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Cisco Secure ACS for Windows v3.2 With PEAP−MS−CHAPv2 Machine Authentication

Document ID: 43486

Introduction

This document demonstrates how to configure Protected Extensible Authentication Protocol (PEAP) with Cisco Secure ACS for Windows version 3.2.

Prerequisites

Requirements

There are no specific prerequisites for this document.

Components Used

The information in this document is based on the software and hardware versions below.

- Cisco Secure ACS for Windows version 3.2
- Microsoft Certificate Services (installed as Enterprise root certificate authority [CA])

Note: For more information, refer to Step−by−Step Guide to Setting up a Certification Authority .

- DNS Service with Windows 2000 Server with Service Pack 3

  Note: If you experience CA Server problems, install hotfix 323172 . The Windows 2000 SP3 Client requires hotfix 313664 to enable IEEE 802.1x authentication.
- Cisco Aironet 1200 Series Wireless Access Point 12.01T
- IBM ThinkPad T30 running Windows XP Professional with Service Pack 1

The information presented in this document was created from devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If you are working in a live network, ensure that you understand the potential impact of any command before using it.

Background Theory

Both PEAP and EAP−TLS build and use a TLS/Secure Socket Layer (SSL) tunnel. PEAP uses only server−side authentication; only the server has a certificate and proves its identity to the client. EAP−TLS, however, uses mutual authentication in which both the ACS (authentication, authorization, and accounting [AAA]) server and clients have certificates and prove their identities to each other.

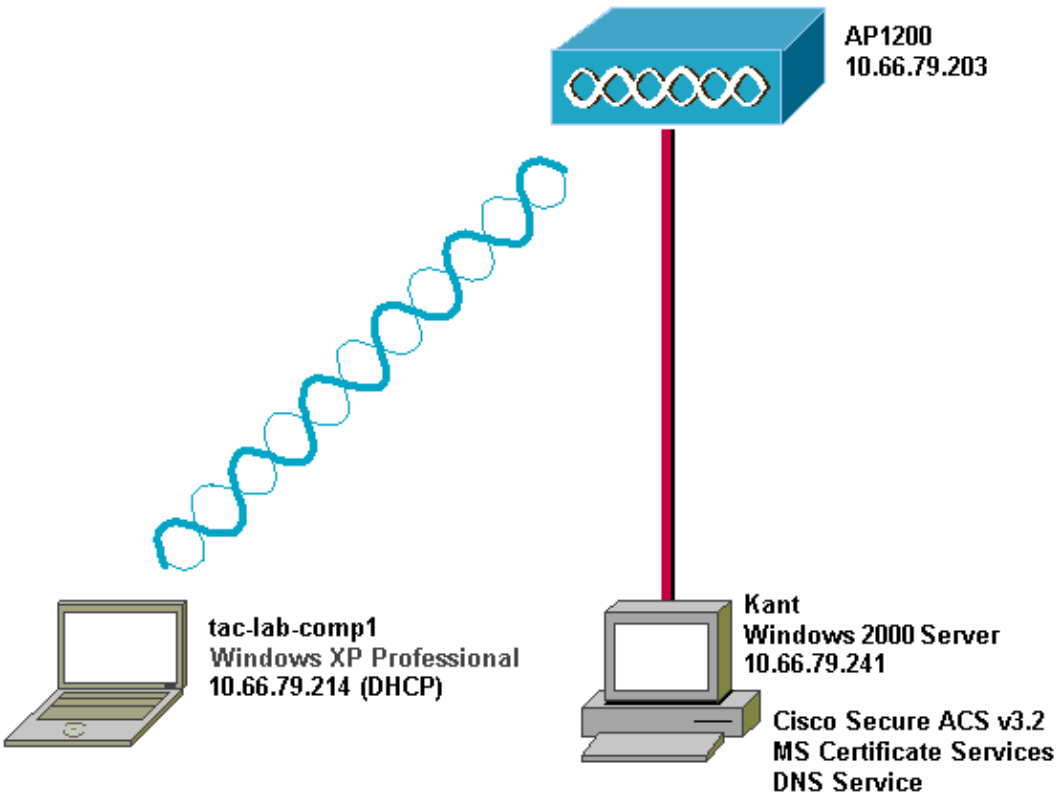
PEAP is convenient because clients do not require certificates. EAP−TLS is useful for authenticating headless devices, because certificates require no user interaction.

Conventions

For more information on document conventions, see the Cisco Technical Tips Conventions.

Network Diagram

This document uses the network setup shown in the diagram below.



Configuring Cisco Secure ACS for Windows v3.2

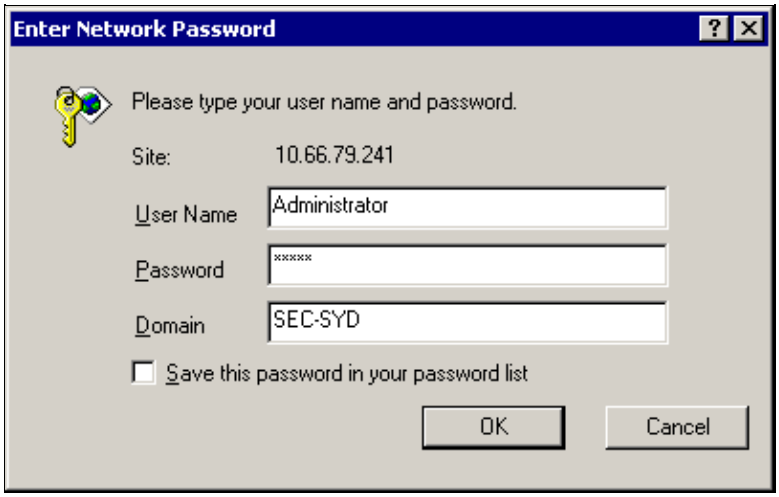
Follow the steps below to configure ACS 3.2.

1. Obtain a certificate for the ACS server.
2. Configure ACS to use a certificate from storage.
3. Specify additional certificate authorities that the ACS should trust.
4. Restart the service and configure PEAP settings on the ACS.
5. Specify and configure the access point as an AAA client.
6. Configure the external user databases.
7. Restart the service.

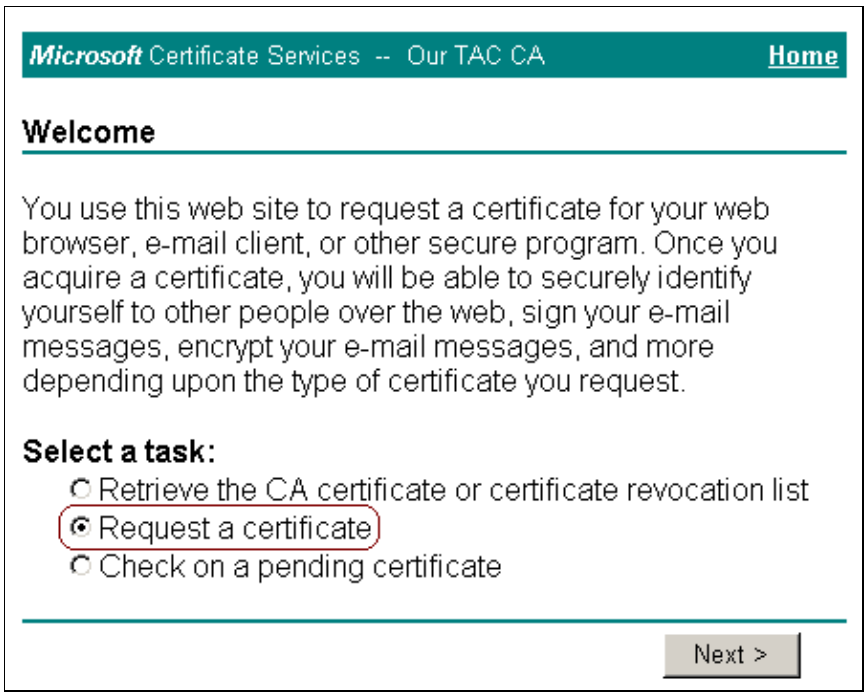
Obtain a Certificate for the ACS Server

Follow these steps to obtain a certificate.

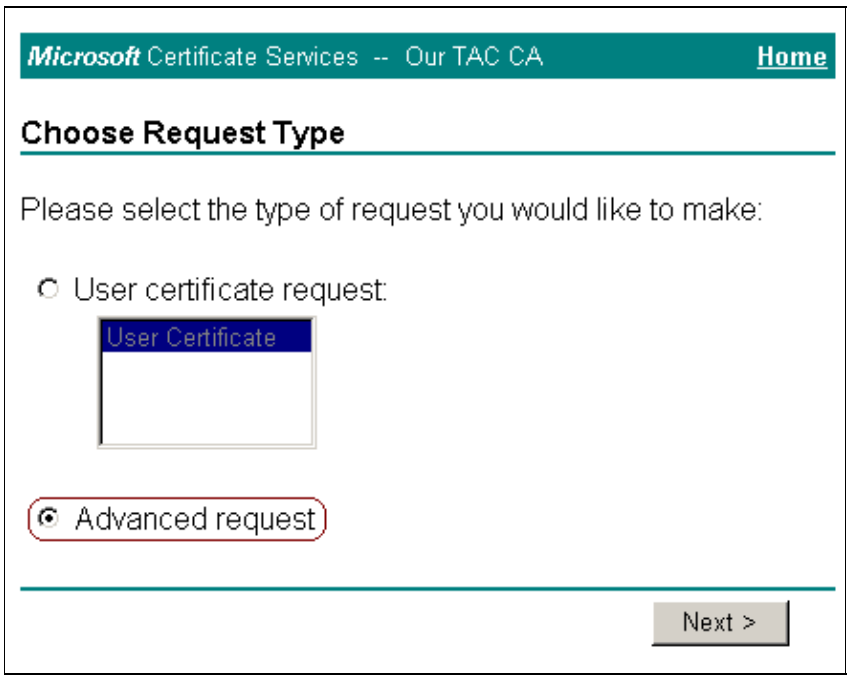
1. On the ACS server, open a web browser and browse to the CA server by entering **http://*CA−ip−address*/certsrv** in the address bar. Log in to the domain as Administrator.



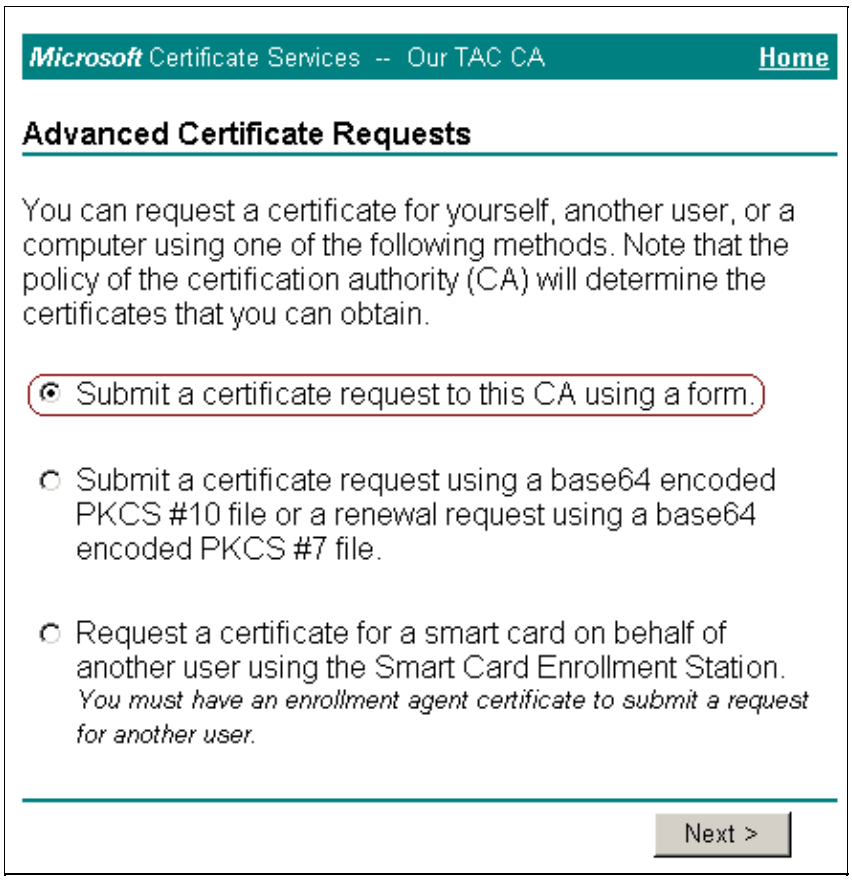
2. Select **Request a certificate**, and then click **Next**.



3. Select **Advanced request**, and then click **Next**.

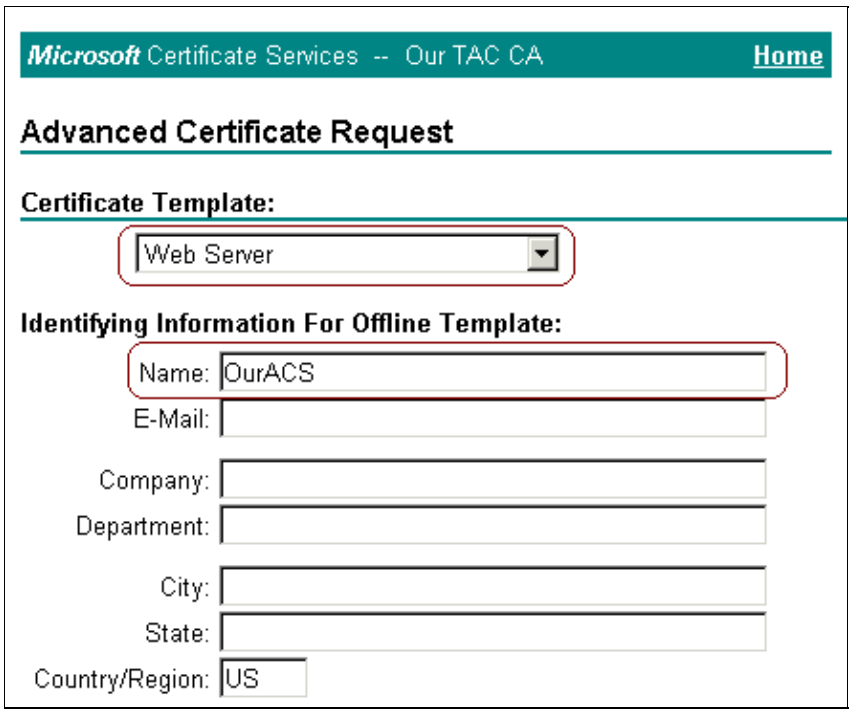


4. Select **Submit a certificate request to this CA using a form**, and then click **Next**.

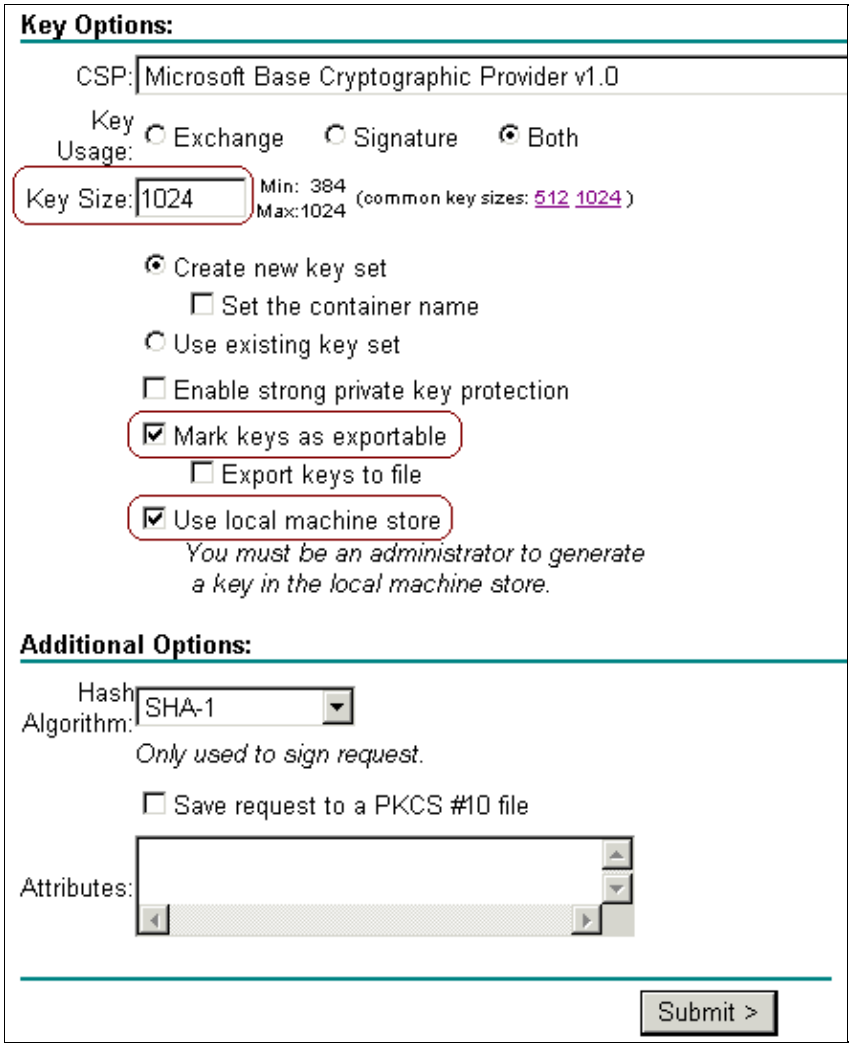


5. Configure the certificate options.

   a. Select **Web Server** as the certificate template. Enter the name of the ACS server.

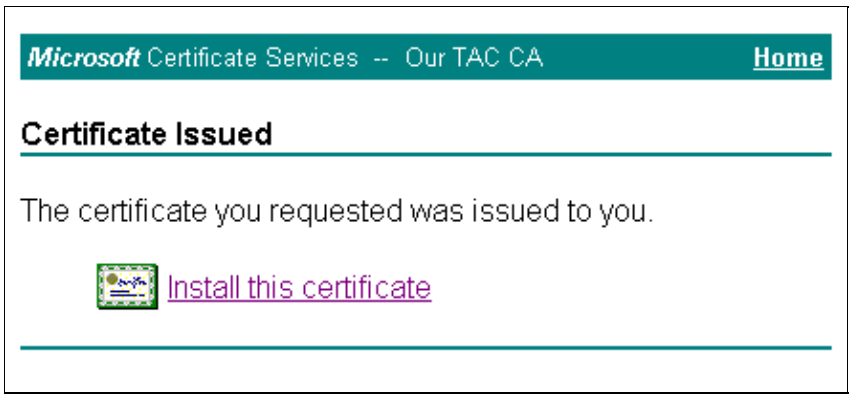


   b. Set the key size to **1024**. Select the options for **Mark keys as exportable** and **Use local machine store**. Configure other options as needed, and then click **Submit**.

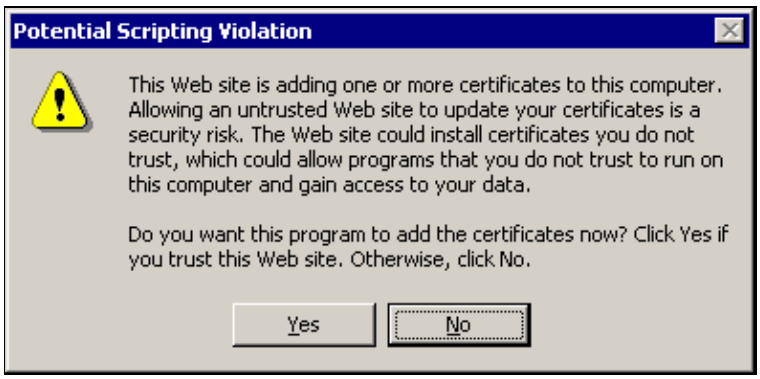


Note: If you see a warning window referring to a scripting violation (depending on your browser's security/privacy settings), click **Yes** to continue.

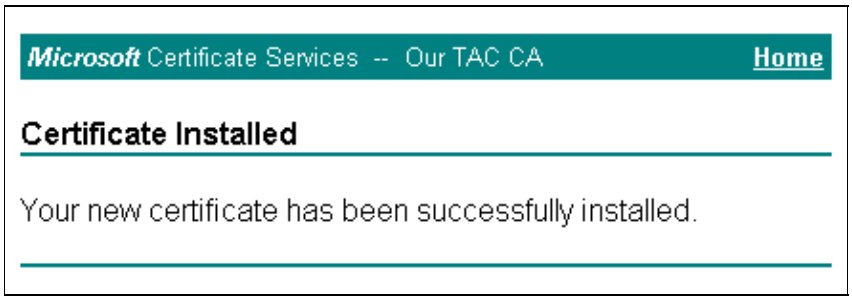
6. Click **Install this certificate**.



Note: If you see a warning window referring to a scripting violation (depending on your browser's security/privacy settings), click **Yes** to continue.



7. If the installation has been successful, you will see a confirmation message.

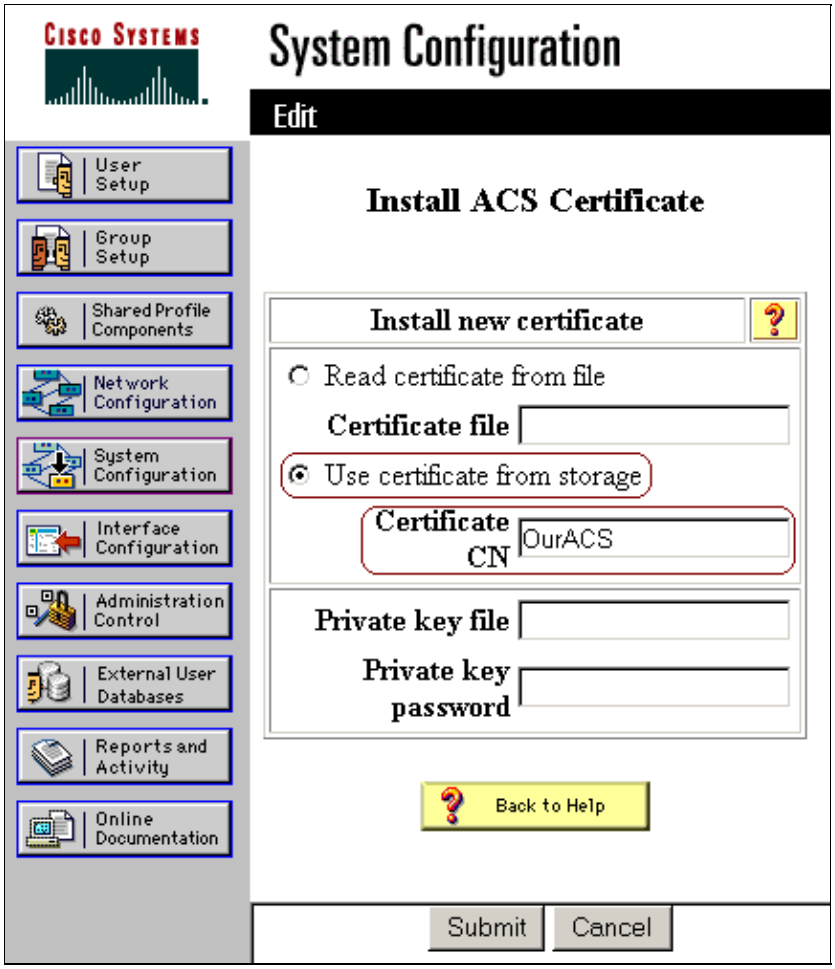


Configure ACS to Use a Certificate From Storage

Follow these steps to configure ACS to use the certificate in storage.

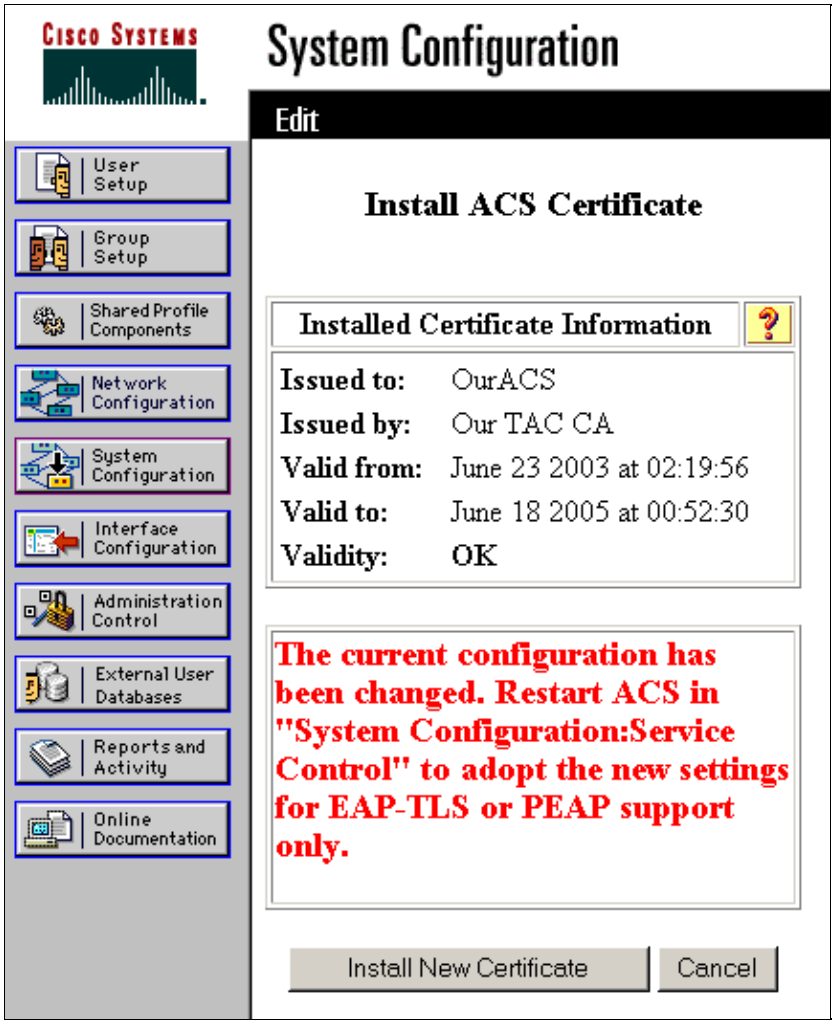
1. Open a web browser and browse to the ACS server by entering **http://*ACS−ip−address*:2002/** in the address bar. Click **System Configuration**, and then click **ACS Certificate Setup**.
2. Click **Install ACS Certificate**.
3. Select **Use certificate from storage**. In the Certificate CN field, enter the name of the certificate that you assigned in step 5a of the section on Obtaining a Certificate From the ACS Server. Click **Submit**.

   This entry must match the name that you typed in the Name field during the advanced certificate request. It is the CN name in the subject field of the server certificate; you can edit the server certificate to check for this name. In this example, the name is "OurACS". Do *not* enter CN name of issuer.



4. When the configuration is complete, you will see a confirmation message indicating that the configuration of the ACS server has been changed.

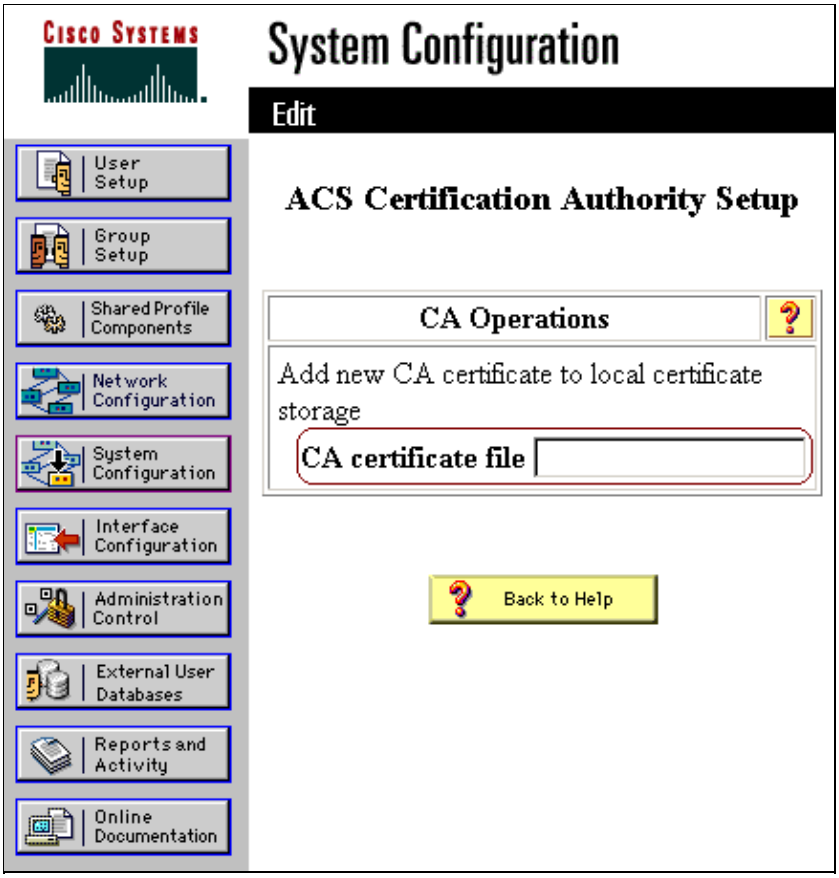
   Note: You do not need to restart the ACS at this time.



Specify Additional Certificate Authorities That the ACS Should Trust

The ACS will automatically trust the CA that issued its own certificate. If the client certificates are issued by additional CAs, then you need to complete the following steps.

1. Click **System Configuration**, and then click **ACS Certificate Setup**.
2. Click **ACS Certificate Authority Setup** to add CAs to the list of trusted certificates. In the field for CA certificate file, enter the location of the certificate, and then click **Submit**.



3. Click **Edit Certificate Trust List**. Check all the CAs that the ACS should trust, and uncheck all the CAs that the ACS should not trust. Click **Submit**.

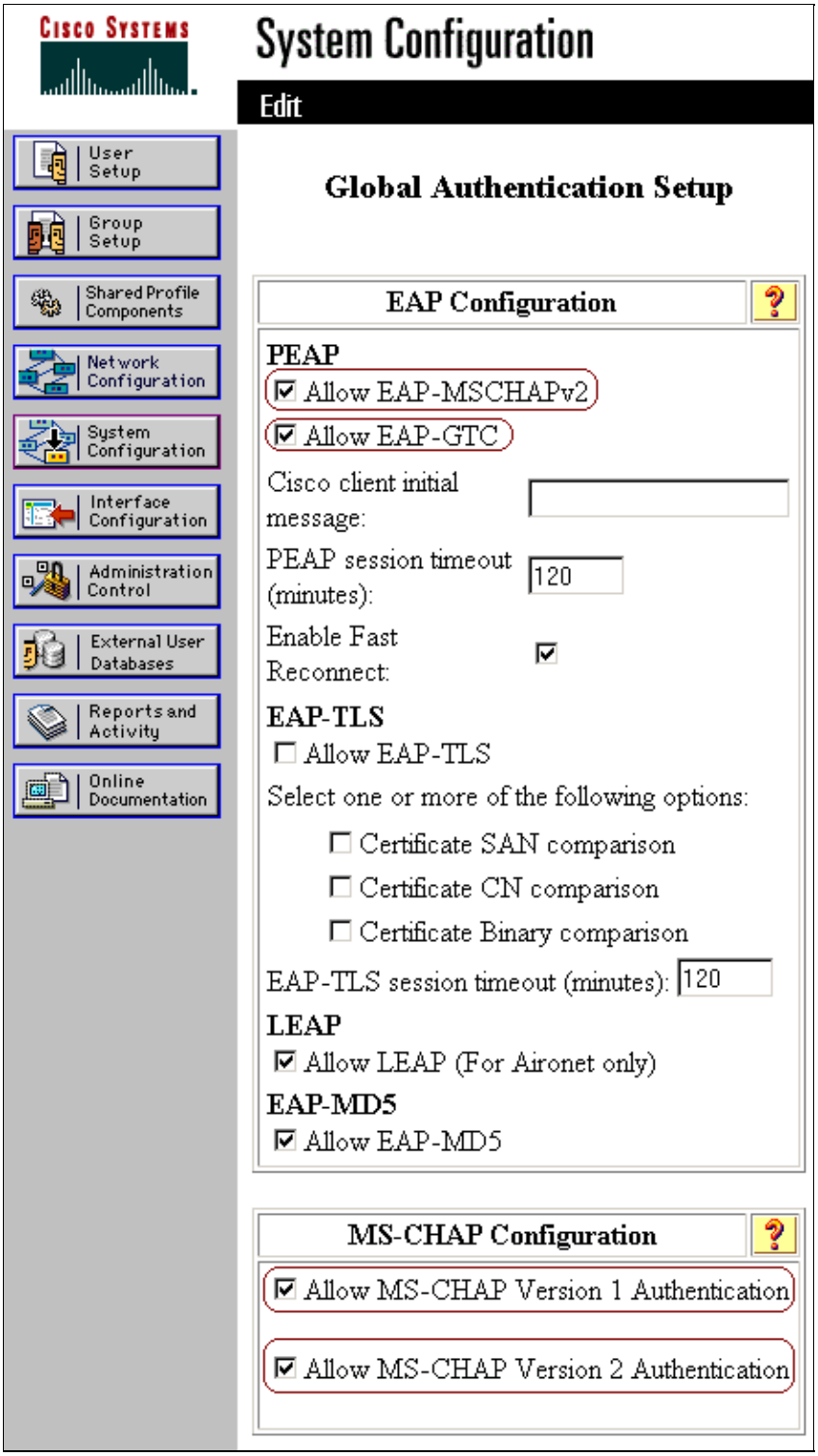
Restart the Service and Configure PEAP Settings on the ACS

Follow the steps below to restart the service and configure PEAP settings.

1. Click **System Configuration**, and then click **Service Control**.
2. Click **Restart** to restart the service.
3. To configure PEAP settings, click **System Configuration**, and then click **Global Authentication Setup**.
4. Check the two settings shown below, and leave all other settings as default. If you wish, you can specify additional settings, such as Enable Fast Reconnect. When you are finished, click **Submit**.

   - **Allow EAP−MSCHAPv2**
   - **Allow MS−CHAP Version 2 Authentication**

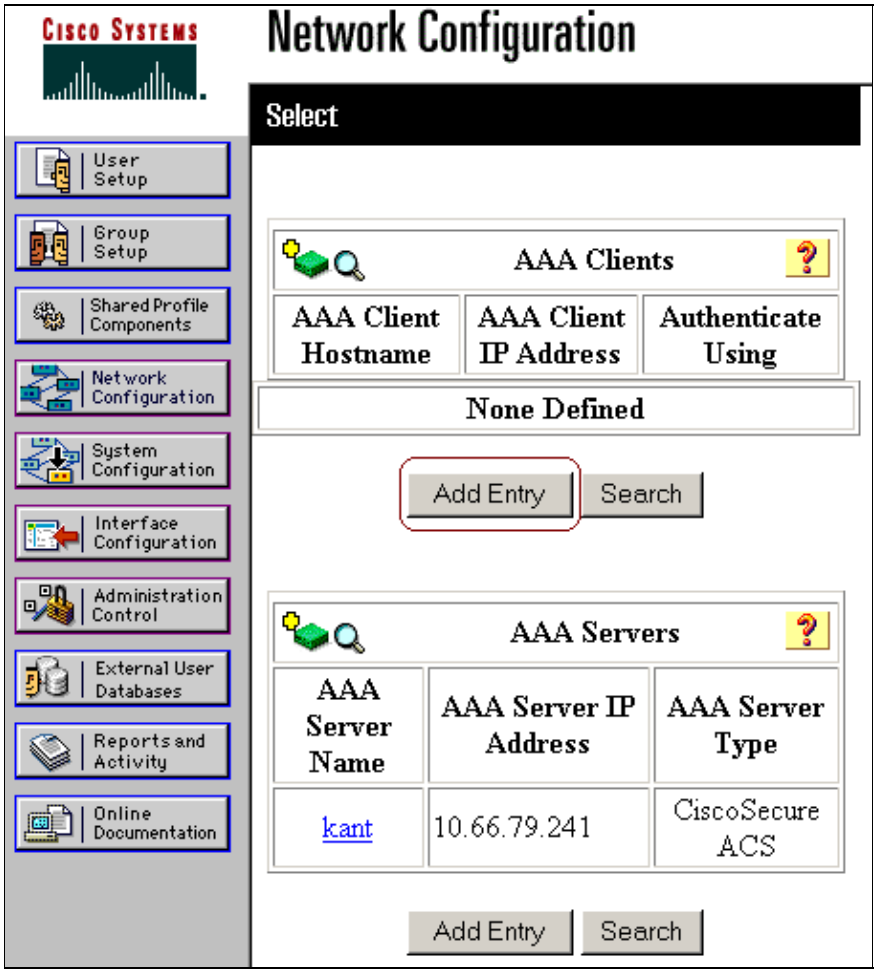
   Note: For more information on Fast Connect, refer to "Authentication Configuration Options" in System Configuration: Authentication and Certificates.



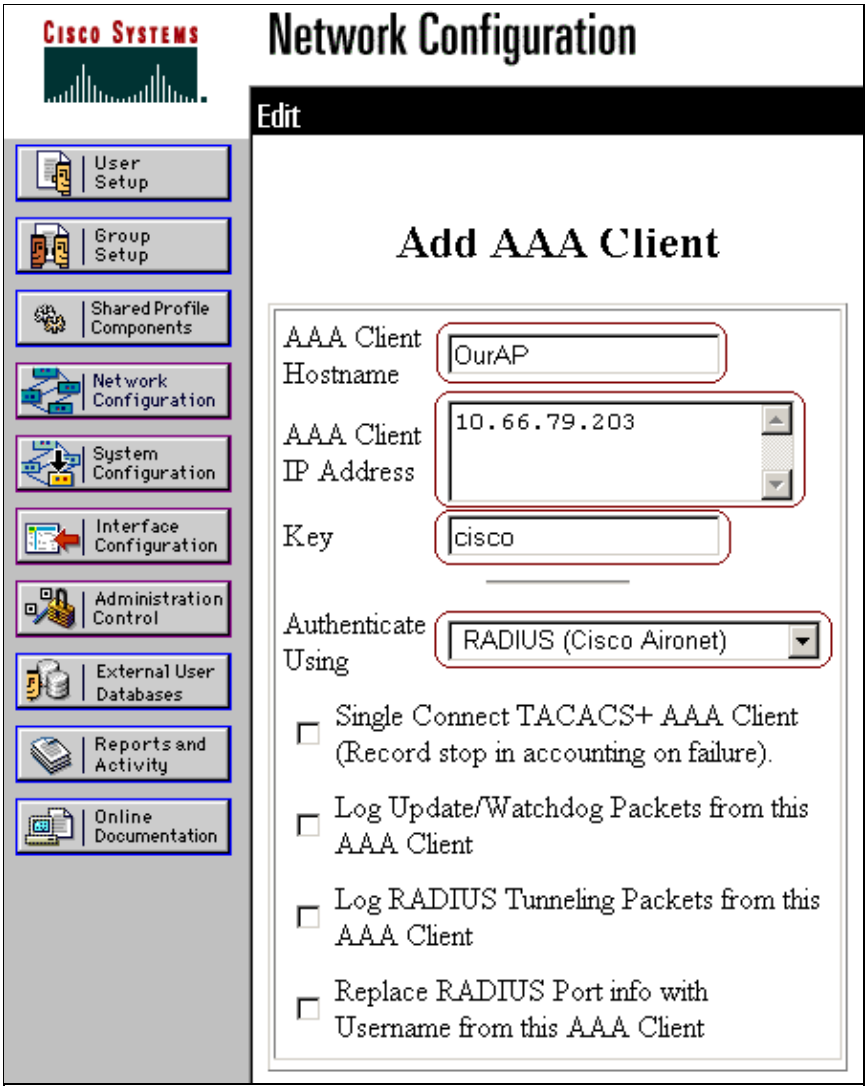
Specify and Configure the Access Point as an AAA Client

Follow these steps to configure the access point (AP) as an AAA client.

1. Click **Network Configuration**. Under AAA Clients, click **Add Entry**.



2. Enter the AP's hostname in the AAA Client Hostname field and its IP address in the AAA Client IP Address field. Enter a shared secret key for the ACS and the AP in the Key field. Select **RADIUS (Cisco Aironet)** as the authentication method. When you are finished, click **Submit**.



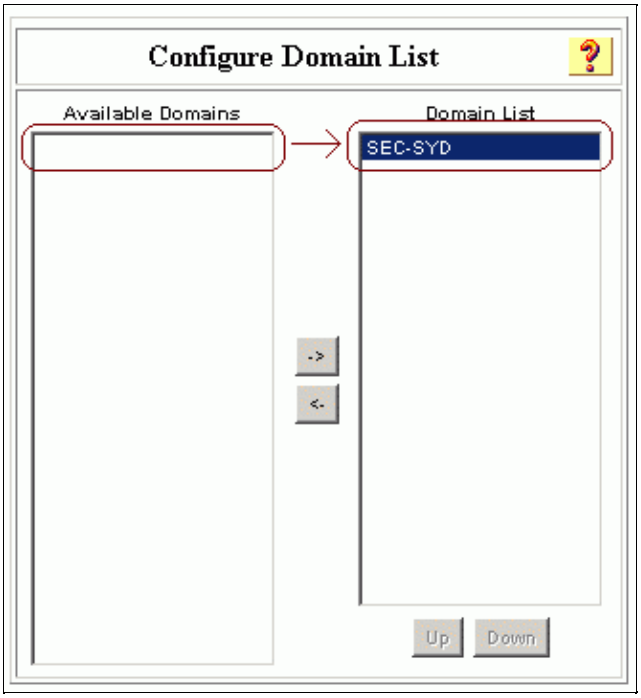
Configure the External User Databases

Follow these steps to configure the external user databases.

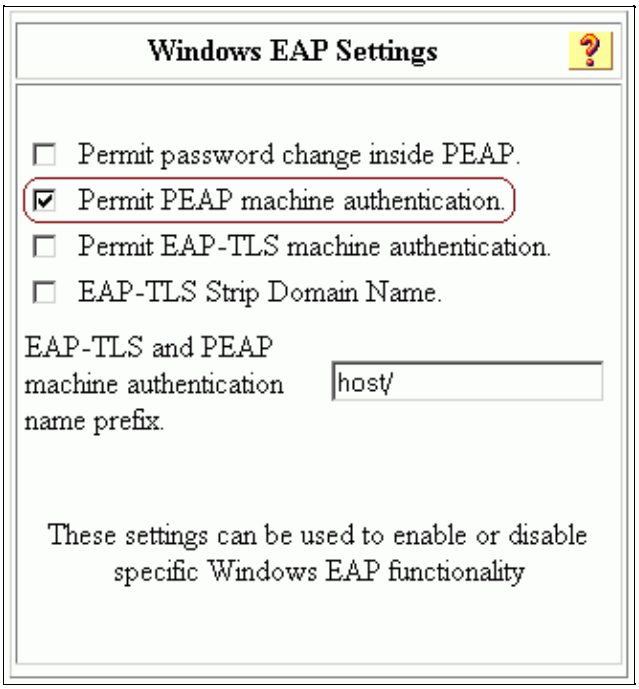
Note: Only ACS 3.2 supports PEAP−MS−CHAPv2 with machine authentication to a Windows database.

1. Click **External User Databases**, and then click **Database Configuration**. Click **Windows Database**.

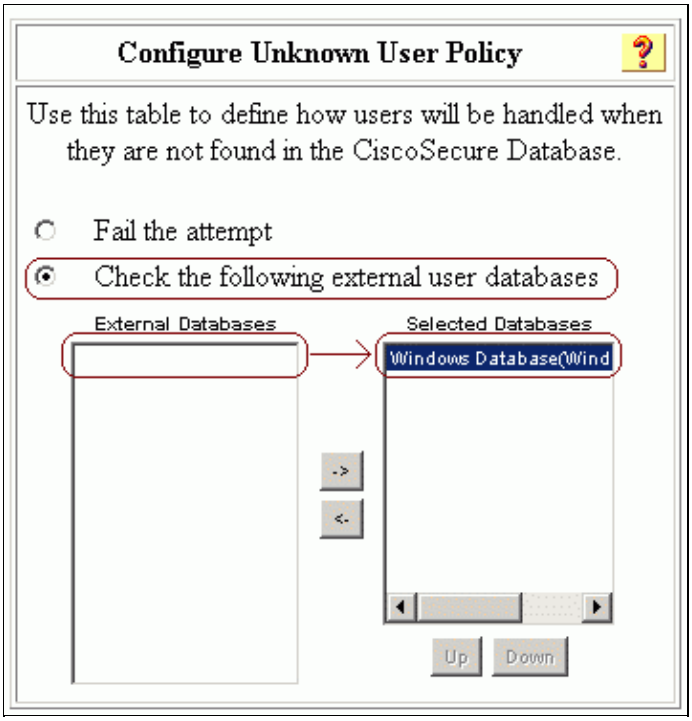
   Note: If there is no Windows database already defined, click **Create New Configuration**, and then click **Submit**.
2. Click **Configure**. Under Configure Domain List, move the SEC−SYD domain from Available Domains to Domain List.



3. To enable machine authentication, under Windows EAP Settings check the option to **Permit PEAP machine authentication**. *Do not* change the machine authentication name prefix. Microsoft currently uses "/host" (the default value) to distinguish between user and machine authentication. If you wish, check the option for **Permit password change inside PEAP**. When you are finished, click **Submit**.



4. Click **External User Databases**, and then click **Unknown User Policy**. Select the option for **Check the following external user databases**, then use the right arrow button (−>) to move Windows Database from External Databases to Selected Databases. When you are finished, click **Submit**.



Restart the Service

When you have finished configuring the ACS, follow these steps to restart the service.

1. Click **System Configuration**, and then click **Service Control**.
2. Click **Restart**.

Configuring the Cisco Access Point

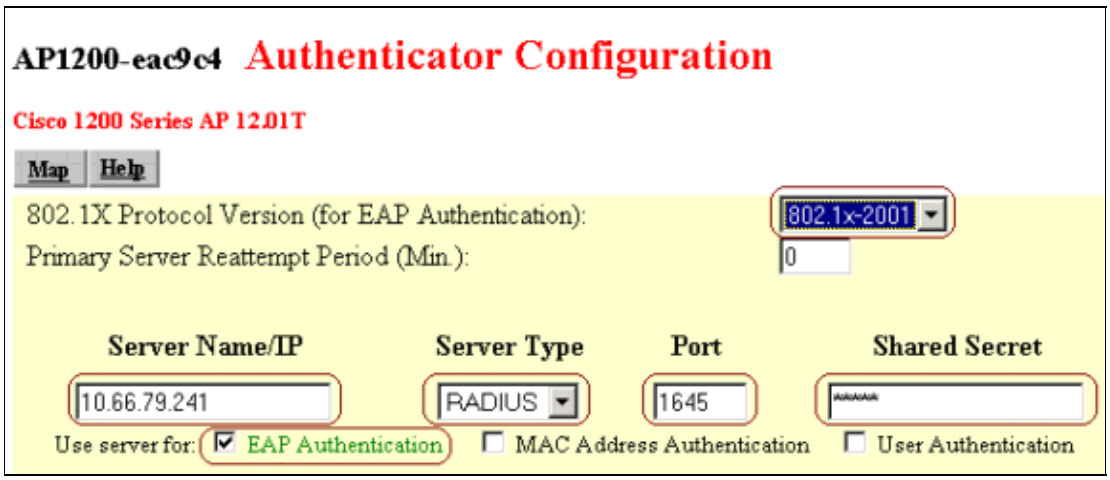
Follow these steps to configure the AP to use the ACS as the authentication server.

1. Open a web browser and browse to the AP by entering **http://*AP−ip−address*/certsrv** in the address bar. On the toolbar, click **Setup**.
2. Under Services, click **Security**.
3. Click **Authentication Server**.

   Note: If you have configured accounts on the AP, you will need to log in.
4. Enter the authenticator configuration settings.

   - Select **802.1x−2001** for the 802.1x Protocol Version (for EAP Authentication).
   - Enter the IP address of the ACS server in the Server Name/IP field.
   - Select **RADIUS** as the Server Type.
   - Enter **1645** or **1812** in the Port field.
   - Enter the shared secret key that you specified in step 2 of Specify and Configure the Access Point as an AAA Client.
   - Check the option for **EAP Authentication** to specify how the server should be used.

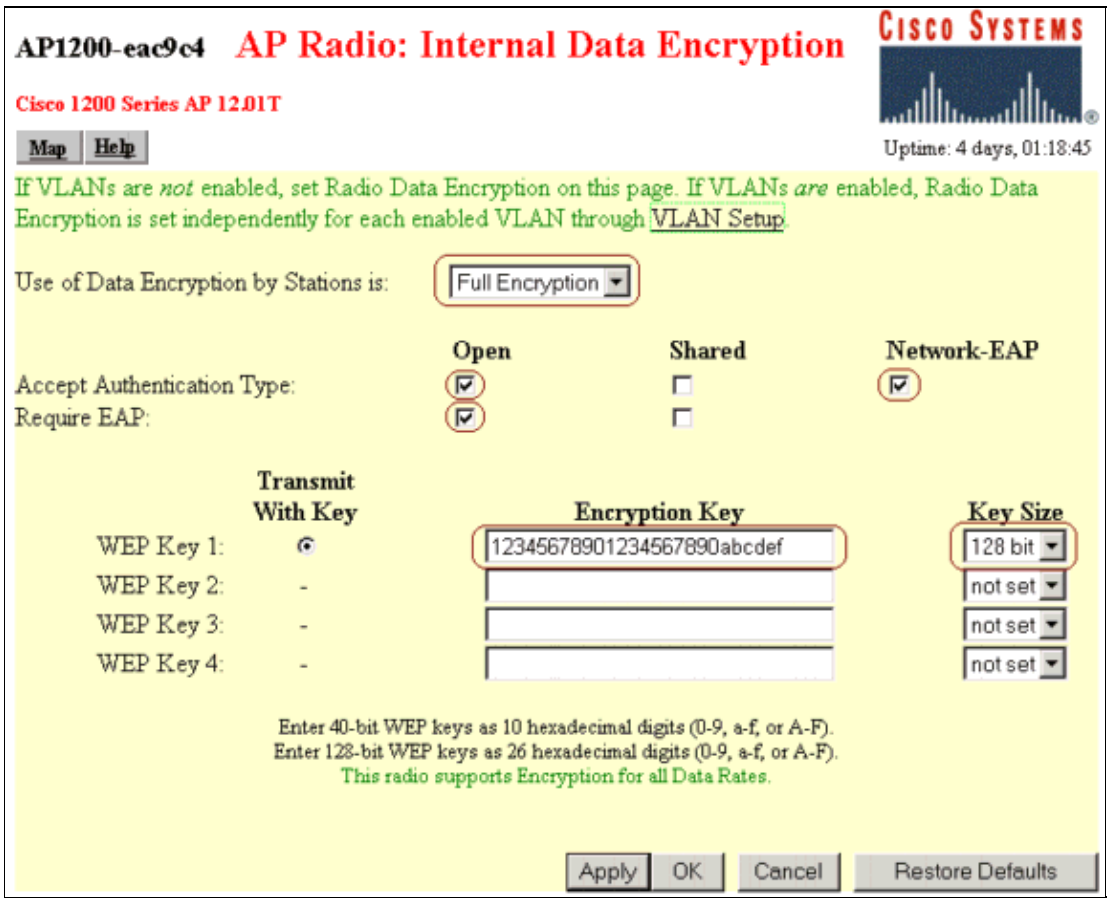
   When you are finished, click **OK**.



5. Click **Radio Data Encryption (WEP)**.
6. Enter the internal data encryption settings.

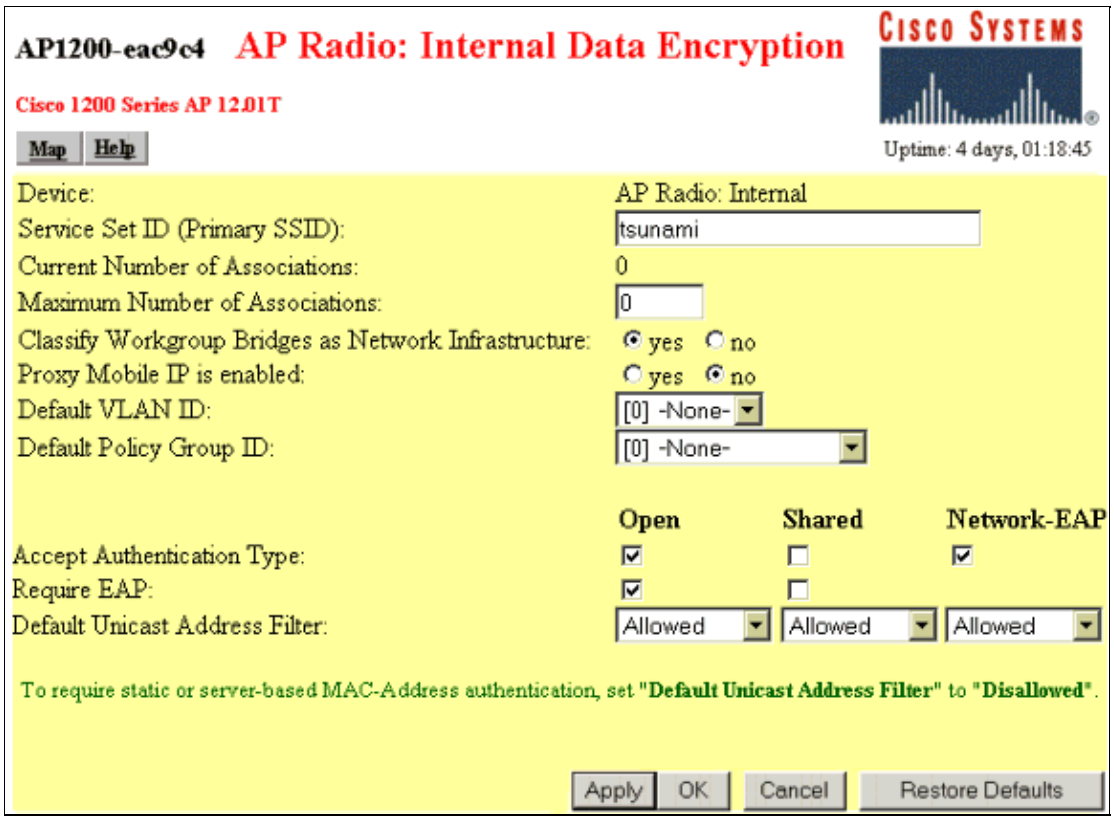
    ♦ Select **Full Encryption** to set the level of data encryption.
    ♦ Enter an encryption key and set the key size to **128 bit** to be used as a broadcast key.

    When you are finished, click **OK**.



7. Confirm that you are using the correct Service Set Identifier (SSID) by going to **Network > Service Sets** > Select the SSID Idx , and click **OK** when you are finished.

    The example below shows the default SSID "tsunami."



Configuring the Wireless Client

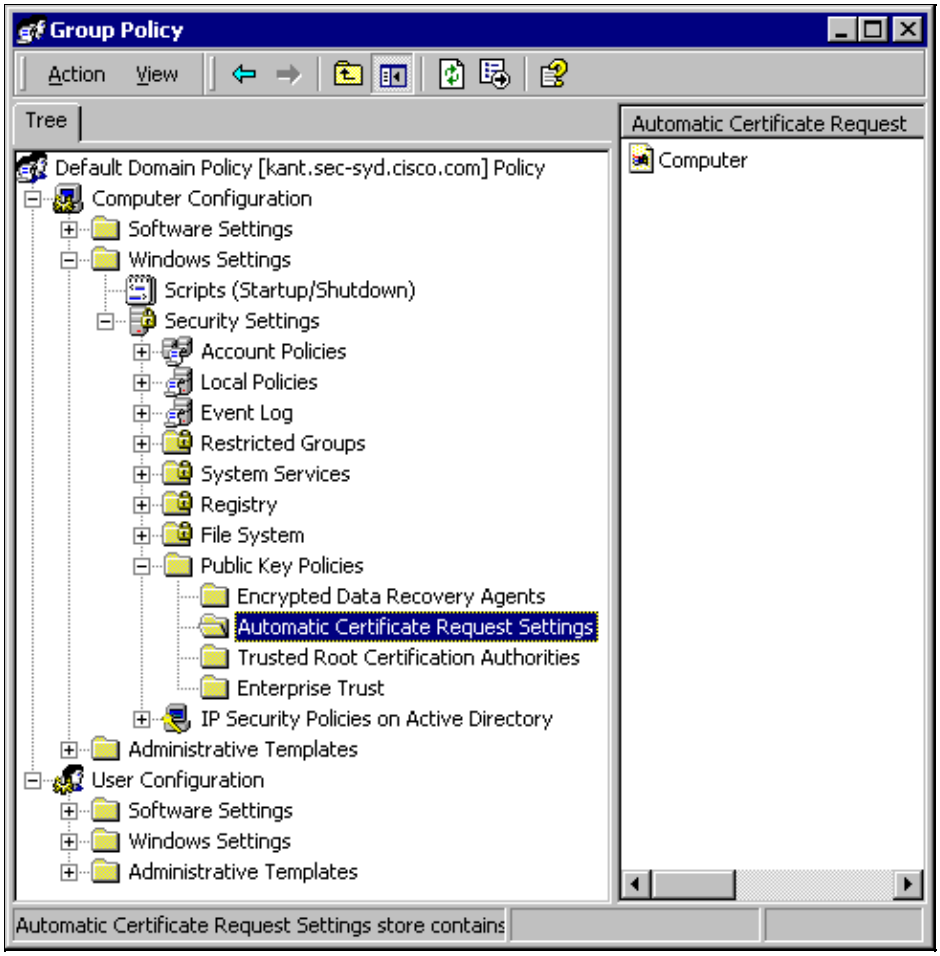
Follow the steps below to configure ACS 3.2.

1. Configure MS certificate machine autoenrollment.
2. Join the domain.
3. Manually install the root certificate on the Windows client.
4. Configure the wireless networking.

Configuring MS Certificate Machine Autoenrollment

Follow the steps below to configure the domain for automatic machine certificate enrollment on domain controller Kant.

1. Go to **Control Panel > Administrative Tools > Open Active Directory Users and Computers.**
2. Right−click on **domain sec−syd** and select **Properties** from the submenu.
3. Select the **Group Policy** tab. Click **Default Domain Policy**, and then click **Edit**.
4. Go to **Computer Configuration > Windows Settings > Security Settings > Public Key Policies > Automatic Certificate Request Settings**.



5. On the menu bar, go to **Action > New > Automatic Certificate Request** and click **Next**.
6. Select **Computer** and click **Next**.
7. Check the CA.

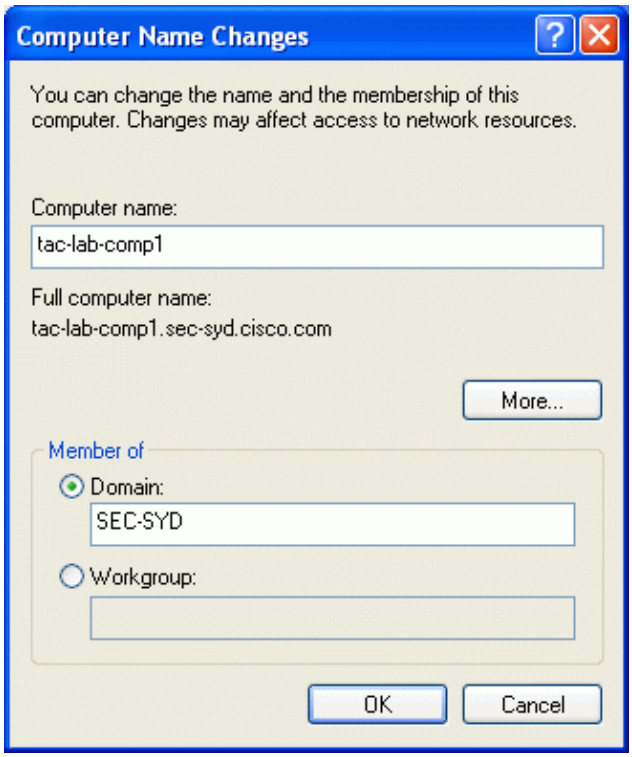
   In this example, the CA is named "Our TAC CA."
8. Click **Next**, and then click **Finish**.

Join the Domain

Follow these steps to add the wireless client to the domain.

Note: To complete these steps, the wireless client must have connectivity to the CA, either through a wired connection or through the wireless connection with 802.1x security disabled.

1. Log in to Windows XP as local administrator.
2. Go to **Control Panel > Performance and Maintenance > System**.
3. Select the **Computer Name** tab, and then click **Change**. Enter the host name in the field for computer name. Select **Domain**, and then enter the name of the domain (SEC−SYD in this example). Click **OK**.



4. When a login dialog is displayed, join the domain by logging in with an account that has permission to join the domain.
5. When the computer has successfully joined the domain, restart the computer. The machine will be a member of the domain; since we have set up machine autoenrollment, the machine will have a certificate for the CA installed as well as a certificate for machine authentication.

Manually Install the Root Certificate on the Windows Client

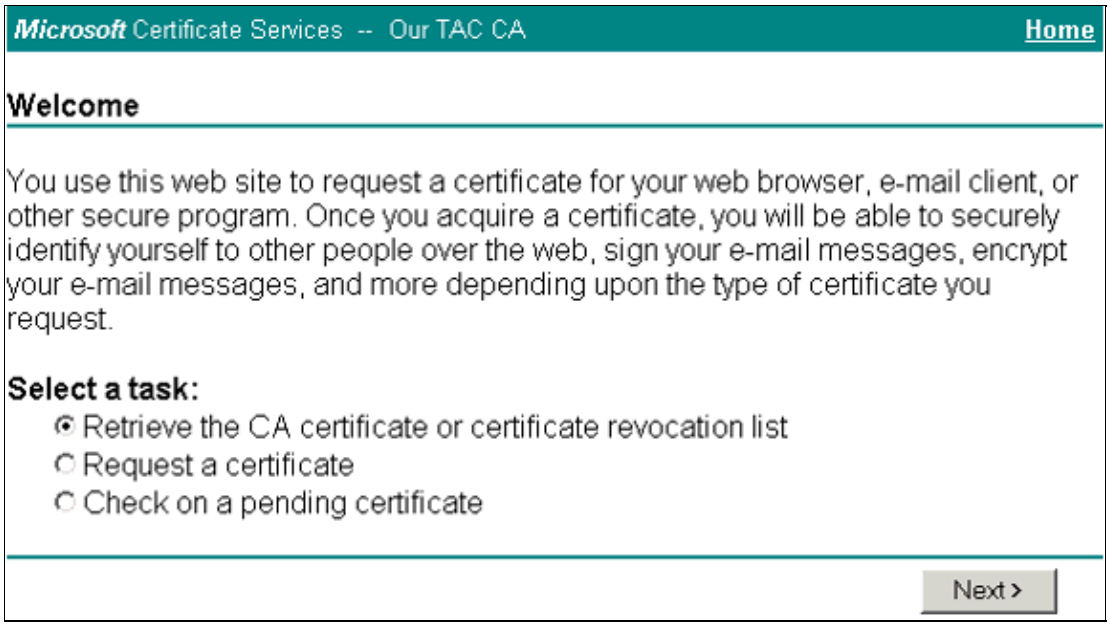
Follow these steps to manually install the root certificate.

Note: If you have already set up machine autoenrollment, you do not need this step. Please skip to Configure the Wireless Networking.

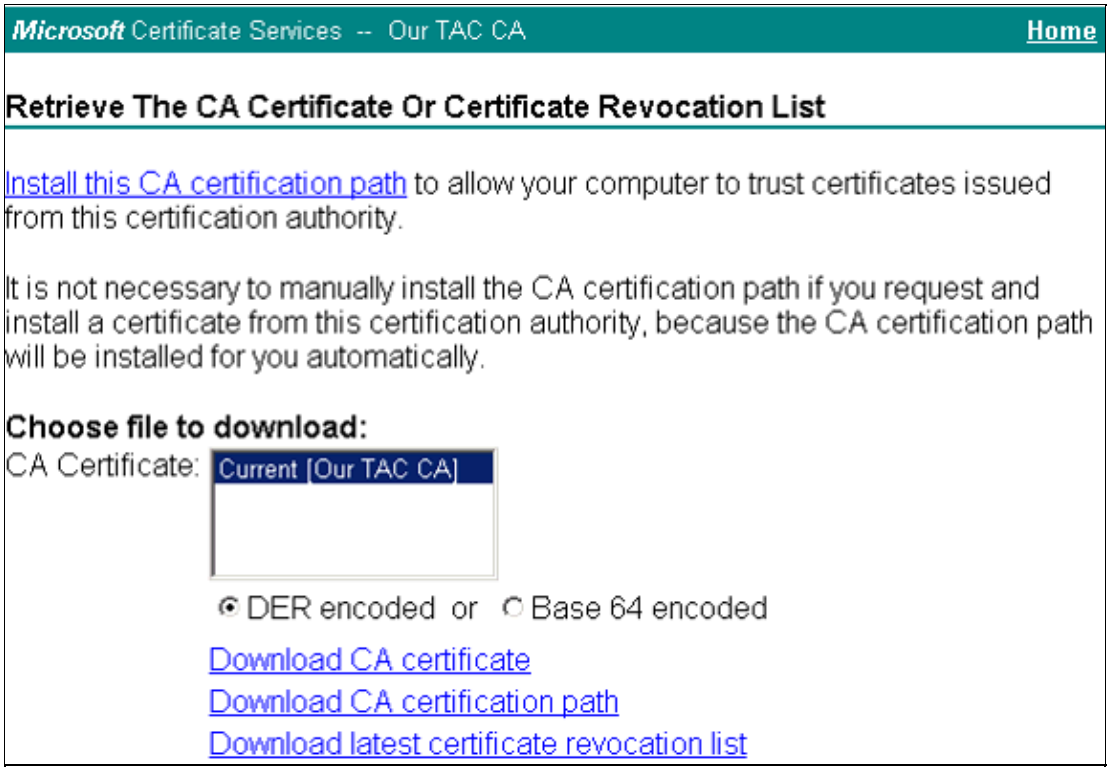
1. On the Windows client machine, open a web browser and browse to the Microsoft CA server by entering **http://*root−CA−ip−address*/certsrv** in the address bar. Log in to the CA site.

   In this example, the CA's IP address is 10.66.79.241.

2. Select **Retrieve the CA certificate or certification revocation list** and click **Next**.

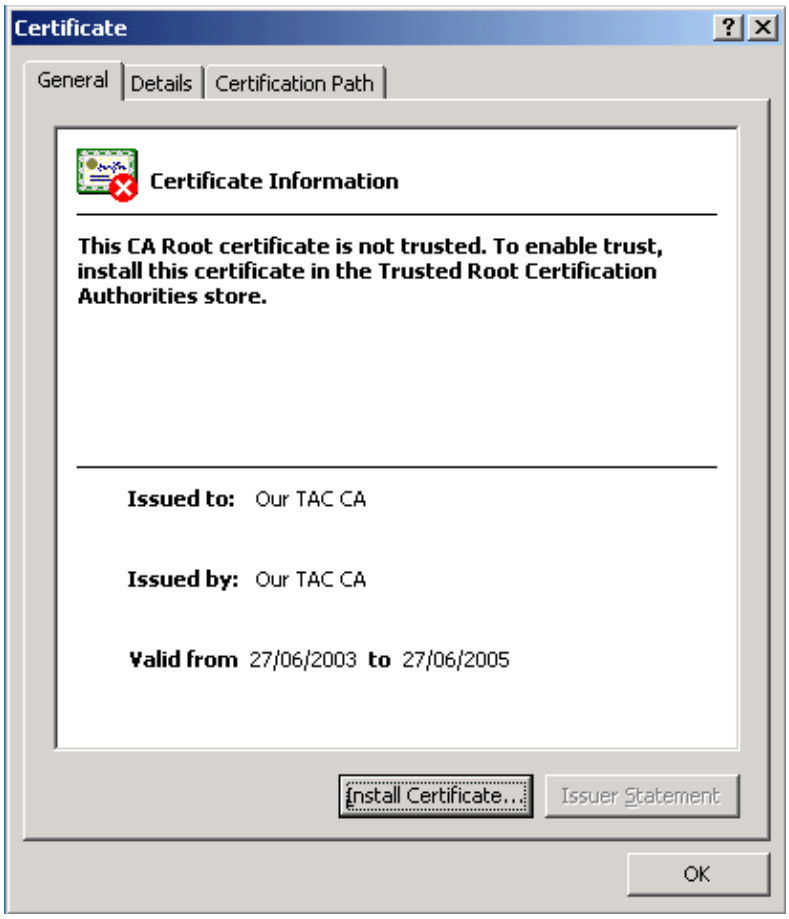


3. Click **Download CA certificate** to save the certificate on the local machine.



4. Open the certificate and click **Install Certificate**.

   Note: In the example below, the icon at the top left indicates that the certificate is not yet trusted (installed).



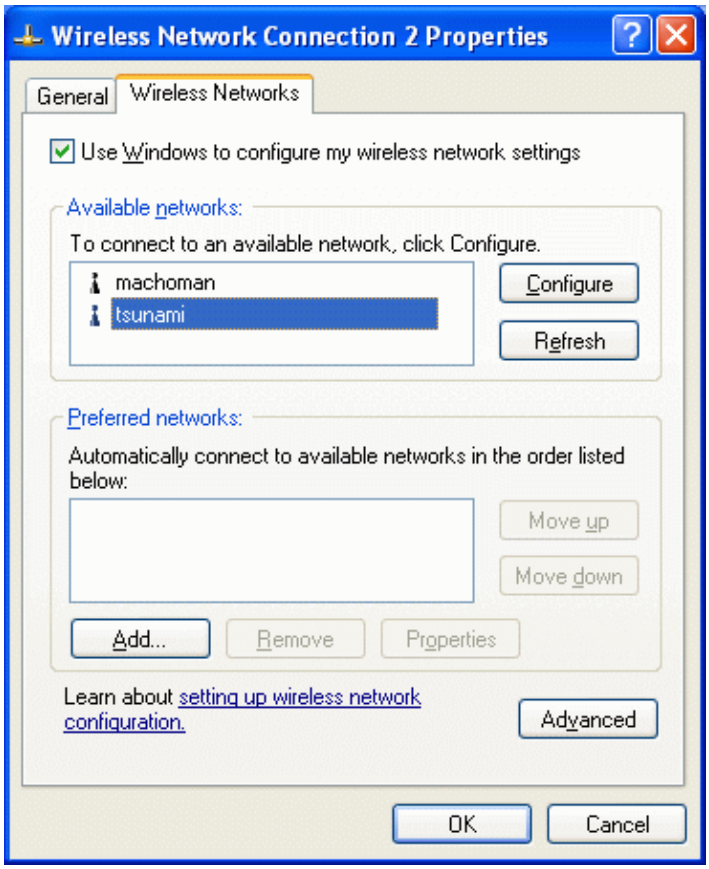
5. Install the certificate in Current User/ Trusted Root Certificate Authorities.

    a. Click **Next**.
    b. Select **Automatically select the certificate store based on the type of the certificate** and click **Next**.
    c. Click **Finish** to place the root certificate automatically under Current User/ Trusted Root Certificate Authorities.

Configure the Wireless Networking

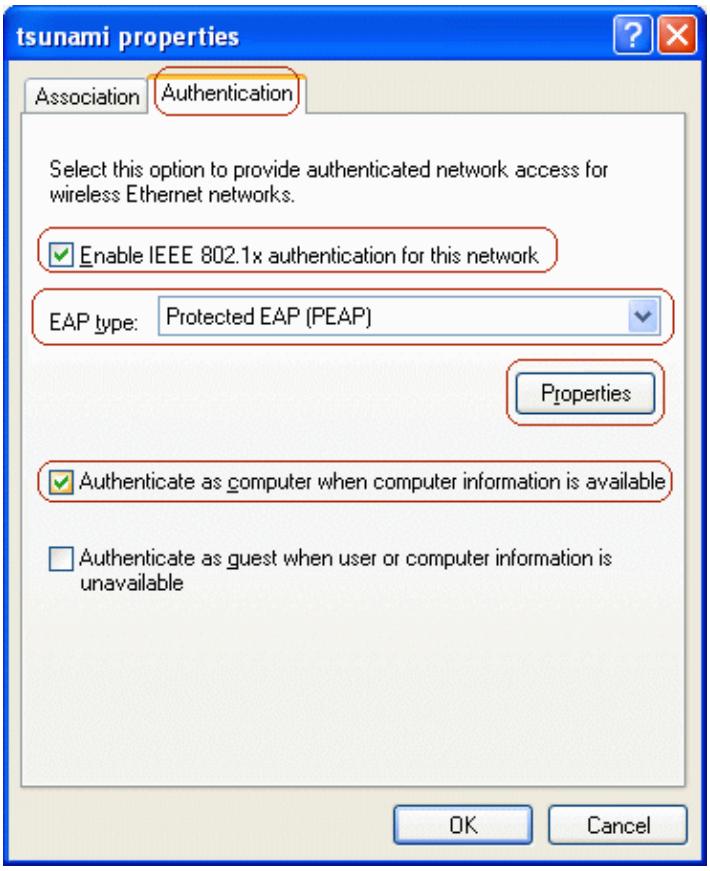
Follow these steps to set the options for wireless networking.

1. Log in to the domain as a domain user.
2. Go to **Control Panel > Network and Internet Connections > Network Connections**. Right−click on **Wireless Connection** and select **Properties** from the submenu that is displayed.
3. Select the **Wireless Networks** tab. Select the wireless network (displayed using the SSID name of the AP) from the list of available networks, and then click **Configure**.



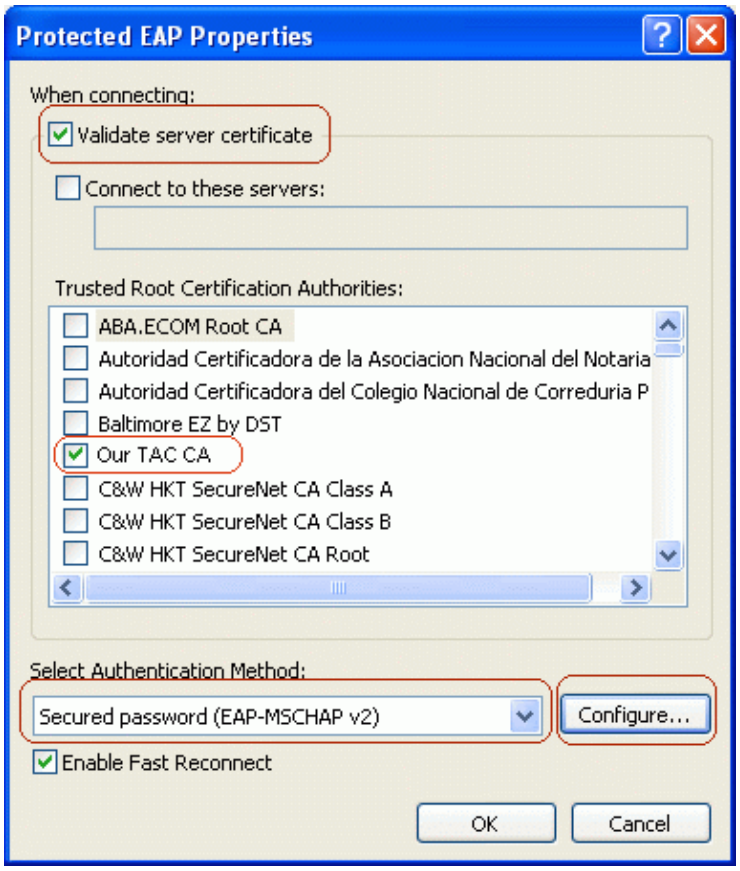
4. On the Authentication tab of the network properties window, check the option for **Enable IEEE 802.1x authentication for this network**. For EAP type, select **Protected EAP (PEAP)** for EAP type, and then click **Properties**.

    Note: To enable machine authentication, check the option for **Authenticate as computer when computer information is available**.



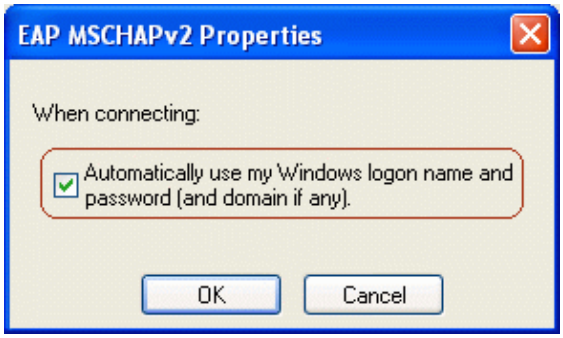
5. Check **Validate server certificate**, and then check the root CA for the enterprise used by PEAP clients and ACS devices. Select **Secure password (EAP−MSCHAP v2)** for the authentication method, and then click **Configure**.

   In this example, the root CA is named "Our TAC CA."

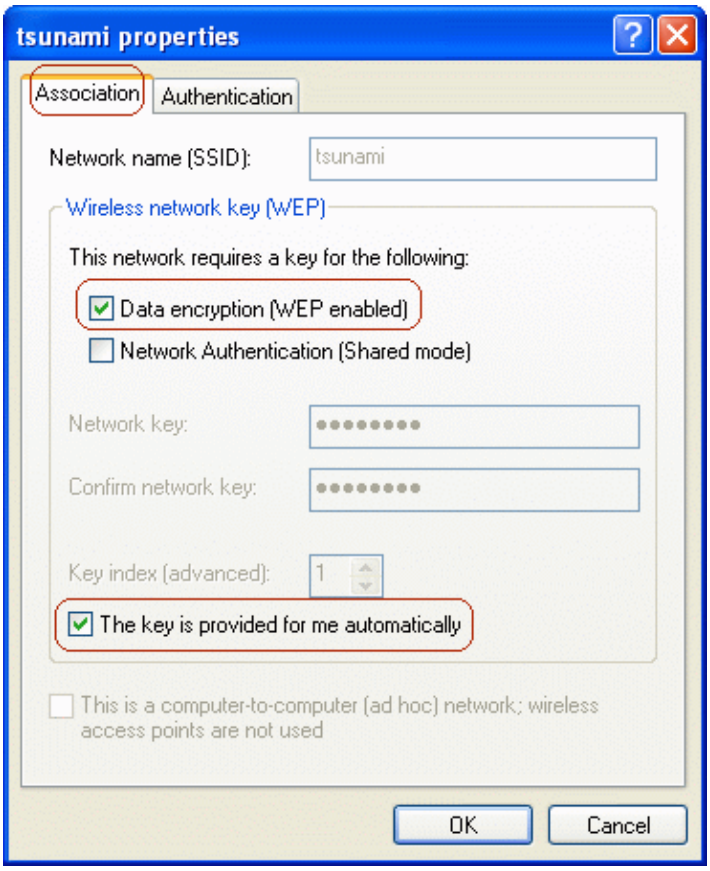


6. To enable single sign−on, check the option for **Automatically use my Windows logon name and password (and domain if any)**. Click **OK** to accept this setting, and then click **OK** again to return to the network properties window.

   With single sign−on for PEAP, the client uses the Windows logon name for the PEAP authentication, so the user does not need to enter the password a second time.



7. On the Association tab of the network properties window, check the options for **Data encryption (WEP enabled)** and **The key is provided for me automatically**. Click **OK**, and then click **OK** again to close the network configuration window.



Verify

This section provides information you can use to confirm your configuration is working properly.

- To verify that the wireless client has been authenticated, on the wireless client go to **Control Panel > Network and Internet Connections > Network Connections**. On the menu bar, go to **View > Tiles**. The wireless connection should display the message "Authentication succeeded."
- To verify that wireless clients have been authenticated, on the ACS web interface go to **Reports and Activity > Passed Authentications > Passed Authentications active.csv**.

Troubleshoot

This section provides information you can use to troubleshoot your configuration.

- Verify that MS Certificate Services have been installed as an Enterprise root CA on a Windows 2000 Advanced Server with Service Pack 3. Hotfixes 323172 and 313664 must be installed *after* MS Certificate Services are installed. If MS Certificate Services are reinstalled, hotfix 323172 must also be reinstalled.
- Verify that you are using Cisco Secure ACS for Windows version 3.2 with Windows 2000 and Service Pack 3. Ensure that hotfixes 323172 and 313664 have been installed.
- If machine authentication fails on the wireless client, there will be no network connectivity on the wireless connection. Only accounts that have their profiles cached on the wireless client will be able to log in to the domain. The machine will need to be plugged in to a wired network or set for wireless connection with no 802.1x security.
- If automatic enrollment with the CA fails when joining the domain, check Event Viewer for possible reasons. Try checking the DNS settings on the laptop.

- If the ACS's certificate is rejected by the client (which depends on the certificate's valid "from" and "to" dates, the client's date and time settings, and CA trust), then the client will reject it and authentication will fail. The ACS will log the failed authentication in the web interface under **Reports and Activity > Failed Attempts > Failed Attempts XXX.csv** with the Authentication Failure−Code similar to "EAP−TLS or PEAP authentication failed during SSL handshake." The expected error message in the CSAuth.log file is similar to the following.

```
AUTH 06/04/2003 14:56:41 E 0345 1644 EAP: buildEAPRequestMsg:
other side probably didn't accept our certificate
```

- In the logs on the ACS web interface, under both **Reports and Activity > Passed Authentications > Passed Authentications XXX.csv** and **Reports and Activity > Failed Attempts > Failed Attempts XXX.csv**, PEAP authentications are shown in the format <DOMAIN>\<user−id>. EAP−TLS authentications are shown in the format <user−id>@<domain>.
- To use PEAP Fast Reconnect, you must enable this feature on both the ACS server and the client.
- If PEAP Password Changing has been enabled, you can change the password only when an account's password has aged or when the account is marked to have its password changed on the next log in.
- You can verify the ACS server's certificate and trust by following the steps below.

1. Log in to Windows on the ACS server with an account that has administrator privileges. Open Microsoft Management Console by going to **Start > Run**, typing **mmc**, and clicking **OK**.
2. On the menu bar, go to **Console > Add/Remove Snap−in**, and then click **Add**.
3. Select **Certificates** and click **Add**.
4. Select **Computer account**, click **Next**, and then select **Local computer (the computer this console is running on)**.
5. Click **Finish**, click **Close**, and then click **OK**.
6. To verify that the ACS server has a valid server−side certificate, go to **Console Root > Certificates (Local Computer) > ACSCertStore > Certificates**. Verify that there is a certificate for the ACS server (named OurACS in this example). Open the certificate and verify the following items.

    ◊ There is no warning about the certificate not being verified for all its intended purposes.
    ◊ There is no warning about the certificate not being trusted.
    ◊ "This certificate is intended to − Ensures the identity of a remote computer."
    ◊ The certificate has not expired and has become valid (check for valid "from" and "to" dates).
    ◊ "You have a private key that corresponds to this certificate."
7. On the Details tab, verify that the Version field has the value V3 and that the Enhanced Key Usage field has Server Authentication (1.3.6.1.5.5.7.3.1).
8. To verify that the ACS server trusts the CA server, go to **Console Root > Certificates (Local Computer) > Trusted Root Certification Authorities > Certificates**. Verify that there is a certificate for the CA server (named Our TAC CA in this example). Open the certificate and verify the following items.

    ◊ There is no warning about the certificate not being verified for all its intended purposes.
    ◊ There is no warning about the certificate not being trusted.
    ◊ The certificate's intended purpose is correct.
    ◊ The certificate has not expired and has become valid (check for valid "from" and "to" dates).

    If the ACS and client did not use the same root CA, then verify that the whole chain of CA servers' certificates have been installed. The same applies if the certificate was obtained from a subcertificate authority.

- You can verify the client's trust by following the steps below.

    1. Log in to Windows on the wireless client with the client's account. Open Microsoft Management Console by going to **Start > Run**, typing **mmc**, and clicking **OK**.
    2. On the menu bar, go to **Console > Add/Remove Snap−in**, and then click **Add**.
    3. Select **Certificates** and click **Add**.
    4. Click **Close**, and then click **OK**.
    5. To verify that the client's profile trusts the CA server, go to **Console Root > Certificates − Current User > Trusted Root Certification Authorities > Certificates**. Verify that there is a certificate for the CA server (named Our TAC CA in this example). Open the certificate and verify the following items.

        ◊ There is no warning about the certificate not being verified for all its intended purposes.
        ◊ There is no warning about the certificate not being trusted.
        ◊ The certificate's intended purpose is correct.
        ◊ The certificate has not expired and has become valid (check for valid "from" and "to" dates).

        If the ACS and client did not use the same root CA, then verify that the whole chain of CA servers' certificates have been installed. The same applies if the certificate was obtained from a subcertificate authority.
- Verify the ACS settings as described in the section on Configuring Cisco Secure ACS for Windows v3.2.
- Verify the AP settings as described in the section on Configuring the Cisco Access Point.
- Verify the wireless client settings as described in the section on Configuring the Wireless Client.
- Verify that the user account exists in the internal database of the AAA server or on one of the configured external databases. Ensure that the account has not been disabled.

Related Information

- **Cisco Secure ACS for Windows Support Page**
- **Documentation for Cisco Secure ACS for Windows**
- **Extensible Authentication Protocol Transport Layer Security Deployment Guide for Wireless LANs**
- **Obtaining Version and AAA Debug Information for Cisco Secure ACS for Windows**
- **Technical Support − Cisco Systems**

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