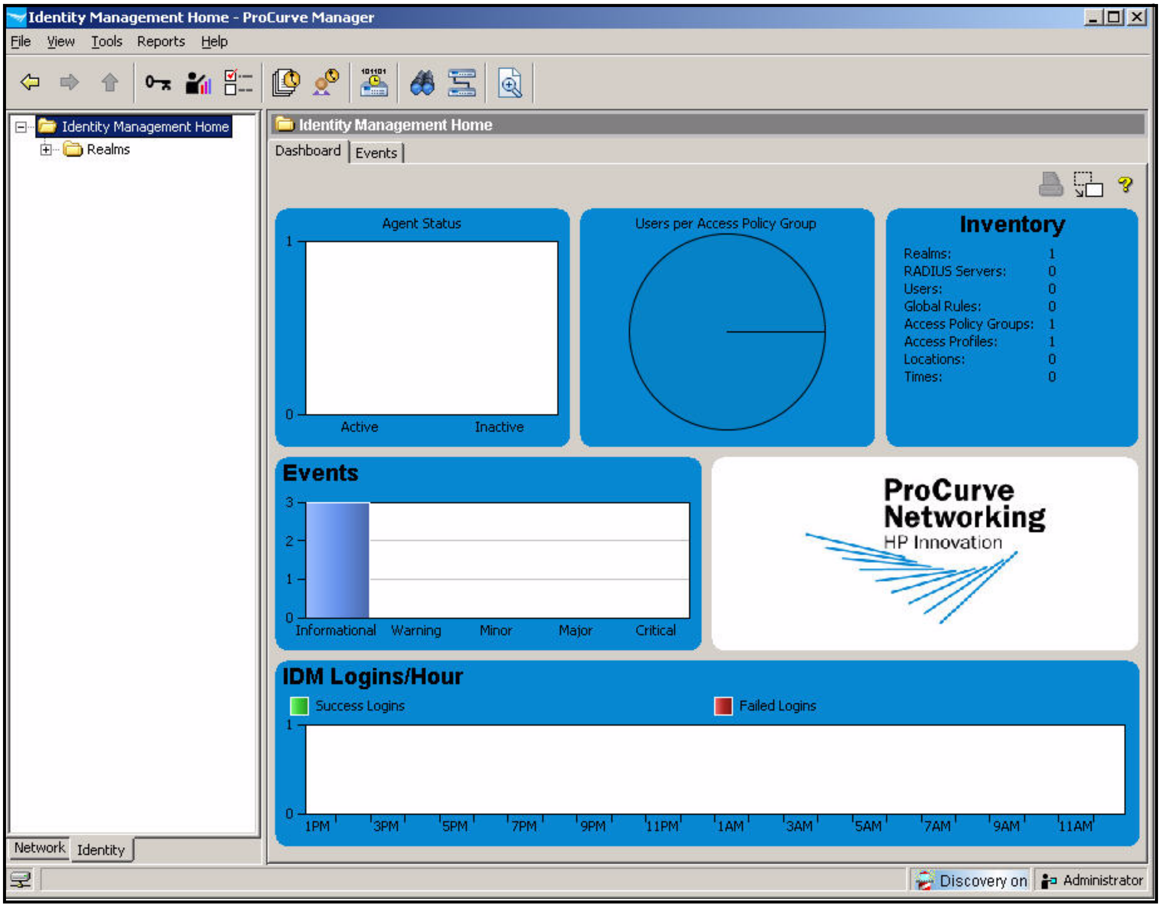
6. Click **Close** in the **Enabling Endpoint Integrity** window.

Add Access Policy Groups and Users

In this implementation, the NPS server authenticates users against Active Directory accounts. IDM can synchronize with Active Directory and add domain security groups as access policy groups. When IDM synchronizes with a group, it automatically adds group members as users in the corresponding policy group.

Follow these steps to synchronize IDM with Active Directory:

1. You should be in the **Identity Management Home** window of PCM+.



Inventory

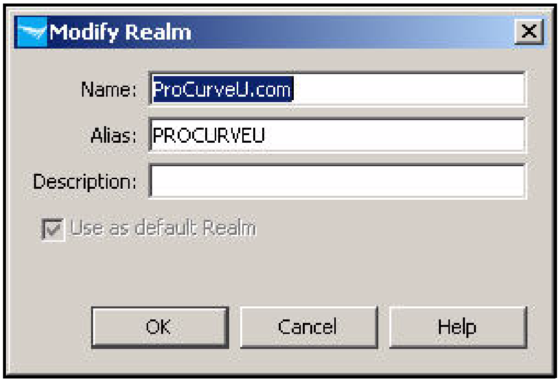
Realms:	1
RADIUS Servers:	0
Users:	0
Global Rules:	0
Access Policy Groups:	1
Access Profiles:	1
Locations:	0
Times:	0

Figure AD-174.ProCurve Manager—Identity Management Home Window

2. In the left pane, right-click your domain's realm name and select **Modify Realm**.

3. For **Alias**, if not already specified, type the NetBIOS (workgroup) name of your domain. In this example: **PROCURVEU**.

   Some users may log in with the "ProCurve.com" domain name and some with the "PROCURVEU" NetBIOS name. Setting the alias ensures that IDM does not create a separate realm for PROCURVEU the first time that a user logs in with that name.


Modify Realm

Name: ProCurveU.com

Alias: PROCURVEU

Description:

☑ Use as default Realm

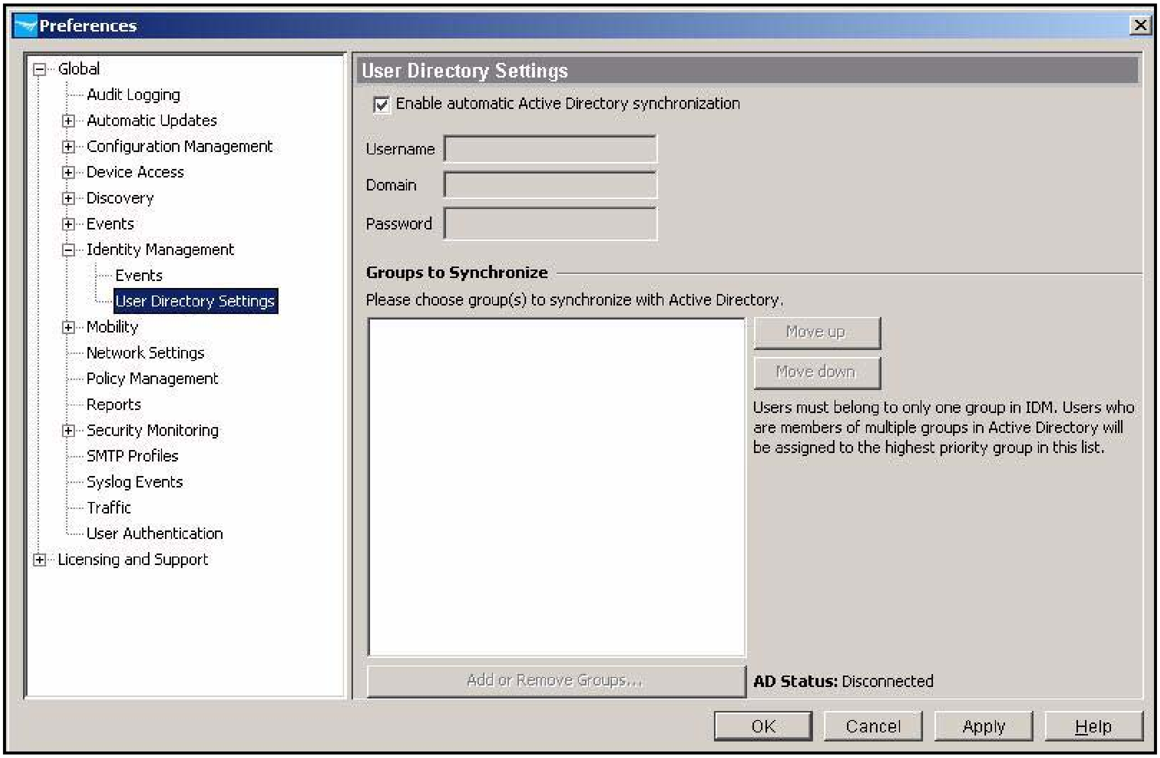
Figure AD-175.ProCurve Manager—Modify Realm Window

4. Click **OK**.

5. In the **Tools** menu, click **Preferences**. (Or click the **Preferences** icon in the global toolbar.)

6. Expand **Identity Management** and select **User Directory Settings**.

7. Select the **Enable automatic Active Directory synchronization** check box.



☑ Enable automatic Active Directory synchronization

Please choose group(s) to synchronize with Active Directory.

Users must belong to only one group in IDM. Users who are members of multiple groups in Active Directory will be assigned to the highest priority group in this list.

AD Status: Disconnected

Figure AD-176.ProCurve Manager—Preferences > Global > Identity Management > User Directory

8. In the **Username** and **Password** boxes,type credentials foran administrator of the domain. In this example, type **Administrator** and **ProCurve0**.

9. For **Domain**, type your domain name. In this example, type **ProCurveU.com**.

10. Click **Add or Remove Groups**.

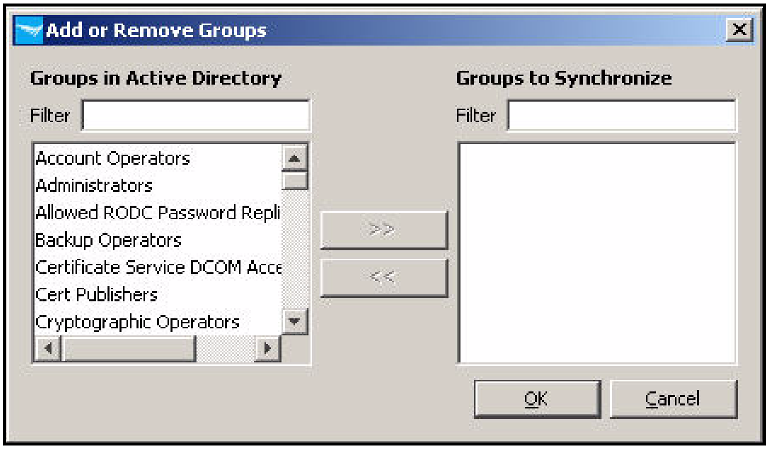


Figure AD-177.ProCurve Manager—Add or Remove Groups Window

11. The **Add or Remove Groups** window displays all Active Directory groups. Select the name of a group and click the **>>** button so that IDM will synchronize with it. Select all the groups that you set up for access rights. In this example, these groups are:
    - Faculty
    - NAP client computers
    - Network_Admins
    - Students

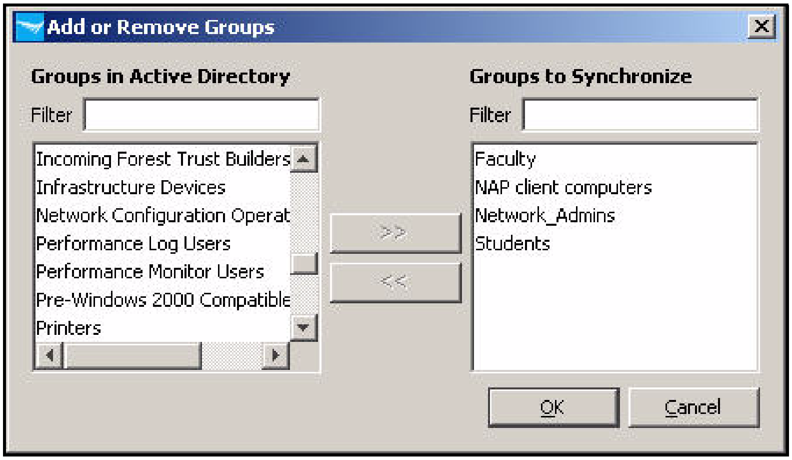


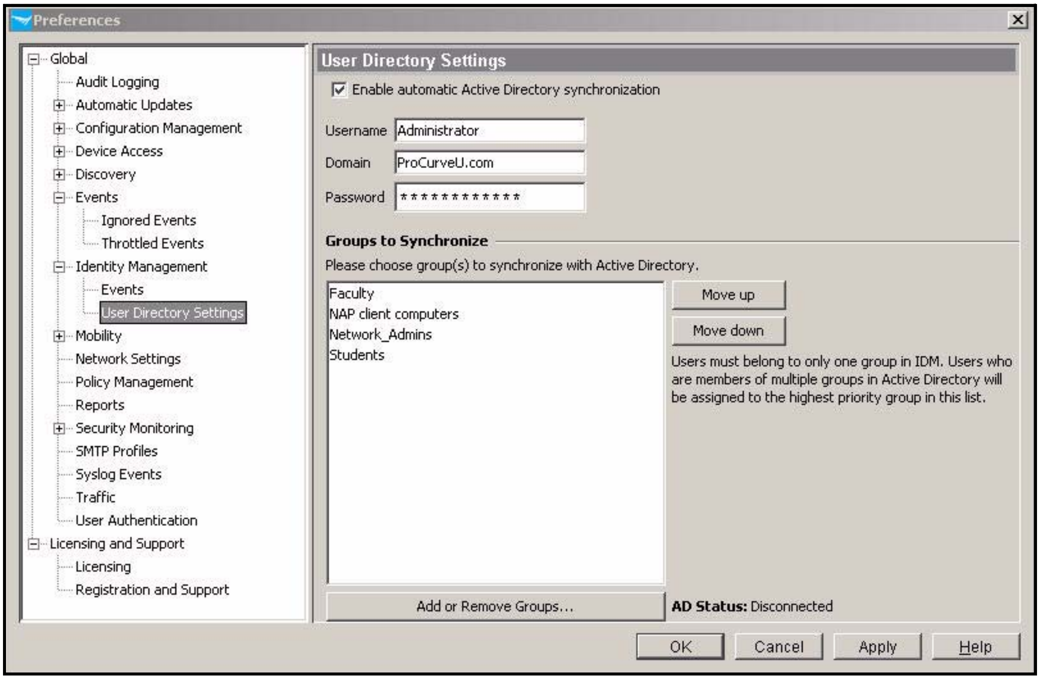
Figure AD-178.PCM+ Console—Add or Remove Groups Window

Note

Although a user can be a member of multiple Active Directory groups, he or she should be a member of only one group that is synchronized in IDM.

12. Click **OK** to save the settings and close the window.

13. If any users belong to more than one group, you must decide which group will take precedence in IDM because each user can belong to only one group in IDM. IDM will assign the user to the group that is listed first in the **Groups to Synchronize** pane. In this example, the user groups are mutually exclusive, but if you needed to move a group to a different position, you would select the group name and click the **Move up** or **Move down** button to change its position.



User Directory Settings

☑ Enable automatic Active Directory synchronization

Username: Administrator

Domain: ProCurveU.com

Password: ************

Groups to Synchronize

Please choose group(s) to synchronize with Active Directory.

Faculty
NAP client computers
Network_Admins
Students

Users must belong to only one group in IDM. Users who are members of multiple groups in Active Directory will be assigned to the highest priority group in this list.

AD Status: Disconnected

Figure AD-179.ProCurve Manager—Preferences > Identity Management > User Directory Settings

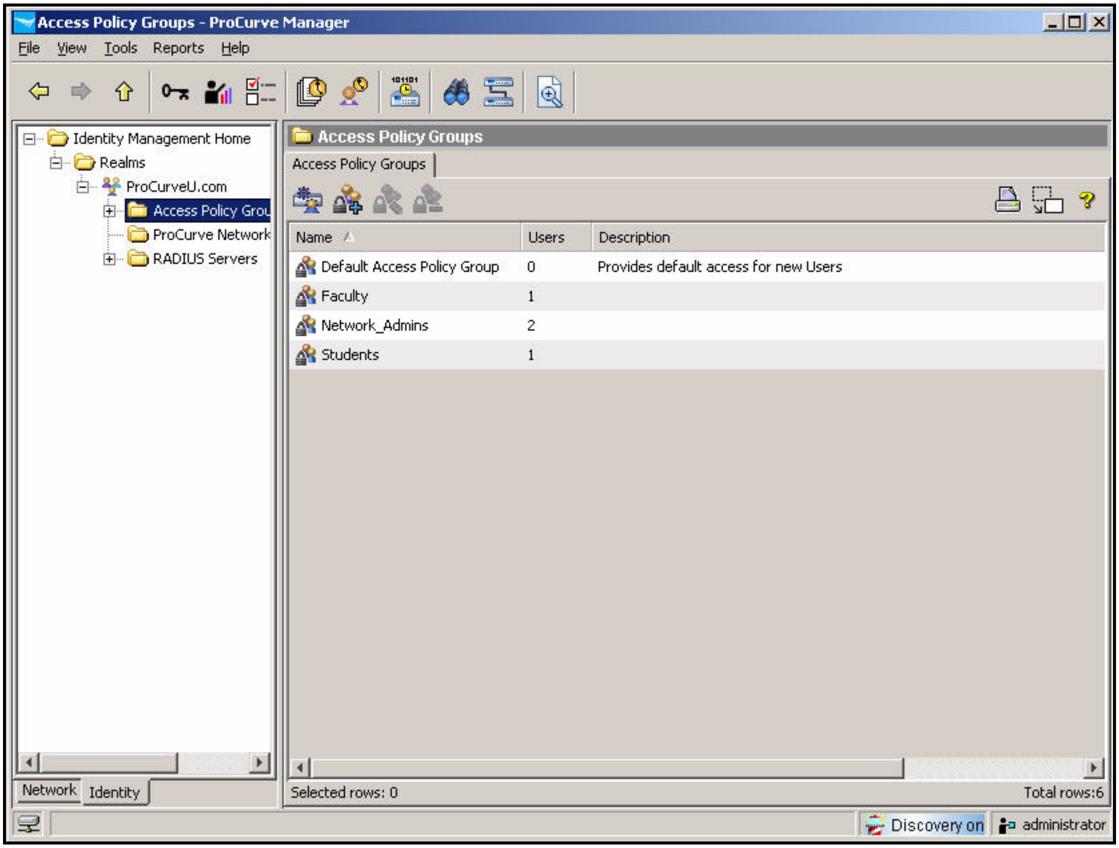
14. Click **OK**.

Each group is added to IDM as an access policy group. All users who belong to the selected groups are imported with the current Windows user login credentials.

Note IDM can import about 8 to 10 users per second.

15. In the left pane, expand your realm and select **Access Policy Groups**. The **Users** column now shows the number of Active Directory user accounts that were imported into each group.

16. Click **OK**.



Name	Users	Description
Default Access Policy Group	0	Provides default access for new Users
Faculty	1	
Network_Admins	2	
Students	1	

Selected rows: 0 Total rows:6

Figure AD-180.ProCurve Manager—Access Policy Groups

Define Network Resources

You must define every resource that you want to control. These can include:

- **A single device**—an IP address
- **Applications (such as DHCP, DNS, and HTTP)**—TCP or UDP ports (or other protocols)
- **Applications on a single device**—an IP address and TCP or UDP ports
- **A VLAN**—a subnet network address

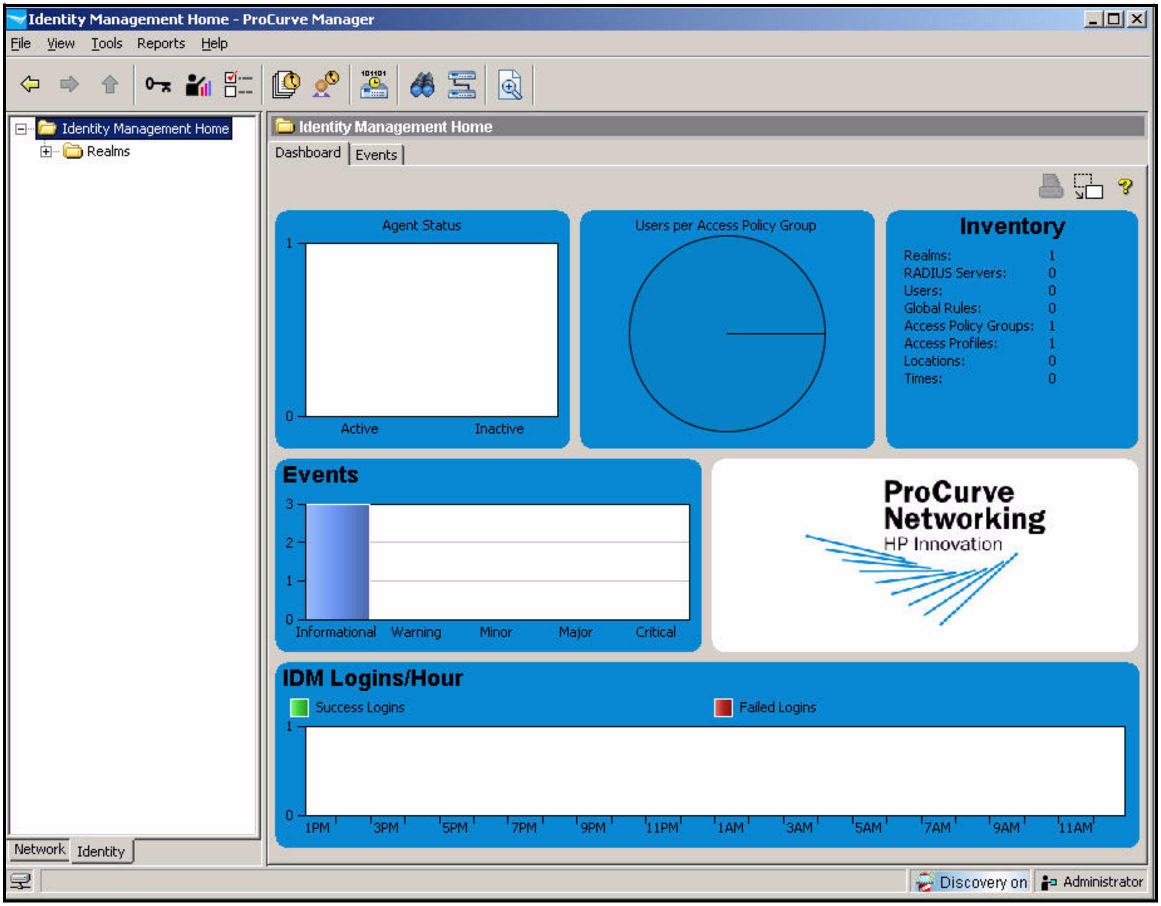
Table AD-8 shows resources for the example network.

Table AD-8. PCU Resources

Resource	IP Address	Protocol	Port or Ports
NPS	10.4.4.16	IP	Any
DHCP	Any	UDP	67
DNS (UDP)	Any	UDP	53
DNS (TCP)	Any	TCP	53
Email	10.4.6.40	TCP	25, 143, 110
Other network services	10.4.0.0/16	IP	Any
Faculty databases	10.5.0.0/16	IP	Any
Management VLAN	10.2.0.0/16	IP	Any
Faculty VLAN	10.8.0.0/16	IP	Any
Students VLAN	10.10.0.0/16	IP	Any
Computer VLAN	10.9.0.0/16	IP	Any
Private network	10.0.0.0/8	IP	Any
Internet	Any	TCP	21, 80, 443

To define resources, follow these steps:

1. In the ProCurve Manager console, click the **Identity** tab.

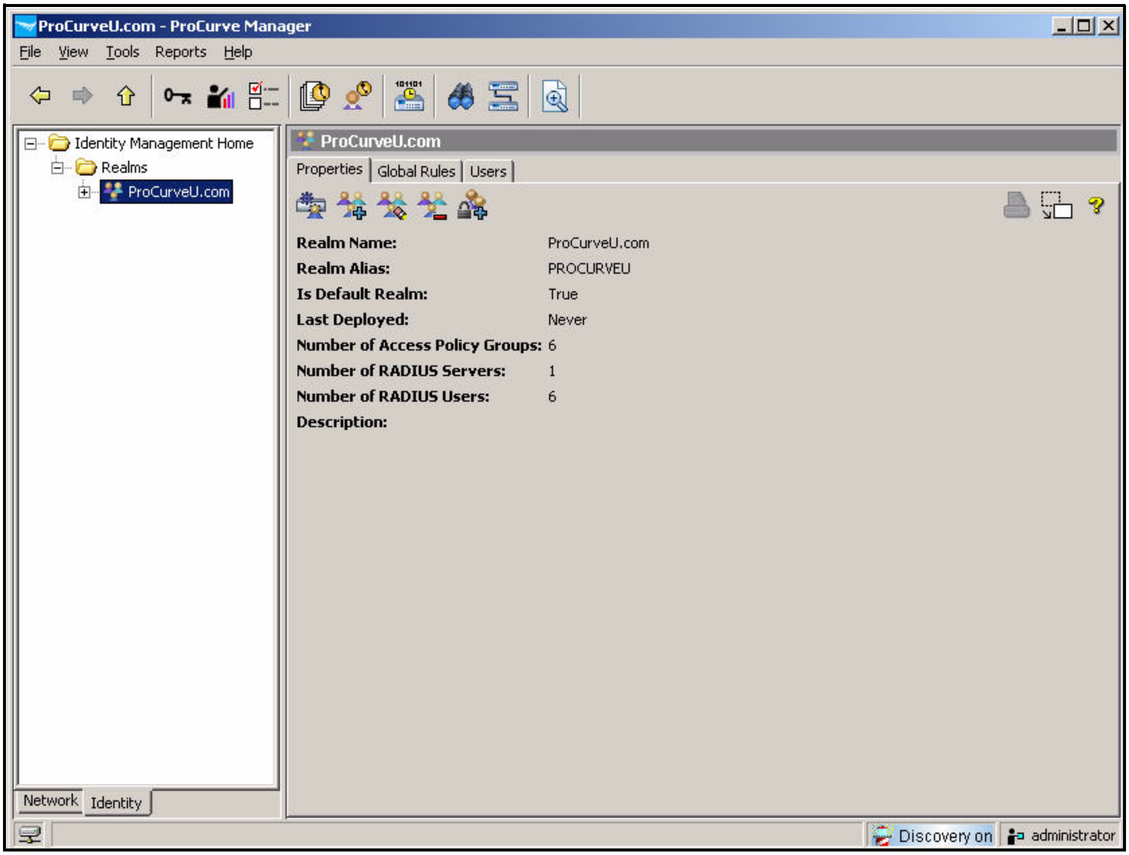


Inventory

Realms:	1
RADIUS Servers:	0
Users:	0
Global Rules:	0
Access Policy Groups:	1
Access Profiles:	1
Locations:	0
Times:	0

Figure AD-181.ProCurve Manager—Identity Management Home Window

2. Click your realm. In this example, click **ProCurveU.com**.



Realm Name: ProCurveU.com
Realm Alias: PROCURVEU
Is Default Realm: True
Last Deployed: Never
Number of Access Policy Groups: 6
Number of RADIUS Servers: 1
Number of RADIUS Users: 6
Description:

Figure AD-182.ProCurve Manager—<*my realm*>

3. In the right pane, make sure that the **Properties** tab is selected. Click the **Configure Identity Management** button.

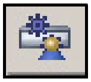


Figure AD-183.Identity Management—Configure Identity Management Button

4. Click **Network Resources** in the left pane of the **Identity Management Configuration** window.

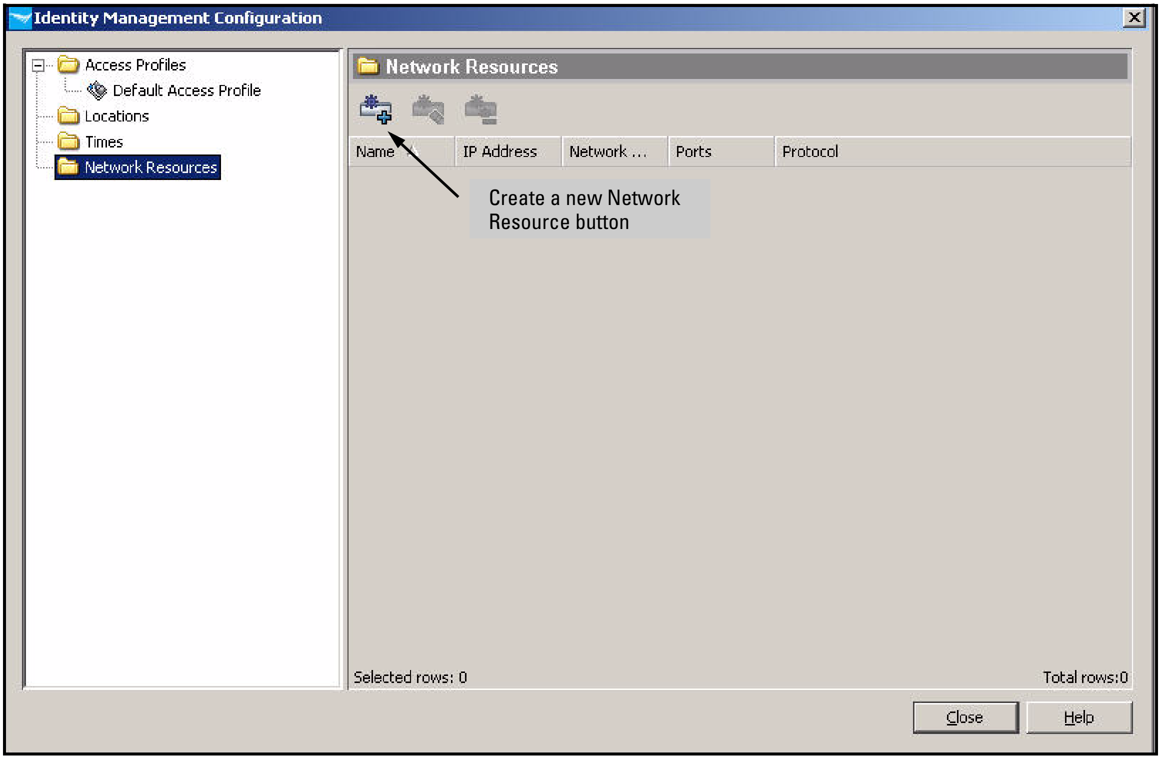
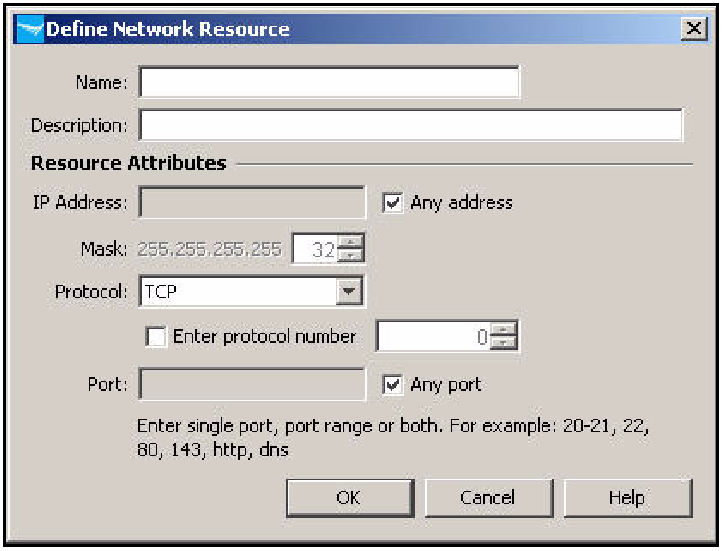


Figure AD-184.Identity Management Configuration Window

5. Click the **Create a new Network Resource** button in the right pane.



Define Network Resource

Name:

Description:

Resource Attributes

IP Address: ☑ Any address

Mask: 255.255.255.255 32

Protocol: TCP

□ Enter protocol number 0

Port: ☑ Any port

Enter single port, port range or both. For example: 20-21, 22, 80, 143, http, dns

Figure AD-185.ProCurve Manager—Define Network Resource Window

6. Follow these steps to set up a resource that is an application type such as DHCP:

   a. In the **Define Network Resource** window, type a string in the **Name** box to identify the application or applications. In this example, type **DHCP**.

   b. In the **Description** box, type a description, if desired.

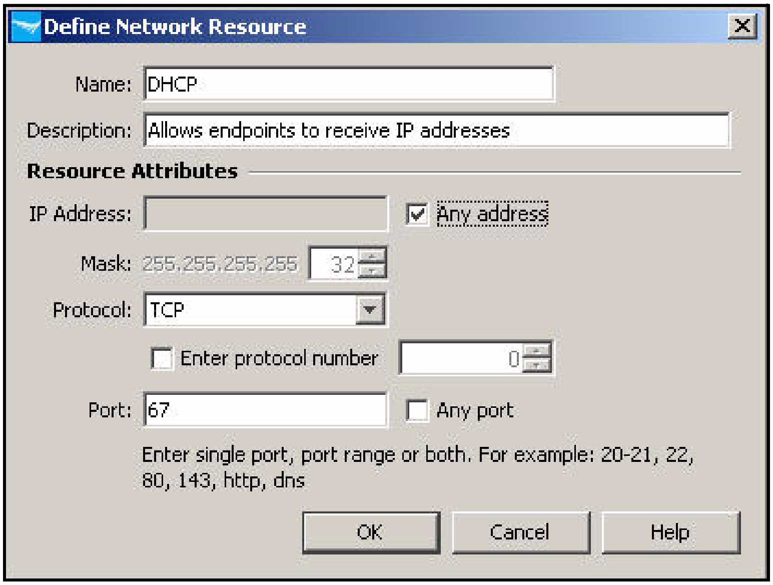
   c. Select the **Any address** check box.

      If you want, you could clear the check box and restrict users to accessing this application on a particular device or subnet. Type the appropriate IP address for the **IP Address and Mask.**

   d. From the **Protocol** list, select the protocol. In this example, select **UDP**.

   e. Clear the **Any port** check box and type the appropriate values for the **Port**. You can type one port, ranges of ports, or multiple, non-consecutive ports, separated by a comma. In this example, type **67**.

   f. Click **OK**.



Name: DHCP

Description: Allows endpoints to receive IP addresses

IP Address: ☑ Any address

Mask: 255.255.255.255 32

Protocol: TCP

□ Enter protocol number 0

Port: 67 □ Any port

Enter single port, port range or both. For example: 20-21, 22, 80, 143, http, dns

Figure AD-186.ProCurve Manager—Define Network Resource Window—DHCP

7. To set up a resource that is an entire VLAN, follow these steps:

   a. In the **Define Network Resource** window, type a string in the **Name** box to identify the VLAN. In this example, type **Faculty databases**.

   b. In the **Description** box, type a description, if desired.

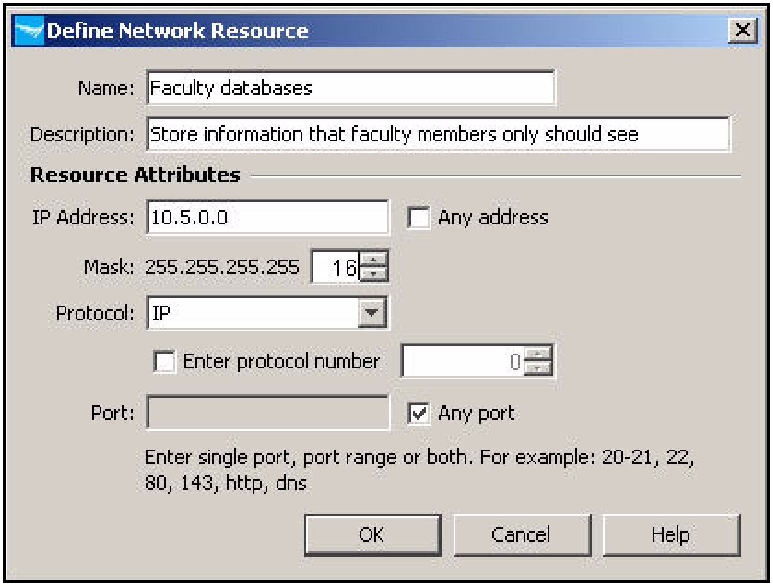
   c. Clear the **Any address** check box.

   d. For the **IP Address**, type the network address of the subnet associated with the VLAN. In this example, type **10.5.0.0**.

   e. For the **Mask**, type or select the prefix length for the subnet. In this example, type **16**.

   f. For **Protocol**, select **IP**.

   g. Click **OK**.



Name: Faculty databases

Description: Store information that faculty members only should see

Resource Attributes

IP Address: 10.5.0.0 □ Any address

Mask: 255.255.255.255 16

Protocol: IP

□ Enter protocol number 0

Port: ☑ Any port

Enter single port, port range or both. For example: 20-21, 22, 80, 143, http, dns

Figure AD-187.ProCurve Manager—Define Network Resource Window—Faculty databases

8. Follow these steps to set up a resource that is a single device:
   a. In the **Define Network Resource** window, type a string in the **Name** box to identify the device. In this example, type **NPS**.
   b. In the **Description** box, type a description, if desired.
   c. Clear the **Any address** check box.
   d. For the **IP Address**, type the device's IP address. In this example, type **10.4.4.16**.
   e. For the **Mask**, select the **16**.
   f. From the **Protocol** list, select the protocol (**IP** is the default andallows all IP traffic). In this example, select **IP**.
   g. Set up the ports:
      i. To allow any traffic to this device, select the **Any port** check box.
      ii. If you want to restrict access to one or several single applications, clear the **Any port** check box and type the appropriate values for the **Port**.

      In this example, you should select the **Any port** check box.
   h. Click **OK**.
9. Repeat step 5, 6, 7, or 8 to set up each resource for your network.
10. When you are finished, click **Close**.

Create Access Profiles

A profile defines a set of rights, including:

- VLAN assignment
- Quality-of-service (QoS) settings
- Rate limit
- Resources allowed and resources denied

Note

For each profile, you can also choose whether, by default, all resources not specifically defined are denied or whether they are allowed. This is called the default access option. In this example, you will allow specific resources and deny all others; the default access option is deny.

Although you can create several profiles for a single group of users—and then assign those profiles under various circumstances—in this example, each user group requires at least two profiles:

- One profile for normal access
- One profile for quarantined access for non-compliant endpoints

  All access policy groups will share the same profile for non-compliant endpoints.

  Non-compliant endpoints are allowed to send DHCP traffic and traffic to the NPS so that they can be retested. They can also send traffic within the Quarantine VLAN, in which remediation servers are installed.

Note

NAP client computers will use the default profile.

The example profiles that you will learn how to create in this section are displayed in Table AD-9.

Table AD-9. Network Resource Assignments per Access Profile

Access Profile	VLAN ID	QoS	Ingress Rate-Limit	Allowed Resources	Denied Resources	Default Access
Network_Admins	2	Don't override	Don't override	All	None	Allow
Faculty	8	Don't override	Don't override	• DHCP • DNS (TCP) • DNS (UDP) • Email • Other network services • Faculty VLAN • Faculty databases • Internet	Private network	Deny
Students	10	Don't override	Don't override	• DHCP • DNS (TCP) • DNS (UDP) • Email • Other network services • Students VLAN • Internet	Private network	Deny
Non-Compliant	32	Don't override	1000 Kbps	• DHCP • NPS	None	Deny

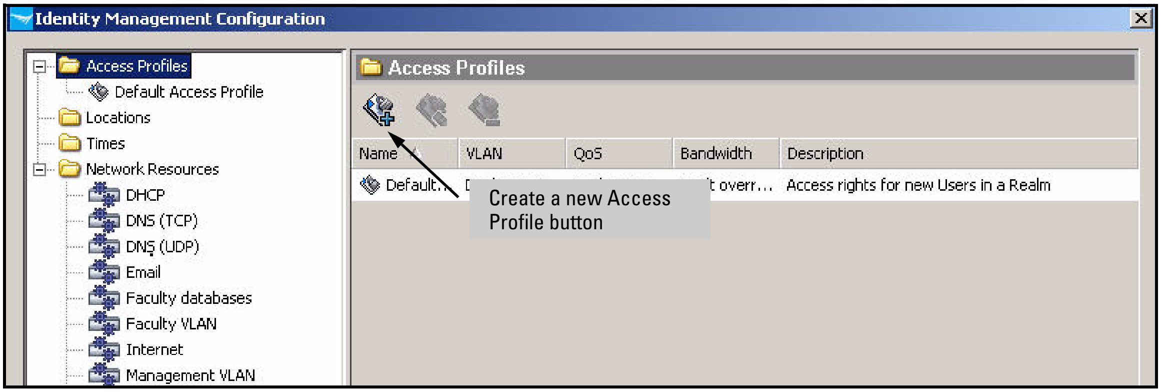
Follow these steps to create the profiles:

1. You should be at the **Identity Management Home** window. (In the ProCurve Manager console, click the **Identity** tab.)

2. Expand **Realms** and click your realm. In this example, click **ProCurveU.com**.

3. At the **Properties** tab in the right pane, click the **Configure Identity Management** button.

4. In the **Identity Management Configuration** window, click **Access Profiles** in the navigation tree.

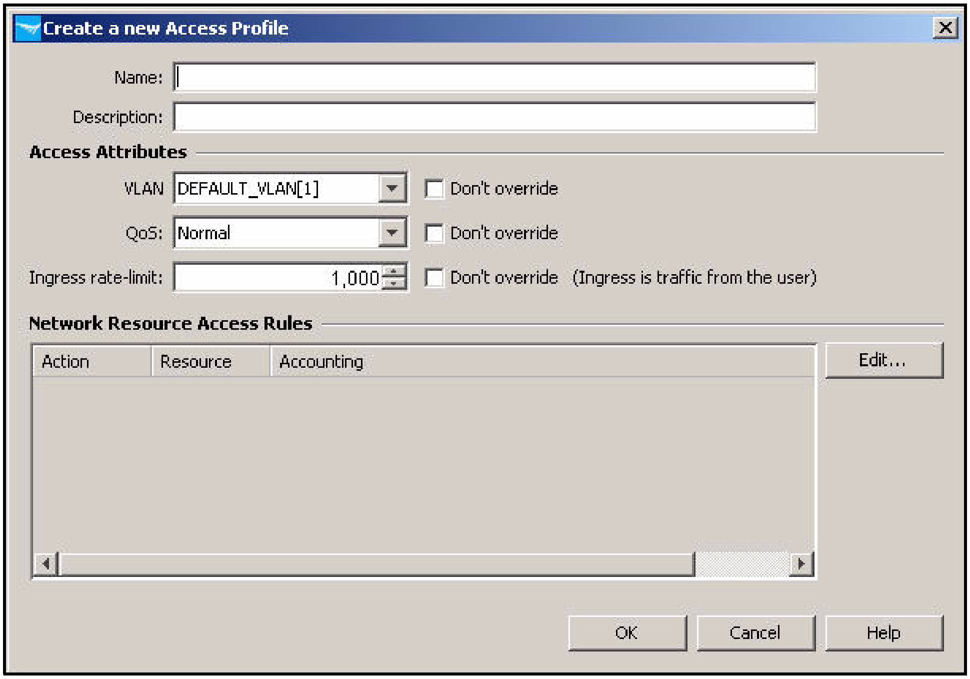


Name	VLAN	QoS	Bandwidth	Description
Default...	D		t overr...	Access rights for new Users in a Realm

Create a new Access Profile button

Figure AD-188.Identity Management Configuration—Access Profiles

5. Click the **Create a new Access Profile** button.



Name:

Description:

Access Attributes

VLAN DEFAULT_VLAN[1] □ Don't override

QoS: Normal □ Don't override

Ingress rate-limit: 1,000 □ Don't override (Ingress is traffic from the user)

Network Resource Access Rules

Action	Resource	Accounting

Figure AD-189.ProCurve Manager—Create a new Access Profile

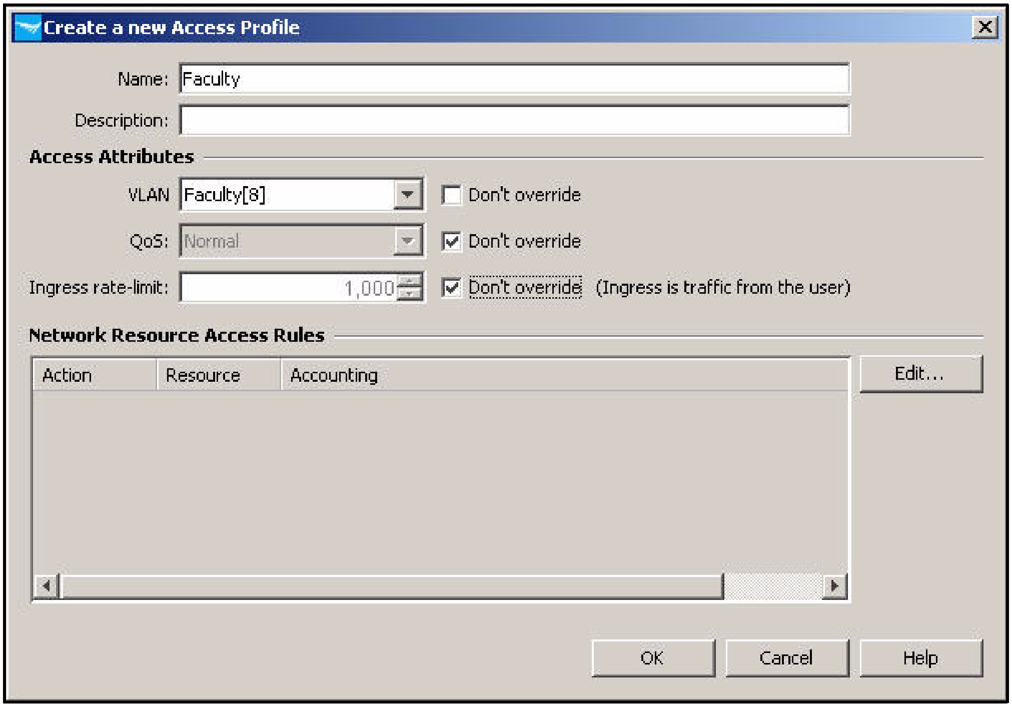
6. In the **Name** box, type the name of the access profile. In this example, you are creating the profile for the Faculty group under normal circumstances. You name the profile **Faculty**.

7. In the **Description** box, type a description, if desired.

8. From the **VLAN** list, select the ID for the users' normal VLAN. In this example, select **8**.

9. For **QoS**, either select the QoS level or select the **Don't override** check box.

10. For **Ingress rate-limit**, either type the rate limit in Kbps or select the **Don't override** check box.



Create a new Access Profile

Name: Faculty

Description:

Access Attributes

VLAN Faculty[8] □ Don't override

QoS: Normal ☑ Don't override

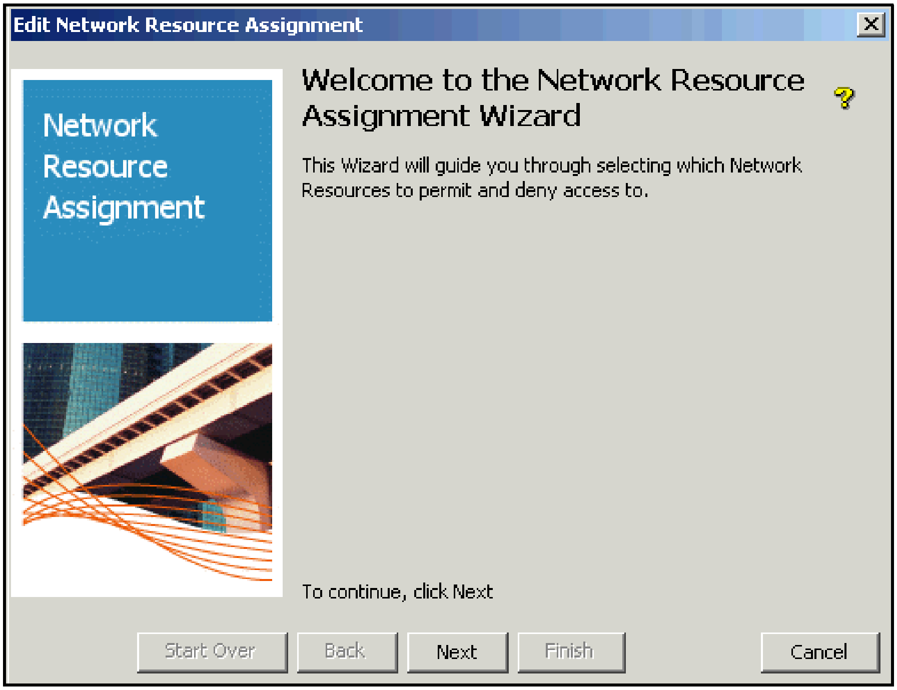
Ingress rate-limit: 1,000 ☑ Don't override (Ingress is traffic from the user)

Network Resource Access Rules

Action	Resource	Accounting

Figure AD-190.ProCurve Manager—Create a new Access Profile

11. In the **Network Resource Access Rules** area, click **Edit**.



Welcome to the Network Resource Assignment Wizard

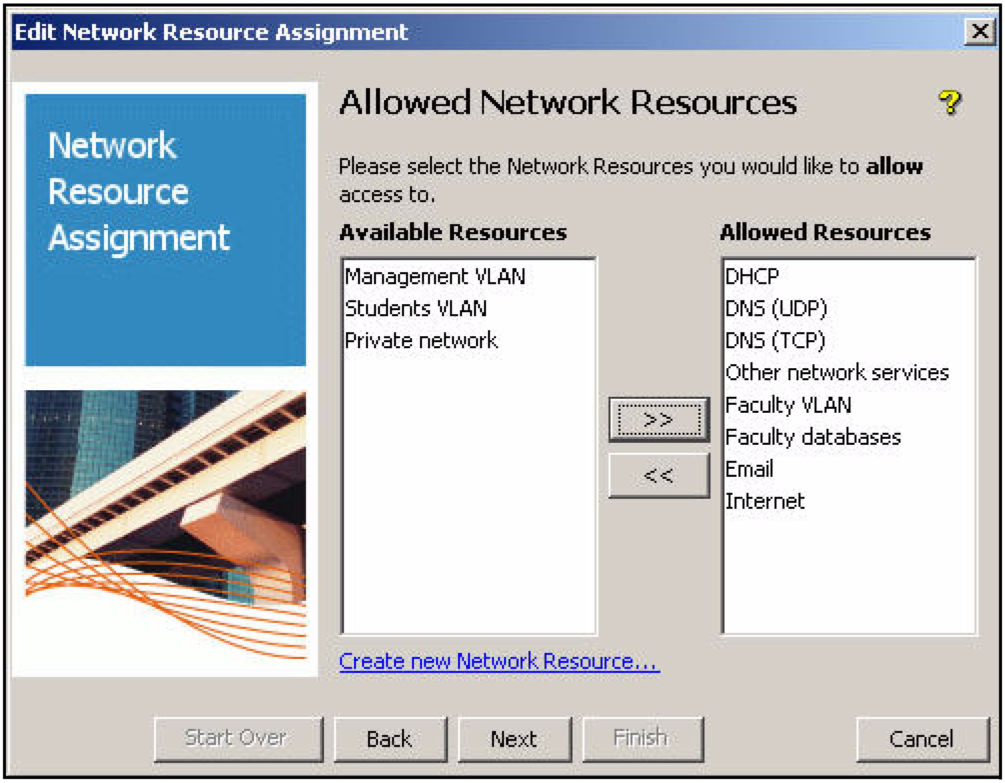
This Wizard will guide you through selecting which Network Resources to permit and deny access to.

To continue, click Next

Figure AD-191.Edit Network Resource Assignment Wizard—Welcome Page

12. In the **Welcome to the Network Resource Assignment Wizard** page, click **Next**.

13. From the **Available Resources** pane, select a resource and click the **>>** button. Repeat for each network resource that you want to assign to this profile. In this example, add the resources shown in the **Allowed Resources** area in Figure AD-192.



Edit Network Resource Assignment

Allowed Network Resources

Please select the Network Resources you would like to **allow** access to.

Available Resources

- Management VLAN
- Students VLAN
- Private network

Allowed Resources

- DHCP
- DNS (UDP)
- DNS (TCP)
- Other network services
- Faculty VLAN
- Faculty databases
- Email
- Internet

Figure AD-192.Edit Network Resource Assignment Wizard—Allowed Network Resources Page

14. When all of the desired resources are in the **Allowed Resources** pane, click **Next**.

15. If you would like to deny this group access to any of the remaining resources, repeat the previous step for resources that you want to *deny*.

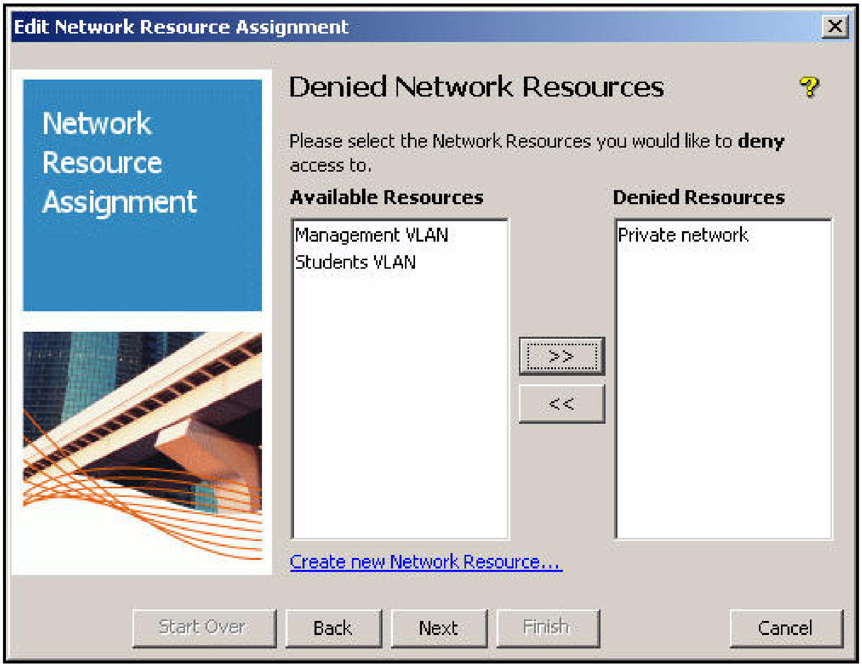
    You might need to deny resources when:

    - A resource is a subset of an allowed resource

      For example, you can grant users access to an entire VLAN, but deny them access to a single server in that VLAN.

      In this example, you have granted users access to the Internet by allowing them to send *any* FTP, HTTP, or HTTPS traffic. Now you will deny access to a subset of that traffic: the entire private network. Users, of course, can access the private resources to which you have specifically granted them rights.

- You use the strategy of allowing all resources, by default



Denied Network Resources

Please select the Network Resources you would like to **deny** access to.

Available Resources

Management VLAN
Students VLAN

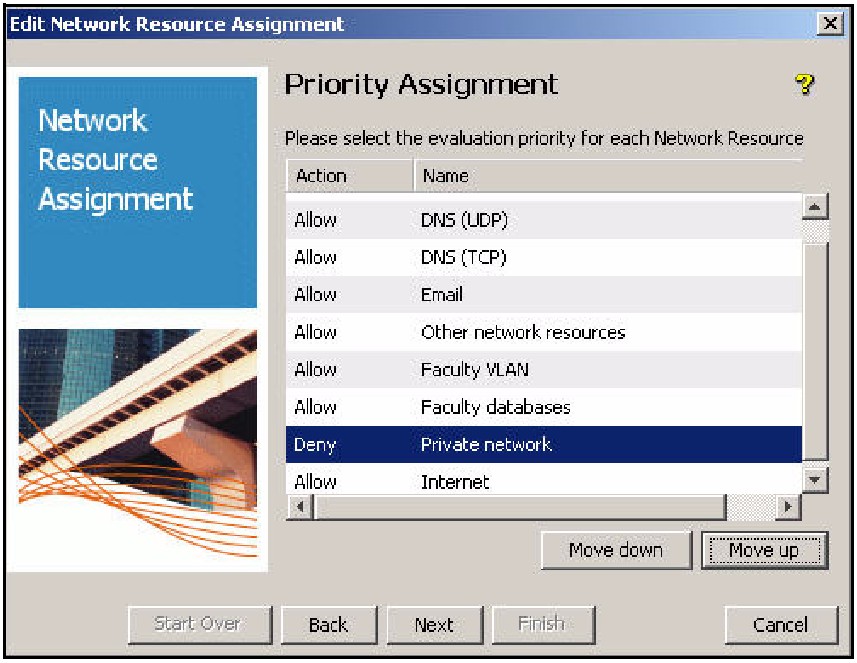
Denied Resources

Private network

Create new Network Resource...

Figure AD-193.Edit Network Resource Assignment Wizard—Denied Network Resources Page

16. When you are finished, click **Next**.



Priority Assignment

Please select the evaluation priority for each Network Resource

Action	Name
Allow	DNS (UDP)
Allow	DNS (TCP)
Allow	Email
Allow	Other network resources
Allow	Faculty VLAN
Allow	Faculty databases
Deny	Private network
Allow	Internet

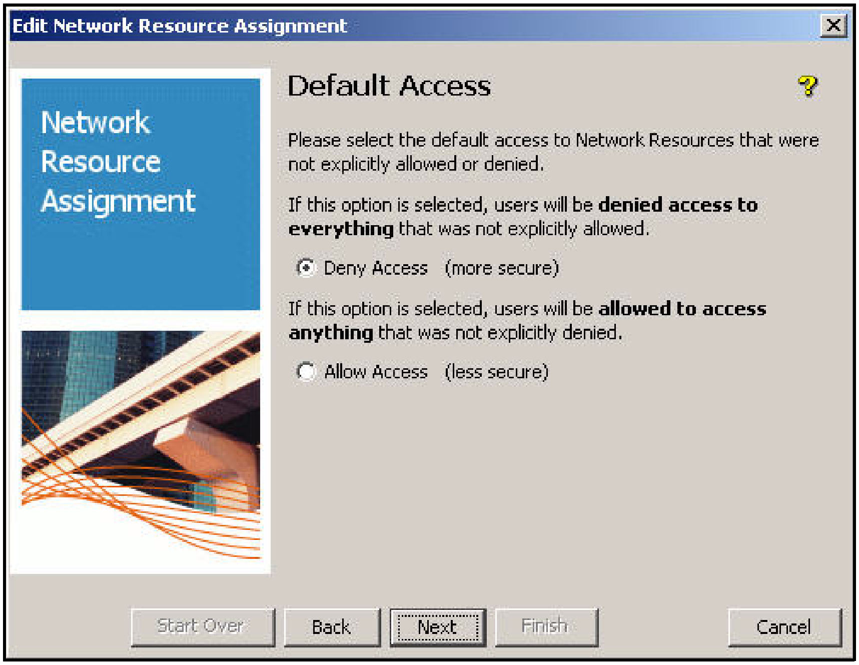
Figure AD-194.Edit Network Resource Assignment Wizard—Priority Assignment Page

17. If you would like to assign any of theallow or deny actions a priority, select the resource for which you would like to modify the order. Then click either the **Move down** or **Move up** button until it is in the desired order.

    You only need to complete this step if the defined resources include overlapping resources. Generally, the more-specific rule should have a higher priority.

    In this example, you must place the rules that allow specific private resources first. Next is the rulethat denies access to the restof the private network. Place the rule that allows access to the Internet at the end of the list.

18. When you are finished, click **Next**.



Default Access

Please select the default access to Network Resources that were not explicitly allowed or denied.

If this option is selected, users will be **denied access to everything** that was not explicitly allowed.

● Deny Access (more secure)

If this option is selected, users will be **allowed to access anything** that was not explicitly denied.

○ Allow Access (less secure)

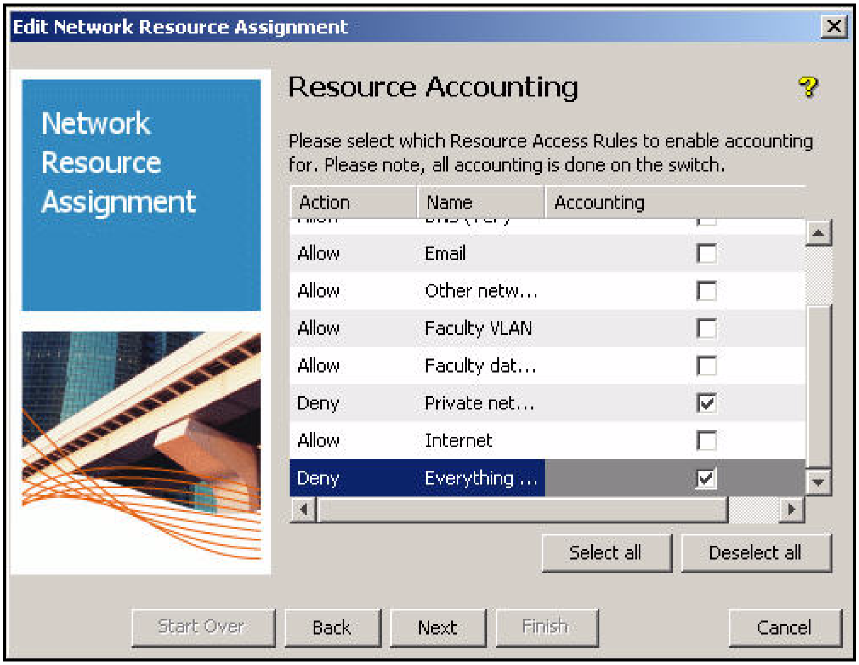
Figure AD-195.Edit Network Resource Assignment Wizard—Default Access Page

19. In the **Default Access** window, select **Deny Access** or **Allow Access** for any resources that were not explicitly allowed or denied. The more secure option is **Deny Access**.

20. Click **Next**.

21. In the**Resource Accounting** window, select the check box next to resources for which you would like to enable accounting. Typically, you should select only the check boxes for *denied* resources.

    Logging every time traffic is allowed quickly fills logs with relatively unimportant information.



Edit Network Resource Assignment

Network Resource Assignment

Resource Accounting

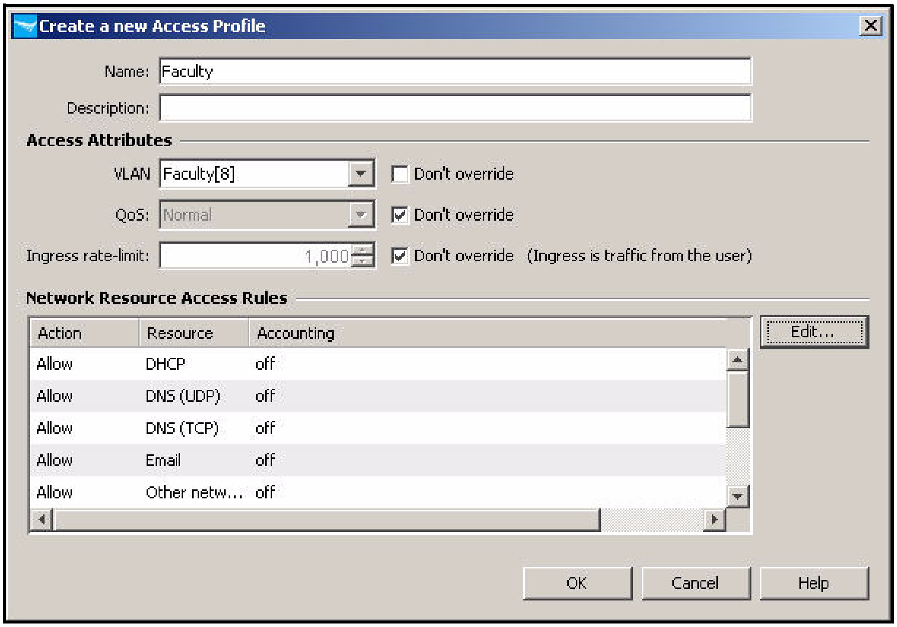
Please select which Resource Access Rules to enable accounting for. Please note, all accounting is done on the switch.

Action	Name	Accounting
Allow	Email	☐
Allow	Other netw...	☐
Allow	Faculty VLAN	☐
Allow	Faculty dat...	☐
Deny	Private net...	☑
Allow	Internet	☐
Deny	Everything ...	☑

Figure AD-196.Edit Network Resource Assignment Wizard—Resource Accounting Page

22. Click **Next**.

23. Click **Finish**.



Name: Faculty

Description:

VLAN Faculty[8] □ Don't override

QoS: Normal ☑ Don't override

Ingress rate-limit: 1,000 ☑ Don't override (Ingress is traffic from the user)

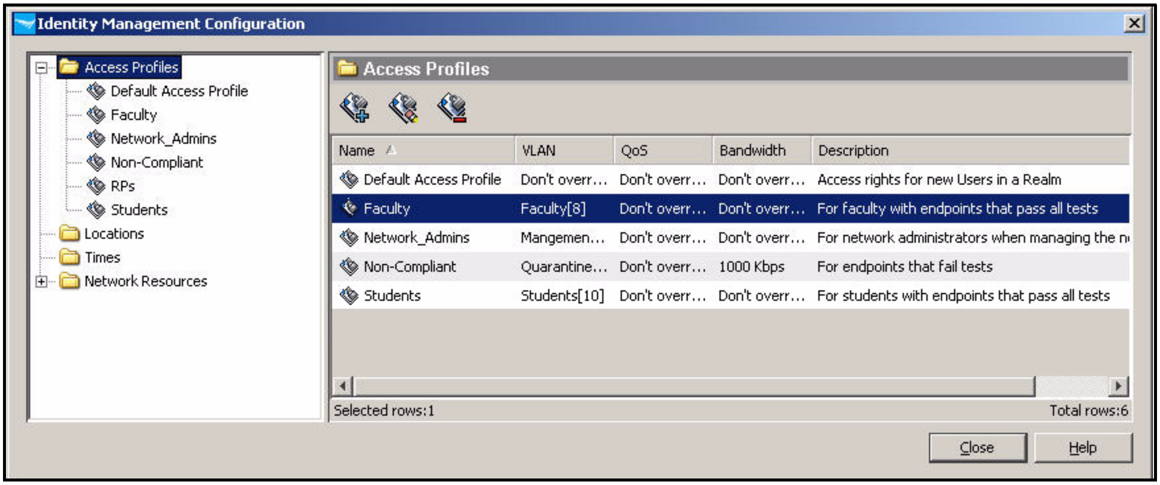
Action	Resource	Accounting
Allow	DHCP	off
Allow	DNS (UDP)	off
Allow	DNS (TCP)	off
Allow	Email	off
Allow	Other netw...	off

Figure AD-197.Edit Network Resource Assignment Wizard—Create a new Access Profile Window

24. Click **OK** in the **Create a new Access Profile** window.

25. Repeat steps 5 through 23 for each profile that you designed for your network.

    Figure AD-198 shows the completed profiles planned in Table AD-9.



Name	VLAN	QoS	Bandwidth	Description
Default Access Profile	Don't overr...	Don't overr...	Don't overr...	Access rights for new Users in a Realm
Faculty	Faculty[8]	Don't overr...	Don't overr...	For faculty with endpoints that pass all tests
Network_Admins	Mangemen...	Don't overr...	Don't overr...	For network administrators when managing the n
Non-Compliant	Quarantine...	Don't overr...	1000 Kbps	For endpoints that fail tests
Students	Students[10]	Don't overr...	Don't overr...	For students with endpoints that pass all tests

Figure AD-198.Identity Management Configuration > Access Profiles

26. Click **Close** on the **Identity Management Configuration** window.

Configure Access Policy Groups

An access policy group rule specifies the profile that an authenticated user in that group receives, given a particular set of criteria, including:

- Time
- Location
- System (whether the endpoint is one that has been marked as belonging to the user)
- WLAN
- Endpoint integrity status

In this example, network access will controlled solely based on user group and endpoint integrity status. Table AD-10 shows the example rules.

Table AD-10.Access Policy Group Rules

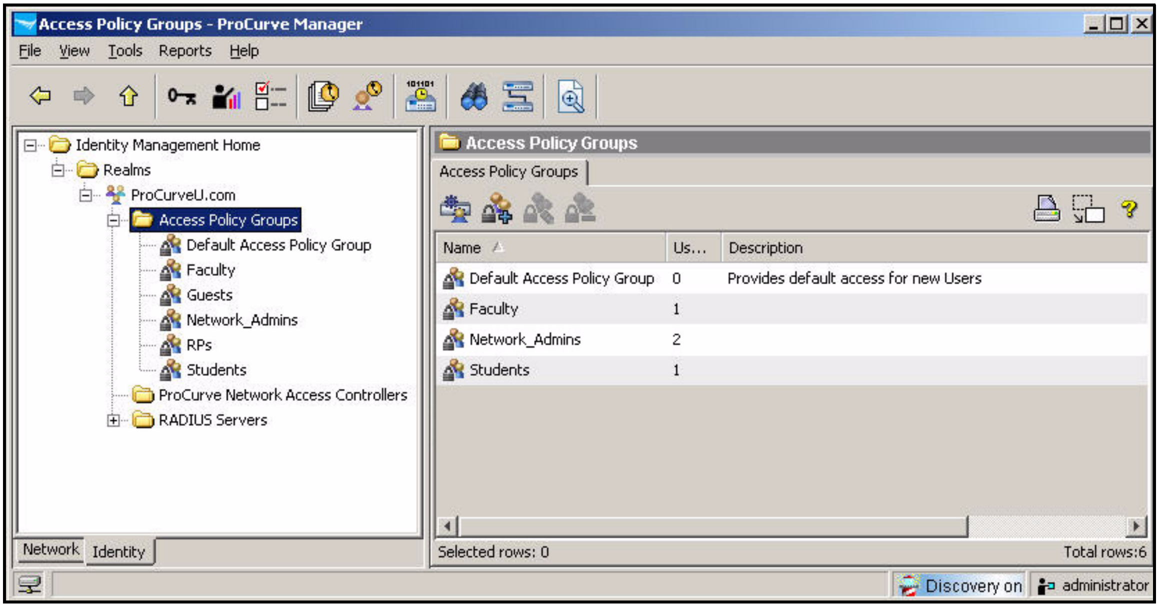
Group	Endpoint Integrity	Profile
Network_Admins	Pass	Network_Admins
	Unknown	Non-Compliant
	Fail	Non-Compliant
Faculty	Pass	Faculty
	Unknown	Non-Compliant
	Fail	Non-Compliant
Students	Pass	Students
	Unknown	Non-Compliant
	Fail	Non-Compliant
NAP client computers	Pass	Default access profile
	Unknown	Non-Compliant
	Fail	Non-Compliant

Note

See the *ProCurve Identity Driven Manager User's Guide* for more information on settings up rules—for example, rules based on access time and location.

Follow these steps to configure access policy group rules:

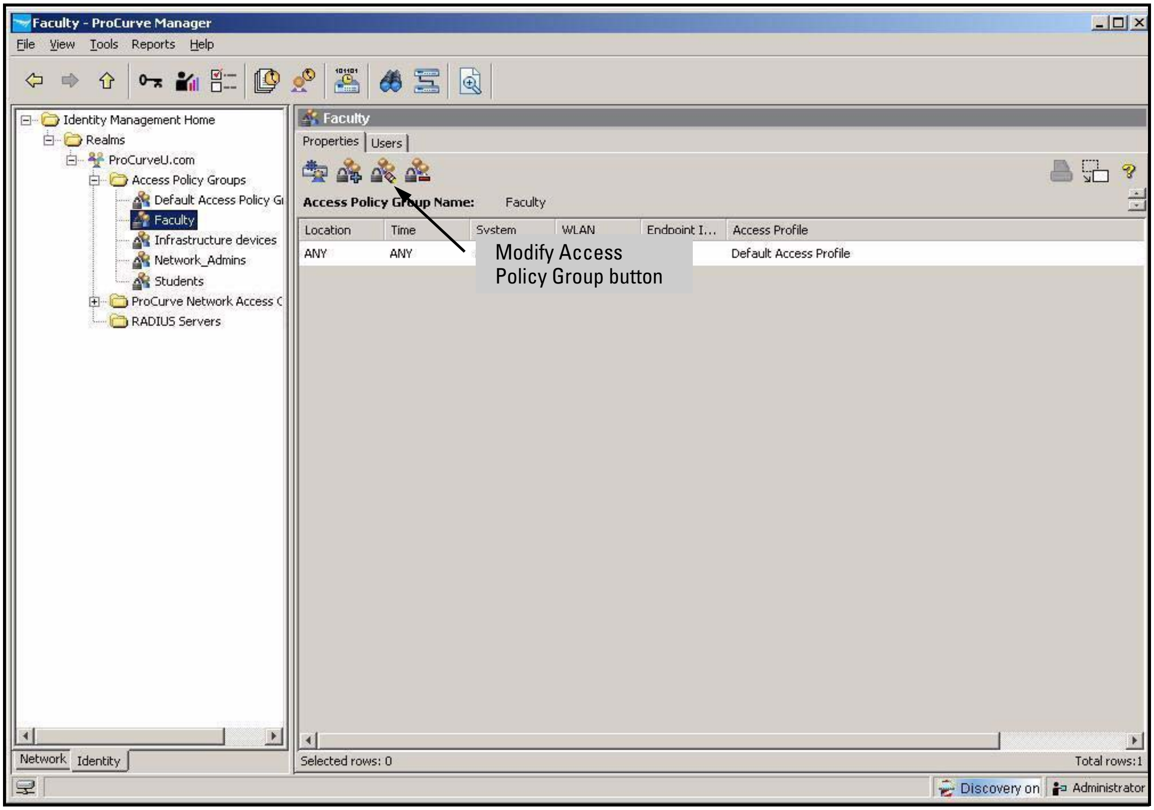
1. In the ProCurve Management console, click the **Identity** tab.
2. Expand **Realms >** ***<your realm>*** **> Access Policy Groups** in the left pane.



Name	Us...	Description
Default Access Policy Group	0	Provides default access for new Users
Faculty	1	
Network_Admins	2	
Students	1	

Figure AD-199.ProCurve Manager—Access Policy Groups

3. Under **Access Policy Groups**, the groups synchronized with Active Directory are displayed. Select the group for which you want to set up access policy rules.



Access Policy Group Name: Faculty

Location	Time	System	WLAN	Endpoint I...	Access Profile
ANY	ANY				Default Access Profile

Selected rows: 0

Total rows:1

Figure AD-200.ProCurve Manager—<*my access policy group*>

4. Click the **Modify Access Policy Group** button.

5. By default, the access policy group includes a rule that grants default access under all conditions. You must change this rule to specify the access profile that you set up for this group. Select the rule and click **Edit**.

6. Set your criteria for users in this group that pass endpoint integrity tests:

   a. For the **Location**, select a location or **ANY**. In this example, keep the default, **ANY**.

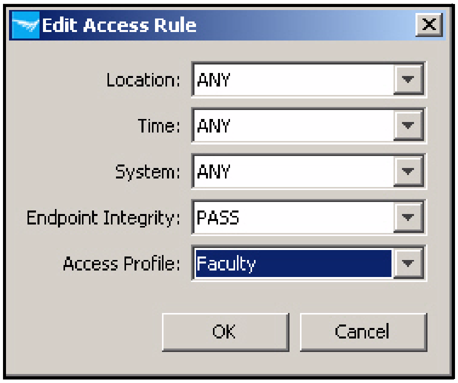
   b. For the **Time**, select a time or **ANY**. In this example, keep the default, **ANY**.

   c. For the **System**, select **OWN** (the endpoint associated with the user) or **ANY** (any endpoint). In this example, keep the default, **ANY**.

   d. For **WLAN**, select a specific **WLAN** or **ANY**. In this example, select **ANY**.

   e. For the **Endpoint Integrity**, select **PASS**.

f. For the **Access Profile**, select the access profile that you created for this group. For example, if you are configuring the Faculty access policy group, select the Faculty access profile.



Edit Access Rule

Location: ANY

Time: ANY

System: ANY

Endpoint Integrity: PASS

Access Profile: Faculty

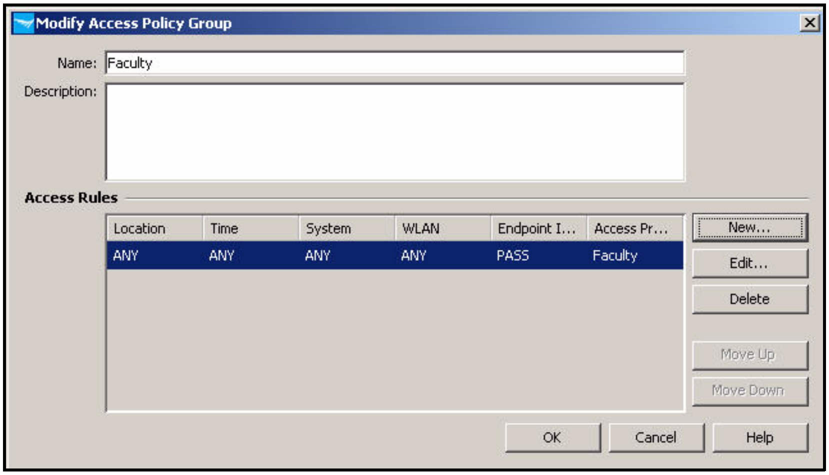
Figure AD-201.ProCurve Manager—Edit Access Rule Window

Note

In this example, criteria such as location and time do not affect access. If you want to designate a location or time other than **ANY**, you must configure that location or time prior to editing the access rules. Refer to the *ProCurve Identity Driven Manager User’s Guide* for more instructions.

7. Click **OK**.

8. Now, add rules for users with endpoints that have not passed endpoint integrity tests and must be quarantined.



Name: Faculty

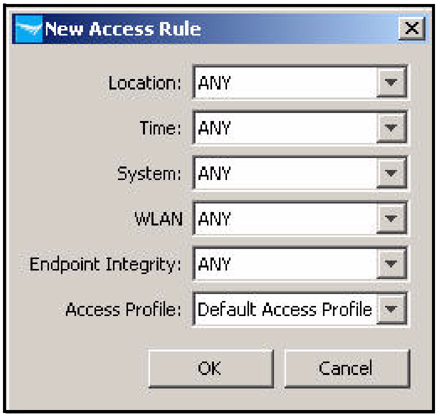
Description:

Access Rules

Location	Time	System	WLAN	Endpoint I...	Access Pr...
ANY	ANY	ANY	ANY	PASS	Faculty

Figure AD-202.ProCurve Manager—Modify Access Policy Group Window

9. Click **New**.



Location: ANY

Time: ANY

System: ANY

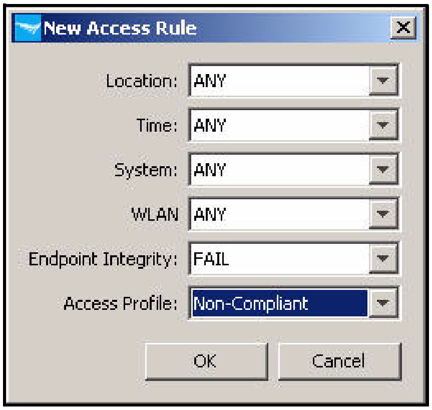
WLAN ANY

Endpoint Integrity: ANY

Access Profile: Default Access Profile

Figure AD-203.ProCurve Manager—New Access Rule Window

10. Set the **Location**, **Time**, **System**, and **WLAN** values to **ANY**.
11. For **Endpoint Integrity**, select **FAIL**.
12. For the **Access Profile**, select the access profile that you created for non-compliant endpoints. In this example, select **Non-Compliant**.

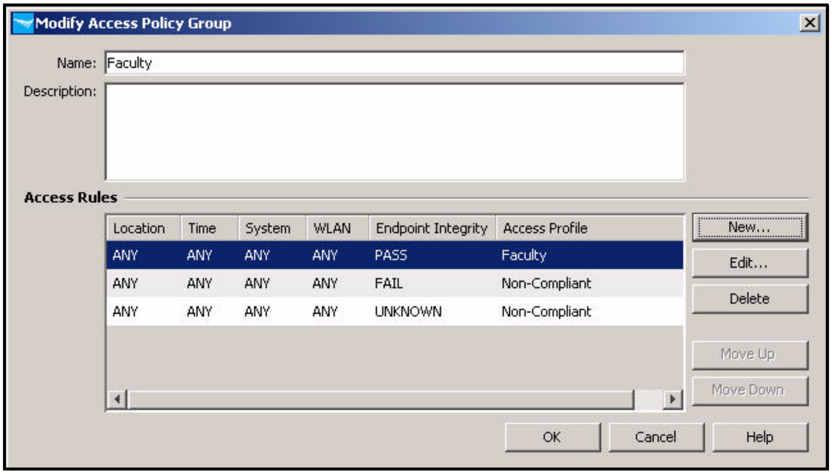


Location: ANY
Time: ANY
System: ANY
WLAN ANY
Endpoint Integrity: FAIL
Access Profile: Non-Compliant

Figure AD-204.ProCurve Manager—New Access Rule Window

13. Click **OK**.

    Figure AD-205 shows the final rules for the Faculty access policy group.

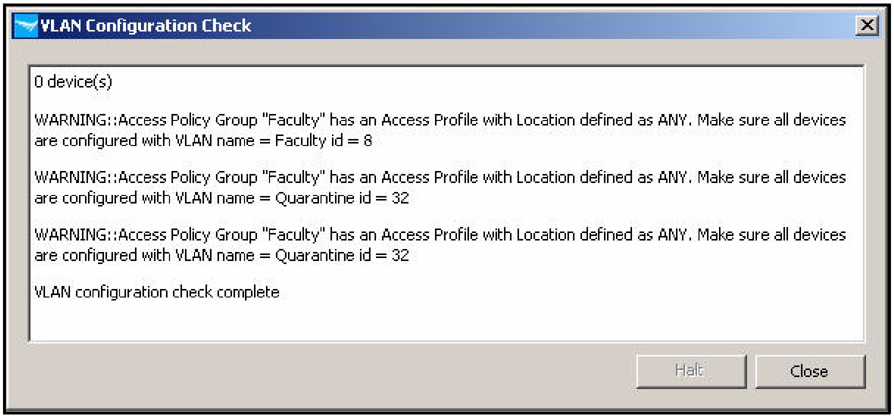


Name: Faculty
Description:

Location	Time	System	WLAN	Endpoint Integrity	Access Profile
ANY	ANY	ANY	ANY	PASS	Faculty
ANY	ANY	ANY	ANY	FAIL	Non-Compliant
ANY	ANY	ANY	ANY	UNKNOWN	Non-Compliant

Figure AD-205.ProCurve Manager—Modify Access Policy Group Window

14. Click **OK**.



0 device(s)

WARNING::Access Policy Group "Faculty" has an Access Profile with Location defined as ANY. Make sure all devices are configured with VLAN name = Faculty id = 8

WARNING::Access Policy Group "Faculty" has an Access Profile with Location defined as ANY. Make sure all devices are configured with VLAN name = Quarantine id = 32

WARNING::Access Policy Group "Faculty" has an Access Profile with Location defined as ANY. Make sure all devices are configured with VLAN name = Quarantine id = 32

VLAN configuration check complete

Figure AD-206.PCM+ Console, IDM Interface—VLAN Configuration Check Window

15. IDM warns you to check that your infrastructure devices support the dynamic VLANs. Click **Close**.

    If necessary, add VLAN tags to uplink ports on switches (or the uplink port of a Wireless Edge Services Module).

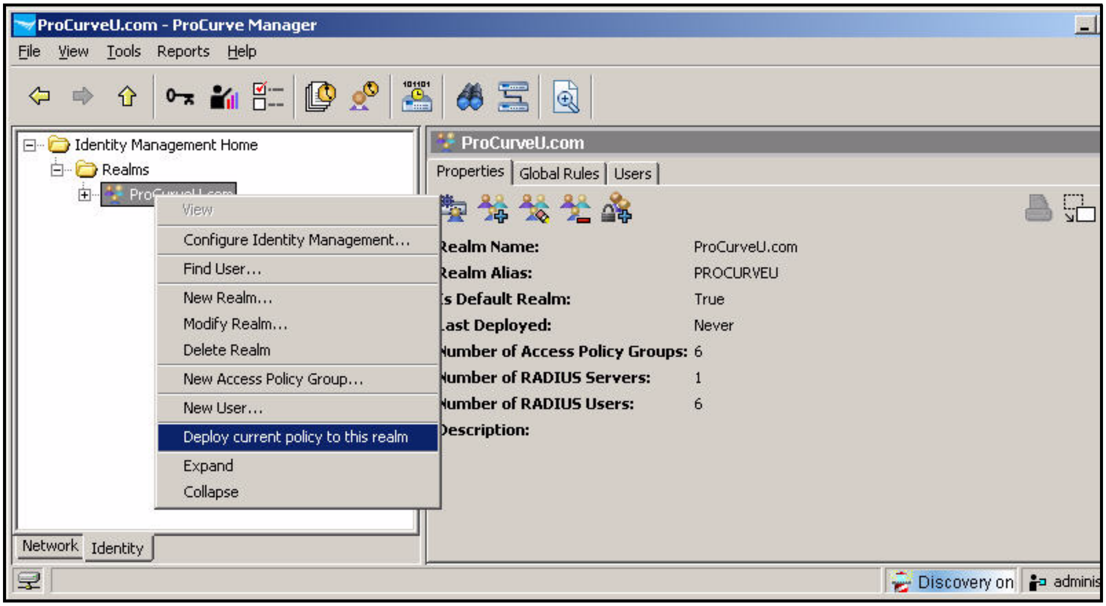
16. Repeat steps 4 to 15 for each access policy group in your environment.

Deploy Policies to the NPS Server

The policies you have configured take effect after you deploy them to the RADIUS servers—in this case, the NPSserver. Once deployed, the policies are stored by the IDM agent on the NPS server, and the server enforcesthe policies whether IDM is running or not.

Follow these steps:

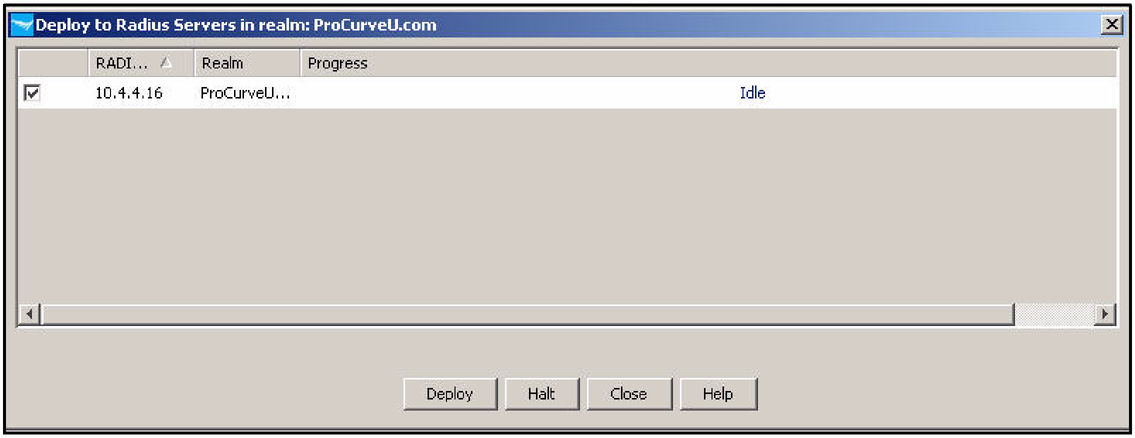
1. You should be in the **Identity Management Home** window of PCM+.
2. In the navigation tree, expand **Realms**.
3. Right-click your domain's realm name and select **Deploy current policy to this realm**.


ProCurveU.com - ProCurve Manager
File View Tools Reports Help
Identity Management Home
Realms
ProCurveU.com
View
Configure Identity Management...
Find User...
New Realm...
Modify Realm...
Delete Realm
New Access Policy Group...
New User...
Deploy current policy to this realm
Expand
Collapse
Network Identity
ProCurveU.com
Properties Global Rules Users
Discovery on
adminis

Realm Name:	ProCurveU.com
Realm Alias:	PROCURVEU
s Default Realm:	True
ast Deployed:	Never
Number of Access Policy Groups:	6
Number of RADIUS Servers:	1
Number of RADIUS Users:	6
Description:	

Figure AD-207.ProCurve Manager—Identity Management Home Window

4. The **Deploy to Radius Servers in realm: <*myrealm*> window** is displayed.



	RADI...	Realm	Progress
☑	10.4.4.16	ProCurveU...	Idle

Figure AD-208.Deploy to Radius Servers in realm: <*myrealm*> Window

5. Select the check box for your NPS server.

6. Click **Deploy**.

7. When the **Progress** bar reaches 100 percent, click **Close**.

Guest Access for Wireless Users

The final component of this solution is guest access. In this solution, the network requires guest access only for wireless users, and guest access is controlled on the Wireless Edge Services Module. You will learn how to complete these tasks:

- Secure a WLAN that is reserved for guests with Web-Auth.
- Configure the Wireless Module's internal RADIUS server.
- Manage guest user accounts with the Web-User administrator.
- Configure an access control list (ACL) for the Guest VLAN on the routing switch.

After carefully weighing the benefits of endpoint integrity against the loss of convenience to guest users, ProCurve University has decided not to implement an endpoint integrity solution for guest users. In addition, network administrators know that for now only a portion of guest users will have computers that are running Windows Vista or Windows XP with SP 3. Computers running other operating systems cannot be tested by the NPS server.

Secure a WLAN with Web-Auth

Many companies use Web-Auth to secure the WLAN that guests must access. This access control method allows users to authenticate to a WLAN using their familiar Web browser interface. If you do not require encryption for the WLAN, users do not have to configure their wireless client at all, making it easy for them to associate to the Wireless Module or AP. Then when they open their Web browser interface to access the Internet, it is redirected to a login page, which makes it easy for them to enter login credentials.

This section teaches you how to secure a WLAN with Web-Auth on the Wireless Module. You must complete these tasks:

- Configure an IP address on the Web-Auth VLAN.
- Enable Web-Auth on the VLAN and configure RADIUS settings.
- Configure Web-Auth pages.

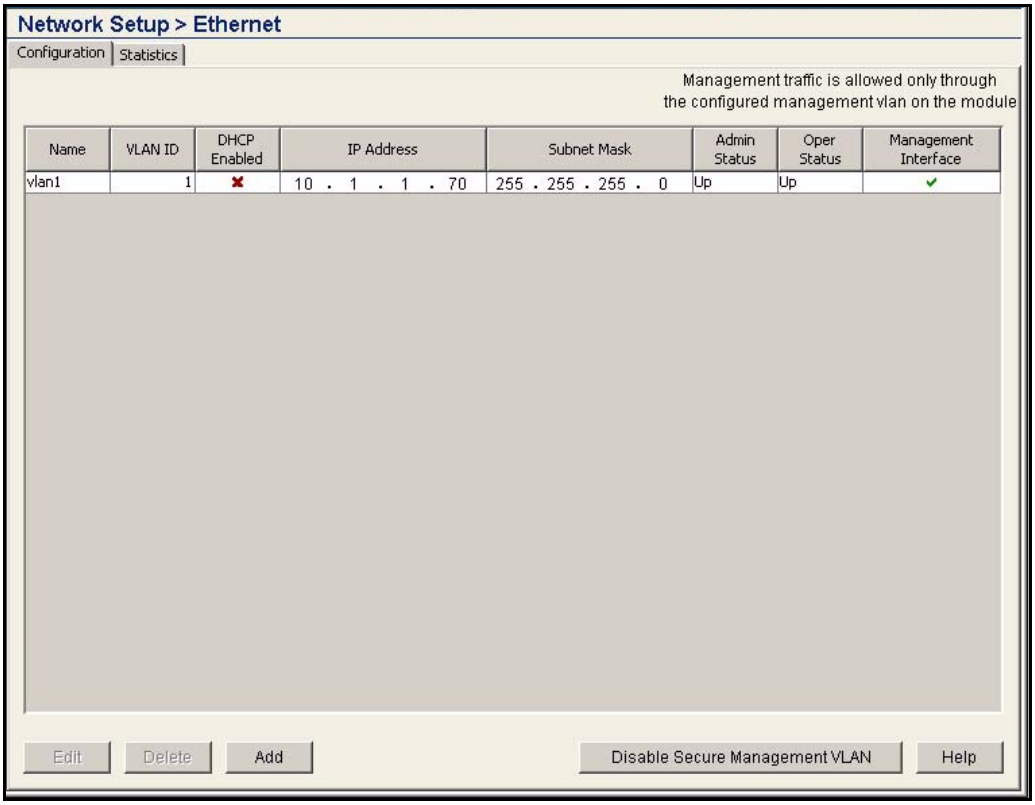
Configure an IP Address on the Web-Auth VLAN

The first step in configuring Web-Auth for the Wireless Module is to assign an IP address to the VLAN associated with the Web-Auth WLAN. Typically, when you set up a WLAN and associate it with a VLAN, you do not need to worry about assigning the Wireless Module an IP address on that VLAN. The Wireless Module simply forwards traffic in the correct VLAN.

For Web-Auth, however, the Wireless Module must present wireless users with Web pages before they log in. The simplest way to ensure that the wireless users can reach these Web pages is typically to assign the Wireless Module an IP address on the users' WLAN.

To configure an IP address for a VLAN, complete the following steps:

1. In the Wireless Modules's Web interface, select **Network Setup > Ethernet**. The **Configuration** tab should be selected.

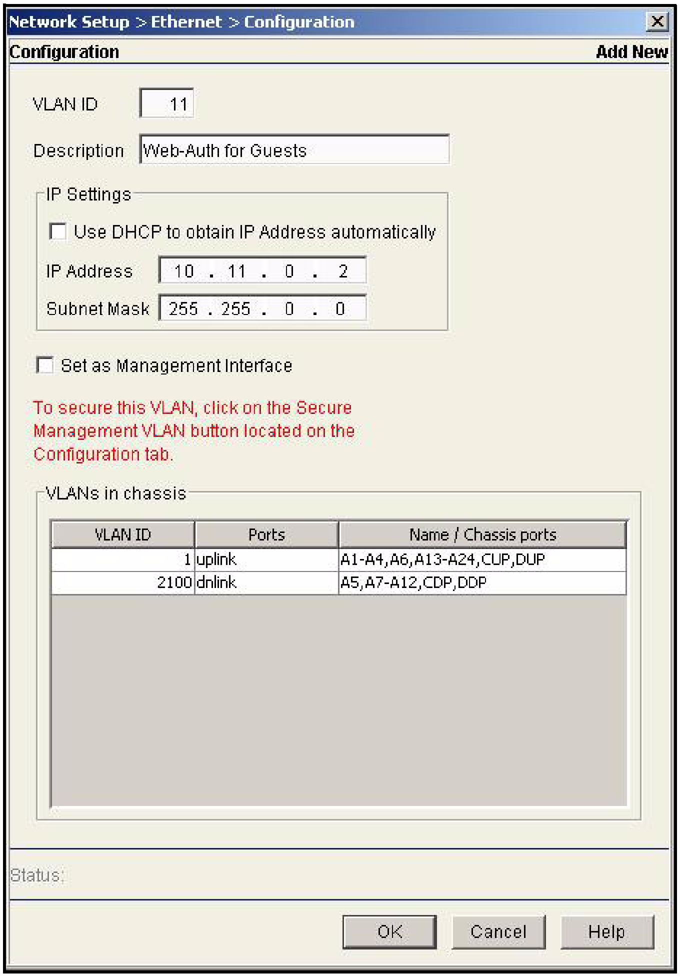


Network Setup > Ethernet
Configuration
Statistics
Management traffic is allowed only through the configured management vlan on the module
Edit
Delete
Add
Disable Secure Management VLAN
Help

Name	VLAN ID	DHCP Enabled	IP Address	Subnet Mask	Admin Status	Oper Status	Management Interface
vlan1	1	✗	10 . 1 . 1 . 70	255 . 255 . 255 . 0	Up	Up	✓

Figure AD-209.Wireless Module—Network Setup > Ethernet > Configuration Window

2. Click **Add**.



Network Setup > Ethernet > Configuration

Configuration — Add New

VLAN ID: 11

Description: Web-Auth for Guests

IP Settings

☐ Use DHCP to obtain IP Address automatically

IP Address: 10 . 11 . 0 . 2

Subnet Mask: 255 . 255 . 0 . 0

☐ Set as Management Interface

To secure this VLAN, click on the Secure Management VLAN button located on the Configuration tab.

VLANs in chassis

VLAN ID	Ports	Name / Chassis ports
1	uplink	A1-A4,A6,A13-A24,CUP,DUP
2100	dnlink	A5,A7-A12,CDP,DDP

Status:

Figure AD-210.Wireless Module—Network Setup > Ethernet > Configuration> Add New Window

3. In the **VLAN ID** field, type the static VLAN for the Web-Auth WLAN. In this example, type **11**.

4. In the **Description** field, type a meaningful description for the VLAN. In this example, the VLAN is intended for wireless guest users connecting via Web-Auth, so you type **Web-Auth for Guests**.

5. For **IP Address**, type an IP address for theWireless Module. In this example, type **10.11.0.2**.

6. For **Subnet Mask**, type the mask for the subnet associated with the VLAN. In this example, type **255.255.0.0**.

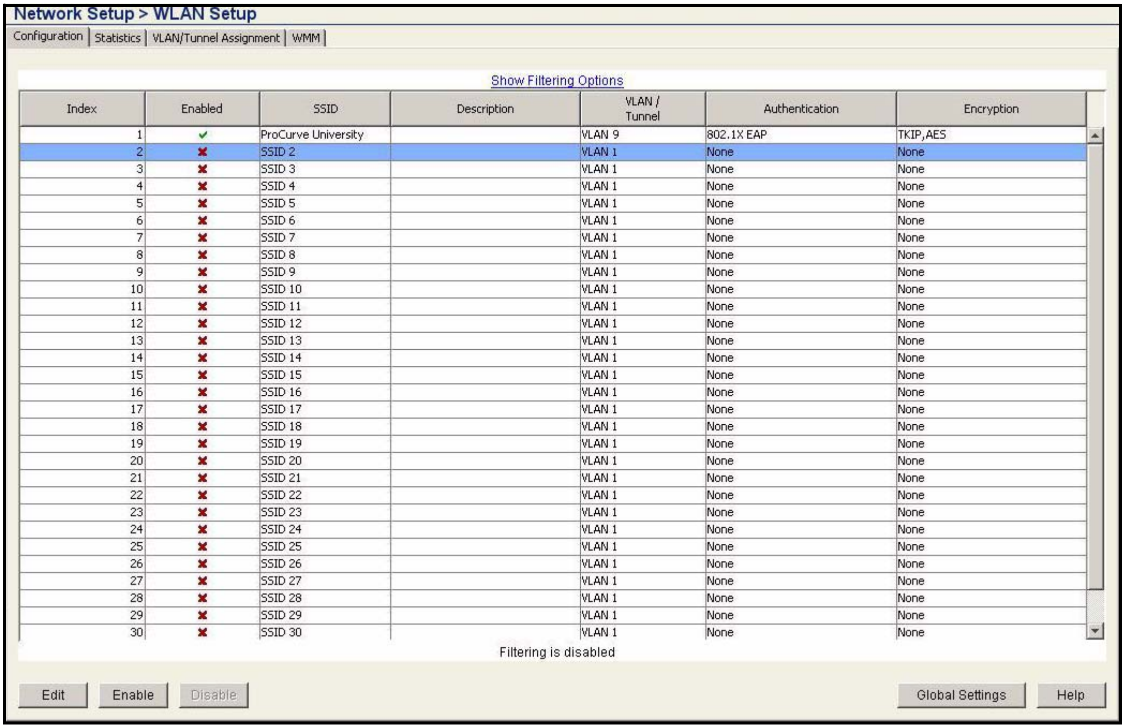
7. Click **OK**.

Enable Web-Auth on the WLAN

After you assign an IP address to the VLAN for the Web-Auth WLAN, you can configure the Web-Auth security settings that the Wireless Module will download to its adopted RPs.

Follow these steps to select Web-Auth security for a WLAN:

1. Select **Network Setup > WLAN Setup**. You should be at the **Configuration** tab.



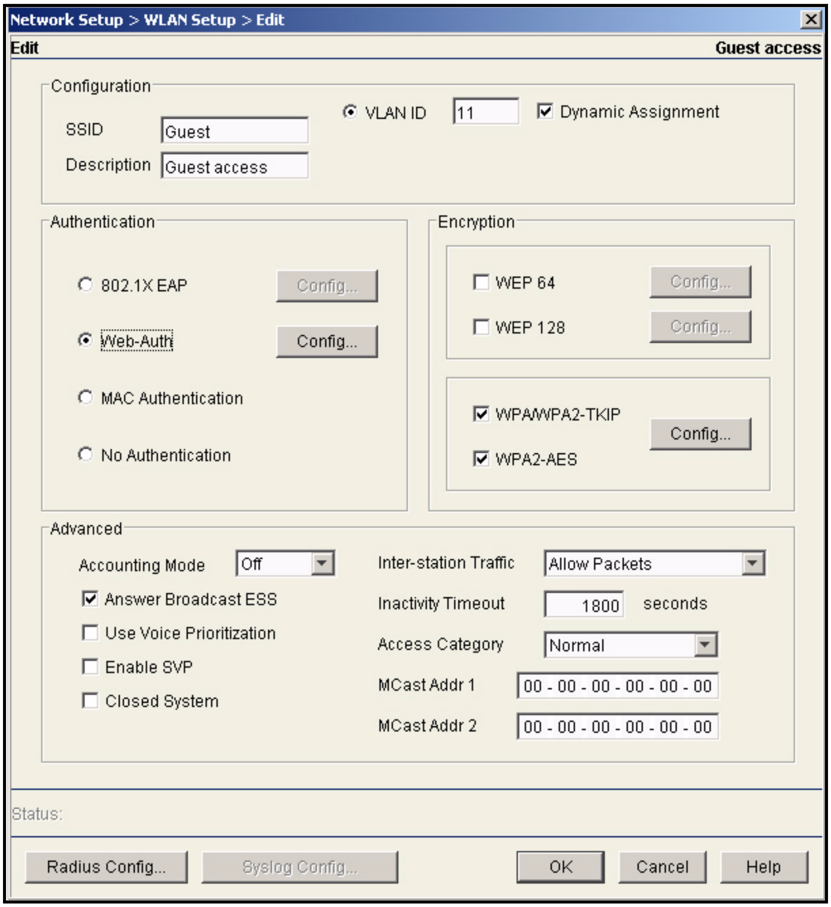
Index	Enabled	SSID	Description	VLAN / Tunnel	Authentication	Encryption
1	✓	ProCurve University		VLAN 9	802.1X EAP	TKIP,AES
2	✗	SSID 2		VLAN 1	None	None
3	✗	SSID 3		VLAN 1	None	None
4	✗	SSID 4		VLAN 1	None	None
5	✗	SSID 5		VLAN 1	None	None
6	✗	SSID 6		VLAN 1	None	None
7	✗	SSID 7		VLAN 1	None	None
8	✗	SSID 8		VLAN 1	None	None
9	✗	SSID 9		VLAN 1	None	None
10	✗	SSID 10		VLAN 1	None	None
11	✗	SSID 11		VLAN 1	None	None
12	✗	SSID 12		VLAN 1	None	None
13	✗	SSID 13		VLAN 1	None	None
14	✗	SSID 14		VLAN 1	None	None
15	✗	SSID 15		VLAN 1	None	None
16	✗	SSID 16		VLAN 1	None	None
17	✗	SSID 17		VLAN 1	None	None
18	✗	SSID 18		VLAN 1	None	None
19	✗	SSID 19		VLAN 1	None	None
20	✗	SSID 20		VLAN 1	None	None
21	✗	SSID 21		VLAN 1	None	None
22	✗	SSID 22		VLAN 1	None	None
23	✗	SSID 23		VLAN 1	None	None
24	✗	SSID 24		VLAN 1	None	None
25	✗	SSID 25		VLAN 1	None	None
26	✗	SSID 26		VLAN 1	None	None
27	✗	SSID 27		VLAN 1	None	None
28	✗	SSID 28		VLAN 1	None	None
29	✗	SSID 29		VLAN 1	None	None
30	✗	SSID 30		VLAN 1	None	None

Filtering is disabled

Figure AD-211.Network Setup > WLAN Setup > Configuration Window

2. Select the WLAN on which you want to configure Web-Auth. In this example, click WLAN 2.

3. Click **Edit**.



Network Setup > WLAN Setup > Edit

Edit — Guest access

Configuration

SSID: Guest

Description: Guest access

● VLAN ID: 11 ☑ Dynamic Assignment

Authentication

○ 802.1X EAP

● Web-Auth

○ MAC Authentication

○ No Authentication

Encryption

□ WEP 64

□ WEP 128

☑ WPA/WPA2-TKIP

☑ WPA2-AES

Advanced

Accounting Mode: Off

☑ Answer Broadcast ESS

□ Use Voice Prioritization

□ Enable SVP

□ Closed System

Inter-station Traffic: Allow Packets

Inactivity Timeout: 1800 seconds

Access Category: Normal

MCast Addr 1: 00 - 00 - 00 - 00 - 00 - 00

MCast Addr 2: 00 - 00 - 00 - 00 - 00 - 00

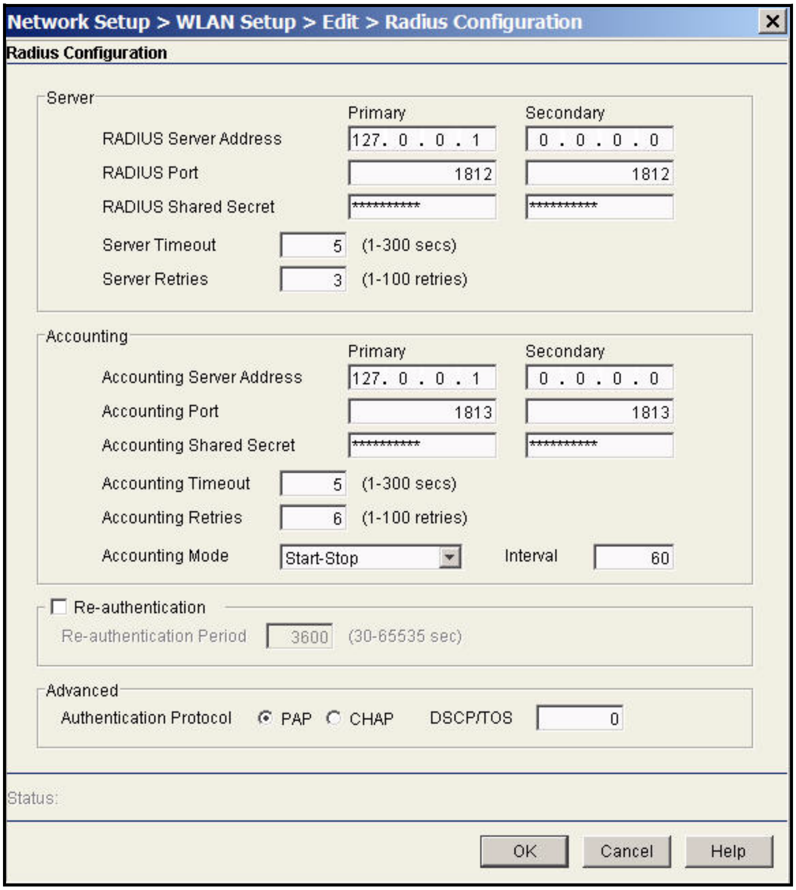
Status:

Figure AD-212.Network Setup > WLAN Setup > Edit Window (Web-Auth)

4. Specify the SSID and VLAN ID. In this example, type **Guest** for SSID and **11** for VLAN ID.

5. Under **Authentication**, select **Web-Auth**.

6. The Wireless Module will authenticate the wireless users to a RADIUS server. To configure the RADIUS settings, click the **Radius Config** button.



Network Setup > WLAN Setup > Edit > Radius Configuration

Radius Configuration

Server

	Primary	Secondary
RADIUS Server Address	127. 0 . 0 . 1	0 . 0 . 0 . 0
RADIUS Port	1812	1812
RADIUS Shared Secret	***********	***********

Server Timeout 5 (1-300 secs)

Server Retries 3 (1-100 retries)

Accounting

	Primary	Secondary
Accounting Server Address	127. 0 . 0 . 1	0 . 0 . 0 . 0
Accounting Port	1813	1813
Accounting Shared Secret	***********	***********

Accounting Timeout 5 (1-300 secs)

Accounting Retries 6 (1-100 retries)

Accounting Mode Start-Stop Interval 60

□ Re-authentication

Re-authentication Period 3600 (30-65535 sec)

Advanced

Authentication Protocol ● PAP ○ CHAP DSCP/TOS 0

Status:

Figure AD-213.Wireless Module—Network Setup > WLAN Setup > Edit > Radius Configuration Window (Local RADIUS Server)

7. Under **Server** in the **Primary** column, configure the settings for the internal RADIUS server:

   a. For **RADIUS Server Address**, type **127.0.0.1**.

   b. For **RADIUS Port**, accept the default, **1812**.

   c. Do not type anything in the **RADIUS Shared Secret** box.

      If you are altering the configuration of a WLAN for which you previously set a shared secret, clear the box.

8. Under **Accounting** in the **Primary** column, configure the settings for the internal RADIUS server:

   a. For **RADIUS Server Address**, type **127.0.0.1**.

   b. For **RADIUS Port**, accept the default, **1813**.

   c. Do not type anything in the **RADIUS Shared Secret** box.

      If you are altering the configuration of a WLAN for which you previously set a shared secret, clear the box.

9. Click **OK** twice to close both windows.

10. Click **Save**.

Configure the Wireless Module's Internal RADIUS Server

The user accounts that the WebUser administrator creates are stored in the Wireless Module's local database. The WLAN that guest users access must be configured to use the Wireless Module's internal RADIUS server, and you must configure the internal RADIUS server to use its local database.

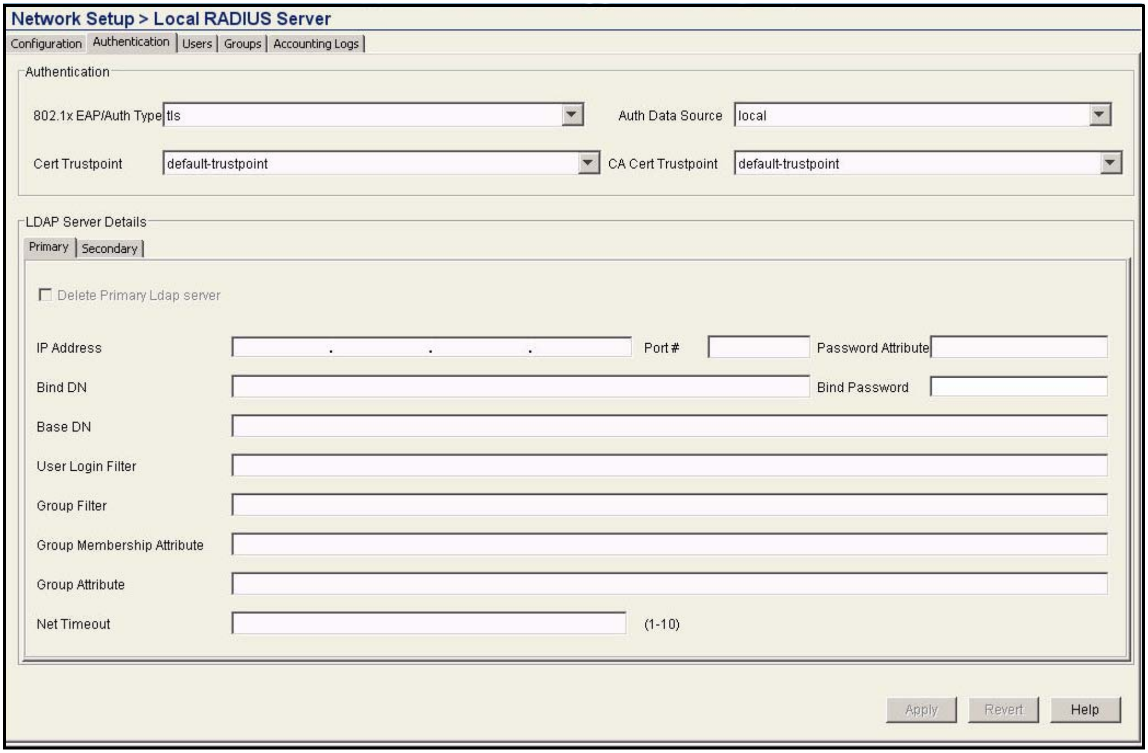
In addition, you must also create a guest group for the internal RADIUS server. When the WebUser administrator creates guest users, he or she must assign the users to a guest group. However, the WebUser administrator does not have rights to create this group. You must set up the group in advance.

Configure Initial RADIUS Settings

Follow these steps to begin setting up your RADIUS server. You must select the EAP type, the server certificate, and the location of the data store. Follow these steps:

1. Select **Network Setup** > **Local RADIUS Server**.

2. Click the **Authentication** tab.



Network Setup > Local RADIUS Server

Authentication

802.1x EAP/Auth Type: tls

Auth Data Source: local

Cert Trustpoint: default-trustpoint

CA Cert Trustpoint: default-trustpoint

LDAP Server Details

☐ Delete Primary Ldap server

IP Address: . . .

Port #:

Password Attribute:

Bind DN:

Bind Password:

Base DN:

User Login Filter:

Group Filter:

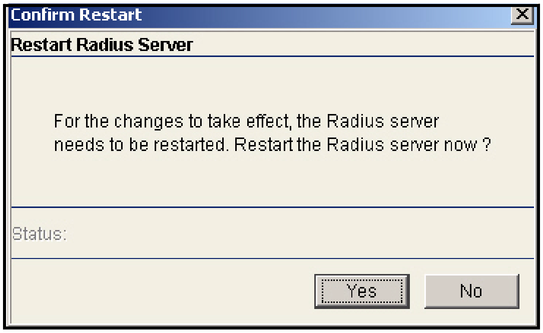
Group Membership Attribute:

Group Attribute:

Net Timeout: (1-10)

Figure AD-214.Wireless Module—Network Setup > Local RADIUS Server > Authentication Window

3. Because the Wireless Module is authenticating users with Web-Auth, you do not need to configure these settings:
   - **802.1x EAP/Auth Type**
   - **Cert Trustpoint**
   - **CA Cert Trustpoint**.
4. For **Auth Data Source**, select **local**. If local is already selected for Auth Data Source, skip to “Configure a Guest Group” on page AD-234.
5. Click **Apply**.



For the changes to take effect, the Radius server needs to be restarted. Restart the Radius server now ?

Figure AD-215.Wireless Module—Confirm Restart Window

6. When prompted to restart the server, click **Yes**.
7. Click **Save**.

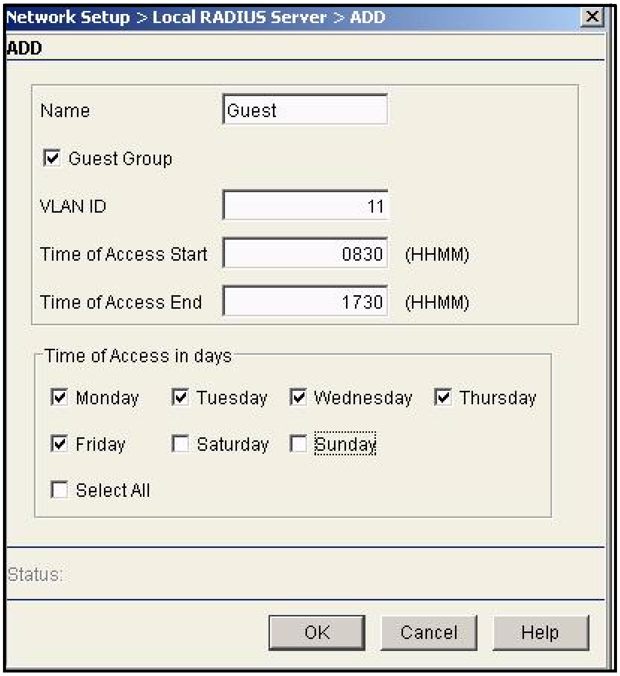
Configure a Guest Group

When you create a guest group, you assign it a VLAN. The Wireless Module will then place the users traffic in this VLAN. For this example, the VLAN for guest access is VLAN 11.

To configure a guest group, complete these steps:

1. Select **Network Setup** > **Radius Server** and click the **Groups** tab.

2. Click **Add**.



Network Setup > Local RADIUS Server > ADD

ADD

Name: Guest

☑ Guest Group

VLAN ID: 11

Time of Access Start: 0830 (HHMM)

Time of Access End: 1730 (HHMM)

Time of Access in days

☑ Monday ☑ Tuesday ☑ Wednesday ☑ Thursday

☑ Friday ☐ Saturday ☐ Sunday

☐ Select All

Status:

Figure AD-216.Wireless Module—Network Setup > Local RADIUS Server > Add Window

3. For **Name**, type a string that uniquely identifies this group.In this example, type **Guest**.

4. Select the **Guest Group** check box.

5. For **VLAN ID**, type the ID for the dynamic VLAN to which users in this group should be assigned. In this example, type **11**.

   Dynamic VLANs can cause issues in a WLAN that enforces Web-Auth. In this example, users in the Guest group are the only users who should connect to the Guest WLAN, which uses Web-Auth. Set the static VLAN for this WLAN to the same ID as this group, which will resolve any problems with Web-Auth.

   If you only have one WLAN on your Wireless Module that authenticates to the local RADIUS server, you can simply leave the VLAN ID at 0 and have the module place users in the WLAN's static VLAN. In this example, however, guests can authenticate to the non-guest WLAN (the Wireless

Module RADIUS server grants an authorized user access to any WLAN that uses it as the RADIUS server). You want to make sure that guests are always placed in the correct VLAN.

6. Specify the times of day when users in this group can connect to the wireless network.

   a. For **Time of Access Start**, type the earliest time that users can connect.

   b. For **Time Access End**, type the latest time users can connect.

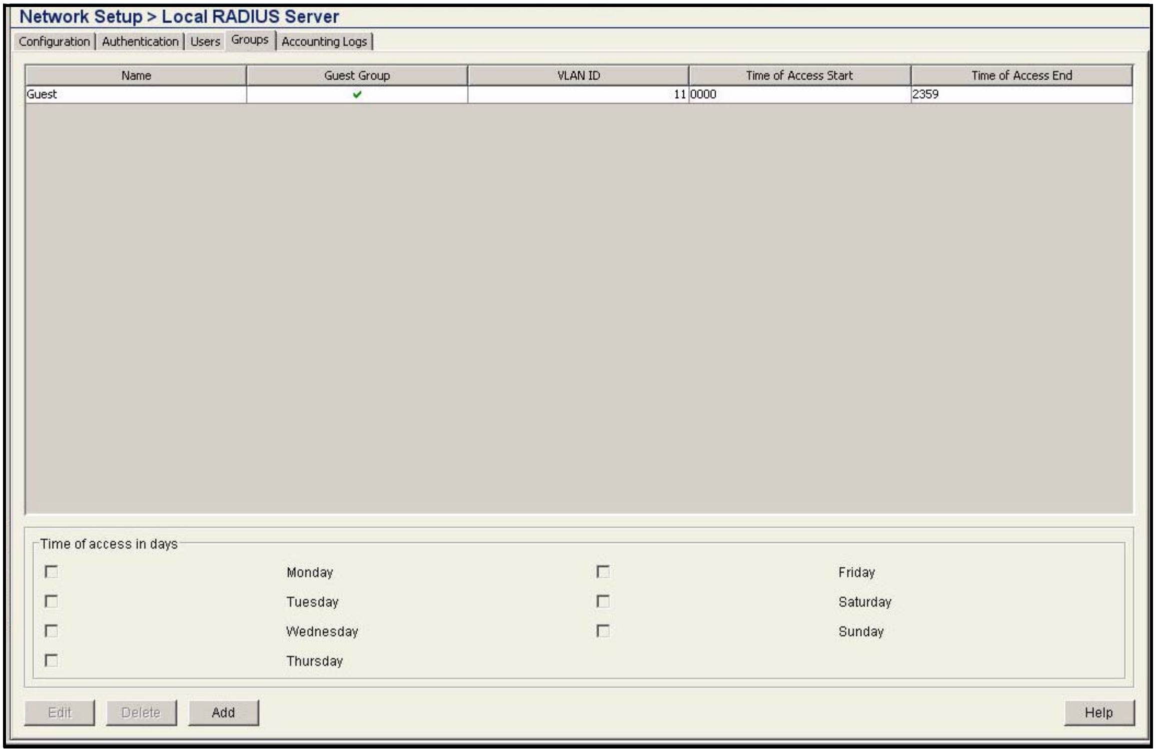
   Always enter times in four digits, the first two digits being the hour in the 24-hour clock and the second two digits being the minutes.

   In this example, type **0830** and **1730**.

7. In the **Time of access in days** area, select check boxes to specify the days of the week when users in this group can connect to the wireless network. In this example, clear the **Saturday** and **Sunday** check boxes.

8. Click **OK**.

9. When prompted to restart the server, click **Yes**.



Name	Guest Group	VLAN ID	Time of Access Start	Time of Access End
Guest	✓	11	0000	2359

Time of access in days

☐ Monday
☐ Tuesday
☐ Wednesday
☐ Thursday
☐ Friday
☐ Saturday
☐ Sunday

Figure AD-217.Wireless Module—Network Setup > Local RADIUS Server > Groups (Guest Group Added)

The group is displayed in the top section of the **Network Setup** > **Local RADIUS Server** > **Groups** window.

Manage Guest User Accounts with the Web-User Administrator

Because guest user accounts are temporary and constantly changing, you may want to assign this task to a help desk technician or even an administrative assistant. Delegating this task to another employee can free up your IT staff, allowing them to concentrate on other network tasks.

For example, ProCurve University provides Internet access to prospective students and parents who visit the university. The IT staff does not want to receive calls from different departments every time a visitor needs access to the Internet.

The Wireless Edge Services Module allows you to create a management account for a WebUser administrator, who has very limited rights to the module's Web browser interface. (The WebUser administrator has no rights to the command line interface, or CLI.) Specifically, the WebUser administrator can access the Wireless Module's Web browser interface and add guest accounts to the module's local database. When the WebUser administrator logs in to the Web browser interface, a unique interface is displayed. This interface helps guide less experienced users through the process of adding guest accounts.

Note

The Web-User administrator can only add guest user accounts to *existing* guest groups. Before turning management of guest accounts over to the Web-User administrator or administrators, you must configure at least one guest group. For information about configuring the RADIUS server and a guest account, see "Configure the Wireless Module's Internal RADIUS Server" on page AD-232.

Create a Web-User Administrator Account

The WebUser administrator is just one of the administrative roles that the Wireless Edge Services Module supports. There are six administrative roles, which allow you to delegate management responsibilities to certain IT members while granting them only the rights they need to perform their designated tasks:

- WebUser, which grants rights to create guest accounts
- Monitor, which grants rights to view settings and statistics
- Helpdesk manager, which grants rights to view settings and statistics and manage logs and troubleshooting snapshots
- Network administrator, which grants rights to view settings and statistics and manage guest accounts
- System administrator, which grandiosities to view settings and statistics, manage logs, and manage the module
- SuperUser, which grants rights to configure all network and security settings, manage the module, manage guest accounts, manage logs and troubleshooting snapshots, and view settings and statistics

The default manager user has the SuperUser role, and the default operator user has the monitor role.

As you can see, the WebUser administrator has the least rights. This administrator can complete only one task: creating guest users.

ProCurve University will create several administrative accounts that have the WebUser administrator role. To distribute the workload, the IT staff will create five WebUser administrators. Each one will handle one or two departments. In addition, the IT staff will create a GuestAdmin account, which can be used by helpdesk technicians who respond to users who cannot reach the WebUser assigned to a particular department.

Table AD-11.WebUser Administrator Accounts for ProCurve University

WebUser Administrator Account	University Department
Angela	Mathematics and Engineering
Hans	English and Humanities
Casandra	University administration
Jorge	Science
Miriam	Psychology
GuestAdmin	IT department

To create a WebUser administrator, complete the following steps:

1. In the Wireless Module Web browser interface, select **Management** > **Web Users**. The **Local Users** tab should be selected.

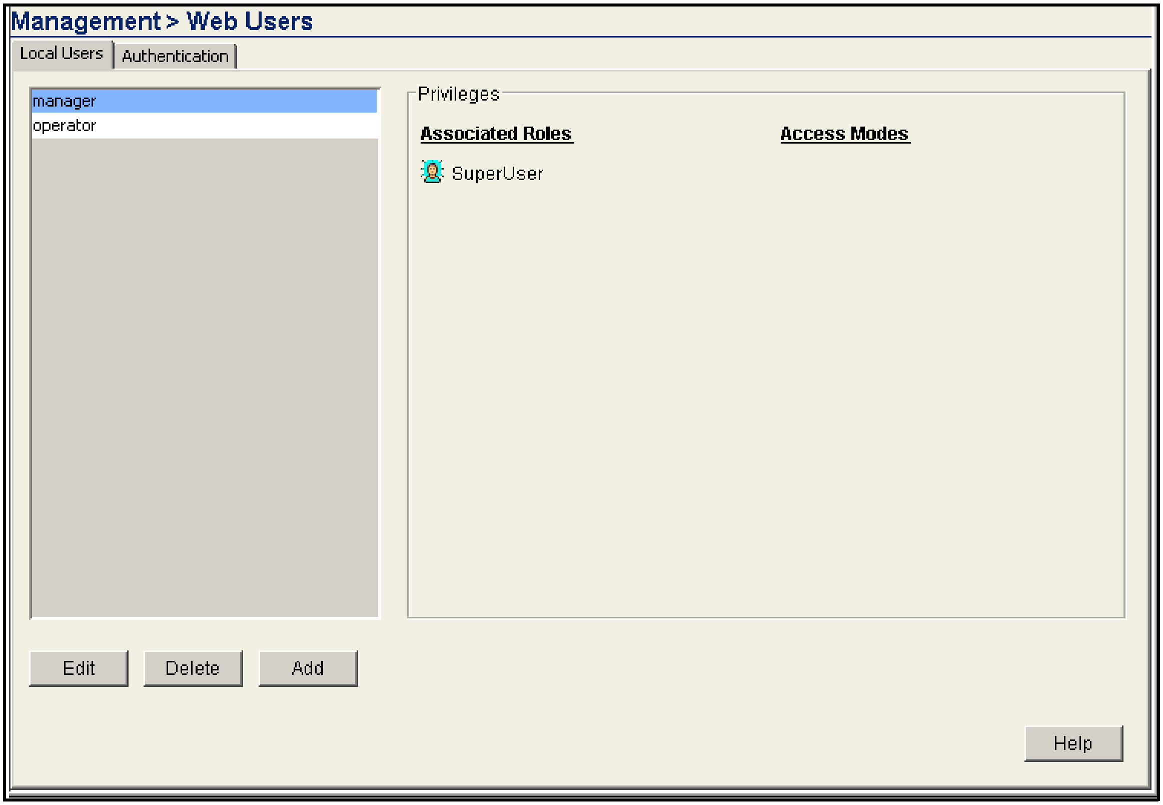
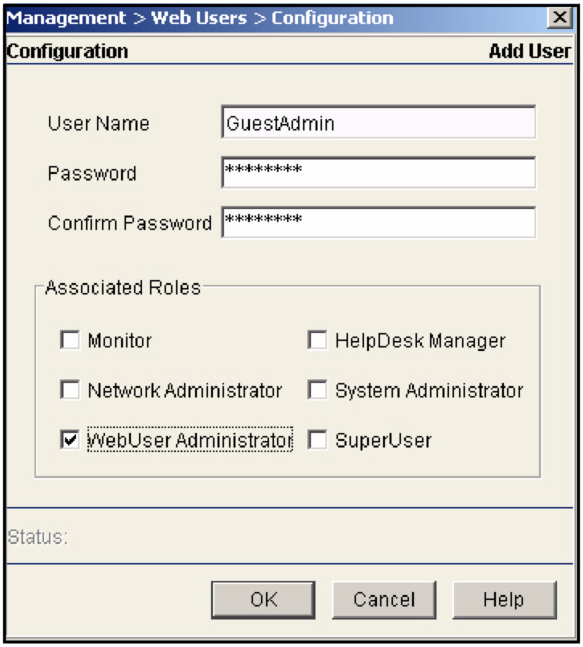


Figure AD-218.Wireless Module—Management > Web-Users > Local Users Window

2. Click **Add**. The **Add User** window is displayed.



Management > Web Users > Configuration

Configuration — Add User

User Name: GuestAdmin

Password: *********

Confirm Password: *********

Associated Roles

□ Monitor
□ HelpDesk Manager
□ Network Administrator
□ System Administrator
☑ WebUser Administrator
□ SuperUser

Status:

Figure AD-219.Wireless Module—Management > Web-Users > Configuration > Add User Window (Web-User Administrator)

3. For **User Name**, type the username, which must be a string between 1 and 28 characters. You can include spaces and special characters. In this example, type **GuestAdmin**.

4. For **Password** and **Confirm Password**, type a password between 8 and 32 characters. The password can include spaces and special characters. For this example, type **procurve4**.

5. Select the **WebUser Administrator** check box.

6. Click **OK**.

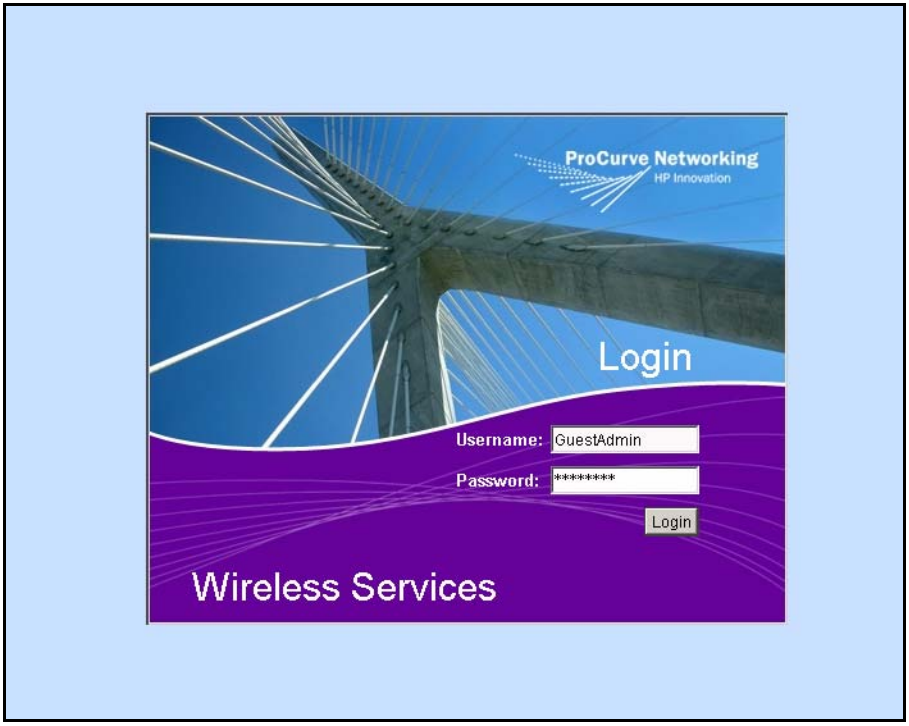
7. Click **Save**.

Add Guest Accounts as a Web-User Administrator

After you create the WebUser administrator account and at least one guest group, the WebUser administrator can begin creating guest accounts. Although the Web browser windows that are designed for the WebUser administrator are intuitive, you may want to take some time to teach the person you assign this role how to log in and create the guest accounts. In fact, you can copy the instructions from this guide and give it to the WebUser administrator at your company.

Complete the following steps to create a guest account:

1. Open a Web browser and type the IP address of the Wireless Module for the URL. In this example, type **10.2.0.20**. The Wireless Module's **Login** window is displayed.

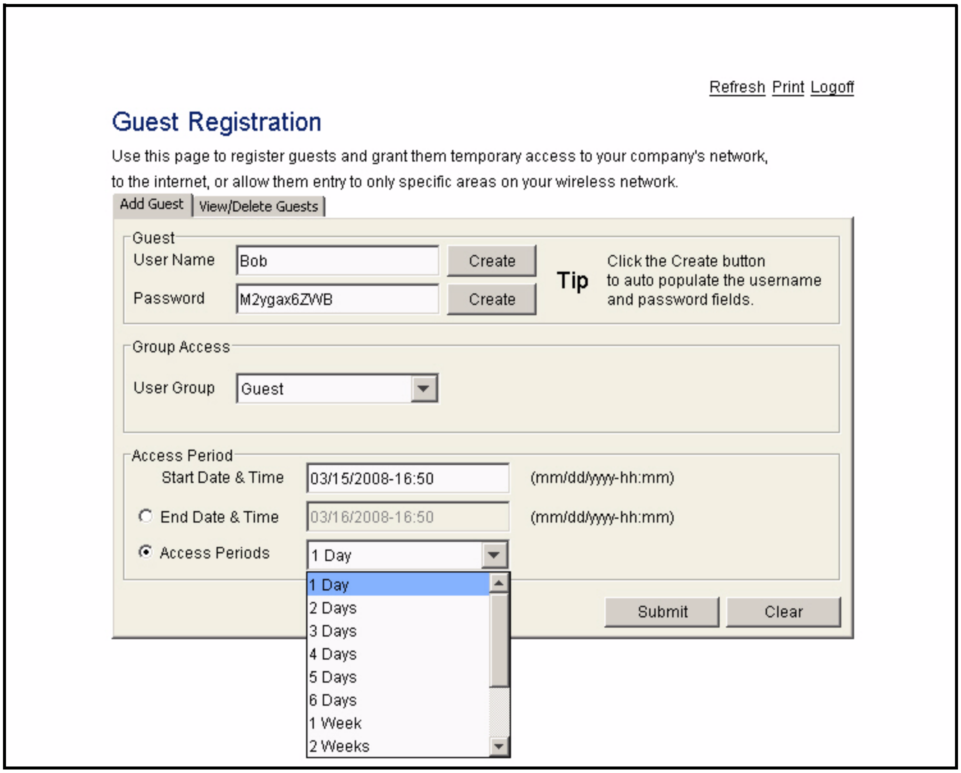


Username: GuestAdmin
Password: ********

Figure AD-220.Wireless Module Login Page

2. For **Username**, type the name configured for the Web-User administrator. In this example, type **GuestAdmin**.

3. For **Password**, type the Web-User administrator's password. In this example, type, **procurve4**.



Guest Registration

Use this page to register guests and grant them temporary access to your company's network, to the internet, or allow them entry to only specific areas on your wireless network.

Guest
User Name: Bob
Password: M2ygax6ZWB

Tip: Click the Create button to auto populate the username and password fields.

Group Access
User Group: Guest

Access Period
Start Date & Time: 03/15/2008-16:50 (mm/dd/yyyy-hh:mm)
○ End Date & Time: 03/16/2008-16:50 (mm/dd/yyyy-hh:mm)
● Access Periods: 1 Day

Figure AD-221.Wireless Module—Guest Registration > Add Guest Window

4. The **Guest Registration** window is displayed. The **Add Guest** tab should be selected.

5. Add the guest user account:

   a. For **User Name**, type the name that the guest will use to log in. To generate a random username, click **Create**. For this example, type **Maria**.

      The username can be up to 64 characters and can include alphanumeric and special characters. It is case sensitive.

   b. For **Password**, type the guest's password. You can also generate a random password by clicking **Create**.

      The password can include up to 21 alphanumeric and special characters. It is case sensitive.

c. For **User Group**, select the group to which this guest belongs and which determines this guests' rights.

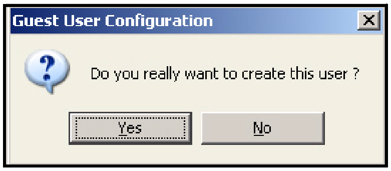
   If the **User Group** list does not include any groups, contact a network administrator who has management access to the Wireless Module. This administrator must create a guest group for you.

d. By default, the guest user account becomes active immediately. (The **Start Date & Time** box in the **Access Period** area is automatically filled with the current time.) However, you can type a different desired date and time for the account to become active. The correct format is **mm/dd/yyyy-hh:mm**, in which **mm** indicates months; **dd**, the day; **yyyy**, years (four-digit); **hh**, hours (on the 24-hour clock); and **mm**, minutes.

e. Next, configure the date and time at which the temporary account becomes inactive (the user can no longer log in). Select one of two options:
   – You can select **End Date & Time** and enter an exact date and time in the box to the right.
   – You can select Access Periods and choose a certain duration for the account from the list shown in Figure AD-221.

   In this example, select **Access Periods** and **2 Days**.

f. Click **Submit**.


Guest User Configuration

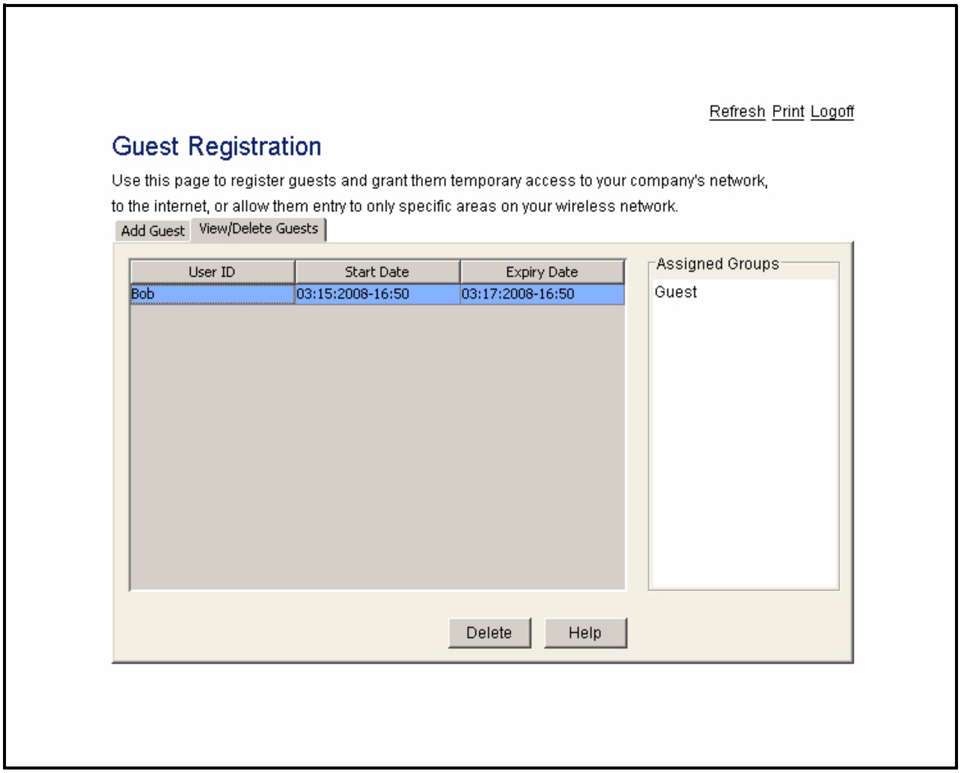
Do you really want to create this user ?

**Figure AD-222.Wireless Module—
Guest Registration Window**

g. Click **Yes** to confirm that you want to create the user account.

h. Repeat these steps to create other users.

6. Verify that the users have been added to the Wireless Module's RADIUS database. Click the **View/Delete Guests** tab.



Guest Registration

Use this page to register guests and grant them temporary access to your company's network, to the internet, or allow them entry to only specific areas on your wireless network.

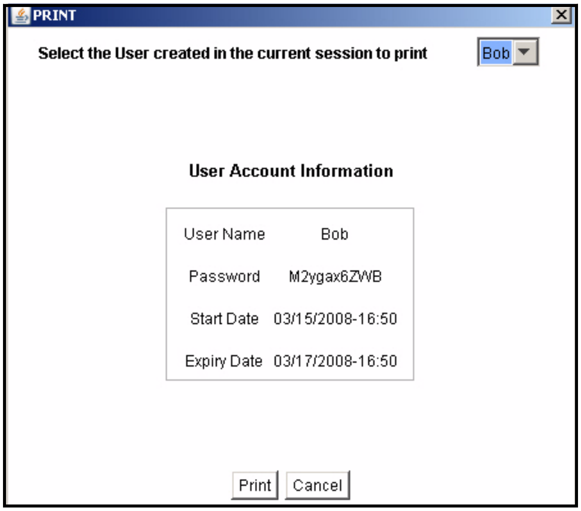
User ID	Start Date	Expiry Date
Bob	03:15:2008-16:50	03:17:2008-16:50

Assigned Groups
Guest

Figure AD-223.Wireless Module—Guest Registration > View/Delete Guests Window

As you can see, the new user account is displayed. If you see a problem, click **Delete** and reconfigure the account on the **Add Guest** tab.

7. To create a record of the guest account, follow these steps:
   a. Click the **Print** link in the top right corner of the window.



Select the User created in the current session to print: Bob

User Account Information

User Name	Bob
Password	M2ygax6ZWB
Start Date	03/15/2008-16:50
Expiry Date	03/17/2008-16:50

Figure AD-224.Wireless Module—Guest Registration > Print Window

b. Select the username from the list at the top of the window. The account information is displayed below.

c. Click **Print**.

d. A window is displayed (windows differ depending on your management station). Follow the steps indicated and print the record.

e. Select a different username to print that account.

f. When you are finished printing account information, close the **Print** window.

When you are finished configuring guest accounts, click the **Logoff** link.

Configure an ACL for the Guest VLAN on the Routing Switch

Typically, you want to grant guests only limited access to your network. In this solution, you will control guests' access with an ACL configured on the default router for the Guest VLAN.

The steps below guide you through configuring an ACL on a ProCurve Switch 5400zl. The example ACL will allow guests to access the Internet but not the private network.

1. Access the CLI of the Switch 5400zl.
2. Move to the global configuration mode context:

   ```
   ProCurve# configure terminal
   ```

3. Configure the access control entries. Typically, you should create entries for an extended ACL so that you can control the destination of the traffic. Refer to your switch's management and configuration guide for the correct syntax for the commands. Below are commands for the example list:

   ```
   ProCurve(config)# ip access-list extended Guest

   ProCurve(config-ext-nacl)# permit udp any any 67

   ProCurve(config-ext-nacl)# permit udp any 10.4.4.15 53

   ProCurve(config-ext-nacl)# permit tcp any 10.4.4.15 53

   ProCurve(config-ext-nacl)# deny ip any 10.0.0.0
   255.0.0.0 log

   ProCurve(config-ext-nacl)# permit ip any any
   ```

4. Apply the list to the Guest VLAN:

Syntax: vlan <*ID*> ip access-group <*identifier*> vlan

Assigns the ACL to the VLAN interface.

Replace ***<ID>*** *with the ID for the Guest VLAN. Replace* ***<identifier>*** *with the name of the ACL that you just created.*

In this example, enter this command:

```
ProCurve(config)# vlan 11 ip access-group Guest vlan
```

5. Save the configuration:

   ```
   ProCurve(config)# write memory
   ```

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