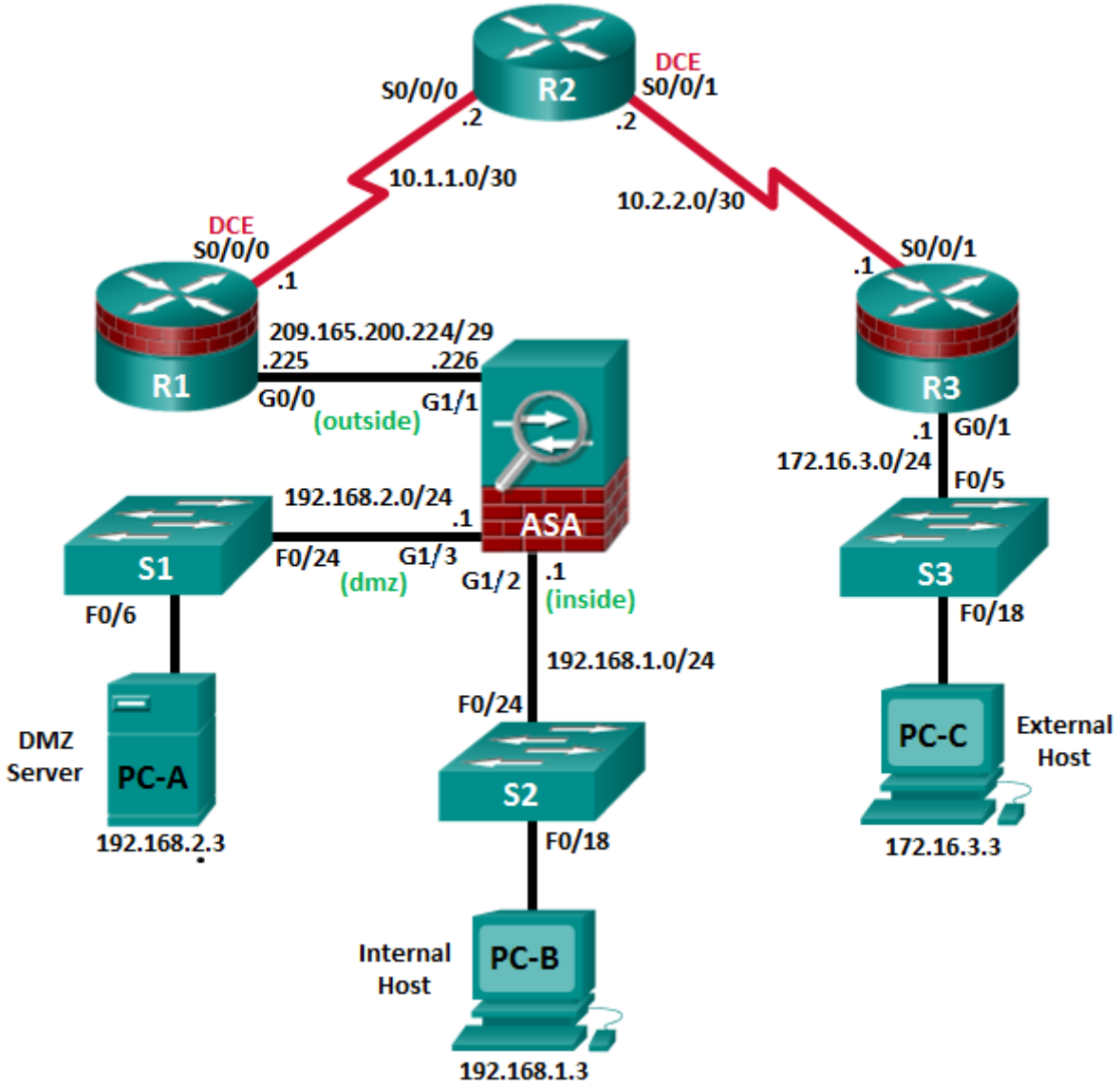
CCNA Security

Chapter 10 – Configure AnyConnect Remote Access SSL VPN Using ASDM

This lab has been updated for use on NETLAB+

Topology



Note: ISR G1 devices use FastEthernet interfaces instead of GigabitEthernet interfaces.

IP Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway	Switch Port
R1	G0/0	209.165.200.225	255.255.255.248	N/A	ASA G1/1
	S0/0/0 (DCE)	10.1.1.1	255.255.255.252	N/A	N/A
R2	S0/0/0	10.1.1.2	255.255.255.252	N/A	N/A
	S0/0/1 (DCE)	10.2.2.2	255.255.255.252	N/A	N/A
R3	G0/1	172.16.3.1	255.255.255.0	N/A	S3 F0/5
	S0/0/1	10.2.2.1	255.255.255.252	N/A	N/A
ASA	Gi1/2	192.168.1.1	255.255.255.0	NA	S2 F0/24
	Gi1/1	209.165.200.226	255.255.255.248	NA	R1 G0/0
	Gi1/3	192.168.2.1	255.255.255.0	NA	S1 F0/24
PC-A	NIC	192.168.2.3	255.255.255.0	192.168.2.1	S1 F0/6
PC-B	NIC	192.168.1.3	255.255.255.0	192.168.1.1	S2 F0/18
PC-C	NIC	172.16.3.3	255.255.255.0	172.16.3.1	S3 F0/18

Objectives

Part 1: Basic Router/Switch/PC Configuration

- Configure basic settings for routers.
- Configure PC host IP settings.
- Verify connectivity.
- Save the basic running configuration for each router and switch.

Part 2: Access the ASA Console and ASDM

- Access the ASA console.
- Clear the previous ASA configuration settings.
- Bypass Setup mode.
- Configure the ASA by using the CLI script.
- Access ASDM.

Part 3: Configuring AnyConnect Client SSL VPN Remote Access Using ASDM

- Start the VPN wizard.
- Specify the VPN encryption protocol.
- Specify the client image to upload to AnyConnect users.
- Configure AAA local authentication.
- Configure the client address assignment.
- Configure the network name resolution.
- Exempt address translation for VPN traffic.

- Review the AnyConnect client deployment details.
- Review the Summary screen and apply the configuration to the ASA.

Part 4: Connecting to an AnyConnect SSL VPN

- Verify the AnyConnect client profile.
- Log in from the remote host.
- Perform platform detection (if required).
- Perform an automatic installation of the AnyConnect VPN Client (if required).
- Manually install the AnyConnect VPN Client (if required).
- Confirm VPN connectivity.

Background/Scenario

In addition to stateful firewall and other security features, the ASA can provide both site-to-site and remote access VPN functionality. The ASA provides two main deployment modes that are found in Cisco SSL remote access VPN solutions:

- **Clientless SSL VPN -** A clientless, browser-based VPN that lets users establish a secure, remote-access VPN tunnel to the ASA and use a web browser and built-in SSL to protect VPN traffic. After authentication, users are presented with a portal page and can access specific, predefined internal resources from the portal.
- **Client-Based SSL VPN -** A client-based VPN that provides full-tunnel SSL VPN connection, but requires a VPN client application to be installed on the remote host. After authentication, users can access any internal resource as if they were physically on the local network. The ASA supports both SSL and IPsec client-based VPNs.

In Part 1 of this lab, you will configure the topology and non-ASA devices. In Part 2, you will prepare the ASA for ASDM access. In Part 3, you will use the ASDM VPN wizard to configure an AnyConnect client-based SSL remote access VPN. In Part 4 you will establish a connection and verify connectivity.

Your company has two locations connected to an ISP. R1 represents a CPE device managed by the ISP. R2 represents an intermediate Internet router. R3 connects users at the remote branch office to the ISP. The ASA is an edge security device that connects the internal corporate network and DMZ to the ISP while providing NAT services to inside hosts.

Management has asked you to provide VPN access to teleworkers using the ASA as a VPN concentrator. They want you to test the client-based model using SSL and the Cisco AnyConnect client.

Note: The router commands and output in this lab are from a Cisco 1941 router with Cisco IOS Release 15.4(3)M2 (with a Security Technology Package license). Other routers and Cisco IOS versions can be used. See the Router Interface Summary Table at the end of the lab to determine which interface identifiers to use based on the equipment in the lab. Depending on the router model and Cisco IOS version, the commands available and the output produced might vary from what is shown in this lab.

The ASA used with this lab is a Cisco model 5506 with an 8-port integrated router, running OS version 9.8(1), Adaptive Security Device Manager (ASDM) version 7.8(1), and comes with a Base license.

Part 1: Basic Router/Switch/PC Configuration

In Part 1, you will configure basic settings on the routers such as interface IP addresses and static routing.

Note: Do not configure any ASA settings at this time.

Step 1: Configure R1 using the CLI script.

In this step, you will use the following CLI script to configure basic settings on R1. Copy and paste the basic configuration script commands listed below. Observe the messages as the commands are applied to ensure that there are no warnings or errors.

Note: Depending on the router model, interfaces might be numbered differently than those listed. You might need to alter the designations accordingly.

Note: Passwords in this task are set to a minimum of 10 characters and are relatively simple for the purposes of performing the lab. More complex passwords are recommended in a production network.

```
enable
config t
hostname R1
security passwords min-length 10
enable algorithm-type scrypt secret cisco12345
username admin01 algorithm-type scrypt secret admin01pass
ip domain name ccnasecurity.com
line con 0
 login local
 exec-timeout 5 0
 logging synchronous
exit
line vty 0 4
 login local
 transport input ssh
 exec-timeout 5 0
 logging synchronous
exit
interface gigabitethernet 0/0
 ip address 209.165.200.225 255.255.255.248
 no shut
exit
int serial 0/0/0
 ip address 10.1.1.1 255.255.255.252
 clock rate 2000000
 no shut
exit
ip route 0.0.0.0 0.0.0.0 Serial0/0/0
crypto key generate rsa general-keys modulus 1024
```

Step 2: Configure R2 using the CLI script.

In this step, you will use the following CLI script to configure basic settings on R2. Copy and paste the basic configuration script commands listed below. Observe the messages as the commands are applied to ensure that there are no warnings or errors.

```
enable
config t
hostname R2
security passwords min-length 10
enable algorithm-type scrypt secret cisco12345
username admin01 algorithm-type scrypt secret admin01pass
ip domain name ccnasecurity.com
line con 0
 login local
 exec-timeout 5 0
 logging synchronous
exit
line vty 0 4
 login local
 transport input ssh
 exec-timeout 5 0
 logging synchronous
exit
interface serial 0/0/0
 ip address 10.1.1.2 255.255.255.252
 no shut
exit
interface serial 0/0/1
 ip address 10.2.2.2 255.255.255.252
 clock rate 2000000
 no shut
exit
ip route 209.165.200.224 255.255.255.248 Serial0/0/0
ip route 172.16.3.0 255.255.255.0 Serial0/0/1
crypto key generate rsa general-keys modulus 1024
```

Step 3: Configure R3 using the CLI script.

In this step, you will use the following CLI script to configure basic settings on R3. Copy and paste the basic configuration script commands listed below. Observe the messages as the commands are applied to ensure that there are no warnings or errors.

```
enable
config t
hostname R3
security passwords min-length 10
enable algorithm-type scrypt secret cisco12345
username admin01 algorithm-type scrypt secret admin01pass
ip domain name ccnasecurity.com
line con 0
 login local
 exec-timeout 5 0
 logging synchronous
exit
line vty 0 4
 login local
 transport input ssh
 exec-timeout 5 0
 logging synchronous
exit
interface gigabitethernet 0/1
 ip address 172.16.3.1 255.255.255.0
 no shut
exit
int serial 0/0/1
 ip address 10.2.2.1 255.255.255.252
 no shut
exit
ip route 0.0.0.0 0.0.0.0 Serial0/0/1
crypto key generate rsa general-keys modulus 1024
```

Step 4: Configure PC host IP settings.

Configure a static IP address, subnet mask, and default gateway for PC-A, PC-B, and PC-C as shown in the IP Addressing table.

Step 5: Verify connectivity.

The ASA is the focal point for the network zones, and it has not yet been configured. Therefore, there will be no connectivity between devices that are connected to it. However, PC-C should be able to ping the R1 interface G0/0. From PC-C, ping the R1 G0/0 IP address (**209.165.200.225**). If these pings are unsuccessful, troubleshoot the basic device configurations before continuing.

Note: If you can ping from PC-C to R1 G0/0 and S0/0/0, you have demonstrated that static routing is configured and functioning correctly.

Step 6: Save the basic running configuration for each router and switch.

Part 2: Accessing the ASA Console and ASDM

Step 1: Clear the previous ASA configuration settings.

a. Use the **write erase** command to remove the **startup-config** file from flash memory.

   Note: The **erase startup-config** IOS command is not supported on the ASA.

b. Use the **reload** command to restart the ASA. This causes the ASA to display in CLI Setup mode. If you see the **System config has been modified. Save? [Y]es/[N]o:** message, type **N**, and press **Enter**.

Step 2: Bypass Setup mode.

When the ASA completes the reload process, it should detect that the startup configuration file is missing and go into Setup mode. If it does not go into Setup mode, repeat Step 1.

a. When prompted to preconfigure the firewall through interactive prompts (Setup mode), respond with **No**.

b. Enter privileged EXEC mode with the **enable** command. The password should be blank (no password).

Step 3: Configure the ASA by using the CLI script.

In this step, you will use a CLI script to configure basic settings, the firewall, and the DMZ.

a. Use the **show run** command to confirm that there is no previous configuration in the ASA other than the defaults that the ASA automatically inserts.

b. Enter global configuration mode. When prompted to enable anonymous call-home reporting, respond **no**.

c. Copy and paste the Pre-VPN Configuration Script commands listed below at the ASA global configuration mode prompt to start configuring the SSL VPNs.

   Observe the messages as the commands are applied to ensure that there are no warnings or errors. If prompted to replace the RSA key pair, respond **yes**.

```
hostname CCNAS-ASA
domain-name ccnasecurity.com
enable password cisco12345
!
interface Gigabit1/1
  nameif outside
 security-level 0
 ip address 209.165.200.226 255.255.255.248
 no shut
!
interface Gigabit1/2
 nameif inside
 security-level 100
 ip address 192.168.1.1 255.255.255.0
 no shut
!
interface Gigabit1/3
 nameif dmz
```

```
 security-level 70
 ip address 192.168.2.1 255.255.255.0
 no shut
!
object network inside-net
 subnet 192.168.1.0 255.255.255.0
!
object network dmz-server
 host 192.168.2.3
!
access-list OUTSIDE-DMZ extended permit ip any host 192.168.2.3
!
object network inside-net
 nat (inside,outside) dynamic interface
!
object network dmz-server
 nat (dmz,outside) static 209.165.200.227
!
access-group OUTSIDE-DMZ in interface outside
!
route outside 0.0.0.0 0.0.0.0 209.165.200.225 1
!
username admin01 password admin01pass
!
aaa authentication telnet console LOCAL
aaa authentication ssh console LOCAL
aaa authentication http console LOCAL
!
http server enable
http 192.168.1.0 255.255.255.0 inside
ssh 192.168.1.0 255.255.255.0 inside
telnet 192.168.1.0 255.255.255.0 inside
telnet timeout 10
ssh timeout 10
!
class-map inspection_default
 match default-inspection-traffic
policy-map global_policy
 class inspection_default
   inspect icmp
!
crypto key generate rsa modulus 1024
```

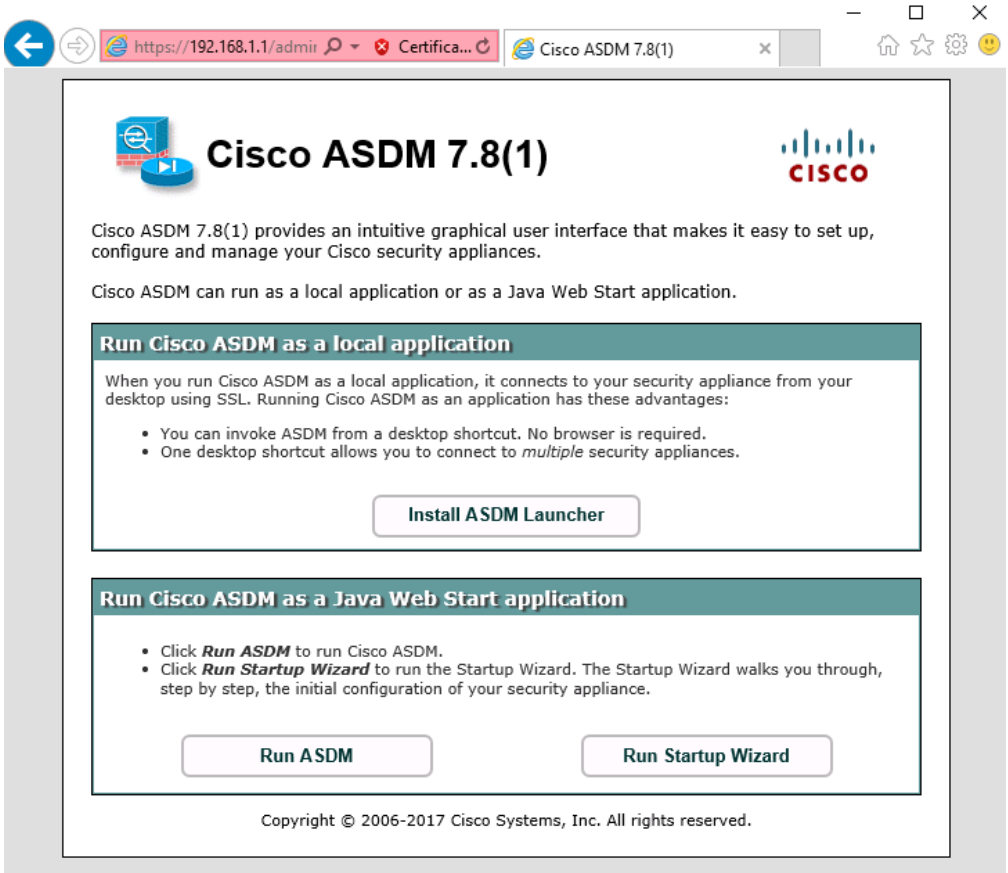
d. At the privileged EXEC mode prompt, issue the **write mem** (or **copy run start**) command to save the running configuration to the startup configuration and the RSA keys to non-volatile memory.

Step 4: Access ASDM.

a. Open a browser on PC-B and test the HTTPS access to the ASA by entering **https://192.168.1.1**. After entering the https://192.168.1.1 URL, you should see a security warning about the website security certificate. Click **Continue to this website**. Click **Yes** for any other security warnings.

   Note: Specify the HTTPS protocol in the URL.

b. At the ASDM welcome page, click **Run ASDM**. The ASDM-IDM Launcher will display. Log in as user **admin01** with the password **admin01pass**.

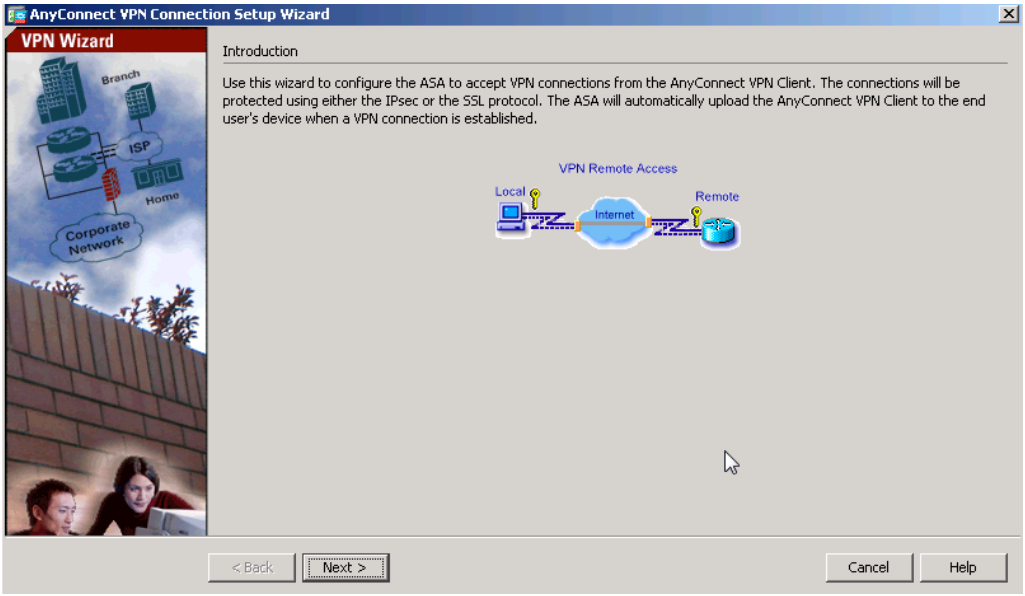


Part 3: Configuring AnyConnect SSL VPN Remote Access Using ASDM

Step 1: Start the VPN wizard.

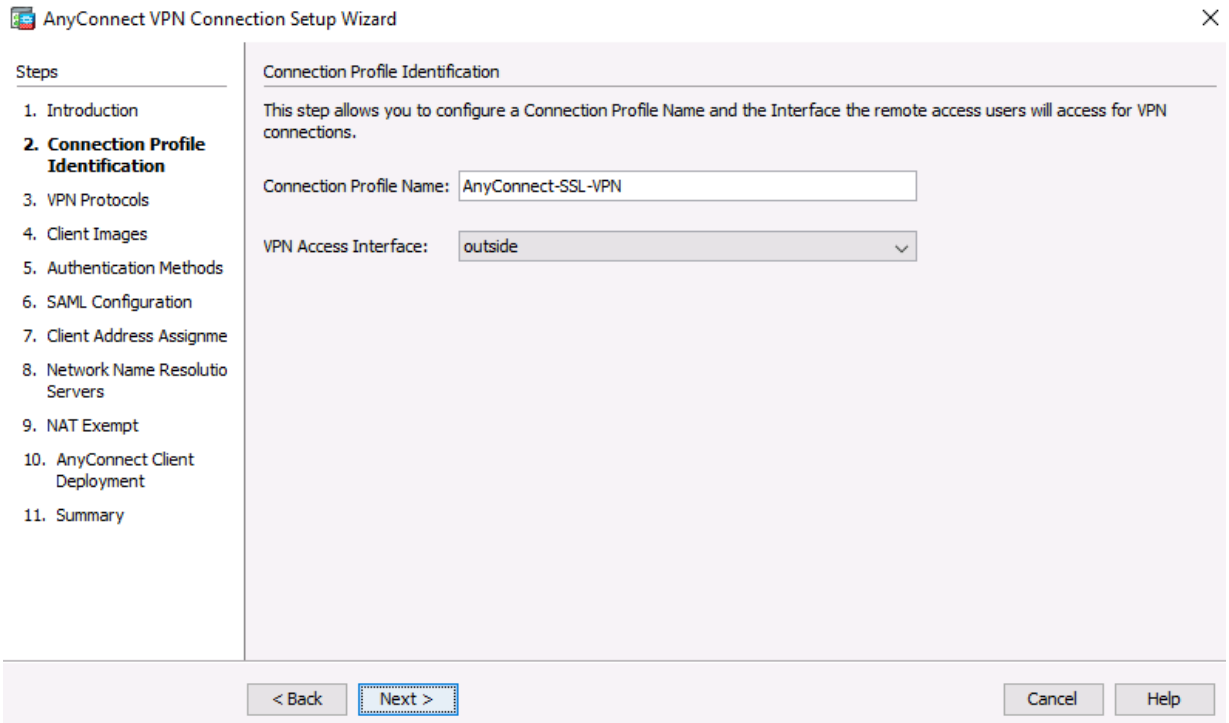
a. On the ASDM main menu, click **Wizards** > **VPN Wizards** > **AnyConnect VPN Wizard**.

b. Review the on-screen text and topology diagram. Click **Next** to continue.



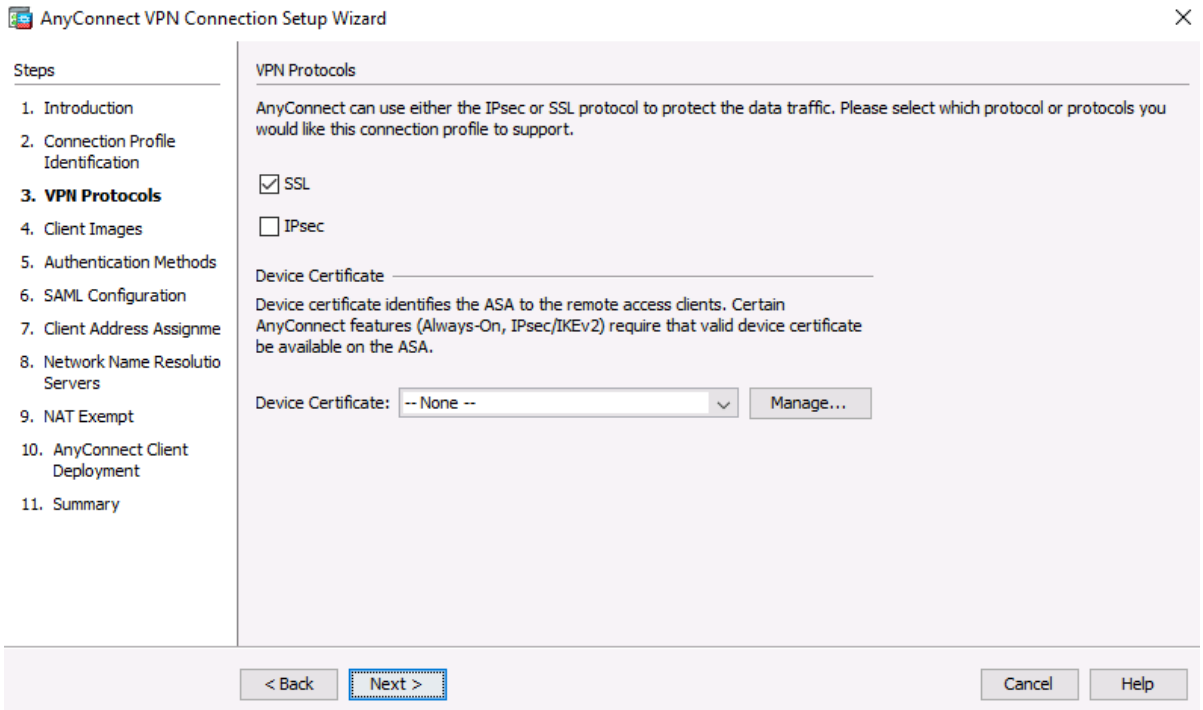
Step 2: Configure the SSL VPN interface connection profile.

On the Connection Profile Identification screen, enter **AnyConnect-SSL-VPN** as the Connection Profile Name and specify the **outside** interface as the VPN Access Interface. Click **Next** to continue.



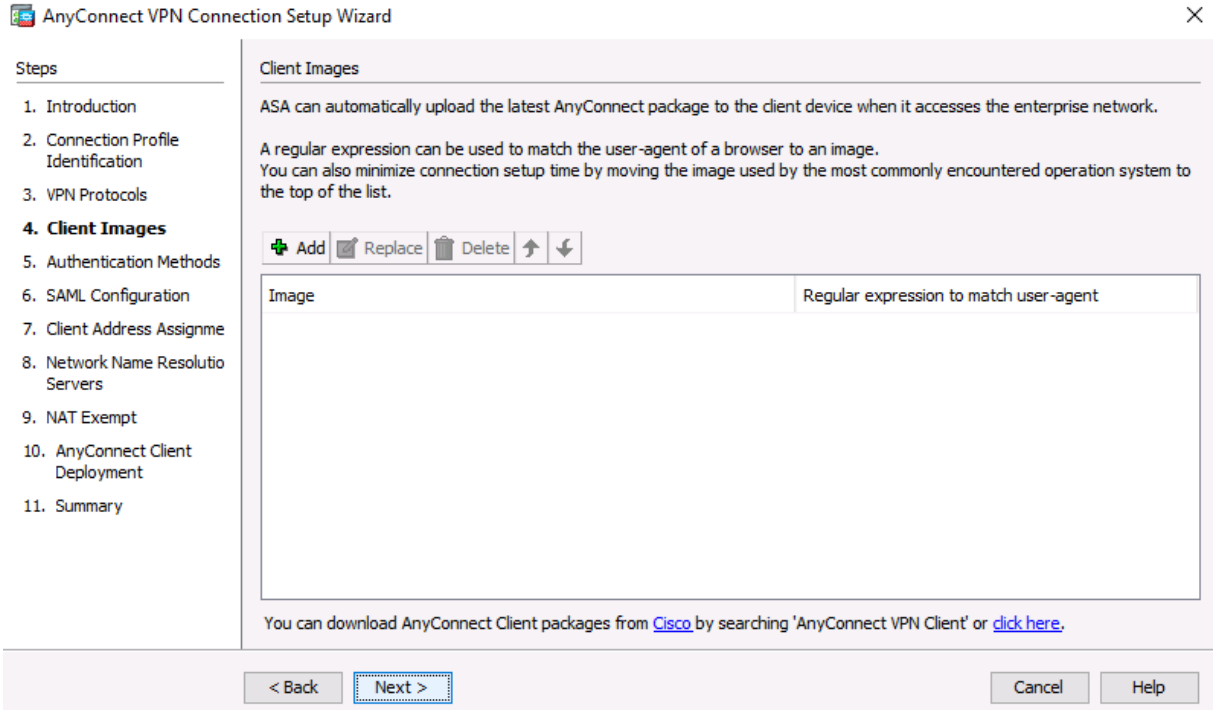
Step 3: Specify the VPN encryption protocol.

On the VPN Protocols screen, **uncheck** the **IPsec** check box and leave the **SSL** check box checked. Do not specify a device certificate. Click **Next** to continue.

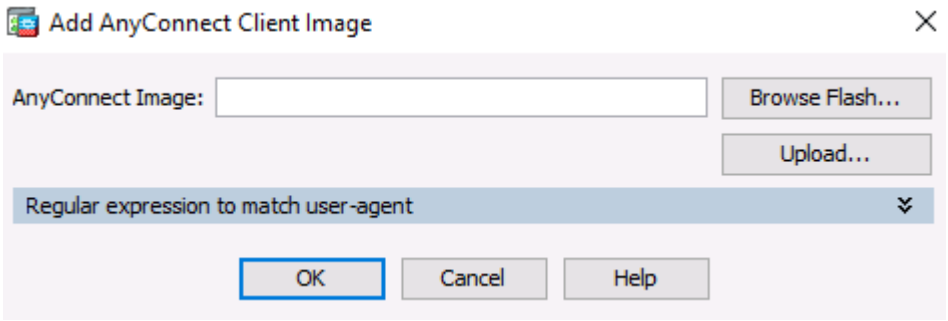


Step 4: Specify the client image to upload to AnyConnect users.

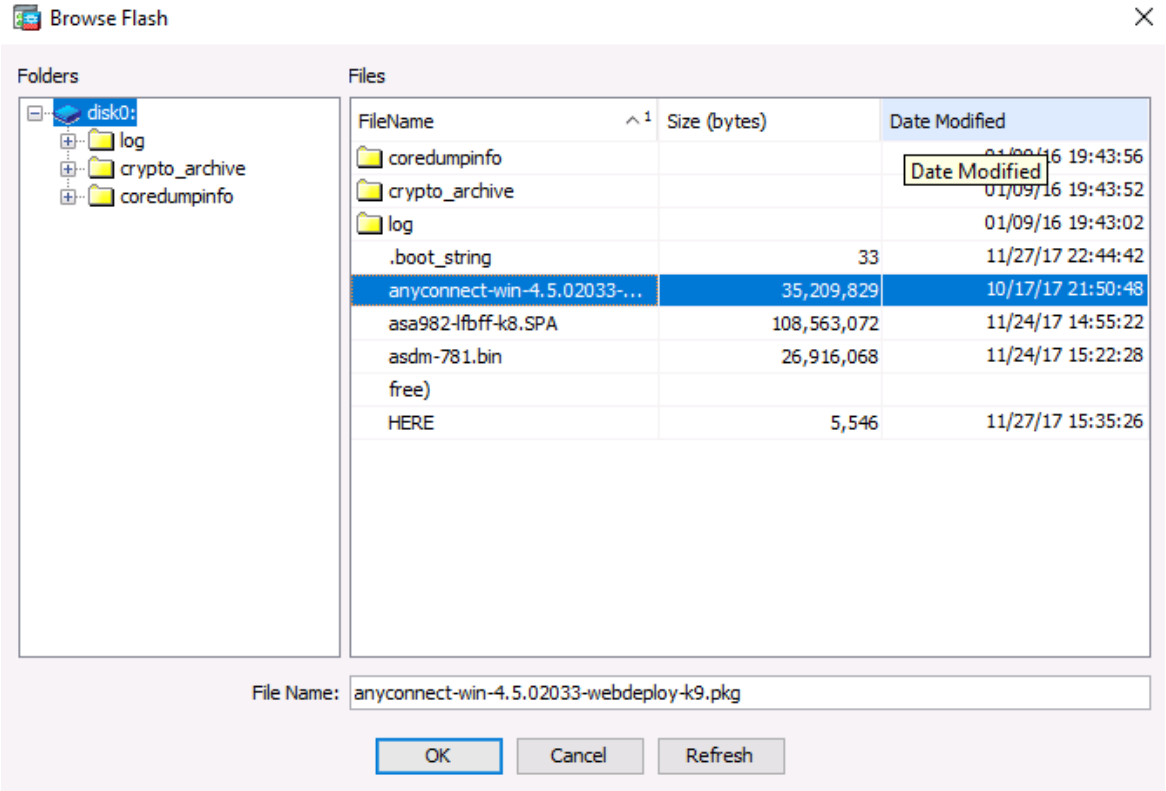
a. On the Client Images screen, click **Add** to specify the AnyConnect client image filename.



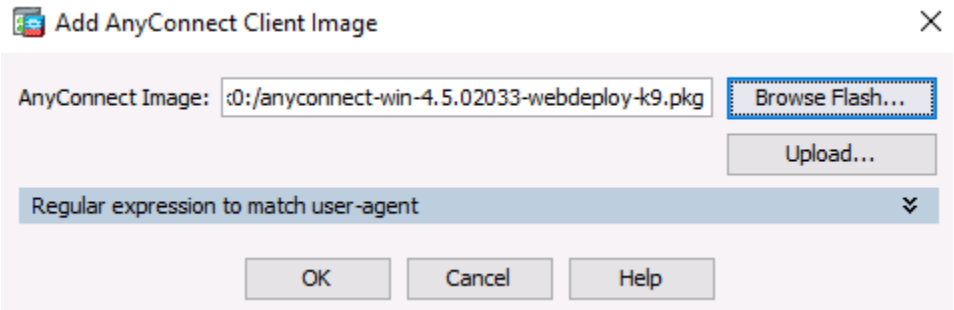
b. In the Add AnyConnect Client Image window, click **Browse Flash**.



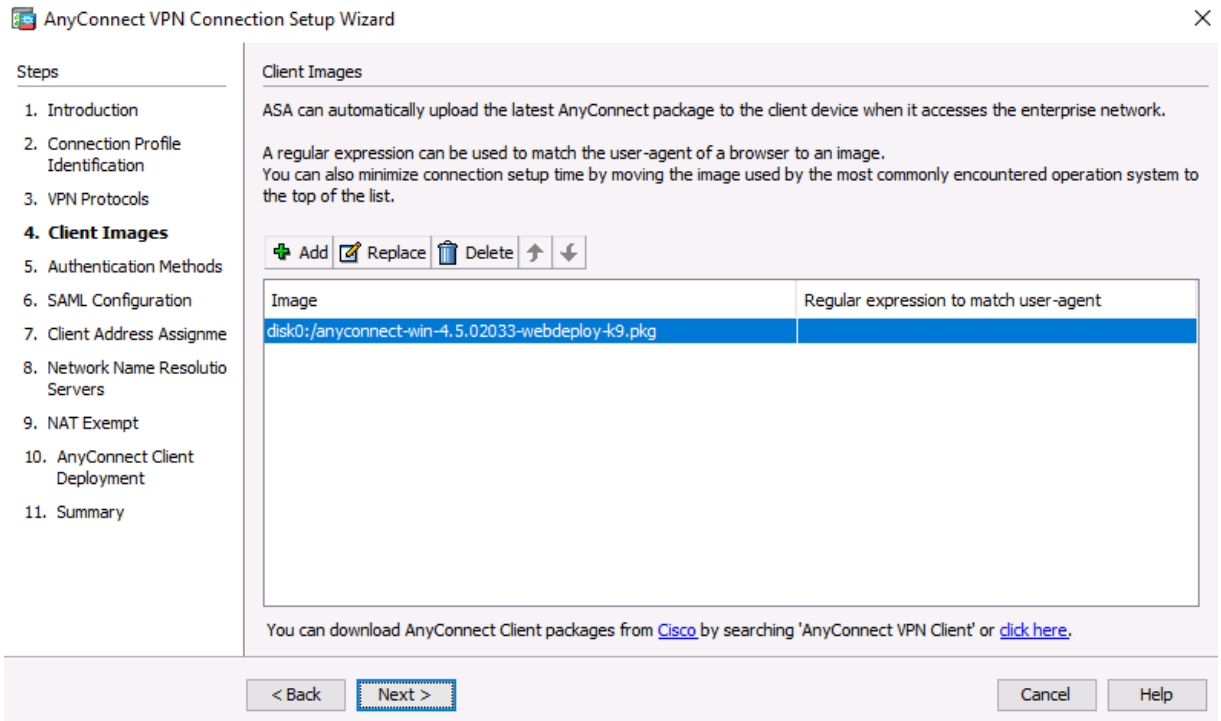
c. In the Browse Flash window, select the AnyConnect package file for Windows (**anyconnect-win-4.XXXXXXXX.pkg**, see the example). Click **OK** to return to the AnyConnect Client Image window.



d. Click **OK** again to return to the Client Image window.



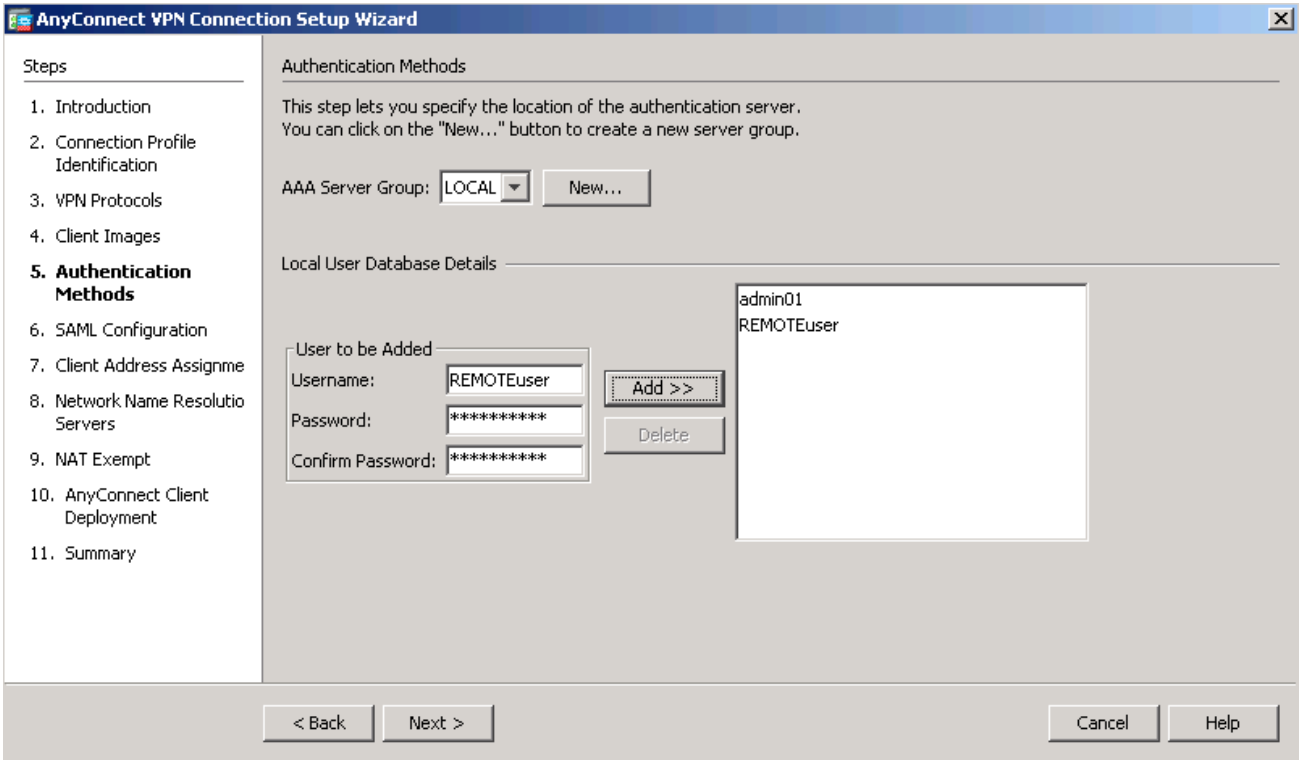
e. The selected image is now displayed on the Client Image window. Click **Next** to continue.



Step 5: Configure AAA local authentication.

a. On the Authentication Methods screen, ensure that the AAA Server Group is specified as **LOCAL**.

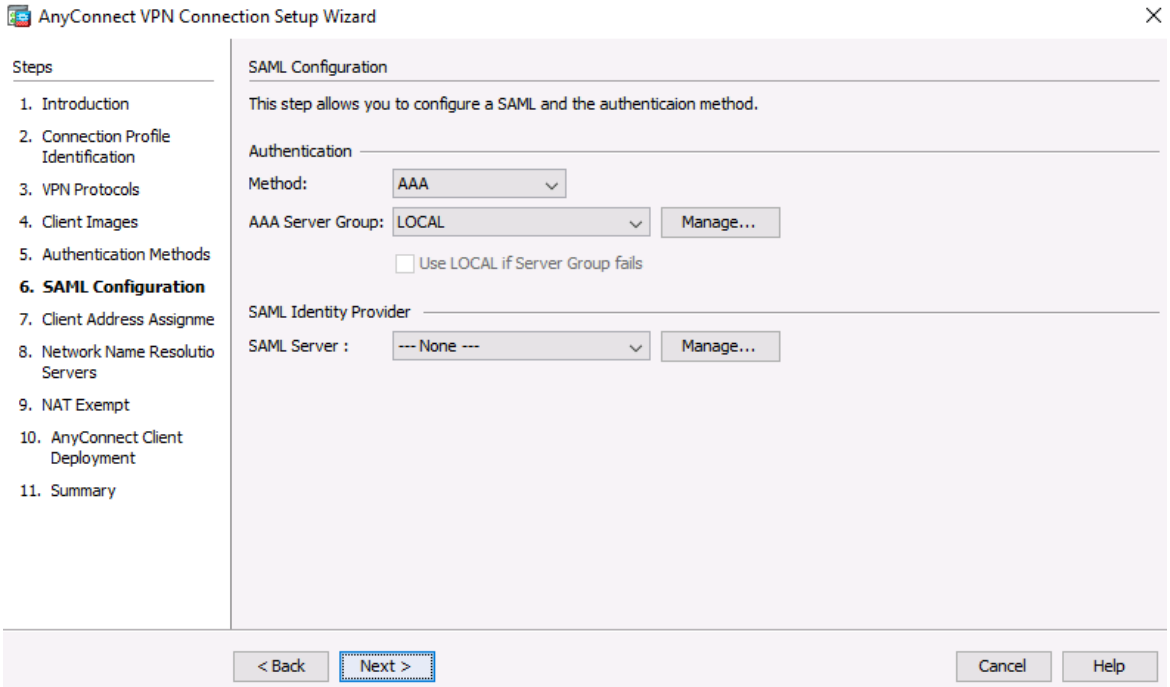
b. Enter a new user named **REMOTEuser** with the password **cisco12345**. Click **Add**.



c. Click **Next** to continue.

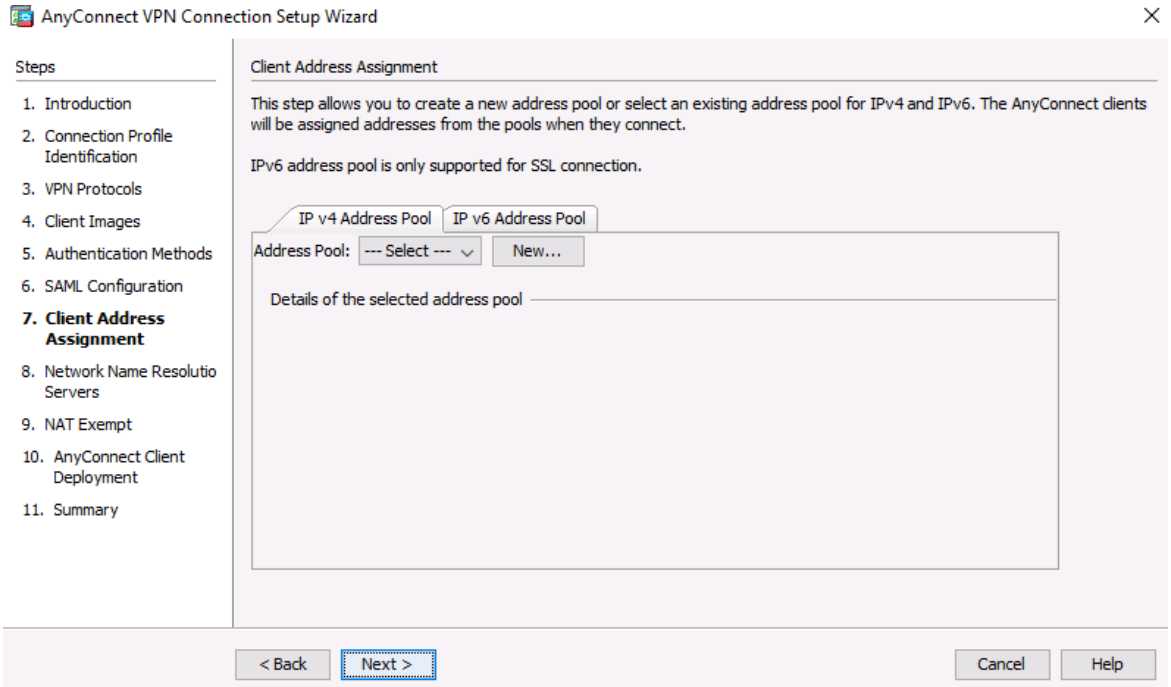
Step 6: Configure the SAML Configuration.

a. Leave the default settings for a SAML and the authentication method and click **Next**.

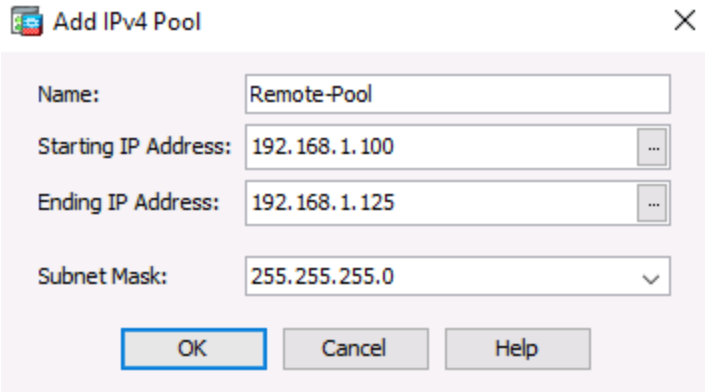


Step 7: Configure the client address assignment.

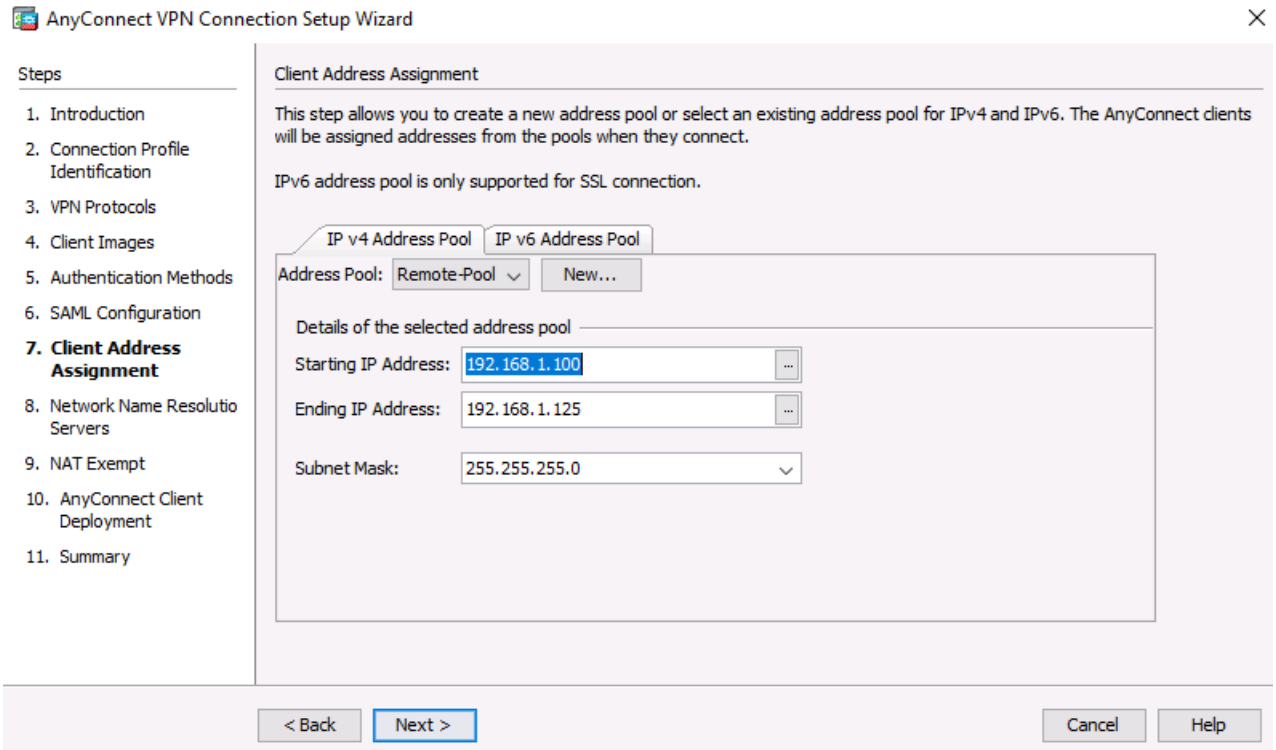
a. In the Client Address Assignment window, click **New** to create an IPv4 address pool.



b. In the Add IPv4 Pool window, name the pool **Remote-Pool** with a starting IP address of **192.168.1.100**, an ending IP address of **192.168.1.125**, and a subnet mask of **255.255.255.0**. Click **OK** to return to the Client Address Assignment window, which now displays the newly created remote user IP address pool.

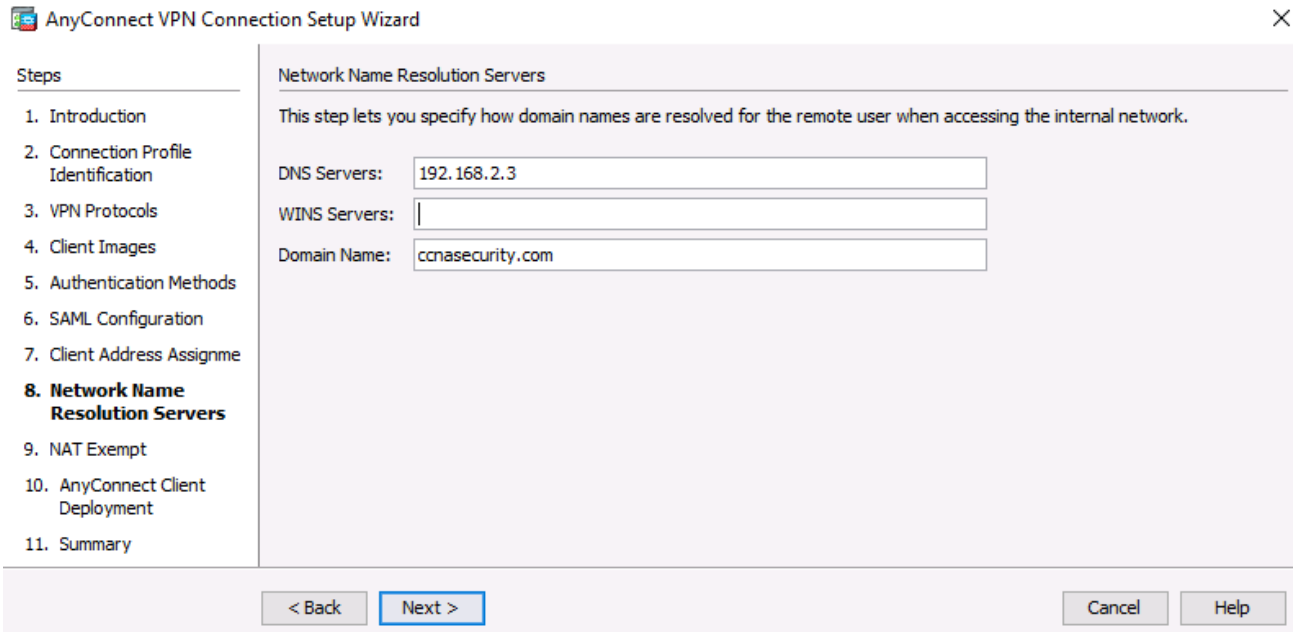


c. The Client Address Assignment window now displays the newly created remote user IP address pool. Click **Next** to continue.



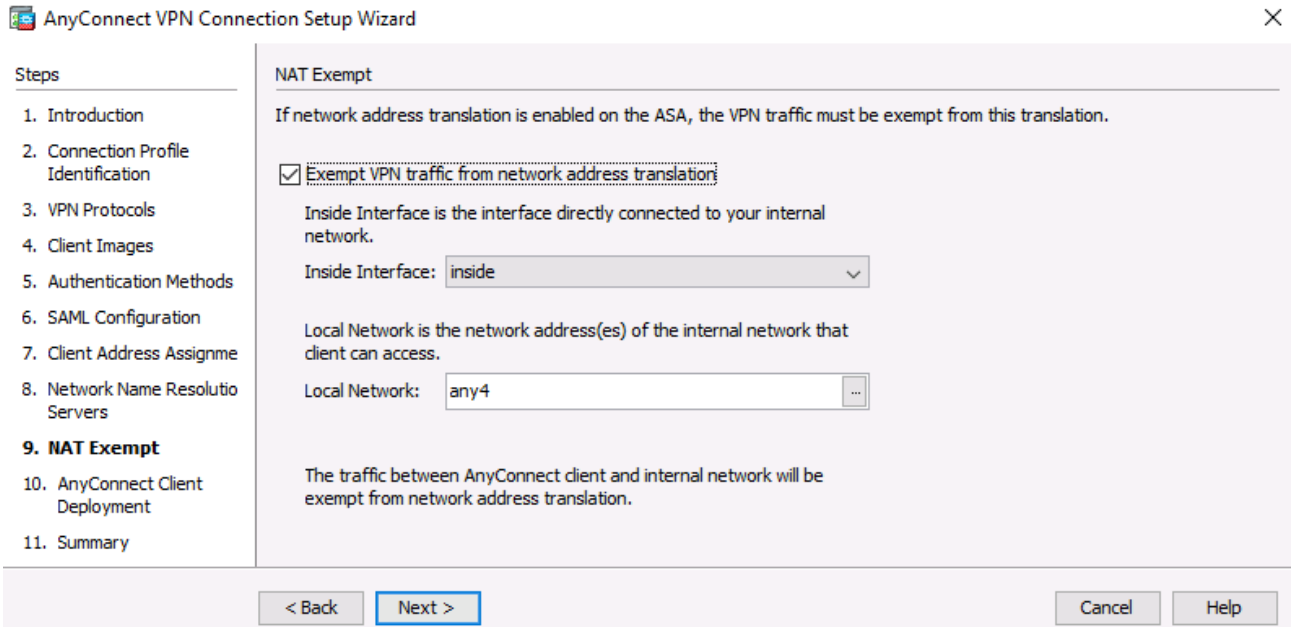
Step 8: Configure the network name resolution.

On the Network Name Resolution Servers screen, enter the IP address of a DNS server (**192.168.2.3**). Leave the current domain name as **ccnasecurity.com**. Click **Next** to continue.



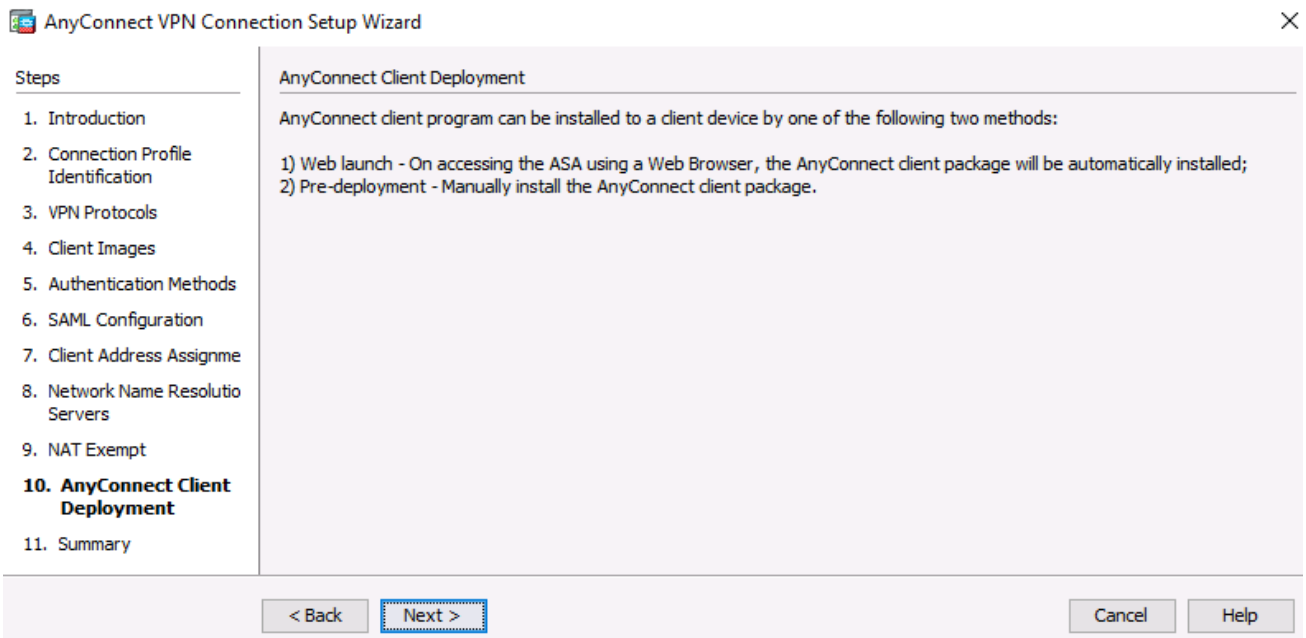
Step 9: Exempt address translation for VPN traffic.

On the NAT Exempt screen, click the **Exempt VPN traffic from network address translation** check box. Do not change the default entries for the Inside Interface (**inside**) and the Local Network (**any4**). Click **Next** to continue.



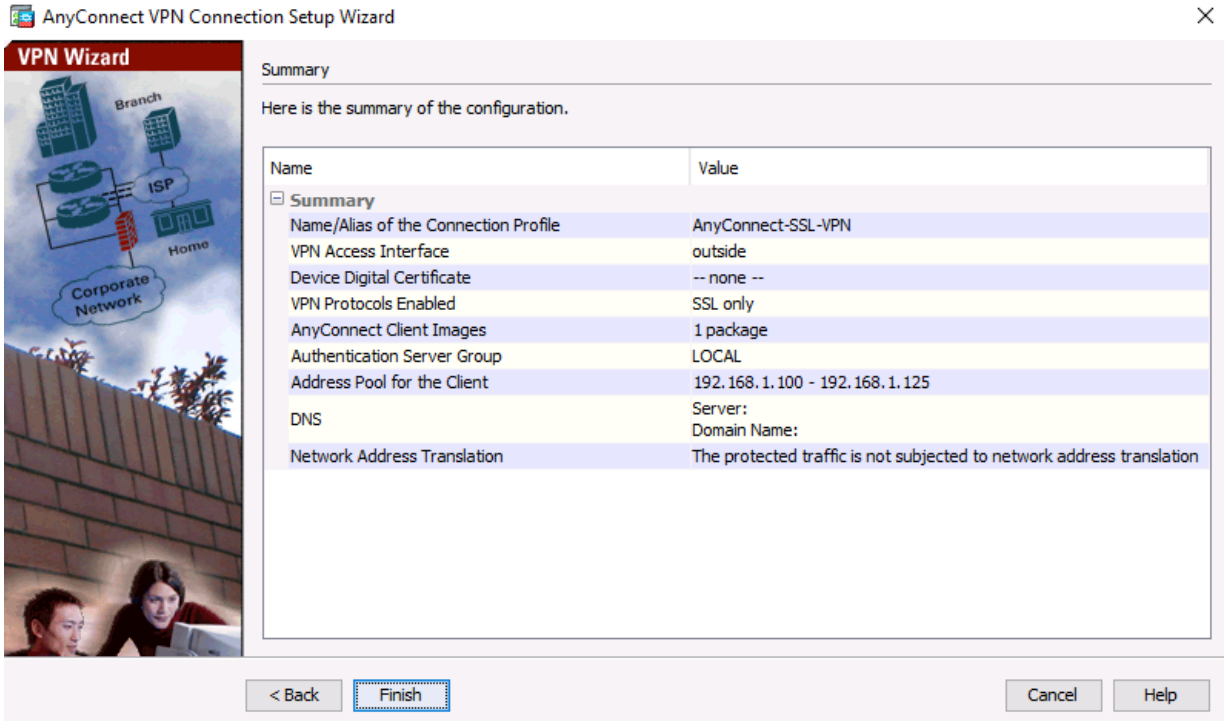
Step 10: Review the AnyConnect client deployment details.

On the AnyConnect Client Deployment screen, read the text describing the options, and then click **Next** to continue.



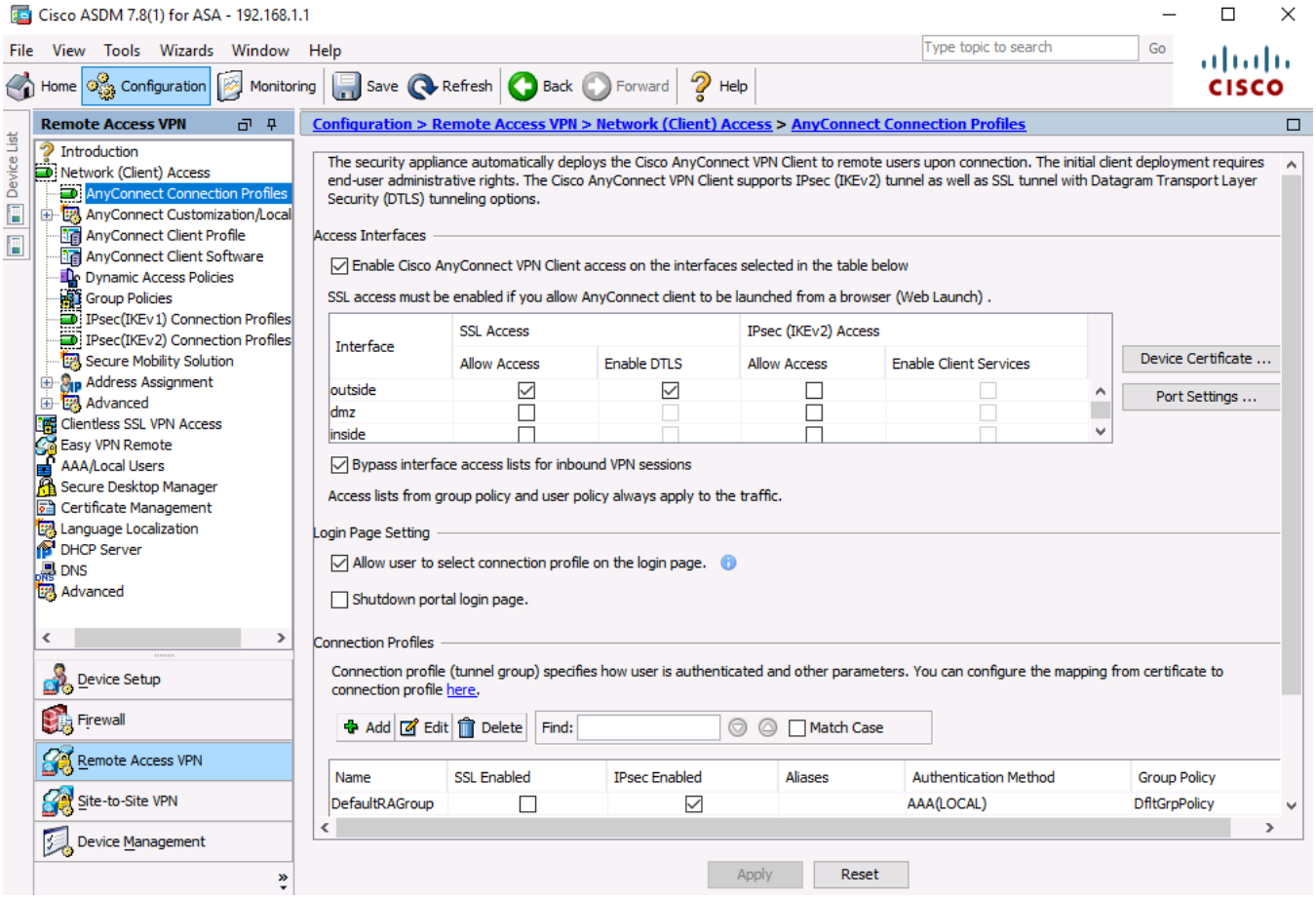
Step 11: Review the Summary screen and apply the configuration to the ASA.

On the Summary screen, review the configuration description and then click **Finish**.



Step 12: Verify the AnyConnect client profile.

After the configuration is delivered to the ASA, the AnyConnect Connection Profiles screen displays.



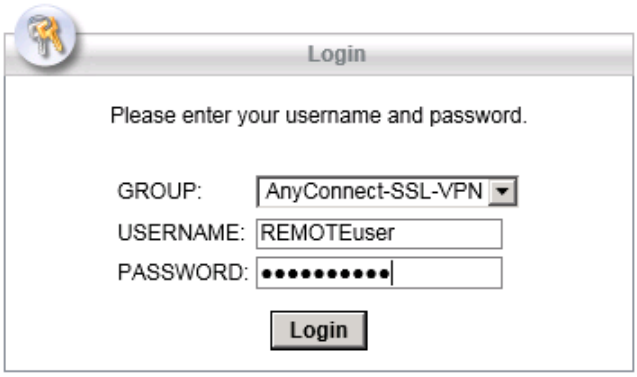
Part 4: Connecting to an AnyConnect SSL VPN

Step 1: Log in from the remote host.

a. Initially, you will establish a clientless SSL VPN connection to the ASA in order to download the AnyConnect client software. Open a web browser on PC-C. In the address field of the browser, enter **https://209.165.200.226** for the SSL VPN. SSL is required to connect to the ASA, therefore, use secure HTTP (HTTPS).

   Note: If you encounter a prompt stating that the connection is not trusted or secure, accept the self-signed certificate to continue.

b. Enter the created username **REMOTEuser** with the password **cisco12345**. Click **Login** to continue.



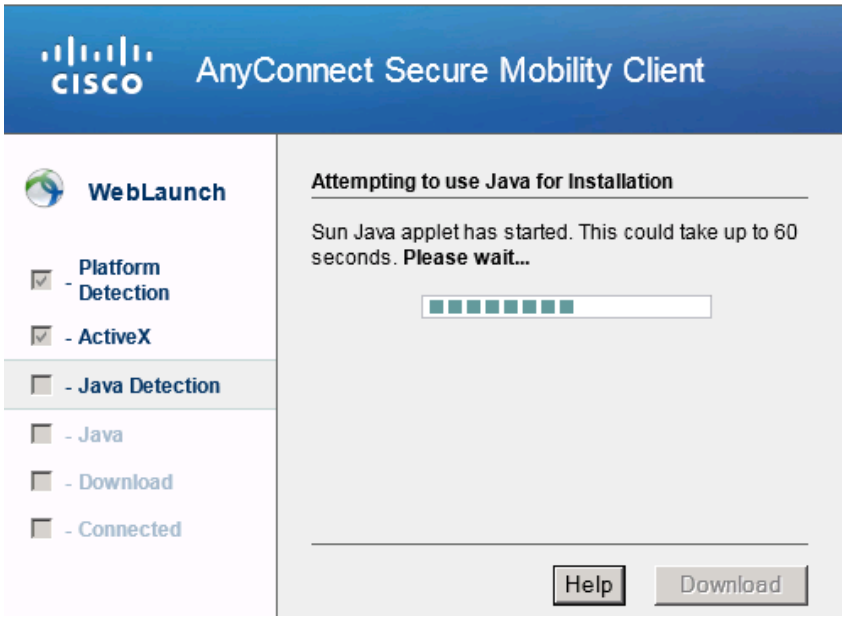
Note: The ASA may request confirmation that this is a trusted site. If requested, click **Yes** to proceed.

Step 2: Perform platform detection (if required).

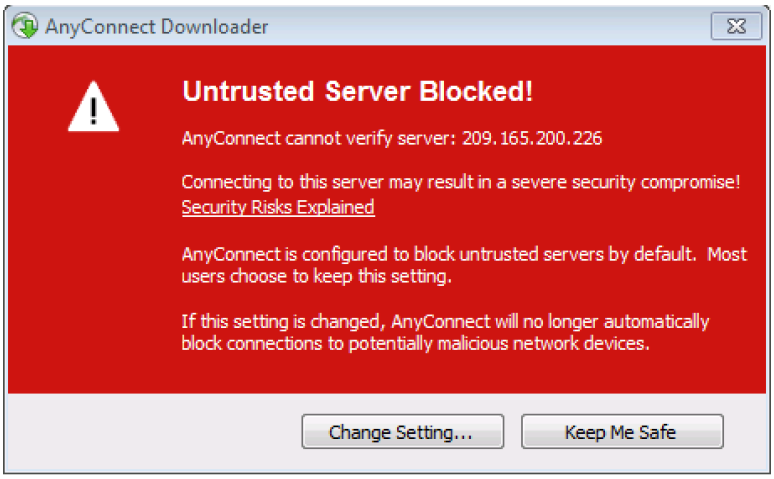
If the AnyConnect client must be downloaded, a security warning will display on the remote host. The ASA will detect whether ActiveX is available on the host system. In order for ActiveX to operate properly with the Cisco ASA, it is important that the security appliance is added as a trusted network site.

Note: If ActiveX is not detected, the AnyConnect client software must be manually downloaded and installed. Skip to **Step 3** for instructions on how to manually download the AnyConnect client software.

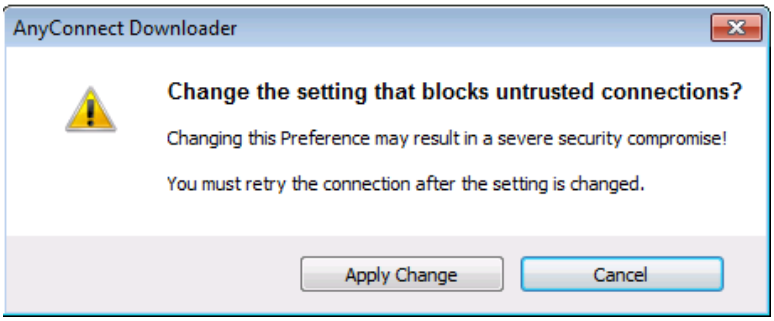
a. The ASA will begin a software auto-download process consisting of a series of compliance checks for the target system. The ASA performs the platform detection by querying the client system in an attempt to identify the type of client connecting to the security appliance. Based on the platform that is identified, the proper software package may be auto-downloaded.



b. If you are presented with the AnyConnect Downloader window that indicates the 209.165.200.226 AnyConnect server could not be verified, click the **Change Setting** button.

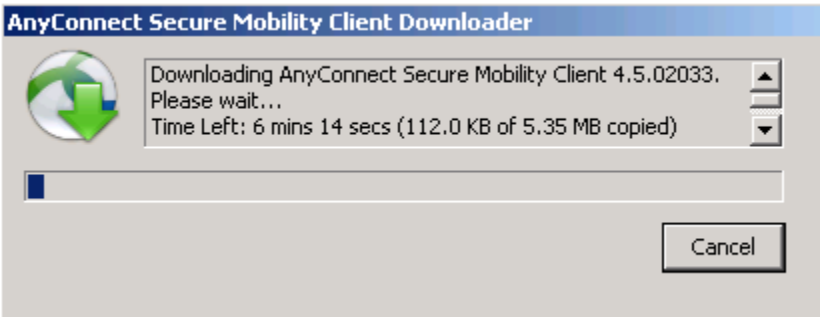


c. The AnyConnect Downloader will present a verification window to change the setting that blocks untrusted connections. Click **Apply Change**.

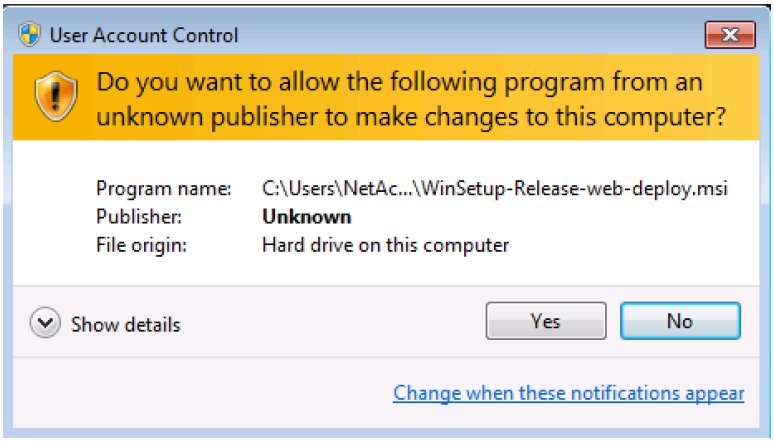


d. If you receive the Security Waning: Untrusted Server Certificate message, Click **Connect Anyway**.

e. The AnyConnect Secure Mobility Client Downloader window counts down the download time.



f. After the download is complete, the software will automatically start to install. Click **Yes** if asked to allow the program to make changes to the computer.



g. When installation is complete, the AnyConnect client will establish the SSL VPN connection.

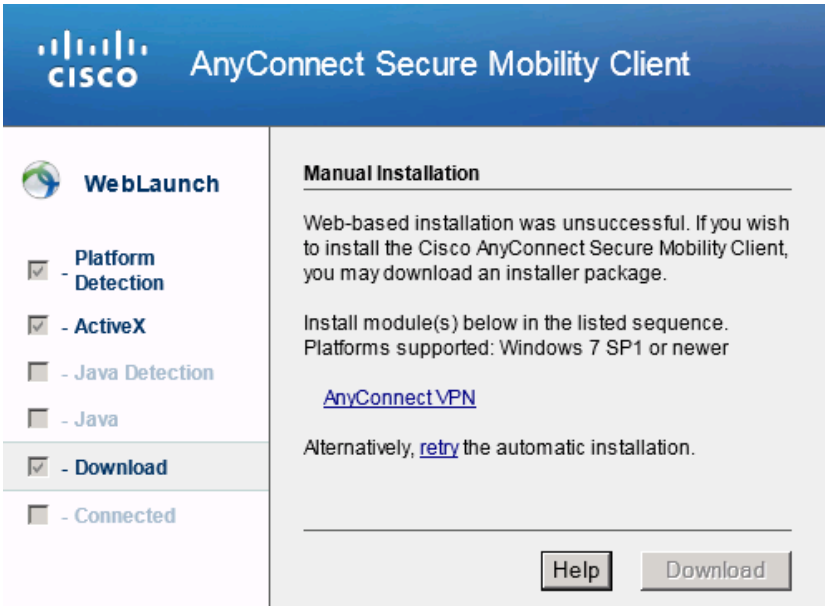
h. If the **Connected** option in the panel on the left is checked, skip to **Step 5**.
If the Connect option is not checked, continue to **Step 3**.

Step 3: Install the AnyConnect VPN Client (if required).

If ActiveX is not detected, the AnyConnect client software must be manually downloaded and installed.

a. On the Manual Installation screen, click **Download**.

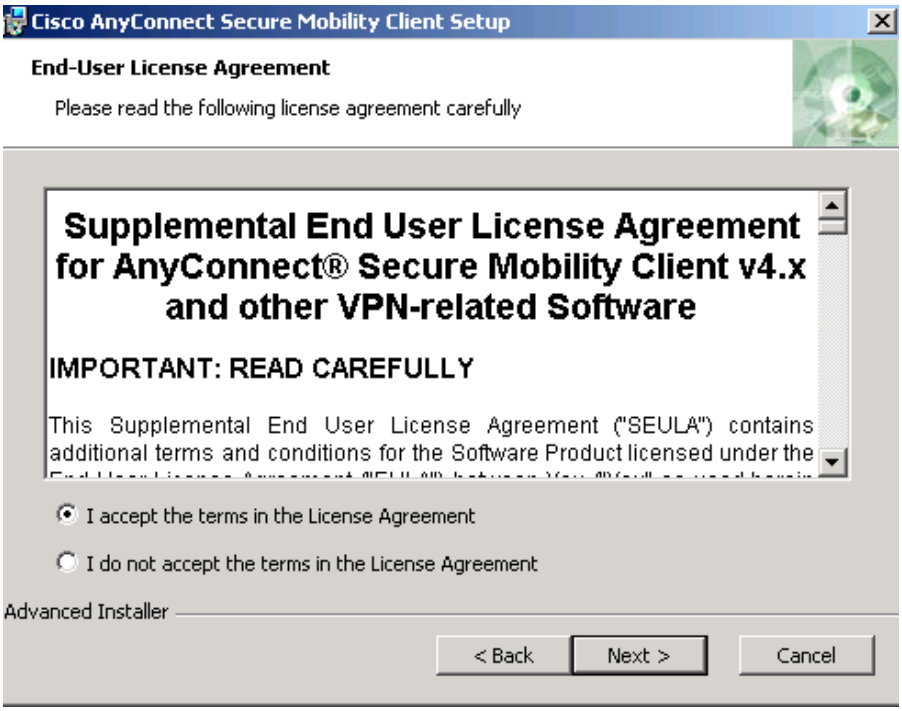
b. Click on the module **AnyConnect VPN**



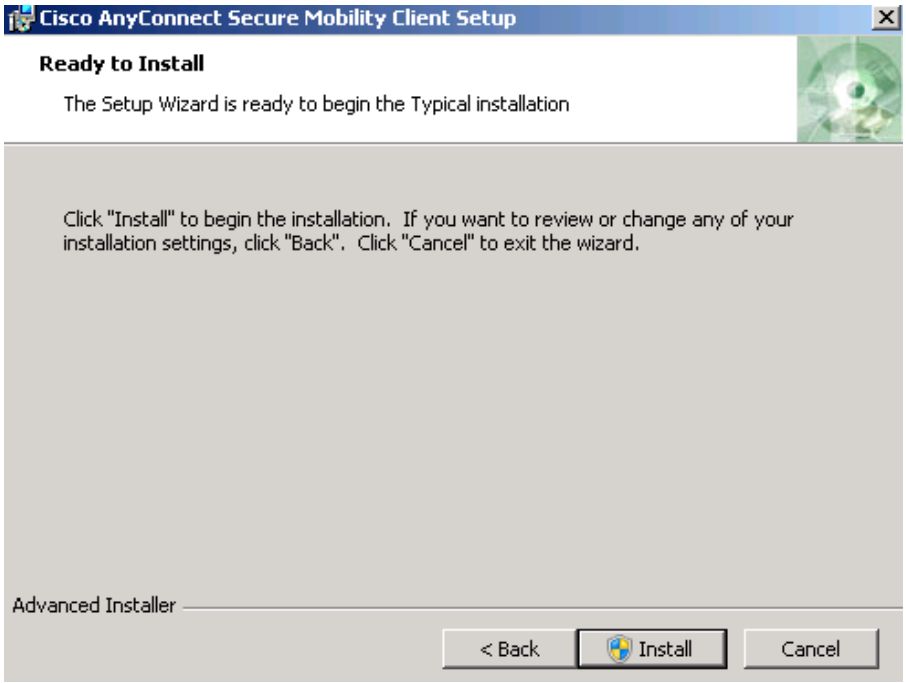
c. Click **Run** to install the AnyConnect VPN client.

d. After the download is complete, the Cisco AnyConnect VPN Client Setup starts. Click **Next** to continue.

e. Read the End-User License Agreement. Select **I accept the terms in the License Agreement** and click **Next** to continue.

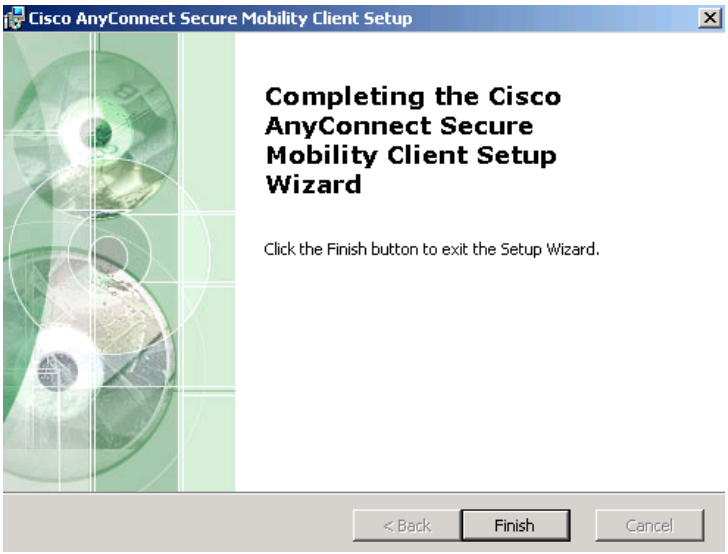


f. The Ready to Install window is displayed. Click **Install** to continue.



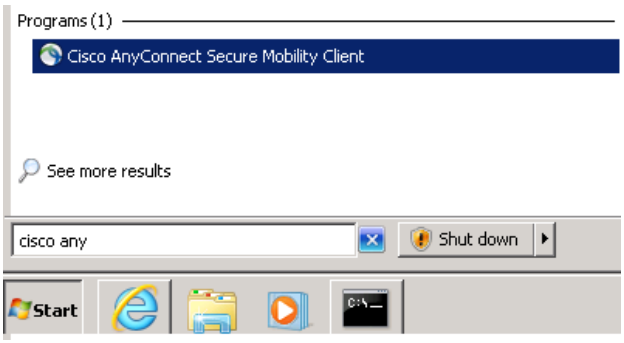
Note: If a security warning is displayed, click **Yes** to continue.

g. Click **Finish** to complete the installation.

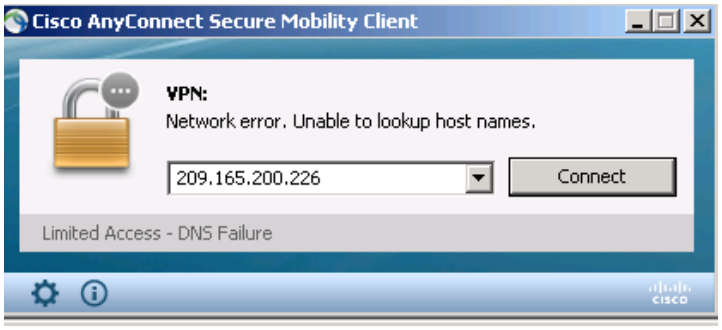


Step 4: Establish an AnyConnect SSL VPN Connection.

a. When the AnyConnect VPN client has been installed, manually start the program by clicking **Start**, type **cisco any** and select **Cisco AnyConnect Secure Mobility Client** to launch the program.



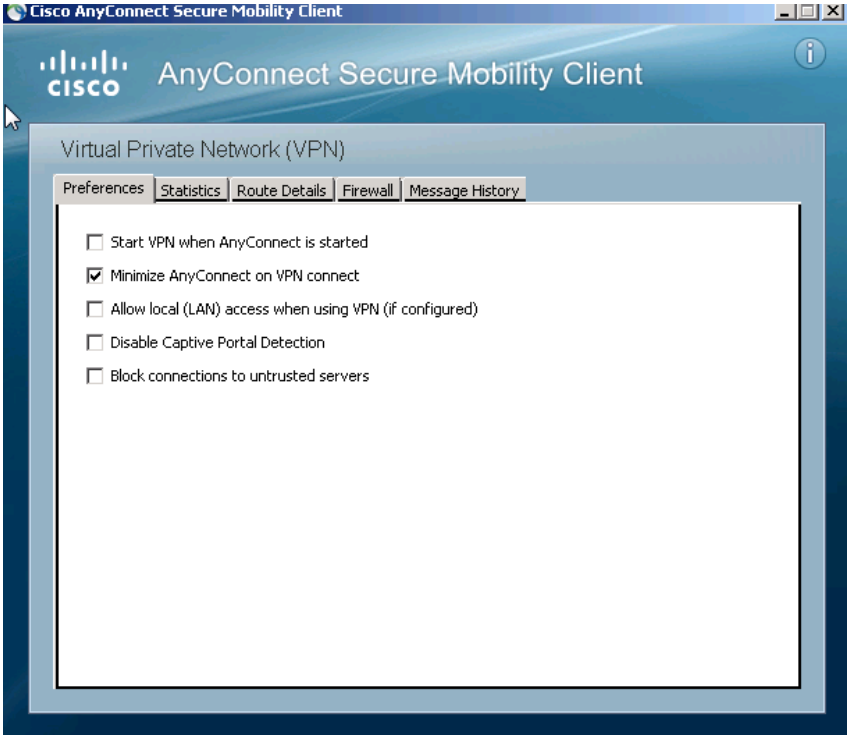
b. When prompted to enter the secure gateway address, enter **209.165.200.226** in the Connect to field, and click **Connect**.



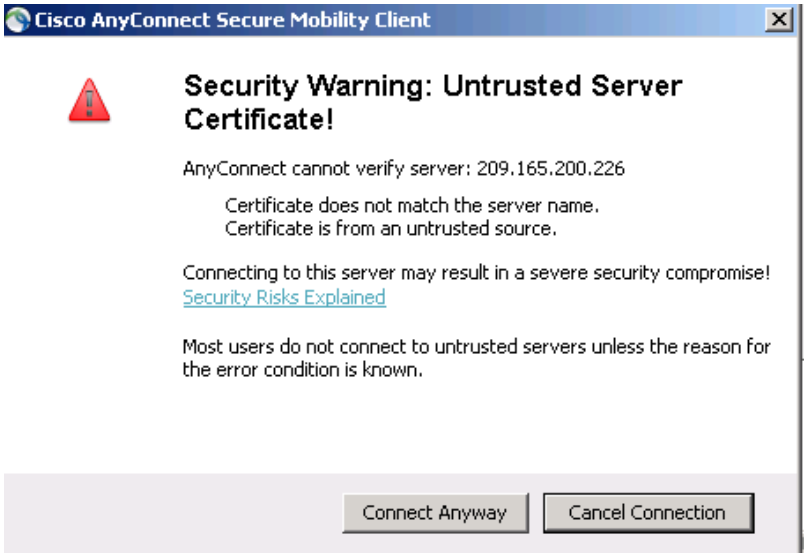
Note: If a security warning is displayed, click **Yes** to proceed.

c. If you are presented with the AnyConnect Secure Mobility Client window that indicates the 209.165.200.226 AnyConnect server could not be verified, click the **Change Setting** button. (Otherwise Proceed to Step **e.**)

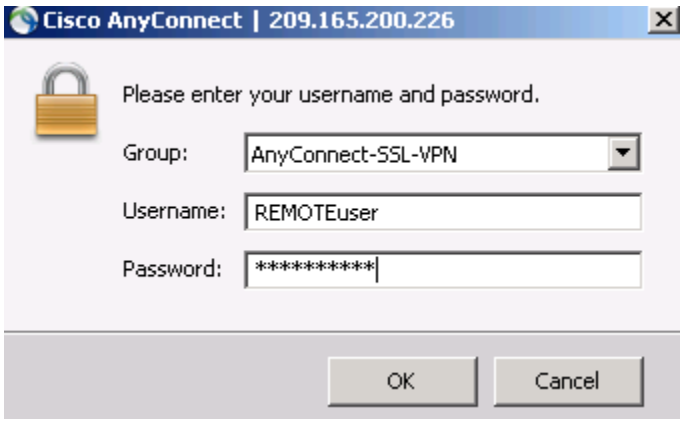
d. The AnyConnect Downloader will present a window. Remove the checkmark from “Block connections to untrusted servers”. Close the window and Connect to 209.165.200.226 again.



e. If you receive the Security Warning: Untrusted Server Certificate! Window, click **Connect Anyway**



f. When prompted, enter **REMOTEuser** for the username and **cisco12345** as the password and click **OK.**

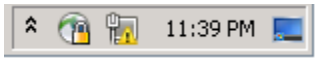


NOTE: If you receive a Login Failed message, go to PC-B ASDM **Monitoring** > **VPN** > **VPN Statistics** > **Sessions**.

Click the Filter By: dropdown and select "**All Remote Access**" and then click **Logout** for the current VPN sessions. And then try to connect from PC-C again.

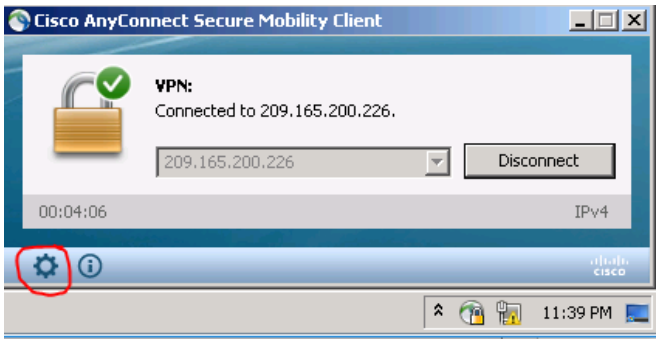
Step 5: Confirm VPN connectivity.

When the full tunnel SSL VPN connection is established, an icon will appear in the system tray that signifies that the client has successfully connected to the SSL VPN network.

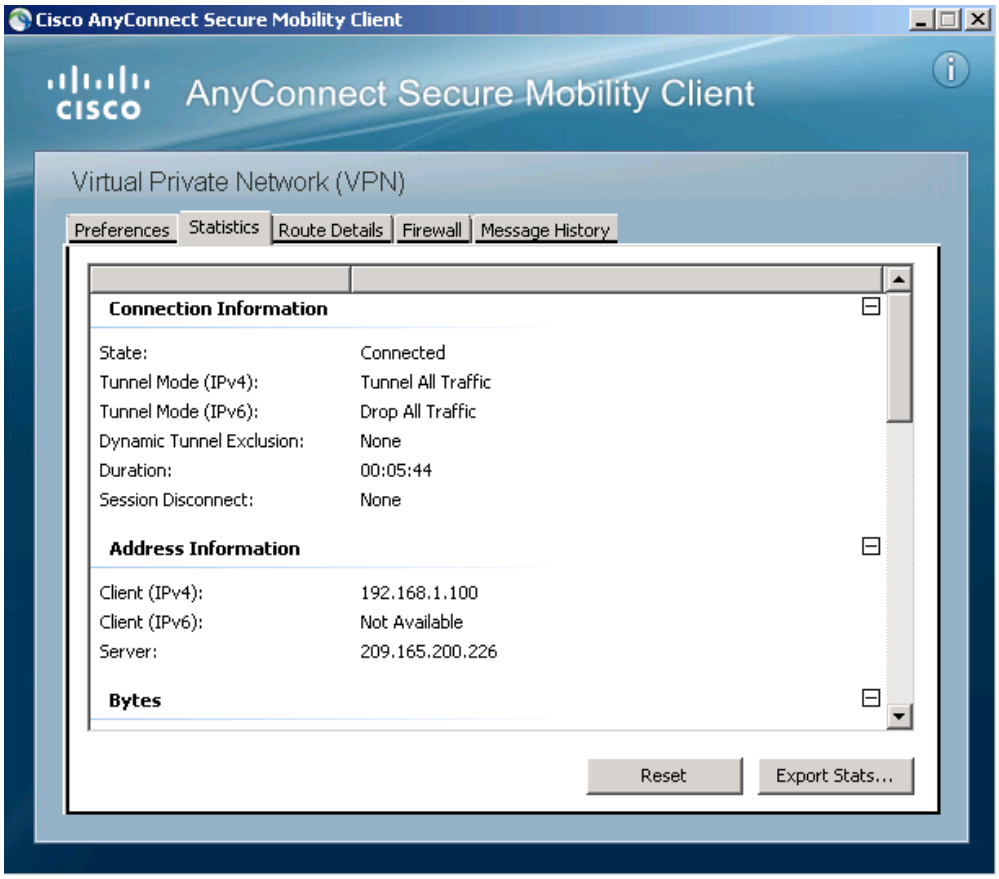


a. Display connection statistics and information by double-clicking the **AnyConnect** icon in the system tray. You can also disconnect the SSN VPN session from here.

b. Click the **gear icon** at the bottom left corner of the Cisco AnyConnect Secure Mobility client window.



c. Use the scroll bar on the right side of the Virtual Private Network (VPN) – Statistics tab for additional connection information.



Note: The inside IP address that is assigned to the client from the VPN pool is 192.168.1.100-125.

d. From a command prompt on the remote host PC-C, verify the IP addressing by using the **ipconfig** command.
Notice that there are two IP addresses listed. One is for the PC-C remote host local IP address (172.16.3.3) and the other is the IP address assigned to the SSL VPN tunnel (192.168.1.100).

```
C:\Windows\system32\cmd.exe
C:\>
C:\>
C:\>
C:\>ipconfig

Windows IP Configuration


Ethernet adapter Local Area Connection 4:

   Connection-specific DNS Suffix  . : ccnasecurity.com
   IPv4 Address. . . . . . . . . . . : 192.168.1.100
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . : 192.168.1.1

Ethernet adapter Local Area Connection:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::a465:e5d3:7d9e:2435%11
   IPv4 Address. . . . . . . . . . . : 172.16.3.3
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . : 172.16.3.1
```

e. From remote host PC-C, ping PC-B (**192.168.1.3**) to verify connectivity.

```
C:\Windows\system32\cmd.exe
C:\>
C:\>ping 192.168.1.3

Pinging 192.168.1.3 with 32 bytes of data:
Reply from 192.168.1.3: bytes=32 time=207ms TTL=128
Reply from 192.168.1.3: bytes=32 time=45ms TTL=128
Reply from 192.168.1.3: bytes=32 time=45ms TTL=128
Reply from 192.168.1.3: bytes=32 time=45ms TTL=128

Ping statistics for 192.168.1.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 45ms, Maximum = 207ms, Average = 85ms

C:\>_
```

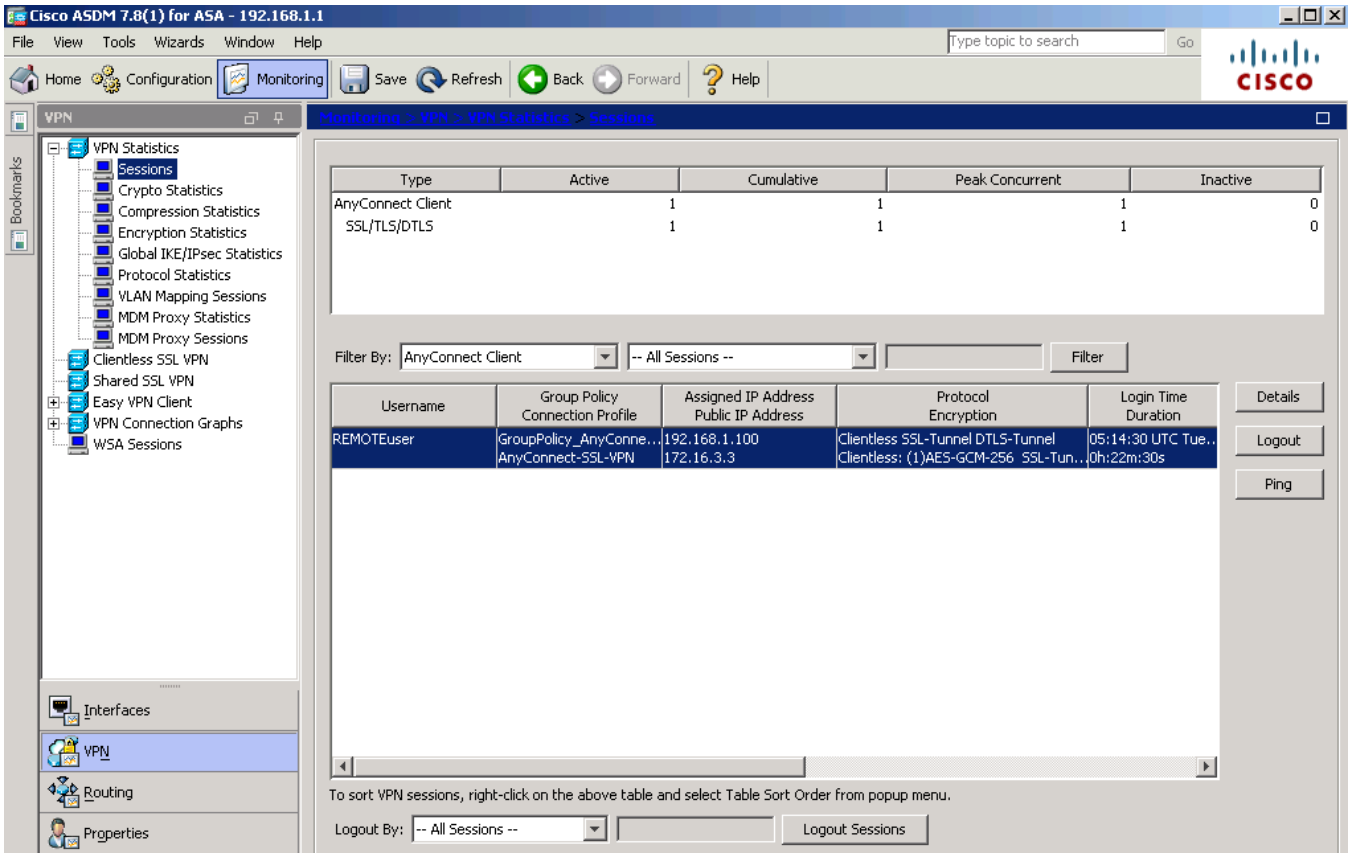
Step 6: Use the ASDM Monitor to view the AnyConnect remote user session.

Note: Future SSL VPN sessions can be launched through the web portal or through the installed Cisco AnyConnect SSL VPN client. While the remote user at PC-C is still logged in using the AnyConnect client, you can view the session statistics by using the ASDM monitor.

Return to the ASDM on PC-B. On the ASDM menu bar, click **Monitoring** and then select **VPN** > **VPN Statistics** > **Sessions**.

Click the **Filter By** pull-down list and select **AnyConnect Client**.
You should see the **Remoteuser** session logged in from PC-C, which has been assigned an inside network IP address of 192.168.1.100 by the ASA.

Note: You may need to click **Refresh** to display the remote user session.



Reflection

1. Describe at least two benefits of client–based vs. clientless VPNs?

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_____

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2. Describe at least one difference between using SSL compared to IPsec for remote access tunnel encryption?

_____

_____

_____

_____

Router Interface Summary Table

Router Interface Summary				
Router Model	**Ethernet Interface #1**	**Ethernet Interface #2**	**Serial Interface #1**	**Serial Interface #2**
1800	Fast Ethernet 0/0 (F0/0)	Fast Ethernet 0/1 (Fa0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
1900	Gigabit Ethernet 0/0 (G0/0)	Gigabit Ethernet 0/1 (G0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
2801	Fast Ethernet 0/0 (F0/0)	Fast Ethernet 0/1 (F0/1)	Serial 0/1/0 (S0/1/0)	Serial 0/1/1 (S0/1/1)
2811	Fast Ethernet 0/0 (F0/0)	Fast Ethernet 0/1 (F0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
2900	Gigabit Ethernet 0/0 (G0/0)	Gigabit Ethernet 0/1 (G0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
Note: To find out how the router is configured, look at the interfaces to identify the type of router and how many interfaces the router has. There is no way to effectively list all the combinations of configurations for each router class. This table includes identifiers for the possible combinations of Ethernet and Serial interfaces in the device. The table does not include any other type of interface, even though a specific router may contain one. An example of this might be an ISDN BRI interface. The string in parenthesis is the legal abbreviation that can be used in Cisco IOS commands to represent the interface.				