CN3200

Administrator's Guide

DRAFT

Note: Any references to CN3000 in this draft also apply to the CN3200.

Colubris Networks®

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Changes are periodically made to the information herein; these changes will be incorporated into new editions of the document.

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Chapter 1

Introduction

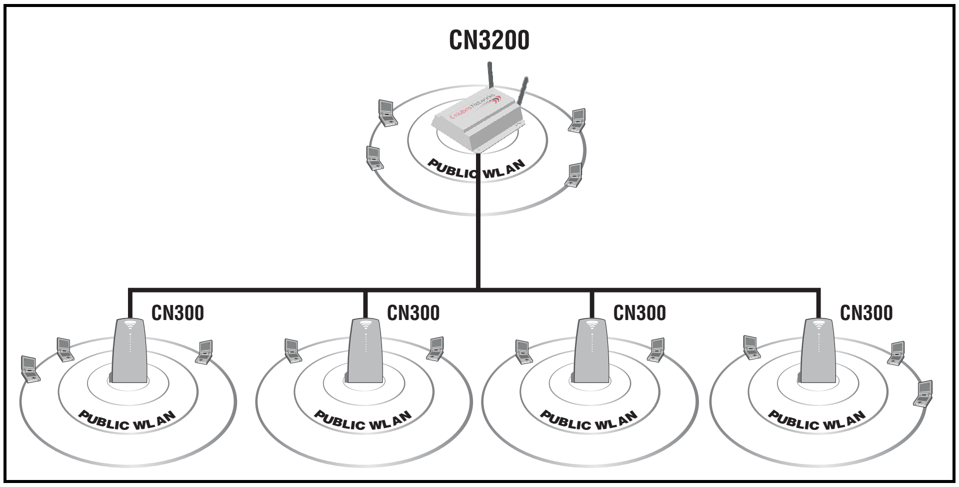
This chapter presents an overview of the CN3200 and illustrates how it can be used to deploy a public access network.

Introducing the CN3200

The CN3200 simplifies the process of installing a public access network by integrating all the key components you need into a single, easy-to-install device. It features an access controller with robust firewall and full-featured router, and a high-speed wireless access point.

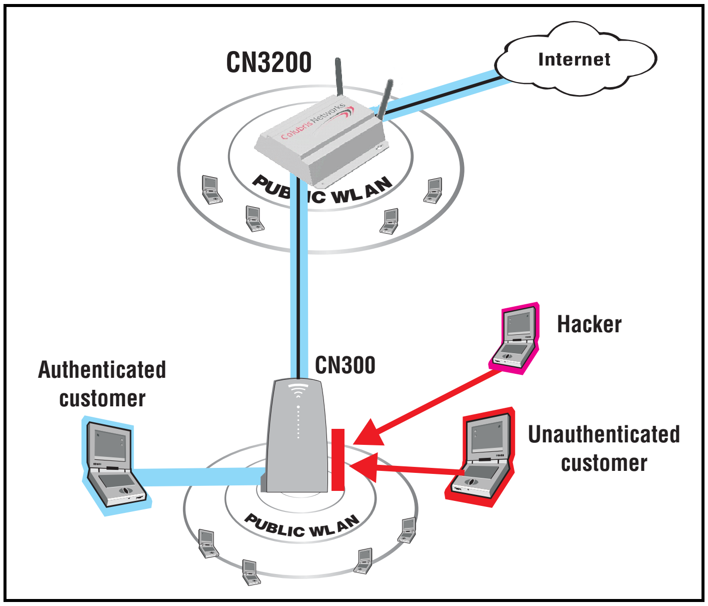
Scalable solution

To service large locations or areas with many customers, you can deploy multiple CN3200s or use CN300 satellite stations to extend the reach of the wireless network.



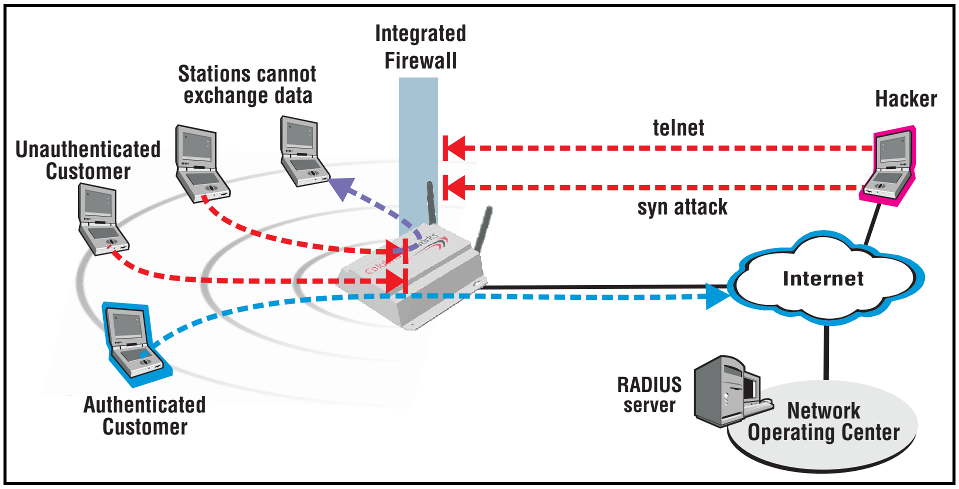
Secure infrastructure

The CN3200 and the CN300s provide the wireless cells which customers use to connect their mobile computers. Intelligent bridging software on the CN300s restricts customer traffic so that it can only flow to and from the CN3200.



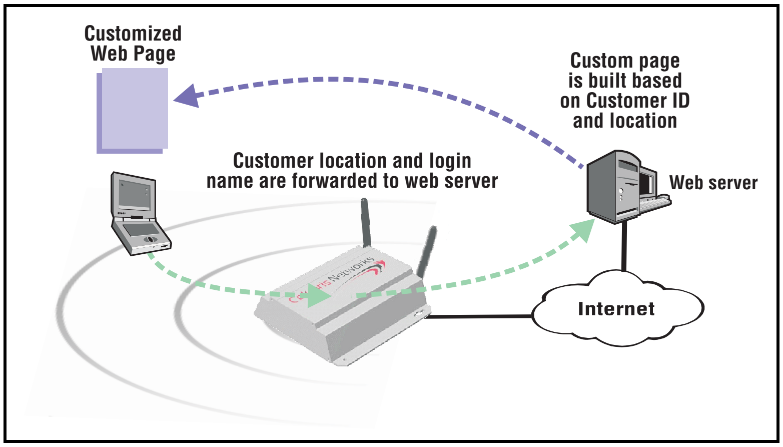
Generally, the CN3200 is configured to provide a ‘public’ area on the network that is freely available to customers without logging in. However, to gain access to the Internet (or restricted resources on the local network) customers are usually required to login. This secures the network and enables billing to take place.

For added security, the CN3200 is protected from malicious Internet traffic by its integrated firewall.



Enhanced user experience

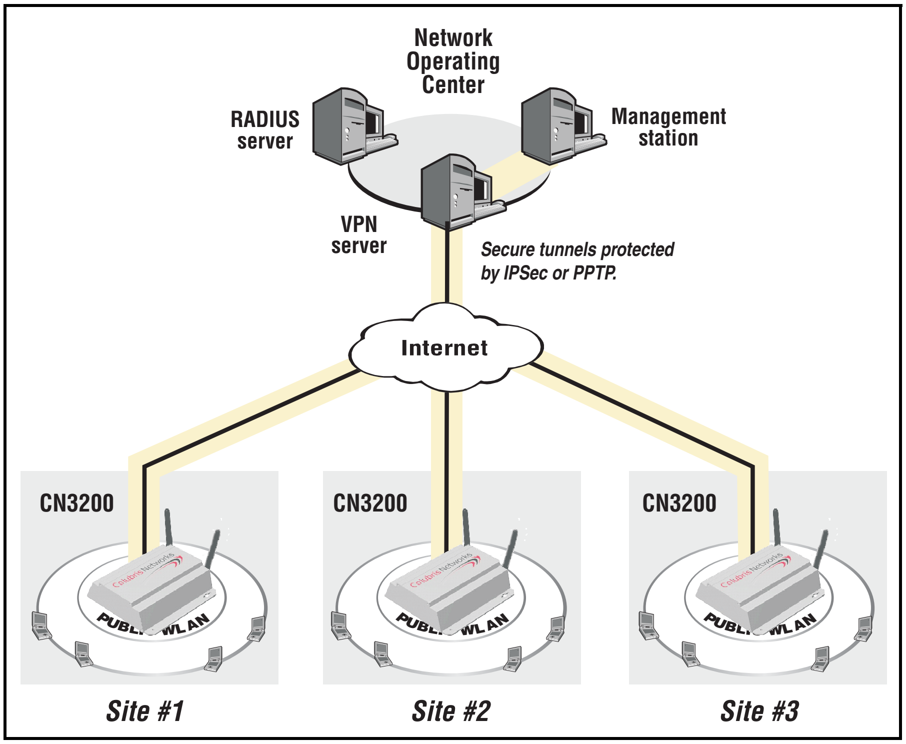
The CN3200 makes it easy to deliver a completely customized experience for your customers.


Customized Web Page
Custom page is built based on Customer ID and location
Customer location and login name are forwarded to web server
Web server
Internet

At login time, customers are authenticated and their location within the network is identified. This information is forwarded to an external web server, enabling it to generate a custom experience for each location or even every customer.

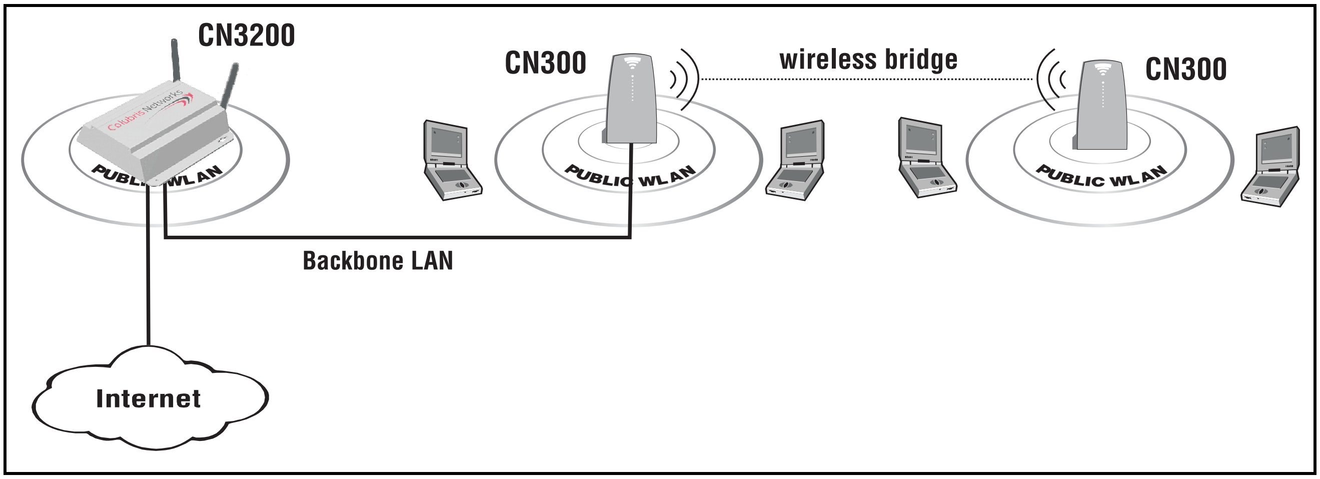
Secure remote management

Integrated VPN client software (PPTP and IPSec) enables the CN3200 to establish a secure connection with a remote network operating center. This provides a secure encrypted tunnel for management and accounting traffic, enabling you to establish a centralized location from which to manage one or more CN3200s.

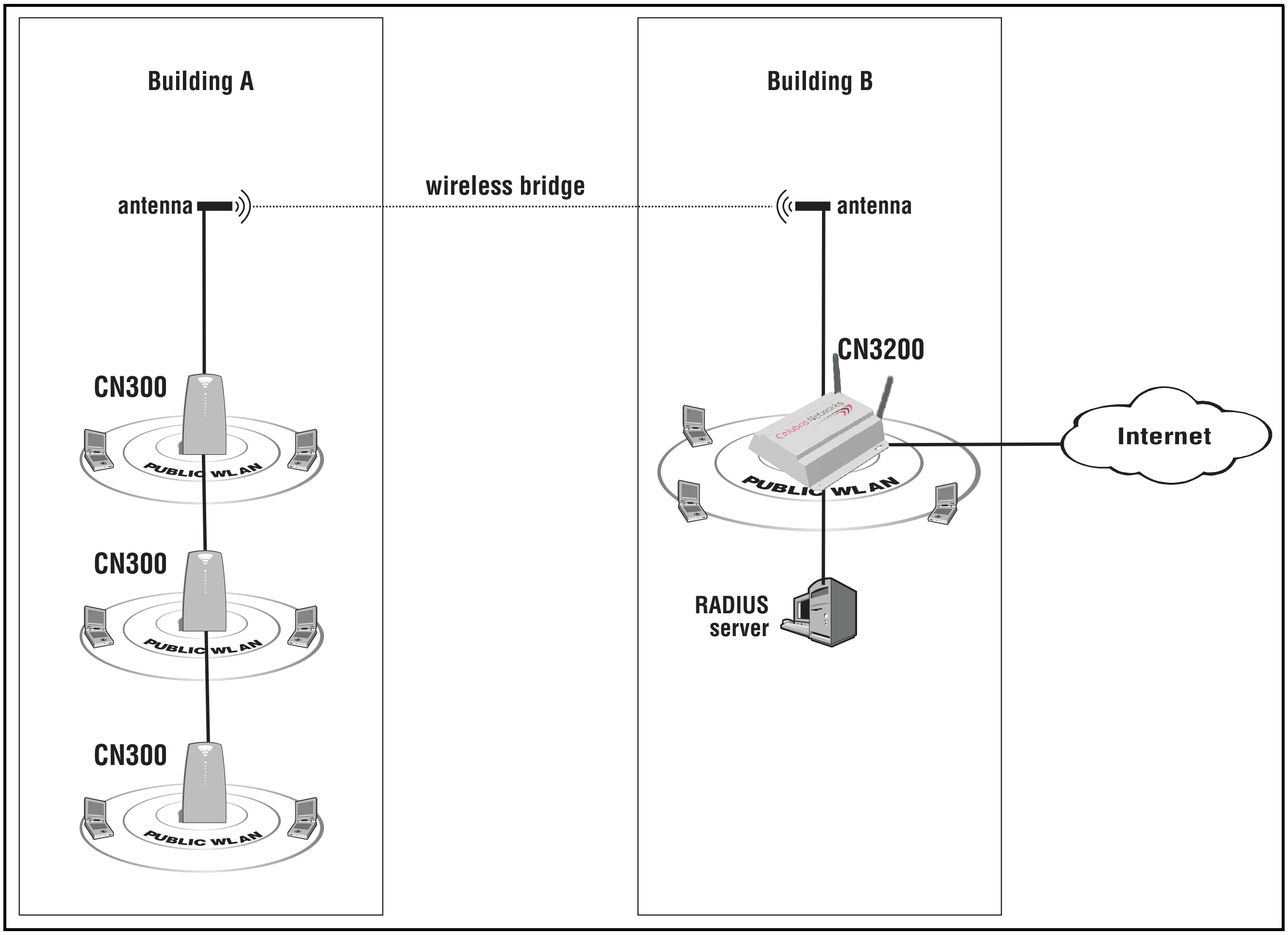


Wireless bridging

The CN3200s wireless bridging feature enables you to use the wireless radio to create point-to-point wireless links to other access points. This feature can be used locally to extend the reach of a network without laying cable. For example:



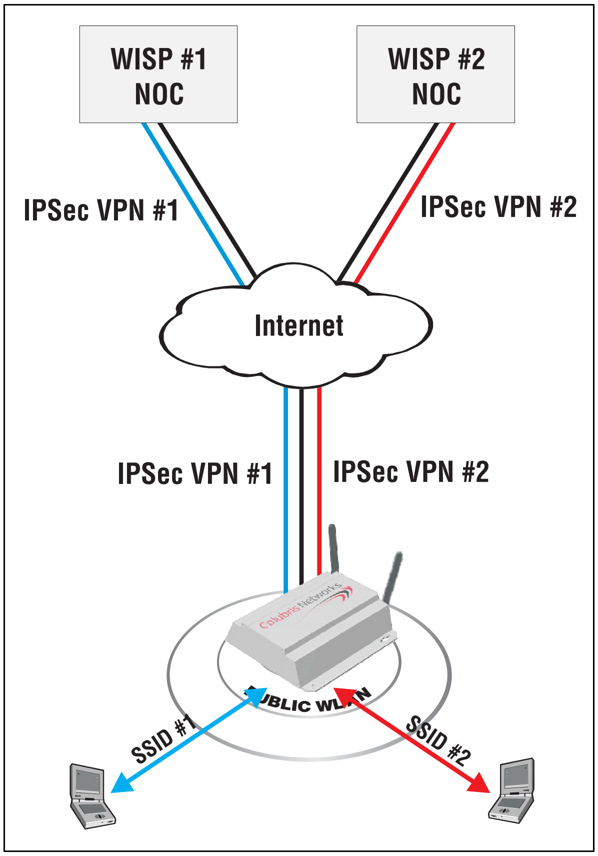
Or, it can be used to create point-to-point links over longer distances, such as between two buildings (as illustrated below). This requires that the appropriate external antenna be installed on each unit (not included).



Multiple SSID support

The CN3200 provides support for multiple SSIDs. This permits the wireless network to be split into multiple distinct entities, each with its own SSID and configuration settings.

By combining multiple SSIDs and IPSec VPNs, several WISPs (wireless Internet service providers) can effectively share wireless access points in one or more locations.



In this scenario, the CN3200 controls access to the Internet. However, it validates customer logins and records accounting information using the RADIUS server in each NOC. The CN3200 knows which RADIUS server to communicate with for a particular customer based on the SSID the customer is associated with. IPSec VPN tunnels provide full protection for all data transfers with the NOC.

Custom login pages can be hosted by each WISP, enabling the shared access point to provide a distinct online experience for each WISP’s customers.

Feature summary

Wireless radio

The CN3200’s dual-band mini-PCI radio module is software configurable to operate either in the 2.4GHz band (802.11b and 802.11g) or the 5GHz band (802.11a).

Note: *Customers are responsible for verifying approval and to identify the regulatory domain that corresponds to a particular country. Not all regulatory domains have been approved. Please consult the Colubris Networks web site (www.colubris.com/certifications) for an up-to-date list.*

802.11a

The following features apply when the radio is operating as IEEE 802.11a (5 Ghz Unlicensed ISM radio band).

Data rates

- 6, 9, 12, 18, 24, 36, 48, 54 Mbps

Frequency band

- North America: 5.150-5.350 GHz and 5.725 -5.825 GHz
- Europe: 5.150-5.350 GHz and 5.470-5.725 GHz and 5.725-5.825 GHz
- Japan: 5.150-5.250 GHz

Operating channels (non-overlapping)

- North America: 12
- Europe: 19
- Japan: 4

Modulation technique

Orthogonal Frequency Division Multiplexing (OFDM)

- BPSK @ 6 and 9 Mbps
- QPSK @ 12 and 18 Mbps
- 16-QAM @ 24 and 36 Mbps
- 64-QAM @ 48 and 54 Mbps

Media Access Protocol

- Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA)

Receive sensitivity

- 6 Mbps: -85 dBm
- 54 Mbps: -65 dBm

Available Transmit Power Settings

- 6-24 Mbps: 17.5dBm +/- 2
- 54 Mbps: 12 dBm +/- 2

Note: *Maximum power setting varies according to individual country regulations.*

Standards compliance

Safety

- IEC 60950
- EN 60950

Radio Approvals

- Wi-Fi
- FCC Part 15.401-15.407
- RSS-210 (Canada)
- EN 300 440 (Europe)
- ARIB STD-T71 (Japan)

EMI and Susceptibility (Class B)

- FCC Part 15.107 and 15.109
- ICES-003 (Canada)
- VCCI (Japan)
- EN 301.489-1 and -17 (Europe)

Other

- IEEE 802.11a
- FCC Bulletin OET-65C
- RSS-102

IEEE 802.11h Support

- Dynamic Frequency Selection (DFS) and Transmit Power Control (TPC) are supported as per the current draft of the IEEE 802.11h specification

Antenna

Two SMA (Female) connectors for use with external antenna (sold separately).

Security architecture client authentication

- SSL protected WEB-based Authentication
- 802.1X support including: PEAP, EAP-TLS, EAP-TTLS, and EAP-SIM to yield mutual authentication
- Wi-Fi Protected Access (WPA) with AES support in HW (ready for WPA-2)· Support for static and dynamic IEEE 802.11 WEP keys of 40 bits and 128 bits

802.11b/g

The following features apply when the radio is operating as IEEE 802.11b and 802.11g (2.4 Ghz Unlicensed ISM radio band).

Data rates

- IEEE 802.11b: 1, 2, 5.5, and 11 Mbps
- IEEE 802.11g (OFDM only): 6, 9, 12, 18, 24, 36, 48, 54Mbps

Frequency band

- North America: 2.412 to 2.462 GHz
- Europe: 2.412 to 2.472 GHz
- Japan: 2.412 to 2.484 GHz

Operating channels

- North America/China: 1
- Europe: 13
- Japan: 14

Non-overlapping operating channels

- Worldwide: 3

Modulation technique

IEEE 802.11b: Direct sequence spread spectrum (DSSS)

- DBPSK @ 1 Mbps
- DQPSK @ 2 Mbps
- CCK @ 5.5 and 11 Mbps

IEEE 802.11g: Orthogonal Frequency Division Multiplexing (OFDM)

- BPSK @ 6 and 9 Mbps
- QPSK @ 12 and 18 Mbps
- 16-QAM @ 24 and 36 Mbps
  - 64-QAM @ 48 and 54 Mbps

Media Access Protocol

- Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA)

Receive sensitivity

IEEE 802.11b

- 11 Mbps: -86 dBm

IEEE 802.11g:

- 6 Mbps: -85 dBm
- 54 Mbps: -65 dBm

Available Transmit Power Settings

IEEE 802.11b

- 1-11 Mbps: 18 dBm +/- 2

IEEE 802.11g:

- 6-24 Mbps: 17 dBm +/- 2
- 54 Mbps: 11.5 dBm +/- 2

Note: *Maximum power setting varies according to individual country regulations.*

Standards compliance

Safety

- IEC 60950
- EN 60950

Radio Approvals

- Wi-Fi
- FCC Part 15.247
- RSS-139-1, RSS-210 (Canada)
  - EN 300.328 (Europe)
- TELEC 33B (Japan)

EMI and Susceptibility (Class B)

- FCC Part 15.107 and 15.109
- ICES-003 (Canada)
- VCCI (Japan)
- EN 301.489-1 and -17 (Europe)

Other

- IEEE 802.11a
- FCC Bulletin OET-65C
- RSS-102

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- 802.1x support including: PEAP, EAP-TLS, EAP-TTLS, and EAP-SIM to yield mutual authentication
- Wi-Fi Protected Access (WPA) with AES support in HW (ready for WPA-2)· Support for static and dynamic IEEE 802.11 WEP keys of 40 bits and 128 bits

Hardware

Status LEDs

Provide status of wireless port, LAN ports, and power

Uplink ports

Two auto-sensing 802.3 10/100BASE-T Ethernet ports

Memory

- 32 Mbytes RAM
- 16 Mbytes FLASH

Input power requirements

- 90 to 240 VAC +/- 10% (power supply)
- IEEE 802.3af 48 VDC +/- 10%(device)

Power draw

8 watts

Dimensions

- Length: 165.7 mm
- Width: 162.5 mm
- Height: 48 mm

Temperature range

- Operating: 0°C to 60°C
- Storage: -40°C to 70°C

Humidity

5% to 95% typical (non-condensing)

Warranty

One year

Networking

- IEEE 802.1d compliant bridging
- GRE (RFC 2784)
- DHCP Server (RFC 2131)
- DHCP Client
- DHCP Relay
- DHCP Option 82 (RFC 3046)
- PPPoE Client (RFC 2516)
- DNS Relay
- Static IP Routing
- Network Address Translation (RFC 1631)
- One-to-one NAT for VPN support

- RIP v1 (RFC 1058) and v2 (RFC 1723)
- SMTP (e-mail) redirection
- ICMP (RFC 792)
- ARP (RFC 826)
- CIDR (RFC 1519)

Network management

- SNMP v1 and v2
- MIB-II with TRAPS
- Colubris Hot Spot MIB for user session control and downstream AP management
- RADIUS Authentication MIB (RFC 2618)
- RIP v2 extension MIB (RFC 1724)
- Secure access (SSL and VPN) to embedded HTML Management Tool
- Scheduled configuration and firmware upgrades from central server
- Real-time status, information and protocol traces (layer 2 and 3)

Access controller functions

- Secure HTML login page
- Support for centralized WEB Portal
- WEB-Proxy server
- Fixed-IP address spoofing
- Location-aware user authentication
- Support for 802.1x using EAP-SIM, EAP-TLS, EAP-TTLS and PEAP
- MAC-level authentication for non-HTTP or 802.1x devices
- RADIUS AAA using EAP-MD5, PAP, CHAP, MSCHAP v2
- Provides detailed accounting based on session duration and/or volume of data
- Flexible support for pre-paid subscription
- Support up to 100 concurrent users at location

Security

- RADIUS Client (RFC 2865 and 2866)
- Layer-2 Wireless Isolation
- Integrated VPN client (IPSec or PPTP) for secure connection to central RADIUS Server
- Per-user customizable firewall

RF Tools

- Rogue AP detection
- Embedded Site Survey tools

Compatibility

- Communicates with all Wi-Fi certified wireless adapters
- Supports all operating systems

Authentication and accounting

- Secure HTML login page
- Support for 802.1x using EAP-MD5, EAP-TLS, EAP-TTLS, PEAP
- RADIUS AAA supporting EAP-MD5, PAP, CHAP, MSCHAP v2, MSCHAP v1
- MAC-level authentication for non-HTTP devices
- Supports up to 100 concurrent users
- Provides accounting by time used or data transferred/received by customers
- Traffic quotas

Management

- Web-based management tool
- Secure local and remote management via HTTPS and VPN
- Scheduled configuration upgrades from a central server
- Remote Syslog
- Web-based firmware upgrades
- Real-time status and information protocol traces
- Site survey and monitoring tool
- SNMP V1, V2 MIB-II with traps and Colubris MIB
- RADIUS Authentication Client MIB (RFC 2618)

Interfaces

- IEEE 802.11b wireless port
- 10/100BaseTX Ethernet port
- 10BaseT Ethernet port

Operating Environment

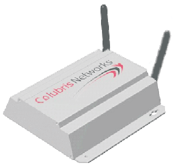
- Temperature: 0ºC to 55ºC
- Humidity: 15% to 95% non-condensing

Regulatory Approvals

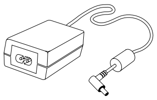
- FCC Part 15, CSA NRTL (C22.2 No 950, UL 1950)
- CE Mark (EN55022, EN55024, IEC 60950)
- Wi-Fi Certified

Package contents

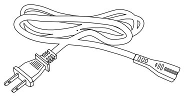
Make sure that your package contains the following items. If an item is missing, contact your reseller.



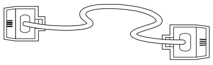
CN3200 Wireless Access Controller



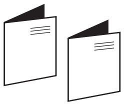
Power supply (optional)



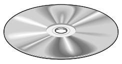
Power cord (optional)



Cross-over Ethernet cable (yellow)



CN3200 warranty, license, and registration cards



CD-ROM
Contains the CN3200 Administrator's Guide, Colubris Backend Archive, and the Colubris Enterprise MIB.

Technical support

To obtain technical support, contact your reseller.

Information about Colubris Networks products and services, including documentation and software updates, is available on our web site at **www.colubris.com.**

Syntax conventions

This manual uses the following formatting conventions.

Example	Description
Network	When referring to the management tool web interface, items in bold type identify menu commands or input fields. They are presented exactly as they appear on screen.
Network > Ports	When referring to the management tool web interface, submenus are indicated using the '>' sign. The example refers to the Ports submenu, which is found under the Network menu.
ip_address	Items in italics are parameters that you must supply a value for.
`use-access-list=`*usename*	Monospaced text is used to present command line output, program listings, or commands that are entered into configuration files or profiles.
`ssl-certificate=`*URL* `[%s] [%n]`	Items enclosed in square brackets are optional. You can either include them or not. Do not type the brackets.

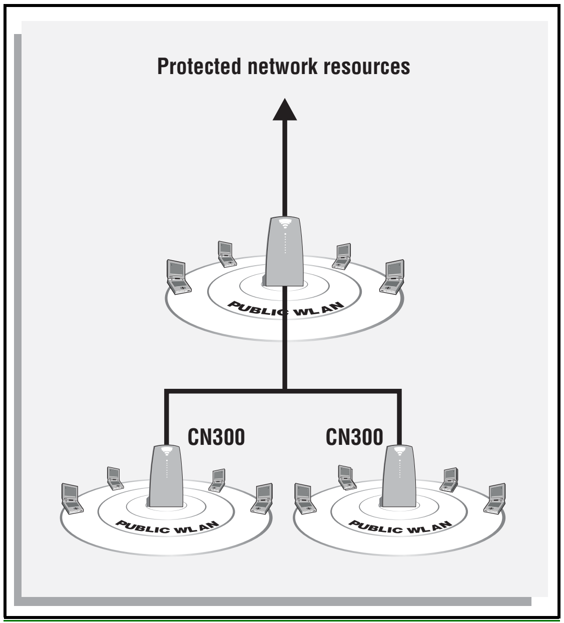
Chapter 2
Important concepts

This chapter covers important topics that will help to understand how to install, deploy, and manage a wireless public access network.

Networking areas

Wireless cells

Each wireless networking area is created by installing a CN3200, and if needed, one or more CN300s. For example:



Coverage

As a starting point for planning your setup, you can assume that the CN3200 provides a wireless cell of up to 300 feet (100 meters) in diameter at high power. Before creating a permanent installation, you should always perform a live test of the coverage provided by each access point to determine its optimum settings and location.

Coverage provided by an access point will be affected by all of the following factors.

Transmission power of the radio

More power means better signal quality and bigger wireless cells. However, cell size should generally not exceed the range of transmission supported by your client stations. If it does, client stations will be able to receive signals from the access point, but they will not be able to reply. Another limiting factor is proximity of other access points in a multi-cell setup. In this case signal strength should be adjusted to avoid interference between adjacent cells.

Note: *Governmental regulations in different parts of the world determine the maximum power output of the CN3200's radio.*

Antenna configuration

Antennas play a large roll in determining shape of the wireless cell and transmission distance. Internal antennas are general omni-directional and provide the same type of coverage in all directions around the access point. Consult the specifications for the antenna to determine how it affects wireless coverage.

Interference

Another limiting factor is interference from other access points or devices that operate in the same frequency band.

Access points operating in the 2.4 Ghz band may experience interference from 2.4 Ghz cordless phones and microwave ovens.

Physical characteristics of the location

To maximize coverage of the wireless cell, the wireless access points are best installed in an open area with as few obstructions as possible. Try to choose a location that is central to the area being served.

Radio waves cannot penetrate metal, instead they are reflected. This means that the wireless access points are able to transmit through wood or plaster walls, and closed windows. However, the steel reinforcing found in concrete walls and floors may block transmissions, or reduce signal quality by creating reflections. This can make it difficult for a single unit to serve users on different floors in a concrete building. Such installations will require a separate wireless access points on each floor.

Authentication and accounting

The CN3200 provides user authentication and accounting support for the wireless customers and manages the security of the network. This means ensuring that only authorized traffic is permitted to reach the protected network resources.

Multiple SSIDs

The CN3200 supports the creation of multiple virtual wireless networks, all sharing the same wireless port. Each virtual network has its own SSID, MAC address, and configuration settings.

Security

To preserve network security, the CN3200 and the CN300 block all communications between wireless client stations. If required, you can disable this feature.

Protected network resources

All resources connected to the CN3200's Internet port are protected. This means that access to them is controlled by configuration settings on the CN3200. By default, these settings are:

- unauthenticated customers cannot access any protected network resources
- authenticated customers can access all protected network resources

While this type of configuration may be suitable for a simple wireless hotspot that provides access to the Internet, more complex setups will need more fine-grained control of the protected network resources. To support this, the CN3200 provides a fully-configurable access list mechanism, which has the following benefits:

- The ability to make specific protected resources available to unauthenticated users. For example, when you want to have public web pages available to customers before they log in, but locate the web server on a protected network.
- The ability to define a list of accessible resources for a single customer or a an entire group. For example, if you have several customer groups (teachers, students, visitors), each can be given access to specific network resources.
- The ability to block specific addresses for a single customer or entire group. For example, you could disallow traffic to file swapping Internet sites to cut down on bandwidth usage.

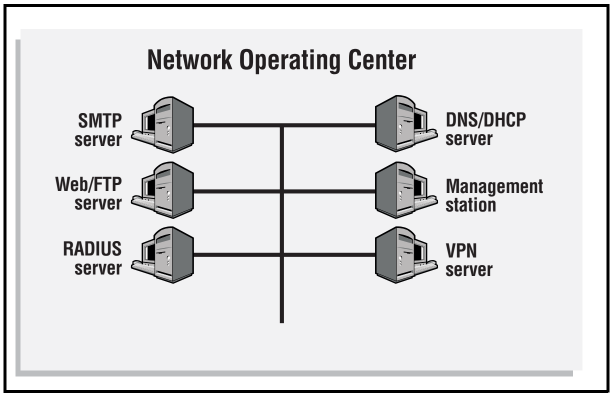
Attaching to a wired LAN

The CN3200 can be attached to a wired LAN. Computers on an attached wired LAN are treated just like those on the wireless LAN. Each computer must be authenticated before it can gain access to protected network resources.

To maintain network security, the wireless LAN and wired LAN are distinct. Traffic is not forwarded between them.

Network operating center (NOC)

The NOC is where the RADIUS, Web, SMTP, FTP, DHCP, DNS, VPN servers and the management station are installed.



NOC components

RADIUS server

The RADIUS server is used to authenticate customers when they log onto the network and record accounting information for each session. It is also used to store configuration settings for the CN3200 and customers. Before the CN3200 activates the public network, it must authenticate itself to the RADIUS server and retrieve its configuration information.

The CN3200 is compliant with RFC 2865 and RFC 2866 and will work with a variety of RADIUS servers.

Web/FTP server

If you intend to customize the look and feel of the public access interface, you will need a Web or FTP server to store your customized pages.

SMTP server

The CN3200 provides an e-mail redirection feature which enables customers to send e-mail using a SMTP server that you supply. If you intend to support this feature, you must install an SMTP server to handle redirected outgoing mail.

VPN server

The CN3200 can use its integrated VPN client (PPTP, IPSec) to create an encrypted connection to a VPN server. This is useful if the CN3200 is connected to a NOC via the Internet. The tunnel ensures the security of authentication traffic and remote management activities and enables you to manage all your CN3200s from a single remote site without security concerns.

DNS/DHCP server

The CN3200 can be configured to relay DHCP requests to an external server. This enables you to control address allocation for all wireless cells from a central location.

Management station

This station is used to control and configure the CN3200 and any satellite CN300s. Control can occur via an SNMP console or through the CN3200's web-based management tool.

Sending traffic to the NOC

For secure transmission of traffic between the CN3200 and the NOC, the CN3200 features both PPTP and IPSec clients. Chapter 10 explains how to configure secure remote connections.

The public access interface

The public access interface is the sequence of web pages that customers use to login to the wireless network and to manage their accounts.

The CN3200 ships with a default public access interface that you can customize to meet the needs of your installation. However, before you do this, you should initialize the default setup and test it with your network as described in Chapter 9. Once the default interface is working, you can make changes to it as described in Chapter 15.

Important: *The CN3200 public access interface is not functional until the CN3200 can successfully connect to a RADIUS server and authenticate itself. This means that the login page for the public access interface will appear, but customers will get an error when they try to log in. This occurs regardless of the method you are using to authenticate customers.*

Important: *Customers using PDAs that only support a single browser window will have difficulty using the public access interface in its standard configuration. To solve this problem, see "Supporting PDAs" on page 172.*

Connecting to and using the wireless network

In order to access protected network resources, customers must:

- successfully connect to the wireless network
- open the login page in their web browser and supply a valid username and password OR login with an 802.1x or WPA client (if this feature is enabled on the CN3200)

The CN3200 provides several features that make it easy for customers to accomplish these tasks.

Broadcast IP address

This feature enables the CN3200 to broadcast its wireless network name (SSID) to all client stations. Most wireless adapter cards have a setting that enables them to automatically discover access points that broadcast their names and automatically connect to the one with the strongest signal.

This feature is enabled by default. To disable it go to the **Network** > **Wireless** page in the CN3200 management tool. If you disable this feature, customers must manually specify the SSID you define for the wireless network.

Allow any IP address

This feature enables the CN3200 to connect with wireless client stations that are using a static IP address that is not on the same segment as the wireless network. This permits customers to access the wireless network without reconfiguring their network settings.

For example, by default the CN3200 assigns creates the wireless network on the subnet 192.168.1.0. If a client station is pre-configured with the address 10.10.4.99, it will still be able to connect to the CN3200 without changing its address, or settings for DNS server and default gateway.

This feature is enabled by default. To disable it go to the **Security** > **Authentication** > **Advanced Settings** page in the CN3200 management tool.

WPA/802.1x clients

The CN3200 provides complete support for these clients. User accounts are managed remotely on a RADIUS server.

Proxy server support

This feature enables the CN3200 to support client stations that are configured to use a proxy server for HTTP and HTTPS, without requiring customers to reconfigure their systems.

This feature is disabled by default. To enable it, go to the **Client station settings** box on the **Security** > **Authentication** > **Advanced Settings** page.

For this feature to work, client stations:

- must not be using a proxy server on port 21, 23, 25, 110, 443, 8080, or 8090. To support ports 8080 and 8090 change the settings for **Security** > **Authentication** > **Advanced Settings** > **Access controller ports**.
- must be using the same proxy server address and port number for both HTTP and HTTPS.
- must not be using 802.1x.

Enabling this feature reduces the maximum number of supported wireless customers to 50.

The RADIUS server

Main tasks

The RADIUS server is a key component of the public access infrastructure. It is used to perform a variety of tasks, including:

- authenticating the CN3200
- authenticating administrator logins
- authenticating customer logins
- storing accounting information for each customer
- storing customization information for the public access interface

Authenticating the CN3200 and storing config information

The CN3200 authenticates itself to a RADIUS server each time:

- it is powered up
- it is restarted
- the authentication interval expires (configured via the management tool)

At each authentication, the following configuration information is retrieved if defined in the RADIUS profile for the CN3200:

- Access list defining the resources unauthenticated customers can access.
- URLs specifying the location of customized Web pages and supporting files.
- A URL specifying the location of a custom security certificate.
- A URL specifying the location of a configuration file.
- The MAC addresses of devices to authenticate.
- The default idle timeout for customer sessions.
- The default address for the SMTP redirection

When you set up a profile for the CN3200 on the RADIUS server you define this information in the form of a Colubris Networks vendor-specific attribute. For details see page 214.

Authenticating customers and storing accounting information

See page 30 for details.

Authenticating administrator logins

The RADIUS server can also be used to authenticate administrator logins. This enables you to have multiple administrators, each with their own username and password, instead of the single account controlled on the **Management > Management tool** page.

More information

For information on configuring the RADIUS server, see:

- Chapter 16, which explains all the settings you can define on the RADIUS server for your customer accounts and network operation.
- Chapter 18, which provides a walkthrough of a sample RADIUS configuration using Steel-belted Radius.
- Chapter 19, which provides a walkthrough of a sample RADIUS configuration using Microsoft's RADIUS server: Internet Authentication Service.

Customer authentication

This manual uses the term *customer* to refer to any person or device that logs into the public access network created by the CN3200.

Customers can be authenticated in several ways.

RADIUS server

This method enables you to use the services of a RADIUS server to manage your customers, track and manage connection time, and generate billing information.

Once the customer is authenticated, configuration information is retrieved for the customer. This includes settings for:

- Connection time limit for the customer's session.
- Idle time limit for the customer's session.
- Access list for the customer.
- Address of the e-mail server to use for redirection of the customer's e-mail.
- URLs specifying the location of customized Welcome and Goodbye pages for the customer.

When you define a profile for each customer on the RADIUS server you define this information in the form of regular RADIUS attributes and a Colubris Network vendor-specific attribute. See "Creating customer profiles on the RADIUS server" on page 225 for more information.

Local user list

The CN3200 enables you to create local accounts that bypass RADIUS authentication and accounting. To login, customers use the public access interface, but instead of using the RADIUS server, authentication is handled directly by the CN3200 and no RADIUS accounting information is logged. These accounts are useful for system administrators and management personnel.

Note: *Local users can must use HTML to login. WPA/802.1x users must be authenticated via RADIUS.*

To setup these accounts, login to the management tool and open the **Security > User List** page.

MAC-based authentication

The CN3200 can authenticate devices based on their MAC address. This is useful for authenticating devices that do not have a web browser (cash registers, for example). These devices do not log in through the public access interface, rather, as soon as the CN3200 sees their MAC address appear on the network, the CN3200 attempts to authenticate them. To setup these accounts, see page 223.

WPA/802.1x

The CN3200 provides full support for users with 802.1x or WPA client software. The CN3200 terminates the session and authenticates users via an external RADIUS server or by using preshared keys (WPA only).

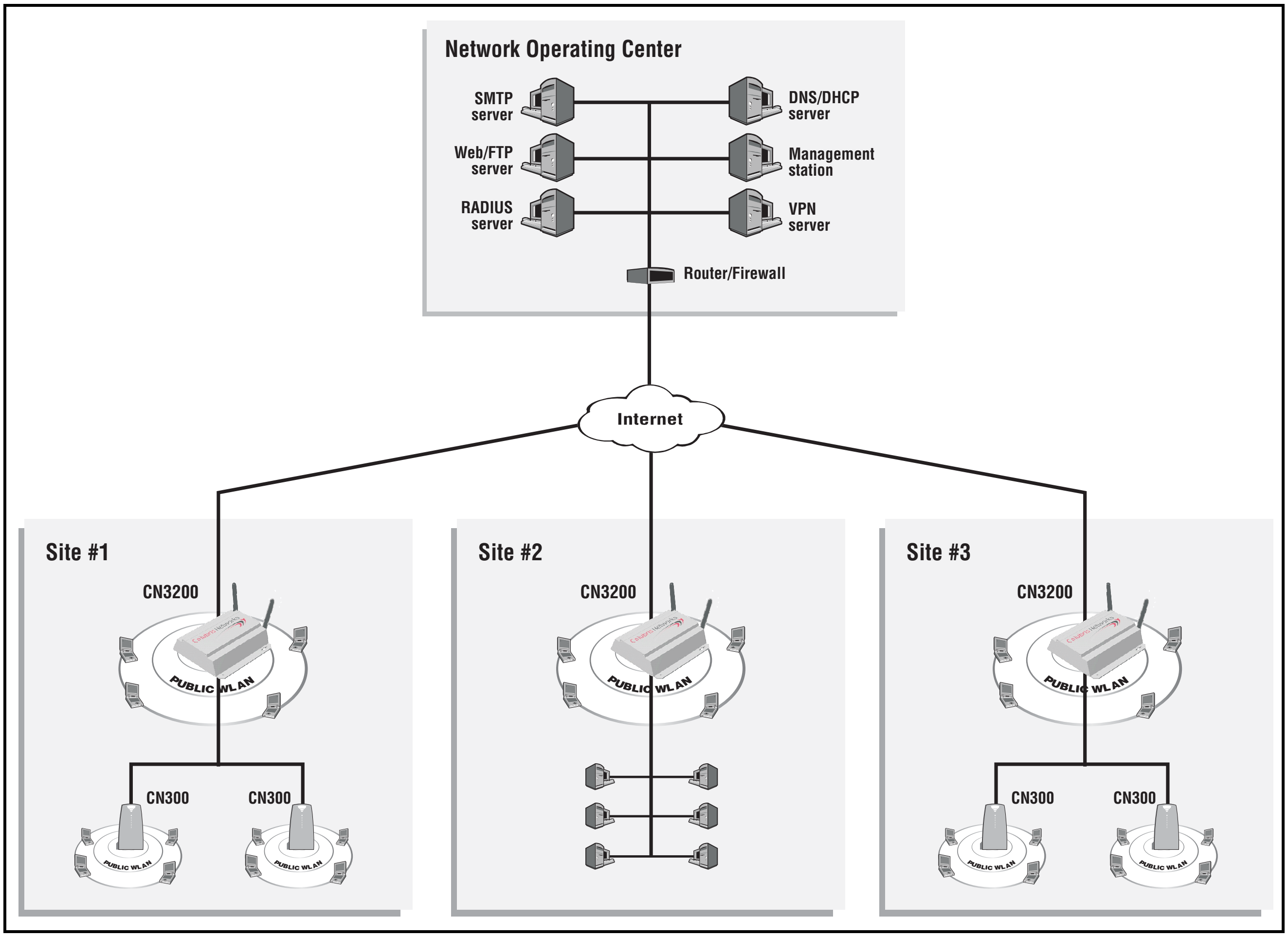
The CN3200 supports 802.1x client software that uses EAP-TLS, EAP-TTLS, and PEAP. Dynamic key rotation is supported.

Chapter 3

Planning your installation

This chapter provides sample deployment strategies for two common scenarios. These scenarios will give you a good idea on how to approach your installation.

Multi-site installation



About this installation

- A single CN3200 is installed along with one or more CN300 satellites at sites #1 and #3.
- At site #2, the CN3200 provides a wireless network and is also connected to a LAN to enable a number of wired computers to act as public access stations.
- Each CN3200 is connected to the Internet via a broadband modem. The Internet connection is protected by the CN3200's firewall.
- A VPN connection is established between each CN3200 and the VPN server at the NOC. This protects all management traffic exchanged between the CN3200s and the NOC, which includes:
  - RADIUS authentication and accounting data.
  - Management session used to control CN3200 configuration and firmware updates.
- Centralized management of customer profiles on the RADIUS server enables customers to login at any location.

Installation strategy

General configuration tasks

Step	Description	See
1	Setup and configure profiles on the RADIUS server(s).	Pages 213 to 232
2	Create custom web pages for the public access interface. (optional)	Chapter 15
3	Create custom certificates. (optional)	Chapter 14

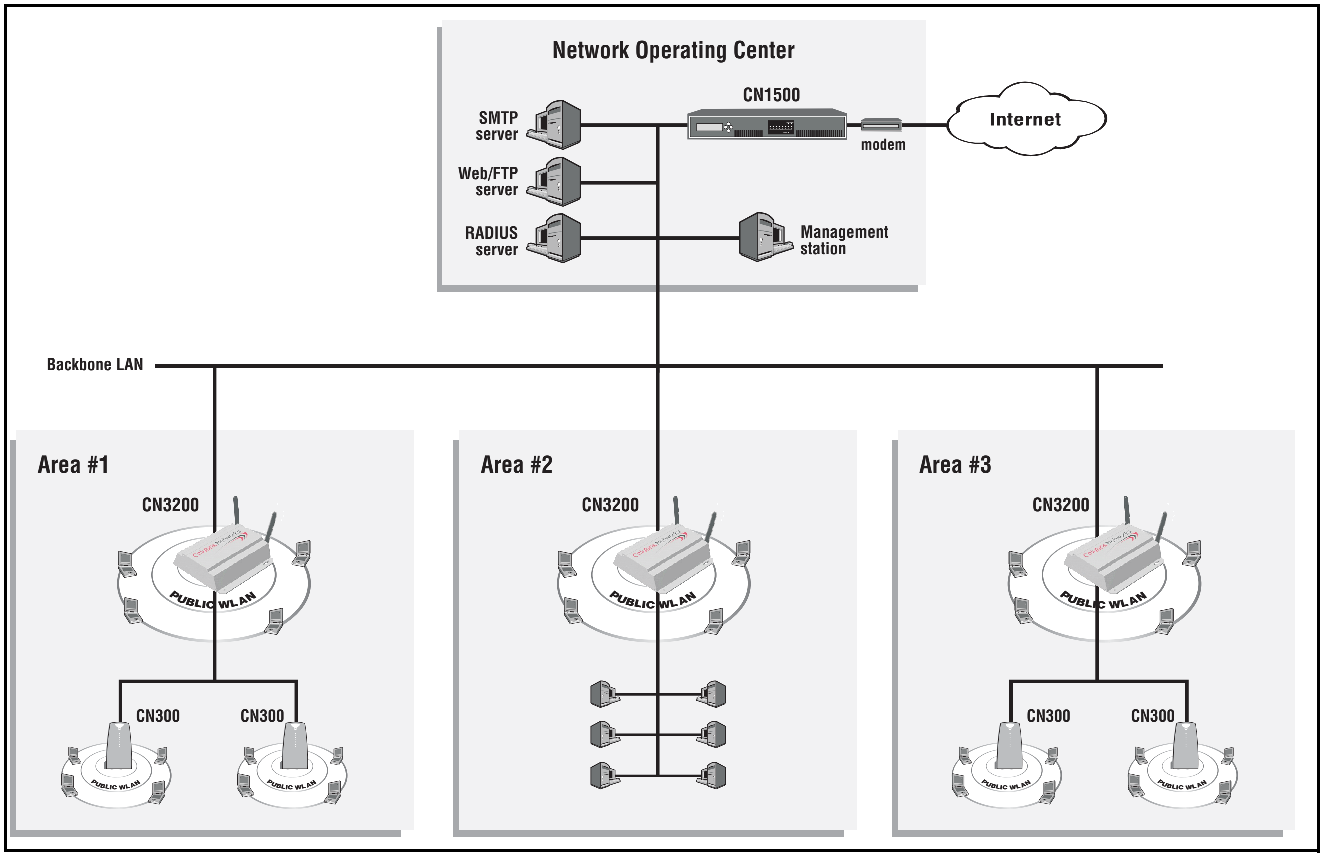
Site #1 and #3

Step	Description	See
1	Setup the CN3200.	Chapter 4
2	Establish a connection to the management tool.	Pages 44 and 46
3	Define management tool security settings.	Page 49
4	Configure and deploy the multi-cell wireless network with the CN300s.	Chapter 6
5	Configure the Internet connection and firewall.	Chapter 8
6	Start the public access interface.	Chapter 9
7	Configure a VPN connection to the NOC.	Chapter 10

Site #2

Step	Description	See
1	Setup the CN3200.	Chapter 4
2	Establish a connection to the management tool.	Pages 44 and 46
3	Define management tool security settings.	Page 49
4	Configure the wireless network.	Chapter 6
5	Connect the CN3200 to the local wired LAN.	Chapter 7
6	Configure the Internet connection and firewall.	Chapter 8
7	Start the public access interface.	Chapter 9
8	Configure a VPN connection to the NOC.	Chapter 10

Multi-area installation



About this installation

- A single CN3200 is installed along with one or more CN300 satellites at areas #1 and #3.
- At area #2, the CN3200 provides a wireless network and is also connected to a LAN to enable a number of wired computers to act as public access stations.
- Each CN3200 is connected to the NOC via the backbone LAN.
- Centralized management of customer profiles on the RADIUS server enables customers to login to the wireless network in any area.

Installation strategy

General configuration tasks

Step	Description	See
1	Setup and configure profiles on the RADIUS server(s).	Pages 213 to 232
2	Create custom web pages for the public access interface. (optional)	Chapter 15
3	Create and install a custom certificate (optional).	Chapter 14

Area #1 and #3

Step	Description	See
1	Install the CN3200.	Chapter 4
2	Establish a connection to the management tool.	Pages 44 and 46
3	Define management tool security settings.	Page 49
4	Configure and deploy the multi-cell wireless network with the CN300s.	Chapter 6
5	Connect the Internet port to the backbone LAN and configure IP addressing.	Page 79
6	Start the public access interface.	Chapter 9

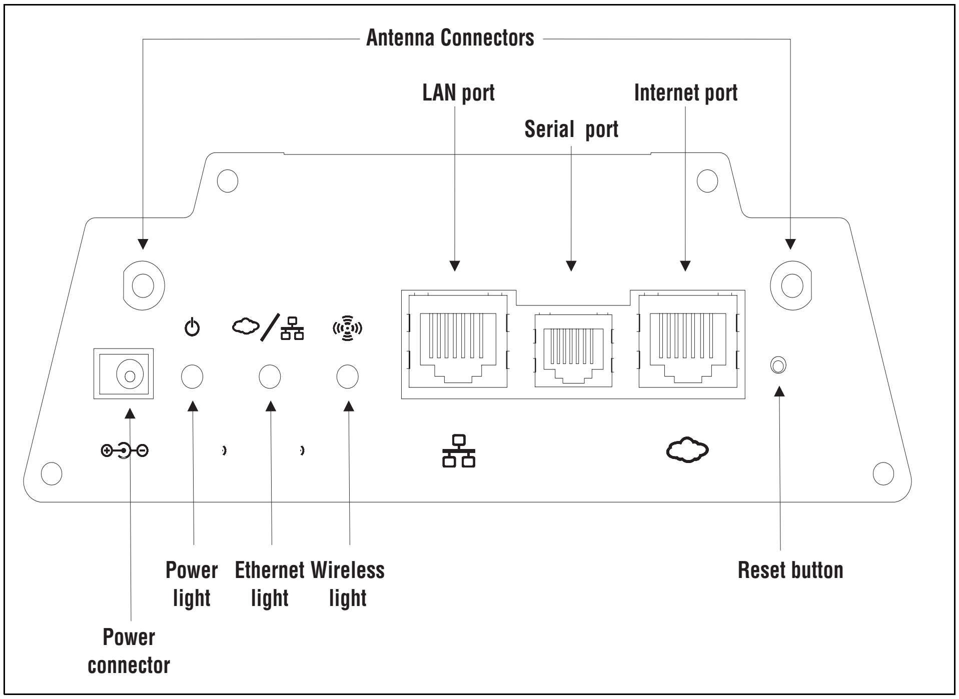
Area #2

Step	Description	See
1	Install the CN3200.	Chapter 4
2	Establish a connection to the management tool.	Pages 44 and 46
3	Define management tool security settings.	Page 49
4	Configure the wireless network.	Chapter 6
5	Connect the CN3200 to the local wired LAN.	Chapter 7
6	Connect the Internet port to the backbone LAN and configure IP addressing.	Page 79
7	Start the public access interface.	Chapter 9

Chapter 4
Installation

This chapter provides an overview of the CN3200 hardware and explains how to install it.

Anatomy



Antenna connectors

The CN3200 has two antenna connectors. Both can transmit and receive. If a single antenna is used it can be attached to either connector.

The connectors are SMA male with reverse polarity. This means antennas or cable connectors must be SMA female with reverse polarity. Antennas should be 2 dBi or less and can be either directly attached or attached via a coax cable.

Antenna diversity

The CN3200 supports antenna diversity. One benefit of this feature is that for a given client station connection, the CN3200 always transmits on the antenna it receives.

If transmission fails, the CN3200 automatically switches antennas and retries.

Ports

The CN3200 has three ports:

LAN port

The CN3200 has two antenna connectors. Both can transmit and receive. If a single antenna is used it can be attached to either connector. The connectors are SMA male with reverse polarity. This means antennas or cable connectors must be SMA female with reverse polarity. Antennas should be 2 dBi or less and can be either directly attached or attached via a coax cable.

Serial port

For future use. Do not connect this port to telecommunications equipment or a phone line.

Internet port

10/100 mbps Ethernet port with RJ-45 connector. Do not connect this port directly to a metropolitan area network (MAN) or wide area network (WAN).

Powering the CN3200

There are two ways to power the CN3200: DC adapter or PoE.

DC power adapter

The supplied DC power adaptor provides 2A at 5V.

Important: *The power adapter is not rated for use in plenum installations.*

Power over Ethernet (PoE)

The CN3200 supports PoE on the LAN port and can be used with any IEEE 802.3af-compliant power injector.

Important: *Cisco PoE injectors are not compliant with IEEE 802.3af and cannot be used with the CN3200.*

Status lights

The status lights provide the following operational information.

Power

on	The CN3200 is fully operational.
flashing	The CN3200 is starting up.
off	Power is off.

Ethernet

on	LED comes on for a short period when the link is established.
flashing	Indicates that either port is transmitting or receiving.
off	Ports are not connected or there is no activity.

Wireless

flashing	Wireless port is receiving data.

Startup behavior

When power is applied to the CN3200, the power light will start flashing. When the power light stops flashing, initialization is complete and the CN3200 is fully operational.

Radio

The CN3200 provides support for IEEE 802.11a and 802.11b/g technologies in a single radio which can be configured in real-time for complete flexibility of operation.

- When operating in 802.11a mode, the radio supports data rates of up to 54 Mbps and eight non-overlapping channels.
- When operating in 802.11b/g mode, the radio provides data rates up to 54 Mbps and three non-overlapping channels to support both 802.11b and 802.11/g client stations.

Reset button

The reset button is located on the rear of the CN3200. Use the end of a paper clip or another pointy object to press the button.

Restarting

Press and release the button quickly to restart the CN3200. This is equivalent to disconnecting and reconnecting the power. The CN3200 will restart immediately.

Resetting to factory defaults

To reset the CN3200 to its factory default settings, do the following:

1. Press and hold the reset button. All the lights on the CN3200 front panel will light up.
2. When the lights begin to flash (after about five seconds), immediately release the button.
3. The CN3200 will restart with factory default settings. When the power light stops flashing, the CN3200 is fully operational.

Important: *Resetting the CN3200 deletes all your configuration settings, resets the Administrator username and password to 'admin', and sets the Wireless port IP address to 192.168.1.1 and the LAN port IP address 192.168.4.1.*

The management tool can also be used to reset the CN3200 to its factory defaults. See "Configuration management" on page 53 for details.

Installing the CN3200

Important: *Installation must be performed by a professional installer familiar with local regulations governing wireless devices.*

Mounting the CN3200

When mounting the CN3200 on a wall, ceiling or other surface, make sure that:

- the surface you attach the CN3200 to and the fasteners you use are able to support at least 5.1 kg (11.25 pounds)
- cable pull (accidental or otherwise), must not make the unit exceed the 5.1 kg (11.25 pound) limit

Plenum installations

Plenum rated cables and attachment hardware must be used if the CN3200 is installed in a plenum. Since the power adapter is not rated for plenum installations, only the CN3200 and appropriate cabling can be located in the plenum.

Note: *If Colubris Networks supplied PoE injectors are used in a plenum installation, they must be located outside the plenum.*

Configuring the CN3200

Before attaching the CN3200 to your network, it is recommended that you start the management tool and define basic configuration settings as described in Chapter 5.

By default, the CN3200 is configured to operate as a DHCP server with a network address of 192.168.1.1 on the wireless and 192.168.4.1 on the LAN port.

The Internet port is configured to operate as a DCHP client.

Refer to Chapter 7 for complete instructions on how to attach the CN3200 to your network.

Chapter 5
The management tool

This chapter provides an overview of the Web-based management tool and explains how to use it to perform management and configuration tasks.

Overview

The management tool is a Web-based interface to the CN3200 that provides easy access to all configuration functions.

Important: *Only one administrator can be logged into the management tool at a given time. If a second administrator logs in while the first is connected, the first administrator is logged out.*

Management station

The management station is the computer that you use to connect to the management tool. To act as a management station, a computer must:

- have a JavaScript-enabled Web browser installed (Netscape 4.04 or higher, or Internet Explorer 5.0 or higher).
- be able to establish an IP connection with the CN3200

Configuring the management station for wireless access

Install and configure the wireless adapter in the management station according to the directions that came with it. During installation make sure that:

- encryption is disabled
- TCP/IP is installed and configured. IP addressing can be either static or DHCP. A unique feature of the CN3500 is its ability to support connections from client stations that have a preconfigured static IP address.
- Set the SSID to be “Colubris Networks”.

Configuring the management station for wired access

Install and configure a network adapter in the management station according to the directions that came with it. During installation make sure that:

- TCP/IP is installed and configured. IP addressing can be either static or DHCP. A unique feature of the CN3500 is its ability to support connections from client stations that have a preconfigured static IP address.

Management scenarios

The CN3200 can be managed both locally and remotely for complete flexibility. The following management scenarios are supported:

Local Management

Remote management

Default settings

The following are some important default settings

Wireless port

- IP address: 192.168.1.1
- Wireless network name: Colubris Networks
- Operating frequency: Channel 10
- ESSID broadcast: On

- Relay between wireless station: Off
- Security: None

LAN port

- IP address: 192.168.1.1
- DHCP server: On

Internet port

- IP address: (DHCP client is active)
- Firewall: High security

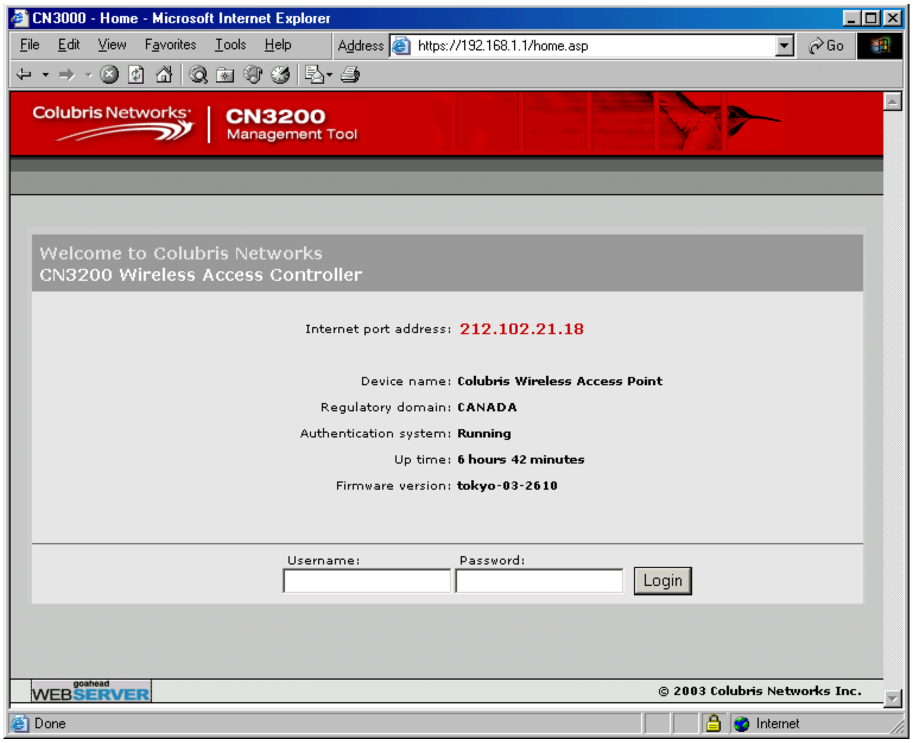
Management tool

- Allow access via LAN port and port
- Login name: admin
- Password: admin

Starting the management tool

1. Start your Web browser.
2. Press Enter. You will be prompted to accept a Colubris Networks security certificate. Do so to continue. (To eliminate this warning message you can install your own certificate as described in Chapter 14.)

   To safeguard the security of the CN3200, access to the management tool must occur via a secure connection. Before this connection can be established, you must accept a Colubris Networks security certificate. The procedure for accepting the certificate varies depending on the browser you are using.
3. After you accept the Colubris Networks certificate, the management tool home page opens.


CN3000 - Home - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Address https://192.168.1.1/home.asp
Go
Colubris Networks
CN3200
Management Tool

Welcome to Colubris Networks
CN3200 Wireless Access Controller

Internet port address: 212.102.21.18

Device name: Colubris Wireless Access Point
Regulatory domain: CANADA
Authentication system: Running
Up time: 6 hours 42 minutes
Firmware version: tokyo-03-2610

Username:
Password:
Login
goahead WEBSERVER
© 2003 Colubris Networks Inc.
Done
Internet

By default, the username and password are both set to **admin**.

Menu summary

The following is a brief overview of the management tool menu options. **For detailed information on each option and its parameters, consult the online help,** which is available by clicking the help icon that appears in the top right corner of most boxes:

?

Home

Displays basic status information on the operation of the CN3200. For a description of the information on the home page, see page 14.

Wireless

Wireless overview

Provides a summary of important wireless settings.

Wi-Fi

Use this page to configure the operating characteristics of the wireless network.

WLAN profiles

Use this page to define multiple SSIDs.

Wireless links

Use this page to define point-to-point links to other access points.

Neighborhood

Use this page to do s site survey and discover other wireless access points that are operating nearby.

Network

Address allocation

Lets you configure the CN3200 to act as a DHCP server or DHCP relay agent, and also to setup bandwidth management.

IP routes

Lets you define routes to send traffic to the appropriate destination. This is useful when the CN3200 is connected to a wired LAN which provides access to other networks.

DNS

Enables you to override the default DNS servers assigned to the CN3200.

GRE

Lets you define GRE tunnels.

NAT

Lets you define static IP routes to make computers on the internal network (WLAN or a connected wired LAN) visible to external computers. For example, this can be used to run an FTP or Web server on the internal network.

RIP

Configures support for RIP.

Security

The security menu lets you define all security-related settings.

RADIUS

This is where you define the settings the CN3200 uses to communicate with external RADIUS servers.

Firewall

Configures the settings for the built-in firewall that protects the Internet port.

PPTP client

Configures the settings for the PPTP client which enables the CN3200 to establish a secure connection to a remote PPTP server via the Internet port.

IPSec

Configures the settings for the IPSec client which enables the CN3200 to establish a secure connection to an IPSec peer via the Internet port.

Certificates

Use this option to manage the SSL certificates used by the CN3200.

Users

This is where you define user accounts when customer authentication is handled directly by the CN3200, rather than using a RADIUS server.

Management

The management menu enables you to configure the operation of the management tool and its SNMP implementation.

Management tool

Use this page to set the admin name and password, and define security parameters that control access to the management tool.

SNMP

Configures SNMP properties and security settings.

System time

Configures system time.

Lets you view the status of other active Colubris access points.

Status

Use this option to view the status of the various components on the CN3200.

Tools

Provides diagnostic tools that can be used to investigate anomalies. Generally, you will use these only under the direction of your reseller. These tools also enable you to view the system log. The system log contains a record of all significant events that occur on the CN3200. This information is useful when troubleshooting the CN3200 with the assistance of your reseller. If needed, the system log can be configured to forward entries to a remote syslog server on the LAN or via the Internet.

Maintenance

Lets you manage configuration and firmware files and save system information for troubleshooting purposes.

Management tool security

The management tool is protected by the following security features.

Administrator password

Access to the CN3200 management tool is protected by a username and password to safeguard configuration settings. The factory default setting for both is **admin**. It is recommended that you change both.

To change the username and/or password, do the following:

1. On the main menu, click **Management**. The *Management tool configuration* page opens.
2. In the **Administrator authentication** box, enter the new username, current password, the new password, and then repeat the new password for confirmation.
3. Click **Save** when you are done.

Validating administrator logins using a RADIUS server

You can use a RADIUS server to authenticate logins to the management tool. One advantage of this is that it enables you to create several administrator accounts, each with its own username and password.

Important: *Make sure that the RADIUS profile you select is configured and that the administrator account is defined on a functioning RADIUS server. If not, you will not be able to log back into the CN3200 because the administrator password cannot be authenticated.*

To setup RADIUS authentication, do the following:

1. On the main menu, click **Security** then click **RADIUS.**
2. Click **Add a New Profile**.
3. Define the settings for the RADIUS profile you want to use to validate administrator logins. Either use an existing profile or add a new profile.
4. Click **Save**.
5. On the main menu, click **Management**.
6. Click **Management tool**.
7. In the **Administrator authentication** box, select the RADIUS server you defined in step 2.
8. Click **Save**.

If you forget the administrator password

The only way to gain access to the management tool if you forget the administrator password is to reset the CN3200 to factory default settings. “Resetting to factory defaults” on page 40

Connection security

To maintain the integrity of the configuration settings, only one user can be connected to the management tool at a given time. To prevent the management tool from being locked up by an idle user two mechanisms are in place:

- If a user’s connection to the management tool remains idle for more than ten minutes, the CN3200 automatically logs the user out.

- If a second user connects to the management tool and logs in with the correct username and password, the first user's session is terminated.

HTTPS

Communications between the management station and the CN3200 occurs via HTTPS. Before logging onto the management tool, users must accept a Colubris Networks certificate. You can replace this certificate with your own. For more information see, Chapter 14.

Remote management security

Secure remote management is possible using the integrated PPTP and IPSec client software. This enables the CN3200 to create a secure tunnel to a remote server using a public network (Internet). This can also be used to secure automatic configuration updates and communications with a remote RADIUS server or Web server. For details, see Chapter 10.

Security settings

The CN3200 can be managed both locally and remotely for complete flexibility. Management occurs via the Web-based management tool which resides on the CN3200. For details see "Management scenarios" on page 44.

To configure security options

1. On the main menu, click **Management**. The *Management tool configuration* page opens.
2. In the **Security** box, enable the management options you require. The options are described in the section that follows.
3. Click **Save**.

Security options

Allowed addresses

Lets you define a list of IP address from which access to the management tool is permitted. To add an entry, specify the IP address and appropriate mask and click **Add**.

When the list is empty, access is permitted from any IP address.

Active interfaces

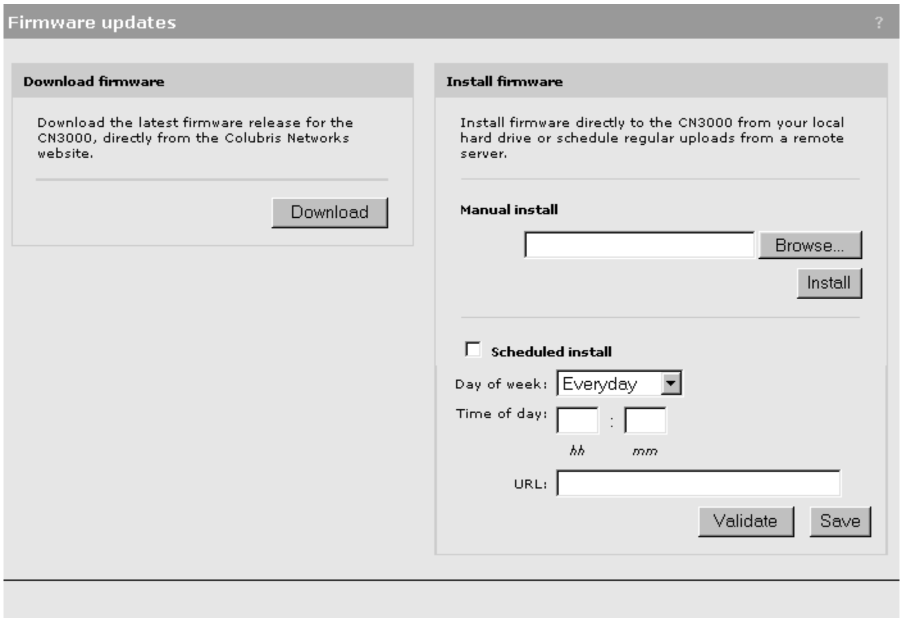
Choose the interfaces through which client stations will be able to access the management tool.

Firmware management

The firmware is special software that controls the operation of the CN3200. Periodically, Colubris Networks will make new versions of the firmware available. Firmware updates can be handled manually, automatically, or with a tool like cURL.

Manual update

1. On the **Maintenance** menu, click **Firmware updates**.



Firmware updates

Download firmware

Download the latest firmware release for the CN3000, directly from the Colubris Networks website.

Install firmware

Install firmware directly to the CN3000 from your local hard drive or schedule regular uploads from a remote server.

Manual install

□ Scheduled install

Day of week: Everyday

Time of day: __ : __

URL:

2. In the **Download firmware** box, click the **Download** button to retrieve the latest firmware from the Colubris Networks web site and save it to your computer's hard drive.
3. Unzip the file.
4. In the **Install firmware** box, click the **Browse** button and select the *.cim file you just unzipped.
5. Click **Install**.

Note: *The CN3200 will automatically restart after the firmware has been installed to activate it. This will disconnect all client stations. Once the CN3200 resumes operation, all client stations will have to reconnect.*

Note: *Configuration settings are preserved during firmware upgrades.*

Scheduled install

The CN3200 can automatically retrieve and install firmware from a local or remote URL. By placing CN3200 firmware on a web or ftp server, you can automate the update process for multiple units.

When the update process is triggered, the CN3200 retrieves the first few bytes of the firmware file to determine if it is different than the active version. If different, the firmware is download and installed. Configuration settings are preserved. However, all connections will be terminated forcing customers to log in again.

Using cURL

It is possible to automate management tasks using a tool like cURL. cURL is a software client that can be used to get/send files to/from a server using a number of different protocols (HTTP, HTTPS, FTP, GOPHER, DICT, TELNET, LDAP or FILE).

cURL is designed to work without user interaction or any kind of interactivity. It is available for Windows and LINUX at: http://curl.haxx.se/. You must use version 7.9.8 or higher.

The following cURL commands illustrate how to update the firmware. The following setup is assumed:

- IP address of the CN3200's Internet port is 24.28.15.22.
- Management access via the Internet port is enabled.
- Firmware is located in the file: CN3200.CIM

Login to the management interface.

```
curl --dump-header cookie.txt -s -m 60 "https://24.28.15.22/
goform/Logout?username=admin&pw=admin"
```

Prepare the CN3200 to receive the firmware update.

```
curl --cookie cookie.txt -m 60 "https://24.28.15.22/script/
firmware_init.asp"
```

Upload the firmware. Once the upload is complete the CN3200 will automatically restart.

```
curl --cookie cookie.txt -s -m 600 -F firmware=@CN3200.cim -F
backup=Install "https://24.28.15.22/goform/ScriptUploadFirmware"
```

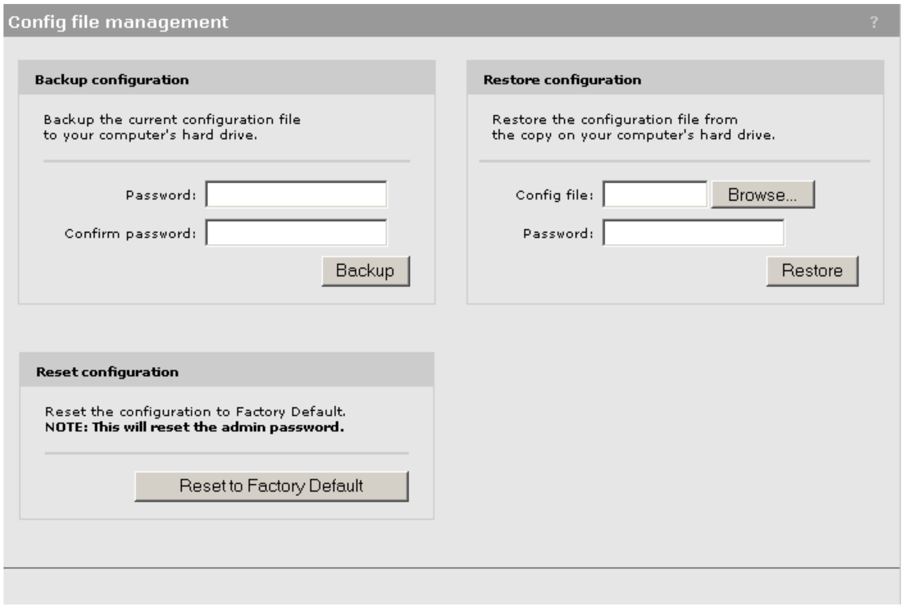
Configuration management

The configuration file contains all the settings that customize the operation of the CN3200.

You can save and restore the configuration file manually, automatically, or with a tool like cURL.

Manual management

Use the **Config file management** option on the **Maintenance** menu to manage your configuration file.



Backup the current configuration file to your computer's hard drive.

Restore the configuration file from the copy on your computer's hard drive.

Reset the configuration to Factory Default.
NOTE: This will reset the admin password.

The following three options are available:

Backup configuration file

This option enables you to backup your configuration settings so they can be easily restored in case of failure. This option is also used when you want to directly edit the configuration file. See Chapter 21 for details.

Reset configuration

Use this option to return the configuration of the CN3200 to its factory default settings.

Note: *Resetting sets the administrator password to 'admin' and resets all configuration settings.*

Restore configuration file

Enables you to restore a configuration from a previously saved backup.

This feature enables you to maintain several configuration files with different settings, which can be useful if you frequently need to alter the configuration of the CN3200, or if you are managing several CN3200s from a central site.

Using cURL

It is possible to automate management tasks using a tool like cURL. cURL is a software client that can be used to get/send files to/from a server using a number of different protocols (HTTP, HTTPS, FTP, GOPHER, DICT, TELNET, LDAP or FILE).

cURL is designed to work without user interaction or any kind of interactivity. It is available for Windows and LINUX at: http://curl.haxx.se/. You must use version 7.9.8 or higher.

The following cURL commands illustrate how to manage the configuration file. The following setup is assumed:

- IP address of the CN3200's Internet port is 24.28.15.22.
- Management access to the Internet port is enabled.
- Configuration file is located in CN3200.CFG.

Uploading the configuration file

1. Login to the management interface.

```
curl --dump-header cookie.txt -s -m 60 "https://24.28.15.22/goform/
Logout?username=admin&pw=admin"
```

2. Prepare the CN3200 to receive the configuration update.

```
curl --cookie cookie.txt -m 60 "https://24.28.15.22/script/
config_init.asp"
```

3. Upload the configuration file.

```
curl --cookie cookie.txt -s -m 600 -F config=@CN3200.cfg -F backup=Restore
"https://24.28.15.22/goform/ScriptUploadConfig"
```

4. Reset the CN3200 to activate the new configuration.

```
curl --cookie cookie.txt -s -m 60 "https://24.28.15.22/script/reset.asp"
```

Downloading the configuration file

1. Login to the management interface.

```
curl --dump-header cookie.txt -s -m 60 "https://24.28.15.22/
goform/Logout?username=admin&pw=admin"
```

2. Download the configuration file.

```
curl --cookie cookie.txt "https://24.28.15.22/download/config.cfg"
-o config.cfg
```

3. Logout.

```
curl --cookie cookie.txt -s -m 4 "https://24.28.15.22/goform/
Logout?logout=Logout"
```

Resetting the configuration to factory defaults

1. Login to the management interface.

```
curl --dump-header cookie.txt  -s -m 60 "https://24.28.15.22/
goform/Logout?username=admin&pw=admin"
```

2. Reset configuration to factory defaults.

```
curl --cookie cookie.txt -m  5 "https://24.28.15.22/goform/
ScriptResetFactory?reset=Reset+to+Factory+Default"
```

3. Reset the CN3200 to activate the new configuration.

```
curl --cookie cookie.txt -s -m 60 "https://24.28.15.22/script/
reset.asp"
```

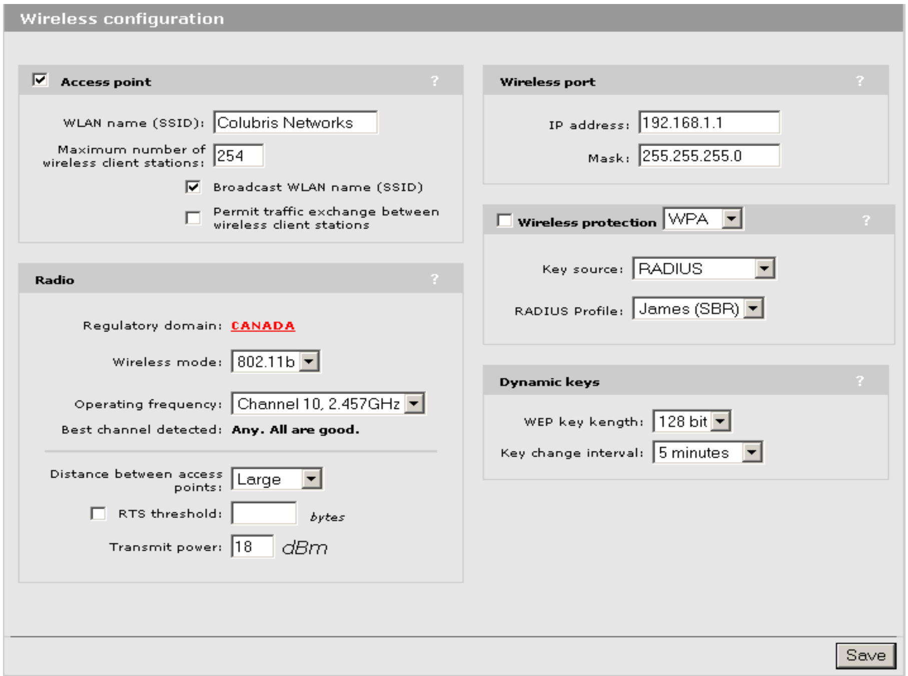
Chapter 6
WLAN configuration

This chapter explains how to setup a wireless network with the CN3200.

Setting up the wireless LAN

Configuration procedure

1. On the main menu, click **Wireless,** and then click **Wi-Fi**. The *Wireless configuration* page opens.



Wireless configuration

☑ Access point

WLAN name (SSID): Colubris Networks

Maximum number of wireless client stations: 254

☑ Broadcast WLAN name (SSID)

□ Permit traffic exchange between wireless client stations

Radio

Regulatory domain: CANADA

Wireless mode: 802.11b

Operating frequency: Channel 10, 2.457GHz

Best channel detected: **Any. All are good.**

Distance between access points: Large

□ RTS threshold: bytes

Transmit power: 18 dBm

Wireless port

IP address: 192.168.1.1

Mask: 255.255.255.0

□ Wireless protection WPA

Key source: RADIUS

RADIUS Profile: James (SBR)

Dynamic keys

WEP key kength: 128 bit

Key change interval: 5 minutes

2. Configure the parameters as described in the sections that follow.
3. Click **Save** when you are done.

Access point

Enable this option to activate the wireless access point. When this option is disabled, wireless client stations will not be able to connect.

WLAN name (SSID)

Specify a name to uniquely identify your wireless network. Each client computer that wants to connect to the CN3200 must use this name. The name is case-sensitive.

Maximum number of wireless client stations

Specify the maximum number of wireless client stations that can be connected to the CN3200 at the same time.

Important: The total number of wireless connections that can be active at any given time across all WLAN profiles is 100.

Broadcast WLAN name (SSID)

When this option is enabled, the CN3200 will broadcast its wireless network name (SSID) to all client stations. Most wireless adapter cards have a setting that enables them to automatically discover access points that broadcast their names and automatically connect to the one with the strongest signal.

If you disable this option, client stations will have to specify the network name you enter for **WLAN name** when they connect.

Radio

Regulatory domain

This parameter is not supported for all wireless cards. It will only appear when the appropriate wireless card is installed in the CN3200.

Choose your country. This changes the available operating frequencies according to the regulatory standards in your country.

Wireless mode

Choose the mode the radio will operate in.

Operating frequency

Select the frequency the CN3200 will operate at. The frequencies that are available are determined by the radio installed in your CN3200 and the regulations that apply in your country.

For optimum performance, choose a frequency that differs from other wireless access points operating in neighboring cells by at least 25 MHz. For more information see “Configuring overlapping wireless cells” on page 66. Consult the **Wireless > Neighborhood** page to view a list of access points currently operating in your area. (If this option is not visible, it is not supported by the radio installed in the CN3200.)

Best channel detected

The CN3200 automatically scans all available channels and lists the channel with the best signal quality. Use this as a guide to select the best operating frequency.

Distance between access points

Use this parameter to adjust the receiver sensitivity of the CN3200. This parameter should only be changed if:

- you have more than one wireless access point installed in your location
- you are experiencing throughput problems

In all other cases, use the default setting of **Large**.

If you have installed multiple CN3200s, reducing the receiver sensitivity of the CN3200 from its maximum will help to reduce the amount of crosstalk between the wireless stations to better support roaming clients. By reducing the receiver sensitivity, client stations will be more likely to connect with the nearest access point.

RTS threshold

Use this parameter to control collisions on the link that can reduce throughput. If the **Status -> Wireless** page shows increasing values for **Tx multiple retry frames** or **Tx single retry frames**, you should adjust this value until the errors clear up. Start with the largest value and slowly decrease until errors are minimized. Note that using a small value for **RTS threshold** can affect throughput.

How it works

If a packet is larger than the threshold, the local CN3200 will hold it and issue a *request to send* (RTS) message to the remote CN3200. Only when the remote CN3200 replies with a *clear to send* (CTS) message will the local CN3200 send the packet. Packets smaller than the threshold are transmitted without this handshake.

Transmit power

This parameter is not supported for all wireless cards. It will only appear when the appropriate wireless card is installed in the CN3200.

Use this parameter to set the transmission power of the wireless radio. Depending on the card you may have the option of selecting values from a list or by directly specifying power in dBM.

Important: *Regardless of the power value you set, the maximum power output will be adjusted internally based on the selected regulatory domain (if supported) and operating frequency.*

List values

- HIGH: Sets the maximum transmission power the wireless card is capable of. It will be either 100mW (20dBm) or 200mW for North America (23dBm).
- MEDIUM - 17dBm (17 dBm)
- LOW - 13dBm (13 (dBm)

Wireless port

IP address

Specify the IP address you want to assign to the wireless port. By default, this is 192.168.1.1.

Note: *Changing the IP address of the wireless port will cause you to lose contact with the management tool. To reconnect, restart your computer or release/renew your IP address, and enter the new address into your browser.*

Note: *If wireless client stations are currently using the CN3200, changing the IP address will cause them to lose their connections. To reconnect, each client must reboot or release/renew its IP address.*

Mask

Specify the appropriate subnet mask for the IP address you specified.

Wireless protection

Select the type of protection you want to use for the wireless network.

WPA

This option enables support for users with WPA client software.

Key transmission protection

This option determines how the TKIP keys are generated.

- RADIUS: The CN3200 obtains the MPPE key from the RADIUS server. This is a dynamic key that changes each time the user logins in and is authenticated. The MPPE key is used to generate the TKIP keys that encrypt the wireless data stream.
- Preshared Key: The CN3200 uses the key you specify to generate the TKIP keys that encrypt the wireless data stream. Since this is a static key, it is not as secure as the RADIUS option.

Key/Confirm key

Specify a key that is between 8 and 64 characters in length.

802.1x

This option enables support for users with 802.1x client software. The CN3200 supports 802.1x client software that uses EAP-TLS, EAP-TTLS, and PEAP.

RADIUS profile

Select the RADIUS profile the CN3200 will use to validate user logins.

Dynamic WEP encryption

Enable the use of dynamic WEP keys for all 802.1x sessions. Dynamic key rotation occurs on key 1, which is the broadcast key. Key 0 is the pairwise key. It is automatically generated by the CN3200.

WEP

Key 1, 2, 3, 4

The number of characters you specify for a key determines the level of encryption the CN3200 will provide.

- For 40-bit encryption, specify 5 ASCII characters or 10 HEX digits.
- For 128-bit encryption, specify 13 ASCII characters or 26 HEX digits.

When encryption is enabled, wireless stations that do not support encryption cannot communicate with the CN3200. The definition for each encryption key must be the same on the CN3200 and all client stations. Keys must also be in the same position. For example, if you are using key 3 to encrypt transmissions, then each client station must also define key 3 to communicate with the CN3200.

Transmission key

Select the key the CN3200 will use to encrypt transmitted data. All four keys are used to decrypt received data.

Key format

Select the format you used to specify the encryption keys:

ASCII

ASCII keys are much weaker than carefully chosen HEX keys. You can include ASCII characters between 32 and 126, inclusive, in the key. However, note that not all client stations support non-alphanumeric characters such as spaces, punctuation, or special symbols in the key.

HEX

Your keys should only include the following digits: 0-9, a-f, A-F

Dynamic keys

WEP key length

This setting determines the level of encryption the CN3200 will provide for 802.1x and WPA.

Key change interval

Specifies how often key rotation occurs for 802.1x and WPA.

Addresses

If the LAN and wireless ports are not bridged (**Network > Ports > LAN port** page), the CN3200 provides a separate DHCP server on each port. Use the check box to enable/disable each one.

The CN3200 provides its own IP address as the DNS server address. The CN3200 acts as a DNS relay and redirects all DNS requests to the DNS servers specified on the DNS/WINS page.

If a WINS server is defined on the DNS/WINS page, its address is provided to DHCP clients as well.

Start / End

Specify the starting and ending IP addresses that define the range of addresses the DHCP server can assign to client stations.

Gateway

Specify the IP address of the default gateway the CN3200 will return to DHCP clients.

Address/mask

Shows the current settings for the port.

The host name in the currently installed SSL certificate is automatically assigned as the domain name of the CN3200. The factory default SSL certificate that is installed on the CN3200 has the host name **wireless.colubris.com**.

You do not have to add this name to your DNS server for it to be resolved. The CNx intercepts all DNS requests it receives on the wireless or LAN ports. It resolves any request that matches the certificate host name by returning the IP address assigned to the Internet port. All other DNS requests are forwarded to the appropriate DNS servers as configured on the **Network > DNS/WINS** page.

To summarize, this means that by default, any DNS request by a client station on the wireless or LAN ports that matches wireless.colubris.com will return the IP address of the CN3200's Internet port.

4.

Wireless profiles

The CN3200 enables you to create multiple wireless networks (also knows as virtual access points) all sharing the same wireless port. Each network has its own SSID (network name), BSSID (MAC address), and configuration settings that are defined in a profile. Up to 16 profiles can be created.

All profiles shared basic settings defined in the Default profile (see below).

Default profile

The default profile (named "Colubris Networks") controls the settings for the parameters that are shared by all profiles. This includes:

- radio settings (operating frequency, distance between access points, transmit power)
- wireless port address and mask
- dynamic key length and key change interval for 802.1x/WPA

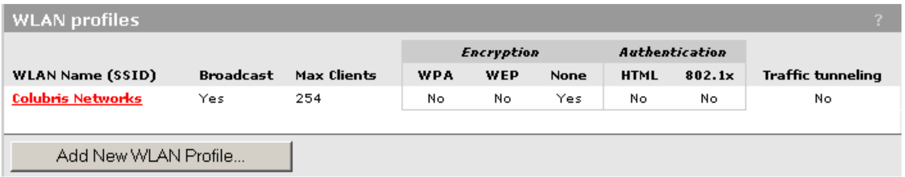
Configure this profile on the **Wireless > Wi-Fi** page.

Configuration considerations

Up to 16 profiles can be defined. Since all profiles share the same radio, bandwidth is also shared. To manage the load on the network, each profile can should be configured to limit the maximum number of wireless client stations.

To create a wireless profile

1. On the main menu, click **Wireless**, and then click **WLAN profiles**. The *WLAN profiles* page opens. Initially, it displays the default WLAN profile.



WLAN profiles

			Encryption			Authentication		
WLAN Name (SSID)	Broadcast	Max Clients	WPA	WEP	None	HTML	802.1x	Traffic tunneling
Colubris Networks	Yes	254	No	No	Yes	No	No	No

2. Click **Add New Profile**.
3. Specify the settings for the profile. Refer to the sections that follow for details.
4. Click **Save** when you are done.

Access point

Enable this option to activate the wireless access point. When this option is disabled, wireless client stations will not be able to connect.

WLAN name (SSID)

Specify a name to uniquely identify your wireless network. Each client computer that wants to connect to this profile must use this name. The name is case-sensitive.

Maximum number of wireless client stations

Specify the maximum number of wireless client stations that can be associated with this SSID at the same time.

Important: The total number of wireless connections that can be active at any given time across all WLAN profiles is 100.

Broadcast WLAN name (SSID)

When this option is enabled, the CN3200 will broadcast its wireless network name (SSID) of this profile to all client stations. Most wireless adapter cards have a setting that enables them to automatically discover access points that broadcast their names and automatically connect to the one with the strongest signal.

If you disable this option, client stations will have to specify the network name you enter for **WLAN name** when they connect.

RADIUS accounting

Enable this option to have the CN3200 generate a RADIUS accounting request ON/OFF for each user authentication. The CN3200 respects the RADIUS interim-update-interval attribute if present inside the RADIUS access accept of the authentication.

Wireless protection

Select the type of protection you want to use for the wireless network.

WPA

This option enables support for users with WPA client software.

Key transmission protection

This option determines how the TKIP keys are generated.

- RADIUS: The CN3200 obtains the MPPE key from the RADIUS server. This is a dynamic key that changes each time the user logins in and is authenticated. The MPPE key is used to generate the TKIP keys that encrypt the wireless data stream.
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Key/Confirm key

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WEP

Key 1, 2, 3, 4

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- For 40-bit encryption, specify 5 ASCII characters or 10 HEX digits.
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When encryption is enabled, wireless stations that do not support encryption cannot communicate with the CN3200. The definition for each encryption key must be the same on the CN3200 and all client stations. Keys must also be in the same position. For example, if you are using key 3 to encrypt transmissions, then each client station must also define key 3 to communicate with the CN3200.

Transmission key

Select the key the CN3200 will use to encrypt transmitted data. All four keys are used to decrypt received data.

Key format

Select the format you used to specify the encryption keys:

ASCII

ASCII keys are much weaker than carefully chosen HEX keys. You can include ASCII characters between 32 and 126, inclusive, in the key. However, note that not all client stations support non-alphanumeric characters such as spaces, punctuation, or special symbols in the key.

HEX

Your keys should only include the following digits: 0-9, a-f, A-F

Configuring overlapping wireless cells

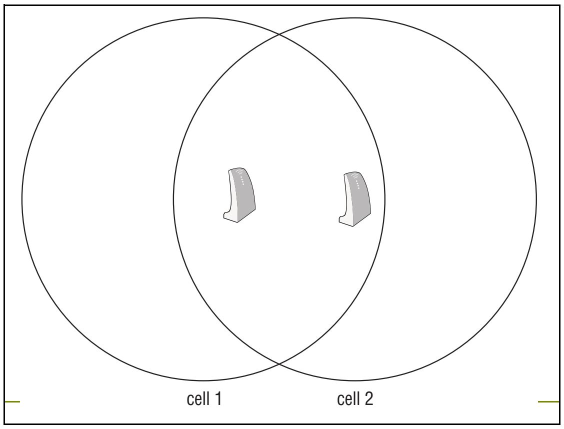
Overlapping wireless cells are caused when two or more access points are within transmission range of each other. This may be under your control (when setting up multiple cells to cover a large location), or out of your control (when your neighbors set up their own wireless networks). In either case, the problems you face are similar.

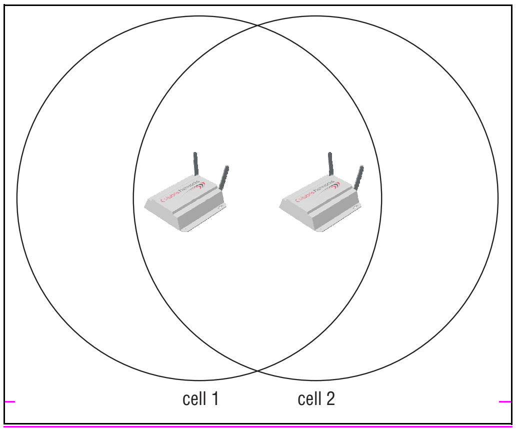
Performance degradation and channel separation

When two wireless cells operating on the same frequency overlap, it can cause a reduction in throughput in both cells. This occurs because a wireless station that is attempting to transmit will defer (delay) its transmission if another station is currently transmitting. On a network with many clients and a lot of traffic, this can severely affect performance as stations defer multiple times before the channel becomes available. If a station is forced to delay its transmission too many times, data may be lost.

Delays and lost transmissions can severely reduce throughput on a network. Use the **Wireless** option on the **Status** menu to view this information on your network.

The following example shows two overlapping wireless cells operating on the same frequency. Since both access points are within range of each other, the number of deferred transmissions will be large.





Overlapping wireless cells can cause transmission delays.

The solution to this problem is to set the two networks to different channels with as great a separation as possible in their operating frequencies. This reduces cross-talk, and enables client stations connected to each access point to transmit at the same time.

Choosing channels

The minimum recommended separation between channels is 25 Mhz. Note however, that this is the recommended minimum. Two channels with this separation will always perform *worse* than two channels using the maximum separation. So, it is always best to use the greatest separation possible between overlapping networks.

With the proliferation of wireless networks, it is very possible that the wireless cells of access points outside your control may overlap your intended area of coverage. To help you choose the best operating frequency, the CN3200 will automatically scan all channels and provide a recommendation on the **Wireless > Wi-Fi** page. To generate a list of all access points operating near you and view their operating frequencies, go to **Wireless > Neighborhood**.

The set of available channels is automatically determined by the CN3200 based on the **Country** setting you define on the **Wi-Fi** page, which means that the number of non-overlapping channels available to you will also vary. This will affect how you setup your multi-cell network.

Example

When operating in 802.11b/g mode, the CN3200 supports the following 14 channels in the 2.4 Ghz band:

Channel	Frequency
1	2412
2	2417
3	2422
4	2427
5	2432
6	2437
7	2442

Channel	Frequency
8	2447
9	2452
10	2457
11	2462
12	2467
13	2472
14	2477

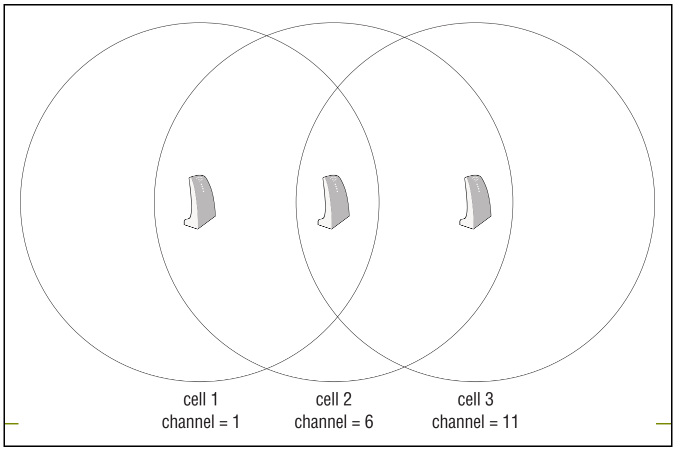
However, the number of channels available for use in a particular country are determined by the regulations defined by the local governing body. For example:

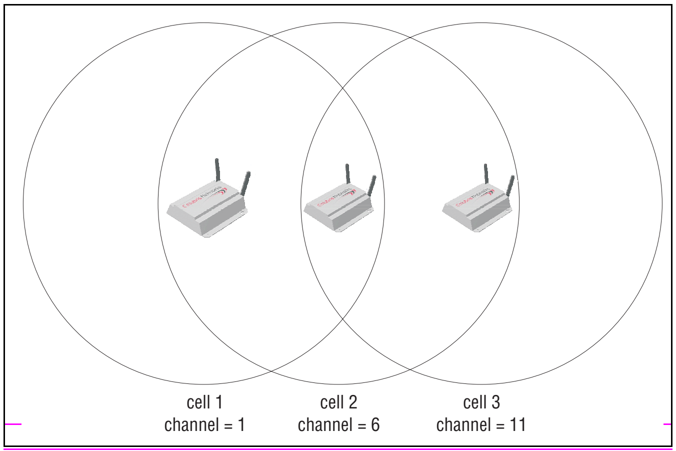
Region	Available channels
North America	1 to 11
Japan	1 to 14
Europe	1 to 13
France	1 to 13
Spain	10 to 13

Since the minimum recommended separation between overlapping channels is 25 MHz (5 cells), the recommended maximum number of overlapping cells you can have in most regions is three. For example:

North America	Europe	Japan
• cell 1 on channel 1 • cell 2 on channel 6 • cell 3 on channel 11	• cell 1 on channel 1 • cell 2 on channel 7 • cell 3 on channel 13	• cell 1 on channel 1 • cell 2 on channel 7 • cell 3 on channel 14

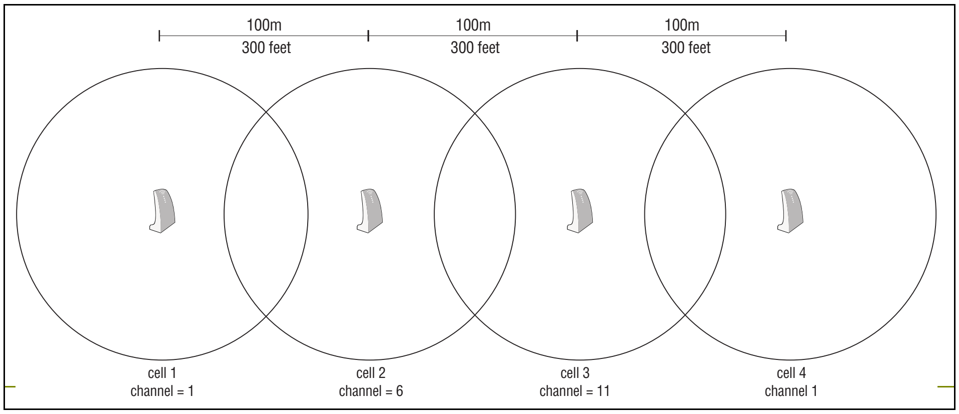
In North America, you would create the following installation:

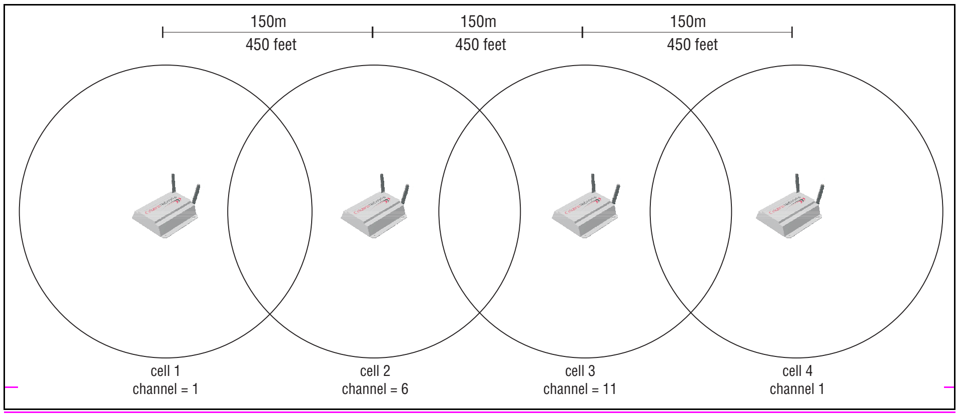




Reducing transmission delays by using different operating frequencies.

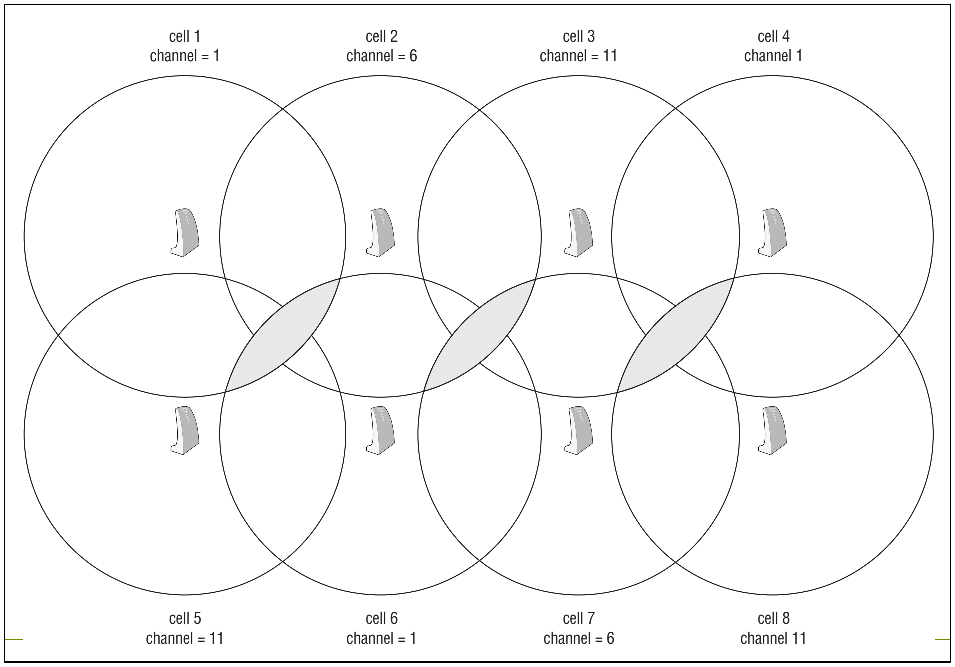
However, It is possible to stagger your cells to reduce overlap and increase channel separation. Consider the following:

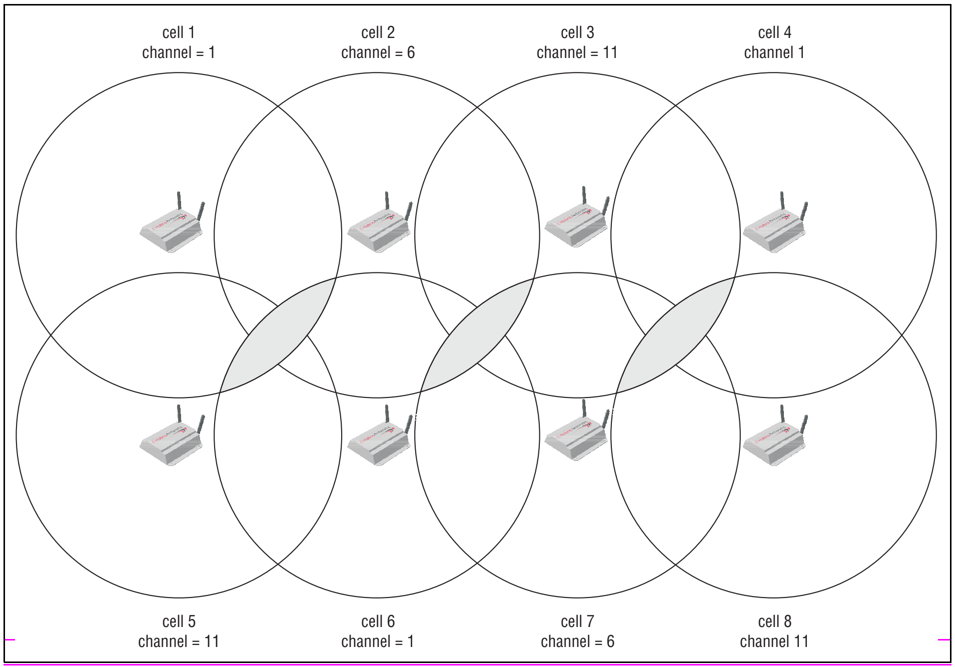




Using only three frequencies across multiple cells (North America).

This strategy can be expanded to cover an even larger area using three channels as follows:





Using three frequencies to cover a large area (North America).

The areas in gray indicate where two cells using the same frequency overlap.

Distance between access points

In environments where the number of wireless frequencies are limited, it can be beneficial to adjust the receiver sensitivity of the CN3200. To make the adjustment, open the **Wi-Fi** page on the **Wireless** menu.

For most installations, the large setting should be used. However, if you are installing multiple CN3200s, and the channels available to you do not provide enough separation, then reducing the receiver sensitivity can help you reduce the amount of crosstalk between the CN3200s.

Another benefit to using reduced settings is that it will improve roaming performance. Client stations will switch between CN3200s more frequently.

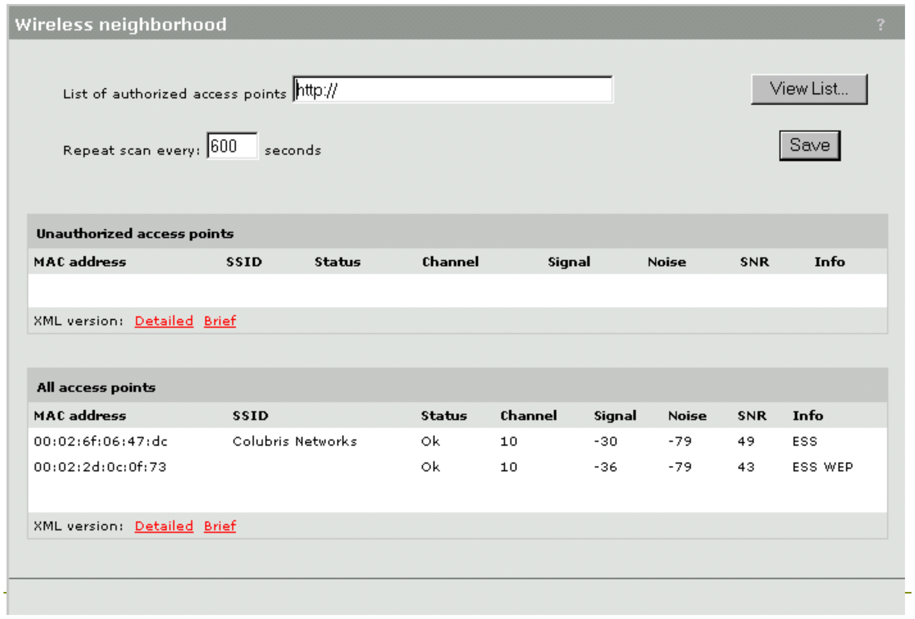
Note: *The distance between access points option provides the best performance benefit when client stations are equipped with wireless adapters that are configured with the same setting. However, not all manufacturers support this setting.*

Conducting a site survey and finding rouge access points

The integrated site survey tool permits easy detection of currently operating access points, and lets you automatically flag unauthorized (rouge) units.

Conducting a site survey

To discover the operating frequencies of other access points in your area, open the **Wireless > Neighborhood** page. The CN3200 will automatically scan to find all active access points. For example:



Wireless neighborhood

List of authorized access points: http://

Repeat scan every: 600 seconds

Unauthorized access points

MAC address	SSID	Status	Channel	Signal	Noise	SNR	Info

XML version: Detailed Brief

All access points

MAC address	SSID	Status	Channel	Signal	Noise	SNR	Info
00:02:6f:06:47:dc	Colubris Networks	Ok	10	-30	-79	49	ESS
00:02:2d:0c:0f:73		Ok	10	-36	-79	43	ESS WEP

XML version: Detailed Brief

Note: *If an access point is not broadcasting its name, the SSID is blank.*

Identifying unauthorized access points

Improperly configured wireless access points can seriously compromise the security of a corporate network. Therefore, it is important that they be identified as quickly as possible.

The wireless neighborhood feature can be configured to automatically list all non-authorized access points that are operating nearby.

To identify unauthorized access points, the CN1050 compares the MAC address of each discovered access point against the list of authorized access points (which you must define). If the discovered access point does not appear in the list, it is displayed in the Unauthorized access points list.

List of authorized access points

The format of this file is XML. Each entry in the file is composed of two items: MAC address and SSID. Each entry should appear on a new line. The easiest way to create this file is to wait for a scan to complete, then open the list of all access points in Brief format. Edit this list so that it contains only authorized access points and save it. Then, specify the address of this file for the **List of authorized access points** parameter.

Chapter 7
Connecting to a wired LAN

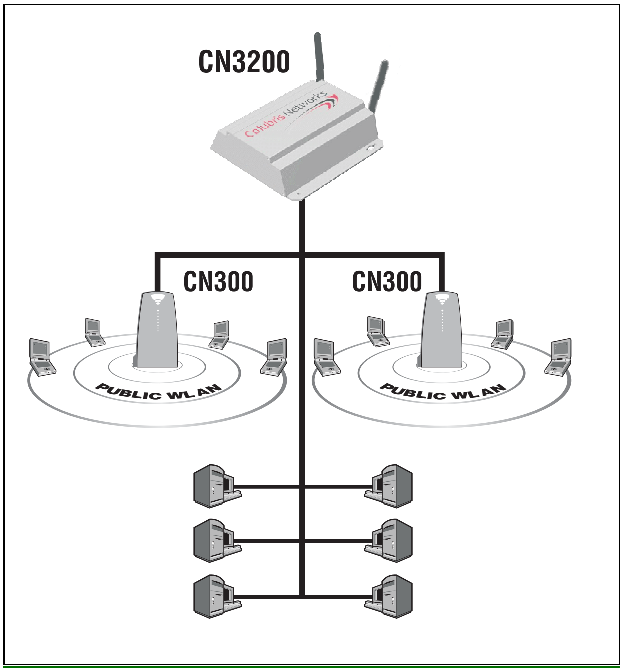
This chapter explains how to configure a connection to a wired LAN.

Overview

The CN3200 provides a LAN port for connection to a wired network. Generally, this is used to:

- connect the CN3200 to one or more CN300s
- connect wired computers to the public access network

For example:



Addressing issues

Using DHCP

To configure the DHCP server

1. Click **Network**.
2. Click **Address Allocation**.
3. Select the **DHCP server** and click **Configure**.
4. Configure the appropriate settings. Refer to the online help for details.
5. Click **Save**.

LAN port address

The CN3200 connects to the wired LAN via its LAN port. You must assign a static IP address to this port because the CN3200 cannot function as a DHCP client on its LAN port.

To assign a static LAN port address

1. Click **Wireless**.
2. Click **Wi-Fi**.
3. Assign the new IP address and associated mask in the Wireless port box.
4. Click **Save**.

DHCP relay agent

If you have multiple CN3200s on your network, configuring each one to act as a DHCP relay agent enables you to assign all IP addresses from a single DHCP server to reduce management overhead.

Take note of the following regarding the DHCP relay option on the CN3200:

- DHCP relay occurs via the CN3200’s Internet port.
- DHCP relay is not supported if PPPoE is active on the Internet port.
- DHCP relay is will not function if the firewall is set to High and NAT is enabled on the Internet port. The reason for this it that the DCHP server must be able to ping the assigned address to prevent duplicate assignments.
- Routes must be defined on the remote DHCP server so that it can successfully send DHCP packets back to the DHCP relay agent running on the CN3200. These routes must identify the segment assigned to the CN3200’s LAN port.

To activate the DHCP relay agent

1. Click **Network**.
2. Click **Address allocation**.
3. Select the **DHCP relay agent** and click **Configure**.
4. Specify the address for the primary and secondary DHCP servers.
5. Click **Save**.

Using static addressing

If the wired LAN uses static IP addressing, you have two options:

1. Disable the DHCP server on the CN3200 and manually define static IP addresses for all client stations.

2. Leave the DCHP server on the CN3200 operational and configure it to assign IP addresses outside the range of the static addresses already in use on the wired LAN.

Chapter 8
Connecting to the Internet

This chapter explains how to connect the CN3200 to the Internet via a broadband modem and how to use the security features provided by the firewall and network address translation

Connecting cables

Connect cables as follows:

1. Turn off your broadband modem, then turn it back on.
2. Use a standard Ethernet cable to connect the CN3200 Internet port to the broadband modem.
3. If the CN3200 is already running, press the reset button to restart it.

Configuring the Internet connection

This section describes how to configure the CN3200 to successfully connect to the Internet. To create a secure connection to a remote network via the Internet, see Chapter 10.

The Internet port can also be used to link the CN3200 to a local area network. Just choose the addressing method that is appropriate for your setup.

Configuration procedure

1. On the main menu, click **Network**.
2. Click **Ports**.
3. In the table, click **Internet port**. The *Internet port configuration* page opens.
4. The CN3200 automatically attempts to detect the type of server on the network. If incorrect, select the correct option and configure the settings described in the sections that follow.
5. Click **Save** when you are done.

Assign IP address via

PPPoE client

Point-to-point protocol over Ethernet. Your ISP will automatically assign an IP address to the CN3200. You need to supply a username and password so the CN3200 can log on.

DHCP client

Dynamic host configuration protocol. Your ISP's DHCP server will automatically assign an address to the CN3200, which functions as a DHCP client.

Static

This option enables you to manually assign an IP address to the CN3200 Internet port.

Link

The title bar shows the current status of the link.

Speed

- Auto: Lets the CN3200 automatically set port speed based on the type of equipment it is connected to.
- 10: Forces the port to operate at 10 mbps.

Duplex

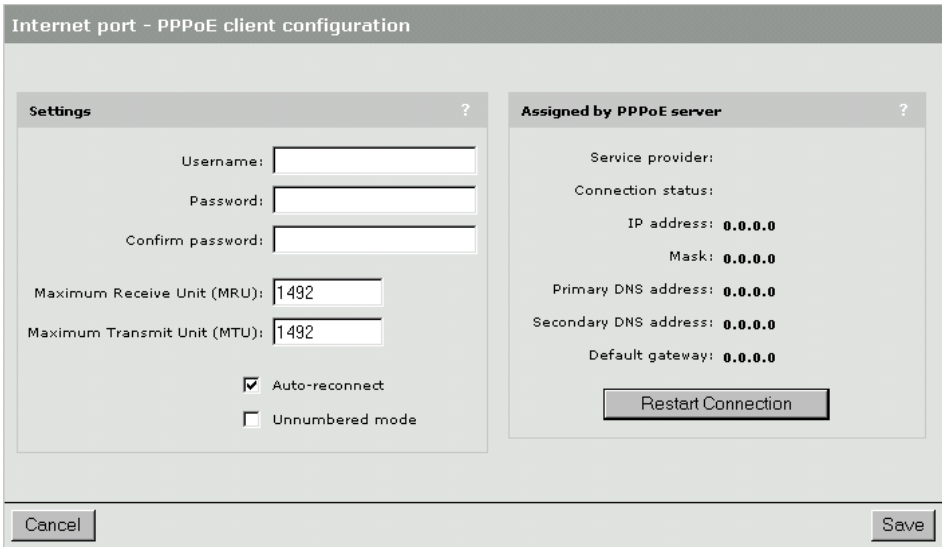
- Auto: Lets the CN3200 automatically set duplex mode based on the type of equipment it is connected to
- Full: Forces the port to operate in full duplex mode.
- Half: Forces the port to operate in half duplex mode.

Network address translation (NAT)

Enable this option to permit all the computers on the wireless network to simultaneously share the connection to the Internet using a single ISP account. If you disable NAT, client stations will not be able to access the Internet unless their IP addresses are valid on the Internet.

If the CN3200 is connected to a wired LAN, computers on the wired LAN can also take advantage of NAT to share the Internet connection.

PPPoE client



Internet port - PPPoE client configuration

Settings ?

Username:

Password:

Confirm password:

Maximum Receive Unit (MRU): 1492

Maximum Transmit Unit (MTU): 1492

☑ Auto-reconnect

□ Unnumbered mode

Assigned by PPPoE server ?

Service provider:

Connection status:

IP address: 0.0.0.0

Mask: 0.0.0.0

Primary DNS address: 0.0.0.0

Secondary DNS address: 0.0.0.0

Default gateway: 0.0.0.0

Settings

Username

Specify the username assigned to you by your ISP. The CN3200 will use this username to log on to your ISP when establishing a PPPoE connection.

Password/Confirm password

Specify the password assigned to you by your ISP. The CN3200 will use this password to log on to your ISP when establishing a PPPoE connection.

Maximum Receive Unit (MRU)

Maximum size (in bytes) of a PPPoE packet when receiving. Changes to this parameter only should be made according to the recommendations of your ISP. Incorrectly setting this parameter can reduce the throughput of your Internet connection.

Maximum Transmit Unit (MTU)

Maximum size (in bytes) of a PPPoE packet when transmitting. Changes to this parameter should only be made according to the recommendations of your ISP. Incorrectly setting this parameter can reduce the throughput of your Internet connection.

Auto-reconnect

The CN3200 will automatically attempt to reconnect if the connection is lost.

Un-numbered mode

This feature is useful when the CN3200 is connected to the Internet and NAT is not being used. Instead of assigning two IP addresses to the CN3200, one to the Internet port and one to the LAN port, both ports can share a single IP address.

This is especially useful when a limited number of IP addresses are available to you.

Assigned by PPPoE server

These settings are assigned to the CN3200 by your ISP's PPPoE server. The Internet connection is not active until this occurs.

Service provider

Identifies your Internet service provider. Not all ISPs provide this information.

Connection status

Indicates the state of the PPPoE connection. If the connection is not active, a message indicates why.

IP address

Identifies the IP address assigned to the CN3200 by the ISP.

Mask

Identifies the subnet mask that corresponds to the assigned IP address.

Primary DNS address

Identifies the IP address of the main DNS server the CN3200 will use to resolve DNS requests.

Secondary DNS address

Identifies the IP address of the backup server the CN3200 will use to resolve DNS requests.

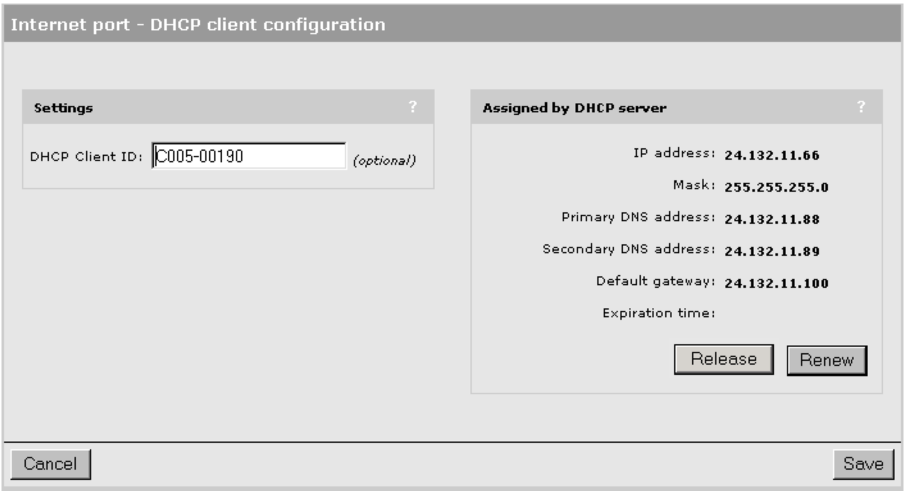
Default gateway

Identifies the IP address of the gateway the CN3200 will forward all outbound traffic to.

Restart Connection button

Click this button to manually establish the PPPoE connection. During normal operation, you will not need to do this because the CN3200 will automatically reconnect if the PPPoE connection is interrupted. However, for certain types of connection failures, the CN3200 may not be able to re-establish the connection, even after several retries. When this occurs, the cause of the failure is displayed in the **Connection** status field and you must click the **Restart Connection** button to manually establish the connection.

DHCP client



Internet port - DHCP client configuration

Settings

DHCP Client ID: C005-00190 (optional)

Assigned by DHCP server

IP address: 24.132.11.66

Mask: 255.255.255.0

Primary DNS address: 24.132.11.88

Secondary DNS address: 24.132.11.89

Default gateway: 24.132.11.100

Expiration time:

Settings

DHCP client ID

Specify an ID to identify the CN3200 to the DHCP server. This parameter is not required by all ISPs.

Assigned by DHCP server

These settings are assigned to the CN3200 by your ISP's DHCP server. The Internet connection is not active until this occurs.

IP address

Identifies the IP address assigned to the CN3200 by the ISP.

Mask

Identifies the subnet mask that corresponds to the assigned IP address.

Primary DNS address

Identifies the IP address of the main DNS server the CN3200 will use to resolve DNS requests.

Secondary DNS address

Identifies the IP address of the backup server the CN3200 will use to resolve DNS requests.

Default gateway

Identifies the IP address of the gateway the CN3200 will forward all outbound traffic to.

Expiration time

Indicates how long the address is valid.

Release

Click to release the CN3200's IP address.

Renew

Click to renew the CN3200's IP address.

Static addressing

Settings

IP address

Specify the static IP address you want to assign to the port.

Address mask

Select the appropriate mask for the IP address you specified.

Default gateway

Identifies the IP address of the gateway the CN3200 will forward all outbound traffic to.

Note:

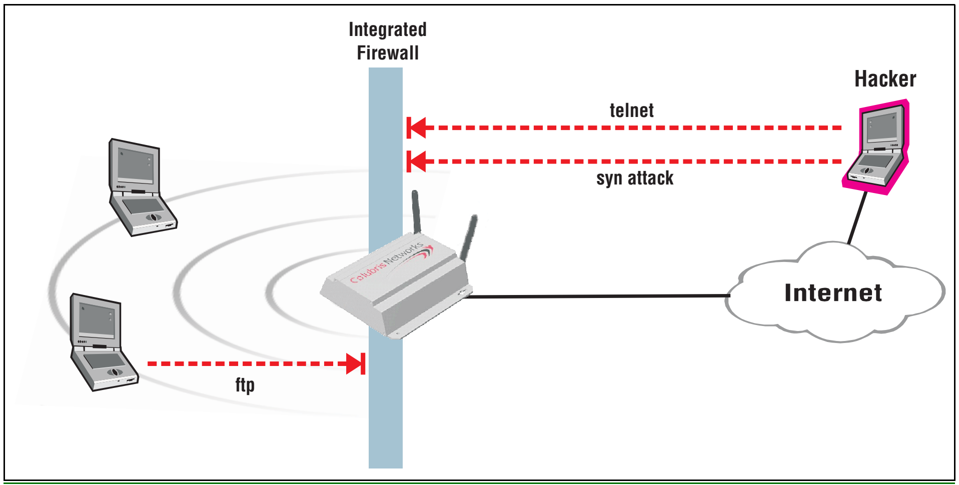
Firewall

To safeguard your network from intruders, the CN3200 features a customizable firewall. The firewall stops external computers from gaining access to the wireless network through the Internet port.

The firewall operates on the traffic streaming through the Internet port. It can be used to control both incoming and outgoing data.

The CN3200 offers a number of predefined rules to let you achieve the required security level without going to the trouble of designing your own rules.

If the CN3200 is connected to a wired LAN, the firewall protects the wired LAN as well.



Blocking unauthorized access with the firewall.

Firewall presets

The easiest way to make use of the firewall is to use one of the preset settings. Three levels of security are provided:

- **High:** Permits all outgoing traffic. Blocks all externally initiated connections.
- **Medium:** Same as High except that it permits incoming PPTP and IPSec connections.
- **Low:** Permits all incoming and outgoing traffic, except for NetBIOS traffic. Use this option if you require active FTP sessions.

Important: *If you enable access to the Management tool or SNMP interface via the Internet port (you do this on the Management tool or SNMP pages), the appropriate rules are automatically added to the firewall to allow this traffic. If you modify or delete these rules, it will affect remote access.*

The following tables indicate how some common applications are affected by the preset firewall settings.

Outgoing traffic

	Firewall setting		
Application	**Low**	**Medium**	**High**
FTP (passive mode)[1]	Passed	Passed	Passed
FTP (active mode)[1]	Passed	Passed	Passed
Web (HTTP, HTTPS)	Passed	Passed	Passed
SNMP	Passed	Passed	Passed
Telnet	Passed	Passed	Passed
Windows networking	Blocked	Blocked	Blocked
ping	Passed	Passed	Passed
PPTP from client station to remote server	Passed	Passed	Passed
NetMeeting (make call)	Passed	Passed	Passed
IPSec pass-through	Passed	Passed	Blocked
NetBIOS	Blocked	Blocked	Blocked

Incoming traffic

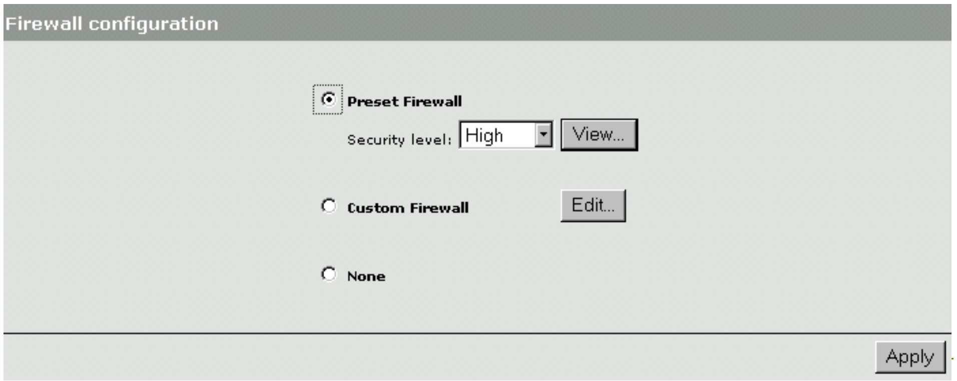
	Firewall setting		
Application	**Low**	**Medium**	**High**
FTP (passive mode)[1]	Passed	Blocked	Blocked
FTP (active mode)[1]	Passed	Blocked	Blocked
Web (HTTPS)	Passed	Blocked	Blocked
Web (HTTP)	Passed	Blocked	Blocked
Telnet	Passed	Blocked	Blocked
Windows networking	Blocked	Blocked	Blocked
PPTP from remote client to a server on the local network	Passed	Passed	Blocked
ping client on local network	Passed	Blocked	Blocked
IPSec pass-through	Passed	Passed	Blocked
NetBIOS	Blocked	Blocked	Blocked
NetMeeting (receive call)	Passed	Blocked	Blocked

[1] Most Web browsers execute FTP in active mode. Some browsers provide a configuration setting that enables you to alter this. For example, in Internet Explorer choose **Internet options** on the **Tools** menu, click the **Advanced** tab, and then under **Browsing** enable **Use Passive FTP for compatibility with some firewalls and DSL modems**.

DRAFT

Firewall configuration

To configure the firewall, on the main menu, click **Security** and then click **Firewall**. The *firewall configuration* page opens.



Firewall configuration

● Preset Firewall

Security level: High

○ Custom Firewall

○ None

Preset firewall

The easiest way to make use of the firewall is to use one of the preset settings. Three levels of security are provided:

Custom Firewall

If you have specific security requirements, you may want to create a custom firewall. This enables you to target specific protocols or ports. See the examples that follow for applications that require the use of a custom firewall.

Customizing the firewall

To customize the firewall, you define one or more rules. A rule lets you target a specific type of data. If the CN3200 finds data that matches the rule, the rule is triggered, and the data is rejected by the firewall.

Rules operate on IP datagrams (sometimes also called packets). Datagrams are the individual packages of data that travel on an IP network. Each datagram contains addressing and control information along with the data it is transporting. The firewall analyses the addressing and control information to apply the rules you define.

The CN3200 applies the firewall rules in the order that they appear in the list. An intelligent mechanism automatically adds the new rules to the list based on their scope. Rules that target a large amount of data are added at the bottom. Rules that target specific addresses appear at the top.

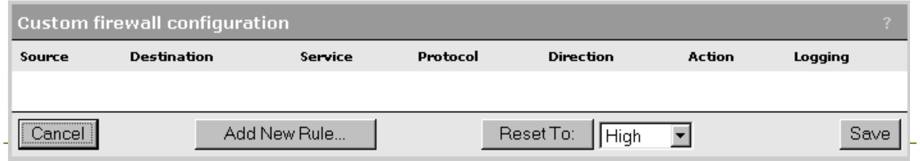
Firewall examples

The examples in this section will help you understand how to customize the firewall for several different applications.

Allowing Web traffic

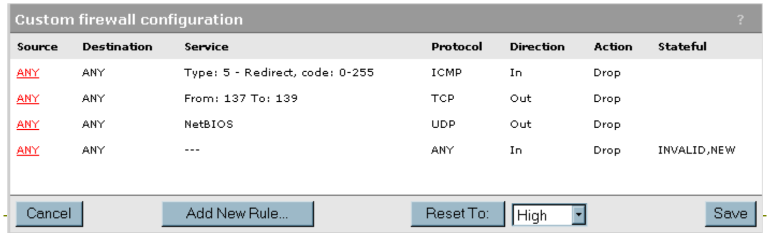
This example illustrates how to create a custom firewall that allows HTTP requests from the external network (Internet). You would do this if, for example, you wanted to provide a Web server on the internal network. To run a server on the internal network also requires static NAT mappings.

1. On the main menu, click **Security** and then click **Firewall**.
2. Select **Custom Firewall** and click the **Edit** button. The *Custom firewall configuration* page opens.


Custom firewall configuration

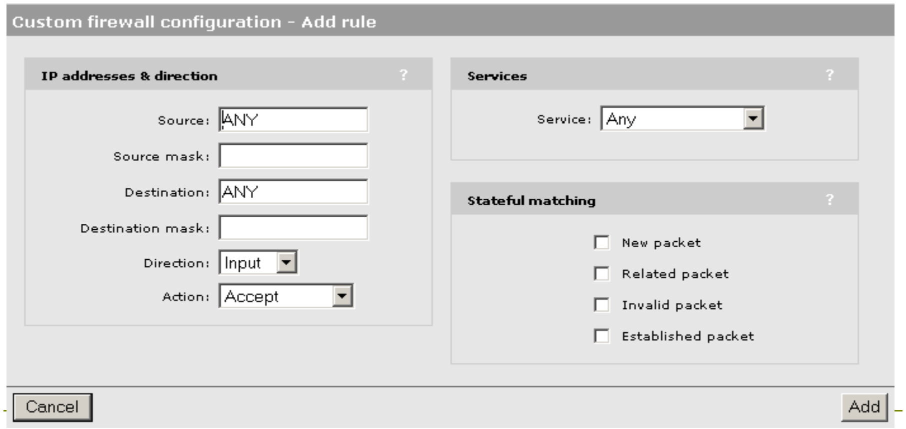
Source	Destination	Service	Protocol	Direction	Action	Logging

3. Click **Reset To High**. This imports all the rules from the predefined high security firewall.


Custom firewall configuration

Source	Destination	Service	Protocol	Direction	Action	Stateful
ANY	ANY	Type: 5 - Redirect, code: 0-255	ICMP	In	Drop	
ANY	ANY	From: 137 To: 139	TCP	Out	Drop	
ANY	ANY	NetBIOS	UDP	Out	Drop	
ANY	ANY	---	ANY	In	Drop	INVALID,NEW

4. Click the last rule to edit it. The *Custom firewall configuration - Edit rule* page opens.


Custom firewall configuration - Add rule

IP addresses & direction

Source: ANY
Source mask:
Destination: ANY
Destination mask:
Direction: Input
Action: Accept

Services

Service: Any

Stateful matching

□ New packet
□ Related packet
□ Invalid packet
□ Established packet

5.

6.

7.

8.

9. Remove the following rule.

Source	Destination	Direction	Action	Service	Port
ANY	ANY	Input	Accept	Any TCP	0 to 442

Source	Destination	Direction	Action	Service	Port
ANY	ANY	Input	Accept	Any TCP	0 to 442

10.

11.

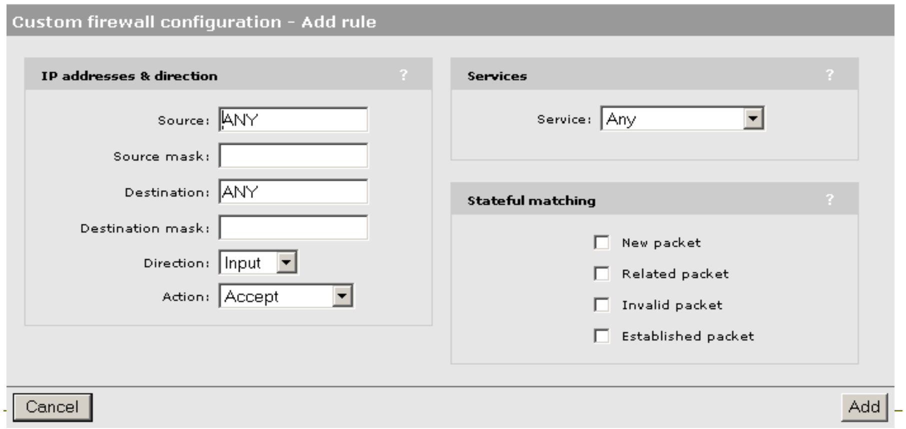
To remove a rule, click the **Source** column to open the *Custom firewall configuration - Edit rule* page and click **Delete**.

12. Add the following rules.

Source	Destination	Port	Direction	Service

ANY	ANY	0 to 79	In	Any TCP
ANY	ANY	81 to 442	In	Any TCP

13. To add a rule, click **Add New Rule**. The *Custom firewall configuration - Add rule* page opens.



Custom firewall configuration - Add rule

IP addresses & direction

Source: ANY

Source mask:

Destination: ANY

Destination mask:

Direction: Input

Action: Accept

Services

Service: Any

Stateful matching

□ New packet

□ Related packet

□ Invalid packet

□ Established packet

14. Fill in the appropriate fields and then click **Add** to save the rule and return to the *Custom firewall configuration* page.

15. When done, click **Save** to activate the firewall.

Allowing FTP traffic

To run an FTP server on the internal network requires changes to the firewall, similar to those done in the previous example. Follow the same steps, except in step 5, add the following rules instead:

Source	Destination	Direction	Port	Protocol
ANY	ANY	In	0 to 19	Any TCP
ANY	ANY	In	22 to 442	Any TCP

Allowing both Web and FTP traffic

If you intend to run both an Web and FTP server, follow the same steps presented in the Web example, except in step 5, add the following rules instead:

Source	Destination	Direction	Port	Protocol
ANY	ANY	In	0 to 19	Any TCP
ANY	ANY	In	22 to 79	Any TCP
ANY	ANY	In	81 to 442	Any TCP

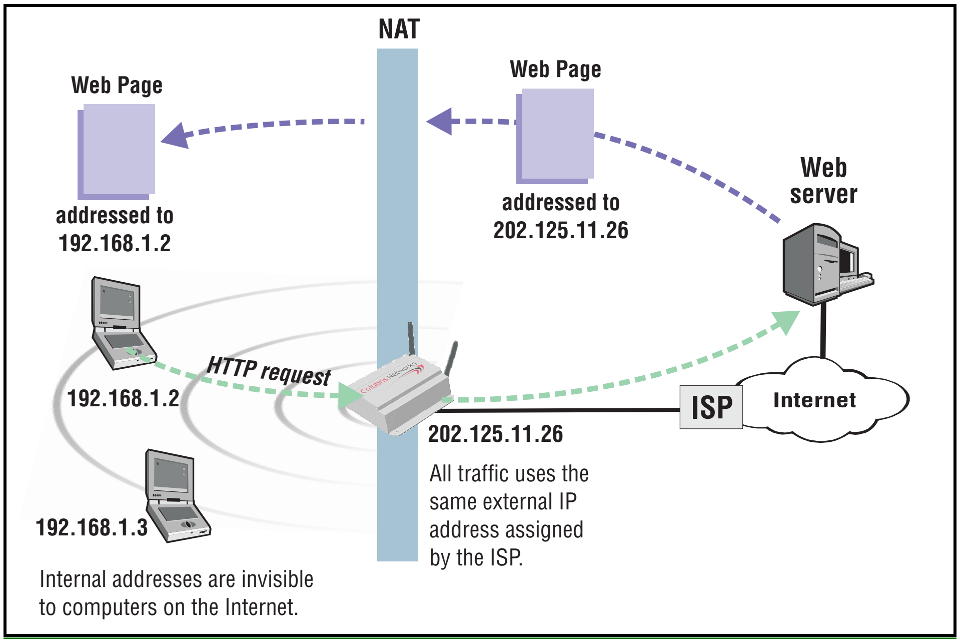
Network address translation

NAT overview

NAT is an address mapping service that enables one set of IP addresses to be used on an internal network, while a second set is used on an external network. NAT handles the mapping between the two sets of addresses.

Generally, NAT is used to map all the addresses on a internal network to a single address for use on an external network like the Internet. The main benefits of this are:

- It enables multiple devices to share a single connection.
- It effectively hides the IP addresses of all devices on the internal network from the outside network.



NAT can also be useful in conjunction with VPN software. When two networks are connected via a VPN tunnel, it may be desirable to obscure the address of local computers for security reasons. NAT makes this possible.

NAT security and static mappings

One of the benefits of NAT is that it effectively hides the IP addresses of all computers on the internal network from the outside network (i.e., the Internet or a remote site via VPN). While this is great for security, in some cases it is useful to make a computer on the internal network accessible externally. For example, if you want to run a Web server or FTP server.

To address this problem, NAT provides the ability to route specific incoming traffic to an IP address on the internal network, through what is called a static NAT mapping. For example, to support a Web server, you would define a static NAT mapping to route traffic on TCP port 80 to an internal computer running a Web server. Note that this may also require changes to the firewall settings to accept the incoming traffic.

A limitation of NAT mappings is that they only allow one internal IP address to act as the destination for a particular protocol (unless you map the protocol to a non-standard port). This means, for example, that you can only run one Web server on the internal network.

Important: *If you use NAT to enable a secure (HTTPS) Web server on the internal network, remote access to the management tool will no longer be possible, as all incoming HTTPS requests will be routed to the internal Web server and not the management tool.*

Important: *NAT mappings bypass the firewall. If you create a static mapping, the firewall is automatically opened to accept the traffic. However, this firewall rule will not be visible on the Firewall configuration page.*

The following table indicates how some common applications are affected by NAT.

Application	NAT	Application	NAT
FTP (passive mode)	Mapping required	Windows networking	No effect
FTP (active mode)	Mapping required	NetMeeting	Mapping required
Telnet	Mapping required		

Most Web browsers execute FTP in active mode. Some browsers provide a configuration option that enables you to alter this. For example, in Internet Explorer choose **Internet options** on the **Tools** menu, click the **Advanced** tab, and then under **Browsing** enable **Use Passive FTP for compatibility with some firewalls and DSL modems**.

The CN3200 provides a list of preset settings for many commonly used applications.

One-to-one NAT

In its default configuration, NAT translates all internal IP address to a single external one. This means that all client station sessions to an external resource appear to originate from the same IP address. Certain applications do not allow multiple connections from the same IP address, or impose a limit. For example: some PPTP servers want a unique IP address for each client station.

To resolve this problem, the CN3200 allows you to assign multiple IP addresses to the Internet port and use them to distinguish outgoing NAT traffic for customers making VPN connections.

How it works

One-to-one NAT functions as follows:

- Define alternate static addresses for the Internet port on the **Network > Ports > Internet Port > Static** page. These addresses must be valid on the Internet.
- Define the attribute “one-to-one-nat” in the RADIUS account for each customer that requires a unique IP address. See “One-to-one NAT” on page 229 for details.
- When a customer with one-to-one NAT support logs into the public access interface and establishes a VPN session, the CN3200 reserves the next available alternate IP address for that customer. If all alternate IP addresses are in use, or none have been defined, then the default IP address of the Internet port is used.

  The address is reserved for as long as the customer is logged in and using a VPN connection. Therefore, you need to define enough alternate IP addresses to support the maximum number of active VPN sessions you expect to have at any one time.

NAT IPSec passthrough

IPSec passthrough enables the CN3200 to support older IPSec clients that do not support NAT traversal. These older IPSec clients are unable to establish an IPSec connection through a gateway, like the CN3200, that is running NAT.

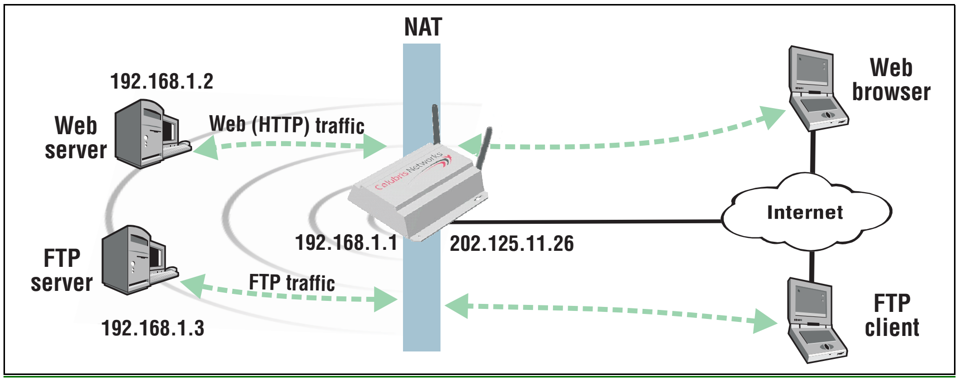
All recent IPSec clients support NAT traversal, so Colubris recommends that IPSec passthrough be disabled unless specifically required.

Note: *If you enables this option, it is possible that certain IPSec clients that support NAT traversal may fail to work.*

To disable this option go to the **Network** > **Ports** > **Internet port** page.

NAT example

The following example illustrates how to configure static NAT mappings to run a Web server and an FTP server on the internal network. This might occur when the CN3200 is used in a enterprise environment.

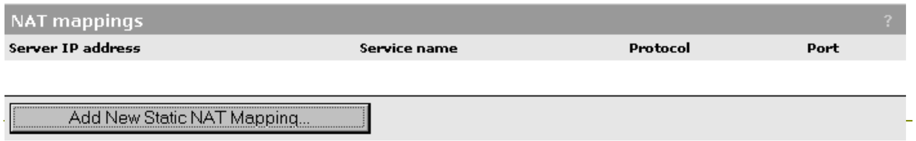


NAT mapping used to support internal Web and FTP servers.

By creating static NAT mappings, FTP and HTTP (Web) traffic can be routed to the proper client station. Note that the addresses of these stations are still not visible externally. Remote computers send their requests to 202.125.11.26 and the CN3200 routes them to the proper client.

To configure the CN3200 to support this example, you would do the following:

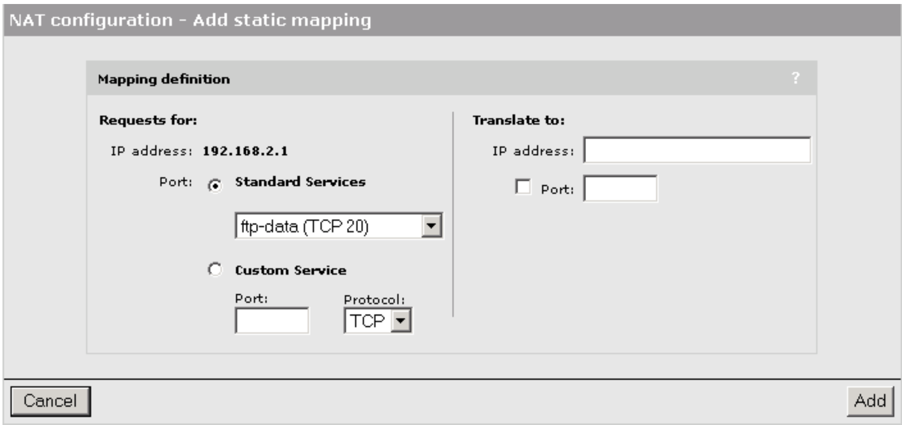
1. On the main menu, click **Network**, then click **NAT**. The *NAT mappings* page appears. Initially it is empty.



NAT mappings

Server IP address	Service name	Protocol	Port

2. Click **Add New Static NAT Mapping**. The *NAT mappings - Add static mapping* page appears.



NAT configuration - Add static mapping

Mapping definition

Requests for:

IP address: 192.168.2.1

Port: ● Standard Services

ftp-data (TCP 20)

○ Custom Service

Port:

Protocol: TCP

Translate to:

IP address:

□ Port:

- Under **Requests for**, choose **Standard Services**, then choose **http (TCP 80).**
- Under **Translate to**, specify the IP address of the Web server. In the example, it is 192.168.1.2.

3. Click **Add** to save your changes and return to the *NAT mappings* page. The new mapping is added to the table.

4. To support the FTP server, two additional mappings need to be created with the following values:

   - **Standard Services** = ftp-data (TCP 20) and **IP address** = 192.168.1.3.
   - **Standard Services** = ftp-control (TCP 21) and **IP address** = 192.168.1.3.

Depending on the firewall settings you are using, you may have to modify the firewall to permit FTP and HTTP traffic to enter via the Internet port.

Chapter 9

Activating the public access interface

This chapter explains how to configure and start the public access interface.

Overview

The public access interface is the sequence of web pages that customers use to login, logout, and view the status of their wireless sessions. The CN3200 ships with a default interface which you can customize to meet the needs of your installation. However, before you do this, you should initialize the default setup and test it with your network. Once the default interface is working, you can make changes to it as described in Chapter 15.

This chapter presents the minimum tasks required to get the public access interface working and enable customer authentication via a RADIUS server.

Task	For instructions
Setting up the CN3200 RADIUS client	See page 95.
Setting up CN3200 authentication	See page 98.
Setting up customer authentication	See page 100.
Setting up the RADIUS server	See page 101.
Testing the public access interface	See page 102.

Important

The CN3200 public access interface will not be functional until the CN3200 can successfully connect to a RADIUS server and authenticate itself. This means that the login page for the public access interface will appear, but customers will get an error when they try to log in. This applies regardless of the method you are using to authenticate customers.

Until you define access lists (see page 216 for details) the following conditions apply:

- **Unauthenticated customers cannot reach any network resources other than the CN3200 login page.**
- **Authenticated customers have access to any network resources connected to the CN3200's Internet port.**

Supporting PDAs

Customers using PDAs that only support a single browser window will have difficulty using the public access interface in its standard configuration.

To solve this problem, see "Supporting PDAs" on page 172.

Step 1: Setting up the CN3200 RADIUS client

The CN3200 lets you define up to 16 RADIUS client profiles. Each profile defines the settings for a RADIUS client connection. To support a client connection, you must create a client account (sometimes called a RAS account) on the RADIUS server. The settings for this account must match the profile settings you define on the CN3200.

For backup redundancy, each profile supports a primary and secondary server.

The CN3200 will function with any RADIUS server that supports RFC 2865 and RFC 2866. Authentication occurs via EAP-MD5, CHAP, MSCHAP v1/v2, or PAP.

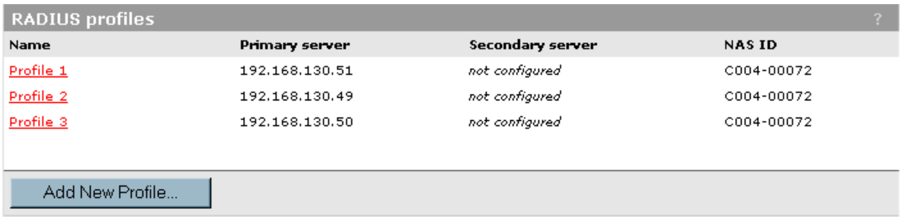
Important: *To safeguard the integrity of the customer accounts, it is important that you protect communications between the CN3200 and the RADIUS server. The CN3200 lets you use PPTP or IPSec to create a secure tunnel to the RADIUS server. Refer to Chapter 10 for complete instructions on how to accomplish this.*

Managing shared secrets

If you are installing multiple CN3200s, and you intend to use VPNs to secure the connection each unit will establish with the RADIUS server, make sure that the shared secret for each device is the same. This is required because there is no way to guarantee that a specific CN3200 will receive a specific IP address when connecting to the VPN server. Since the RADIUS server requires that you associate an IP addresses with a secret, the only way to avoid problems is to use the same secret for all CN3200s. The username and password assigned to each CN3200 can be different, enabling you to differentiate between devices.

Configuration procedure

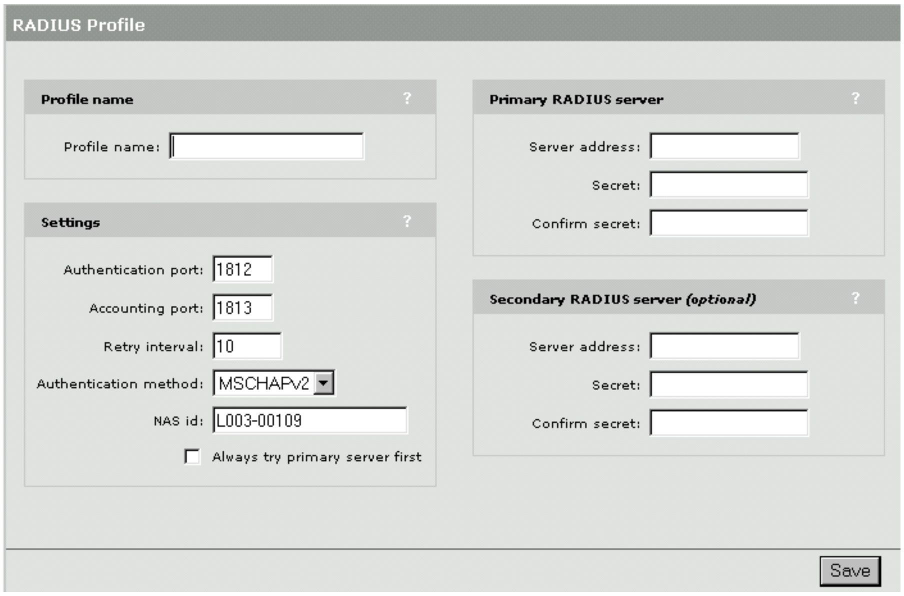
1. Click **Security**, then click **RADIUS**. The *RADIUS profiles list* page opens.



RADIUS profiles

Name	Primary server	Secondary server	NAS ID
Profile 1	192.168.130.51	*not configured*	C004-00072
Profile 2	192.168.130.49	*not configured*	C004-00072
Profile 3	192.168.130.50	*not configured*	C004-00072

2. Click **Add New Profile**. The *RADIUS profile* page opens.



RADIUS Profile

Profile name

Profile name:

Settings

Authentication port: 1812

Accounting port: 1813

Retry interval: 10

Authentication method: MSCHAPv2

NAS id: L003-00109

□ Always try primary server first

Primary RADIUS server

Server address:

Secret:

Confirm secret:

Secondary RADIUS server *(optional)*

Server address:

Secret:

Confirm secret:

3. Configure the settings as required. Refer to the sections that follow for detailed configuration information on each parameter.
4. Click **Save** when you are done.

Profile name

Specify a name to identify the profile.

RADIUS profile settings

Authentication port

Specify the port to use for authentication. By default, RADIUS servers use port 1812.

Accounting port

Specify the port to use for accounting. By default, RADIUS servers use port 1813.

Retry interval

Controls the retry interval (in seconds) for access and accounting requests that time-out. If no reply is received within this interval, the CN3200 switches between the primary and secondary RADIUS servers (if defined). If a reply is received after the interval expires, it is ignored.

This parameter applies to access and accounting requests generated by the following:

- administrator logins to the management tool
- customer logins via HTML
- MAC-based authentication of devices
- authentication of the CN3200

The maximum number of retries can be determined as follows:

- HTML-based logins: The number of retries is calculated by taking the setting for HTML-based logins **Authentication Timeout** parameter and dividing it by the value of this parameter. The default settings result in 4 retries (40 / 10).
- MAC-based and CN3200 authentication: Number of retries is infinite.
- 802.1x authentication. Retries are controlled by the 802.1x client software.

Authentication method

Choose the default authentication method the CN3200 will use when exchanging authentication packets with the primary/secondary RADIUS server defined for this profile.

For 802.1x users, the authentication method is always determined by the 802.1x client software and is not controlled by this setting.

If traffic between the CN3200 and the RADIUS server is not protected by a VPN, it is recommended that you use EAP-MD5 or MSCHAP V2 if supported by your RADIUS Server. (PAP, MSCHAP V1 and CHAP are less secure protocols.)

NAS Id

Specify the network access server ID you want to use for the CN3200. By default, the serial number of the CN3200 is used. The CN3200 includes the NAS-ID attribute in all packets that it sends to the RADIUS server.

Always try primary server first

Set this option to force the CN3200 to contact the primary server first.

Otherwise, the CN3200 sends the first RADIUS access request to the last known RADIUS server that replied to any previous RADIUS access request. If the request times out, the next request is sent to the other RADIUS server if defined.

For example, assume that the primary RADIUS server was not reachable and that the secondary server responded to the last RADIUS access request. When a new authentication request is received, the CN3200 sends the first RADIUS access request to the secondary RADIUS server.

If it does not reply, the RADIUS access request is retransmitted to the primary RADIUS server. The CN3200 always alternates between the two servers, when configured.

Primary RADIUS server

Server address

Specify the IP address of the RADIUS server.

Secret/Confirm secret

Specify the secret (password) that CN3200 will use when communicating with the RADIUS server. The shared secret is used to authenticate all packets exchanged with the server to prove that they originate from a valid/trusted source.

Secondary RADIUS server

Server address

Specify the IP address of the RADIUS server.

Secret/Confirm secret

Specify the secret (password) that CN3200 will use when communicating with the RADIUS server. The shared secret is used to authenticate all packets exchanged with the server to prove that they originate from a valid/trusted source.

Step 2: Setting up CN3200 authentication

Important: *The CN3200 public access interface will not be functional until the CN3200 can successfully connect to a RADIUS server and authenticate itself. This means that the login page for the public access interface will appear, but customers will get an error when they try to log in. This applies regardless of the method you are using to authenticate customers.*

The CN3200 authenticates itself to a RADIUS server each time:

- it is powered up
- it is restarted
- the authentication interval expires

At each authentication, the CN3200 can retrieve configuration information (if defined), which includes settings such as:

- Access list defining the network resources unauthenticated customers have access to.
- URLs specifying the location of any customized Web pages and their support files.
- a URL specifying the location of a custom security certificate.
- a URL specifying the location of a configuration file.
- MAC addresses of devices to authenticate.

When you set up a profile for the CN3200 on the RADIUS server you define this information in the form of a Colubris Networks vendor-specific attribute. See “Creating a profile for the CN3200 on the RADIUS server” on page 214 for details.

Configuration procedure

1. Click **Security**, then click **Authentication**. The *Authentication* page opens.
2. Configure the settings for the CN3200 as required. Refer to the “Configuration parameters” section that follows for detailed configuration information on each parameter.
3. Click **Save**, when you are done.
4. If the profile for the CN3200 is configured on the RADIUS server, click the **Force authentication** button. The red indicator will change to green if the CN3200 successfully connects to the RADIUS server and is authenticated.

Configuration parameters

RADIUS profile

Choose the RADIUS profile that will be used to authenticate the CN3200.

RADIUS username

Name of the RADIUS account assigned to the CN3200.

RADIUS password / Confirm password

Password of the RADIUS account assigned to the CN3200.

Authentication interval

The CN3200 will re-authenticate itself each time this interval expires. This enables it to retrieve updated operating information at regular intervals.

To avoid potential service interruptions that may occur when new operating information is activated by the CN3200, it is strongly recommended that a large interval (12 hours or more) be used.

You can override this value using the RADIUS Attribute Session-timeout, which enables the following effective strategy: Configure **Authentication interval** to a small value (10 to 20 minutes) and set the RADIUS Attribute Session-timeout to override it with a large value (12 hours) when authentication is successful. Since the Authentication interval is also respected for Access Reject packets, this configuration results in a short re-authentication interval in the case of failure, and a long one in the case of success.

Accounting

Enable this option to have the CN3200 generate a RADIUS accounting request ON/OFF each time its authentication state changes.

Last authenticated

Indicates when the CN3200 was last successfully authenticated.

Force authentication

Click this button to force the CN3200 to authenticate now. This lets you test your settings.

Advanced settings

Click this button to set additional authentication-related settings.

Step 3: Setting up customer authentication

The CN3200 uses the services of a RADIUS server to authenticate customer logins, track and manage connection time, and generate billing information.

To login to the public access network, each customer must supply a username and password. The CN3200 sends this information to the RADIUS server for authentication. If the customer login is approved, the RADIUS server returns configuration information for the customer. This includes settings for:

- Connection time limit for the customer’s session.
- Idle time limit for the customer’s session.
- Access list for the customer.
- Address of the e-mail server to use for redirection of the customer’s e-mail.
- URLs specifying the location of customized Welcome and Goodbye pages for the customer.

When you set up a profile for a customer on the RADIUS server you define this information in the form of a Colubris Networks vendor-specific attribute. See “Creating customer profiles on the RADIUS server” on page 225 for details.

Configuration procedure

1. On the main menu, click **Security**.
2. Click **Authentication**. The *Authentications settings* page opens.
3. Configure the settings for HTML-based user logins as defined below. This controls the authentication procedure for customers who will login via the public access interface on the CN3200.
4. Click **Save**, when you are done.

Step 4: Setting up the RADIUS server

To authenticate the CN3200 and its customers you must configure accounts on a RADIUS server. The procedure for doing this varies depending on the RADIUS server you are using. Consult the documentation that came with your RADIUS server for details.

Minimum setup

As a bare minimum you need to:

- **Define RADIUS client settings for the CN3200**

  Any device that uses the authentication services of a RADIUS server is called a RADIUS client. Therefore, each CN3200 is considered to be a RADIUS client and you must define client settings for each one that you intend to install.

  See page 213 for details.

- **Create a RADIUS profile for the CN3200**

  Before it can activate the public access interface, the CN3200 must log onto a RADIUS server and retrieve certain operating settings which you must define. Therefore, you must create at least one RADIUS profile for use by the CN3200. If you have multiple CN3200s, they can all be associated with a single RADIUS profile.

  See page 214 for details.

- **Create a RADIUS profile for one or more customers**

  The customer profile is used to authenticate customers when they login and store accounting information. It contains the settings that define the characteristics of their account.

  See page 225 for details.

More information

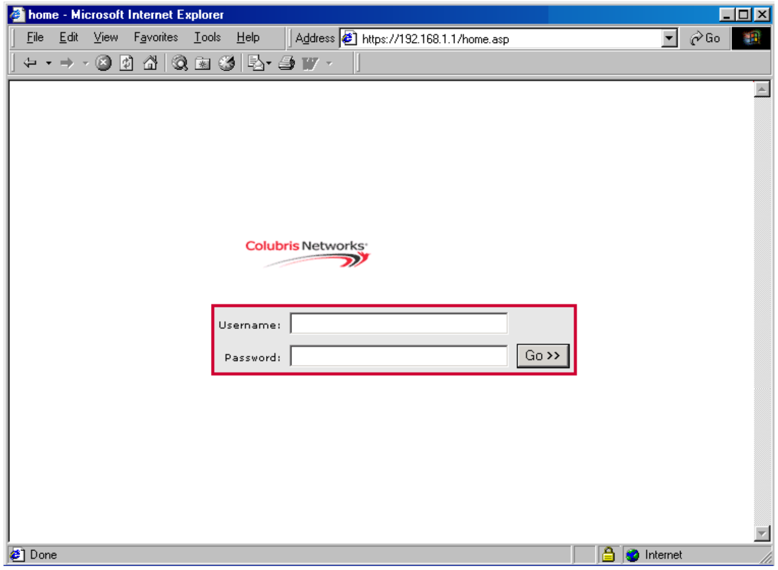
For more information on configuring the RADIUS server, see:

- Chapter 16, which describes all the RADIUS configuration settings you can define to customize the operation of the public access network and customer accounts.
- Chapter 18, which provides a walkthrough of a sample RADIUS configuration using Steel-belted Radius.
- Chapter 19, which provides a walkthrough of a sample RADIUS configuration using Microsoft's RADIUS server: Internet Authentication Service.

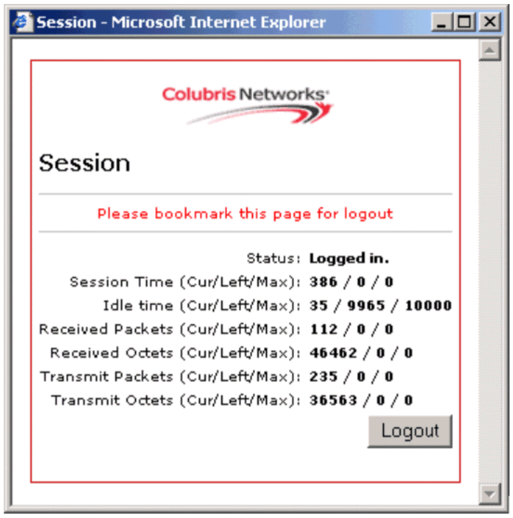
Step 5: Testing the public access interface

To test your installation, use a wireless client station to log onto the public access interface. For this to work, the CN3200 must be configured as the client's default gateway.

1. Start the client station's web browser and enter the IP address (or domain name) of a web site on the Internet.
2. The CN3200 should intercept the URL and display the login page. (Depending on the type of certificate that is installed on the CN3200, you may see a security warning first.)


home - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Address https://192.168.1.1/home.asp
Go
Colubris Networks
Username:
Password:
Go >>
Done
Internet

3. To login, specify a valid customer name and password. The CN3200 session page should open.



Session

Please bookmark this page for logout

Status: **Logged in.**
Session Time (Cur/Left/Max): **386 / 0 / 0**
Idle time (Cur/Left/Max): **35 / 9965 / 10000**
Received Packets (Cur/Left/Max): **112 / 0 / 0**
Received Octets (Cur/Left/Max): **46462 / 0 / 0**
Transmit Packets (Cur/Left/Max): **235 / 0 / 0**
Transmit Octets (Cur/Left/Max): **36563 / 0 / 0**

4. Next, you are automatically redirected to the web site you originally requested.

Chapter 10

Secure remote connectivity

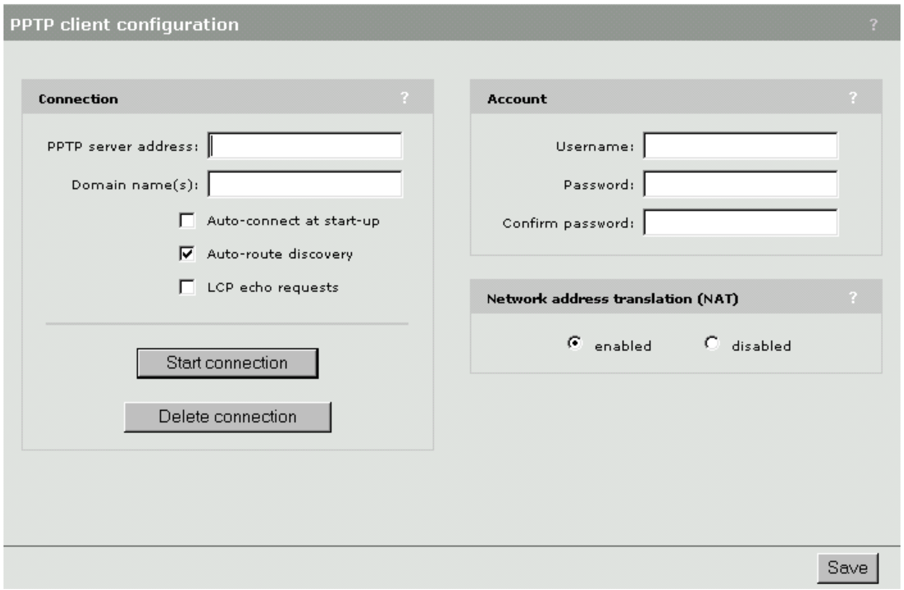
This chapter explains how to establish secure connections to a remote network.

Secure remote connectivity using the PPTP client

The CN3200 features PPTP client software which enables it to create a secure connection to a remote site via a non-secure infrastructure like the Internet. PPTP works by creating a secure tunnel between two devices. Traffic in the tunnel is protected against eavesdropping by means of encryption. Traffic in the PPTP tunnel bypasses the CN3200's firewall.

Configuration procedure

1. On the main menu, click **Security**.
2. Click **PPTP client**. The *PPTP client configuration* page opens.



3. Configure the settings required by your connection. Refer to the sections that follow for detailed configuration information on each parameter.
4. Click **Save**, when you are done.

Connection

PPTP server address

Specify the domain name or IP address of the PPTP server the CN3200 will connect to.

Domain name(s)

Specify the domain name(s) of the PPTP server. Put a space between each name as a separator. The CN3200 routes all traffic addressed to this domain through the PPTP connection.

Auto-connect at start-up

Enable this option if you want the CN3200 to automatically establish the PPTP connection when it restarts.

Auto-route discovery

Enable this option if you want the CN3200 to automatically discover and add routes to IP addresses on the other side of the PPTP tunnel. The addresses must be part of the specified domain. Routes are added only when an attempt is made to access the addresses.

LCP echo

Certain VPN servers may terminate your connection if it is idle. If you enable this option, the CN3200 will send a packet from time to time to keep the connection alive.

Account

Username

Specify the username the CN3200 will use to log on to the PPTP server. If you are logging on to a Windows NT domain, specify: domain_name\username

Password / Confirm password

Specify the password the CN3200 will use to log on to the PPTP server.

Network Address Translation (NAT)

If you enable NAT, it effectively hides the addresses of all local computers so that they are not visible on the other side of the PPTP connection.

If you disable NAT, then the appropriate IP routes must be added to send traffic though the tunnel.

Note: *This setting does not affect traffic on the Internet port.*

Secure remote connectivity using IPSec

IPSec provides the ability for two hosts (called peers in IPSec terminology) to communicate in complete security over any IP-based network.

IPSec achieves this security though the use of sophisticated encryption that makes it impossible for an eavesdropper to decode the packets of data being exchanged between two IPSec peers.

The CN3200 supports IPSec on the Internet port. This enables you to use IPSec to safeguard data exchanged with remote RADIUS servers,

Preconfigured settings

The Internet Key Exchange protocol is used to negotiate IPSec security associations. The negotiation is controlled by setting a number of different IKE options. To simplify the configuration of IPSec, the CN3200 presets some of these options, while others are automatically defined based on the needs of the peer.

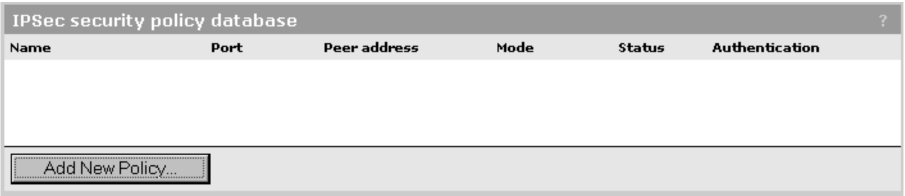
The following is a summary of the most important non-configurable IKE options:

Hash algorithm	Accepts the algorithm proposed by the peer. Supports MD5 and SHA-1.
Phase 2 encryption algorithm	3DES
Oakley group or Diffie-Hellman	Accepts the group proposed by the peer. Supports groups 2 and 5.
ID type and ID	• If you enable **Preshared key** for **Authentication method**, the CN3200 automatically sets: ID type = IP address ID = IP address assigned to the Internet port. To establish a security association the peer must also set its **IP type** to **IP address**. • If you enable **X.509 certificates** for **Authentication method**, the CN3200 automatically sets: ID type = DER_ASN1_DN ID = the distinguished name included in the local certificate. The peer however can use any of the four formats the CN3200 supports: IP address, fully qualified user name, fully qualified host name, or DER_ASN1_DN.
Security association lifetimes	• Phase 1: 6 hours • Phase 2: 1 hour

Perfect forward secrecy (PFS)	New keying material will be generated for each IPsec security association rather than being derived from the ISAKMP SA keying material.

Configuration procedure

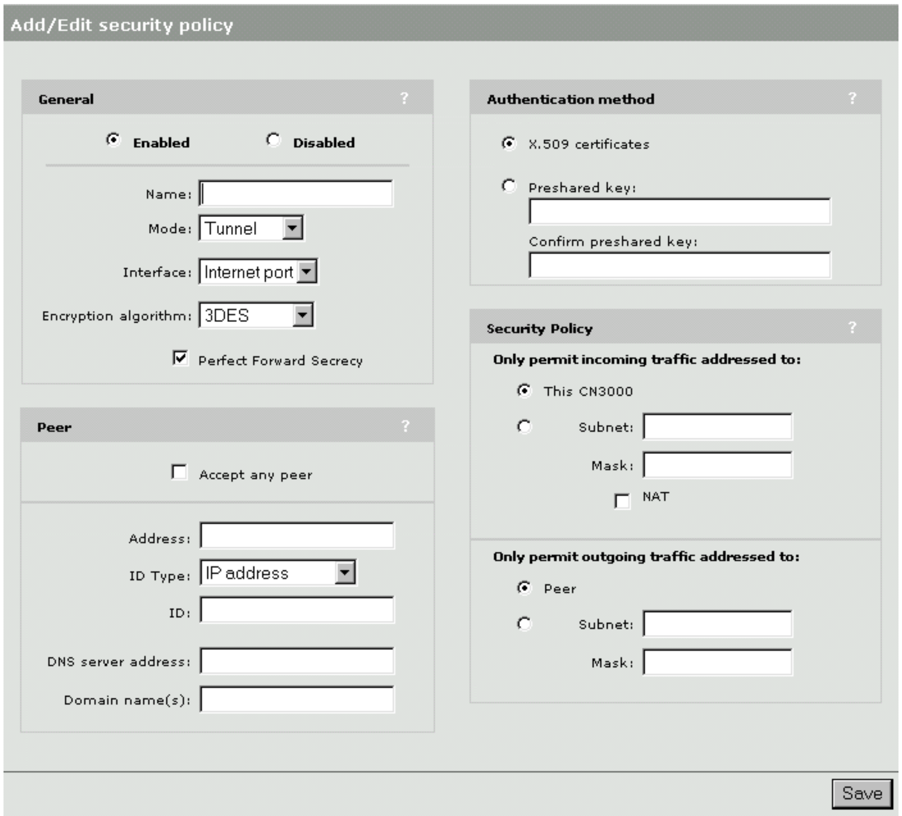
1. On the main menu, click **Security**.
2. Click **IPSec**. The *IPSec security policy database* page opens.



IPSec security policy database

Name	Port	Peer address	Mode	Status	Authentication

3. Click **Add New Policy**. The *IPSec add/edit policy* page opens.



Add/Edit security policy

General

● Enabled ○ Disabled

Name:

Mode: Tunnel

Interface: Internet port

Encryption algorithm: 3DES

☑ Perfect Forward Secrecy

Peer

□ Accept any peer

Address:

ID Type: IP address

ID:

DNS server address:

Domain name(s):

Authentication method

● X.509 certificates

○ Preshared key:

Confirm preshared key:

Security Policy

Only permit incoming traffic addressed to:

● This CN3000

○ Subnet:

Mask:

□ NAT

Only permit outgoing traffic addressed to:

● Peer

○ Subnet:

Mask:

4. Configure the settings required by your policy Refer to the sections that follow for detailed configuration information on each parameter.
5. Click **Save**, when you are done.

General

A security association can only be established between the CN3200 and a peer if the policy is enabled.

Name

Specify a name for the policy. This identifies the policy in the IPSec security policy database.

Mode

Choose the mode of operation. Two options are available.

- Tunnel mode: Use this mode if you want to create a secure tunnel to a remote peer in order to transfer data between two networks (i.e. both peers are operating as gateways). This option can also be used in peer-to-peer mode by selecting the appropriate options for **Incoming traffic** and **Outgoing traffic**.
- Transport mode: This option creates a point-to-point connection to a remote peer. Use this option if only the CN3200 needs to communicate with the remote peer.

Interface

Select the port that the policy applies to.

Encryption algorithm

Select the encryption algorithm used for this policy.

- 3DES: Hardware accelerated
- AES/3DES: Will propose AES, If other side does not accept, then will switch to 3DES. AES is slower because no hardware acceleration is available. Should be used for low-bandwidth (<1.5 Mb) connections.

Perfect Forward Secrecy

Enable this option to support automatic regeneration of keys. The key is changed according to the following intervals:

- Phase 1 exchange: key changed every 6 hours
- Phase 2 exchange: key changed every 1 hour

Note: The CN3200 will negotiate times up to 24 hours as required by the peer.

Peer

Accept any peer

(only available in tunnel mode)

Enable this option to permit the policy to accept an IPSec security association from any peer. When this option is enabled, the CN3200 sets **ID type** and **ID** automatically based on the selection for **Authentication method**. See IKE options for more information.

Address

Specify the IP address or domain name of the peer.

ID type

Specify the method used to identify the peer.

IP address

- Specify the peer’s IP address. If you are using a **Preshared key** for **Authentication method**, then you must use this option.

FQDN

Specify a fully qualified domain name. For example: gateway.colubris.com

user@FQDN

Specify a fully-qualified user name. For example: fred@colubris.com

DER_ASN1_DN

Specify a distinguished name (DN) in LDAP (X.501) format. Enter a maximum of 91 characters. The following fields are supported.

Field	Description
CN	commonName
SN	serialNumber
C	countryName
L	localityName
ST	stateOrProvinceName
O	organizationName
OU	organizationalUnitName
G	givenName
E	emailAddress

Separate fields by a comma, space, or a forward slash (/). For example:

```
(CN=joe/E=joe@company.com/O=Company Inc./C=US)
```

ID

Specify an **ID** based on the **ID type** you selected. If you selected IP address, then you can leave this field blank to use the address in the **Address** field.

DNS server address

Specify the domain name or IP address of the primary and secondary DNS servers that the CN3200 will use to resolve DNS requests related to the remote peer's domain. In most cases these servers will be located on the network protected by the peer.

Domain name

Specify the domain name of the peer. Any DNS requests on the wireless LAN for addressed to this domain are forwarded to the DNS server specified above. This enables the CN3200 to properly forward traffic to stations on the other side of an IPSec tunnel.

Authentication method

X.509 certificates

Select this option to use X.509 certificates to validate peers. To define certificate settings, select **certificates** on the **security** menu.

Preshared key

Specify the key that will be used by the CN3200 to validate peers. The CN3200 and the peer must both use the same key.

Security

Only permit incoming traffic addressed to

These settings enable you to filter incoming traffic so that only traffic addressed to a specific network or network device is permitted from the peer. Note that the setting you make for this parameter must match the setting the peer makes for outgoing traffic. If not, the connection will not be established.

This CN3200

Only accepts incoming traffic that is addressed to the CN3200. All other traffic is dropped.

Subnet
Mask

Only accepts incoming traffic that is addressed to the specified subnet or host you specify. All other traffic is dropped. To accept all traffic from the peer, specify both the **Subnet** and **Mask** as: 0.0.0.0

NAT

Enable network address translation for traffic addressed to the specified **Subnet**. This hides the addresses of local computers from the peer. If you enable NAT, the peer does not have to match the settings for **Subnet**.

Only permit outgoing traffic addressed to

These settings enable you to filter outgoing traffic so that only traffic addressed to the peer, a specific network, or network device is sent. All other traffic is sent onto the Internet outside the tunnel.

Note that the setting you make for this parameter must match the setting the peer makes for incoming traffic. If not, the connection will not be established.

Peer

Only sends outgoing traffic that is addressed to the peer. All other traffic is sent onto the Internet outside the tunnel.

Subnet
Mask

Only sends outgoing traffic that is addressed to the specified subnet or host you specify. All other traffic is dropped. To send all outgoing traffic to the peer, specify both the **Subnet** and **Mask** as: 0.0.0.0

Chapter 11

Centralized architecture

This chapter explains how to create centralized management structures for a variety of applications.

Scenario #1: Centralized authentication

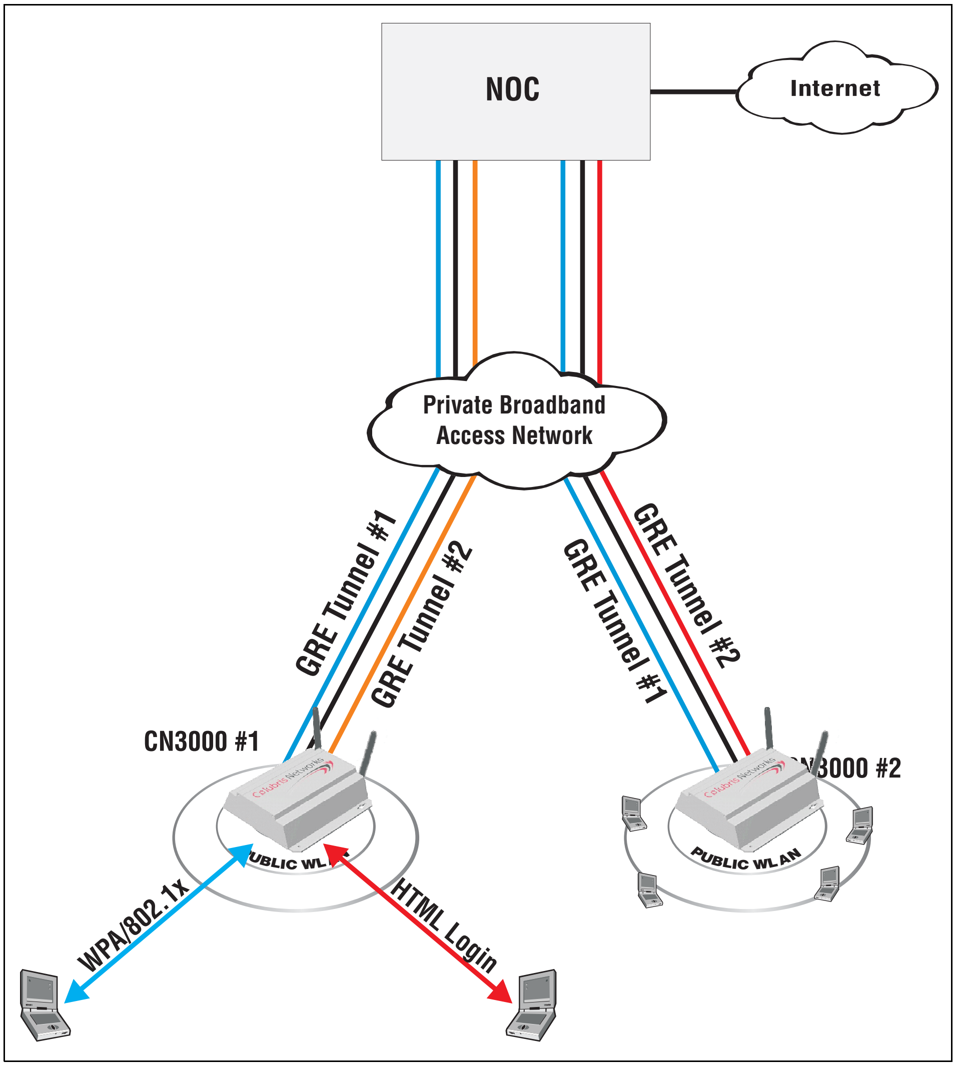
This scenario illustrates how to use GRE tunnels to move management of the public access network to a centralized location that can be shared by multiple geographically distributed access points.

How it works

In this scenario, each CN3200 forwards all user traffic to a remote NOC. The NOC is responsible for managing customer logins to the public access network and granting access to the Internet.

This scenario supports two types of customers:

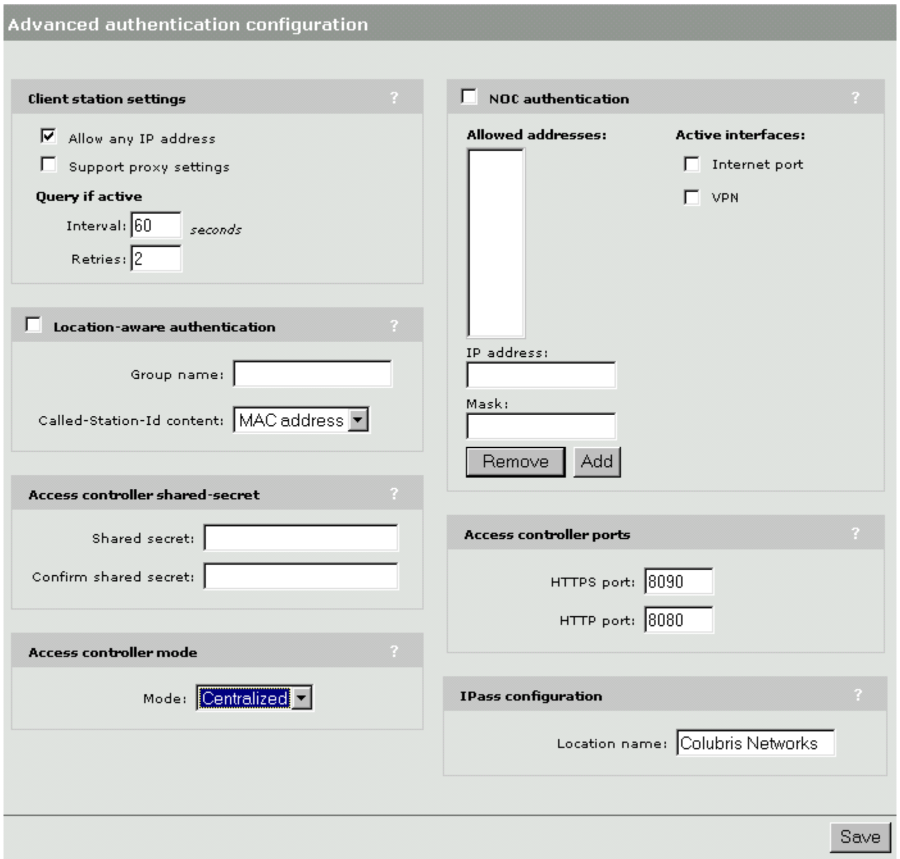
- **Customers who login via an HTML session:** Traffic for these customers is routed through GRE tunnel #2, which is configured to handle all unauthenticated wireless traffic. The CN3200 does no processing of this traffic.
- **Customer who are using WPA or 802.1x:** Login for these customers is handled by the CN3200, which terminates the WPA or 802.1x session. The CN3200 uses the services of the RADIUS server at the NOC to validate the logins. Once authenticated, all customer traffic is sent in GRE tunnel #1.



Configuration roadmap

The following configuration steps provide an overview on how to set up a CN3200 to function in this scenario.

1. Open the **Security** > **Authentication** > **Advanced** page.
2. In the **Access controller mode** box, select **Centralized** and click **Save**. This disables the public access interface on the CN3200.



Advanced authentication configuration

Client station settings
☑ Allow any IP address
□ Support proxy settings
Query if active
Interval: 60 seconds
Retries: 2

□ Location-aware authentication
Group name:
Called-Station-Id content: MAC address

Access controller shared-secret
Shared secret:
Confirm shared secret:

Access controller mode
Mode: Centralized

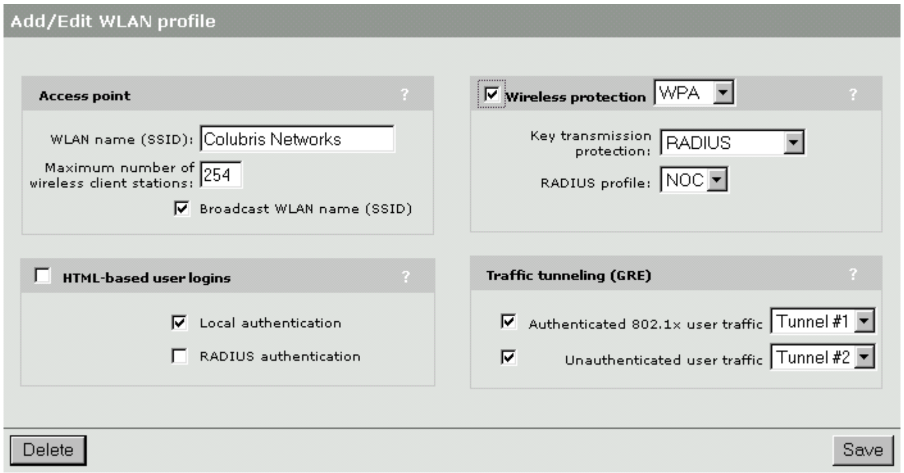
□ NOC authentication
Allowed addresses:
IP address:
Mask:
Active interfaces:
□ Internet port
□ VPN

Access controller ports
HTTPS port: 8090
HTTP port: 8080

IPass configuration
Location name: Colubris Networks

3. Open the **Network** > **GRE** page, and add two GRE tunnels to the remote NOC.
4. Open the **Security** > **RADIUS** page, and add a RADIUS profile that connects to the RADIUS server on the NOC.
5. Open the **Wireless** > **WLAN profiles** page.
6. Click the **Colubris Networks** profile to edit it.
7. In the **Traffic Tunneling (GRE)** box, do the following:
   - Map Authenticated 802.1x user traffic to GRE tunnel #1
   - Map Unauthenticated user traffic to GRE tunnel #2.
8. In the **Wireless protection** box, enable either **WPA** or **802.1x** and set it to use the RADIUS profile you defined earlier.

9. Your settings should look like this when done:



Add/Edit WLAN profile

Access point

WLAN name (SSID): Colubris Networks

Maximum number of wireless client stations: 254

☑ Broadcast WLAN name (SSID)

☑ **Wireless protection** WPA

Key transmission protection: RADIUS

RADIUS profile: NOC

□ **HTML-based user logins**

☑ Local authentication

□ RADIUS authentication

Traffic tunneling (GRE)

☑ Authenticated 802.1x user traffic: Tunnel #1

☑ Unauthenticated user traffic: Tunnel #2

10. Click **Save**.

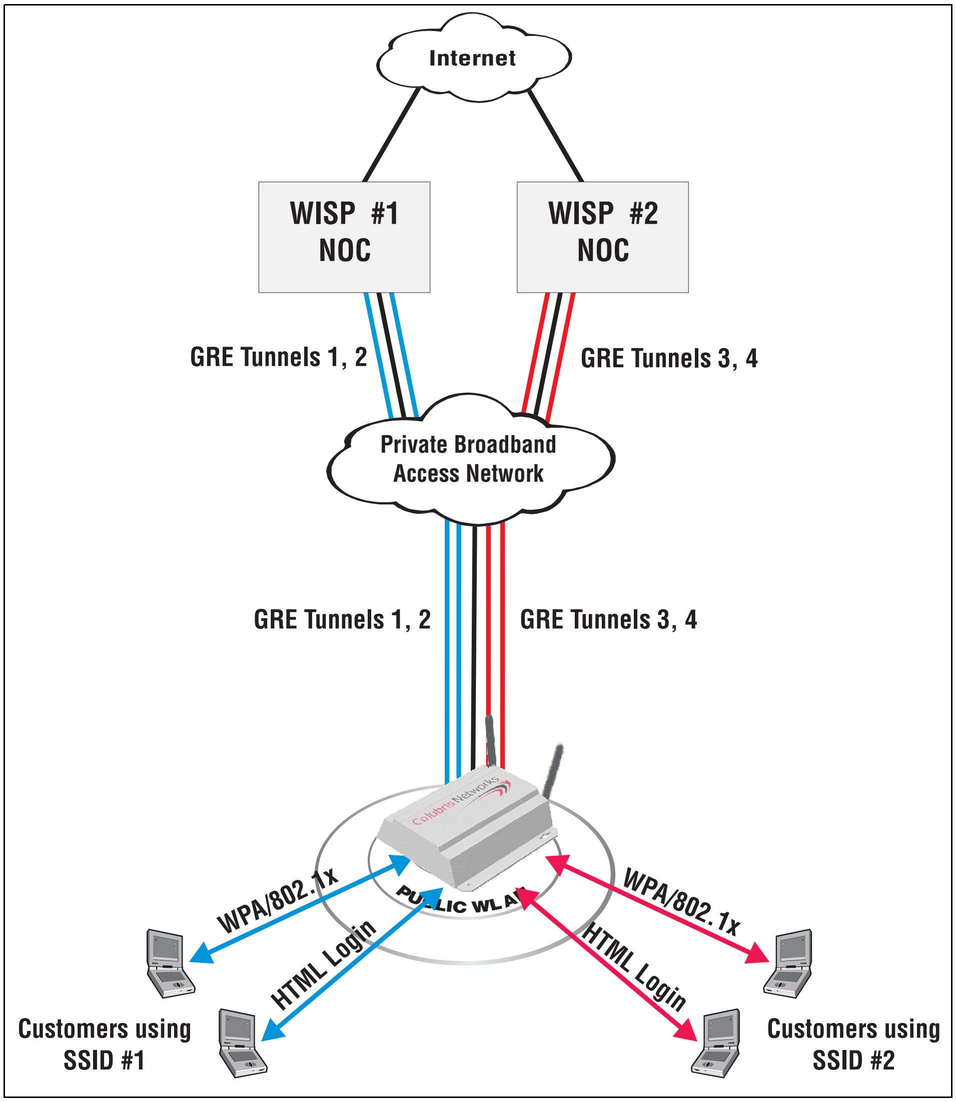
Scenario #2: Wholesaling with GRE

This scenario illustrates how to use GRE tunnels and multiple SSIDs to share an access point between more than one wireless Internet service provider (WISP). This scenario assumes that one WISP is the owner of a private broadband network and uses this network to link one or more CN3200s installed at different locations. This WISP also owns the CN3200s and is responsible for managing them. This WISP then leases out use of the access points to other WISPs.

How it works

Each WISP provides their own NOC linked to the private broadband network. The NOCs control customer logins to the public access network and granting access to the Internet.

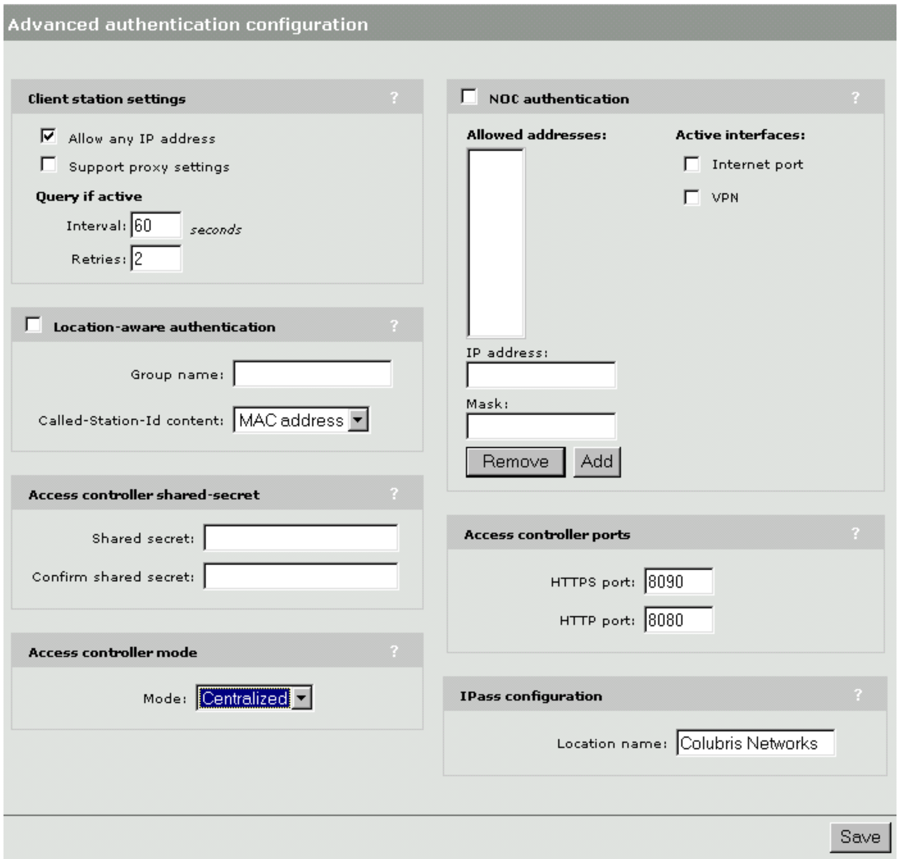
Each CN3200 is configured with two SSIDs for each WISP. The first is for customers using HTML logins, and the second is for customers who are using WPA or 802.1x. The two SSIDs are then each mapped to a specific GRE tunnel that terminates at the appropriate NOC.



Configuration roadmap

The following configuration steps provide an overview on how to set up a CN3200 to function in this scenario.

1. Open the **Security** > **Authentication** > **Advanced** page.
2. In the **Access controller mode** box, select **Centralized** and click **Save**. This disables the public access interface on the CN3200.



Advanced authentication configuration

Client station settings

☑ Allow any IP address

□ Support proxy settings

Query if active

Interval: 60 *seconds*

Retries: 2

□ **Location-aware authentication**

Group name:

Called-Station-Id content: MAC address

Access controller shared-secret

Shared secret:

Confirm shared secret:

Access controller mode

Mode: Centralized

□ **NOC authentication**

Allowed addresses:

IP address:

Mask:

Active interfaces:

□ Internet port

□ VPN

Access controller ports

HTTPS port: 8090

HTTP port: 8080

IPass configuration

Location name: Colubris Networks

3. Open the **Network** > **GRE** page, and add four GRE tunnels, two to each remote NOC.
4. Open the **Security** > **RADIUS** page, and add a RADIUS profile that connects to the RADIUS server on NOC 1. This is required for authentication of the CN3200.
5. Open the **Wireless** > **WLAN profiles** page.
6. Define four profiles, two for each NOC.
   - In the **Traffic Tunneling (GRE)** box, map authenticated and unauthenticated user traffic to their own tunnels for each NOC.
   - In the **Wireless protection** box, enable either **WPA** or **802.1x** on one profile for each NOC.

Scenario #3: Wholesaling with VPNs

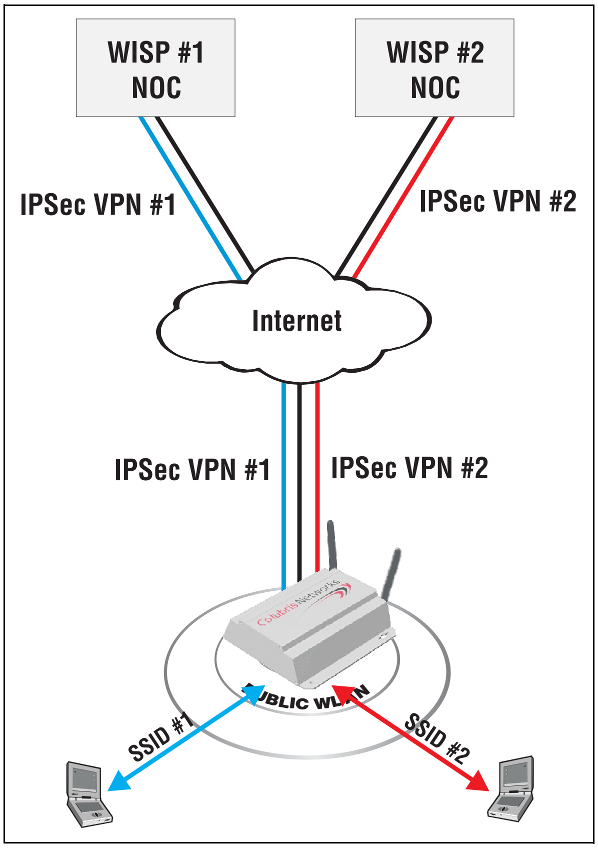
This scenario illustrates how to use IPSec and multiple SSIDs to share an access point between multiple WISPs.

How it works

In this scenario, the CN3200 controls access to the public access network. A separate WLAN profile is defined for each WISP and is mapped to an IPSec tunnel that terminates at the appropriate NOC. Each WISP must provide a RADIUS server at the NOC to handle accounting and authentication duties. In addition, a web server is required to host the customized public access interface.

Customers can choose which WISP to use by selecting the appropriate SSID when they start their wireless client software.

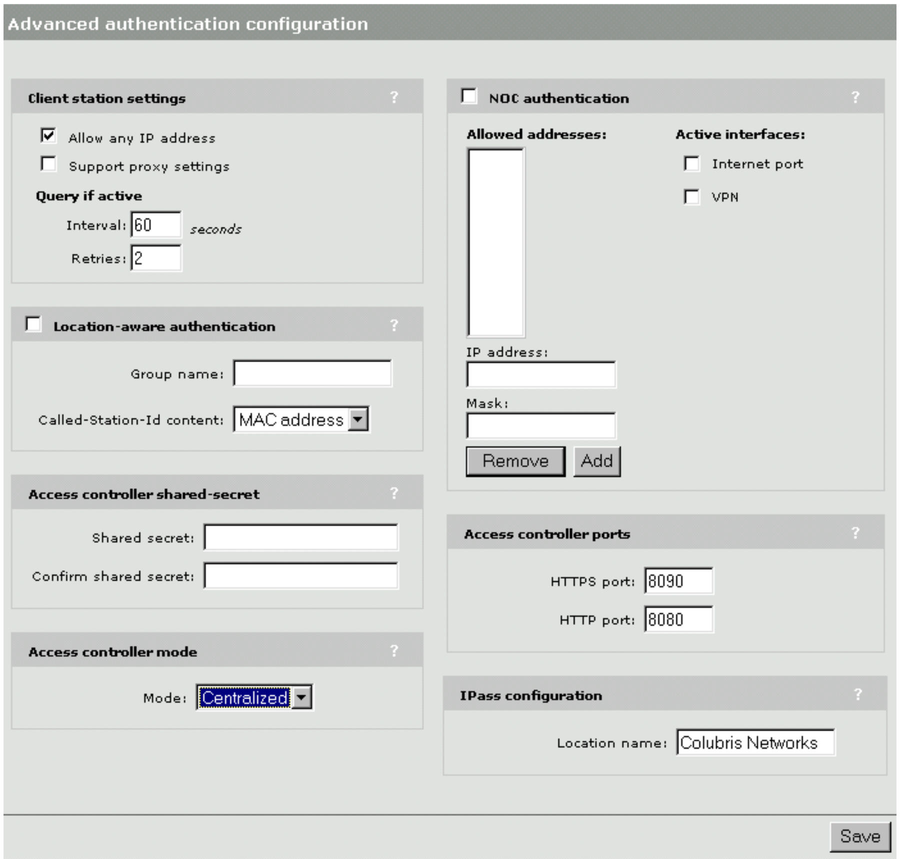
In this scenario, all customers use HTML-based login.



Configuration roadmap

The following configuration steps provide an overview on how to set up a CN3200 to function in this scenario.

1. Open the **Security** > **Authentication** > **Advanced** page.
2. In the **Access controller mode** box, select **Internal** and click **Save**. This enables the public access interface on the CN3200.



Advanced authentication configuration

Client station settings

☑ Allow any IP address

□ Support proxy settings

Query if active

Interval: 60 *seconds*

Retries: 2

□ **Location-aware authentication**

Group name:

Called-Station-Id content: MAC address

Access controller shared-secret

Shared secret:

Confirm shared secret:

Access controller mode

Mode: Centralized

□ **NOC authentication**

Allowed addresses:

IP address:

Mask:

Active interfaces:

□ Internet port

□ VPN

Access controller ports

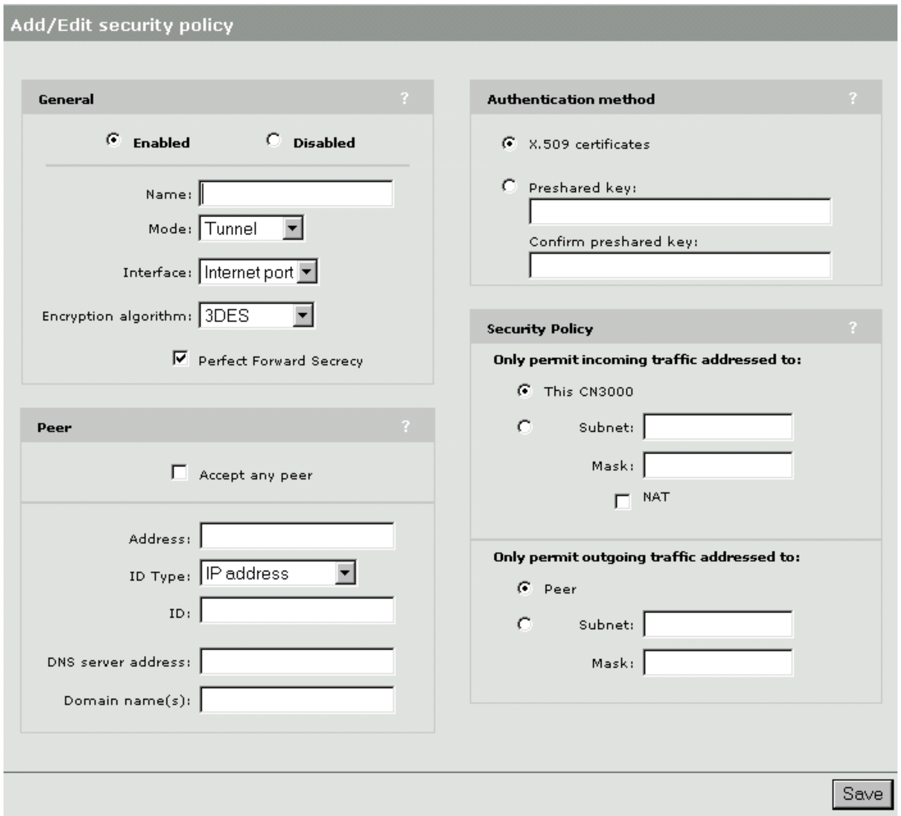
HTTPS port: 8090

HTTP port: 8080

IPass configuration

Location name: Colubris Networks

3. Open the **Security** > **IPSec** page and add two security associations, one to each remote NOC.
   - Set **Only permit outgoing traffic addressed to** the IP address of the NOC subnet.



Add/Edit security policy

General

● Enabled ○ Disabled

Name:

Mode: Tunnel

Interface: Internet port

Encryption algorithm: 3DES

☑ Perfect Forward Secrecy

Peer

□ Accept any peer

Address:

ID Type: IP address

ID:

DNS server address:

Domain name(s):

Authentication method

● X.509 certificates

○ Preshared key:

Confirm preshared key:

Security Policy

Only permit incoming traffic addressed to:

● This CN3000

○ Subnet:

Mask:

□ NAT

Only permit outgoing traffic addressed to:

● Peer

○ Subnet:

Mask:

4. Open the **Security** > **RADIUS** page, and add two RADIUS profiles, one to each remote NOC.
5. Open the **Wireless** > **WLAN profiles** page, add two WLAN profiles. Make sure that each profile is mapped to the correct RADIUS profile.

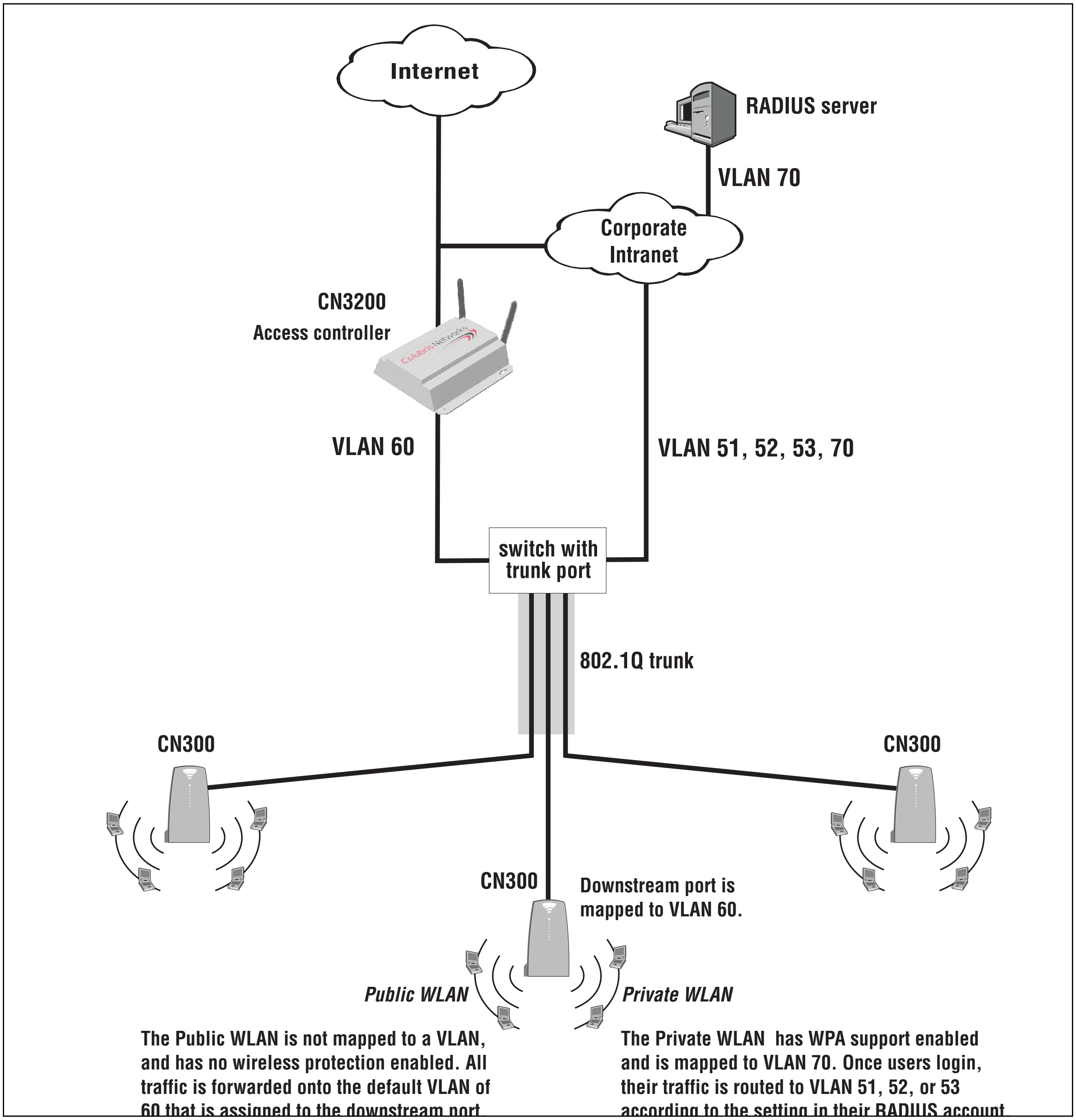
Scenario 4: Public/private access with VLANs

This scenario illustrates how to use multiple SSIDs and VLANs to securely share the wireless infrastructure between public and private users.

How it works

In this scenario, the corporate network has four VLANs.

- VLANs 51, 52, 53 and 70 are assigned to the corporate Intranet and are used by employees. VLAN carries authentication traffic to the RADIUS server.
- VLAN 60 is used by guests and is mapped to the CN3200. Access lists on the CN3200 control the network resources guests can reach. For example, guests can use the Internet and specific servers or printers on the corporate Intranet.



The Public WLAN is not mapped to a VLAN, and has no wireless protection enabled. All traffic is forwarded onto the default VLAN of 60 that is assigned to the downstream port.

The Private WLAN has WPA support enabled and is mapped to VLAN 70. Once users login, their traffic is routed to VLAN 51, 52, or 53 according to the setting in their RADIUS account.

All CN300s have identical configurations as follows:

- Downstream port mapped to VLAN 60. This means that all traffic with no VLAN assigned will be sent on VLAN 60 by default. Note that all management traffic from the CN300s will use this VLAN and therefore be sent to the CN3200.
- Two SSIDs are defined:
  - Public: This SSID is used by guests who login with their web browsers via the CN3200's public access interface. Guests accounts are stored on the corporate RADIUS server. No VLAN is assigned to this SSID so all traffic is assigned to VLAN 60 and is directed to the CN3200.
  - Private: This SSID is used by employees to securely access the corporate intranet. WPA is enabled on this SSID and it is mapped to VLAN 70. This permits employees to reach the corporate RADIUS server for their logins to be validated. Once authenticated, the RADIUS server assigns the employee with a new VLAN based on settings in the employees RADIUS account. This enables employees to be assigned either VLAN 51, 52, or 53 according to their needs.

Configuration roadmap

The following configuration steps provide an overview on how to set up a CN3200 to function in this scenario.

On the CN3200

1. Open the **Security** > **RADIUS** page.
   - Add a RADIUS profile that connects to the corporate RADIUS server.
2. Open the **Security** > **Authentication** page.
   - In CN3000 authentication, define settings to connect to the corporate RADIUS server via the profile you just added.
3. Open the **Wireless > WLAN profiles** page. Add Public.
   - Add a profile named Public.
   - Do not assign a VLAN to this profile.
   - Enable **HTML-based user logins** and assign them to **RADIUS authentication**.
4. Open the **Security** > **Authentication** > **Advanced** page and set the **Access controller shared secret**.
5. Customize the public access interface as required. See Chapter 9 for details.
6. Define access lists to restrict the resources guests can reach. See for "Access list" on page 229 details.

On the CN300s

1. Open the **Wireless > WLAN profiles** page. Add two profiles: Private and Public.
   - Private profile: in the **Wireless protection** box, enable either **WPA** or **802.1x**.
2. Open the **Network** > **Ports** page.
   - Enable **DHCP client**.
   - Set **VLAN** to **60**.
   - Disable **Restrict VLAN to management traffic only**.

3. Open the **Security > Access controller** page.
   - Set the **Access controller shared secret** to same value as on the access controller.
   - Disable **Location-aware authentication**.

On the RADIUS server

Define the following:

1. Define accounts for the CN3000, guests, and employees.
2. In the employee account, setup support for VLAN mapping by defining the following RADIUS attributes:
   - Tunnel-type: Set to "VLAN".
   - Tunnel-medium-type: Set to "802".
   - Tunnel-private-group: Set to the VLAN number.

   See “VLAN support” on page 231. for more information.

Chapter 12
Wireless bridging

This chapter explains how to use the wireless bridging feature to establish links between access points.

Overview

The wireless bridging feature enables you to use the wireless radio to create point-to-point wireless links to other access points.

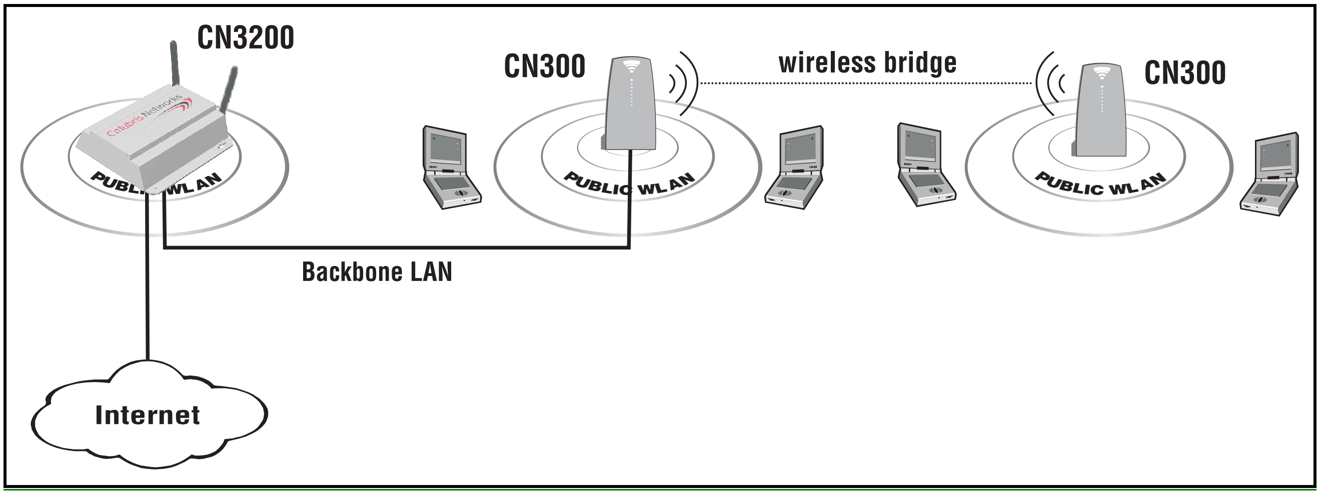
Each CN3200 can support up to six wireless bridges, which can operate at the same time as the network serving wireless customers.

Scenarios

The following scenarios illustrate potential applications for wireless bridging.

RF extension

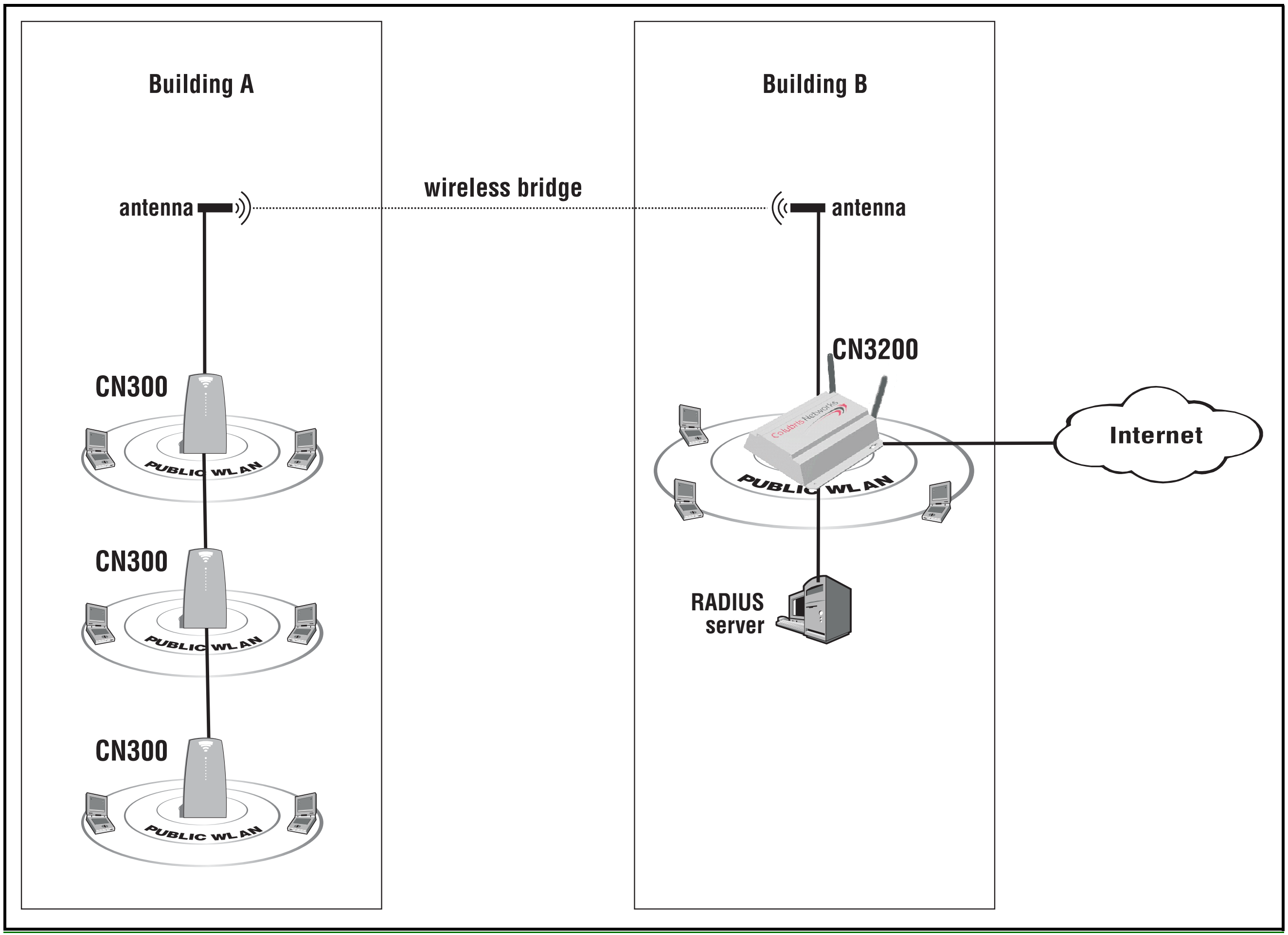
Wireless bridging provides an effective solution for extending wireless coverage in situations where it may be impractical or expensive to install cabling to a wireless access point. For example:



In this scenario, the two CN300s are used to expand the coverage of the wireless network. The first CN300 is connected to the CN3200 via a backbone LAN. The second CN300 uses the wireless bridging function to link with the first CN300.

Building-to-building connections

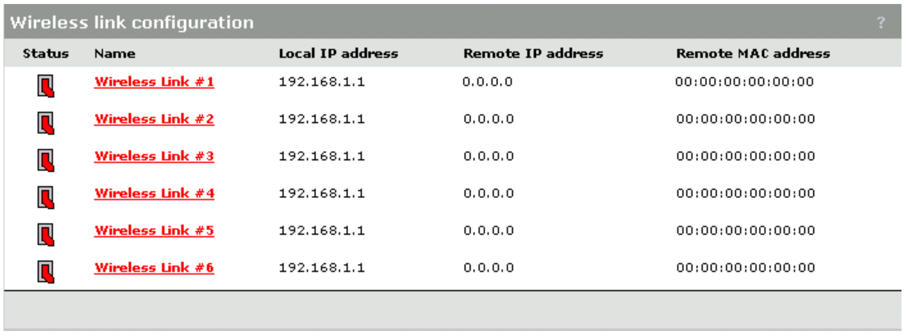
The CN3200s wireless bridging feature can also be used to create point-to-point links over longer distances. For example, to create building-to-building connections.



In this scenario, each CN3200 must be equipped with the appropriate external antenna and be within line of sight to make the connection. Customers are authenticated via the RADIUS server.

Setting up a wireless link

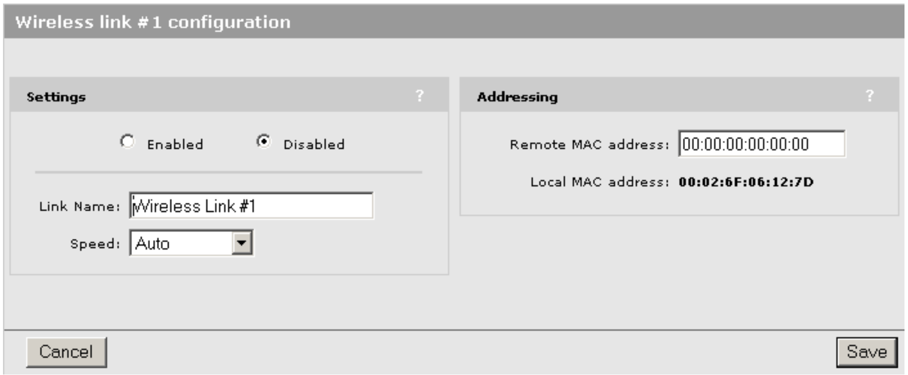
1. On the Wireless menu, click **Wireless links**. The *Wireless links* page opens.



Wireless link configuration ?

Status	Name	Local IP address	Remote IP address	Remote MAC address
▮	Wireless Link #1	192.168.1.1	0.0.0.0	00:00:00:00:00:00
▮	Wireless Link #2	192.168.1.1	0.0.0.0	00:00:00:00:00:00
▮	Wireless Link #3	192.168.1.1	0.0.0.0	00:00:00:00:00:00
▮	Wireless Link #4	192.168.1.1	0.0.0.0	00:00:00:00:00:00
▮	Wireless Link #5	192.168.1.1	0.0.0.0	00:00:00:00:00:00
▮	Wireless Link #6	192.168.1.1	0.0.0.0	00:00:00:00:00:00

2. Click the wireless link you want to configure. The configuration page for the link opens.



Wireless link #1 configuration

Settings ?

○ Enabled ● Disabled

Link Name: Wireless Link #1

Speed: Auto

Addressing ?

Remote MAC address: 00:00:00:00:00:00

Local MAC address: **00:02:6F:06:12:7D**

3. In the **Settings** box, select **Enabled**.
4. In the **Addressing** box, specify the **MAC address** of the other access point.
5. Click **Save**.

Wireless link status

To view the status of the wireless links, open the **Status** > **Wireless** page.

Chapter 13
SNMP interface

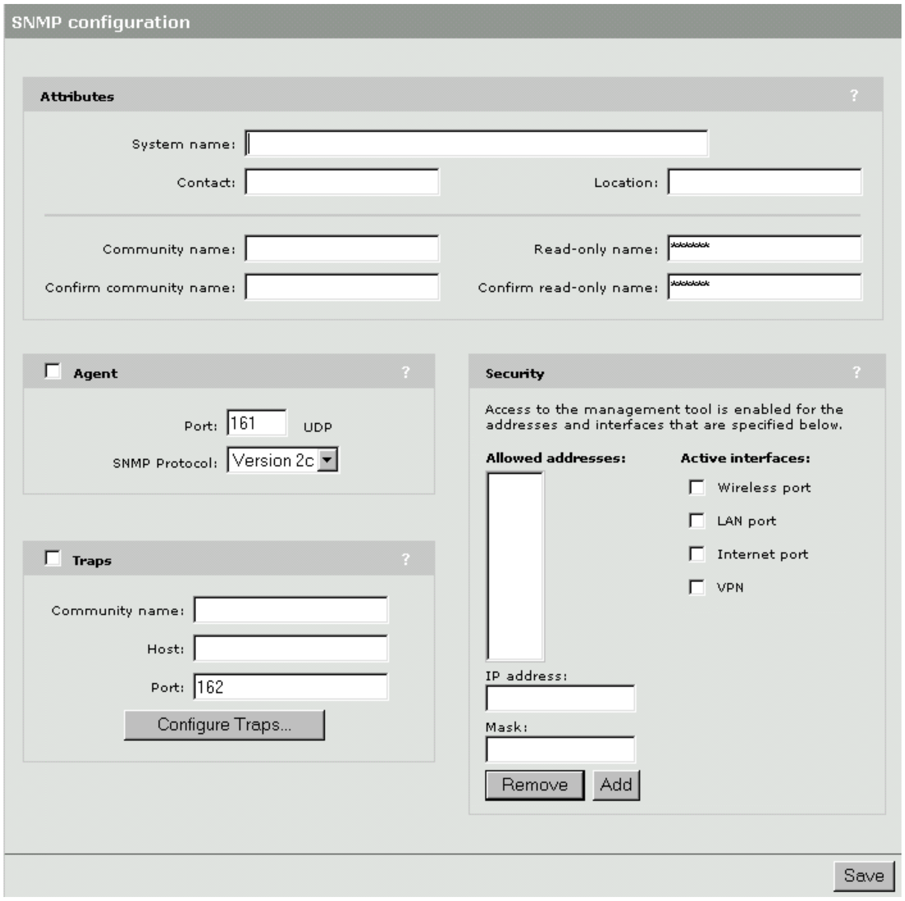
This chapter provides an overview of the SNMP interface and the MIBs supported by the CN3200.

Configuring the SNMP interface

The CN3200 SNMP interface can be reached both locally and remotely for complete flexibility.

To configure SNMP options

1. On the main menu, click **Management**, then click **SNMP**. The *SNMP configuration* page opens.



SNMP configuration

Attributes ?

System name:

Contact:

Location:

Community name:

Read-only name: ******

Confirm community name:

Confirm read-only name: ******

□ **Agent** ?

Port: 161 UDP

SNMP Protocol: Version 2c

□ **Traps** ?

Community name:

Host:

Port: 162

Security ?

Access to the management tool is enabled for the addresses and interfaces that are specified below.

Allowed addresses:

Active interfaces:

□ Wireless port

□ LAN port

□ Internet port

□ VPN

IP address:

Mask:

2. Enable the options that you require. The options are described in the sections that follow.
3. Click **Save**.

Attributes

System name

Specify a name to identify the CN3200.

Contact

Contact information for the CN3200.

Location

Location where the CN3200 is installed.

Community name

This is the password that controls access to the SNMP information. A network management program must supply this password when attempting to set or get SNMP information from the CN3200.

Read-only community name

This is the password that controls read-only access to the SNMP information. A network management program must supply this password when attempting to get SNMP information from the CN3200.

Agent

Enables/disables support for SNMP.

Port

Specify the port and protocol the CN3200 will use to respond to SNMP requests. Default port is 161.

SNMP protocol

Specify the SNMP version.

Traps

Enables/disables support for SNMP traps.The CN3200 supports the following MIB II traps:

- coldStart
- linkUp
- linkDown
- authenticationFailure

In addition, the CN3200 supports a number of Colubris-specific traps as described in the Colubris Enterprise MIB. The Colubris Enterprise MIB is available on the Colubris Networks web site.

Community name

Specify the password required by the remote host that will receive the trap.

Host

Specify the IP address or domain name of the host that the CN3200 will send traps to.

Port

Specify the port that the CN3200 will send traps on. By default, port 162 is used.

Configure Traps

Click this button to customize certain traps.

Security

Allowed addresses

Lets you define a list of IP address from which access to the SNMP interface is permitted. To add an entry specify the IP address and appropriate mask and click **Add**.

When the list is empty, access is permitted from any IP address.

Active interfaces

Choose the interfaces through which client stations will be able to access the SNMP interface.

Standard MIBs

The CN3200 supports the following MIBs:

- IEEE8021-PAE-MIB
- RFC1213-MIB
  Full read support. Write support as defined below.
- RIPv2-MIB
- 802.11b
  The MIB defined in "IEEE Std 802.11b/D8.0, September 2001 Annex D" has been moved under the Colubris Enterprise MIB (COLUBRIS-IEEE802DOT11).
- Colubris Enterprise MIB (Discussed in detail later in this chapter.)

Management consoles

To manage the CN3200, third-party SNMP management consoles must support the SNMPV2C protocol.

MIB II support details

The CN3200 provides complete read support of MIB II objects 1.10. The following table lists all MIB II objects defined as read/write and indicates the objects that can be “set” on the CN3200.

Set	Group	OID	Notes
Y	system	sysContact	
Y		SysName	
Y		sysLocation	
Y	interfaces	ifAdminStatus(1)	Can be *up(1)*, *down(2)*, or *testing(3)*.
N	At	AtIfIndex	
N		atPhysAddress	
N		atNetAddress	
N	Ip	ipForwarding	
N		ipDefaultTTL	
N		ipRouteDest	
N		ipRouteIfIndex	
N		iprouteMetric1	
N		iprouteMetric2	
N		iprouteMetric3	
N		iprouteMetric4	
N		ipRouteNextHop	
N		ipRouteType (3)	Can be *other(1), invalid(2), direct(3),* or *indirect(4).*

Set	Group	OID	Notes
N		ipRouteAge	
N		ipRouteMask	
N		ipRouteMetric5	
N		ipNetToMediaIfIndex	
N		ipNetToMediaNetAddress	
N		ipNetToMediaType(4)	Can be *other(1), invalid(2), dynamic(3),* or *static(4).*
N	Tcp	tcpConnState(5)	Can be *closed(1), listen(2), synSent(3), synReceived(4), established(5), finWait1(6), finWait2(7), closeWait(8), lastAck(9), closing(10), timeWait(11),* or *deleteTCB(12).*

Colubris Enterprise MIB

The Colubris Enterprise MIB is available on the Colubris Networks web site. It is organized as follows:

- COLUBRIS-CDP-MIB
- COLUBRIS-IEEE802DOT11
- COLUBRIS-MAINTENANCE-MIB
- COLUBRIS-PRODUCTS-MIB
- COLUBRIS-SMI (Glue between standard tree and Colubris Enterprise MIB.)
- COLUBRIS-SYSLOG-MIB
- COLUBRIS-SYSTEM-MIB
- COLUBRIS-TC (Contains Colubris textual conventions.)

COLUBRIS-IEEE802DOT11 MIB details

Group	OID	Get	Set
dot11StationConfig			
	dot11StationId	N	N
	dot11MediumOccupancyLimit	N	N
	dot11CFPPeriod	N	N
	dot11CFPMaxDuration	N	N
	dot11AuthenticationResponseTimeOut	N	N
	dot11PowerManagementMode	N	N
	dot11DesiredSSID	N	N
	dot11DesiredBSSType	N	N
	dot11OperationalRateSet	N	N
	dot11BeaconPeriod	Y	N
	dot11DTIMPeriod	Y	N
	dot11AssociationResponseTimeOut	N	N
	dot11PrivacyOptionImplemented	Y	N
dot11AuthenticationAlgorithms			
	dot11AuthenticationAlgorithmsEnable	Y	N
dot11WEPDefaultKeys			
	dot11WEPDefaultKeyValue	Y	Y
dot11WEPKeyMappings			
	dot11WEPKeyMappingAddress	N	N
	dot11WEPKeyMappingWEPOn	N	N
	dot11WEPKeyMappingValue	N	N
	dot11WEPKeyMappingStatus	N	N
dot11Privacy			
	dot11PrivacyInvoked	Y	Y
	dot11WEPDefaultKeyID	Y	Y
	dot11WEPKeyMappingLength	N	N
	dot11ExcludeUnencrypted	Y	Y
dot11SMTnotification		N	N

Group	OID	Get	Set
dot11Operation			
	Dot11RTSThreshold	Y	Y
	Dot11ShortRetryLimit	Y	N
	Dot11LongRetryLimit	Y	N
	Dot11FragmentationThreshold	Y	N
	Dot11MaxTransmitMSDULifetime	Y	N
	Dot11MaxReceiveLifetime	Y	N
dot11Counters		Y	N
Group	OID		
dot11GroupAddresses			
	Dot11Address	N	N
	Dot11GroupAddressesStatus	N	N
dot11PhyOperation			
	Dot11CurrentRegDomain	Y	N
dot11PhyAntenna			
	Dot11CurrentTxAntenna	Y	N
	Dot11CurrentRxAntenna	Y	N
dot11PhyTxPower			
	Dot11CurrentTxPowerLevel	Y	N
dot11PhyFHSS			
	Dot11CurrentChannelNumber	N	N
	Dot11CurrentDwellTime	N	N
	Dot11CurrentSet	N	N
	Dot11CurrentPattern	N	N
	Dot11CurrentIndex	N	N
dot11PhyDSSS			
	Dot11CurrentChannel	Y	Y
	Dot11CurrentCCAMode	Y	N
	Dot11EDThreshold	Y	N
dot11PhyIR			
	Dot11CCAWatchdogTimerMax	N	N
	Dot11CCAWatchdogCountMax	N	N
	Dot11CCAWatchdogTimerMin	N	N
	Dot11CCAWatchdogCountMin	N	N

Group	OID	Get	Set
dot11RegDomainsSupported		Y	N
dot11AntennasList			
	Dot11SupportedTxAntenna	Y	N
	Dot11SupportedRxAntenna	Y	N
	Dot11DiversitySelectionRx	Y	N
SupportedDataRatesTx		Y	N
SupportedDataRatesRx		Y	N

Traps

Not applicable.

Chapter 14
SSL certificates

This chapter explains how to create and install SSL certificates to secure communications with the CN3200.

Overview of SSL certificates

The only way to securely access a web server is to encrypt the data stream that is exchanged between the browser and the web server. This ensures that if data is intercepted by a malicious third-party using a network analyzer on the LAN or the Internet, it will be difficult or impossible for the data to be deciphered.

However, encryption does not solve another important security issue, namely how the identity of a web server can be validated before a connection to it is established. The solution to this problem is provided by digital certificates.

A digital certificate is a collection of information about a web server, digitally signed by a certificate authority. A certificate authority is by definition an entity that can be trusted. It may be an entity in your organization responsible for issuing certificates, a commercial certificate authority such as Thawte or Entrust, or even yourself.

SSL is the standard for creating a secure encrypted connection between a web browser and a web server. SSL relies on the exchange of digital certificates, which provide the means for the web server and browser to authenticate each other.

SSL authentication

The following sequence of steps illustrates how an SSL session is established.

1. A web browser attempts to open a web page via HTTPS.
2. The web server sends its digital certificate (as well as information needed to establish the SSL connection) to the web browser. The certificate is signed using the private key of a certificate authority (CA). This is usually a well-known commercial entity.
3. The web browser attempts to validate the web server’s certificate. This occurs as follows:
   - The web browser checks that the server’s certificate has not expired. The certificate will contain the certificate’s validity period which can be compared to the current date.
   - The web browser may be configured to check that the certificate is not in a Certificate Revocation List maintained by the entity that issued the certificate.
   - The web browser checks its internal list of trusted CAs to find the one that signed the web server’s certificate. Using the public key of this CA (which is also stored in the web browser), the web browser validates the authenticity of the web server’s digital signature. This is possible because the web server’s certificate is signed using the CA’s private key.
   - The web browser extracts the domain name of the web server from the certificate. (When the certificate was registered, this domain name was associated with the IP address of the CN3200’s Internet port.) It then compares this against the domain name of the web server.
4. The web browser and the web server agree on a symmetric key to encrypt the SSL connection.
5. The SSL connection is started.

The host name in the currently installed SSL certificate is automatically assigned as the domain name of the CN3200. The factory default SSL certificate that is installed on the CN3200 has the host name **wireless.colubris.com**.

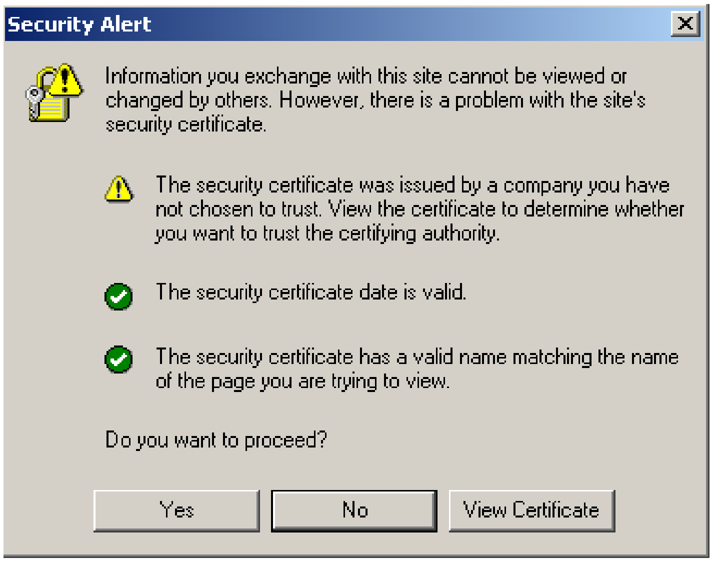
You do not have to add this name to your DNS server for it to be resolved. The CNx intercepts all DNS requests it receives on the wireless or LAN ports. It resolves any request that matches the certificate host name by returning the IP address assigned to the Internet port. All other DNS requests are forwarded to the appropriate DNS servers as configured on the **Network > DNS/WINS** page.

To summarize, this means that by default, any DNS request by a client station on the wireless or LAN ports that matches wireless.colubris.com will return the IP address of the CN3200’s Internet port.

Eliminating certificate warning messages

The default certificate installed on the CN3200 is not registered with a certificate authority. It is a self-signed certificate which is attached to the default IP address (192.168.1.1) for the CN3200.

This results in the following warning message each time a web browser attempts to validate the certificate:



Security Alert

Information you exchange with this site cannot be viewed or changed by others. However, there is a problem with the site's security certificate.

⚠ The security certificate was issued by a company you have not chosen to trust. View the certificate to determine whether you want to trust the certifying authority.

✓ The security certificate date is valid.

✓ The security certificate has a valid name matching the name of the page you are trying to view.

Do you want to proceed?

There are three (3) types of possible warnings in the Security Alert:

1. The security certificate was issued by a company you have not chosen to trust.

   This indicates that your browser has no knowledge of the certificate and treats it as if it cannot be trusted. The is caused by not having a CA certificate in the browser that can validate the certificate provided by the CN3200.

   To eliminate this warning message, you can:

   - Replace the default certificate on the CN3200 with a certificate registered with a known certificate authority.
   - Install a self-signed certificate on the CN3200 and install a matching Root CA certificate in the browsers for all client stations.

   For instructions, see “Creating an SSL certificate” on page 143.

2. The Security certificate date is valid.

   Signifies that the operating system's date is within the range of beginning and end dates specified in the security certificate. Certificates have a limited lifetime and must be renewed and replaced before they expire or else warnings will appear in the browser.

3. The security certificate has a valid name.

   This refers to the domain name listed in the "subject" field of the security certificate that matches the domain name of the URL that you're attempting to go to. By default the name in the "subject" field of the certificate installed in the CN3000 also becomes the domain name of the CN3000 and is resolved by the CN3000 itself.

Creating an SSL certificate

The are three ways to create a digital certificate:

- Obtain a registered certificate from a recognized certificate authority: This is the best option, since it ensures that your certificate can be validated by any web browser. A number of companies offer this service for a nominal charge. These include: Thawte, Verisign, and Entrust.
- Become a CA and issue your own certificate: You can become your own CA. and create as many certificates as you require. However, since your CA will not be included in the internal list of trusted CAs maintained by most browsers, customers will get a security alert until they add your CA to their browser.
- Create a self-signed certificate: This is the least secure method, since the certificate is signed using the private key of the server rather than a CA. Self-signed certificates should generally be used for testing purposes only.

Certificate tools

Digital certificates can be created/managed with a variety of tools. The examples in this chapter use the OpenSSL tools and components included with the Colubris Backend archive. You should download and install these items as follows:

1. Download **Backend_v.1.22.zip** from www.colubris.com > **download** > **CN3000.**
2. Download **openssl-0.9.7a-win32-bin.zip** from http://curl.haxx.se/download.html > **OpenSSL Library Packages**.
3. Open a command prompt and create the following folder on your computer:

   `c:\certificates` and **`c:\certificates\newcerts`**

4. Extract **openssl-0.9.7a-win32-bin.zip** into **c:\certificates**.
5. Extract the contents of the **certificates folder** in the **Backend_v.1.22.zip** into **c:\certificates**.

You are now ready to execute the following examples.

Obtaining a registered certificate

This example illustrates how to create a certificate request and send it to a certificate authority to obtain a registered public certificate.

The benefit of using a registered certificate is that the public key for these CAs is included by default in most web browsers, eliminating warning messages.

For the purposes of this example:

- the certificate will be requested for the domain name: **www.company.com**
- the secret password used to protect the key is **your_password**

1. Open a Windows command-line session.
2. Go to the directory where you installed the certificate tools. This example assumes **c:\certificates**.
3. Execute the command: **newreq *domain_name***

   For example:

```
C:\certificates\>newreq www.company.com
You will now be prompted for a password
that will protect the new private key.
Loading 'screen' into random state - done
0 semi-random bytes loaded
```

```
Generating RSA private key, 1024 bit long modulus
....................................++++++
..................................++++++
e is 65537 (0x10001)
Enter pass phrase: your_password

At this stage, the private key has been generated and you are prompted
to specify the secret password that will protect the key. Do not forget
this password, otherwise you will loose access to the private key.
From this point on, this password will be referred to as the key
password.
When prompted, enter the password again to confirm it.
Verifying password - Enter PEM pass phrase: your_password
Re-enter the password for your new private key
(The same you just entered)
Enter pass phrase for www.company.com.key: your_password

You are about to be asked to enter information that will be incorporated
into your certificate request.
What you are about to enter is what is called a Distinguished Name or a
DN.
There are quite a few fields but you can leave some blank
For some fields there will be a default value,
If you enter '.', the field will be left blank.
-----
Country Name (2 letter code) [CA]:
State or Province Name (full name) [Quebec]:
Locality Name (eg, city) [Laval]:
Organization Name (eg, company) [Colubris Networks Inc.]:Company Inc.
Organizational Unit Name (eg, section) [Research &
Development]:Department
Your Name []:www.company.com
Email Address [support@colubris.com]:support@company.com
Generated certificate request:
Using configuration from openssl.conf

Certificate Request:
    Data:
        Version: 0 (0x0)
        Subject: C=CA, ST=Quebec, L=Laval, O=Company Inc.,
OU=Department, CN=www
.company.com/Email=support@company.com
        Subject Public Key Info:
            Public Key Algorithm: rsaEncryption
            RSA Public Key: (1024 bit)
                Modulus (1024 bit):
                    00:cb:bb:24:82:9d:f6:24:ee:8f:f4:ec:39:5c:88:
a2:c3:08:96:68:1b:0b:c8:a8:48:09:db:6f:01:c2:
45:41:d0:a4:eb:b0:11:78:3d:55:ea:49:26:e1:dc:
9a:02:79:ae:fc:2c:4a:8a:d7:d7:eb:50:49:ec:08:
d3:7b:fe:66:52:fd:74:0a:9d:f4:e1:79:95:3a:7f:
46:d6:79:ea:04:7c:63:1b:36:9c:c2:28:4f:1a:01:
9a:90:90:6f:7c:f3:b4:d7:0d:d5:9d:e0:bf:b3:af:
b9:8a:95:6a:87:20:0b:e8:28:29:03:cb:1d:54:9f:
                    6d:c5:67:d6:1d:6b:9a:08:4b
                Exponent: 65537 (0x10001)
        Attributes:
            a0:00
    Signature Algorithm: md5WithRSAEncryption
        a5:53:2d:91:95:1f:9c:75:ac:0e:92:1d:b9:7f:b2:c3:ce:59:
ca:aa:fc:1c:e2:f2:09:a9:bf:1d:34:ae:a9:ac:44:6a:d8:7e:
ac:de:9e:ed:00:d9:57:e0:bf:c9:c1:a6:25:ba:d6:68:a8:24:
d5:05:94:03:c8:54:49:cd:db:a6:d4:87:29:c5:ab:0e:59:30:
01:f9:d0:f8:0e:75:c5:39:38:0c:77:e3:87:ab:6d:25:3f:fd:
d5:a6:08:0a:02:0c:67:6d:84:bb:2b:3e:d8:b3:2c:08:1d:38:
53:a7:61:00:7a:91:67:16:03:6a:51:0b:67:db:73:4c:4d:96:
        bf:80
-----BEGIN CERTIFICATE REQUEST-----
MIIB2TCCAUICAQAwgZgxCzAJBgNVBAYTAkNBMQ8wDQYDVQQIEwZRdWViZWMxDjAM
BgNVBAcTBUxhdmFsMRUwEwYDVQQKEwxDb21wYW55IEluYy4xEzARBgNVBAsTCkRl
cGFydG1lbnQxGDAWBgNVBAMTD3d3dy5jb21wYW55LmNvbTEiMCAGCSqGSIb3DQEJ
ARYTc3VwcG9ydEBjb21wYW55LmNvbTCBnzANBgkqhkiG9w0BAQEFAAOBjQAwgYkC
gYEAy7skgp32JO6P9Ow5XIiiwwiWaBsLyKhICdtvAcJFQdCk67AReD1V6kkm4dya
Anmu/CxKitfX61BJ7AjTe/5mUv10Cp304XmVOn9G1nnqBHxjGzacwihPGgGakJBv
fPO01w3VneC/s6+5ipVqhyAL6CgpA8sdVJ9txWfWHWuaCEsCAwEAAaAAMA0GCSqG
SIb3DQEBBAUAA4GBAKVTLZGVH5x1rA6SHbl/ssPOWcqq/Bzi8gmpvx00rqmsRGrY
fqzenu0A2Vfgv8nBpiW61mioJNUFlAPIVEnN26bUhynFqw5ZMAH50PgOdcU5OAx3
44erbSU//dWmCAoCDGdthLsrPtizLAgdOFOnYQB6kWcWA2pRC2fbc0xNlr+A
-----END CERTIFICATE REQUEST-----
```

At this stage, two files have been created in c:\certificates:

- **`www.company.com.key`**: This file contains the private key for the server.
- **`www.company.com.req`**: This file contains the certificate request which you send to a Trusted Certificate Authority to obtain a public key certificate

from the CA of your choice. The certificate file will be protected by the password you specified.

You

Becoming a CA

This procedure enables you to sign your web server certificates using your own private key. Customers who trust you will be able to trust the certificates you have signed, providing that they have your public key certificate.

Creating the CA certificates

You will be asked for a password to protect the new private key, which will be the private key for your own Certificate Authority.

Important: *This password will be required when signing subsequent certificates.*

Ideally, the private key should be handled as one of your corporate secrets and should be in a safe location accessible to the person responsible for signing the certificates.

For the purposes of this example:

- the certificate will be requested for the domain name: **CompanyCA**
- the secret password used to protect the key is **CA_key_password**

1. Open a Windows command-line session.
2. Go to the directory where you installed the certificate tools. This example assumes **c:\certificates**.
3. Execute the command: **newca CompanyCA**

```
C:\certificates\DemoCA>newca CompanyCA
You will be asked for a password protecting your
Certificate Authority Private Key
Loading 'screen' into random state - done
Generating a 1024 bit RSA private key
.........++++++
..++++++
writing new private key to 'CA\private\CAkey.pem'
Enter PEM pass phrase: CA_key_password
Verifying password - Enter PEM pass phrase: CA_key_password
-----
You are about to be asked to enter information that will be incorporated
into your certificate request.
What you are about to enter is what is called a Distinguished Name or a
DN.
There are quite a few fields but you can leave some blank
For some fields there will be a default value,
If you enter '.', the field will be left blank.
-----
Country Name (2 letter code) [CA]:
State or Province Name (full name) [Quebec]:
Locality Name (eg, city) [Laval]:
Organization Name (eg, company) [Colubris Networks Inc.]:Company Inc.
Organizational Unit Name (eg, section) [Research &
Development]:Department
Your Name []:Test-Only Certificate Authority
Email Address [support@colubris.com]:ca@company.com

The certificate for your CA will then be displayed.
Certificate:
    Data:
        Version: 3 (0x2)
        Serial Number: 0 (0x0)
        Signature Algorithm: md5WithRSAEncryption
       Issuer: C=CA, ST=Quebec, L=Laval, O=Company Inc., OU=Department,
CN=Test
-Only Certificate Authority/Email=ca@company.com
        Validity
            Not Before: Feb 27 21:46:40 2002 GMT
            Not After : Feb 27 21:46:40 2003 GMT
        Subject: C=CA, ST=Quebec, L=Laval, O=Company Inc.,
OU=Department, CN=Tes
t-Only Certificate Authority/Email=ca@company.com
        Subject Public Key Info:
            Public Key Algorithm: rsaEncryption
            RSA Public Key: (1024 bit)
                Modulus (1024 bit):
                    00:c5:b8:ff:2b:82:cf:93:39:eb:90:ff:fe:21:a0:
de:d4:38:0c:ae:08:f3:dc:d5:52:59:80:9d:72:5a:
9b:2d:cf:22:e3:84:c9:f7:e1:99:67:7b:08:74:71:
25:14:24:93:00:f5:4f:c2:ee:6c:88:35:96:df:20:
80:69:4c:c8:13:df:7c:cc:06:86:c2:bc:30:4a:97:
41:b0:2d:23:33:60:bb:ba:68:5f:26:87:4b:22:14:
f6:3e:99:15:c6:ca:29:0d:c6:20:23:97:78:ae:94:
bb:13:02:ed:96:66:06:40:8a:60:7a:c8:ac:18:5b:
                    8c:4b:95:26:c2:84:04:e9:a9
                Exponent: 65537 (0x10001)
    Signature Algorithm: md5WithRSAEncryption
        12:4c:98:8d:ed:da:42:5f:d4:d4:83:14:b1:2b:8a:28:a4:90:
30:8f:09:22:47:f5:3c:8d:e2:ae:8d:f6:4e:e9:14:0c:89:26:
f6:0a:92:dc:5a:9b:fc:77:e7:94:33:db:86:93:98:1b:34:37:
3d:5e:06:9e:4d:d9:50:4f:57:b5:3f:d8:06:ad:27:26:a8:5c:
b7:36:e0:10:ae:a2:b3:5a:ed:90:5a:90:85:0f:94:8e:01:55:
7d:e5:69:b1:60:19:9c:68:3b:4c:1c:4b:b7:0b:b5:47:9d:a5:
92:d6:45:df:e4:6a:db:96:af:58:13:88:c2:c2:f9:66:3b:32:
        1d:bc
-----BEGIN CERTIFICATE-----
MIICvDCCAiWgAwIBAgIBADANBgkqhkiG9w0BAQQFADCBozELMAkGA1UEBhMCQ0Ex
DzANBgNVBAgTBlF1ZWJlYzEOMAwGA1UEBxMFTGF2YWwxFTATBgNVBAoTDENvbXBh
bnkgSW5jLjETMBEGA1UECxMKRGVwYXJ0bWVudDEoMCYGA1UEAxMfVGVzdC1Pbmx5
IENlcnRpZmljYXRlIEF1dGhvcml0eTEdMBsGCSqGSIb3DQEJARYOY2FAY29tcGFu
eS5jb20wHhcNMDIwMjI3MjE0NjQwWhcNMDMwMjI3MjE0NjQwWjCBozELMAkGA1UE
BhMCQ0ExDzANBgNVBAgTBlF1ZWJlYzEOMAwGA1UEBxMFTGF2YWwxFTATBgNVBAoT
DENvbXBhbnkgSW5jLjETMBEGA1UECxMKRGVwYXJ0bWVudDEoMCYGA1UEAxMfVGVz
dC1Pbmx5IENlcnRpZmljYXRlIEF1dGhvcml0eTEdMBsGCSqGSIb3DQEJARYOY2FA
Y29tcGFueS5jb20wgZ8wDQYJKoZIhvcNAQEBBQADgY0AMIGJAoGBAMW4/yuCz5M5
65D//iGg3tQ4DK4I89zVUlmAnXJamy3PIuOEyffhmWd7CHRxJRQkkwD1T8LubIg1
lt8ggGlMyBPffMwGhsK8MEqXQbAtIzNgu7poXyaHSyIU9j6ZFcbKKQ3GICOXeK6U
uxMC7ZZmBkCKYHrIrBhbjEuVJsKEBOmpAgMBAAEwDQYJKoZIhvcNAQEEBQADgYEA
EkyYje3aQl/U1IMUsSuKKKSQMI8JIkf1PI3iro32TukUDIkm9gqS3Fqb/HfnlDPb
hpOYGzQ3PV4Gnk3ZUE9XtT/YBq0nJqhctzbgEK6is1rtkFqQhQ+UjgFVfeVpsWAZ
nGg7TBxLtwu1R52lktZF3+Rq25avWBOIwsL5ZjsyHbw=
-----END CERTIFICATE-----
```

At this stage, two files have been created in c:\certificates:

- **CompanyCA.key**, which contains the private key for your new Certificate Authority.
- **CompanyCA.pem**, which contains the X.509 certificate for your Certificate Authority's public key.

These two files have been respectively copied into:

```
C:\certificates\CA\private\CAkey.pem
```

and

```
C:\certificates\CA\private\CAcert.pem
```

Creating the web server certificates

Once you have created the CA certificates, you can use them to create certificates for your CN3200 or web server.

1. Open a Windows command-line session.
2. Go to the directory where you installed the certificate tools. This example assumes **c:\certificates**.
3. Execute the command: **newselfcert *domain_name***

```
C:\certificates\DemoCA>newcert www.company.com
*** You will now be prompted for a password ***
*** that will protect the new private key.  ***
Loading 'screen' into random state - done
0 semi-random bytes loaded
Generating RSA private key, 1024 bit long modulus
...........++++++
....++++++
e is 65537 (0x10001)
Enter PEM pass phrase: your_password
Verifying password - Enter PEM pass phrase: your_password
*** Re-enter the password for your new private key ***
*** (The same you just entered) ***
Using configuration from openssl.conf
Enter PEM pass phrase:
You are about to be asked to enter information that will be incorporated
```

```
into your certificate request.
What you are about to enter is what is called a Distinguished Name or a
DN.
There are quite a few fields but you can leave some blank
For some fields there will be a default value,
If you enter '.', the field will be left blank.
-----
Country Name (2 letter code) [CA]:
State or Province Name (full name) [Quebec]:
Locality Name (eg, city) [Laval]:
Organization Name (eg, company) [Colubris Networks Inc.]:Company Inc.
Organizational Unit Name (eg, section) [Research &
Development]:Department
Your Name []:www.company.com
Email Address [support@colubris.com]:webmaster@company.com
Generated certificate request:
Using configuration from openssl.conf
Certificate Request:
    Data:
        Version: 0 (0x0)
        Subject: C=CA, ST=Quebec, L=Laval, O=Company Inc.,
OU=Department, CN=www
.company.com/Email=webmaster@company.com
        Subject Public Key Info:
            Public Key Algorithm: rsaEncryption
            RSA Public Key: (1024 bit)
                Modulus (1024 bit):
                    00:f6:93:52:3b:6b:da:7c:f2:dc:4b:5f:93:2c:9a:
0c:50:52:ac:3d:5a:a4:43:d2:ef:7d:36:b5:54:9c:
7a:df:b2:bd:9b:82:41:3b:ae:07:8a:45:26:a3:37:
eb:c1:c4:e7:04:d2:67:32:ca:08:33:9f:ac:ec:23:
89:e2:36:60:63:61:5c:2d:60:9a:92:48:ed:b3:7c:
0f:60:94:6d:a4:74:d5:eb:a9:7f:40:cc:cd:24:ae:
13:f0:a7:ea:db:81:a5:d0:1b:dc:26:f8:8f:89:c6:
27:1d:5c:d5:ae:a4:94:76:e8:d6:14:37:ac:aa:95:
                    62:26:d8:22:b1:5f:fb:19:d5
                Exponent: 65537 (0x10001)
        Attributes:
            a0:00
    Signature Algorithm: md5WithRSAEncryption
        35:04:94:33:7e:13:86:05:9e:dd:49:4d:eb:d7:cb:21:6c:8b:
aa:84:2a:6b:9b:ff:49:7d:6f:06:49:c8:ba:18:8b:b7:ad:4b:
ab:3d:2d:91:79:1f:c3:48:a1:83:7b:d4:38:b6:10:1c:87:bd:
e6:46:41:69:b1:1a:ec:31:19:cc:05:44:46:24:7b:3b:b4:e2:
f3:54:94:36:90:f3:5f:f8:94:23:95:e6:26:0f:c7:36:39:44:
5d:94:85:e6:64:10:ae:b5:4e:a0:3b:ca:bd:e0:ae:eb:ad:af:
44:bf:20:a2:f8:30:cc:14:f1:0a:0e:3b:b5:32:a3:c9:2a:14:
        05:25
-----BEGIN CERTIFICATE REQUEST-----
MIIB2zCCAUQCAQAwgZoxCzAJBgNVBAYTAkNBMQ8wDQYDVQQIEwZRdWViZWMxDjAM
BgNVBAcTBUxhdmFsMRUwEwYDVQQKEwxDb21wYW55IEluYy4xEzARBgNVBAsTCkRl
cGFydG1lbnQxGDAWBgNVBAMTD3d3dy5jb21wYW55LmNvbTEkMCIGCSqGSIb3DQEJ
ARYVd2VibWFzdGVyQGNvbXBhbnkuY29tMIGfMA0GCSqGSIb3DQEBAQUAA4GNADCB
iQKBgQD2k1I7a9p88txLX5MsmgxQUqw9WqRD0u99NrVUnHrfsr2bgkE7rgeKRSaj
N+vBxOcE0mcyyggzn6zsI4niNmBjYVwtYJqSSO2zfA9glG2kdNXrqX9AzM0krhPw
p+rbgaXQG9wm+I+JxicdXNWupJR26NYUN6yqlWIm2CKxX/sZ1QIDAQABoAAwDQYJ
KoZIhvcNAQEEBQADgYEANQSUM34ThgWe3UlN69fLIWyLqoQqa5v/SX1vBknIuhiL
t61Lqz0tkXkfw0ihg3vUOLYQHIe95kZBabEa7DEZzAVERiR7O7Ti81SUNpDzX/iU
I5XmJg/HNjlEXZSF5mQQrrVOoDvKveCu662vRL8govgwzBTxCg47tTKjySoUBSU=
-----END CERTIFICATE REQUEST-----
*** You will now be prompted for the password for your ***
*** Certificate Authority private key. ***
Using configuration from openssl.conf
Loading 'screen' into random state - done
Enter PEM pass phrase:
Check that the request matches the signature
Signature ok
The Subjects Distinguished Name is as follows
countryName           :PRINTABLE:'CA'
stateOrProvinceName   :PRINTABLE:'Quebec'
localityName          :PRINTABLE:'Laval'
organizationName      :PRINTABLE:'Company Inc.'
organizationalUnitName:PRINTABLE:'Department'
commonName            :PRINTABLE:'www.company.com'
emailAddress          :IA5STRING:'webmaster@company.com'
Certificate is to be certified until Feb 28 16:31:17 2003 GMT (365 days)
Sign the certificate? [y/n]:y


1 out of 1 certificate requests certified, commit? [y/n]y
Write out database with 1 new entries
Data Base Updated
```

At this stage, two files have been created:

- **`www.company.com.key`**, which contains the private key for the server.

- **www.company.com.pem**, which contains theX.509 certificate for the web server's public key.

A copy of www.company.com.pem has been created as:

```
C:\certificates\DemoCA\CA\newcerts\01.pem
```

The file containing the next serial number that will be used for the next certificate to be signed has been updated:

```
C:\certificates\DemoCA\CA\serial
```

The previous version of this file is in:

```
C:\certificates\DemoCA\CA\serial.old
```

The file containing the serial numbers and descriptions of all certificates issued by the certificate authority has been updated with a description of the certificate just issued to www.company.com:

```
C:\certificates\DemoCA\CA\index.txt
```

The previous version of this file is in:

```
C:\certificates\DemoCA\CA\index.txt.old
```

Viewing the certificate

It is important to confirm that the company details are correct and in this case, you will see that the Issuer and the Subject are different.

The content of the certificate CA be displayed using **viewcert**.

```
C:\certificates\DemoCA>viewcert www.company.com
Certificate:
    Data:
        Version: 3 (0x2)
        Serial Number: 1 (0x1)
        Signature Algorithm: md5WithRSAEncryption
        Issuer: C=CA, ST=Quebec, L=Laval, O=Company Inc.,
OU=Department, CN=Test
-Only Certificate Authority/Email=ca@company.com
        Validity
            Not Before: Feb 28 16:31:17 2002 GMT
            Not After : Feb 28 16:31:17 2003 GMT
        Subject: C=CA, ST=Quebec, L=Laval, O=Company Inc.,
OU=Department, CN=www
.company.com/Email=webmaster@company.com
        Subject Public Key Info:
            Public Key Algorithm: rsaEncryption
            RSA Public Key: (1024 bit)
                Modulus (1024 bit):
                    00:f6:93:52:3b:6b:da:7c:f2:dc:4b:5f:93:2c:9a:
                    0c:50:52:ac:3d:5a:a4:43:d2:ef:7d:36:b5:54:9c:
7a:df:b2:bd:9b:82:41:3b:ae:07:8a:45:26:a3:37:
eb:c1:c4:e7:04:d2:67:32:ca:08:33:9f:ac:ec:23:
89:e2:36:60:63:61:5c:2d:60:9a:92:48:ed:b3:7c:
0f:60:94:6d:a4:74:d5:eb:a9:7f:40:cc:cd:24:ae:
13:f0:a7:ea:db:81:a5:d0:1b:dc:26:f8:8f:89:c6:
27:1d:5c:d5:ae:a4:94:76:e8:d6:14:37:ac:aa:95:
                    62:26:d8:22:b1:5f:fb:19:d5
                Exponent: 65537 (0x10001)
        X509v3 extensions:
            X509v3 Basic Constraints:
                CA:FALSE
            Netscape Comment:
                OpenSSL Generated Certificate
            X509v3 Subject Key Identifier:

E3:5A:38:77:E4:0C:B9:16:98:BF:A8:D5:A4:5D:A8:81:A2:C2:72:B6
            X509v3 Authority Key Identifier:
                DirName:/C=CA/ST=Quebec/L=Laval/O=Company Inc./
OU=Department/CN=
Test-Only Certificate Authority/Email=ca@company.com
                serial:00

    Signature Algorithm: md5WithRSAEncryption
```

```
37:2b:ad:c2:18:9a:dc:ab:14:b9:de:f4:dd:d4:b8:21:84:59:
2a:8a:af:5f:ea:a5:33:1b:90:0e:56:ff:f5:34:5c:1b:8c:1b:
ba:bd:64:1b:f0:6b:f4:a8:b8:14:dc:8b:1f:25:f9:04:25:85:
82:d5:07:8b:26:90:7d:c7:c8:71:ba:37:e0:a8:42:91:31:30:
2b:56:4a:34:70:14:22:38:7c:3f:99:5d:a5:5c:2c:a0:52:58:
cc:b0:87:5d:14:ff:c3:7e:c8:ed:4e:a8:7b:ca:f3:d3:e3:85:
99:88:a4:7f:26:15:a1:14:61:01:87:18:53:ab:48:d4:f8:f9:
        aa:2d
-----BEGIN CERTIFICATE-----
MIID0DCCAzmgAwIBAgIBATANBgkqhkiG9w0BAQQFADCBozELMAkGA1UEBhMCQ0Ex
DzANBgNVBAgTBlF1ZWJlYzEOMAwGA1UEBxMFTGF2YWwxFTATBgNVBAoTDENvbXBh
bnkgSW5jLjETMBEGA1UECxMKRGVwYXJ0bWVudDEoMCYGA1UEAxMfVGVzdC1Pbmx5
IENlcnRpZmljYXRlIEF1dGhvcml0eTEdMBsGCSqGSIb3DQEJARYOY2FAY29tcGFu
eS5jb20wHhcNMDIwMjI4MTYzMTE3WhcNMDMwMjI4MTYzMTE3WjCBmjELMAkGA1UE
BhMCQ0ExDzANBgNVBAgTBlF1ZWJlYzEOMAwGA1UEBxMFTGF2YWwxFTATBgNVBAoT
DENvbXBhbnkgSW5jLjETMBEGA1UECxMKRGVwYXJ0bWVudDEYMBYGA1UEAxMPd3d3
LmNvbXBhbnkuY29tMSQwIgYJKoZIhvcNAQkBFhV3ZWJtYXN0ZXJAY29tcGFueS5j
b20wgZ8wDQYJKoZIhvcNAQEBBQADgY0AMIGJAoGBAPaTUjtr2nzy3EtfkyyaDFBS
rD1apEPS7302tVScet+yvZuCQTuuB4pFJqM368HE5wTSZzLKCDOfrOwjieI2YGNh
XC1gmpJI7bN8D2CUbaR01eupf0DMzSSuE/Cn6tuBpdAb3Cb4j4nGJx1c1a6klHbo
1hQ3rKqVYibYIrFf+xnVAgMBAAGjggEZMIIBFTAJBgNVHRMEAjAAMCwGCWCGSAGG
+EIBDQQfFh1PcGVuU1NMIEdlbmVyYXRlZCBDZXJ0aWZpY2F0ZTAdBgNVHQ4EFgQU
41o4d+QMuRaYv6jVpF2ogaLCcrYwgboGA1UdIwSBsjCBr6GBqaSBpjCBozELMAkG
A1UEBhMCQ0ExDzANBgNVBAgTBlF1ZWJlYzEOMAwGA1UEBxMFTGF2YWwxFTATBgNV
BAoTDENvbXBhbnkgSW5jLjETMBEGA1UECxMKRGVwYXJ0bWVudDEoMCYGA1UEAxMf
VGVzdC1Pbmx5IENlcnRpZmljYXRlIEF1dGhvcml0eTEdMBsGCSqGSIb3DQEJARYO
Y2FAY29tcGFueS5jb22CAQAwDQYJKoZIhvcNAQEEBQADgYEANyutwhia3KsUud70
3dS4IYRZKoqvX+qlMxuQDlb/9TRcG4wbur1kG/Br9Ki4FNyLHyX5BCWFgtUHiyaQ
fcfIcbo34KhCkTEwK1ZKNHAUIjh8P5ldpVwsoFJYzLCHXRT/w37I7U6oe8rz0+OF
mYikfyYVoRRhAYcYU6tI1Pj5qi0=
-----END CERTIFICATE-----
```

This time, the issuer and subject fields of the certificate are different.

Verifying the certificate

You can check that a certificate has been issued by your Certificate Authority using the command **verifycert**:

```
C:\certificates\DemoCA>verifycert CompanyCA www.company.com
www.company.com.pem: OK
```

Creating a self-signed certificate

If you decide to use this option, there is no need for a certificate authority. This limits the effectiveness of the certificate since it is signed using the private key of the server.

For the purposes of this example:

- the certificate will be requested for the domain name: **www.company.com**
- the secret password used to protect the key is y**our_password**

1. Open a Windows command-line session.
2. Go to the directory where you installed the certificate tools. This example assumes **c:\certificates**.
3. Execute the command: **newselfcert *domain_name***

```
C:\certificates>newselfcert www.company.com
You will now be prompted for a password
that will protect the new private key.
Loading 'screen' into random state - done
0 semi-random bytes loaded
Generating RSA private key, 1024 bit long modulus
.......................................................................
.....+++++
+
........++++++
e is 65537 (0x10001)
Enter pass phrase:  your_password
Verifying password - Enter pass phrase: your_password
Re-enter the password for your new private key
```

```
(The same you just entered)
Enter pass phrase for www.company.com.key: your_password

You are about to be asked to enter information that will be incorporated
into your certificate request.
What you are about to enter is what is called a Distinguished Name or a
DN.
There are quite a few fields but you can leave some blank
For some fields there will be a default value,
If you enter '.', the field will be left blank.
-----
Country Name (2 letter code) [CA]:
State or Province Name (full name) [Quebec]:
Locality Name (eg, city) [Laval]:
Organization Name (eg, company) [Colubris Networks Inc.]:Company Inc.
Organizational Unit Name (eg, section) [Research &
Development]:Department
Your Name []:www.company.com
Email Address [support@colubris.com]:webmaster@company.com

The resulting serf-signed certificate will then be displayed:

Certificate:
    Data:
        Version: 3 (0x2)
        Serial Number: 0 (0x0)
        Signature Algorithm: md5WithRSAEncryption
       Issuer: C=CA, ST=Quebec, L=Laval, O=Company Inc., OU=Department,
CN=www.
company.com/Email=webmaster@company.com
        Validity
            Not Before: Feb 27 21:34:38 2002 GMT
            Not After : Mar 29 21:34:38 2002 GMT
        Subject: C=CA, ST=Quebec, L=Laval, O=Company Inc.,
OU=Department, CN=www
.company.com/Email=webmaster@company.com
        Subject Public Key Info:
            Public Key Algorithm: rsaEncryption
            RSA Public Key: (1024 bit)
                Modulus (1024 bit):
                    00:d7:63:8f:5f:ee:29:99:6e:6a:c5:06:61:30:e7:
87:3e:5b:d5:04:af:ba:92:cd:f1:cc:f4:19:4a:95:
ec:79:76:47:b5:5a:0d:4d:aa:7d:27:c2:d5:1c:bf:
4a:04:3a:34:6e:86:6d:34:40:1a:15:1b:21:4c:44:
eb:50:f4:27:19:bd:59:0f:80:a9:85:a7:0b:4e:5d:
1e:c8:b8:ff:1a:c4:d9:18:2a:9d:a9:c9:1c:0f:17:
92:38:58:89:ac:1e:b6:d4:b0:97:5d:47:41:28:ea:
ef:f5:cf:ac:c1:cc:0e:d9:9f:71:d6:74:ec:32:af:
                    a9:26:5b:11:cf:96:be:09:c9
                Exponent: 65537 (0x10001)
    Signature Algorithm: md5WithRSAEncryption
        38:f2:ee:90:38:fc:23:ce:0c:e2:50:5b:86:a9:f0:7e:2e:b6:
dd:d9:4a:d1:ad:6a:78:b0:44:f8:44:dd:4c:8b:93:49:44:35:
a8:ae:77:b1:ae:be:bb:0b:27:28:7d:69:f5:6e:9a:51:88:82:
32:a6:2d:21:16:ea:81:11:c8:6e:b2:f3:c8:4b:4b:72:1e:7d:
55:7e:5f:86:0f:f0:63:96:a9:08:e3:d0:f5:3b:f6:b5:a8:ed:
8f:65:56:7d:7c:b8:a3:09:50:39:39:fe:e1:f7:fc:82:6f:7b:
da:07:8d:09:9c:a0:a1:c2:09:b0:9e:24:4d:20:d5:95:0b:bd:
        08:8b
-----BEGIN CERTIFICATE-----
MIICqjCCAhOgAwIBAgIBADANBgkqhkiG9w0BAQQFADCBmjELMAkGA1UEBhMCQ0Ex
DzANBgNVBAgTBlF1ZWJlYzEOMAwGA1UEBxMFTGF2YWwxFTATBgNVBAoTDENvbXBh
bnkgSW5jLjETMBEGA1UECxMKRGVwYXJ0bWVudDEYMBYGA1UEAxMPd3d3LmNvbXBh
bnkuY29tMSQwIgYJKoZIhvcNAQkBFhV3ZWJtYXN0ZXJAY29tcGFueS5jb20wHhcN
MDIwMjI3MjEzNDM4WhcNMDIwMzI5MjEzNDM4WjCBmjELMAkGA1UEBhMCQ0ExDzAN
BgNVBAgTBlF1ZWJlYzEOMAwGA1UEBxMFTGF2YWwxFTATBgNVBAoTDENvbXBhbnkg
SW5jLjETMBEGA1UECxMKRGVwYXJ0bWVudDEYMBYGA1UEAxMPd3d3LmNvbXBhbnku
Y29tMSQwIgYJKoZIhvcNAQkBFhV3ZWJtYXN0ZXJAY29tcGFueS5jb20wgZ8wDQYJ
KoZIhvcNAQEBBQADgY0AMIGJAoGBANdjj1/uKZluasUGYTDnhz5b1QSvupLN8cz0
GUqV7Hl2R7VaDU2qfSfC1Ry/SgQ6NG6GbTRAGhUbIUxE61D0Jxm9WQ+AqYWnC05d
Hsi4/xrE2RgqnanJHA8XkjhYiawettSwl11HQSjq7/XPrMHMDtmfcdZ07DKvqSZb
Ec+WvgnJAgMBAAEwDQYJKoZIhvcNAQEEBQADgYEAOPLukDj8I84M4lBbhqnwfi62
3dlK0a1qeLBE+ETdTIuTSUQ1qK53sa6+uwsnKH1p9W6aUYiCMqYtIRbqgRHIbrLz
yEtLch59VX5fhg/wY5apCOPQ9Tv2tajtj2VWfXy4owlQOTn+4ff8gm972geNCZyg
ocIJsJ4kTSDVlQu9CIs=
-----END CERTIFICATE-----
```

At this stage, two files have been created:

- **www.company.com.key**, which contains the private key for the server,
- **www.company.com.pem**, which contains the X.509 certificate for the web server's public key. You must now convert the certificate to a format that the CN3000 will accept as explained on page 152.

Note: *Customers must install this certificate in their browsers to stop the certificate warning message. See the section* “Installing certificates in a browser” on page 154.

Converting a certificate to PKCS #12 format

Before you can install a certificate on the CN3200, you need to convert it to PKCS #12 format. This can be done with the openssl program **pemtopkcs12**. Execute the command:

pemtopkcs12 ***certificate***

Replace ***certificate*** with the name of the certificate file.

Make sure that the .PEM and .KEY file are in the same folder and have the same name (with a different extension).

You will be prompted for two passwords:

- PEM pass phrase: Password used to protect the private key
- Export password: Password that will lock the PKCS#12 file. You will specify this password when you load the certificate onto the CN3200.

For example:

```
pemtopkcs12 hotspot.colubris.com
Loading 'screen' into random state - done
Enter PEM pass phrase:
Enter Export Password:
Verifying password - Enter Export Password:
```

This procedure will generate a file named **.pcs12** file that contains both the private key and public key certificate. This file can now be installed on the CN3200.

Installing a new SSL certificate

Before you can install a new SSL certificate, make sure that it conforms to the following:

- It must be in PKCS #12 format. See "Converting a certificate to PKCS #12 format" on page 152 for directions on how to do this.
- It must contain a private key. (The password is used to access the private key.)
- It must not have a name that is an IP address. The name should be a domain name containing at least one dot. If you try to add a certificate with an invalid name, the default certificate is restored.

Manual installation

To install a new SSL certificate, do the following:

1. Use your web browser to open the management tool.
2. On the **Security** menu, click **Certificates**.
3. In the **Web server - SSL certificate** box, specify the location of the new certificate and its password. If you are using the certificate created by the example in this chapter:
    - The certificate is located in: **c:\certificates\www.company.com.pkcs12.**
    - The password is **your_export_password**.
4. Click **install.**

Installing certificates in a browser

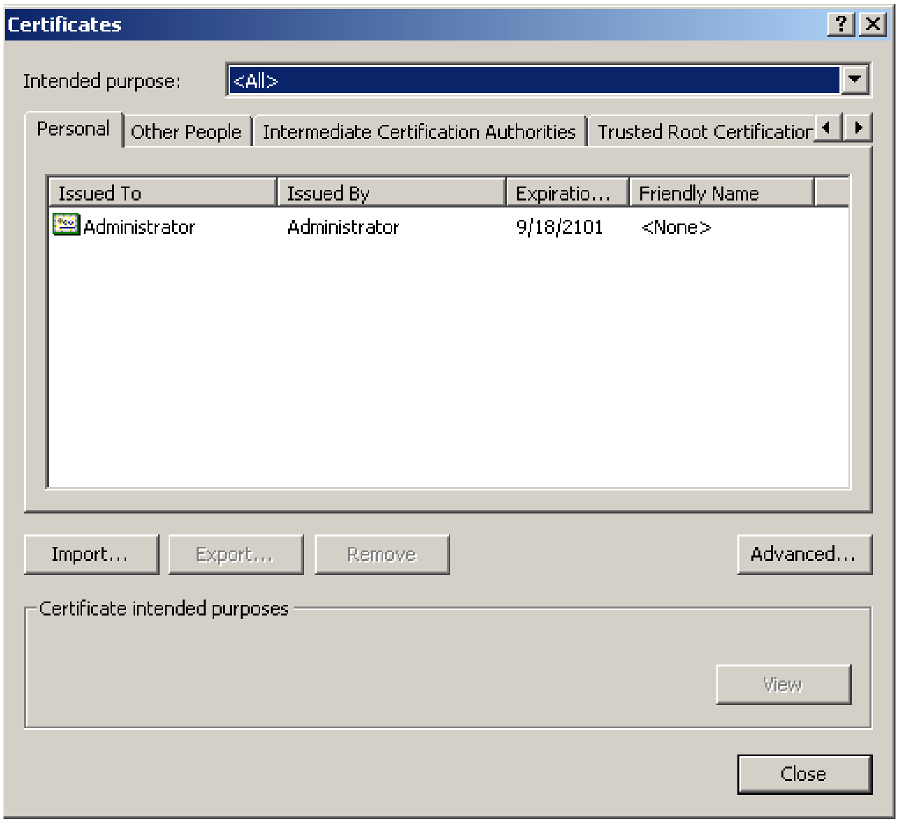
If you are operating as your own certificate authority, installing a certificate signed by your own CA will still cause a security warning to appear when customers open the CN3200's Login page. This occurs because your CA is not part of the group of well-known certificate authorities included with most browsers. This means customers will get a security warning when establishing the SSL connection with the Login page.

To eliminate this warning message, customers must add the public key certificate for your CA to the list maintained by their browsers.

Internet Explorer

To eliminate the certificate warning message in Internet Explorer 6.0, do the following:

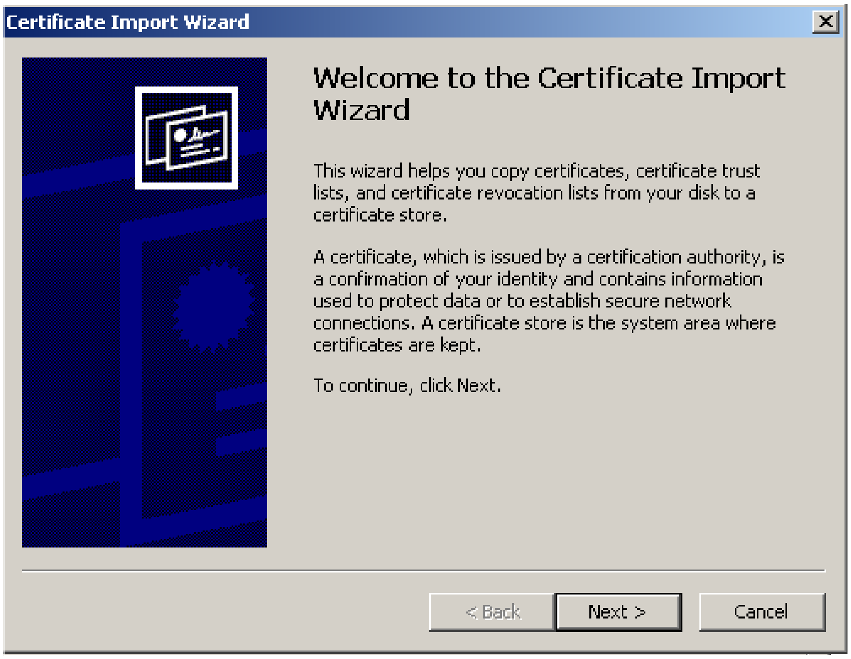
1. On the **Tools** menu, click **Internet Options**.
2. Click the **Content** tab.
3. Click **Certificates**. The *Certificates* window opens.


Certificates
Personal
Other People
Intermediate Certification Authorities
Trusted Root Certificatior
Import...
Export...
Remove
Advanced...
Certificate intended purposes
View
Close

Intended purpose: <All>

Issued To	Issued By	Expiratio...	Friendly Name
Administrator	Administrator	9/18/2101	<None>

4. Click **Import**. The *Certificate Import Wizard* starts. Click **Next**.



Certificate Import Wizard

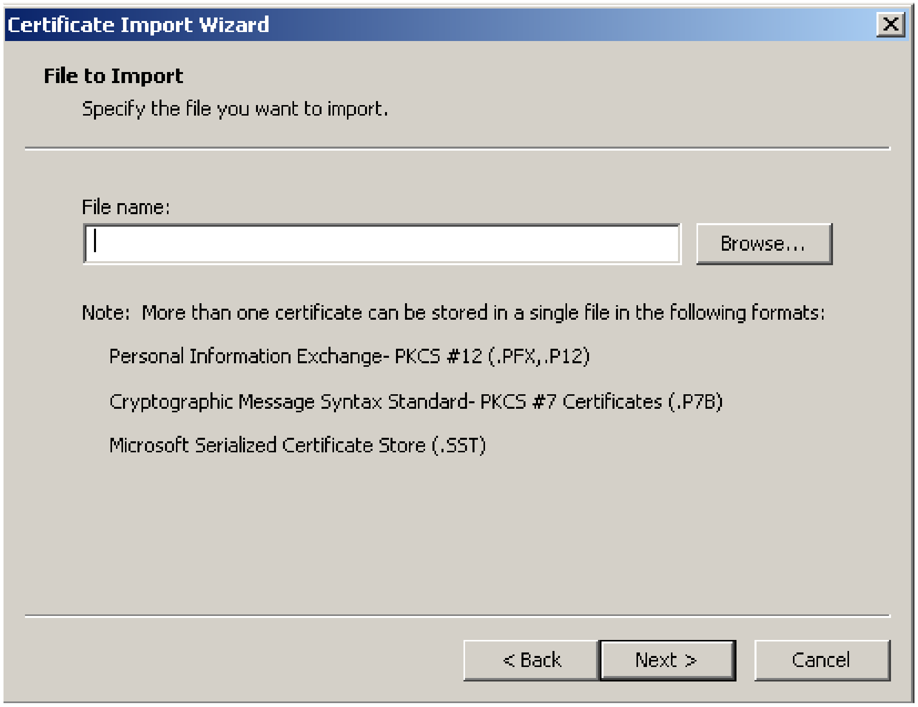
Welcome to the Certificate Import Wizard

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.

5. Click **Browse**.



Certificate Import Wizard

File to Import

Specify the file you want to import.

File name:

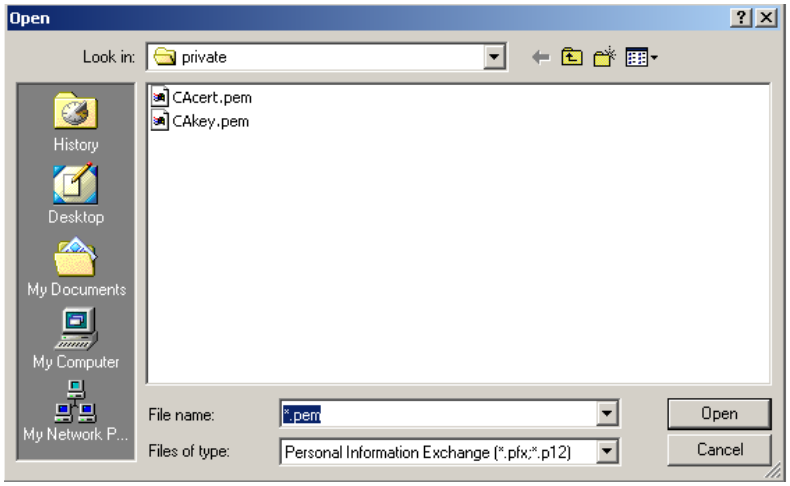
Note: More than one certificate can be stored in a single file in the following formats:

Personal Information Exchange- PKCS #12 (.PFX,.P12)

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

Microsoft Serialized Certificate Store (.SST)

6. Specify ***.pem** in the **File name** box, and press the **Enter** key, then select **CAcert.pem** and click **Open**.



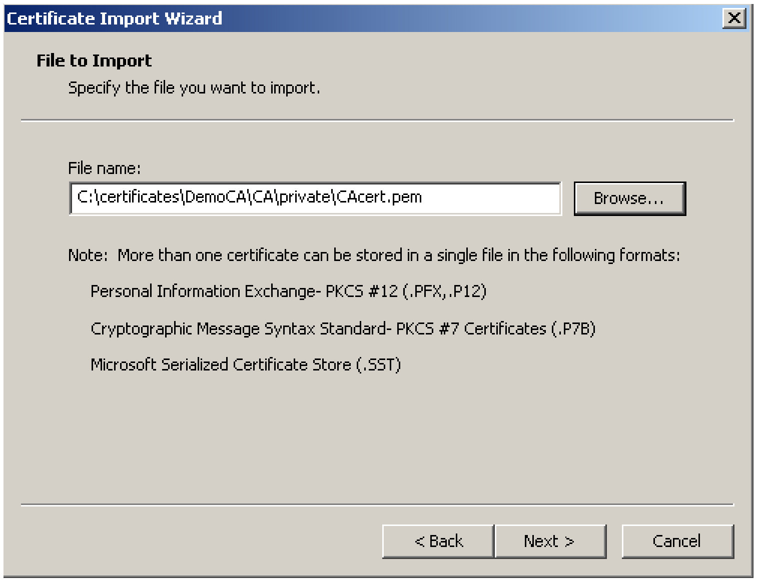
Look in: private

CAcert.pem
CAkey.pem

File name: *.pem

Files of type: Personal Information Exchange (*.pfx;*.p12)

7. Click **Next**.



File to Import

Specify the file you want to import.

File name:
C:\certificates\DemoCA\CA\private\CAcert.pem

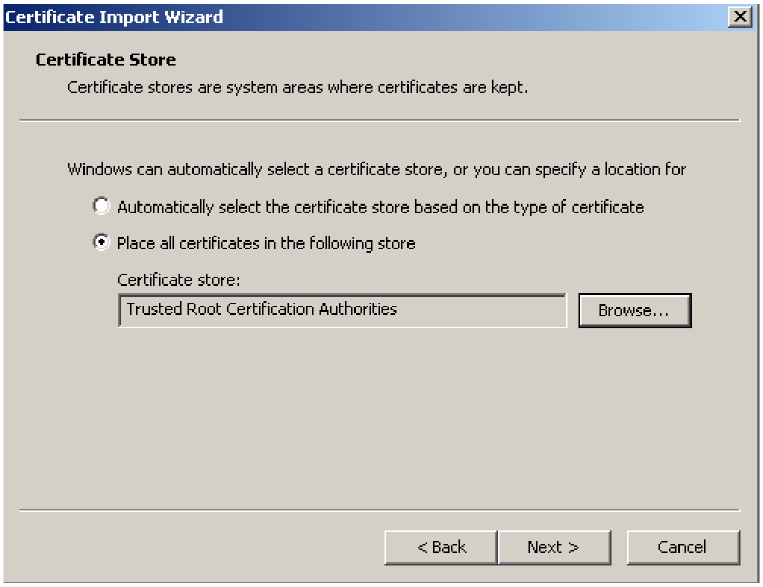
Note: More than one certificate can be stored in a single file in the following formats:

Personal Information Exchange- PKCS #12 (.PFX,.P12)

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

Microsoft Serialized Certificate Store (.SST)

8. Click **Next**.



Certificate Store

Certificate stores are system areas where certificates are kept.

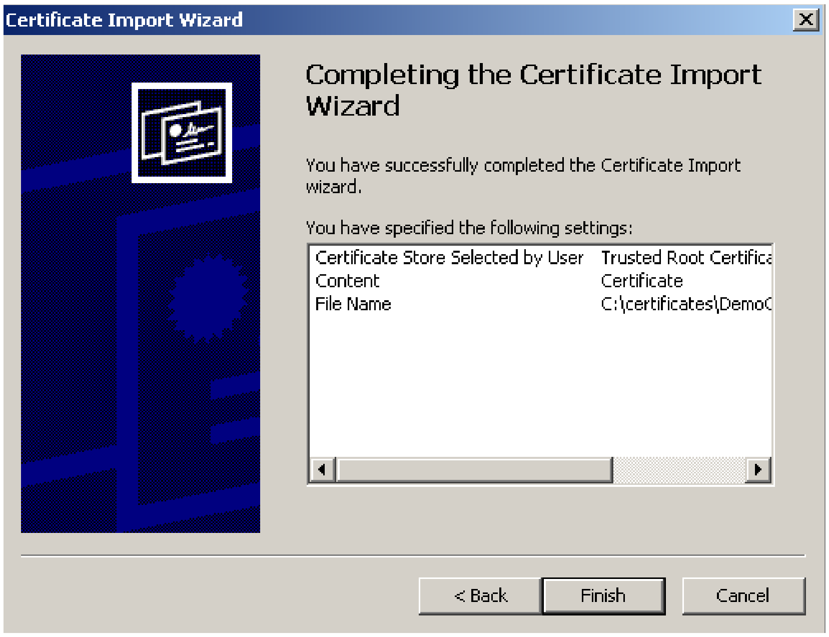
Windows can automatically select a certificate store, or you can specify a location for

○ Automatically select the certificate store based on the type of certificate

● Place all certificates in the following store

Certificate store:
Trusted Root Certification Authorities

9. Click **Finish**.



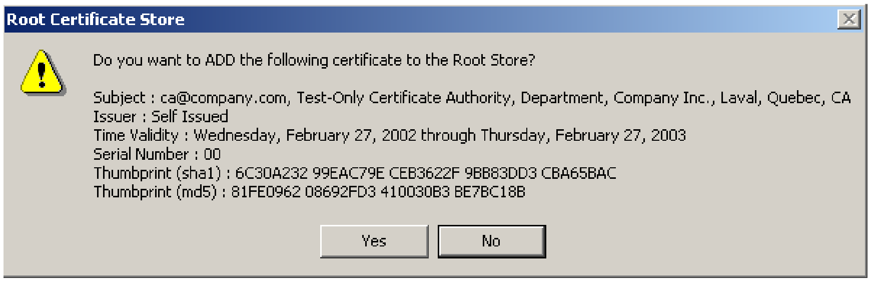
Completing the Certificate Import Wizard

You have successfully completed the Certificate Import wizard.

You have specified the following settings:

Certificate Store Selected by User	Trusted Root Certifica
Content	Certificate
File Name	C:\certificates\DemoC

10. Click **Yes**.



Do you want to ADD the following certificate to the Root Store?

Subject : ca@company.com, Test-Only Certificate Authority, Department, Company Inc., Laval, Quebec, CA
Issuer : Self Issued
Time Validity : Wednesday, February 27, 2002 through Thursday, February 27, 2003
Serial Number : 00
Thumbprint (sha1) : 6C30A232 99EAC79E CEB3622F 9BB83DD3 CBA65BAC
Thumbprint (md5) : 81FE0962 08692FD3 410030B3 BE7BC18B

Customers who do this will no longer see any security warnings.

Netscape Navigator

To eliminate the certificate warning message in Netscape Navigator 7.1,do the following:

1. On the **Edit** menu, click **Preferences**.
2. Click **Privacy & Security**.
3. Click **Certificates**.
4. Click **Manage Certificates**.
5. Click **Authorities**.
6. Click **Import**.
7. Select your Public Key certificate. (If you are using the examples in this chapter, select **C:\certificates\ca\private\CAcert.pem**.)
8. Click **Open**.
9. Select **Trust this CA to identify web sites**.
10. Optional: Click **View** to verify the certificate details.
11. Click **Ok, Ok**.

Chapter 15
Customizing the public access interface

This chapter provides an overview of the public access interface and explains how to customize it.

Overview

The public access interface is the sequence of web pages that customers use to login, logout, and view the status of their wireless sessions. The CN3200 enables you to tailor these pages to provide a customized look-and-feel for your site. Using a RADIUS server, Web pages can be auto-updated, enabling you to manage multiple units effortlessly.

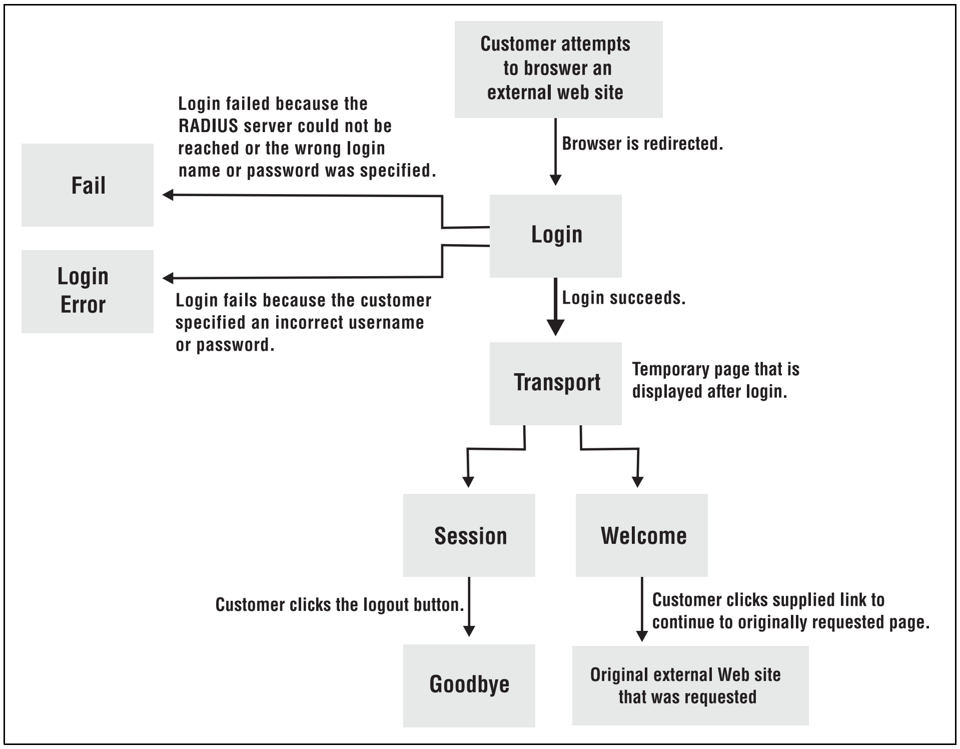
Common configuration tasks

The following table lists some common configuration tasks and indicates where to find more information.

Task	For instructions
Changing the Login page and logo.	See page 168.
Hosting the login page on your own web server.	See page 173.
Displaying custom Welcome or Goodbye pages.	See page 171.
Delivering custom content based on a customer's location in the network.	See page 171.
Supporting PDAs.	See page 172.
Restricting customer logins based on their location in the network.	See page 181.

Site map

The public access interface is composed of seven pages and is structured as follows:


Customer attempts to broswer an external web site
Browser is redirected.
Login failed because the RADIUS server could not be reached or the wrong login name or password was specified.
Fail
Login
Login Error
Login fails because the customer specified an incorrect username or password.
Login succeeds.
Transport
Temporary page that is displayed after login.
Session
Welcome
Customer clicks the logout button.
Customer clicks supplied link to continue to originally requested page.
Goodbye
Original external Web site that was requested

The pages are split into two groups: internal pages and external pages.

Note: *You can also create a remote login page that resides on the web server and is not downloaded to the CN3200. See "Using a remote login page" on page 173 for details.*

Internal pages

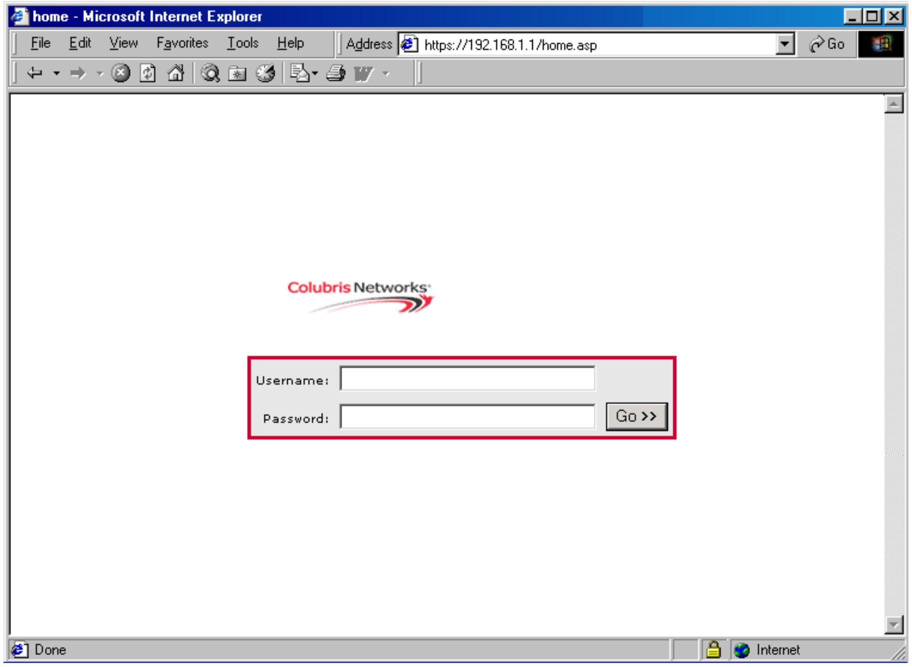
Internal pages are resident on the CN3200. You have the option of using the default pages supplied with the CN3200 or replacing them with customized pages of your own design.

To load custom pages you must define their URLs when you create a RADIUS profile for the CN3200. When the CN3200 authenticates itself to the RADIUS server it will retrieve the URLs for these pages, then download and activate the pages.

Login page

This page contains a single graphic element (suitable for a logo or other identifying element) and two fields: username and password.

The default Login page is:



Address https://192.168.1.1/home.asp

Note: *You can also create a remote login page that resides on an external web server and is not downloaded to the CN3200. See* “Using a remote login page” on page 173 *for details.*

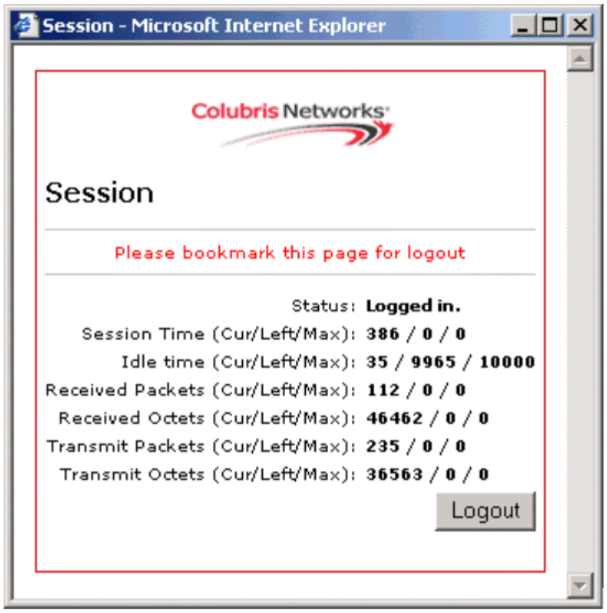
Transport page

This page appears briefly and spawns the Session and Welcome pages.

Session page

This page displays usage statistics for the session, and the logout button the customer clicks to terminate the session.

The default Session page is:



Session

Please bookmark this page for logout

Status: Logged in.
Session Time (Cur/Left/Max): 386 / 0 / 0
Idle time (Cur/Left/Max): 35 / 9965 / 10000
Received Packets (Cur/Left/Max): 112 / 0 / 0
Received Octets (Cur/Left/Max): 46462 / 0 / 0
Transmit Packets (Cur/Left/Max): 235 / 0 / 0
Transmit Octets (Cur/Left/Max): 36563 / 0 / 0

Managing the session page

The session page is automatically opened after the customer logs in. By default, it contains the logout button. The following URL can be used to re-open the session page if a customer accidentally closes it. Without the session page, the customer will not be able to log out.

`http://`*`CN3200_ip`*`:`*`port`*`/session.asp.`

For example:

```
http://192.168.1.1:8080/session.asp
```

Launching the session page from the Welcome page

You can embed the following URL on the Welcome page, which will dynamically link to the session page:

`http://`*`CN3200_ip`*`:`*`port`*`/session.asp`

Forcing a logout

You can force a logout with this URL:

`http://`*`CN3200_ip`*`:`*`port`*`/goform/HtmlLogout`

For example:

```
http://192.168.1.1:8080/goform/HtmlLogout
```

Customers with PDAs

Customers using PDAs that only support a single browser window will never see the session page. This makes it impossible for them to logout. To solve this problem, see “Supporting PDAs” on page 172.

Fail page

This page appears if:

- the CN3200 cannot contact the RADIUS server to authenticate a customer
- the CN3200 fails to be authenticated by the RADIUS server due to bad username or password on the **Security > Authentication** page, or wrong RADIUS configuration on the **Security > RADIUS** page

External pages

External pages are stored on a remote Web server. The CN3200 retrieves the URLs for these pages in two ways:

- when it authenticates itself to the RADIUS server
- when the CN3200 authenticates a customer using the RADIUS server

By defining unique URLs for each customer, you can provide customized versions of the external pages.

Note: *You can also create a remote login page that resides on an external web server and is not downloaded to the CN3200. See* "Using a remote login page" on page 173 *for details.*

Welcome page

The Welcome page includes a link to the page that was originally requested. If the CN3200 cannot reach the custom URL specified for the Welcome page or if a custom URL is not defined, it jumps directly to the page originally requested by the customer.

Goodbye page

This page acknowledges a customer logout.

Login error page

This page appears if the customer cannot be authenticated. The reason is displayed on the page. You can customize the messages on this page by editing the file messages.txt. See "Message file" on page 192 for details.

How it works

The following diagram illustrates the sequence of events that occur when a customer attempts to browse an external web site.

Customizing the internal pages

This section explains how to customize the four internal pages (Login, Transport, Session, Fail), as well as the shared image file (logo) and the message file.

Creating new internal pages

To create new internal pages, use the fully-commented samples provided on the CD (in the folder **\HTML\Colubris**) as a starting point For your reference, these samples are also reproduced at the end of this chapter. (Additional samples are available at www.colubris.com.)

Important: *Do not create new pages by saving an internal page while viewing it within your web browser. The server-side code is removed when you do this and the resulting pages will not work. Use the examples on the CD as the base for your pages.*

The internal pages use a number of Colubris-specific ASP functions to display status information. You can make use of these functions to enhance your custom pages too. These functions are described starting on page 184.

Important restrictions

Because the internal pages must be loaded onto the CN3200, the following restrictions apply to their construction.

- **You must specify a URL for all the internal pages, even if you only want to change one page. The pages you do not change can just be copies of the standard internal pages.**
- Do not alter the ID tags “[!-- Colubris --]” & “[!-- Custom --]” located at the top of the page.
- Do not alter any JavaScript code, except for the Session window parameters width and height.
- Only one image can be included on these pages. It must be a .gif file (recommended size less than 20K). This same image file is shared by all pages, and must be resident on the CN3200. For instructions on how to change it, see “Examples” on page 168.
- Do not alter any occurrences of "Get...();" or "GetWelcomeURL();”
- Do not alter any form elements. All names and values should be left intact.
- Do not change the file name extensions of the internal pages.

Loading new internal pages

To load new internal pages, you must define their URLs using a Colubris-AVPair value string when you create a RADIUS profile for the CN3200. See Chapter 16 for information on how to create RADIUS profiles.

When the CN3200 authenticates itself, it retrieves the URLs for the custom pages, then automatically downloads and activates them.

Colubris-AVPair value string

The following table presents the Colubris-AVPair value strings used for customizing the internal pages.

Internal page	Colubris-AVPair value string	Notes
Login	`login-page=` *`URL_of_page`*	Required. Unless a remote login page is being used (page 173).
Transport	`transport-page=` *`URL_of_page`*	Required.
Session	`session-page=` *`URL_of_page`*	Required.
Fail	`fail-page=` *`URL_of_page`*	Required.
Re-usable image	`logo=` *`URL_of_gif_file`*	Required. This image is shared by all pages.
Error messages	`messages=` *`URL_of_text_file`*	Optional. These messages appear when various error conditions occur.

Important: ***The internal pages can only be changed as a group.*** *You cannot, for example, just use the login-page string in a RADIUS profile. You must use all required items. This means that the minimum set you can specify in a RADIUS profile is:*

```
login-page= URL_of_page
transport-page= URL_of_page
session-page= URL_of_page
fail-page= URL_of_page
logo= URL_of_gif_file
```

Placeholders

The following optional placeholders can be appended to the Colubris-AVPair value strings for the internal pages.

Placeholder	Description
`%n`	Returns the NAS ID assigned to the CN3200. By default, this is the unit’s serial number.
`%s`	Returns the RADIUS login name assigned to the CN3200. By default, this is the unit’s serial number.
`%i`	Returns the domain name assigned to the CN3200’s Internet port.
`%a`	Returns the IP address of the CN3200’s interface that is sending the authentication request.

Examples

These examples show how to accomplish some common customization tasks. Additional examples are available on the Colubris Networks web site.

Changing the login page and logo

1. Create a folder called **newpages** on your web sever.
2. Create a file called **logo.gif** that contains your logo and place it in the **newpages** folder.
3. Copy the following files from the **\HTML\Colubris\Internal** folder on the CD and place them in the **newpages** folder.
   - login.html
   - transport.html
   - session.html
   - fail.html
4. Edit the **login.html** to meet the requirements of your site.
5. Add the following entries to the RADIUS profile for the CN3200.

```
login-page=web_server_URL/newpages/login.html
transport-page=web_server_URL/newpages/transport.html
session-page=web_server_URL/newpages/session.html
fail-page=web_server_URL/newpages/fail.html
logo=web server URL/newpages/logo.gif
```

Customizing error messages

Several of the internal pages use the functions GetAuthenticationErrorMessage() and GetSessionStateMessage() to return a string from the file “message.txt.” You can customize the messages in this file for your installation as follows:

1. Create a folder called **newpages** on your web sever.
2. Copy the file messages.txt from the **\HTML\Colubris\Internal** folder on the CD and place it in the **newpages** folder.
3. Edit **messages.txt** with an ASCII editor. Customize the messages to suit your installation.
4. Add the following entry to the RADIUS profile for the CN3200.

```
messages=web_server_URL/newpages/messages.txt
```

Customizing the external pages

This section explains how to customize the three external pages: Welcome, Login error, and Goodbye.

Creating new external pages

In contrast to the internal pages, the external pages do not have any restrictions on their construction since they reside on a third-party server.

To create new external pages, use the fully-commented samples provided on the CD (in the folder \HTML) as a starting point. For your reference, these samples are also included at the end of this chapter.

Activating new external pages

To activate new external pages, you must define their URLs using the Colubris-AVPair value string when you create a RADIUS profile for the CN3200 or a customer. See Chapter 16 for information on how to create RADIUS profiles.

When the CN3200 authenticates itself, or a customer, it retrieves the URLs for the custom pages, then automatically redirects customers to them when required.

Note: *The CN3200 maintains a separate copy of the URLs for external pages for each customer. This means it is possible to provide different pages on a per-customer basis.*

Colubris-AVPair value string

The following table presents the Colubris-AVPair value strings used for customizing the external pages.

Attribute	Notes

`login-err-url=`
`URL_of_page` `[`*`placeholder`*`]`
	Access to the web server hosting this page must be granted to all unauthenticated customers. Do this with an appropriate access list definition. (Customers can see this page *before* they are logged in.)

`welcome-url=`
`URL_of_page` `[`*`placeholder`*`]`
	The customer is authenticated, so the welcome page can be located on any URL reachable by the customer.

`goodbye-url=`
`URL_of_page` `[`*`placeholder`*`]`
	Access to the web server hosting this page must be granted to all unauthenticated customers. Do this with an appropriate access list definition. (Customers see this page *after* they are logged out.)

Placeholders

An important feature of the external pages is that they make it easy to deliver a unique experience for each customer. By appending the following optional placeholders to the Colubris-AVPair value strings for the external pages, you can pass important information to the web server. Server-side code can process this information to generate custom pages on the fly.

Placeholder	Description
`%c`	Returns the IP address of the customer's computer.
`%l`	Returns the URL on the CN3200 where customer login information should be posted for authentication. This option is used with the remote login page feature.
`%n`	Returns the NAS ID assigned to the CN3200. By default, this is the unit's serial number.
`%s`	Returns the RADIUS login name assigned to the CN3200. By default, this is the unit's serial number.
`%u`	Returns the login name of the customer.
`%o`	Returns the original URL requested by the customer.
`%i`	Returns the domain name assigned to the CN3200's Internet port.
`%p`	Returns the IP port number on the CN3200 where customer login information should be posted for authentication.
`%a`	Returns the IP address of the CN3200's interface that is sending the authentication request.
`%E`	When the location-aware feature is enabled, returns the ESSID of the wireless access point the customer is associated with.
`%G`	When the location-aware feature is enabled, returns the group name of the wireless access point the customer is associated with.
`%C`	When the location-aware feature is enabled, returns the Called-station-id content for the wireless access point the customer is associated with.
`%r`	Returns the string sent by the RADIUS server when an authentication request fails. The RADIUS server must be configured to support this feature. The information contained in the returned string depends on the configuration of the RADIUS server.
`%m`	Returns the Calling-station-id content for the wireless access point the customer is associated with.

Examples

These examples show how to accomplish some common customization tasks.

Displaying custom welcome and goodbye pages

This example shows how to display unique welcome and goodbye pages for specific customers, or groups of customers.

For this example, assume you have two sets of customers: basic and premium. To distinguish the two groups, you have setup the customer accounts on the RADIUS server accordingly. (Perhaps you are using access lists to restrict each group to a different section of the public network as described on page 220).

1. Create the following two folders on your web sever: **basic** and **premium**.
2. Copy the following files from the **\HTML\Colubris\External** folder on the CD into both the **basic** and **premium** folders on your web server.
    - **welcome.html**
    - **goodbye.html**
3. Edit **welcome.html** and **goodbye.html** in each folder and customize them for each set of customers.
4. Add the following entry to the RADIUS profile for the basic customers.

```
welcome-url=web_server_URL/basic/welcome.html
goodbye-url=web_server_URL/basic/goodbye.html
```

5. Add the following entry to the RADIUS profile for the premium customers.

```
welcome-url=web_server_URL/premium/welcome.html
goodbye-url=web_server_URL/premium/goodbye.html
```

6. Add the following entry to the RADIUS profile for the CN3200. This gives all unauthenticated users access to the web server hosting the goodbye page.

```
access-list=loginserver,ACCEPT,tcp,web server IP address
```

Delivering dynamically generated content

Another way to generate custom pages is to add placeholders in the URLs for the custom external pages and then use server-side scripting to dynamically create the pages. This method provides a powerful mechanism to automatically generate completely customized pages on a per-user basis. Rather than designing one or more static pages, as in the previous example, the custom pages in this example can be built on-the-fly based on customer preferences stored in a central database, or on a customer's location within the network.

For example, if you want to generate a custom welcome page for each customer:

1. Add the following entry to the RADIUS profile for the CN3200.

```
welcome-url=web_server_URL/premium/welcome.html
?loginname=%u&IPaddress=%i
```

2. Create a server-side script to retrieve the login name (%u) and the CN3200's IP address (or domain name). The script can use this information to then display a custom page based on customer's preferences (stored in the server's database) and location within the wireless network.

Supporting PDAs

Customers using PDAs that only support a single browser window will have difficulty using the public access interface in its standard configuration.

The problem

Once a customer logs in to the public access interface, two web pages are sent to their browser: the Welcome page and the Session page.

The Session page contains a logout button. Customers who are unable to view this page will not be able to log out.

The solution

To solve the problem, modify the Welcome page to include a logout button. You can do this as follows:

1. Create a folder called **PDAcustomers** on your web sever.
2. Copy **welcome.html** from the **\HTML\Colubris\External** folder on the CD into this folder.
3. Edit **welcome.html** to include a logout link with the target:

   ```
   http://CN3200_ip:port/goform/HtmlLogout.
   ```

   For example:

   ```
   http://192.168.1.1:8080/goform/HtmlLogout.
   ```

   Add a warning to this page that tells PDA customers to bookmark the Welcome page so that they can logout.
4. Add the following entry to the RADIUS profile for all PDA customers.

   ```
   welcome-url=web_server_URL/PDAcustomers/welcome.html
   ```

Using a remote login page

The CN3200 provides an option that allows you to redirect customers to a remote server to log in to the public access interface instead of using the internal login page.

Advantages

Hosting the login page on a remote server provides you with the following benefits:

- The login page is completely customizable. You are not bound by the limits imposed by loading a login page onto the CN3200.
- Customers can login to the public access interface without exposing their web browsers to the SSL certificate on the CN3200. This eliminates warning messages caused by having an SSL certificate on the CN3200 that is not signed by a well-known certificate authority. Only applies when using the NOC authentication feature.
- If you want to support secure login with SSL, but have multiple CN3200s, using a remote login page means you only need to purchase a single SSL certificate signed by a well-known certificate authority, instead of one for each access point.Only applies when using the NOC authentication feature.

Activating a remote login page

The remote login page is activated by adding Colubris-AVPair value strings to the RADIUS profile for the CN3200. See Chapter 16 for a detailed discussion on how to use these strings.

Colubris-AVPair value string

The following table summarizes the Colubris-AVPair value strings for the remote login page.

Item	Colubris-AVPair value string
External login	`login-url=` *URL_of_the_page* [*placeholder*] Access to the web server hosting this page must be granted to all unauthenticated customers. Do this with an appropriate access list definition.
NOC certificate	`ssl-noc-certificate=` *URL_of_the_Certificate* Certificate issued to the application on the web server that will send customer info to the CN3200 for authentication. For NOC-based authentication only.
NOC CA certificate	`ssl-noc-ca-certificate= URL_of_the_`*certificate* Certificate of the certificate authority (CA) that issued the NOC certificate. For NOC-based authentication only.

Placeholders

The following placeholders can be added to the login-url string.

Placeholder	Description
`%c`	Returns the IP address of the customer’s computer.
`%l`	Returns the URL on the CN3200 where customer login information should be posted for authentication.
`%n`	Returns the NAS ID assigned to the CN3200. By default, this is the unit’s serial number.
`%s`	Returns the RADIUS login name assigned to the CN3200. By default, this is the unit’s serial number.
`%o`	Returns the original URL requested by the customer.
`%i`	Returns the domain name assigned to the CN3200’s Internet port.
`%p`	Returns the port number on the CN3200 where customer login information should be posted to for authentication.
`%a`	Returns the IP address of the CN3200’s interface that is sending the authentication request.
`%E`	When the location-aware feature is enabled, returns the ESSID of the wireless access point the customer is associated with.
`%G`	When the location-aware feature is enabled, returns the group name of the wireless access point the customer is associated with.
`%C`	When the location-aware feature is enabled, returns the Called-station-id content for the wireless access point the customer is associated with.
`%r`	Returns the string sent by the RADIUS server when an authentication request fails. The RADIUS server must be configured to support this feature. The information contained in the returned string depends on the configuration of the RADIUS server.
`%m`	Returns the Calling-station-id content for the wireless access point the customer is associated with.

Important: ***To use the remote login page, you must provide a complete set of internal pages (except for login.html), which includes:***

```
transport-page= URL_of_page
session-page= URL_of_page
fail-page= URL_of_page
logo= URL_of_gif_file
```

How it works

Although the remote login page feature enables you to host the public access login page on a remote web server, authentication of customers is still performed by the CN3200 via a RADIUS server. To accomplish this, the remote web server must send customer login information back to the CN3200. There are two ways to accomplish this: basic remote login or using the NOC-based authentication feature.

Basic remote login

The following diagram shows the sequence of events for a typical customer session when using basic remote login.

Security issues

- It is recommended that the web server hosting the remote login page be secured with SSL (requires an SSL certificate from a well-know CA), to ensure that customer logins are secure. Without SSL security, logins are exposed and may be compromised, enabling fraudulent use of the network.
- Communications between the customer's browser and the CN3200 is always SSL-based. The default certificate on the CN3200 will generate a warning on the customer's browser unless replaced with a certificate signed by a well-known CA.

Example

To enable a basic remote login page, do the following:

1. Create the following folder on your web sever: **newlogin**
2. Copy the following files from the **\HTML\Colubris\Internal** folder on the CD and place them in the **newlogin** folder.
   - login.html
   - transport.html
   - session.html
   - fail.html
   - logo.gif
3. Add the following entries to the RADIUS profile for the CN3200.

   ```
   login-url=web_server_URL/newlogin/login.html?loginurl=%l
   transport-page=web_server_URL/newlogin/transport.html
   session-page=web_server_URL/newlogin/session.html
   fail-page=web_server_URL/newlogin/fail.html
   logo=web server URL/newlogin/logo.gif
   access-list=loginserver,ACCEPT,tcp,web_server_IP_address
   use-access-list=loginserver
   ```

4. Customize **login.html** to accept username and password information from customers and then send it to the CN3200. You can use code similar to the following example to redirect the customer's web browser to the login URL on the CN3200 for authentication:

   ```
   <form action="https://CN3200.wireless.colubris.com:8090/goform/
   HtmlLoginRequest" method="POST">
   ```

   For more flexibility, the remote login page should be written using a server-side scripting language such as ASP, PHP, or PERL. This enables the remote login page to take advantage of the placeholders that may have been defined in the login-url section of the RADIUS profile. See section "Placeholders" on page 174 for more information about the placeholders.

NOC-based authentication

The NOC authentication feature provides a secure way of authenticating public access customers, with strong mutual authentication between the web server hosting the remote login page and the CN3200 used for authenticating customer logins. This occurs via the two Colubris-AVPair value strings (**ssl-noc-certificate** and **ssl-noc-ca-certificate**), which define the locations of two certificates. These certificates enable the CN3200 to validate that the customer information it receives does indeed come from a trusted application. For example, from a login application on the web server.

Additional security is provided via the NOC access list. You use this list to define the set of remote IP addresses that the CN3200 will accept authentication requests from. If a request is received from an address not in this list, it is discarded.

Since this method does not expose a customer's browser to the CN3200, there is no need to install a certificate signed by a well-known certificate authority on the CN3200. (You can however, install a certificate on the CN3200 if you want to secure communications between it and the web server hosting the remote login page.)

The following diagram shows the sequence of events for a typical customer session when using the NOC-based authentication feature.

Security issues

- HTTPS can be used on the web server to secure the login page. To avoid warning messages on the customer's browser, the SSL certificate installed on the web server should be signed by a well-known CA.
- When establishing the SSL session with the CN3200, the login application must supply its SSL certificate. In a standard SSL setup, the CN3200 would just use the CA for this certificate to validate its identity. However, the CN3200 does not want to accept SSL connections from any remote entity with a valid certificate. Rather, it only wants to accept connections from a specific entity: the remote login application. Therefore, to uniquely identify itself, the login application must supply the **same** certificate configured in the CN3200's RADIUS account as *ssl-noc-certificate*. The CN3200 verifies that this certificate has been signed by the certificate authority whose public key certificate is pointed to by *ssl-noc-ca-certificate*.
- To identify itself, the CN3200 uses the SSL certificate configured on the **Security > Certificates** page. For added security, the login application could also check that this SSL certificate has been signed by the certificate authority for which the web server has the public key certificate. (By default, this certificate is not signed by a well-known CA.)
- An effective way to handle the certificates would be to:

Install an SSL certificate signed by a well-known CA on the web server hosting the remote login page. This certificate will be used to secure customer logins.

Install a second SSL certificate on the web server hosting the remote login page. This certificate will be used by the login application to secure communications with the CN3200. This certificate could be signed by your own CA to reduce cost.

Install an SSL certificate on the CN3200 (optional). This certificate could also be signed by your own CA to reduce cost. Use the **Security > Certificates** page to install it. This certificate will be used to secure communications between the CN3200 and the login application on the web server.

If the SSL certificate installed on the CN3200 is signed by an intermediate certificate authority, the PKCS#12 file imported into the CN3200 must contain:

- the private key for the CN3200's SSL certificate
- the whole set of X.509 certificates required by an SSL client to create the certificate chain to validate the CN3200's SSL certificate: Root CA cer --> Intermediate CA (1) cert --> ...--->Intermediate CA(n) --> CN3xxx cert.

This enables the SSL client to be aware of the entire certificate chain, even if by default it only knows about the root CA for this certificate chain.

Communications between the login application and the CN3200

- Once a customer has supplied login information on the remote login page, the login application must submit an authenticaiton request containing the customer's login name, password, and IP address to the CN3200 by establishing an SSL session to the following URL:

```
https://CN3200_ip:8090/goform/HtmlNocLoginRequest
?username=username&password=password&ipaddr=customer_ip
```

CN3000_ip is the IP address of the CN3200 or you could use a domain name if you have defined one using the hosts file on the web server. (By default, the secure web server on the CN3200 operates on port 8090. This can be changed on the **Management Tool** page if required.)

The CN3200 requires that the contents of the Host HTTP header match the actual domain name/IP address and port the CN3200 is operating on:

Host: CN3200_domain_name:secure_web_server_port_number
or
Host: CN3200_IP_address:secure_web_server_port_number

This will usually be the case, unless the CN3200 is behind a device that provides network address translation (NAT). In this situation, the login application must manually forge the Host HTTP header. The easist way to do this is to define `login-url` with the `%i` and `%p` placeholders. This returns the domain name of the CN3200 and the port number of its secure web server. The login application can then contstruct the appropriate Host HTTP header.

Example 1

Assume that the CN3200 is not behind a NATing device, and that its IP address is 192.168.4.2. The subject DN in its SSL certificates is www.noc-cn3000.com.

The Host HTTP header should be set to one of:

- Host: www.noc-cn3000.com:8090
- Host: 192.168.4.2:8090

Example 2

Assume that the CN3200 is behind a NATting device. The device has the address 192.168.30.173, and the CN3200 has the address 192.168.4.2. A NAT mapping is defined on the NATting device that redirects traffic recieved on port 8090 to 192.168.4.2:8090.

The login application must send its requests to 192.168.30.173, which results in a HTTP Host header that contains one of the following:

- Host: natting.router.com:8090
- Host: 192.168.30.173:8090

When this request is forwarded to the CN3200, it will be rejected. To solve the problem, the login appication must forge the host HTTP header. This is easily done by plugging in the values returned by the %i, %a, and %p placeholders. For example:

Host: %i:%p
or
Host: %a,%p

- The CN3200 sends the username and password to the RADIUS server to authenticate the customer. If authentication is successful, the customer's IP address is used to grant wireless network access to the customer's computer.
- The CN3200 returns a positive or negative answer for the customer login, along with the relevant URLs that may be needed by the login application in order to redirect the customer to either a Welcome page or a Login error page located on the web server. This information is returned as standard HTML. The login application must parse this information to retrieve the response. All possible responses are described in "Authentication results" on page 348.

Example

This is a simple example showing how to use the NOC authentication feature. See Chapter 20 for an example of the code that would be needed by a login application to communicate with the CN3200.

1. Create the following folder on your web sever: **newlogin**
2. Copy the following files from the **\HTML\Colubris\Internal** folder on the CD and place them in the **newlogin** folder.

- login.html
- transport.html
- session.html
- fail.html
- logo.gif

3. Customize **login.html** to accept username and password information from customers and then send it to the CN3200. You could use code similar to the following PHP example to send login information back to the CN3200 for authentication:

   ```
   https://ipaddress of CNx;8090/goform/HtmlNocLoginRequest
   ?username=username&password=password&ipaddress=customer_
   ip
   ```

   The variable `loginurl` contains the URL on the CN3200 where customer information is sent for authentication.

4. Start the management tool.
5. On the main menu, click **Security**, then click **Authentication**.

6. Click the **Advanced Settings** button.
7. Enable the **NOC authentication** feature.
8. Add the IP address of the web server to the **Allowed Addresses** box.
9. Click **Save**.
10. In the RADIUS profile for the CN3200, define the following:

```
login-url= URL_of_page_on_remote_server
access-list=loginserver,ACCEPT,tcp,web_server_IP_address,443
ssl-noc-certificate= URL_of_the_certificate
ssl-noc-ca-certificate= URL_of_the_certificate
transport-page=web_server_URL/newlogin/transport.html
session-page=web_server_URL/newlogin/session.html
fail-page=web_server_URL/newlogin/fail.html
logo=web server URL/newlogin/logo.gif
use-access-list=loginserver
```

Forcing customer logout

Customers can be logged out by calling the following URL:

```
https://CN3200_ip:8090/goform/HtmlNocLogoutRequest
?ipaddress=customer_ip
```

Important: *This request must come from the login application (or another other application that is using the same SSL certificate).*

The CN3200 returns a positive or negative answer for the customer logout as standard HTML. The login application must parse this information to retrieve the response.

Logout success

```
<HTML>
NOC_INFO_STATUS=NOC_STATUS_SUCCESS
</HTML>
```

Logout failure

```
<HTML>
NOC_INFO_STATUS=NOC_STATUS_FAILURE
NOC_INFO_INT_ERR_MESSAGE=<error message>
</HTML>
```

Note: *These definitions are contained in noc.h which is described on page 348.*

Location-aware authentication

This feature enables you to control logins to the public access network based on the wireless access point a customer is connected to.

Important: *This feature does not support 802.1x customers and devices using MAC-based authentication.*

How it works

When a customer attempts to login to the public access network, the CN3200 sets the Called-Station-ID in the RADIUS access request to one of the following values (your choice):

- the MAC address of the wireless port the customer is associated with
- the ESSID of the access point the customer is associated with
- a group name (you can assign a group name to each wireless access point)

Consider the following topology for a fictional small hotel. The restaurant and lounge are available to all hotel customers who subscribe to the wireless service. However, the conference room is available only to a specific group of guests who book it in advance.

In this example, the access points in each area are assigned the following unique group names:

- conference_room
- restaurant
- lounge

When a customer logs in, server-side code can be used to determine the access point they are associated with by inspecting the Called-Station-ID. Then, using their account information, access can either be granted or denied.

Security

o maintain the security of the network logins, the CN3200 will only accept location-aware information from a CN300 that has a matching shared secret to its own.

Roaming

If your network supports roaming, each time a customer switches wireless access points the CN3200 will send the following:

- Called-Station-ID = MAC address or ESSID or Group name.
- Service-Type = 8744 (decimal)

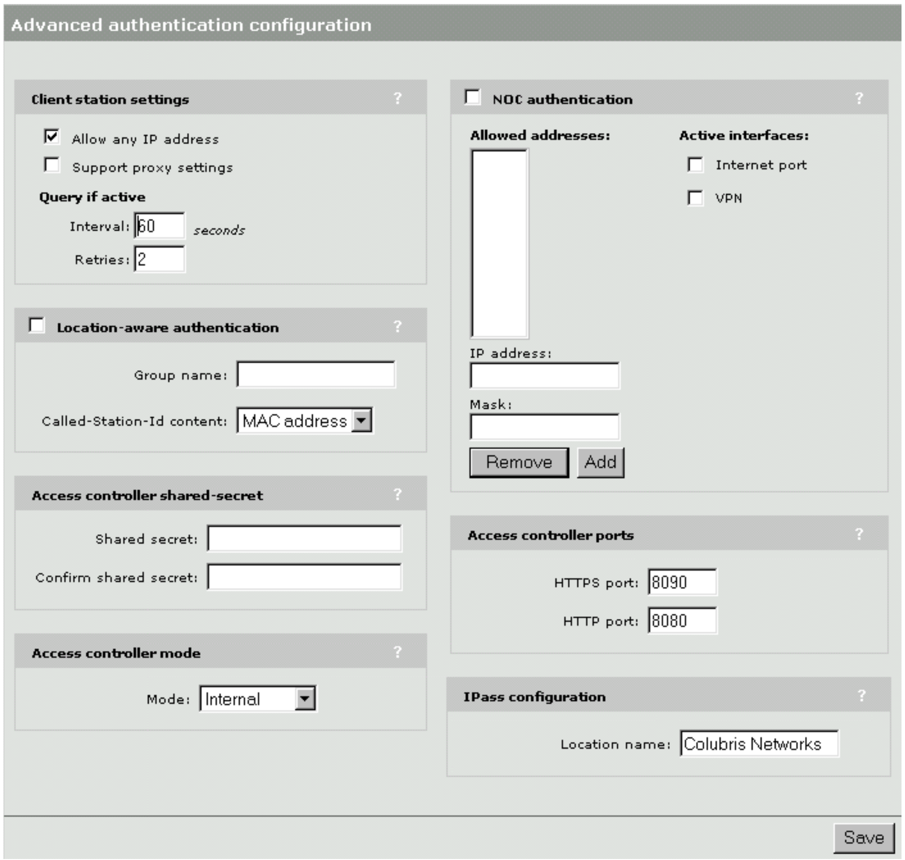
This information enables you to track the movements of your customers. If they roam to an unauthorized access point, you can log them out.

In the fictional small hotel, if a customer roams from the lounge to the conrerence room, server-side code can evaluate the Called-Station-ID to determine if the customer has access. If not, the customer can be logged out.

Configuration

To activate location-aware authentication, do the following:

1. Open the **Security > Authentication > Advanced Settings page,**



Advanced authentication configuration

Client station settings

☑ Allow any IP address

□ Support proxy settings

Query if active

Interval: 60 seconds

Retries: 2

□ Location-aware authentication

Group name:

Called-Station-Id content: MAC address

Access controller shared-secret

Shared secret:

Confirm shared secret:

Access controller mode

Mode: Internal

□ NOC authentication

Allowed addresses:

IP address:

Mask:

Remove Add

Active interfaces:

□ Internet port

□ VPN

Access controller ports

HTTPS port: 8090

HTTP port: 8080

IPass configuration

Location name: Colubris Networks

Save

2. Enable the **Location-aware authetication** option. Configure the parameters as described in the section that follows.

Parameters

Group name

Specify a group name for the access point. This name is used to identify customer logins via the Called-Station-ID. You can assign the same group name to more than one access point.

Called-Station-ID content

Choose the value that you want the CN3200 to return in the Called-Station-ID when it generates a RADIUS access request for a customer login.

- the MAC address of the wireless port the customer is associated with
- the SSID of the access point the customer is associated with
- the group name of the access point the customer is associated with

iPass support

The CN3200 provides support for the Generic Interface Specification from iPass which enables you to create an iPass-compatible hotspot.

To setup the CN3200 as an iPass hotspot, you must define the IPass authentication server on the **Security** > **RADIUS** page. You can use either Profile 1 or Profile 2 to do this.

ASP functions

The following ASP functions can be called from the internal pages only.

Errors

GetAuthenticationErrorMessage()

Returns a message (from message.txt) indicating the status of the last authentication request. This function is used on the default Login and Fail pages to update the customer on the status of the login or logout.

RADIUS

GetMsChapV2Failed()

Returns the MS CHAP V2 error string. This function is only supported if you select MSCHAP V2 as the authentication scheme on the CN3200 (**Security > RADIUS** page). The RADIUS server must also support this feature. For a list of possible return values see RFC 2759.

GetRadiusNasId()

Returns the NAS ID configured for RADIUS Profile on the CN3200. (See “Setting up the CN3200 RADIUS client” on page 95 for details on setting the NAS ID.) This can be used to identify the CN3200 that authenticated a customer. For an example of how this function is used, see GetNasAddress().

GetRadiusReplyMessage()

Returns the string sent by the RADIUS server when an authentication request fails. The RADIUS server must be configured to support this feature. The information contained in the returned string depends on the configuration of the RADIUS server.

GetNasAddress()

Returns the fully-qualified domain name of the CN3200 as is specified in the currently loaded SSL certificate.

Example

In certain instances you may want customers to register for an account before they log in. To accomplish this you could modify the Login page by adding a register button. This would redirect the customer’s browser to a registration web server where they would setup their account. (This page must be made accessible to non-authenticated customers using the appropriate access list rule.)

To avoid having the customer login once registration is complete, the registration web server can send the customer back to the CN3200 using a special URL that will automatically log the customer into the public access interface.

Assuming the registration server is 192.169.30.1, the register button code on the Login page might look something like this:

```
<FORM><INPUT
onclick="javascript:window.location='https://192.168.30.1/demo-
php/register.php?
NASip=<%GetNasAddress();%>&NASid=<%GetRadiusNasId();%>';"
type=button value="Click Here to Register">
</FORM>
```

The NAS ID and NAS address are required when the customer is redirected back to the CN3200 after registration. The code on the registration web page would look something like this:

```
// Registering user information in the backend database
RegisterUser($username,
$firstname,
$lastname,
$company,
$title,
$phone,
$email,
$NASid,    // identifies the CN3200 the customer is connected to
$NASip
);

// set URL to redirect browser to
$targetURL = "location: https://
" . $NASip . ":8090/goform/HtmlLoginRequest?
username=" . $username . "&password=" . $password;

// When done
header($targetURL);
```

The target URL is built using the NAS IP and username and password. The form name is hard-coded.

Page URLs

GetSessionUrl()

Returns the URL of the Session page.

GetWelcomeUrl()

Returns the URL of the Welcome page.

GetFailRetryUrl()

Returns the URL of the next internal page to display as follows:

- Returns the Fail page URL if a login or logout request is currently pending.
- Returns the Transport page URL if the customer is already logged in.

This function is designed to be used in conjunction with IsRequestPending().

GetOriginalUrl()

Returns the URL the customer tried to access before being redirected to the Login page.

Session status and properties

IsRequestPending()

Returns ‘yes’ if a login or logout request is already pending for the current customer. This function is useful when a RADIUS server is slow to respond and a customer repeatedly clicks the login or logout buttons. For example, consider the following code which could be used to modify the Fail page to address this problem.

```
function loading()  //called when the fail page is first loaded
if ("<% IsLoggedIn(); %>" == "yes") //logout is pending, so refresh page
refresh();
else
{
     // customer is already logged out or a login is currently pending
     // (i.e., customer clicked login button twice
if ("<% IsRequestPending(); %>" == "yes")
setTimeout('refresh()',3000);
else //no login or logout is pending and customer is logged out
document.form1.close.value = "Close window"; //change button label
}
}

function refresh()   // refresh the Fail page
{document.location="<%GetFailRetryUrl();%>"; }
```

IsLoggedIn()

Returns "yes" if the customer is logged in. See IsRequestPending() for an example that shows how to use this function.

GetSessionStateMessage()

Returns a message (from message.txt) indicating the status of the customer session.

GetUserName()

Returns the username for the current customer.

GetMaxSessionTime()

Returns the total amount of connection time configured for the current customer session in minutes and seconds in the format: mm:ss.

GetMaxSessionTimeHMS()

Returns the total amount of connection time configured for the current customer session in hours, minutes and seconds in the format: hh:mm:ss.

ConvertMaxSessionTime(*unit*)

Returns the total amount of connection time configured for the current customer in the specified unit.

y	Years
d	Days
h	Hours
m	Minutes
s	Seconds

For example if the customer account is configured for 5000 seconds, then:

- ConvertSessionTime("y") returns 0, calculated as (5000 / (365*24 *60*60)).
- ConvertSessionTime("d") returns 0, calculated as (5000 / (24*60*60)).
- ConvertSessionTime("h") returns 1, calculated as (5000 / (60*60)).
- ConvertSessionTime("m") returns 83, calculated as (5000 / 60).
- ConvertSessionTime("s") returns 5000, calculated as (5000 / 1).

TruncateMaxSessionTime(*unit*)

Returns the total amount of connection time configured for the current customer truncated to the specified unit.

y	Years
d	Days
h	Hours
m	Minutes
s	Seconds

For example if the customer account is configured for 5000 seconds, then:

- TruncateSessionTime("y") returns 0.
- TruncateSessionTime("d") returns 0.
- TruncateSessionTime("h") returns 1.
- TruncateSessionTime("m") returns 23.
- TruncateSessionTime("s") returns 20.

GetSessionRemainingIdleTime()

Returns the amount of time remaining until the customer will be logged out due to inactivity.

GetSessionTime()

Returns session duration for the current customer in minutes and seconds in the format: mm:ss.

GetSessionTimeHMS()

Returns session duration for the current customer in hours, minutes and seconds in the format: hh:mm:ss.

ConvertSessionTime(*unit*)

Returns session duration for the current customer in the specified unit. See ConvertMaxSession time for details.

TruncateSessionTime(*unit*)

Returns session duration for the current customer truncated to the specified unit. See TruncateMaxSession time for details.

SetSessionRefreshInterval(*sec*)

Specifies the refresh interval for the Session page in seconds.

GetSessionRemainingTime()

Returns the amount of connection time remaining for the current customer session in minutes and seconds in the format: mm:ss.

GetSessionRemainingTimeHMS()

Returns the amount of connection time remaining for the current customer session in hours, minutes and seconds in the format: hh:mm:ss.

ConvertSessionRemainingTime(*unit*)

Returns the total amount of connection time remaining for the current customer in the specified unit. See ConvertMaxSession time for details.

TruncateSessionRemainingTime(*unit*)

Returns the total amount of connection time remaining for the current customer truncated to the specified unit. See TruncateMaxSession time for details.

GetMaxSessionIdleTime()

Returns the total amount of idle time configured for the current customer session.

GetSessionIdleTime()

Returns the amount of time the current session has been idle.

GetSessionInputPackets()

Returns the number of packets received by the current customer session.

GetSessionInputOctets(*div*)

Returns the number of octets received by the current customer session.

If you specify a value for the optional parameter div, then the return value is the number of octets divided by *div*.

GetSessionOutputPackets()

Returns the number of packets sent by the current customer session.

GetSessionOutputOctets(*div*)

Returns the number of octets sent by the current customer session.

If you specify a value for the optional parameter div, then the return value is the number of octets divided by *div*.

Session quotas

These functions let you retrieve the quota limits that are set for the current customer session. If any of these limits are reached, the customer is logged out. For details see “Quotas” on page 229.

GetSessionRemainingInputPackets()

Returns the number of incoming packets the current customer session can still receive. This value is a decimal string (10 characters) representing a 32-bit unsigned integer.

GetSessionRemainingInputOctets(*div*)

Returns the number of incoming octets the current customer session can still receive. This value is a decimal string (20 characters) representing a 64-bit unsigned integer.

If you specify a value for the optional parameter div, then the return value is the number of octets divided by *div*.

GetSessionRemainingOutputPackets()

Returns the maximum number of outgoing packets the current customer session can still send. This value is a decimal (10 characters) string representing a 32-bit unsigned integer.

GetSessionRemainingOutputOctets(*div*)

Returns the maximum number of outgoing octets the current customer session can still send. This value is a decimal string (20 characters) representing a 64-bit unsigned integer.

If you specify a value for the optional parameter div, then the return value is the number of octets divided by *div*.

GetMaxSessionInputPackets()

Returns the maximum number of incoming packets the current customer session can receive. This value is a decimal string (10 characters) representing a 32-bit unsigned integer.

GetMaxSessionInputOctets(*div*)

Returns the maximum number of incoming octets the current customer session can receive. This value is a decimal string (20 characters) representing a 64-bit unsigned integer.

If you specify a value for the optional parameter div, then the return value is the number of octets divided by *div*.

GetMaxSessionOutputPackets()

Returns the maximum number of outgoing packets the current customer session can send. This value is a decimal string (10 characters) representing a 32-bit unsigned integer.

GetMaxSessionOutputOctets(*div*)

Returns the maximum number of outgoing octets the current customer session can send. This value is a decimal (20 characters) string representing a 64-bit unsigned integer.

If you specify a value for the optional parameter div, then the return value is the number of octets divided by *div*.

iPass support

iPassGetLoginUrl()

Returns the iPass Login URL.

iPassGetAbortLoginUrl()

Returns the iPass Abort Login URL.

iPassGetLogoffUrl()

Returns the iPass Logout URL.

iPassGetRedirectResponseCode()

Checks if the iPass authentication server is reachable and enabled. Returns one of the following values:

0	Authentication server is reachable and enabled..
105	The authentication server could not be reached or is unavailable.
255	The authenticaiton server could not be reached due to an error on the CN3200 (Internet port not up, for example).

iPassGetAccessProcedure()

Returns the access procedure supported by the CN3200. The CN3200 supports procedure version 1.0.

iPassGetLocationName()

Returns the location name defined on the **Security** > **Authentication** page. By default this is set to **Colubris Networks**.

iPassGetAccessLocation()

Returns a value which can be used to determine the access point a customer is connected to. This is useful when you are using one or more CN300s in addition to the CN3200.

- If a customer logs into the CN300, this function returns the MAC address of the CN300's downsteam port.
- If a customer logs into the CN3200, this function returns the MAC address of the CN3200's LAN port.

iPassGetLoginResponseCode()

Returns one of the following values when a customer attempts to login to iPass:

50	Login was successful.
100	Login failed. Access was rejected.
102	Login failed. Authentication server error or timeout.
201	Authentication is pending.
255	The authenticaiton server could not be reached due to an error on the CN3200 (Internet port not up, for example).

iPassGetLoginResponseCode()

Returns one of the following values when a customer attempts to logout from iPass:

150	Logout was successful.
255	The authenticaiton server could not be reached due to an error on the CN3200 (Internet port not up, for example).

Message file

The functions GetAuthenticationErrorMessage() and GetSessionStateMessage() are used in various internal pages to return a string from the file “message.txt”. You can customize the messages in this file for your installation. See “Customizing the internal pages” on page 166 for instructions on loading a custom message file.

The default message file contains the following messages:

```
# CN3xxx Message file
# The messages in this file are returned by the following two functions:
#  - GetSessionStateMessage();
#  - GetAuthenticationErrorMessage();
#
# To customize these messages, edit the text between quotes only.

# Messages returned by GetAuthenticationErrorMessage();

# The customer logged out, but no URL for the Goodbye page was defined..
err-msg-logout-no-goodbye-url      = "You have been logged out."

# The customer login was rejected by the server, but the no URL for the
# Login Error page was defined. The rejection may be due to any
# number of factors and depends on how access is granted by the server.
# Possible causes include: invalid username or password, no more connection
# time available, account expired.
err-msg-login-refused      = "Your login was refused."

# The CN3xxx encountered an abnormal condition.
# This error message should not appear in the course of normal operations.
err-msg-internal-error     = "Network access error. Code = "

# The maximum number of customers are already connected to the CN3xxx.
err-msg-max-user-reached   = "No connection is currently available. Please try again later."

# The customer is already logged in.
err-msg-already-logged-in  = "The username you specified is already logged in."

# The customer's password is longer that the limit of 127 characters.
err-msg-password-too-long  = "The password you specified is too long."

# The customer's username is longer than the limit of 127 characters
err-msg-username-too-long  = "The username you specified is too long."

# This only occurs during the short periods when the CN3xxx is in the process
# of authenticating itself to the RADIUS server.
err-msg-service-initializing       = "The service is initializing, please try again later."

# The customer did not provide a username.
err-msg-missing-username   = "You did not provide a username."

# The CN3xxx could not authenticate the customer because no reply was received from the RADIUS
server.
# The network may be down or the server itself may be down.
err-msg-login-timeout      = "You cannot be logged in at this time. Please try again later."

# The CN3xxx could not authenticate the customer because there is no RADIUS server spcified in
the
# the configuration. In the management, go to the Security > Radius page and enter the address
of your RADIUS Server.
err-msg-missing-aaa-servers= "Incomplete configuration: You must configure at least one RADIUS
Server."

# This only occurs when the CN3xxx is not able to reach the RADIUS servers anymore to
authenticate the customers.
err-msg-lost-service       = "The Service is down, please try again later."

# Messages returned by GetSessionStateMessage();

# The customer is logged in. (MAC address has been verified.)
stat-logged-in     = "Logged in."

# The customer's computer is not replying to ARP request or has changed its MAC address.
stat-lost-carrier = "Logged out. Computer was unreachable."

# The customer's session has been idle for too long
stat-idle-timeout = "Logged out. (Idle timeout.)"
```

```
# The customer has exhausted the available session time.
stat-session-timeout  = "Logged out. (Reached the session time limit.)"

# User was logged out due to administrator termination
stat-admin-reset = "Logged out. (Administrator terminated the session.)"
# The network authentication software is down.
stat-nas-is-rebooting = "The network service is currently unavailable."

# The customer has already logged out.
stat-logged-out = "Already logged out."

# Pending login in request
stat-logging-in = "Your login request is pending. Please wait."

# Pending login out request
stat-logging-out = "Your logout request is pending. Please wait."

# The customer's session exceeded its quotas
stat-quota-exceeded= "Logged out. (Quota Exceeded.)"
```