CHAPTER 7

SSC FIPS 140-2 Level 1 Validation

This chapter contains these sections:

Overview

U.S. Federal agencies as well as Canadian government agencies are required to comply with the Federal Information Processing Standards Publication (FIPS) 140-2 when purchasing IT products that contain cryptographic modules. This release of SSC supports a FIPS 140-2 Level 1 module (currently in process for validation with the National Institute of Standards and Technology (NIST) and provides FIPS-compliant IEEE 802.11i (WPA2) security support.

Note FIPS functionality is not supported by the Windows Vista version of SSC.

An administrator can choose to allow enterprise employees to perform one of these operations:

- Connect to only FIPS-compliant networks.
- Connect to other non-FIPS-compliant networks.

This can be achieved by restricting the allowed association and encryption modes and the authentication methods in the policy section of the SSC schema.

The SSC FIPS module supports FIPS approved AES encryption modes including WPA2 Personal (WPA2-PSK) and WPA2 Enterprise (802.1X). The SSC FIPS module also supports EAP methods including EAP-TLS, EAP-PEAP, and EAP-FAST. SSC 5.1.1 enables administrators to support both FIPS-compliant WLAN profiles as well as optional non-compliant configurations such as access to Wi-Fi hotspots with client VPN security enabled.

The administrator is responsible for naming the profile appropriately to indicate whether the network is FIPS enabled.

A fully FIPS-compliant solution requires three components:

- SSC 5.1.1 with the FIPS module
- 3eTI FIPS certified Crypto Kernel Library (CKL) with supported NIC adapter drivers
- A FIPS-compliant network profile configuration created by the network administrator

3eTI FIPS Certified Crypto Kernel Library (CKL)

These NIC adapter chipsets are supported by the 3eTI FIPS certified CKL:

- Intel 2100, 2200, 2915, and 3945 chipsets
- Broadcom: All BCM 43xx chipsets that support driver version 4.100.27.0 or later
- Atheros PCI chipset based NIC adapters, including Cisco AIR-CB21 wireless client adapter cards
- Atheros: 5001, 5004, 5005, AR5211, and AR5212 chipsets

FIPS Integration

To ensure a FIPS-compliant solution, the network administrator is required to set up network profiles that allow only WPA2 handshakes with AES encryption with FIPS-compliant EAP types or WPA2-Personal (Pre-shared key).

The SSC Log Packager utility collects logs of the 3eTI packets.

3eTI CKL Driver Installer

For instructions on how to install the 3eTI FIPS validated CKL with supported drivers, see the "Installing the 3eTI Driver" section on page 7-3.

Additional FIPS Information

For additional FIPS information, refer to the "FIPS 140-2 Level I Compliant Deployment Example" section on page 7-14 and the "Configuring a Single-User Account for FIPS" section on page C-1.

Installing the 3eTI Driver

This section provides instructions for installing the 3eTI FIPS validated Cryptographic Kernel Library (CKL) with supported drivers that integrate with SSC to provide a complete FIPS solution.

Important Notes

1. The 3eTI CKL driver installer is designed to allow only one 3eTI wireless driver to be installed on a system at any given time. A previous driver must be un-installed prior to installing a different type of driver. For a driver of the same type, uninstalling the previous driver is not necessary because the next installation just updates the existing driver.
2. When the hardware is present and installed in the system, the installer updates the corresponding OEM wireless NIC adapter driver with the 3eTI modified driver that supports the 3eTI CKL.

3eTI CKL Driver Installer Overview

The 3eTI CKL driver installer can be started using one of these methods:

- Double-clicking the .exe file—can only be used for normal driver installations in which the NIC adapter is installed in the PC before the installer is run.
- Using the installer command without command-line options—can be used only for normal driver installations.
- Using the installer command with command- line options—can be used for normal and pre-installed driver installations.

When you start the driver installer by double-clicking the .exe file or using the run command without command-line options, the installer performs these operations:

- Detects and installs the 3eTI CKL with a supported NIC adapter driver for FIPS operation.
- If multiple NIC adapters are detected that support the 3eTI CKL, the installer prompts the user for adapter selection.
- If a compatible NIC adapter is not found on the PC, the installer aborts the installation and displays this error message:

  The installer cannot auto-detect a NIC chipset to provide FIPS support. To enforce a pre-installation, you are required to run the installer using the command line. For instructions or further assistance, please contact your network administrator.

Note Pre-installation scenarios are best supported with command-line options that allow the network administrator to specify specific installation options. Pre-installations are typically preformed by a network administrator and not a novice user.

Installer Command and Command-Line Options

The installer supports the following command and command-line options:

3eTI-drv-installer.exe –s –auto Type= XXXX

–s	Used to perform a silent installation without prompting the user.
–auto	Used to perform an intelligent installation, where the installer determines the supported NIC adapter in the PC and installs the appropriate driver. This causes the installer to perform the same operations as entering the command without command line options.
Type=*XXXX*	Used to specify the NIC adapter chipset for a pre-installation or a normal installation. *Pre-installation* means that the driver is installed before the specified NIC adapter is installed in the PC. *Normal installation* means that the NIC adapter is installed before the driver is installed.

XXXX Value	Description
Intel3945	Specifies drivers for the Intel3945 chipset.
Centrino	Specifies drivers for Intel 2100, l2200, and 2915 chipsets.
Broadcom	Specifies drivers for Broadcom chipsets supported by the Installer.
Atheros	Specifies drivers for the Atheros 5001, 5004, 5005, AR5211, and AR5212 chipsets.
Cisco	Specifies drivers for the Cisco AIR-CB21 card with an Atheros chipset.

Note When using –s for silent installation, you must also specify –auto or Type=XXXX or both –auto and Type=XXXX.

Examples:

- Using *–auto* in conjunction with *–s*:
  - Performs an intelligent installation by automatically detecting the NIC adapter that is installed.
  - Performs a silent installation without prompting the user.
  - If multiple NIC adapters are detected, selects any supported chipset.
- Using *–auto* in conjunction with *Type=XXXX*:
  - Attempts to Install the driver for the NIC adapter chipset specified by Type=XXXX.
  - If the detected NIC adapters do not support the specified chipset, installs a driver for any NIC adapter with a supported chipset.
- Using *3eTI-drv-installer.exe Type=Intel3945 –auto –s*:
  - Attempts to install a driver for the Intel3945 chipset without prompting the user.
  - If a NIC adapter with the Intel3945 chipset is not detected, silently installs a driver for any other detected NIC adapter with a supported chipset.
  - If a NIC adapter with a supported chipset is not detected, does not pre-install any driver.

- Using *3eTI-drv-installer.exe Type=Intel3945 –s*:
  - Attempts to install a driver for the Intel3945 chipset without prompting the user.
  - If a supported NIC adapter chipset is not detected, performs a pre-install by installing the specified chipset driver.

Running the Installer without Using Command-Line Options

To perform a normal installation with the NIC adapter installed in the PC, follow these instructions:

Step 1 Start the installer by following one of these steps:

a. Use Windows Explorer to locate the **3eTI-drv-installer.exe** file on your PC and double-click the filename.

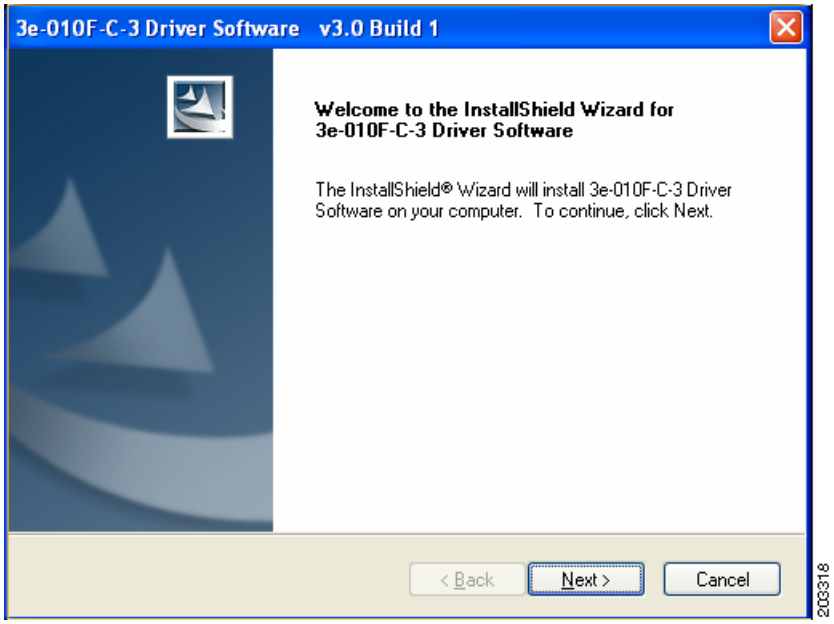
b. Click **Start > Run** and enter this installer run command:

path **/ 3eTI-drv-installer.exe**

Where *path* is the directory path to the installer file.

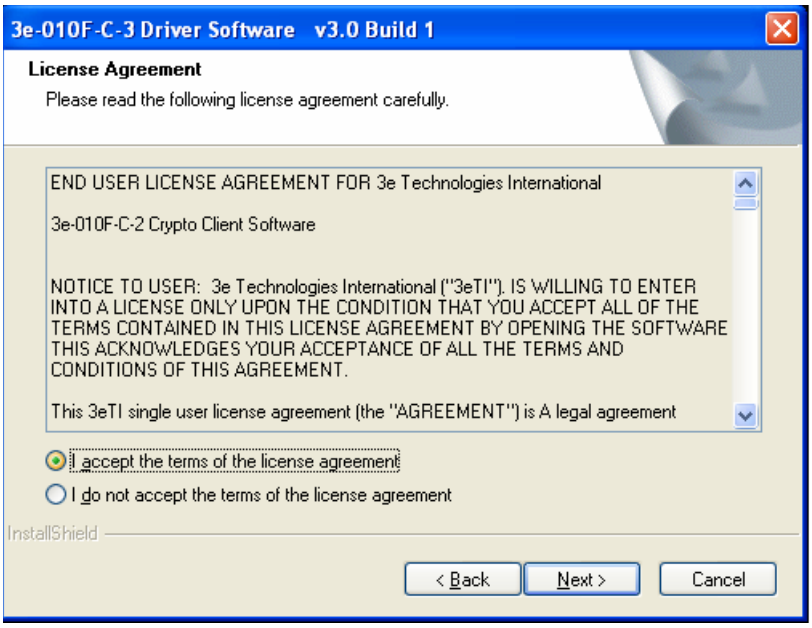
The Driver Welcome window appears (Figure 7-1).

Figure 7-1 Driver Welcome Window



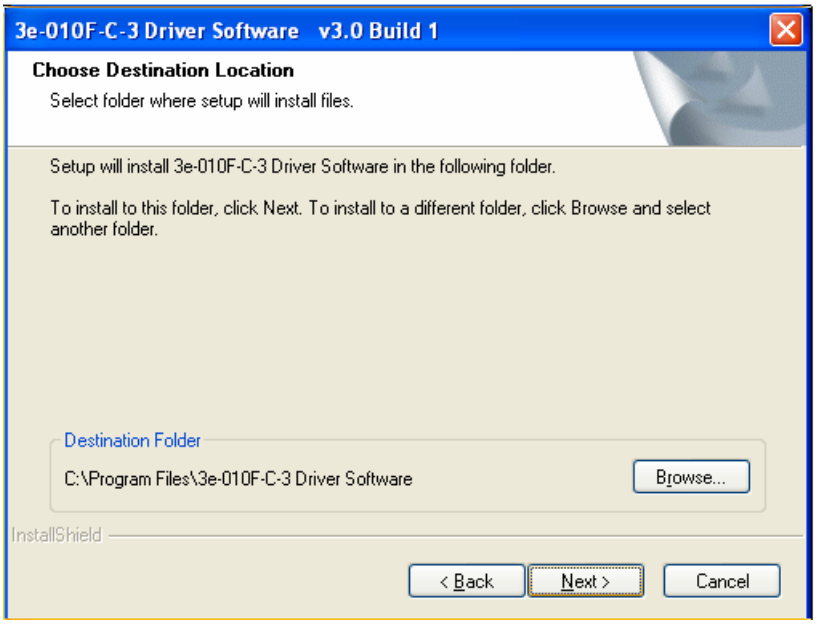
Step 2 Click **Next** and the license agreement appears (see Figure 7-2).

Figure 7-2 License Agreement



Step 3 Read and accept the license agreement and click **Next**. Figure 7-3 appears.

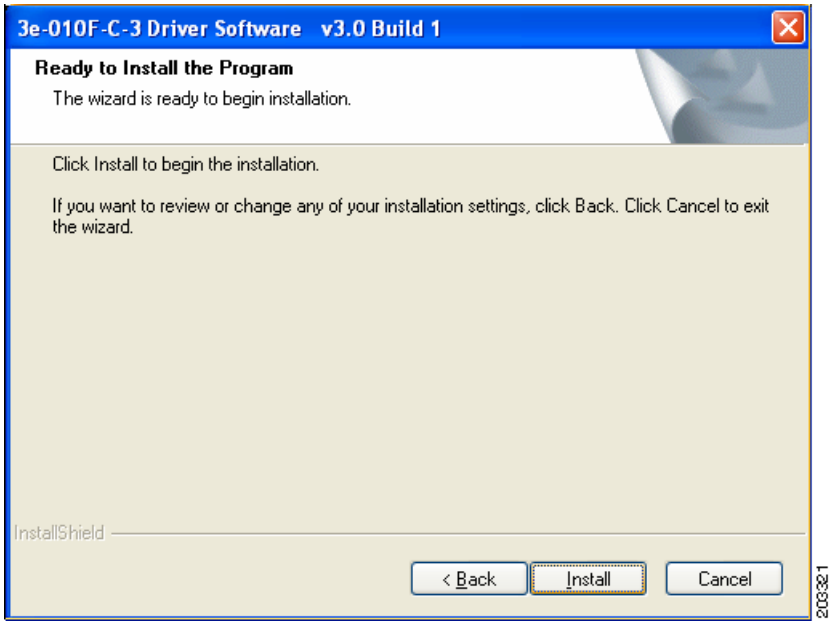
Figure 7-3 Destination Location Window



Step 4 Accept the driver software default destination folder or click **Browse** to locate the desired folder.

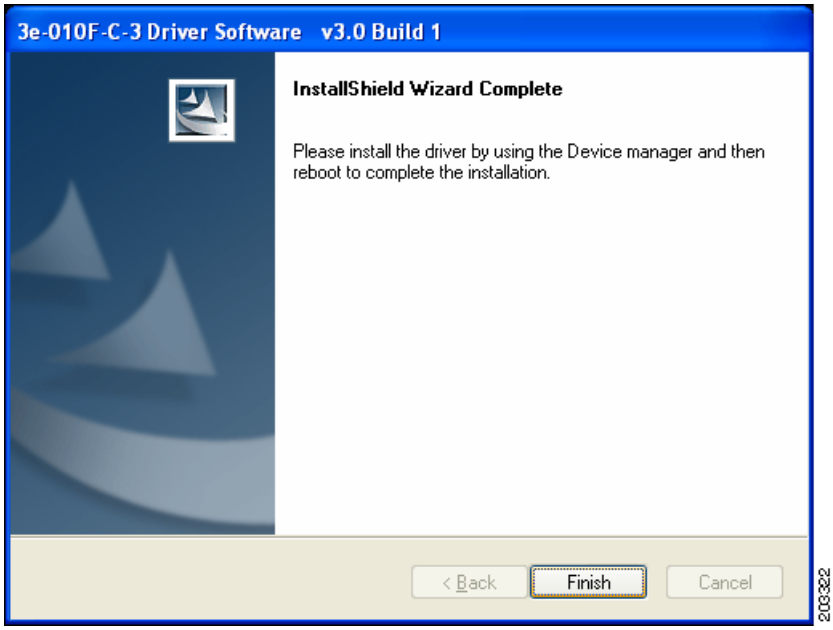
Step 5 Click **Next** and Figure 7-4 appears.

Figure 7-4 Ready to Install Window



Step 6 Click **Install** to start the installation process. When the installation completes, Figure 7-5 appears.

Figure 7-5 Wizard Complete Window



Step 7 Click **Finish**.

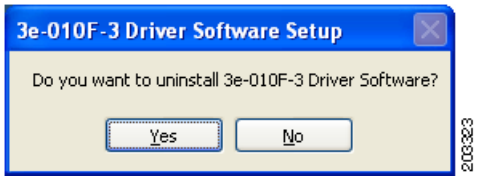
Uninstalling Previous 3eTI Driver Software

To uninstall previous 3eTI driver software, follow these steps:

Step 1 To uninstall the previous 3eTI driver software, click **Start > Settings > Control Panel > Add or Remove Programs**.

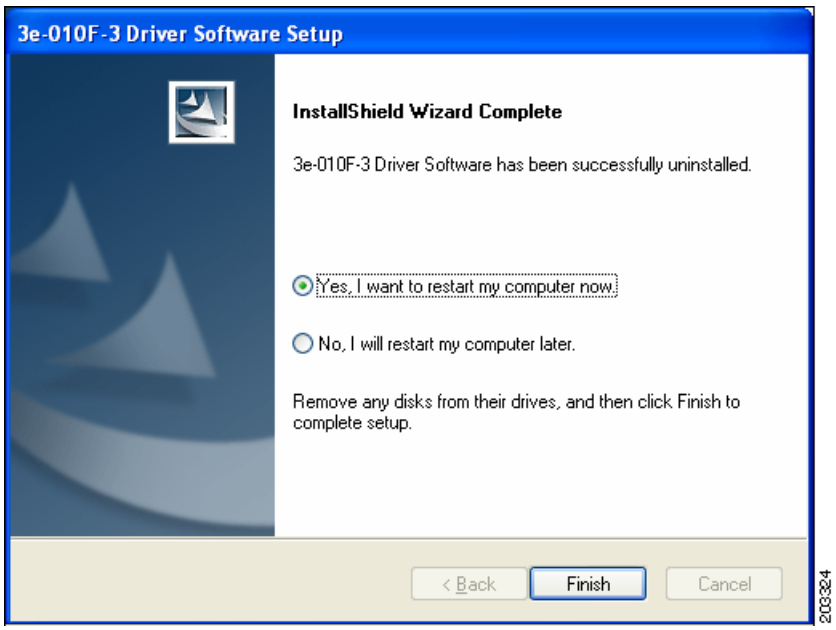
Step 2 Choose the 3eTI driver software, such as 3e-010F-3 and click **Remove**. A pop-up window appears (see Figure 7-6).

Figure 7-6 Uninstall Driver Software Pop-Up



Step 3 Click **Yes** to uninstall the driver software. Figure 7-7 appears.

Figure 7-7 Restart Computer Now Window



Step 4 Check **Yes** to restart your computer.

Step 5 Click **Finish**. Your PC reboots to completely remove the driver software.

Silent Driver Installation for Enterprise Deployment

To run the installer using a silent mode, follow these steps:

Step 1 Run the installer by entering this command:

path **/ 3eTI-drv-installer.exe -s Type=***XXXX*

Where:

path is the directory path to the installer file.

-s indicates silent installation.

Type= *XXXX* specifies the chipset, such as Centrino, Intel3945, or Cisco (see the "Installer Command and Command-Line Options" section on page 7-4).

A pop-up status window appears indicating that the driver installation is in progress and then disappears when the installation completes.

Installing the Driver without a Previously Installed Network Adapter

To install the 3eTI driver on a PC without an installed NIC adapter, follow these steps:

Step 1 Start the installer by clicking **Start** > **Run** and enter this installer run command:

path **/ 3eTI-drv-installer.exe Type =** *XXXX*

Where:

path is the directory path to the installer file.

Type=*XXXX* specifies the chipset, such as Centrino, Intel3945, or Cisco (see the "Installer Command and Command-Line Options" section on page 7-4).

Figure 7-1 appears.

Step 2 Perform Step 2 through Step 7 in the "Running the Installer without Using Command-Line Options" section on page 7-5.

Step 3 When the driver installation is complete, insert or install the NIC adapter in the PC.

Manually Upgrading the 3eTI Driver Software

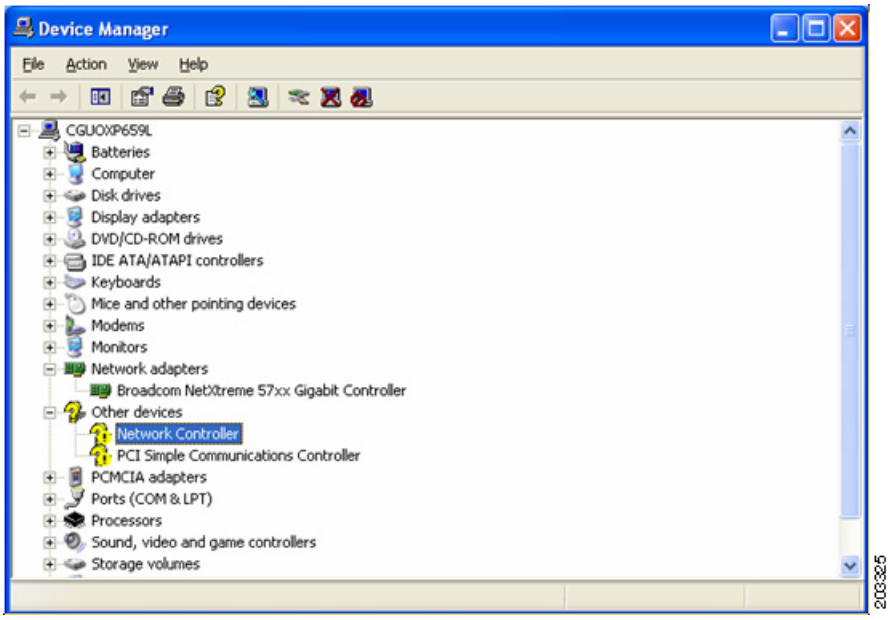
Manual upgrade instructions are provided to help troubleshoot driver installation problems. This is not expected to be a part of an enterprise-wide deployment.

Follow these steps to manually upgrade the 3eTI driver software using the Windows Device Manager:

Step 1 Right-click the **My Computer** icon on your desktop and choose **Properties**.

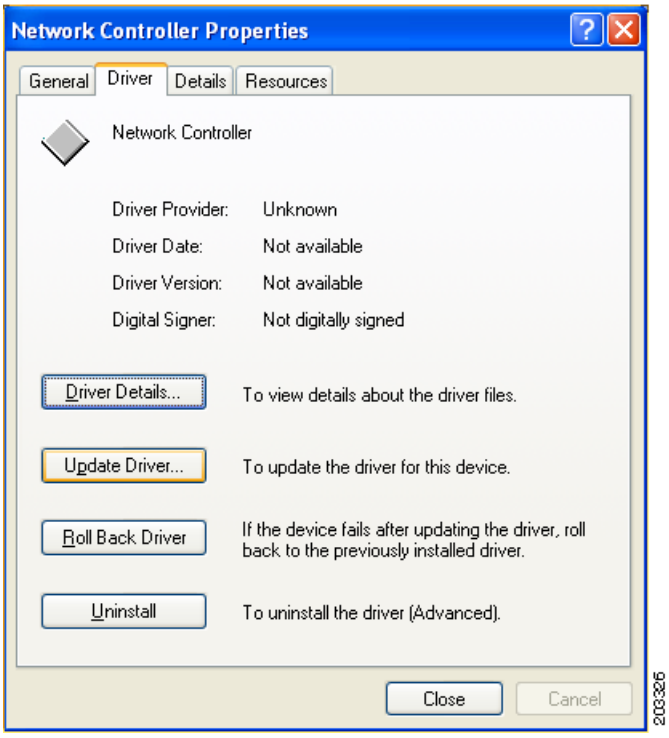
Step 2 Click **Hardware** on the System Properties window, click **Device Manager**. Figure 7-8 appears.

Figure 7-8 Windows Device Manager Window



Step 3 If your Network Adapter is installed or inserted and the driver software is not installed, the device will be listed under Other devices and shown with a yellow question mark. Right-click on your network adapter and choose **Properties**. The Network Controller Properties window appears (see Figure 7-9).

Figure 7-9 Network Controller Properties Window

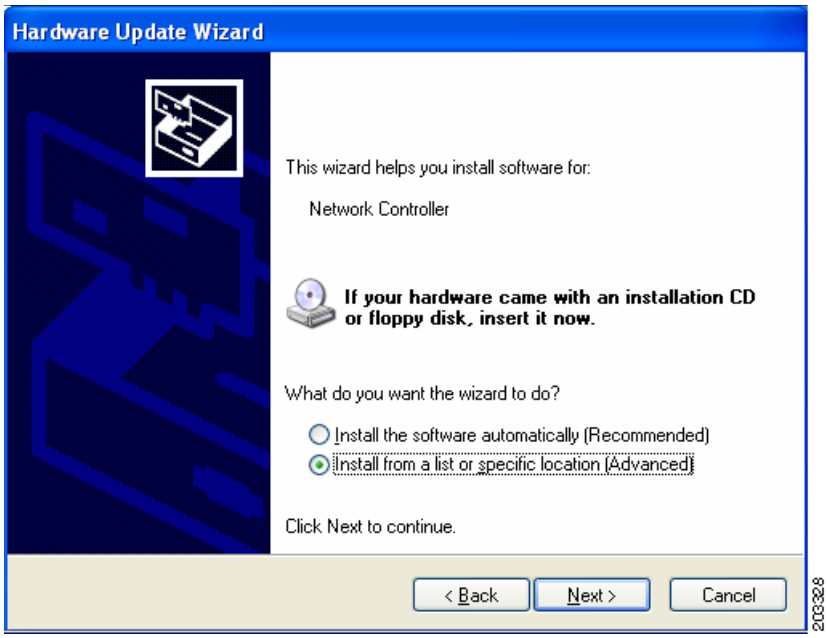


Step 4 Click **Driver > Update Driver** and Figure 7-10 appears.

Figure 7-10 Windows Hardware Update Wizard Window

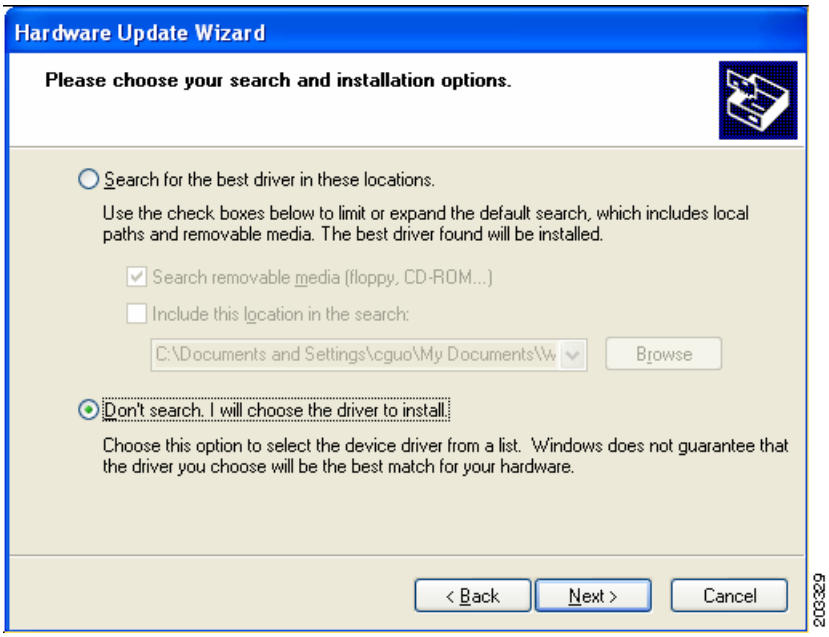
Step 5 Click **No** to prevent Windows from searching for the driver software and click **Next**. Figure 7-11 appears.

Figure 7-11 Installation CD or Floppy Disk Option Window



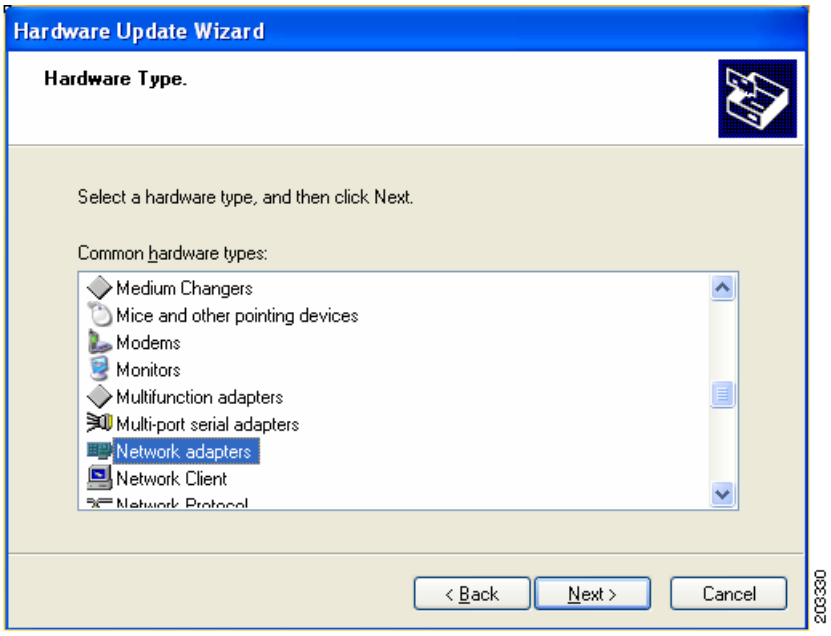
Step 6 Check **Install from a list or specific location (Advanced)** and click **Next**. Figure 7-12 appears.

Figure 7-12 Search and Installation Options Window



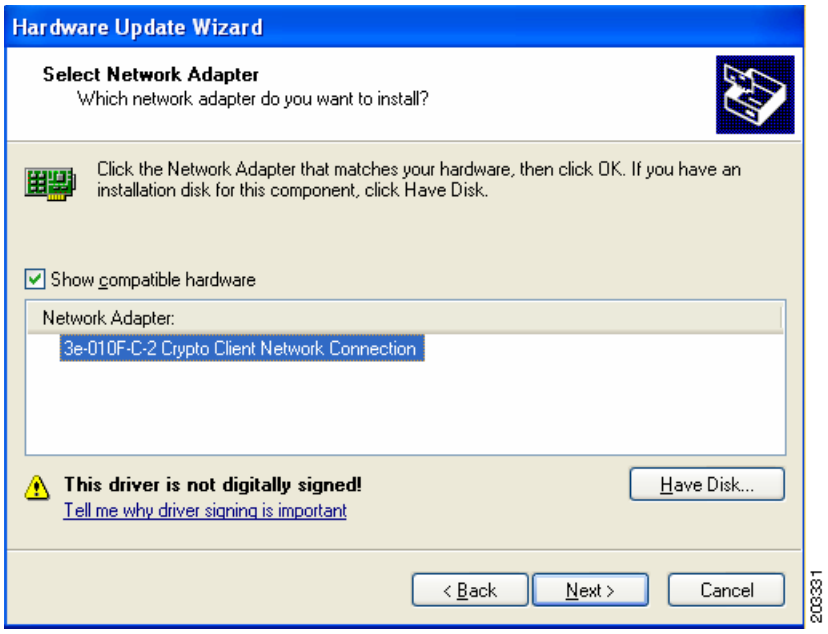
Step 7 Check **Don't search. I will choose the driver to install** and click **Next**. Figure 7-13 appears.

Figure 7-13 Windows Hardware Type Window



Step 8 Choose **Network adapter** and click **Next**. Figure 7-14 appears.

Figure 7-14 Select Network Adapter Window

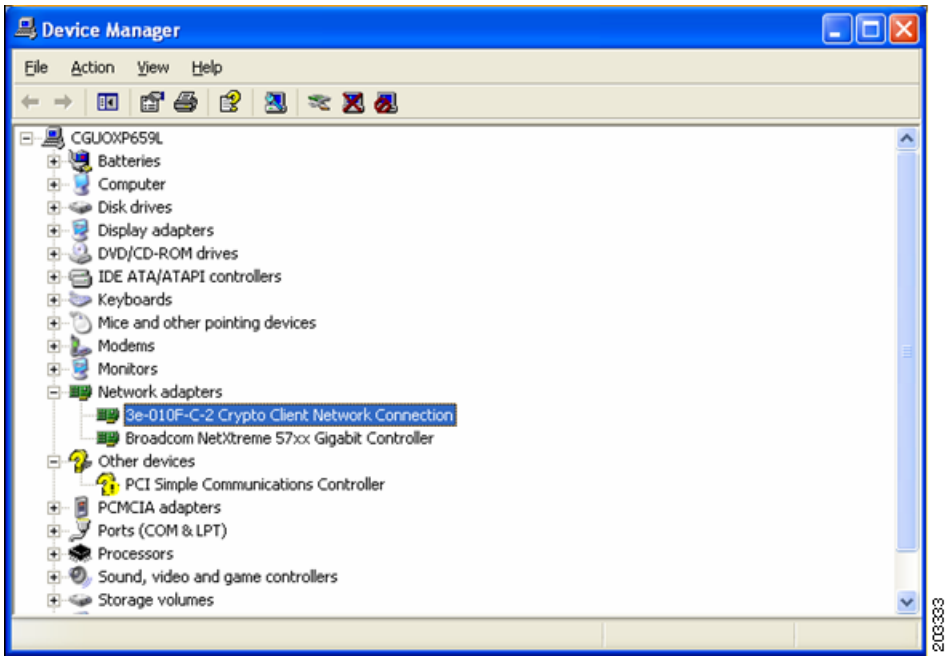


Step 9 Choose the 3eTI network connection and click **Next**. Figure 7-15 appears.

Figure 7-15 Installation Complete Window

Step 10 The hardware driver installation is complete. Click **Finish**. The Device Manager window reappears (see Figure 7-16).

Figure 7-16 Updated Windows Device Manager Window



Step 11 To verify that the driver is installed properly, right click on the 3eTI network connection and choose **Properties**. Ensure that the adapter properties window indicates **This device is working properly** under the Device status.

FIPS 140-2 Level I Compliant Deployment Example

This section describes a deployment example that explains how to configure typical network authentication profiles for SSC to ensure compliance with FIPS 140-2 Level 1 requirements. SSC 5.1.0 is the first release that supports the Cisco SSC FIPS module, which is currently in process for validation with the National Institute of Standards and Technology (NIST). When the service starts up, it executes in the FIPS operating mode.

The network administrator is responsible to configure and deploy FIPS-compliant profiles for the intended user base. The SSC Management utility is used to create FIPS-compliant profiles for wired or wireless media.

A fully FIPS-compliant solution requires three components to be installed and configured on the client:

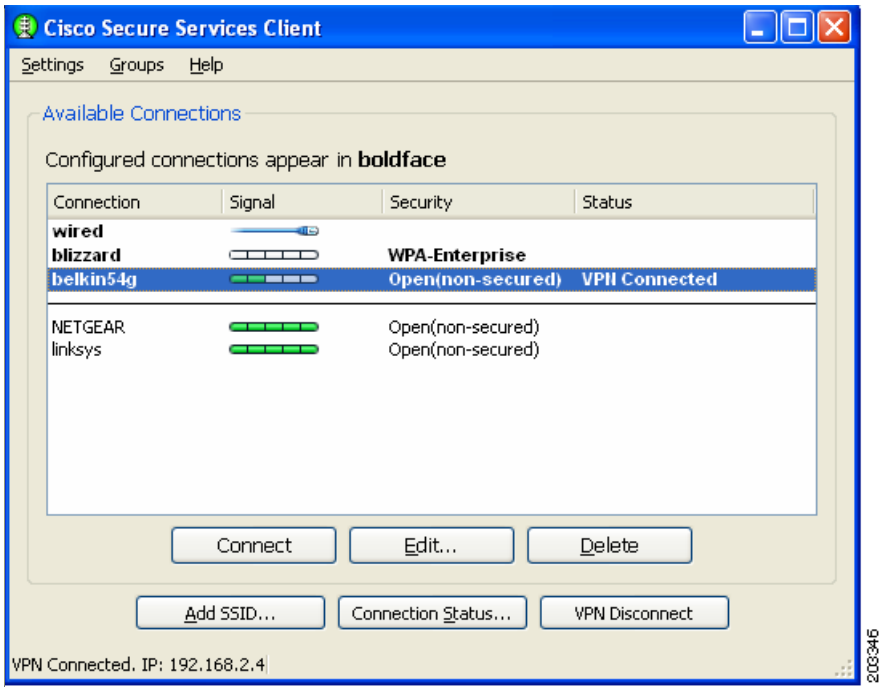
1. SSC running the SSC FIPS module (SSC 5.1.1).
2. A FIPS-compliant network profile configured by the network administrator.
3. An installed 3eTI FIPS CKL module with supported NIC adapter drivers.

When SSC and the management toolkit software are installed and running on the network administrator's PC, SSC scans for available wireless networks and displays the available networks.

Note Only the wireless network devices with their SSID's enabled for broadcast are visible.

The configured connections displayed in bold (see Figure 7-17) can be configured by the network administrator or the user. The profiles configured by the network administrator are permanent and cannot be deleted or revised by the user.

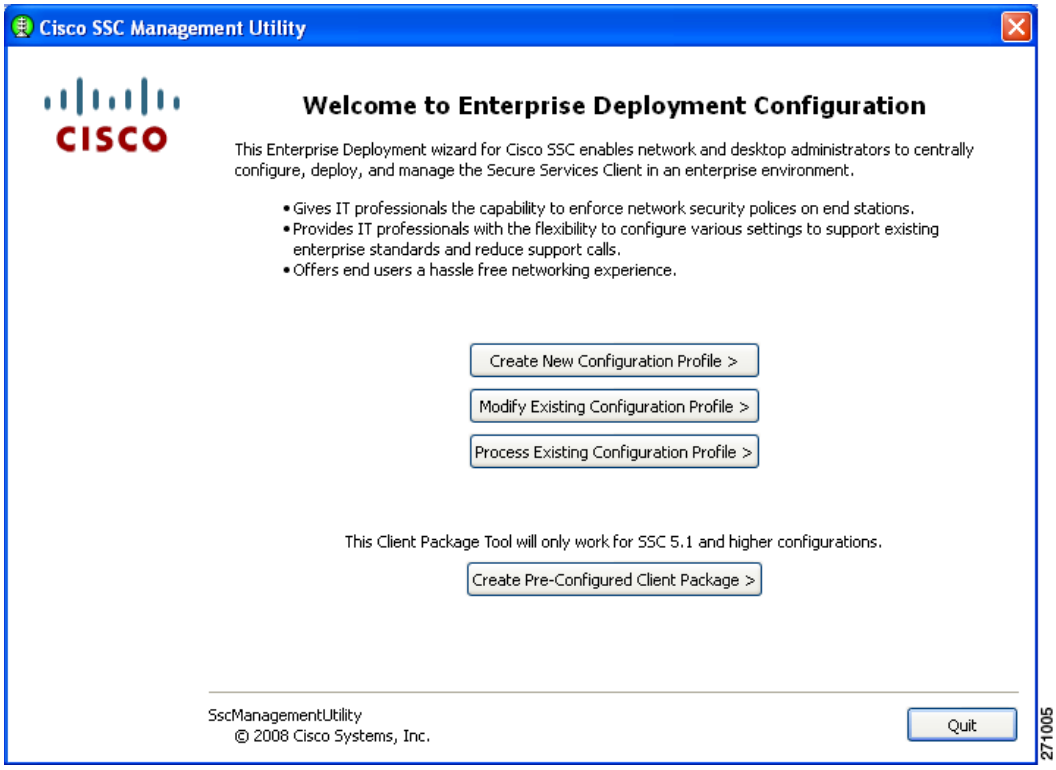
Figure 7-17 Typical Cisco SSC Window



To configure typical SSC profiles for FIPS compliance, follow these instructions:

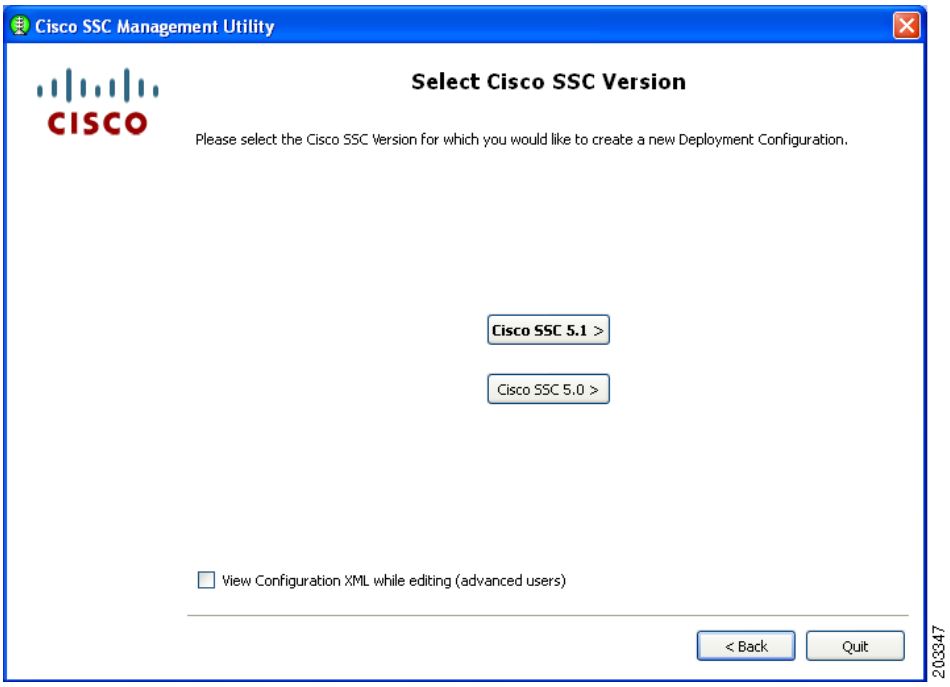
Step 1 Navigate to the directory in which the management toolkit is installed and double-click **sscManagementUtility.exe**. Figure 7-18 appears.

Figure 7-18 Cisco SSC Management Utility Main Window



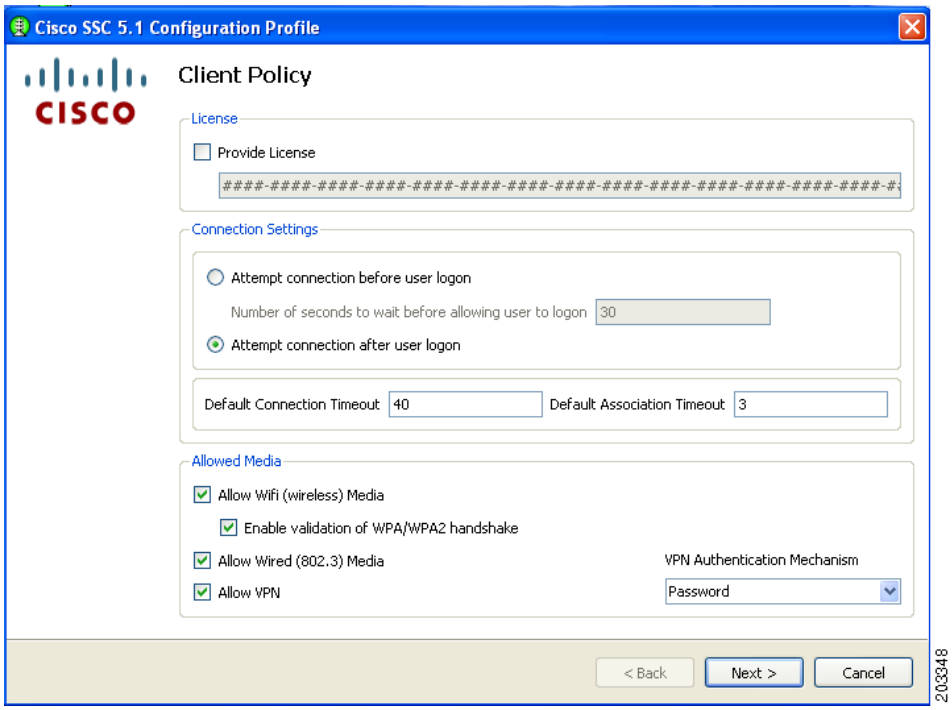
Step 2 To create a new configuration profile, click **Create New Configuration Profile**. Figure 7-19 appears.

Figure 7-19 Select Cisco SSC Version Window



Step 3 Click **Cisco SSC 5.1.1** and Figure 7-20 appears.

Figure 7-20 Client Policy Window



You must ensure that all needed options are checked in the Allowed Media area to allow that media to be configured, such as *Allow Wired (802.3) Media*.

Step 4 follow these steps:

a. Check **Allow Wi-Fi (wireless) Media**.

b. Check **Allow Wired (802.3) Media**.

c. Check **Provide License** and enter the license if it is available.

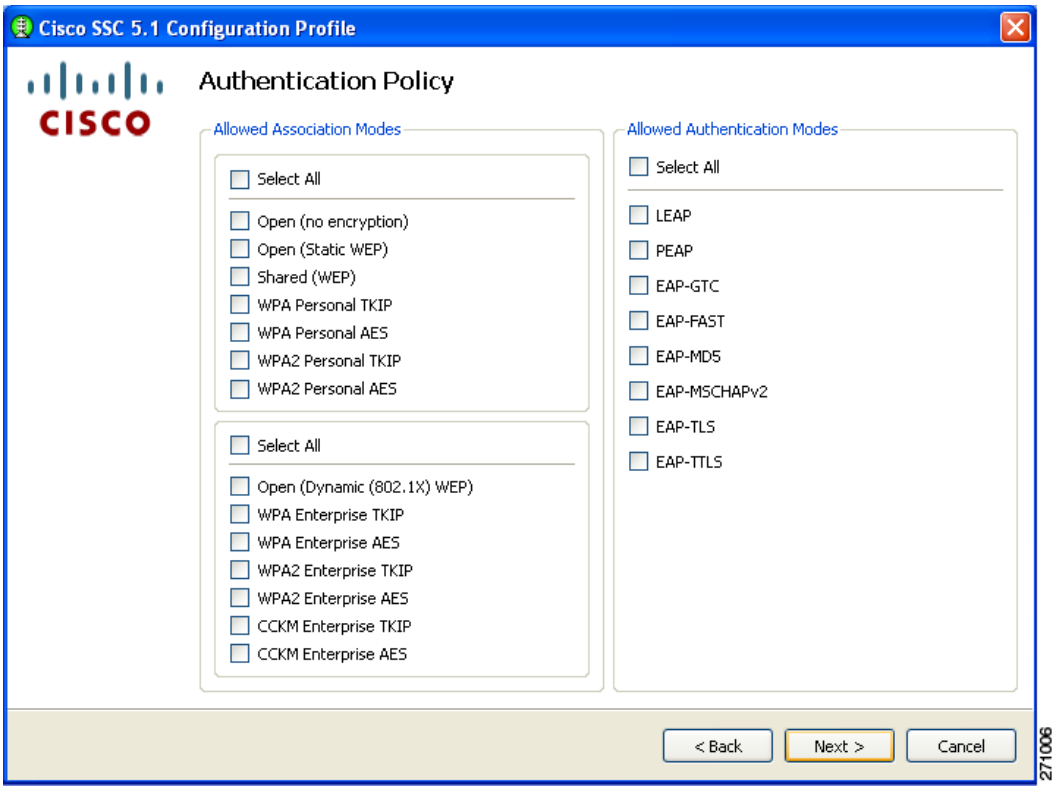
d. If VPN is installed on the PC and supported on the enterprise network infrastructure, check **Allow VPN**. Choose the appropriate VPN Authentication Mechanism for your network.

e. Check **Enable validation of WPA/WPA2 handshake**. As a part of FIPS compliance, this option is enabled.

Note Some network adapter drivers might not work correctly when this option is checked.

f. Click **Next** and Figure 7-21 appears.

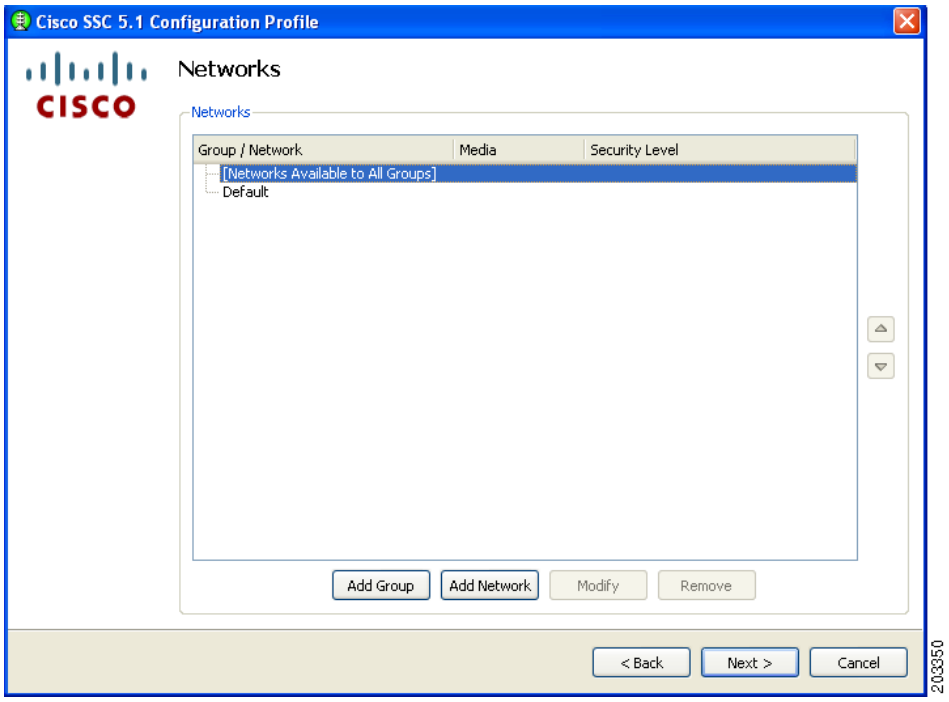
Figure 7-21 Authentication Policy Window



Step 5 Check the appropriate association and authentication modes that are allowed on your network and click **Next**. Figure 7-22 appears.

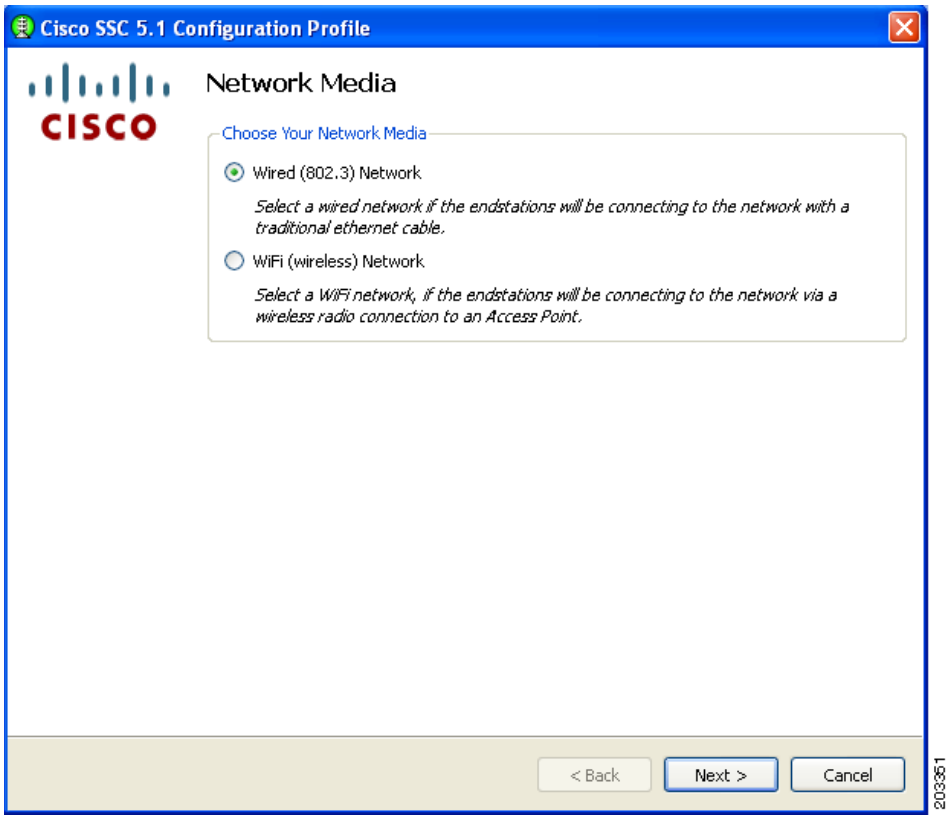
SSC can be configured to support both FIPS-compliant and non-compliant profiles. FIPS-compliant profiles include WPA2 Personal AES and WPA2 Enterprise AES. Supported EAP types with WPA2 Enterprise AES include: EAP TLS, PEAP, and EAP Fast.

Figure 7-22 Networks Window



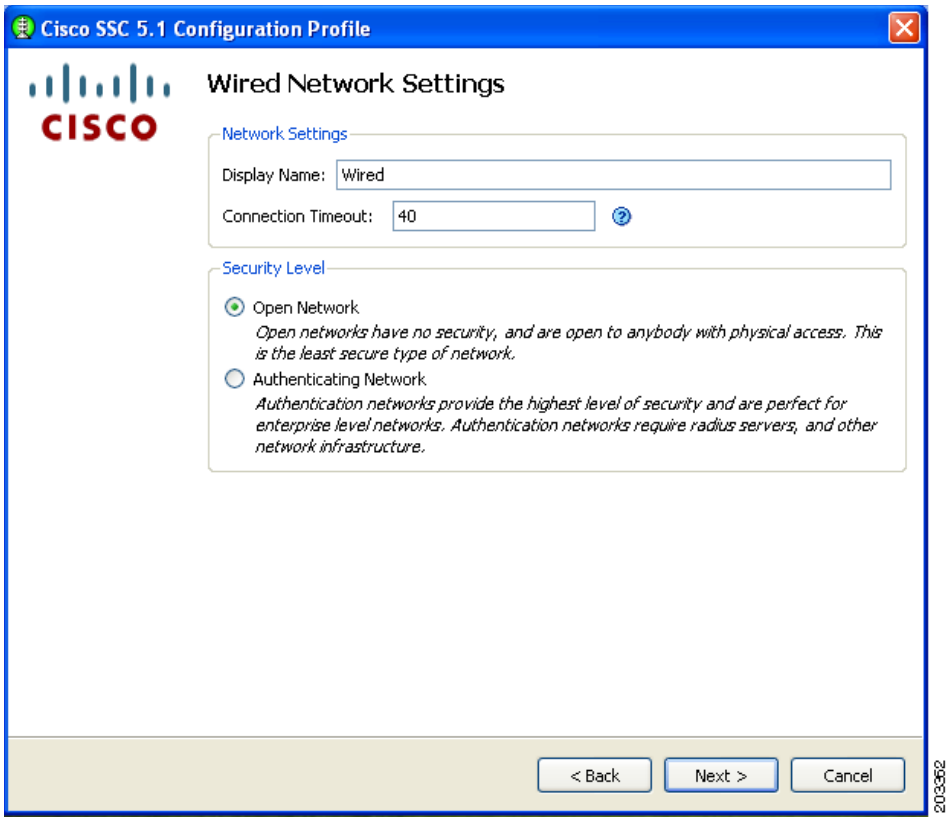
Step 6 Click **Add Network**. The first network to create is a wired network. This causes SSC to limit the connections to only one at a time. Figure 7-23 appears.

Figure 7-23 Network Media Window



Step 7 Check **Wired (802/3) Network** and click **Next**. Figure 7-24 appears.

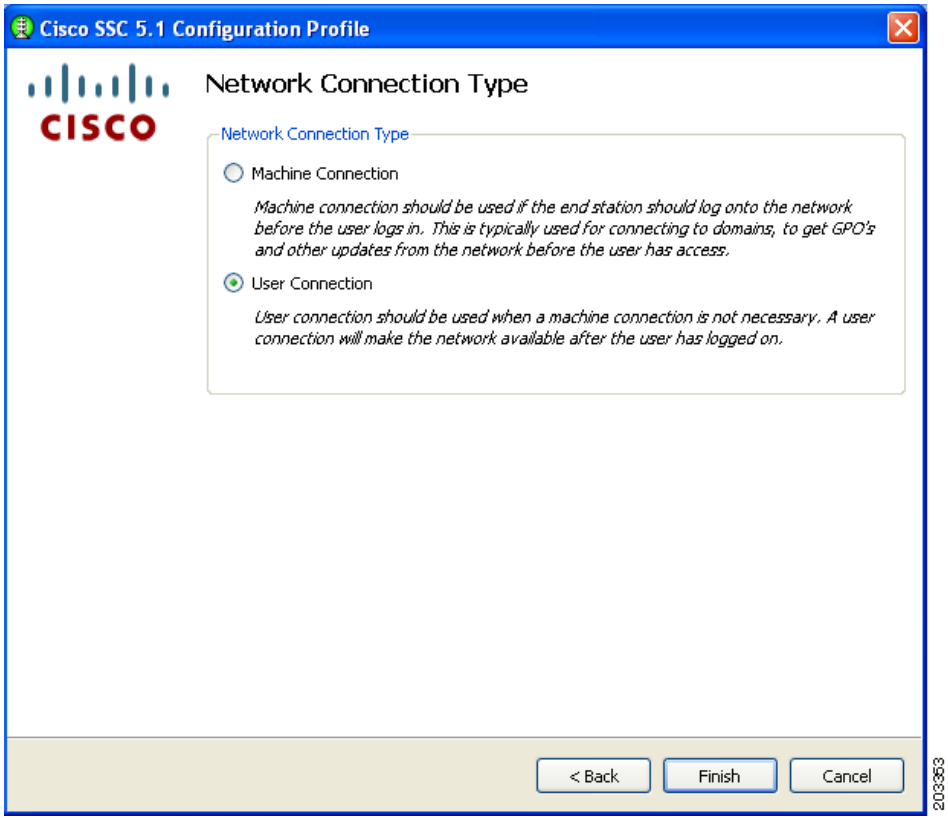
Figure 7-24 Wired Network Settings Window



Step 8 Enter **Wired** in the Display Name field and check **Open Network**.

Step 9 Click **Next** and Figure 7-25 appears.

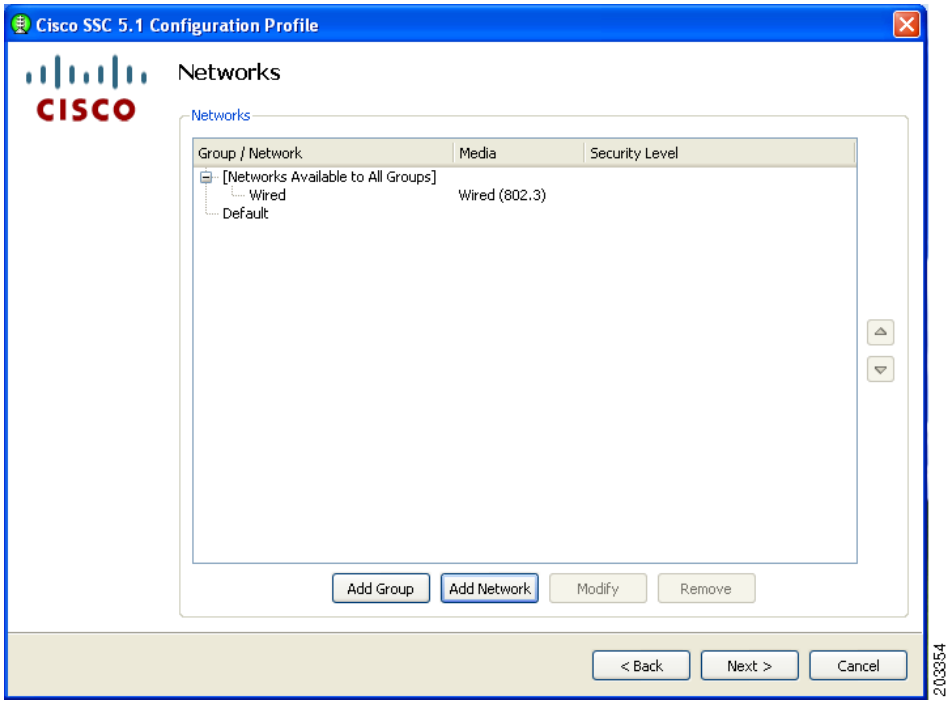
Figure 7-25 Network Connection Type Window



Step 10 Check **User Connection** and click **Finish**. You have configured your wired non-authentication port. The next operation is necessary to configure a FIPS-compliant wireless authentication profile.

Figure 7-26 appears.

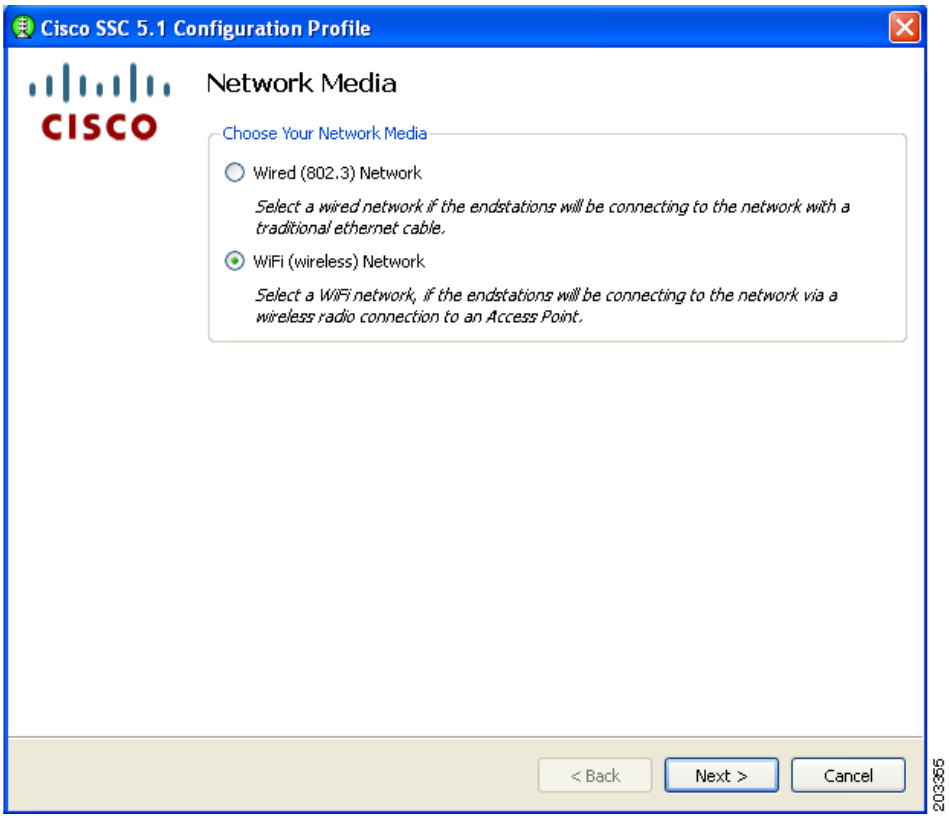
Figure 7-26 Networks Window



In Figure 7-26, the wired network is shown configured.

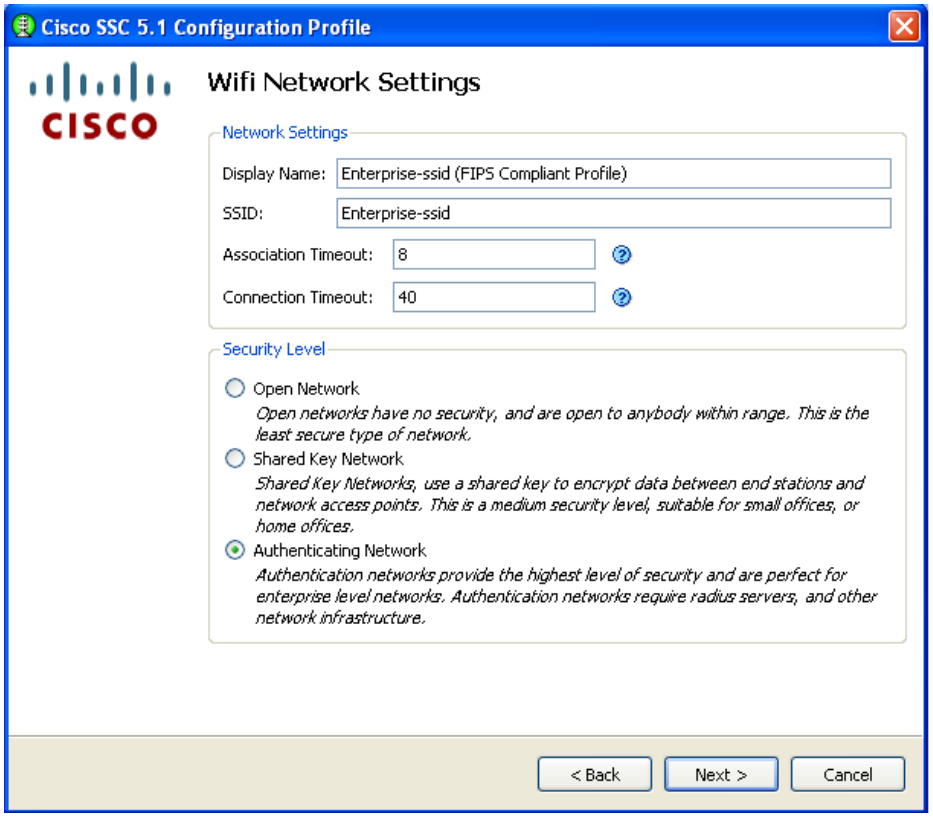
Step 11 Click **Add Network** and Figure 7-27 appears.

Figure 7-27 Network Media Window



Step 12 Check **Wi-Fi (wireless) Network** and click **Next**. Figure 7-28 appears.

Figure 7-28 Wi-Fi Network Settings Window



Note Some smartcard authentication systems require almost 60 seconds to complete an authentication. When using a smartcard, it might be necessary to increase the Connection Timeout value.

Step 13 follow these steps:

a. Enter the Display Name for the profile. It is recommended that the display name set by the network administrator to indicate that it is a FIPS-compliant profile, such as adding *FIPS* in addition to the display name (see Figure 7-28). This profile identification indicates that when connected using this administrator-deployed profile, the network authentication profile conforms to FIPS requirements.

b. Enter the SSID value in the SSID field.The SSID should be set to a valid enterprise SSID. The SSID value is case sensitive.

c. Change the Association Timeout from the default of 3 to value of 8 to 10 seconds.

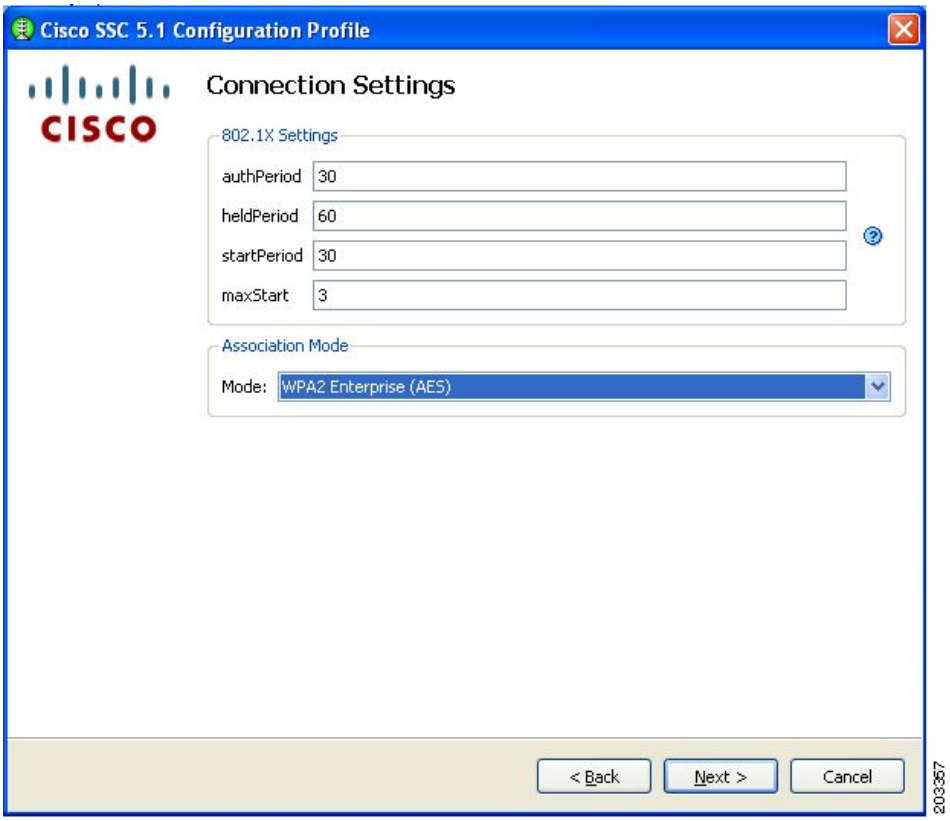
Note The Cisco AIR-CB21client adapter is not sensitive to this value; however, other wireless client adapters, such as the Intel 3945 client adapter require the increased association timeout value.

d. Click **Next**.

Step 14 When the CCX Settings window appears, ignore the settings and click **Next**. Figure 7-29 appears.

Note The CCX Setting window options are not applicable to Windows XP or Windows 2000 environments.

Figure 7-29 Connection Settings Window



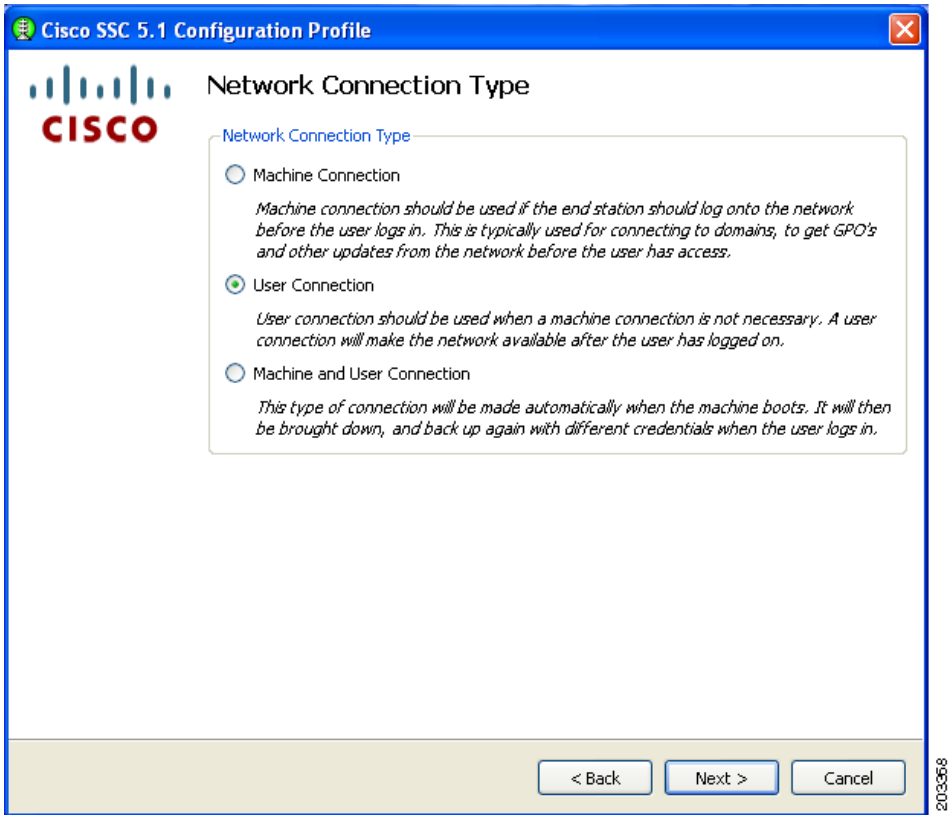
Step 15 Click the Association Mode drop-down arrow and choose **WPA2 Enterprise (AES)**.

Step 16 When configuring the 802.1X settings, Cisco recommends that you use the 802.1X default settings.

These settings are optimized for several different wireless environments and for a wired authenticating profile. Other setting values can be used, but they might not produce optimized operation.

Step 17 Click **Next** and Figure 7-30 appears.

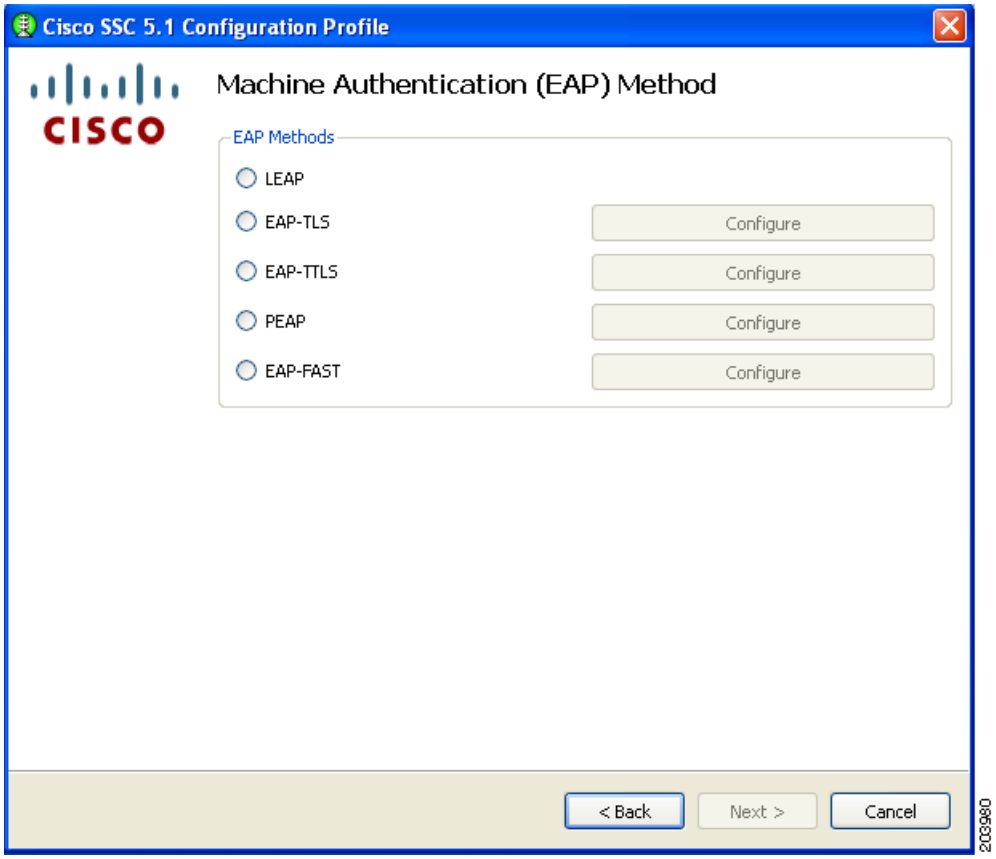
Figure 7-30 Network Connection Type Window



Any of the three options can be selected and will be FIPS-compliant.

Step 18 For this example, check **User Connection** and click **Next**. Figure 7-31 appears.

Figure 7-31 User Authentication (EAP) Method Window



Step 19 Follow one of these steps with the following EAP methods:

- Check **EAP-TLS** and click **Next**. Go to Step 20.
- Check **PEAP** and click **Next**. Go to Step 21.
- Check **EAP-Fast** and click **Next**. Go to Step 22.

Step 20 If you checked EAP-TLS, Figure 7-32 appears.

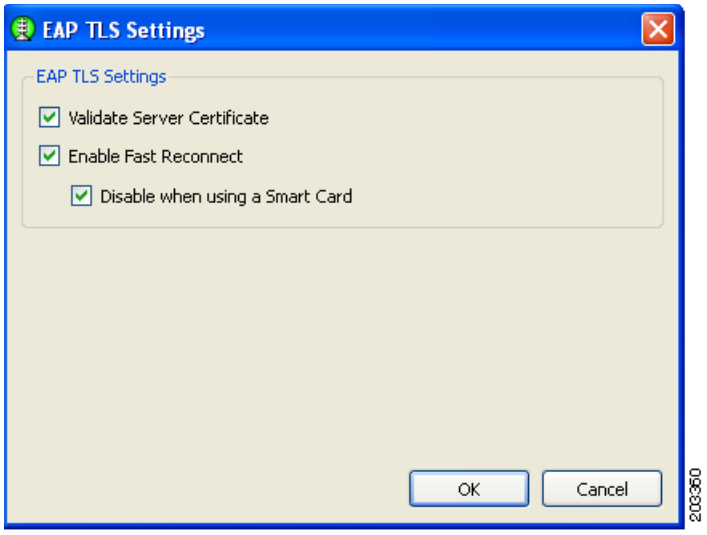
When using smartcards, there are two typical usage scenarios:

- The smartcard must be inserted for every smartcard re-authentication.
- The smartcard must be inserted for the first authentication, then the smartcard can be removed and only needs to be reinserted when the user logs out.

Both usage scenarios are acceptable for a FIPS-compliant profile.

Follow these steps:

Figure 7-32 EAP-TLS Settings Window



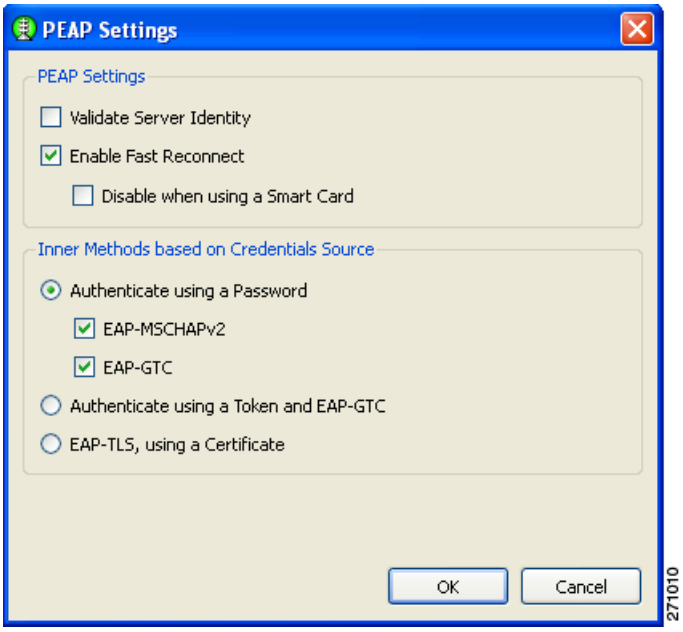
a. In a FIPS-compliant profile, check **Validate Server Certificate**.

b. Click **OK**. The User Authentication (EAP) Method window reappears.

c. Click **Next** on the User Authentication (EAP) Method window and go to Step 23.

Step 21 If you checked PEAP, Figure 7-33 appears.

Figure 7-33 PEAP Settings Window



For a FIPS-compliant profile, follow these steps:

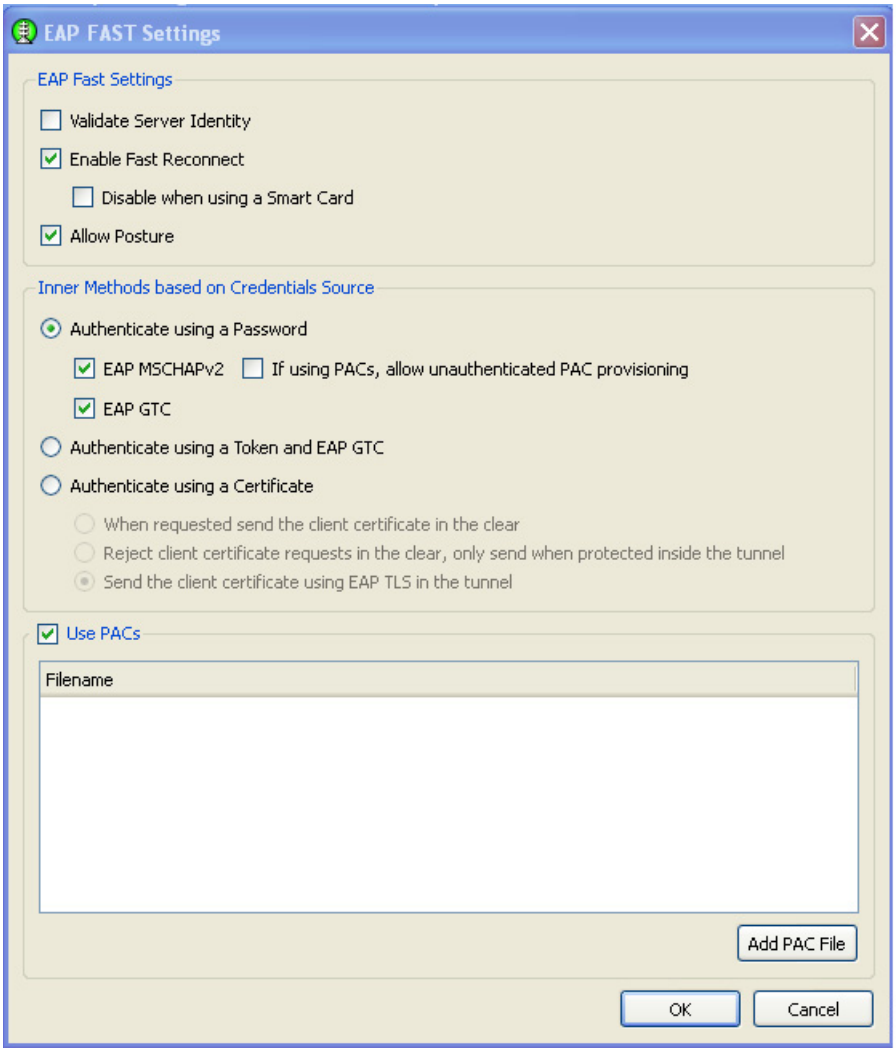
a. Check **Validate Server Identity**.

b. Click **OK** and the User Authentication (EAP) Method window reappears.

c. Click **Next** on the User Authentication (EAP) Method window and go to Step 23.

Step 22 If you checked EAP-Fast, Figure 7-34 appears.

Figure 7-34 EAP-Fast Settings Window



For a FIPS-compliant profile, follow these steps:

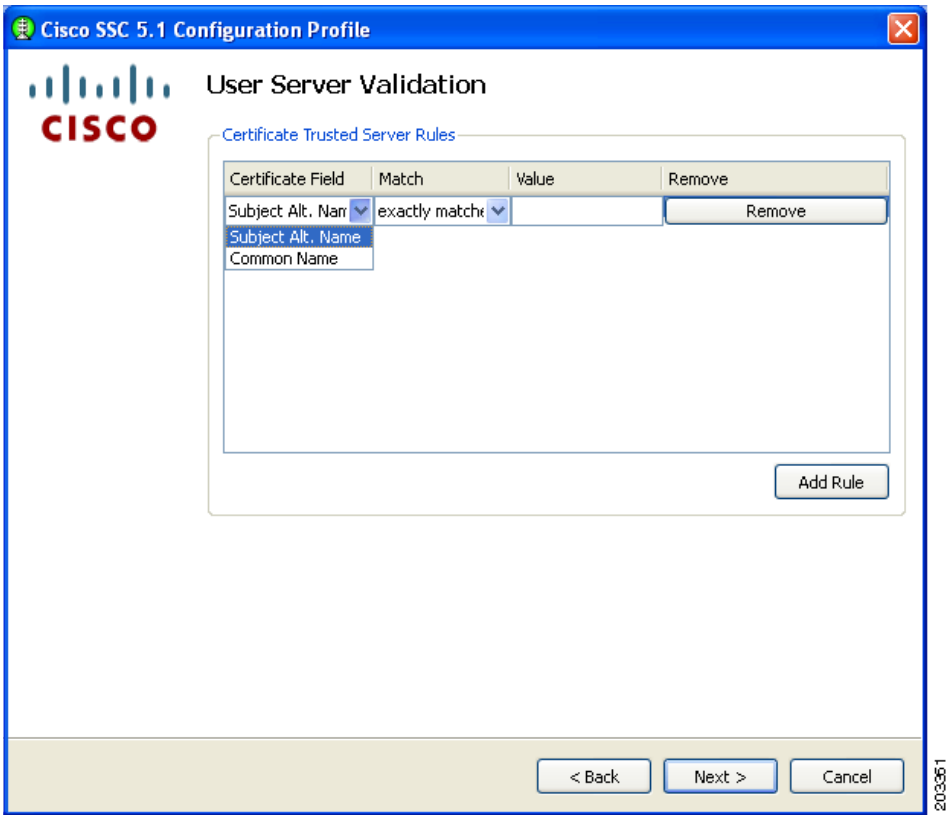
a. Check **Validate Server Identity**.

b. Click **OK** the User Authentication (EAP) Method window reappears.

c. Click **Next** on the User Authentication (EAP) Method window and go to Step 23.

Step 23 If you previously checked Validate Server Identity, Figure 7-35 appears.

Figure 7-35 Certificate Trusted Server Validation Rules Window



Step 24 Optional, define server validation rules by following these steps:

a. Click **Add Rule**.

b. Click the drop-down arrows and highlight the desired options.

c. Enter a value in the Value field.

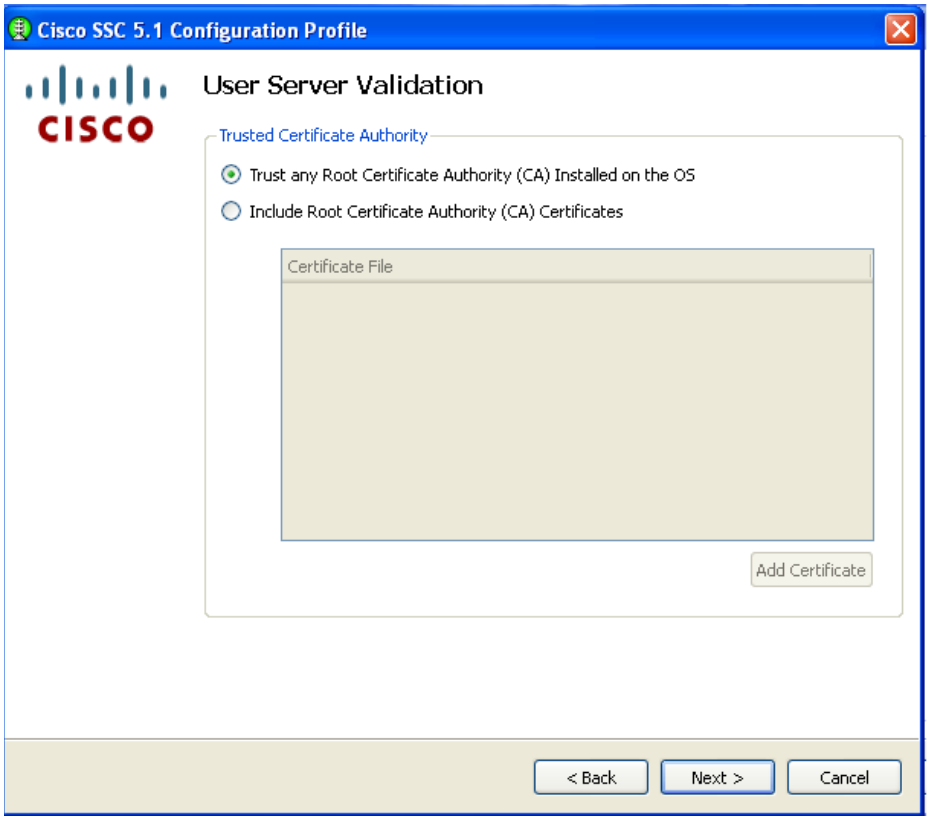
Note Click **Remove** to remove the rule.

d. When complete, click **Next** and Figure 7-36 appears.

Even when certificate rules are not created, these validations occur implicitly to satisfy FIPS:

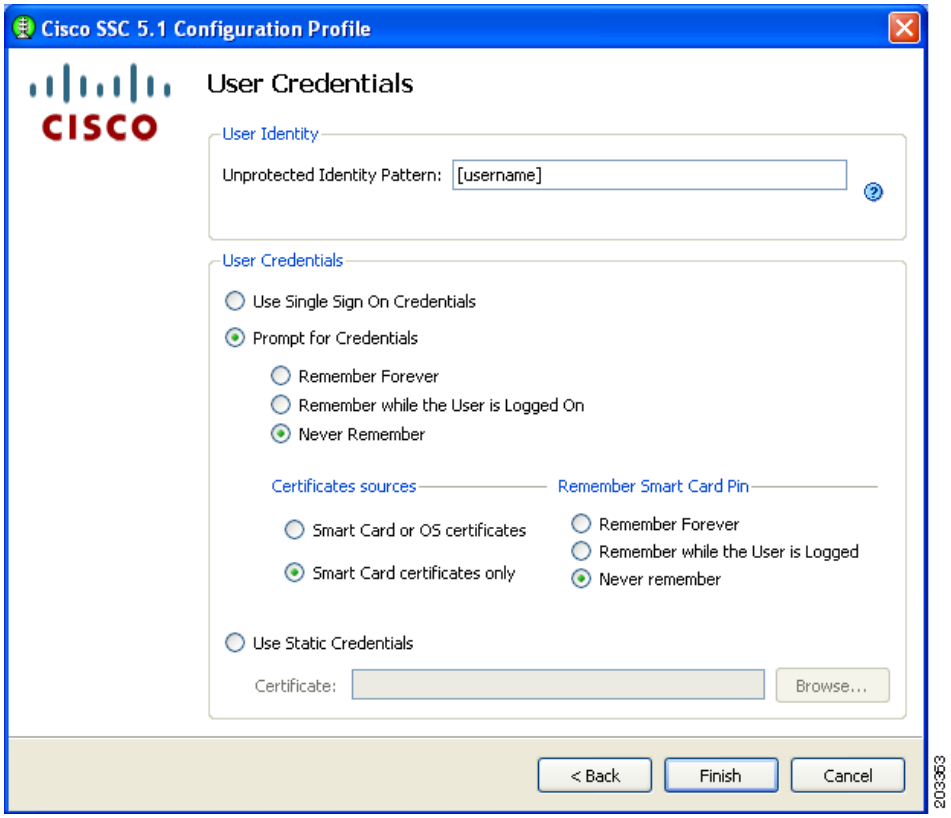
- The received server certificate has not expired.
- The server certificate chain is valid.
- The root node of the server certificate chain is trusted.

Figure 7-36 Trusted Server Authority Validation Window



Step 25 Accept the default setting or check the desired option. Click **Next** and Figure 7-37 appears.

Figure 7-37 Credentials Window



Step 26 Follow these steps:

a. Enter a username the Unprotected Identity Pattern field.

b. Check one of these options:

- **Single Sign On Credentials**
- **Prompt for Credentials**
- **Use Static Credentials**

c. If using Prompt for Credentials, check one of these options:

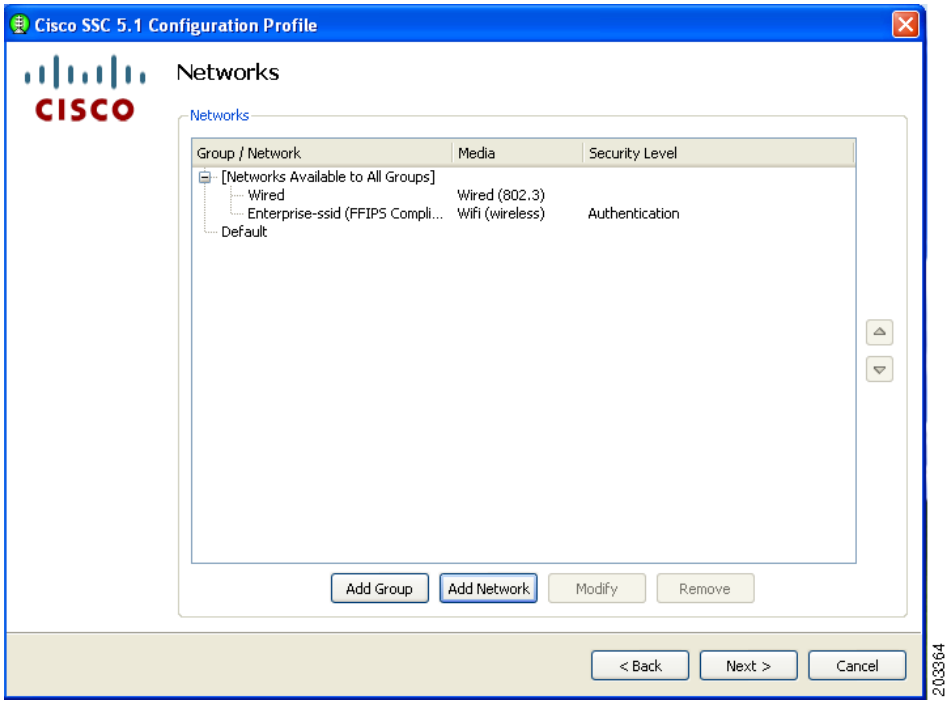
- **Never Remember**
- **Remember while the User is Logged On**

For FIPS-compliance, Never Remember and Remember while the User is Logged On are the only acceptable selections. All relevant security critical parameters are handled securely and cleared when no longer needed.

Note The Single Sign On and Use Static Credentials can be used in FIPS enabled mode.

d. Click **Finish** and Figure 7-38 appears.

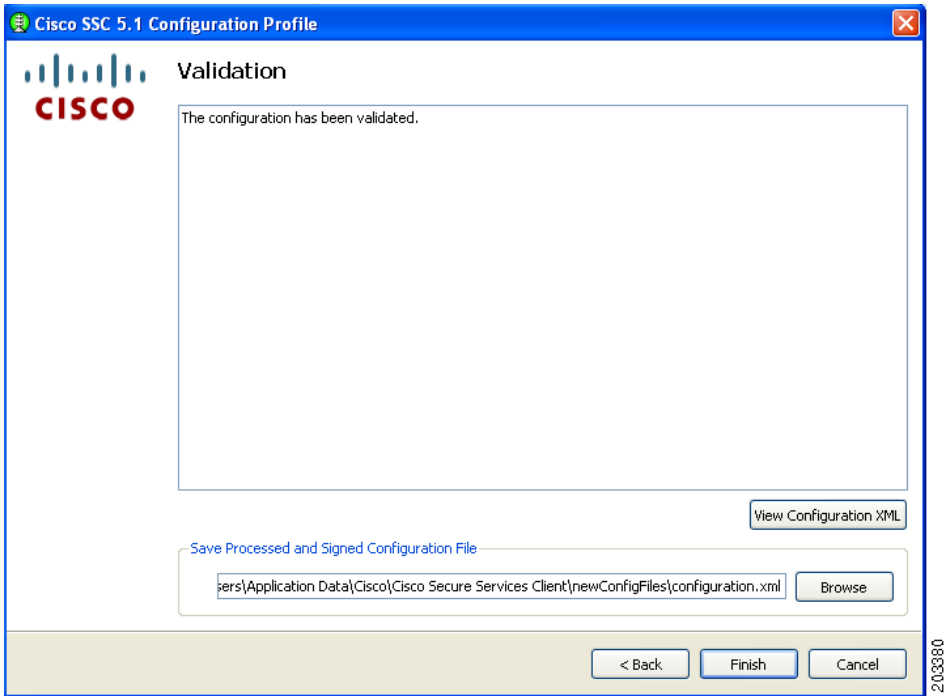
Figure 7-38 Configured Networks Window



This window lists the networks that have been created for this profile.

Step 27 Click **Next** and Figure 7-39 appears.

Figure 7-39 Validation Window



This window allows the administrator to view the configuration XML and save the configuration in an encrypted file for deployment. The administrator can also save an un-encrypted file for review, but this file must never be deployed.

Step 28 Follow these steps:

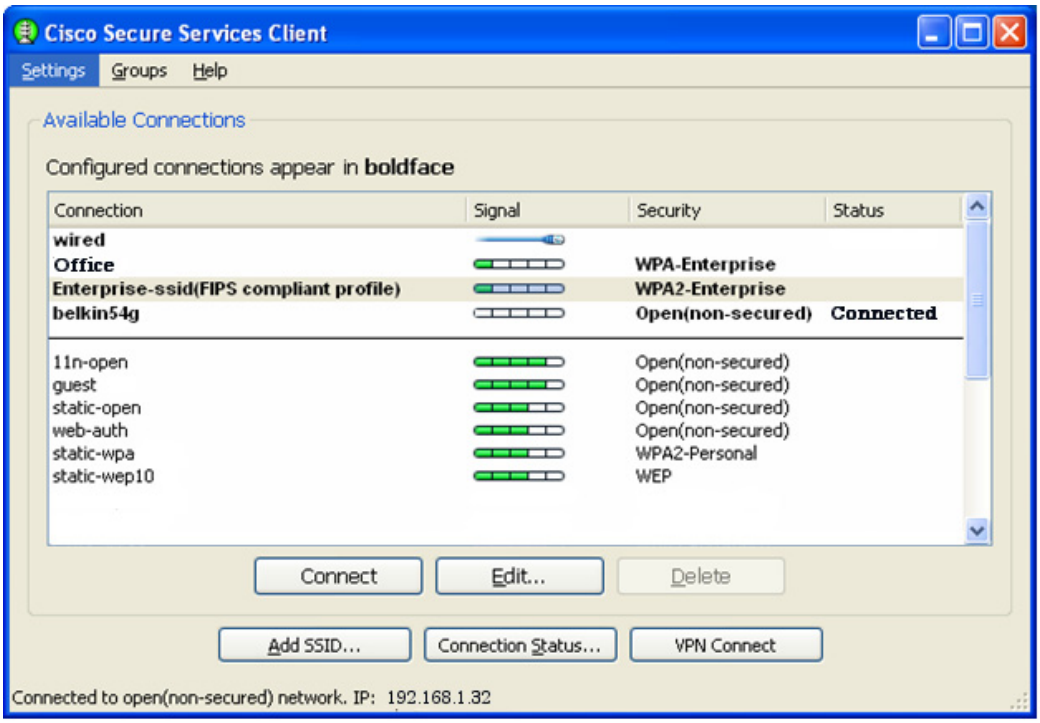
a. Accept the default location for storage of the encrypted configuration file or click **Browse** to browse to a different folder.

b. Optional, uncheck Save Original Configuration File.

c. Click **Finish**.

The configuration is now complete. If you open the SSC main window (see Figure 7-40), the new Enterprise-ssid (FIPS-compliant profile) have been added to the list of connections.

Figure 7-40 Available Connections Window



In Figure 7-40 the Enterprise-ssid profile is easily identified as a FIPS-compliant profile. For this profile, the delete button is disabled so that the user cannot delete the profile. Also, all the administrator configured credential settings are unavailable, when the Edit button is clicked. The only option that can be user-configured is to automatically initiate VPN connections on the FIPS-compliant network connection between the access point and the client PC.

Obtaining SSC and 3eTI Driver Installer Software

SSC 5.1.0 software is available from the Cisco Software Center:

- SSCMgmtToolKit—Contains the sscManagementUtility and support files.
- Cisco_SSC-XP2K_5.1.0.zip—Contains the SSC files. For SSC license information, refer to the "SSC License Information" section on page 2-5.
- CiscoClientUtilities_5.1.0.zip—Contains the Log Packager.

The SSC software can be obtained from the Cisco Software Center at this URL:

http://www.cisco.com/public/sw-center/index.shtml

Click **Wireless Software > Client Adapters and Client Software > Cisco Secure Services Client** and follow the prompts to 5.1.0 under Latest Releases.

Note You must register with Cisco.com or be a registered user to download software.

The FIPS 3eTI CKL supported driver installer cannot be downloaded from the Cisco Software Center and must be ordered from Cisco. A non-expiring license for the SSC software can be ordered from Cisco using these product numbers:

- AIR-SC5.0-XP2K—Cisco SSC Release 5.1 software license.
- AIR-SSCFIPS-DRV—3eTI CKL supported driver installer

The ordered 3eTI CKL supported driver installer software is shipped to the customer on a product CD.

Note The SSCMgmtToolKit (SSC Management Utility) and the Cisco Client Utilities are only available for download from the Cisco Software Center.