

The following table is a summary for subnet planning on a network with a 16-bit network number.

**Table 72** 16-bit Network Number Subnet Planning

NO. "BORROWED" HOST BITS	SUBNET MASK	NO. SUBNETS	NO. HOSTS PER SUBNET
1	255.255.128.0 (/17)	2	32766
2	255.255.192.0 (/18)	4	16382
3	255.255.224.0 (/19)	8	8190
4	255.255.240.0 (/20)	16	4094
5	255.255.248.0 (/21)	32	2046
6	255.255.252.0 (/22)	64	1022
7	255.255.254.0 (/23)	128	510
8	255.255.255.0 (/24)	256	254
9	255.255.255.128 (/25)	512	126
10	255.255.255.192 (/26)	1024	62
11	255.255.255.224 (/27)	2048	30
12	255.255.255.240 (/28)	4096	14
13	255.255.255.248 (/29)	8192	6
14	255.255.255.252 (/30)	16384	2
15	255.255.255.254 (/31)	32768	1

## Configuring IP Addresses

Where you obtain your network number depends on your particular situation. If the ISP or your network administrator assigns you a block of registered IP addresses, follow their instructions in selecting the IP addresses and the subnet mask.

If the ISP did not explicitly give you an IP network number, then most likely you have a single user account and the ISP will assign you a dynamic IP address when the connection is established. If this is the case, it is recommended that you select a network number from 192.168.0.0 to 192.168.255.0. The Internet Assigned Number Authority (IANA) reserved this block of addresses specifically for private use; please do not use any other number unless you are told otherwise. You must also enable Network Address Translation (NAT) on the WiMAX Device.

Once you have decided on the network number, pick an IP address for your WiMAX Device that is easy to remember (for instance, 192.168.1.1) but make sure that no other device on your network is using that IP address.

The subnet mask specifies the network number portion of an IP address. Your WiMAX Device will compute the subnet mask automatically based on the IP

address that you entered. You don't need to change the subnet mask computed by the WiMAX Device unless you are instructed to do otherwise.

## Private IP Addresses

Every machine on the Internet must have a unique address. If your networks are isolated from the Internet (running only between two branch offices, for example) you can assign any IP addresses to the hosts without problems. However, the Internet Assigned Numbers Authority (IANA) has reserved the following three blocks of IP addresses specifically for private networks:

- 10.0.0.0 — 10.255.255.255
- 172.16.0.0 — 172.31.255.255
- 192.168.0.0 — 192.168.255.255

You can obtain your IP address from the IANA, from an ISP, or it can be assigned from a private network. If you belong to a small organization and your Internet access is through an ISP, the ISP can provide you with the Internet addresses for your local networks. On the other hand, if you are part of a much larger organization, you should consult your network administrator for the appropriate IP addresses.

Regardless of your particular situation, do not create an arbitrary IP address; always follow the guidelines above. For more information on address assignment, please refer to RFC 1597, Address Allocation for Private Internets and RFC 1466, Guidelines for Management of IP Address Space.

## IP Address Conflicts

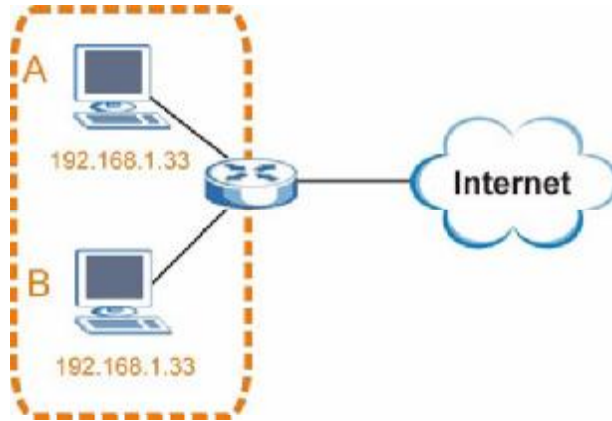
Each device on a network must have a unique IP address. Devices with duplicate IP addresses on the same network will not be able to access the Internet or other resources. The devices may also be unreachable through the network.

### Conflicting Computer IP Addresses Example

More than one device can not use the same IP address. In the following example computer **A** has a static (or fixed) IP address that is the same as the IP address that a DHCP server assigns to computer **B** which is a DHCP client. Neither can access the Internet. This problem can be solved by assigning a different static IP

address to computer **A** or setting computer **A** to obtain an IP address automatically.

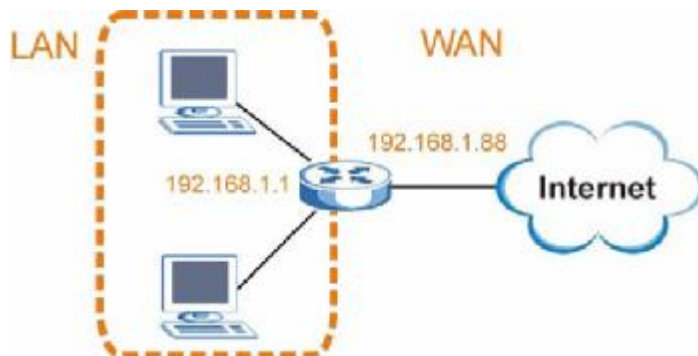
**Figure 122** Conflicting Computer IP Addresses Example



### Conflicting Router IP Addresses Example

Since a router connects different networks, it must have interfaces using different network numbers. For example, if a router is set between a LAN and the Internet (WAN), the router's LAN and WAN addresses must be on different subnets. In the following example, the LAN and WAN are on the same subnet. The LAN computers cannot access the Internet because the router cannot route between networks.

**Figure 123** Conflicting Computer IP Addresses Example

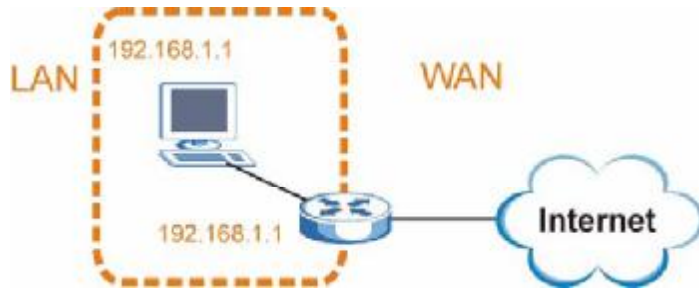


### Conflicting Computer and Router IP Addresses Example

More than one device can not use the same IP address. In the following example, the computer and the router's LAN port both use 192.168.1.1 as the IP address.

The computer cannot access the Internet. This problem can be solved by assigning a different IP address to the computer or the router's LAN port.

**Figure 124** Conflicting Computer and Router IP Addresses Example



# Importing Certificates

This appendix shows you how to import public key certificates into your web browser.

Public key certificates are used by web browsers to ensure that a secure web site is legitimate. When a certificate authority such as VeriSign, Comodo, or Network Solutions, to name a few, receives a certificate request from a website operator, they confirm that the web domain and contact information in the request match those on public record with a domain name registrar. If they match, then the certificate is issued to the website operator, who then places it on the site to be issued to all visiting web browsers to let them know that the site is legitimate.

Many ZyXEL products, such as the NSA-2401, issue their own public key certificates. These can be used by web browsers on a LAN or WAN to verify that they are in fact connecting to the legitimate device and not one masquerading as it. However, because the certificates were not issued by one of the several organizations officially recognized by the most common web browsers, you will need to import the ZyXEL-created certificate into your web browser and flag that certificate as a trusted authority.

Note: You can see if you are browsing on a secure website if the URL in your web browser's address bar begins with `https://` or there is a sealed padlock icon (  ) somewhere in the main browser window (not all browsers show the padlock in the same location.)

In this appendix, you can import a public key certificate for:

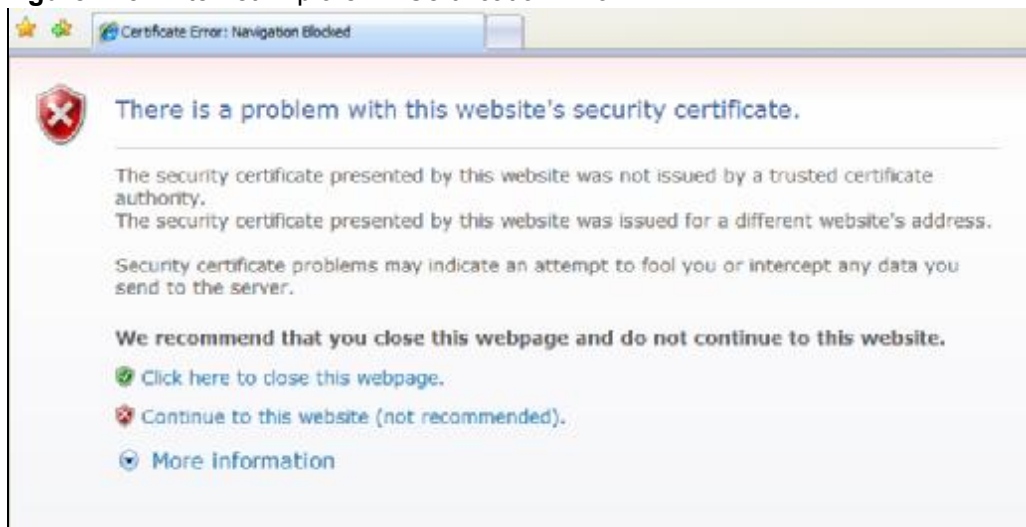
- Internet Explorer on [page 206](#)
- Firefox on [page 216](#)
- Opera on [page 222](#)
- Konqueror on [page 230](#)

## Internet Explorer

The following example uses Microsoft Internet Explorer 7 on Windows XP Professional; however, they can also apply to Internet Explorer on Windows Vista.

- 1 If your device's web configurator is set to use SSL certification, then the first time you browse to it you are presented with a certification error.

**Figure 125** Internet Explorer 7: Certification Error



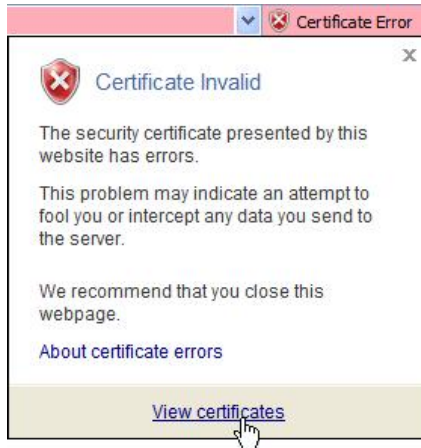
- 2 Click **Continue to this website (not recommended)**.

**Figure 126** Internet Explorer 7: Certification Error



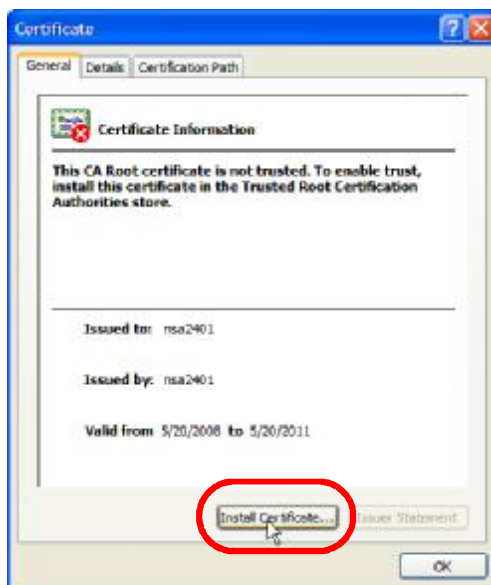
- 3 In the **Address Bar**, click **Certificate Error** > **View certificates**.

**Figure 127** Internet Explorer 7: Certificate Error



- 4 In the **Certificate** dialog box, click **Install Certificate**.

**Figure 128** Internet Explorer 7: Certificate



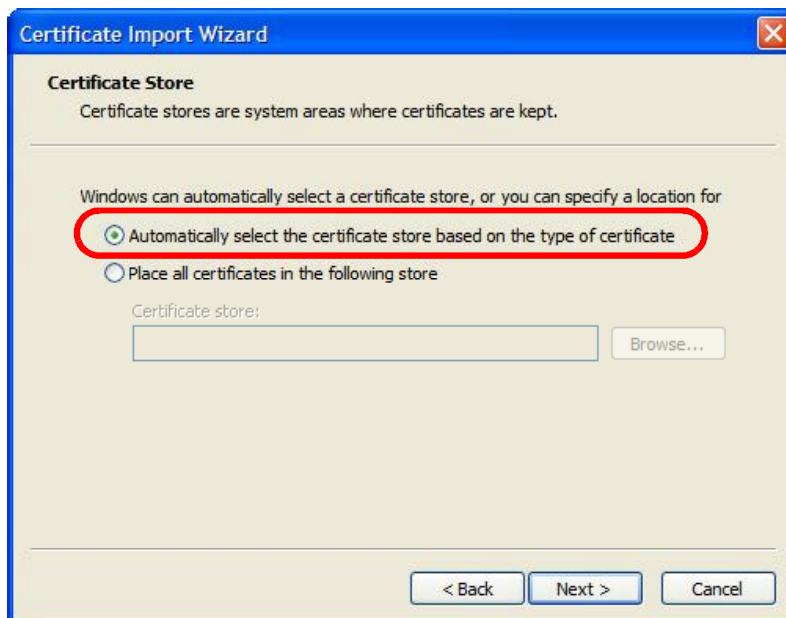
- 5 In the **Certificate Import Wizard**, click **Next**.

**Figure 129** Internet Explorer 7: Certificate Import Wizard



- 6 If you want Internet Explorer to **Automatically select certificate store based on the type of certificate**, click **Next** again and then go to step 9.

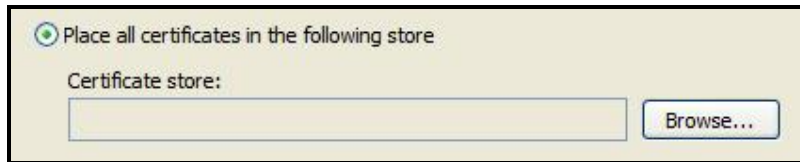
**Figure 130** Internet Explorer 7: Certificate Import Wizard





- 7 Otherwise, select **Place all certificates in the following store** and then click **Browse**.

**Figure 131** Internet Explorer 7: Certificate Import Wizard



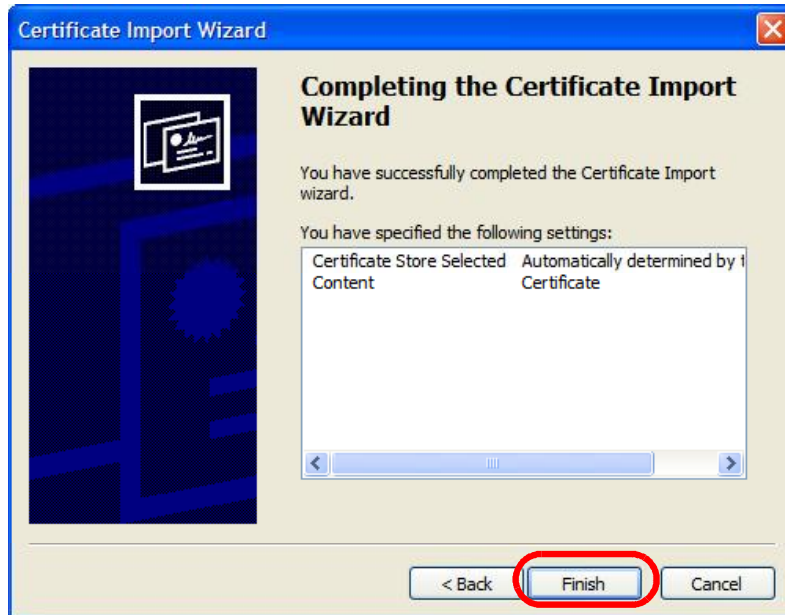
- 8 In the **Select Certificate Store** dialog box, choose a location in which to save the certificate and then click **OK**.

**Figure 132** Internet Explorer 7: Select Certificate Store



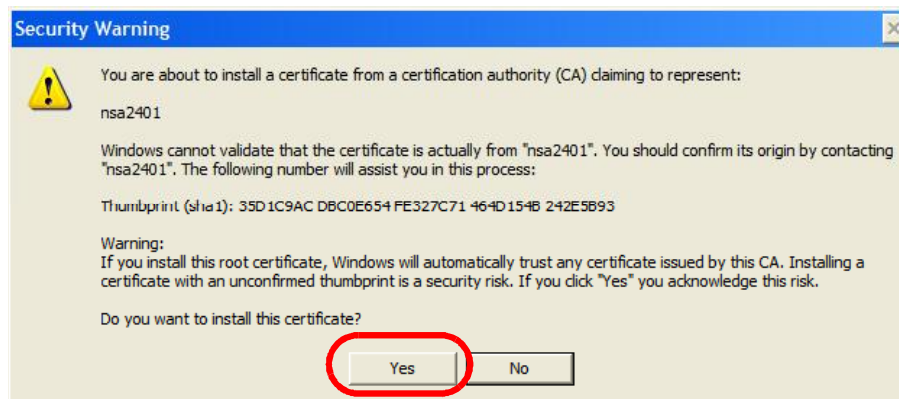
- 9 In the **Completing the Certificate Import Wizard** screen, click **Finish**.

**Figure 133** Internet Explorer 7: Certificate Import Wizard



- 10 If you are presented with another **Security Warning**, click **Yes**.

**Figure 134** Internet Explorer 7: Security Warning



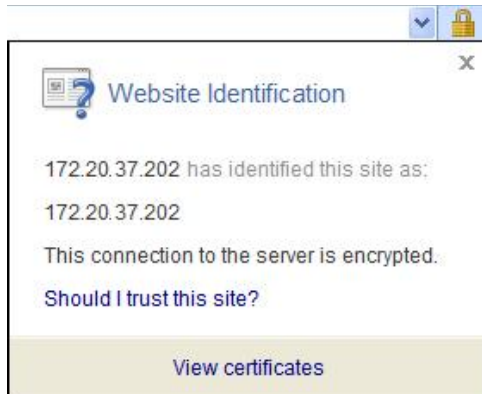
- 11 Finally, click **OK** when presented with the successful certificate installation message.

**Figure 135** Internet Explorer 7: Certificate Import Wizard



- 12 The next time you start Internet Explorer and go to a ZyXEL web configurator page, a sealed padlock icon appears in the address bar. Click it to view the page's **Website Identification** information.

**Figure 136** Internet Explorer 7: Website Identification



## Installing a Stand-Alone Certificate File in Internet Explorer

Rather than browsing to a ZyXEL web configurator and installing a public key certificate when prompted, you can install a stand-alone certificate file if one has been issued to you.

- 1 Double-click the public key certificate file.

**Figure 137** Internet Explorer 7: Public Key Certificate File



- 2 In the security warning dialog box, click **Open**.

**Figure 138** Internet Explorer 7: Open File - Security Warning



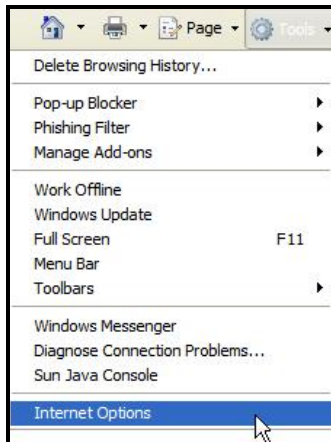
- 3 Refer to steps 4-12 in the Internet Explorer procedure beginning on [page 206](#) to complete the installation process.

## Removing a Certificate in Internet Explorer

This section shows you how to remove a public key certificate in Internet Explorer 7.

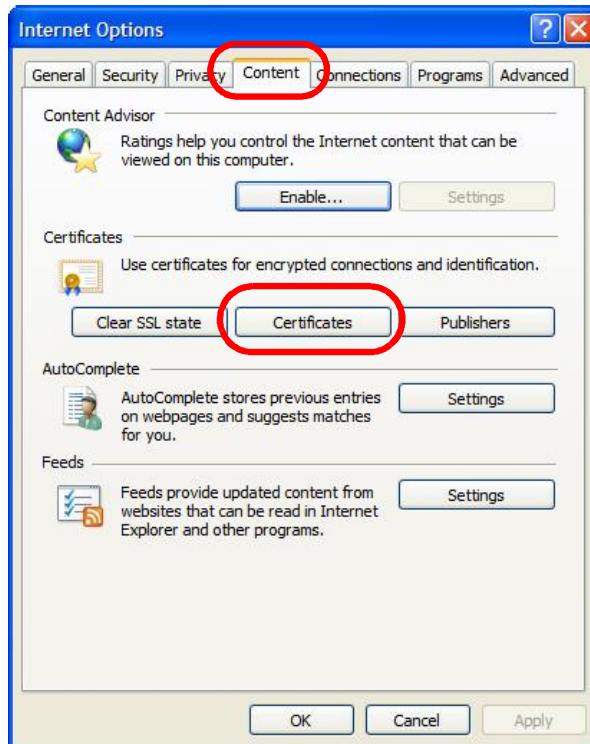
- 1 Open **Internet Explorer** and click **TOOLS > Internet Options**.

**Figure 139** Internet Explorer 7: Tools Menu



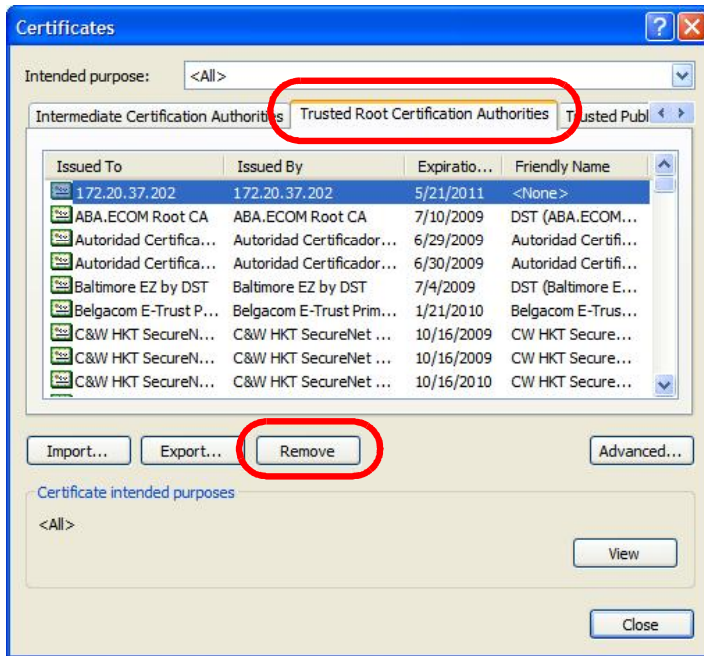
- 2 In the **Internet Options** dialog box, click **Content > Certificates**.

**Figure 140** Internet Explorer 7: Internet Options



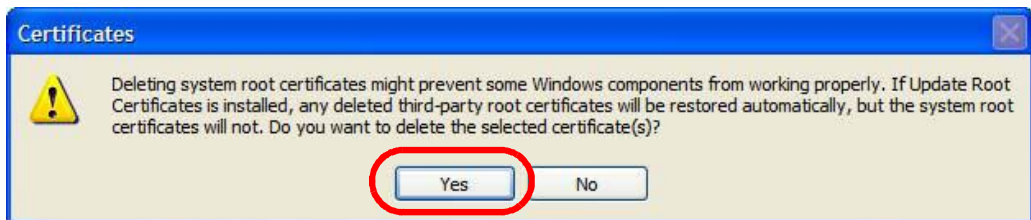
- 3 In the **Certificates** dialog box, click the **Trusted Root Certification Authorities** tab, select the certificate that you want to delete, and then click **Remove**.

**Figure 141** Internet Explorer 7: Certificates



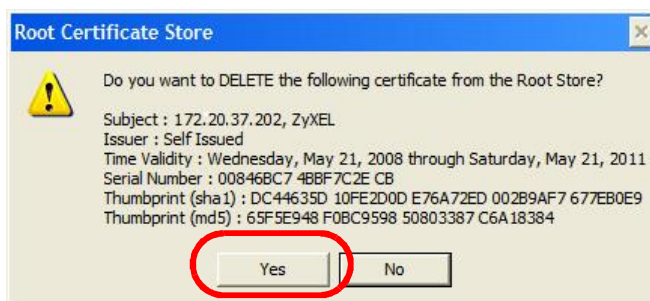
- 4 In the **Certificates** confirmation, click **Yes**.

**Figure 142** Internet Explorer 7: Certificates



- 5 In the **Root Certificate Store** dialog box, click **Yes**.

**Figure 143** Internet Explorer 7: Root Certificate Store



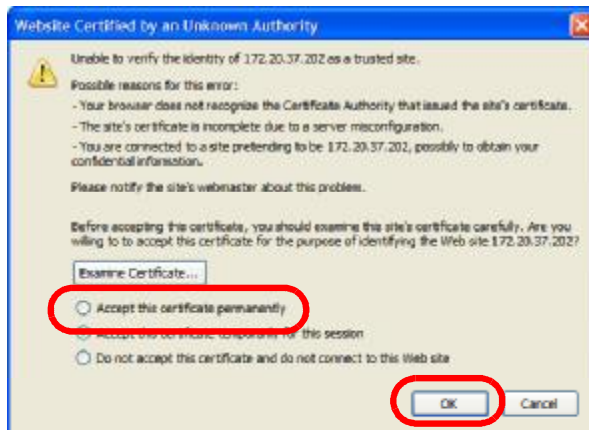
- 6 The next time you go to the web site that issued the public key certificate you just removed, a certification error appears.

## Firefox

The following example uses Mozilla Firefox 2 on Windows XP Professional; however, the screens can also apply to Firefox 2 on all platforms.

- 1 If your device's web configurator is set to use SSL certification, then the first time you browse to it you are presented with a certification error.
- 2 Select **Accept this certificate permanently** and click **OK**.

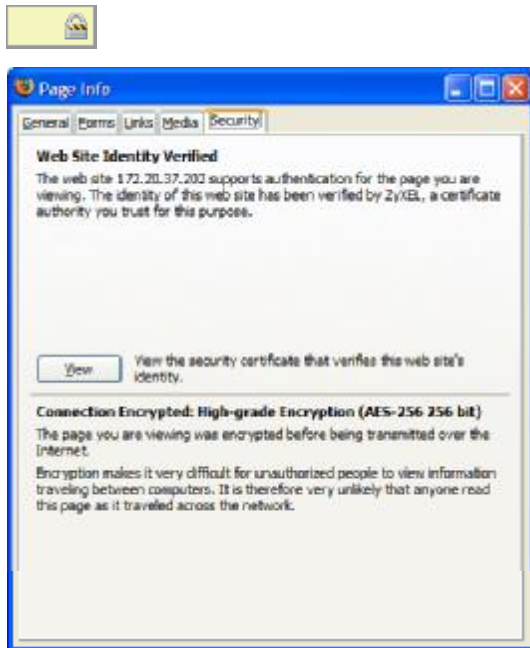
**Figure 144** Firefox 2: Website Certified by an Unknown Authority





- 3 The certificate is stored and you can now connect securely to the web configurator. A sealed padlock appears in the address bar, which you can click to open the **Page Info > Security** window to view the web page's security information.

**Figure 145** Firefox 2: Page Info

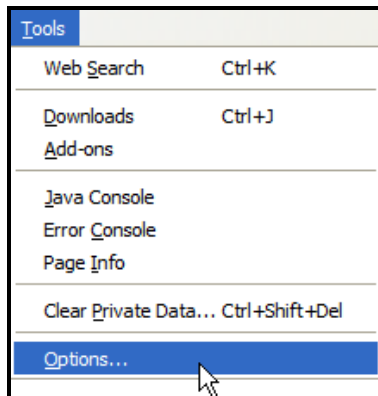


## Installing a Stand-Alone Certificate File in Firefox

Rather than browsing to a ZyXEL web configurator and installing a public key certificate when prompted, you can install a stand-alone certificate file if one has been issued to you.

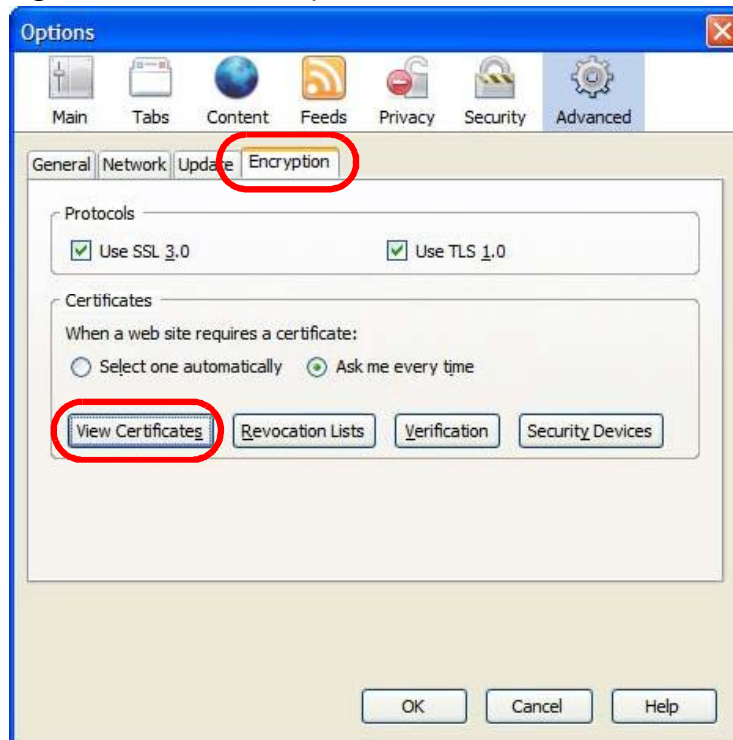
- 1 Open **Firefox** and click **TOOLS > Options**.

**Figure 146** Firefox 2: Tools Menu



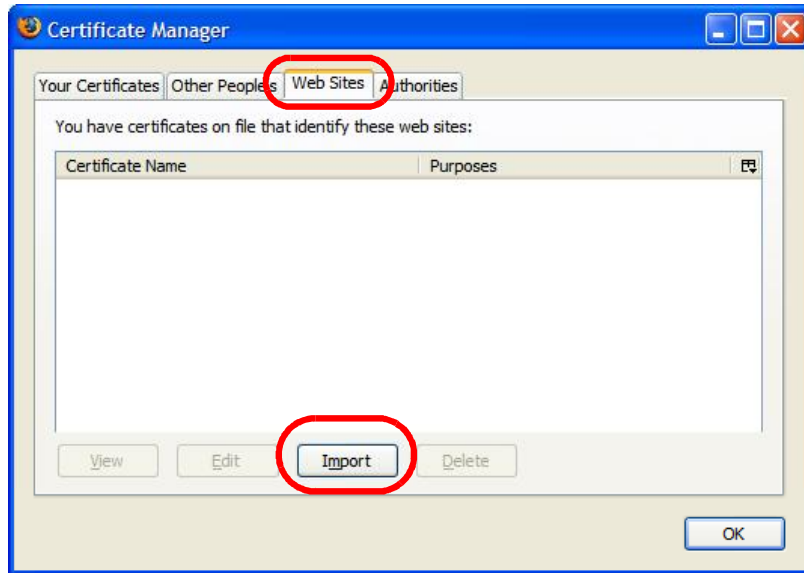
- 2 In the **Options** dialog box, click **ADVANCED > Encryption > View Certificates**.

**Figure 147** Firefox 2: Options



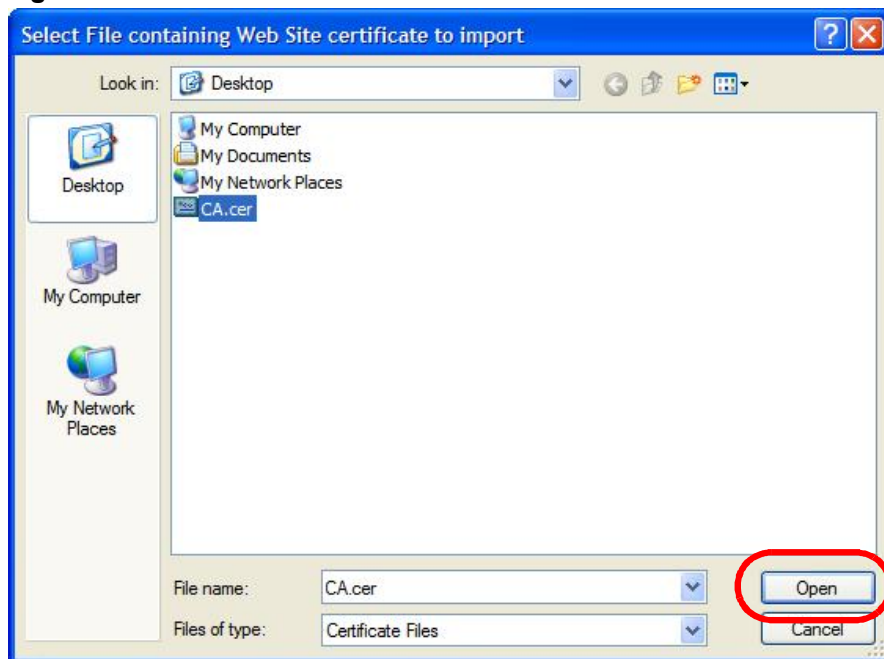
- 3 In the **Certificate Manager** dialog box, click **Web Sites** > **Import**.

**Figure 148** Firefox 2: Certificate Manager



- 4 Use the **Select File** dialog box to locate the certificate and then click **Open**.

**Figure 149** Firefox 2: Select File



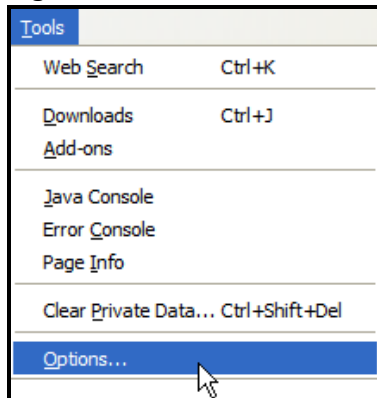
- 5 The next time you visit the web site, click the padlock in the address bar to open the **Page Info** > **Security** window to see the web page's security information.

## Removing a Certificate in Firefox

This section shows you how to remove a public key certificate in Firefox 2.

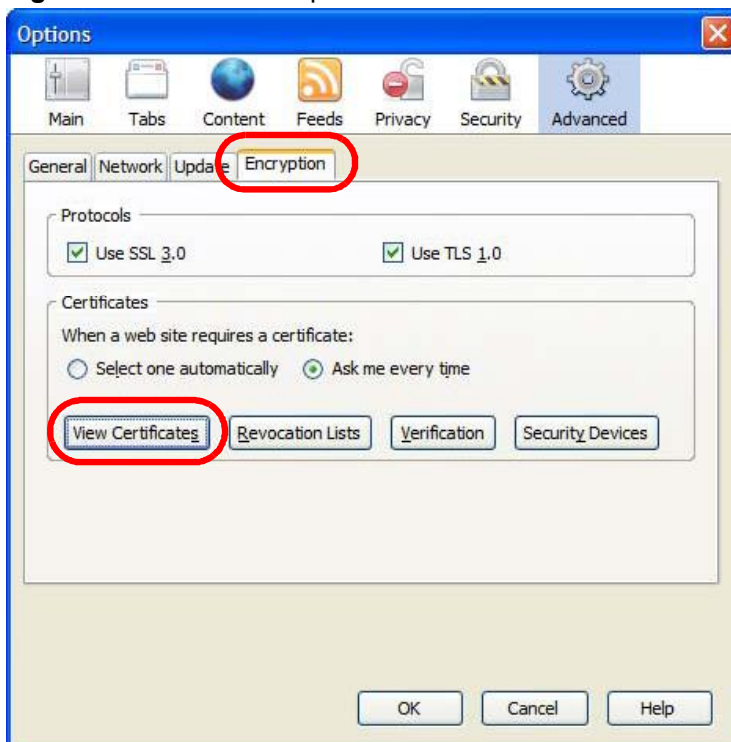
- 1 Open **Firefox** and click **TOOLS > Options**.

**Figure 150** Firefox 2: Tools Menu



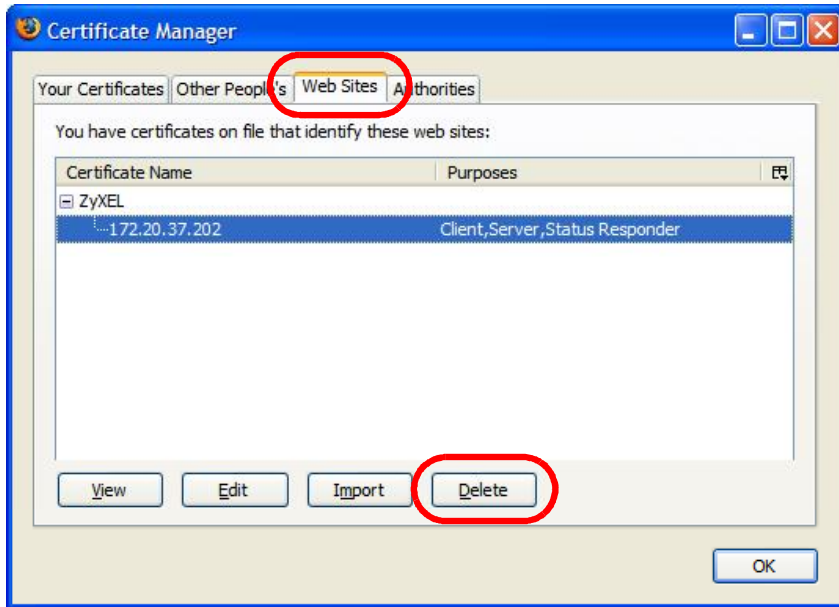
- 2 In the **Options** dialog box, click **ADVANCED > Encryption > View Certificates**.

**Figure 151** Firefox 2: Options



- 3 In the **Certificate Manager** dialog box, select the **Web Sites** tab, select the certificate that you want to remove, and then click **Delete**.

**Figure 152** Firefox 2: Certificate Manager



- 4 In the **Delete Web Site Certificates** dialog box, click **OK**.

**Figure 153** Firefox 2: Delete Web Site Certificates



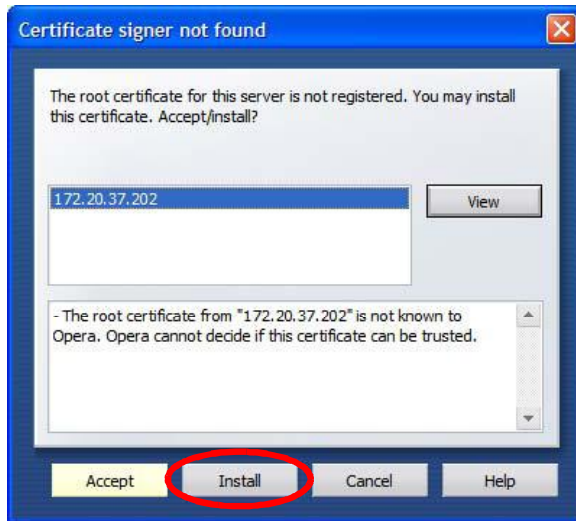
- 5 The next time you go to the web site that issued the public key certificate you just removed, a certification error appears.

## Opera

The following example uses Opera 9 on Windows XP Professional; however, the screens can apply to Opera 9 on all platforms.

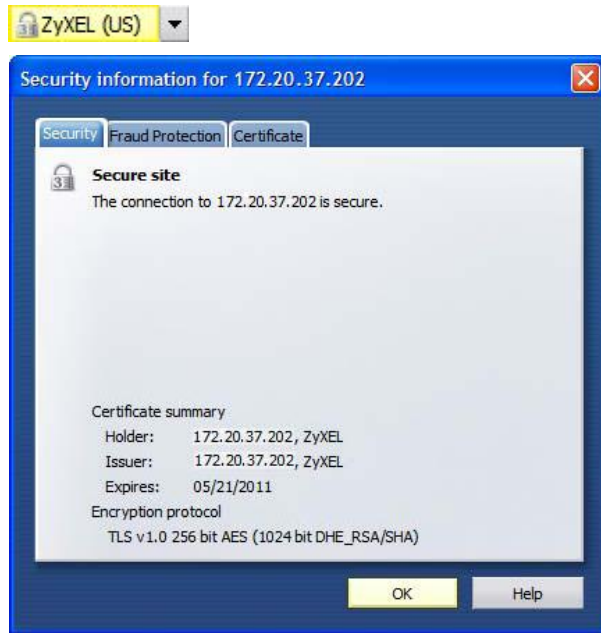
- 1 If your device's web configurator is set to use SSL certification, then the first time you browse to it you are presented with a certification error.
- 2 Click **Install** to accept the certificate.

**Figure 154** Opera 9: Certificate signer not found



- 3 The next time you visit the web site, click the padlock in the address bar to open the **Security information** window to view the web page's security details.

**Figure 155** Opera 9: Security information

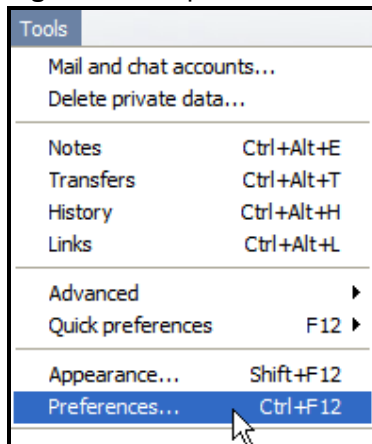


## Installing a Stand-Alone Certificate File in Opera

Rather than browsing to a ZyXEL web configurator and installing a public key certificate when prompted, you can install a stand-alone certificate file if one has been issued to you.

- 1 Open **Opera** and click **TOOLS > Preferences**.

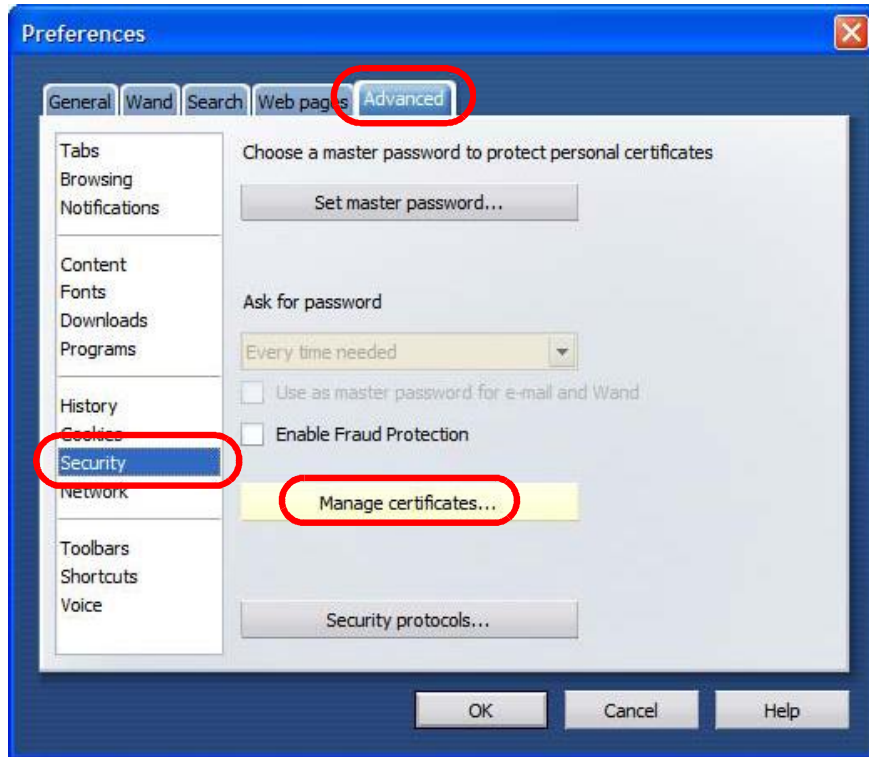
**Figure 156** Opera 9: Tools Menu





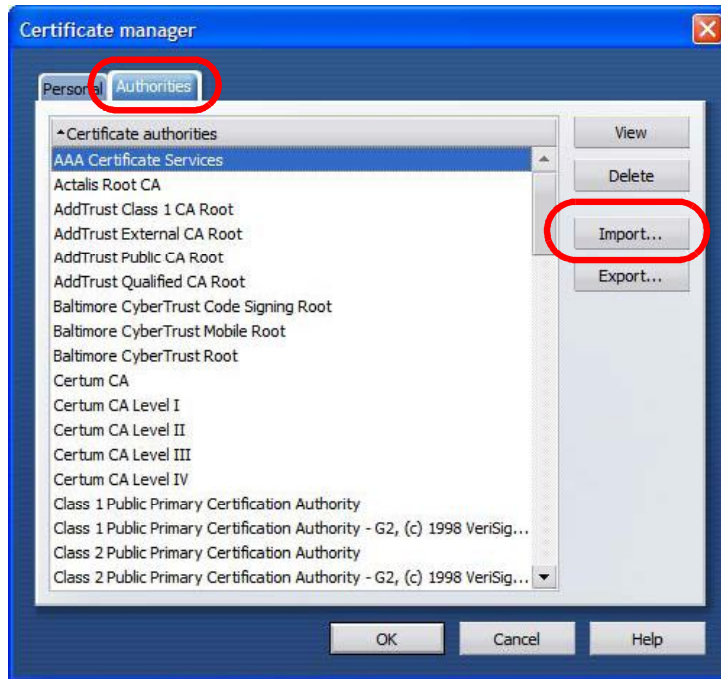
- 2 In **Preferences**, click **ADVANCED > Security > Manage certificates**.

**Figure 157** Opera 9: Preferences



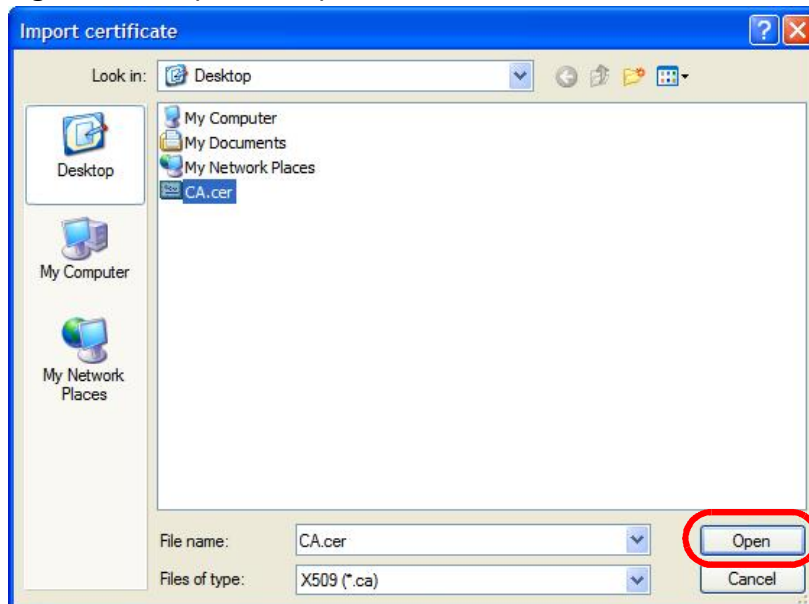
- 3 In the **Certificates Manager**, click **Authorities > Import**.

**Figure 158** Opera 9: Certificate manager



- 4 Use the **Import certificate** dialog box to locate the certificate and then click **Open**.

**Figure 159** Opera 9: Import certificate



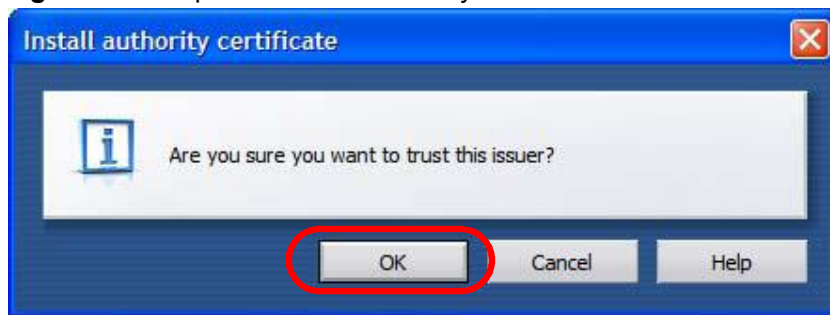
- 5 In the **Install authority certificate** dialog box, click **Install**.

**Figure 160** Opera 9: Install authority certificate



- 6 Next, click **OK**.

**Figure 161** Opera 9: Install authority certificate



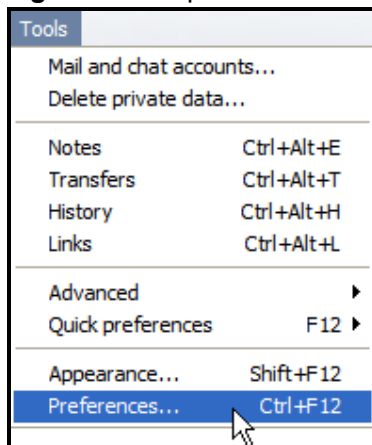
- 7 The next time you visit the web site, click the padlock in the address bar to open the **Security information** window to view the web page's security details.

## Removing a Certificate in Opera

This section shows you how to remove a public key certificate in Opera 9.

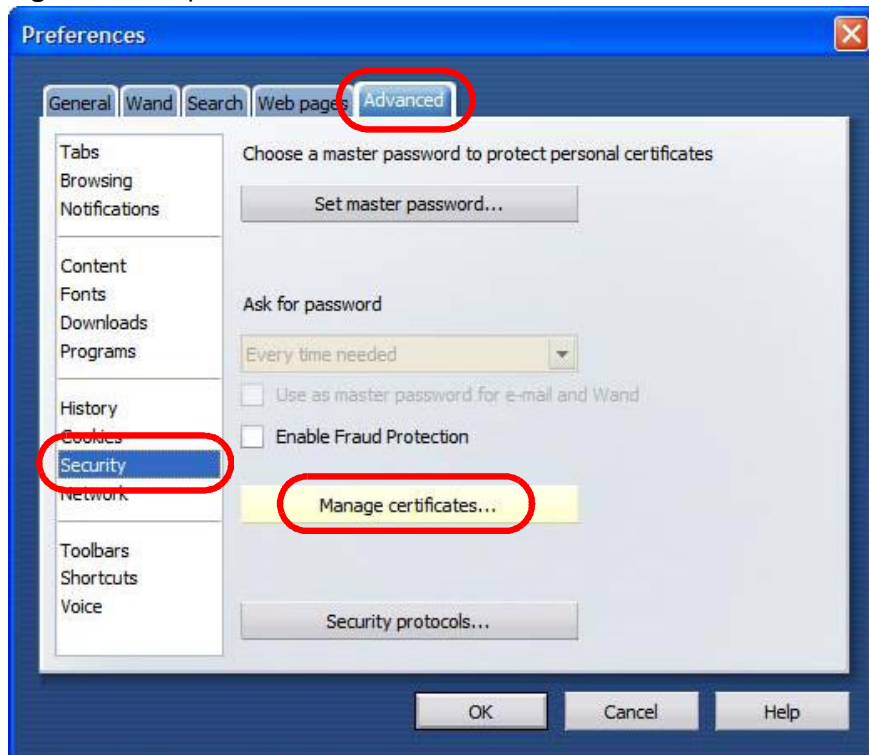
- 1 Open **Opera** and click **TOOLS > Preferences**.

**Figure 162** Opera 9: Tools Menu



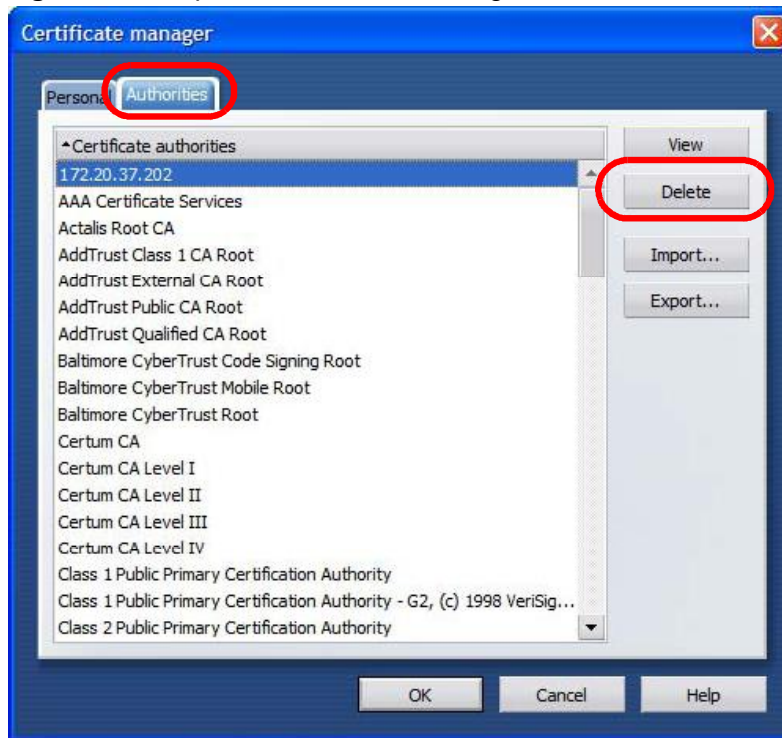
- 2 In **Preferences, ADVANCED > Security > Manage certificates**.

**Figure 163** Opera 9: Preferences



- 3 In the **Certificates manager**, select the **Authorities** tab, select the certificate that you want to remove, and then click **Delete**.

**Figure 164** Opera 9: Certificate manager



- 4 The next time you go to the web site that issued the public key certificate you just removed, a certification error appears.

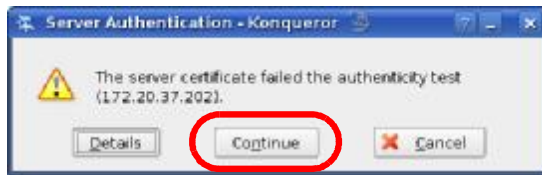
Note: There is no confirmation when you delete a certificate authority, so be absolutely certain that you want to go through with it before clicking the button.

## Konqueror

The following example uses Konqueror 3.5 on openSUSE 10.3, however the screens apply to Konqueror 3.5 on all Linux KDE distributions.

- 1 If your device's web configurator is set to use SSL certification, then the first time you browse to it you are presented with a certification error.
- 2 Click **Continue**.

**Figure 165** Konqueror 3.5: Server Authentication



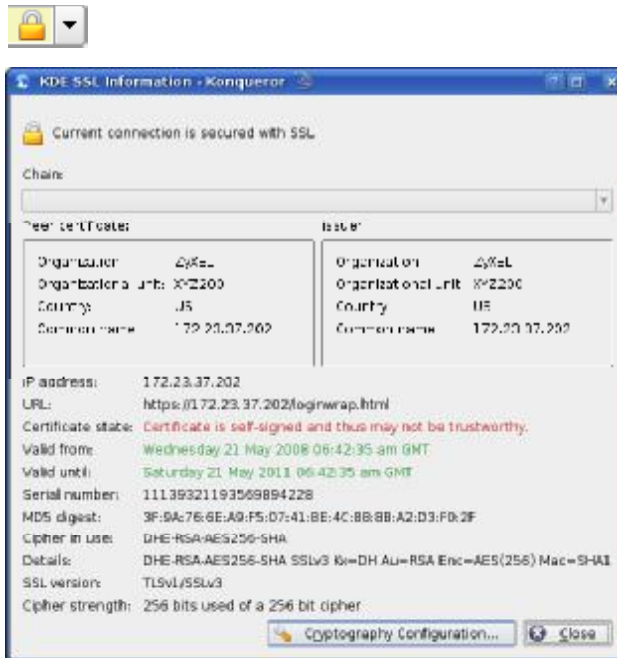
- 3 Click **Forever** when prompted to accept the certificate.

**Figure 166** Konqueror 3.5: Server Authentication



- 4 Click the padlock in the address bar to open the **KDE SSL Information** window and view the web page's security details.

**Figure 167** Konqueror 3.5: KDE SSL Information



## Installing a Stand-Alone Certificate File in Konqueror

Rather than browsing to a ZyXEL web configurator and installing a public key certificate when prompted, you can install a stand-alone certificate file if one has been issued to you.

- 1 Double-click the public key certificate file.

**Figure 168** Konqueror 3.5: Public Key Certificate File



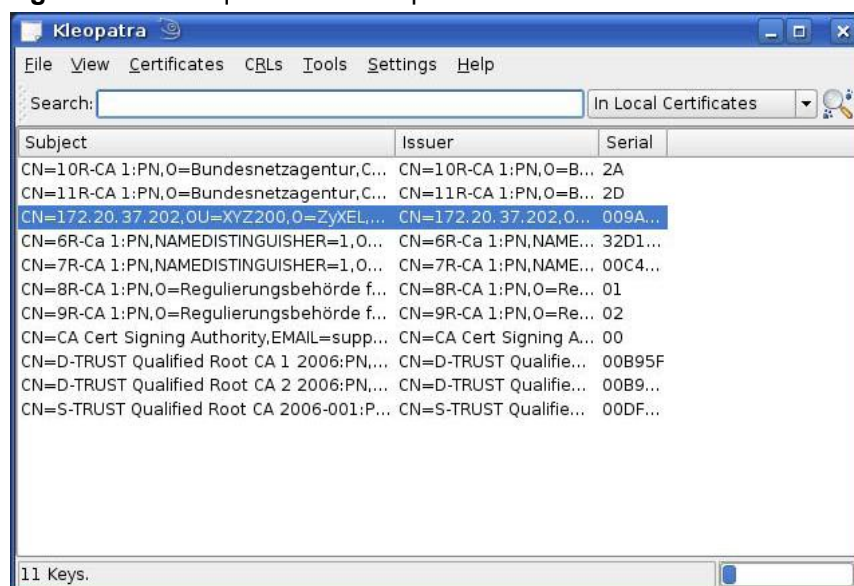
- 2 In the **Certificate Import Result - Kleopatra** dialog box, click **OK**.

**Figure 169** Konqueror 3.5: Certificate Import Result



The public key certificate appears in the KDE certificate manager, **Kleopatra**.

**Figure 170** Konqueror 3.5: Kleopatra





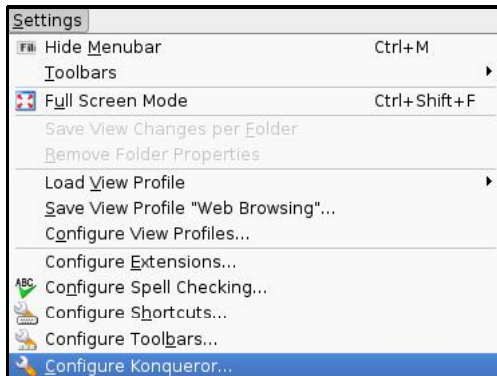
- 3 The next time you visit the web site, click the padlock in the address bar to open the **KDE SSL Information** window to view the web page's security details.

## Removing a Certificate in Konqueror

This section shows you how to remove a public key certificate in Konqueror 3.5.

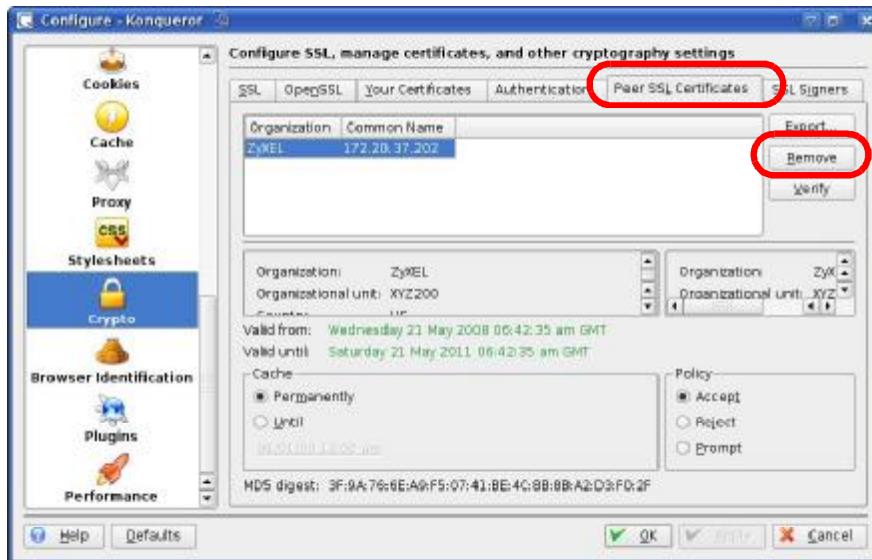
- 1 Open **Konqueror** and click **Settings > Configure Konqueror**.

**Figure 171** Konqueror 3.5: Settings Menu



- 2 In the **Configure** dialog box, select **Crypto**.
- 3 On the **Peer SSL Certificates** tab, select the certificate you want to delete and then click **Remove**.

**Figure 172** Konqueror 3.5: Configure



- 4 The next time you go to the web site that issued the public key certificate you just removed, a certification error appears.

Note: There is no confirmation when you remove a certificate authority, so be absolutely certain you want to go through with it before clicking the button.



## Common Services

The following table lists some commonly-used services and their associated protocols and port numbers. For a comprehensive list of port numbers, ICMP type/code numbers and services, visit the IANA (Internet Assigned Number Authority) web site.

- **Name:** This is a short, descriptive name for the service. You can use this one or create a different one, if you like.
- **Protocol:** This is the type of IP protocol used by the service. If this is **TCP/UDP**, then the service uses the same port number with TCP and UDP. If this is **USER-DEFINED**, the **Port(s)** is the IP protocol number, not the port number.
- **Port(s):** This value depends on the **Protocol**. Please refer to RFC 1700 for further information about port numbers.
  - If the **Protocol** is **TCP, UDP, or TCP/UDP**, this is the IP port number.
  - If the **Protocol** is **USER**, this is the IP protocol number.
- **Description:** This is a brief explanation of the applications that use this service or the situations in which this service is used.

**Table 73** Commonly Used Services

NAME	PROTOCOL	PORT(S)	DESCRIPTION
AH (IPSEC_TUNNEL)	User-Defined	51	The IPSEC AH (Authentication Header) tunneling protocol uses this service.
AIM/New-ICQ	TCP	5190	AOL's Internet Messenger service. It is also used as a listening port by ICQ.
AUTH	TCP	113	Authentication protocol used by some servers.
BGP	TCP	179	Border Gateway Protocol.
BOOTP_CLIENT	UDP	68	DHCP Client.
BOOTP_SERVER	UDP	67	DHCP Server.
CU-SEEME	TCP UDP	7648 24032	A popular videoconferencing solution from White Pines Software.
DNS	TCP/UDP	53	Domain Name Server, a service that matches web names (for example <a href="http://www.zyxel.com">www.zyxel.com</a> ) to IP numbers.

**Table 73** Commonly Used Services (continued)

NAME	PROTOCOL	PORT(S)	DESCRIPTION
ESP (IPSEC_TUNNEL)	User-Defined	50	The IPSEC ESP (Encapsulation Security Protocol) tunneling protocol uses this service.
FINGER	TCP	79	Finger is a UNIX or Internet related command that can be used to find out if a user is logged on.
FTP	TCP TCP	20 21	File Transfer Program, a program to enable fast transfer of files, including large files that may not be possible by e-mail.
H.323	TCP	1720	NetMeeting uses this protocol.
HTTP	TCP	80	Hyper Text Transfer Protocol - a client/server protocol for the world wide web.
HTTPS	TCP	443	HTTPS is a secured http session often used in e-commerce.
ICMP	User-Defined	1	Internet Control Message Protocol is often used for diagnostic or routing purposes.
ICQ	UDP	4000	This is a popular Internet chat program.
IGMP (MULTICAST)	User-Defined	2	Internet Group Management Protocol is used when sending packets to a specific group of hosts.
IKE	UDP	500	The Internet Key Exchange algorithm is used for key distribution and management.
IRC	TCP/UDP	6667	This is another popular Internet chat program.
MSN Messenger	TCP	1863	Microsoft Networks' messenger service uses this protocol.
NEW-ICQ	TCP	5190	An Internet chat program.
NEWS	TCP	144	A protocol for news groups.
NFS	UDP	2049	Network File System - NFS is a client/server distributed file service that provides transparent file sharing for network environments.
NNTP	TCP	119	Network News Transport Protocol is the delivery mechanism for the USENET newsgroup service.
PING	User-Defined	1	Packet INternet Groper is a protocol that sends out ICMP echo requests to test whether or not a remote host is reachable.
POP3	TCP	110	Post Office Protocol version 3 lets a client computer get e-mail from a POP3 server through a temporary connection (TCP/IP or other).

**Table 73** Commonly Used Services (continued)

NAME	PROTOCOL	PORT(S)	DESCRIPTION
PPTP	TCP	1723	Point-to-Point Tunneling Protocol enables secure transfer of data over public networks. This is the control channel.
PPTP_TUNNEL (GRE)	User-Defined	47	PPTP (Point-to-Point Tunneling Protocol) enables secure transfer of data over public networks. This is the data channel.
RCMD	TCP	512	Remote Command Service.
REAL_AUDIO	TCP	7070	A streaming audio service that enables real time sound over the web.
REXEC	TCP	514	Remote Execution Daemon.
RLOGIN	TCP	513	Remote Login.
RTELNET	TCP	107	Remote Telnet.
RTSP	TCP/UDP	554	The Real Time Streaming (media control) Protocol (RTSP) is a remote control for multimedia on the Internet.
SFTP	TCP	115	Simple File Transfer Protocol.
SMTP	TCP	25	Simple Mail Transfer Protocol is the message-exchange standard for the Internet. SMTP enables you to move messages from one e-mail server to another.
SNMP	TCP/UDP	161	Simple Network Management Program.
SNMP-TRAPS	TCP/UDP	162	Traps for use with the SNMP (RFC:1215).
SQL-NET	TCP	1521	Structured Query Language is an interface to access data on many different types of database systems, including mainframes, midrange systems, UNIX systems and network servers.
SSH	TCP/UDP	22	Secure Shell Remote Login Program.
STRM WORKS	UDP	1558	Stream Works Protocol.
SYSLOG	UDP	514	Syslog allows you to send system logs to a UNIX server.
TACACS	UDP	49	Login Host Protocol used for (Terminal Access Controller Access Control System).
TELNET	TCP	23	Telnet is the login and terminal emulation protocol common on the Internet and in UNIX environments. It operates over TCP/IP networks. Its primary function is to allow users to log into remote host systems.

**Table 73** Commonly Used Services (continued)

NAME	PROTOCOL	PORT(S)	DESCRIPTION
TFTP	UDP	69	Trivial File Transfer Protocol is an Internet file transfer protocol similar to FTP, but uses the UDP (User Datagram Protocol) rather than TCP (Transmission Control Protocol).
VDOLIVE	TCP	7000	Another videoconferencing solution.





# Legal Information

## Copyright

Copyright © 2011 by ZyXEL Communications Corporation.

The contents of this publication may not be reproduced in any part or as a whole, transcribed, stored in a retrieval system, translated into any language, or transmitted in any form or by any means, electronic, mechanical, magnetic, optical, chemical, photocopying, manual, or otherwise, without the prior written permission of ZyXEL Communications Corporation.

Published by ZyXEL Communications Corporation. All rights reserved.

## Disclaimers

ZyXEL does not assume any liability arising out of the application or use of any products, or software described herein. Neither does it convey any license under its patent rights nor the patent rights of others. ZyXEL further reserves the right to make changes in any products described herein without notice. This publication is subject to change without notice.

Your use of the WiMAX Device is subject to the terms and conditions of any related service providers.

Do not use the WiMAX Device for illegal purposes. Illegal downloading or sharing of files can result in severe civil and criminal penalties. You are subject to the restrictions of copyright laws and any other applicable laws, and will bear the consequences of any infringements thereof. ZyXEL bears NO responsibility or liability for your use of the download service feature.

## Trademarks

Trademarks mentioned in this publication are used for identification purposes only and may be properties of their respective owners.

## Certifications

### Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

#### **IMPORTANT NOTE:**

##### **Radiation Exposure Statement:**

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

注意！

### **Notices**

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

### **Viewing Certifications**

- 1 Go to <http://www.zyxel.com>.
- 2 Select your product on the ZyXEL home page to go to that product's page.
- 3 Select the certification you wish to view from this page.

## **ZyXEL Limited Warranty**

ZyXEL warrants to the original end user (purchaser) that this product is free from any defects in materials or workmanship for a period of up to two years from the date of purchase. During the warranty period, and upon proof of purchase, should the product have indications of failure due to faulty workmanship and/or materials, ZyXEL will, at its discretion, repair or replace the defective products or components without charge for either parts or labor, and to whatever extent it shall deem necessary to restore the product or components to proper operating condition. Any replacement will consist of a new or re-manufactured functionally equivalent product of equal or higher value, and will be solely at the discretion of ZyXEL. This warranty shall not apply if the product has been modified, misused, tampered with, damaged by an act of God, or subjected to abnormal working conditions.

**Note**

Repair or replacement, as provided under this warranty, is the exclusive remedy of the purchaser. This warranty is in lieu of all other warranties, express or implied, including any implied warranty of merchantability or fitness for a particular use or purpose. ZyXEL shall in no event be held liable for indirect or consequential damages of any kind to the purchaser.

To obtain the services of this warranty, contact your vendor. You may also refer to the warranty policy for the region in which you bought the device at [http://www.zyxel.com/web/support\\_warranty\\_info.php](http://www.zyxel.com/web/support_warranty_info.php).

**Registration**

Register your product online to receive e-mail notices of firmware upgrades and information at [www.zyxel.com](http://www.zyxel.com).

# Index

## A

AAA [58](#)  
accounting server  
  see AAA  
activity [58](#)  
Advanced Encryption Standard  
  see AES  
AES [153](#)  
ALG [80](#)  
alternative subnet mask notation [196](#)  
Application Layer Gateway  
  see ALG  
authentication [58](#), [151](#)  
  inner [154](#)  
  key  
  server [58](#)  
  types [154](#)  
authorization [151](#)  
  request and reply [153](#)  
  server [58](#)  
auto-discovery  
  UPnP [100](#)

## B

base station  
  see BS  
BS [57–58](#)  
  links [58](#)

## C

CA [59](#), [60](#)  
CBC-MAC [153](#)  
CCMP [151](#), [153](#)  
cell [57](#)  
certificates [151](#)

CA [59](#)  
  formats [60](#)  
  verification [153](#)  
certification  
  notices [243](#)  
  viewing [243](#)  
Certification Authority, see CA  
chaining [153](#)  
chaining message authentication  
  see CCMP  
CMAC  
  see MAC  
copyright [241](#)  
counter mode  
  see CCMP  
coverage area [57](#)  
cryptography [151](#)

## D

data [151–153](#)  
  decryption [151](#)  
  encryption [151](#)  
  flow [153](#)  
DHCP [77](#)  
  server [77](#)  
diameter [58](#)  
digital ID [60](#), [151](#)  
Dynamic Host Configuration Protocol  
  see DHCP

## E

EAP [58](#)  
EAP (Extensible Authentication Protocol) [60](#)  
EAP-TLS [60](#)  
EAP-TTLS [60](#)  
encryption [151–153](#)

traffic [153](#)  
Ethernet  
  encapsulation [79](#)  
Extensible Authorization Protocol  
  see EAP

## F

FCC interference statement [242](#)  
firewall [107](#)  
FTP [113](#)  
  restrictions [113](#)

## I

IANA [202](#)  
identity [58](#), [151](#)  
idle timeout [114](#)  
IEEE 802.16 [57](#), [151](#)  
IEEE 802.16e [57](#)  
IGD 1.0 [81](#)  
inner authentication [154](#)  
Internet  
  access [58](#)  
  gateway device [81](#)  
Internet Assigned Numbers Authority  
  see IANA [202](#)  
interoperability [57](#)

## K

key [151](#)  
  request and reply [153](#)

## M

MAC [153](#)  
MAN [57](#)  
Management Information Base (MIB) [116](#)  
Message Authentication Code

  see MAC  
message integrity [153](#)  
Metropolitan Area Network  
  see MAN  
microwave [57](#), [58](#)  
mobile station  
  see MS  
MS [58](#)

## N

NAT [201](#)  
  and remote management [114](#)  
  server sets [79](#)  
  traversal [81](#)  
network  
  activity [58](#)  
  services [58](#)

## P

pattern-spotting [153](#)  
PKMv2 [58](#), [151](#), [154](#)  
plain text encryption [153](#)  
Privacy Key Management  
  see PKM  
private key [151](#)  
product registration [244](#)  
public certificate [153](#)  
public key [151](#)

## R

RADIUS [58](#), [60](#), [152](#)  
  Message Types [152](#)  
  Messages [152](#)  
  Shared Secret Key [152](#)  
registration  
  product [244](#)  
related documentation [3](#)  
remote management and NAT [114](#)  
remote management limitations [113](#)

**S**

safety warnings [7](#)  
secure communication [151](#)  
secure connection [58](#)  
security [151](#)  
security association [153](#)  
    see SA  
services [58](#)  
SIP  
    ALG [80](#)  
    Application Layer Gateway, see ALG  
SNMP [114](#)  
    manager [116](#)  
SS [57](#), [58](#)  
subnet [193](#)  
    mask [194](#)  
subnetting [196](#)  
subscriber station  
    see SS  
syntax conventions [5](#)  
system timeout [114](#)

**T**

tampering  
TCP/IP configuration [77](#)  
TEK [153](#)  
TFTP restrictions [113](#)  
TLS [151](#)  
transport encryption key  
    see TEK  
transport layer security  
    see TLS  
trigger port forwarding  
    process [95](#)  
TTLS [151](#), [154](#)  
tunneled TLS  
    see TTLS

**U**

unauthorized device [151](#)  
Universal Plug and Play  
    see UPnP  
UPnP [80](#)  
    application [81](#)  
    auto-discovery [100](#)  
    security issues [81](#)  
    Windows XP [98](#)  
user authentication [151](#)

**V**

verification [153](#)

**W**

WiMAX [57–58](#)  
    security [153](#)  
    WiMAX Forum [57](#)  
Wireless Interoperability for Microwave Access  
    see WiMAX  
Wireless Metropolitan Area Network  
    see MAN  
wireless network  
    access [57](#)  
    standard [57](#)  
wireless security [151](#)  
wizard setup [27](#)







