TECHNICAL DOCUMENTATION

XpressConnect
Enrollment System

Integration with Microsoft™ NPS Configuration Guide

Software Release 4.2

December 2015

Summary: This document describes how to configure a Microsoft Network Policy Server to act as the RADIUS server for use with the Enrollment System in a wireless network with EAP-TLS authentication. This guide provides instructions for configuring firewall rules, configuring the Enrollment System to act as a private CA and issue certificates to be imported by the NPS, how to configure RADIUS proxy, and troubleshooting information.

Document Type: Configuration

Audience: Network Administrator

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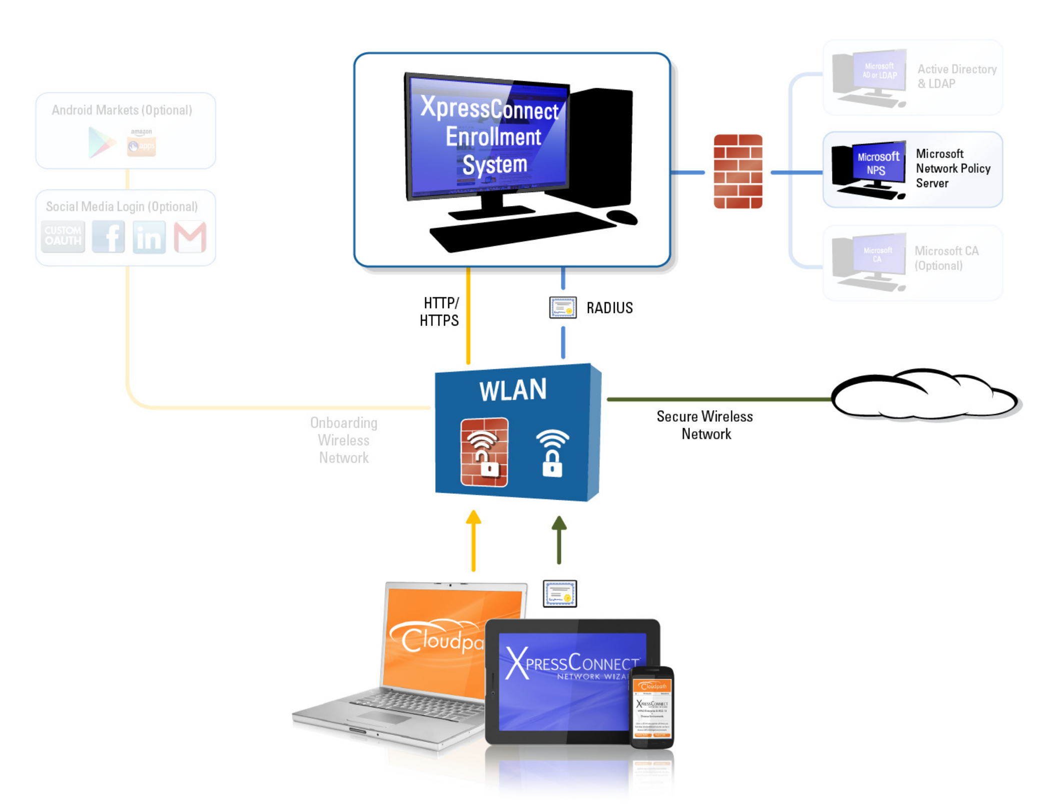
Overview

Network Policy Server (NPS) is the Microsoft implementation of a Remote Authentication Dial-in User Service (RADIUS) server and proxy. As a RADIUS server, NPS performs authentication and authorization of network connection attempts. NPS authenticates users and devices by verifying their Active Directory credentials.

RADIUS clients are network access servers such as wireless access points (APs), 802.1X-capable switches, virtual private network (VPN) servers, and dial-up servers because they use the RADIUS protocol to communicate with RADIUS servers such as NPS servers.

FIGURE 1. Enrollment System Integrated with Microsoft Network Policy Server


Android Markets (Optional)
amazon apps
Social Media Login (Optional)
CUSTOM OAUTH
XpressConnect Enrollment System
Microsoft AD or LDAP
Active Directory & LDAP
Microsoft NPS
Microsoft Network Policy Server
Microsoft CA
Microsoft CA (Optional)
HTTP/ HTTPS
RADIUS
WLAN
Onboarding Wireless Network
Secure Wireless Network
Cloudpath
XpressConnect Network Wizard

You can configure an NPS as a RADIUS server that integrates with the XpressConnect Enrollment System. The Enrollment System (ES) can be used as a private CA for certificate deployments using either PEAP-TLS or EAP-TLS authentication. The ES provides certificates to your NPS server acting as a RADIUS server, and client certificates to your client computers and users. NPS servers are logically connected to your network so that they can receive incoming access requests directly from wireless APs or wireless controllers.

This guide describes how to configure a Microsoft 2008 NPS as a RADIUS server for use with the XpressConnect Enrollment System in a 802.11 wireless network with EAP-TLS authentication.

Prerequisites

Before you can configure an NPS to work with the Enrollment System, you must have the following devices/services set up in your network.

- Microsoft 2008 Domain Controller configured with Active Directory services.
- Microsoft 2008 Network Policy Server must be configured (and registered) within your domain. See Tips and Troubleshooting, on page 27 for more information.
- Wireless Controllers and/or Access Points configured for EAP-TLS authentication. Make note of the IP address of the RADIUS client. This is required when configuring the NPS for 802.1X wireless connections-standard configuration.

Note >>
We recommend that you install Microsoft NPS services on a separate server from your Microsoft Active Directory services.

Configuring Firewall Rules For Use With the Enrollment System

This section describes how to configure firewall rules for use with the XpressConnect Enrollment System. Additional firewall information can be found on the *Administration > Advanced > Firewall Requirements* page.

The network firewall must be configured to allow the Enrollment System and the Network Policy Server to communicate.

Depending on where the Enrollment System is placed in your network, certain TCP ports are required to allow the ES to communicate with NPS and Active Directory (AD) services.

- Open TCP port 389 to allow the Enrollment System to query AD for users and groups during user login.
- Open TCP port 80 to allow the NPS to query the Enrollment System for OCSP.

Note >>
See the Tips and Troubleshooting section for additional information about firewall settings.

Configuring the Enrollment System

If you deploy certificate-based authentication, a server running NPS must have a server certificate. During the authentication process, the NPS sends the server certificate to the client computer as proof of identity.

To work with the XpressConnect Enrollment System (ES), the NPS requires a server certificate and the private key of the Root CA from the Enrollment System. The certificates are generated and downloaded from the ES, and then uploaded to the NPS.

This section describes how to configure the Enrollment System as a private CA, generate the RADIUS server certificate, download the public and private key of the RADIUS server certificate, and download the public key of the intermediate CA.

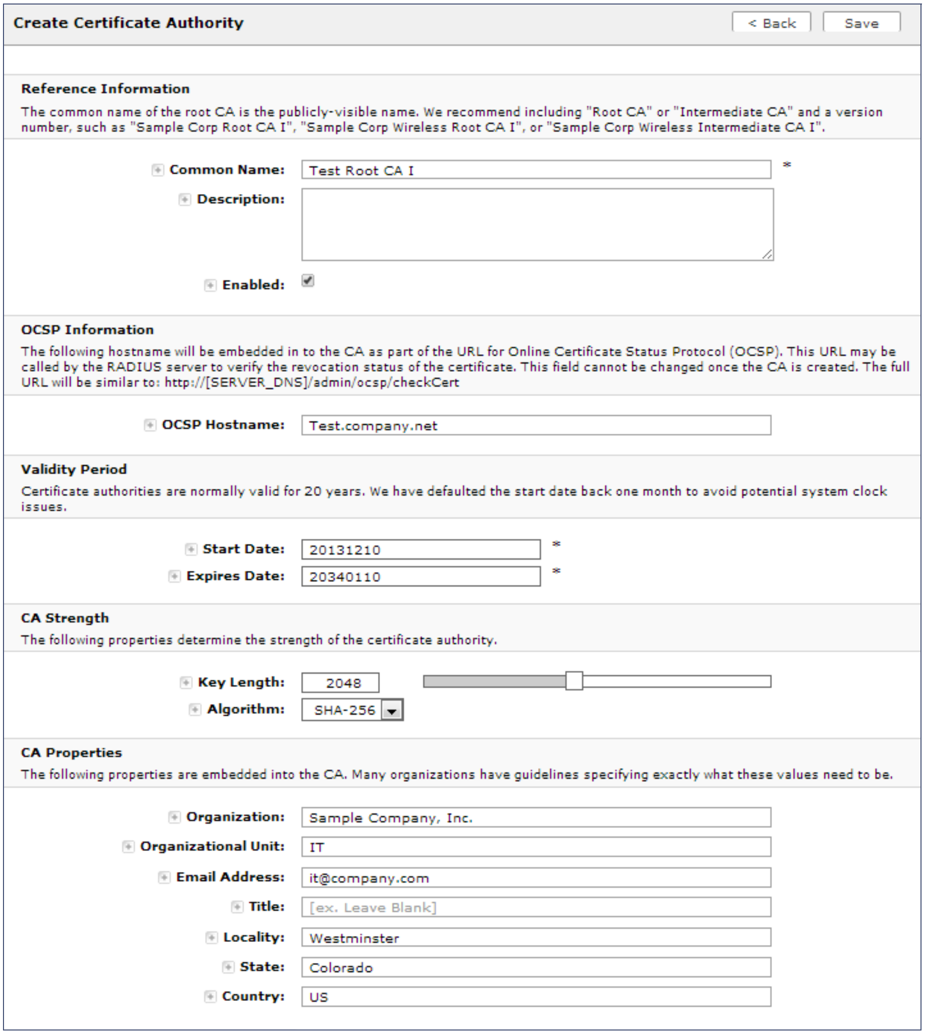
Create the Certificate Authority

This section describes how to create a standalone CA in the Enrollment System.

How to Set Up a Standalone Certificate Authority

1. In the ES, on the left menu, select *Certificate Authority* > *Manage CA*.
2. Create new CA.
3. Select *Generate New Certificate Authority*.
4. On the *Create Certificate Authority* page, enter the following information:
   - Common Name - This is the publicly-visible name of the root CA. We recommend that you use the word *Root* in the name and include a version number.
   - Description - Enter a description useful to other administrators.
   - Enabled - The default is enabled. Be sure this box is checked.
   - OCSP Host Name - This host name is embedded into the CA as part of the URL for the OCSP.
   - Validity Period - Leave the default, or specify the *Start* and *Expires* dates.
   - CA Strength - Configure the strength of the CA by specifying the *Key Length* and *Algorithm*.
   - CA Properties - These properties are embedded into the CA. Enter the appropriate information as required by your network policy.

FIGURE 2. Create Certificate Authority



Create Certificate Authority

Reference Information

The common name of the root CA is the publicly-visible name. We recommend including "Root CA" or "Intermediate CA" and a version number, such as "Sample Corp Root CA I", "Sample Corp Wireless Root CA I", or "Sample Corp Wireless Intermediate CA I".

Common Name: Test Root CA I *

Description:

Enabled: ☑

OCSP Information

The following hostname will be embedded in to the CA as part of the URL for Online Certificate Status Protocol (OCSP). This URL may be called by the RADIUS server to verify the revocation status of the certificate. This field cannot be changed once the CA is created. The full URL will be similar to: http://[SERVER_DNS]/admin/ocsp/checkCert

OCSP Hostname: Test.company.net

Validity Period

Certificate authorities are normally valid for 20 years. We have defaulted the start date back one month to avoid potential system clock issues.

Start Date: 20131210 *

Expires Date: 20340110 *

CA Strength

The following properties determine the strength of the certificate authority.

Key Length: 2048

Algorithm: SHA-256

CA Properties

The following properties are embedded into the CA. Many organizations have guidelines specifying exactly what these values need to be.

Organization: Sample Company, Inc.

Organizational Unit: IT

Email Address: it@company.com

Title: [ex. Leave Blank]

Locality: Westminster

State: Colorado

Country: US

5. *Save* the CA.

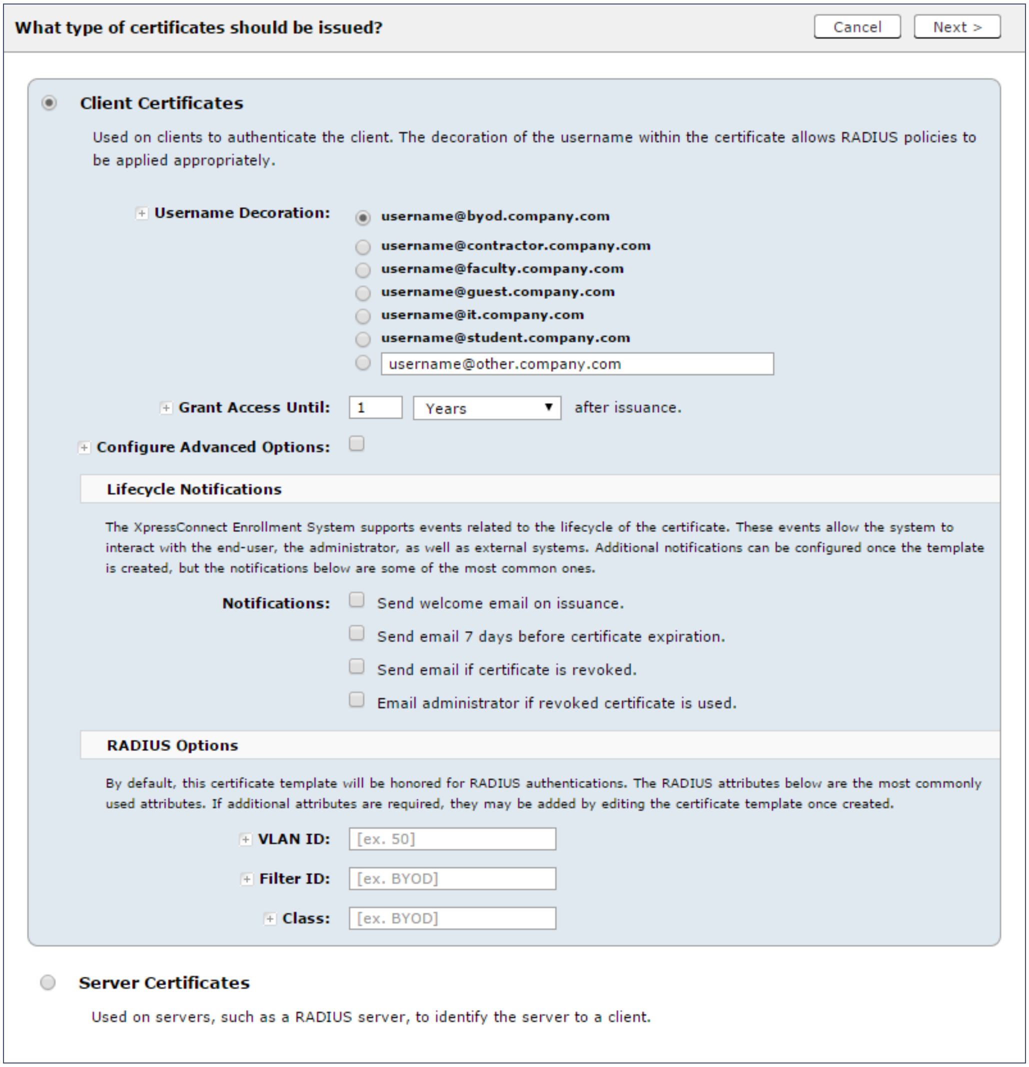
Client Certificate Template Settings For NPS

In the Enrollment System, certificate templates are used to generate certificates. A template defines the properties embedded into a certificate when it is issued. Some properties are static and remain the same for every certificate. Other properties are calculated or use variables, allowing them to differ per certificate, based on user and device.

How to Set Up a Client Certificate Template Using an Onboard CA

1. In the ES, on the left menu, select *Certificate Authority > Manage Templates.*
2. Click *Add Template* to create a new certificate template.
3. Choose *Use an onboard certificate authority* and select the onboard CA you created in the previous section.
4. Select *Client Certificates*.

FIGURE 3. Create Client Certificate Template



What type of certificates should be issued?

● **Client Certificates**

Used on clients to authenticate the client. The decoration of the username within the certificate allows RADIUS policies to be applied appropriately.

Username Decoration:
● username@byod.company.com
○ username@contractor.company.com
○ username@faculty.company.com
○ username@guest.company.com
○ username@it.company.com
○ username@student.company.com
○ username@other.company.com

Grant Access Until: 1 Years after issuance.

Configure Advanced Options: □

Lifecycle Notifications

The XpressConnect Enrollment System supports events related to the lifecycle of the certificate. These events allow the system to interact with the end-user, the administrator, as well as external systems. Additional notifications can be configured once the template is created, but the notifications below are some of the most common ones.

Notifications:
□ Send welcome email on issuance.
□ Send email 7 days before certificate expiration.
□ Send email if certificate is revoked.
□ Email administrator if revoked certificate is used.

RADIUS Options

By default, this certificate template will be honored for RADIUS authentications. The RADIUS attributes below are the most commonly used attributes. If additional attributes are required, they may be added by editing the certificate template once created.

VLAN ID: [ex. 50]
Filter ID: [ex. BYOD]
Class: [ex. BYOD]

○ **Server Certificates**

Used on servers, such as a RADIUS server, to identify the server to a client.

5. Select or enter a Username Decoration. The decoration of the username within the certificate allows RADIUS policies to be applied appropriately.
6. Grant access for the appropriate amount of time.

For example, you might have a client certificate template for a guest user that is valid for one, or a few days, another for a contractor that is valid for 6 months, and one for employees that is good for a year.

Tip >>
To configure pattern attributes, certificate strength, and EKUs, check the *Configure Advanced Options* box before you click *Next*.

7. Select any email notifications to be sent to the user related to the lifecycle of the certificate. Additional certificate notifications can be configured after the template is created.
8. Enter RADIUS Options to assign a VLAN ID or Filter ID to certificates that use this template. These settings only applies if you are using the ES onboard RADIUS server.

Client Certificate Template Advanced Options

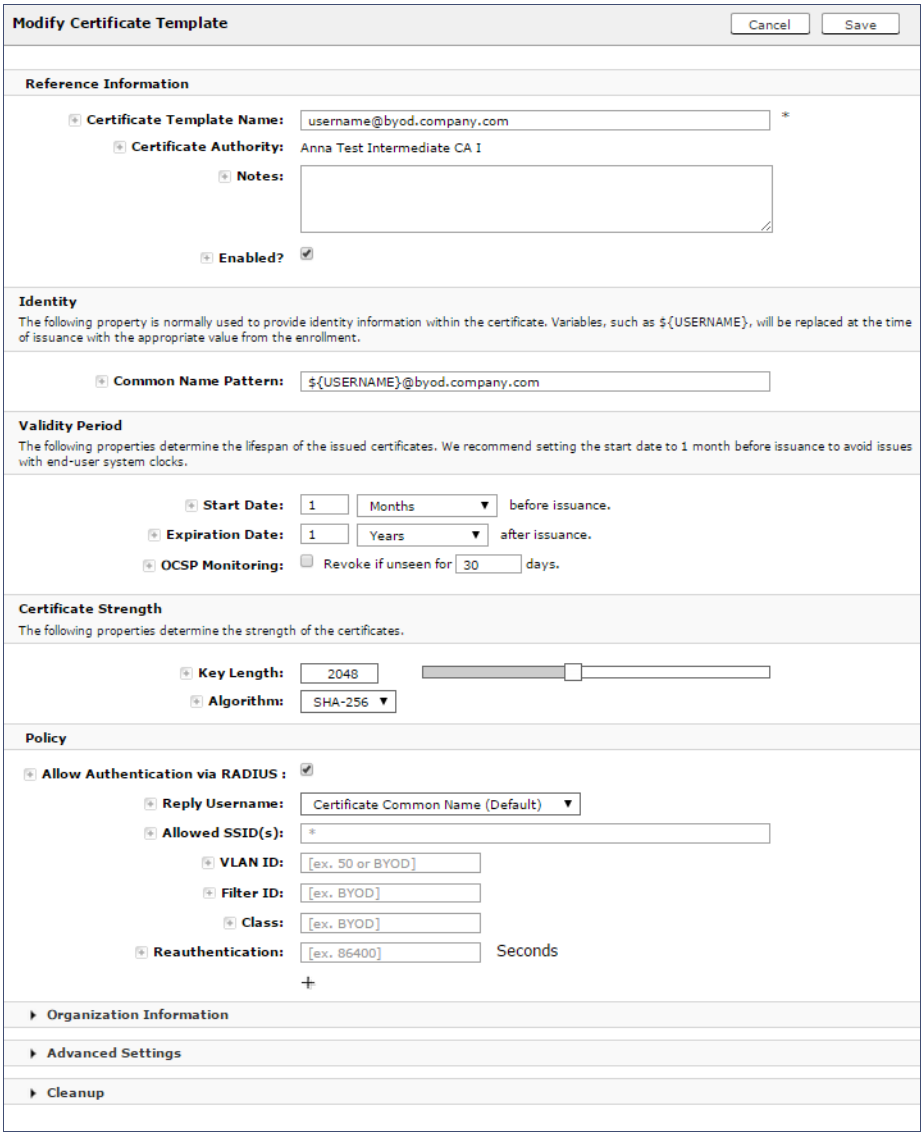
This section describes the fields on the on the *Modify Certificate Template* page, which displays if you checked *Configure Advanced Options* while creating a **Client** certificate template.

- Reference Information - Enter the *Certificate Template Name* and *Notes* - This information is for reference only. Enable the template.
- Identity - Enter the *Common Name Pattern* used to determine the common name for certificates generated suing this template. Variables, such as ${SERVER_NAME} are replaced when issued with the value from enrollment.
- Validity Period - Used to determine the lifespan of the issued certificate.
- Certificate Strength - Enter the *Key Length* and *Algorithm* for certificates using this template.
- Organization Information -Enter the *Patterns* to for certificates using this template.
- Advanced Settings - Enter the *Patterns* to for certificates using this template.

If you are using the NPS as a RADIUS server in your environment, the server certificate requires that you have a *SAN Other Name* in addition to the *Common Name* properties. The *SAN Other Name Pattern* must match the variable used in the *Common Name Pattern* field.

Note >>
Client certificate templates must use the *Microsoft Client EKU - 1.3.6.1.5.5.7.3.2*. This establishes the *Extended Key Usage* properties for the certificate.

FIGURE 4. Modify Client Certificate Template



Modify Certificate Template

Reference Information

Certificate Template Name: username@byod.company.com *

Certificate Authority: Anna Test Intermediate CA I

Notes:

Enabled? ☑

Identity

The following property is normally used to provide identity information within the certificate. Variables, such as ${USERNAME}, will be replaced at the time of issuance with the appropriate value from the enrollment.

Common Name Pattern: ${USERNAME}@byod.company.com

Validity Period

The following properties determine the lifespan of the issued certificates. We recommend setting the start date to 1 month before issuance to avoid issues with end-user system clocks.

Start Date: 1 Months ▼ before issuance.

Expiration Date: 1 Years ▼ after issuance.

OCSP Monitoring: □ Revoke if unseen for 30 days.

Certificate Strength

The following properties determine the strength of the certificates.

Key Length: 2048

Algorithm: SHA-256 ▼

Policy

Allow Authentication via RADIUS : ☑

Reply Username: Certificate Common Name (Default) ▼

Allowed SSID(s): *

VLAN ID: [ex. 50 or BYOD]

Filter ID: [ex. BYOD]

Class: [ex. BYOD]

Reauthentication: [ex. 86400] Seconds

+

▸ Organization Information

▸ Advanced Settings

▸ Cleanup

- Use the options in the *Cleanup* section to delete client certificate templates and associated data.

Create a Certificate Template for the NPS Server Certificate

The server certificate helps to verify the identity of the NPS (acting as a RADIUS server) to wireless clients.

This section describes how to set up a server certificate template in the Enrollment System.

How to Set Up a Server Certificate Template Using an Onboard CA

1. In the ES, on the left menu, select *Certificate Authority > Manage Templates.*
2. Click *Add Template* to create a new certificate template.
3. Choose *Use an onboard certificate authority* and select the onboard CA you created in the previous section.
4. Select *Server Certificates*.
5. Enter a validity period for the server certificate, and click *Next* to use the default settings.

Tip >>
To configure pattern attributes, certificate strength, and EKUs, check the *Configure Advanced Options* box before you click *Next*.

Server Certificate Template Advanced Options

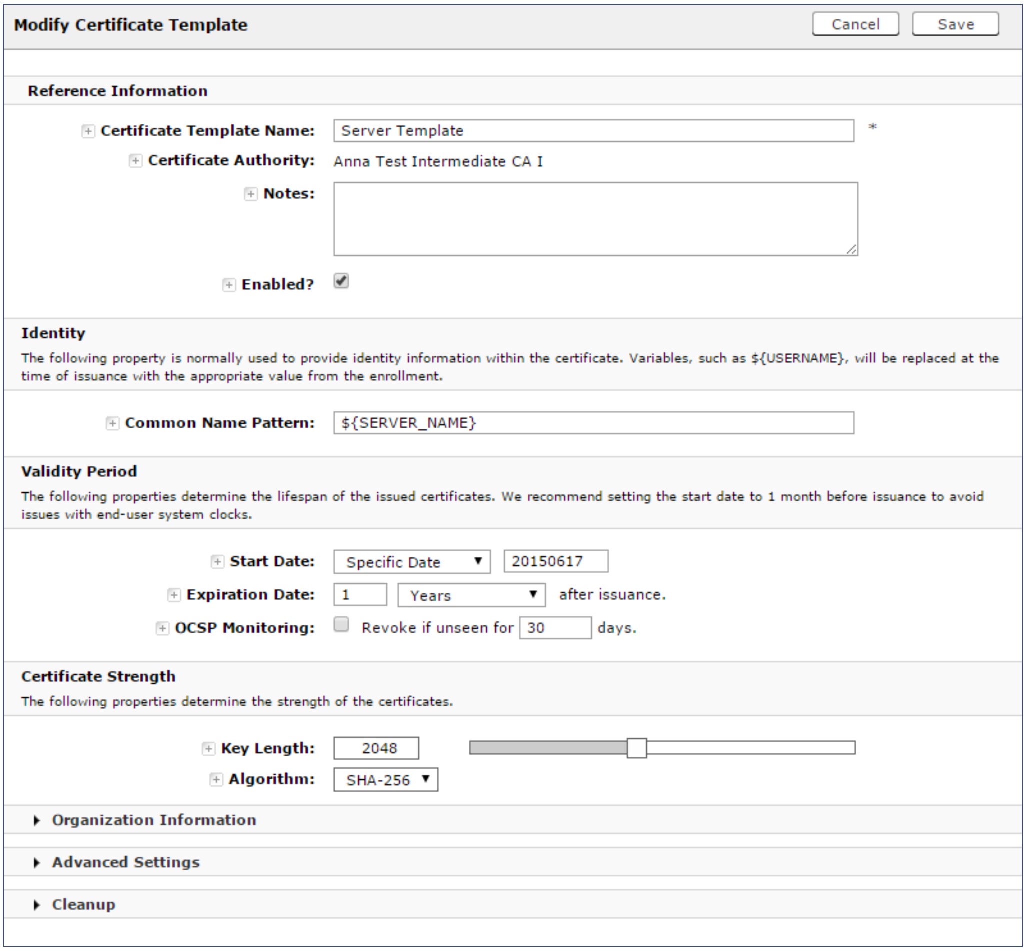
This section describes the fields on the on the *Modify Certificate Template* page, which displays if you checked *Configure Advanced Options* while creating a **Server** certificate template.

- Reference Information - Enter the *Certificate Template Name* and *Notes* - This information is for reference only. Enable the template.
- Identity - Enter the *Common Name Pattern* used to determine the common name for certificates generated suing this template. Variables, such as ${SERVER_NAME} are replaced when issued with the value from enrollment.
- Validity Period - Used to determine the lifespan of the issued certificate.
- Certificate Strength - Enter the *Key Length* and *Algorithm* for certificates using this template.
- Organization Information -Enter the *Patterns* to for certificates using this template.
- Advanced Settings - Enter the *Patterns* to for certificates using this template.

If you are using the NPS as a RADIUS server in your environment, the server certificate requires that you have a *SAN Other Name* in addition to the *Common Name* properties. The *SAN Other Name Pattern* must match the variable used in the *Common Name Pattern* field.

Note >>
Server certificate templates must use the *Microsoft Server EKU - 1.3.6.1.5.5.7.3.1.* This establishes the *Extended Key Usage* properties for the certificate.

FIGURE 5. Modify Server Certificate Template



Modify Certificate Template

Reference Information

Certificate Template Name: Server Template *

Certificate Authority: Anna Test Intermediate CA I

Notes:

Enabled? ☑

Identity

The following property is normally used to provide identity information within the certificate. Variables, such as ${USERNAME}, will be replaced at the time of issuance with the appropriate value from the enrollment.

Common Name Pattern: ${SERVER_NAME}

Validity Period

The following properties determine the lifespan of the issued certificates. We recommend setting the start date to 1 month before issuance to avoid issues with end-user system clocks.

Start Date: Specific Date ▼ 20150617

Expiration Date: 1 Years ▼ after issuance.

OCSP Monitoring: □ Revoke if unseen for 30 days.

Certificate Strength

The following properties determine the strength of the certificates.

Key Length: 2048

Algorithm: SHA-256 ▼

▸ **Organization Information**

▸ **Advanced Settings**

▸ **Cleanup**

- Use the options in the *Cleanup* section to delete server certificate templates and associated data.

Generate the Server Certificate for the NPS

This section describes how to generate a server certificate from the server certificate template and the Enrollment System onboard CA you created in the previous steps.

How to Generate the Server Certificate

1. In the ES, go to *Certificate Authority > Generate Certificate.*
2. Select the NPS server certificate template you just created.

3. Use the default *SERVER_NAME*.
4. Select *Auto-Generate CSR* from the *CSR source* and *Save*. The certificate is generated and displayed on the *View Certificate* page.

> **Note >>**
> Alternately, NPS can generate a Certificate Signing Request (CSR) to be used within Enrollment System for generating the RADIUS server certificate. You use the same server certificate template, but instead of allowing ES to auto generate the certificate, you select the *Copy & Paste CSR* option from the *CSR source*.

How to Download the RADIUS Server Certificate

1. Navigate to the *Configuration > Advanced > RADIUS Server* page.
2. In the RADIUS Server Certificate section, download the *Public Key* for the server certificate. Alternately, you can download the *CSR* or certificate *Chain*, or replace an existing RADIUS server certificate.

Download the Public Key of the Intermediate CA

The Public Key of the Intermediate CA is used to establish the proper chaining of the RADIUS server certificate. Proper chaining is necessary for the wireless end-points to establish a ‘trust’ for the RADIUS server certificate to the Intermediate CA, which is used to sign the client certificates.

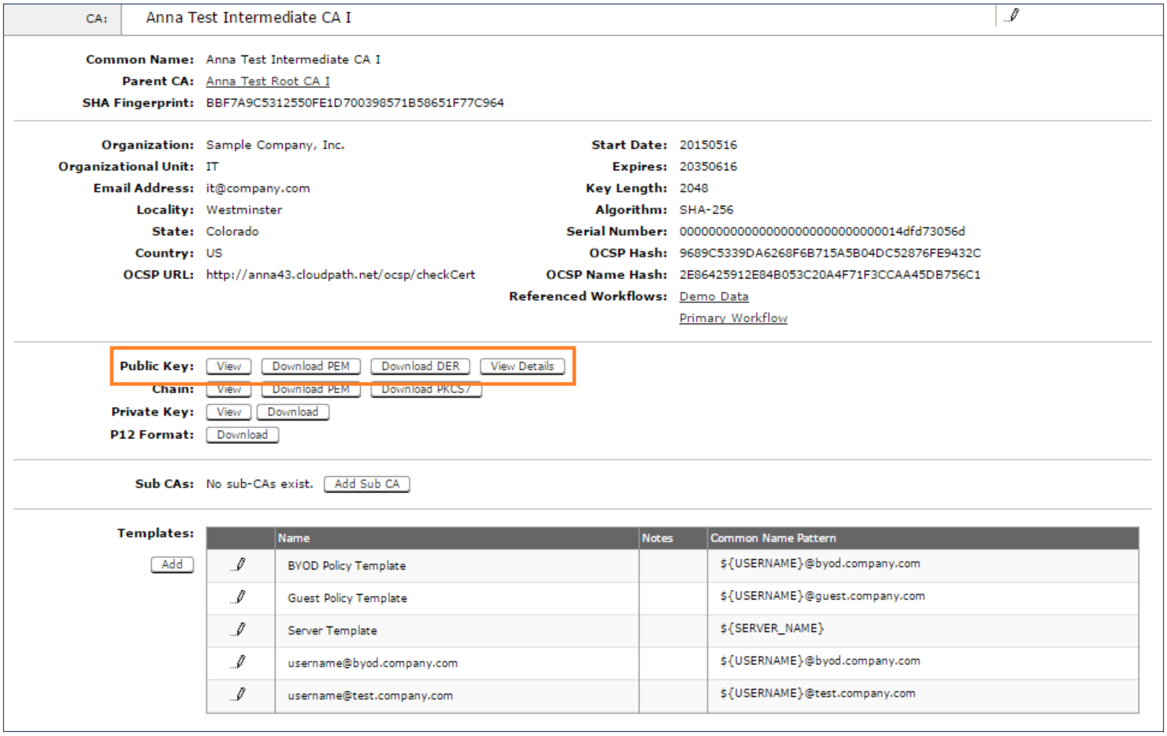
This section describes how to download the public key of the Intermediate CA to use with NPS.

> **Note >>**
> By default, the Intermediate CA (ES onboard CA) signs the user certificate. If your environment is set up to have the Root CA sign the client certificate, you must download and install the public key of the Root CA.

How to Download the Public Key

1. In the ES, go To *Certificate Authority > Manage CA*. Expand the onboard CA you created in a previous step.
2. Expand the onboard CA.
3. In the Sub CAs section, click the link to open the Intermediate CA page.
4. Download the *Public Key* of the Intermediate CA.

FIGURE 6. Download Public Key of Intermediate CA



CA: Anna Test Intermediate CA I

Common Name: Anna Test Intermediate CA I
Parent CA: Anna Test Root CA I
SHA Fingerprint: BBF7A9C5312550FE1D700398571B58651F77C964

Organization: Sample Company, Inc.
Organizational Unit: IT
Email Address: it@company.com
Locality: Westminster
State: Colorado
Country: US
OCSP URL: http://anna43.cloudpath.net/ocsp/checkCert

Start Date: 20150516
Expires: 20350616
Key Length: 2048
Algorithm: SHA-256
Serial Number: 0000000000000000000000000000014dfd73056d
OCSP Hash: 9689C5339DA6268F6B715A5B04DC52876FE9432C
OCSP Name Hash: 2E86425912E84B053C20A4F71F3CCAA45DB756C1
Referenced Workflows: Demo Data
Primary Workflow

Sub CAs: No sub-CAs exist.

Templates:

	Name	Notes	Common Name Pattern
	BYOD Policy Template		${USERNAME}@byod.company.com
	Guest Policy Template		${USERNAME}@guest.company.com
	Server Template		${SERVER_NAME}
	username@byod.company.com		${USERNAME}@byod.company.com
	username@test.company.com		${USERNAME}@test.company.com

Configuring the Network Policy Server

The following sections describe how to configure Microsoft 2008 Network Policy Server to use as a RADIUS server with the Enrollment System.

> **Prerequisite >>**
> The NPS must be configured within your domain.

Import the RADIUS Server Certificate for the NPS

This section describes how to import the server certificate to the NPS Certificate Store.

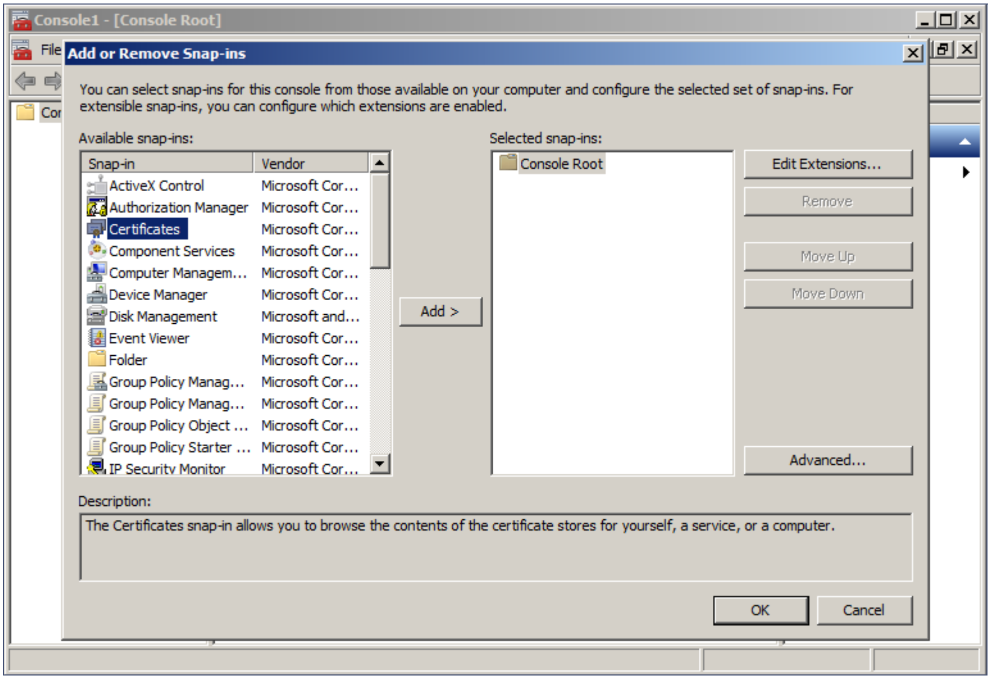
How to Add a Certificates Snap-In

1. From a command window, run ***mmc*** to open a Console window.

Tip >>
Do not use certmgr to import the server certificate. The certmgr allows you to manage certificates for the *Current User*. However, you must import the server certificate into the *NPS Computer* certificate store.

2. Go to *File* > *Add/Remove Snap-in*.
3. On the *Add or Remove Snap-ins* page, select *Certificates* from the left pane (Available Snap-ins:) and click *Add*.

FIGURE 7. Add Snap-in



You can select snap-ins for this console from those available on your computer and configure the selected set of snap-ins. For extensible snap-ins, you can configure which extensions are enabled.

Available snap-ins:

Snap-in	Vendor
ActiveX Control	Microsoft Cor...
Authorization Manager	Microsoft Cor...
Certificates	Microsoft Cor...
Component Services	Microsoft Cor...
Computer Managem...	Microsoft Cor...
Device Manager	Microsoft Cor...
Disk Management	Microsoft and...
Event Viewer	Microsoft Cor...
Folder	Microsoft Cor...
Group Policy Manag...	Microsoft Cor...
Group Policy Manag...	Microsoft Cor...
Group Policy Object ...	Microsoft Cor...
Group Policy Starter ...	Microsoft Cor...
IP Security Monitor	Microsoft Cor...

Selected snap-ins:

Console Root

Description:

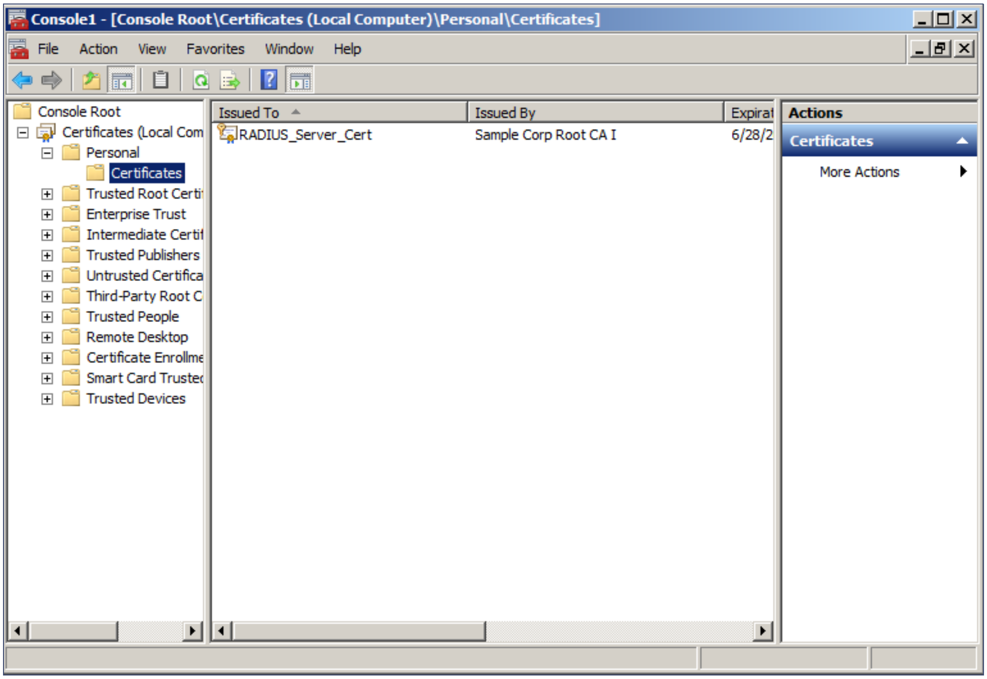
The Certificates snap-in allows you to browse the contents of the certificate stores for yourself, a service, or a computer.

4. In the *Certificates* snap-in window, select *Computer Account* and click *Next*.
5. In the *Select Computer* window, Select *Local Computer* and click *Finish*. The *Certificates (Local Computer* should be listed in the right pane (Selected Snap-ins:) of the *Add or Remove Snap-ins* window.
6. Click *OK*.

How to Import the RADIUS Server Certificate into the Local Computer Personal Certificate Store

1. On the Console window, expand *Certificate (Local Computer)* to locate the *Personal/Certificates* folder.

FIGURE 8. Certificates Folder in Console Window



Console1 - [Console Root\Certificates (Local Computer)\Personal\Certificates]

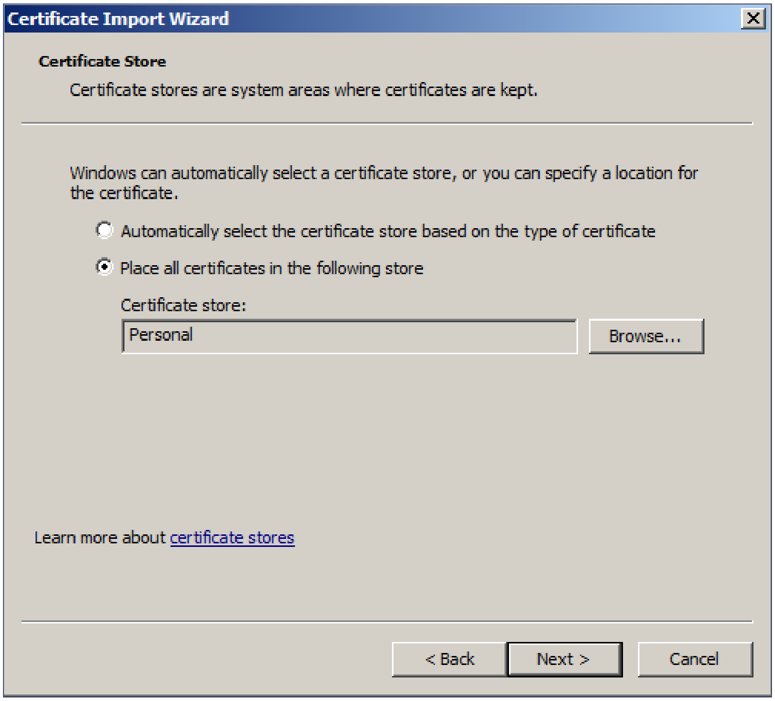
Issued To	Issued By	Expirat
RADIUS_Server_Cert	Sample Corp Root CA I	6/28/2

2. Go to *Action* > *All Tasks* > *Import* to start the *Certificate Import Wizard*.
3. Browse to locate the private key of the server certificate you generated in the Enrollment System to use for the NPS and click *Open*.
4. On the *Certificate Import Wizard*, click *Next*.

5. Place the NPS server certificates in the *Personal* store and click *Next*.

> **Tip >>**
>
> Be sure that the RADIUS server certificate shows the key icon . If it doesn't, you do not have the private key for the RADIUS certificate. If you have issues, try downloading the RADIUS certificate and private key in P12 format. You can also try using the command line interface to install the private key for the RADIUS certificate. See RADIUS Server Certificate Missing Private Key, on page 29.

FIGURE 9. Certificate Import Wizard



Certificate Import Wizard

Certificate Store

Certificate stores are system areas where certificates are kept.

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

○ Automatically select the certificate store based on the type of certificate

● Place all certificates in the following store

Certificate store: Personal

6. Review the imported certificate and click *Finish*.

Import the Public Key of the Intermediate CA

The public key of the Intermediate CA (ES onboard CA) establishes the proper trust chain of the RADUIS server certificate.

This section describes how to import the public key of the Intermediate CA to the NPS Certificate Store.

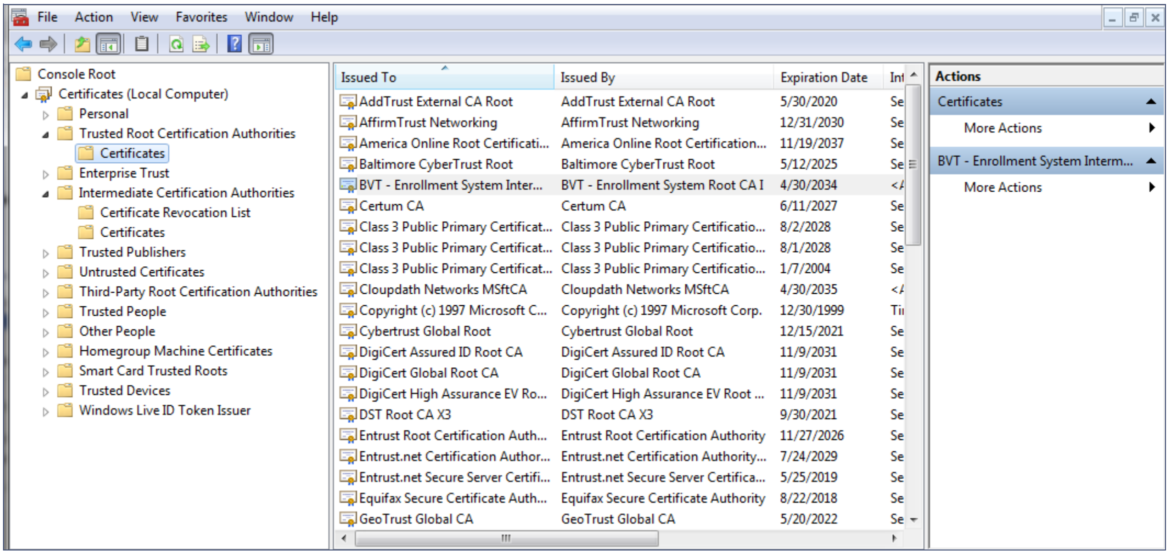
Note >>
By default, the Intermediate CA (ES onboard CA) signs the user certificate. If your environment is set up to have the Root CA sign the client certificate, you must download and install the public key of the Root CA.

How to Import the Public Key of the Intermediate CA to the Enterprise Trust Store

1. On the Console window, expand *Certificate (Local Computer)* to locate the *Enterprise Trust/ Certificates* folder.
2. Go to *Action > All Tasks > Import* to start the *Certificate Import Wizard*.
3. Browse to locate the public key of the Enrollment System on-board Intermediate CA and click *Open*.
4. On the *Certificate Import Wizard*, click *Next*.
5. Import the public key of the Intermediate CA in the *Certificate (Local Computer) Trusted Root Certiificate Authorties* store and click *Next*.

Note >>
We have found that there are fewer issues when you import into the Trusted Root CA store. However, if you import the public key of the ES onboard Intermediate CA into the Intermediate CA store, this should also work.

FIGURE 10. Root Certificate in the Enterprise Certificate Store



- Console Root
  - Certificates (Local Computer)
    - Personal
    - Trusted Root Certification Authorities
      - Certificates
    - Enterprise Trust
    - Intermediate Certification Authorities
      - Certificate Revocation List
      - Certificates
    - Trusted Publishers
    - Untrusted Certificates
    - Third-Party Root Certification Authorities
    - Trusted People
    - Other People
    - Homegroup Machine Certificates
    - Smart Card Trusted Roots
    - Trusted Devices
    - Windows Live ID Token Issuer

Issued To	Issued By	Expiration Date	Int
AddTrust External CA Root	AddTrust External CA Root	5/30/2020	Se
AffirmTrust Networking	AffirmTrust Networking	12/31/2030	Se
America Online Root Certificati...	America Online Root Certification...	11/19/2037	Se
Baltimore CyberTrust Root	Baltimore CyberTrust Root	5/12/2025	Se
BVT - Enrollment System Inter...	BVT - Enrollment System Root CA I	4/30/2034	<A
Certum CA	Certum CA	6/11/2027	Se
Class 3 Public Primary Certificat...	Class 3 Public Primary Certificatio...	8/2/2028	Se
Class 3 Public Primary Certificat...	Class 3 Public Primary Certificatio...	8/1/2028	Se
Class 3 Public Primary Certificat...	Class 3 Public Primary Certificatio...	1/7/2004	Se
Cloupdath Networks MSftCA	Cloupdath Networks MSftCA	4/30/2035	<A
Copyright (c) 1997 Microsoft C...	Copyright (c) 1997 Microsoft Corp.	12/30/1999	Ti
Cybertrust Global Root	Cybertrust Global Root	12/15/2021	Se
DigiCert Assured ID Root CA	DigiCert Assured ID Root CA	11/9/2031	Se
DigiCert Global Root CA	DigiCert Global Root CA	11/9/2031	Se
DigiCert High Assurance EV Ro...	DigiCert High Assurance EV Root ...	11/9/2031	Se
DST Root CA X3	DST Root CA X3	9/30/2021	Se
Entrust Root Certification Auth...	Entrust Root Certification Authority	11/27/2026	Se
Entrust.net Certification Author...	Entrust.net Certification Authority...	7/24/2029	Se
Entrust.net Secure Server Certifi...	Entrust.net Secure Server Certifica...	5/25/2019	Se
Equifax Secure Certificate Auth...	Equifax Secure Certificate Authority	8/22/2018	Se
GeoTrust Global CA	GeoTrust Global CA	5/20/2022	Se

6. Review the imported certificate and click *Finish*.

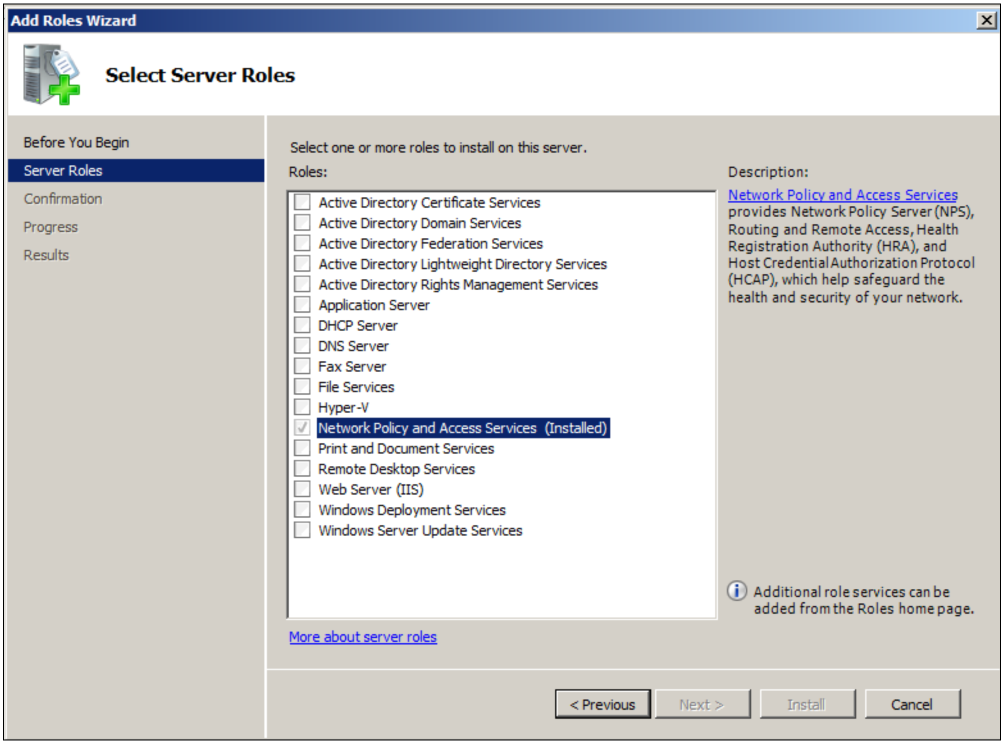
Set up Roles and Services

This section describes how to install Network Policy and Access Services (NPAS) as a Server Role.

How to Add NPAS as a Server Role

1. Open Server Manager.
2. Open the *Add Roles* wizard and install *Network Policy and Access Services*.

FIGURE 11. Install Network Policy and Access Services



Add Roles Wizard

Select Server Roles

Select one or more roles to install on this server.

Roles:

- □ Active Directory Certificate Services
- □ Active Directory Domain Services
- □ Active Directory Federation Services
- □ Active Directory Lightweight Directory Services
- □ Active Directory Rights Management Services
- □ Application Server
- □ DHCP Server
- □ DNS Server
- □ Fax Server
- □ File Services
- □ Hyper-V
- ☑ Network Policy and Access Services (Installed)
- □ Print and Document Services
- □ Remote Desktop Services
- □ Web Server (IIS)
- □ Windows Deployment Services
- □ Windows Server Update Services

Description:

Network Policy and Access Services provides Network Policy Server (NPS), Routing and Remote Access, Health Registration Authority (HRA), and Host Credential Authorization Protocol (HCAP), which help safeguard the health and security of your network.

Additional role services can be added from the Roles home page.

More about server roles

3. Open the *Add Role Services* window and verify that the *Network Policy Server* is installed for *Network Policy and Access Services*.
4. In the *Role Summary* section, verify that NPS is running.

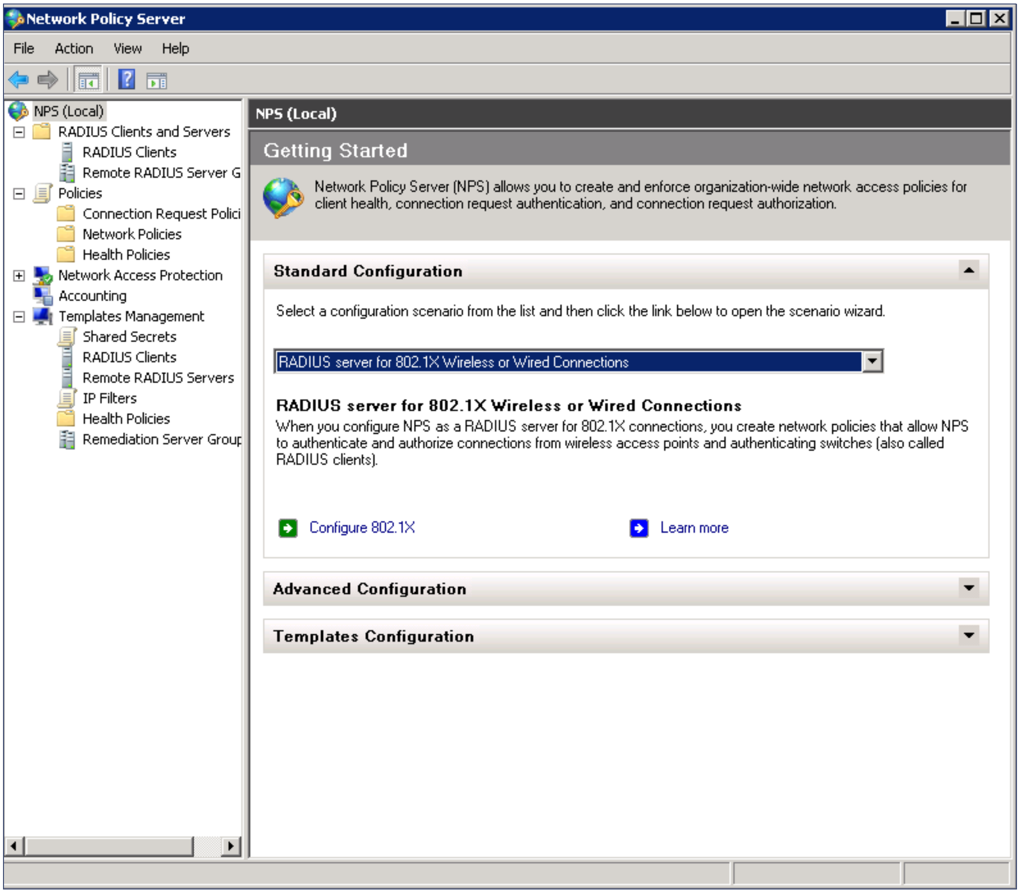
Network Policy Setup for EAP/TLS

This section describes how to configure the 802.1X connection policy.

How to Set Up 802.1X Connections

1. Open Server Manager.
2. Expand *Network Policy and Access Services* and select *NPS (Local)*. The *Standard Configuration* section should appear in the center pane.
3. Select *RADIUS server for 802.1X Wireless or Wired Connections* and Click *Configure 802.1X.*

FIGURE 12. Configure 802.1X



Network Policy Server (NPS) allows you to create and enforce organization-wide network access policies for client health, connection request authentication, and connection request authorization.

Select a configuration scenario from the list and then click the link below to open the scenario wizard.

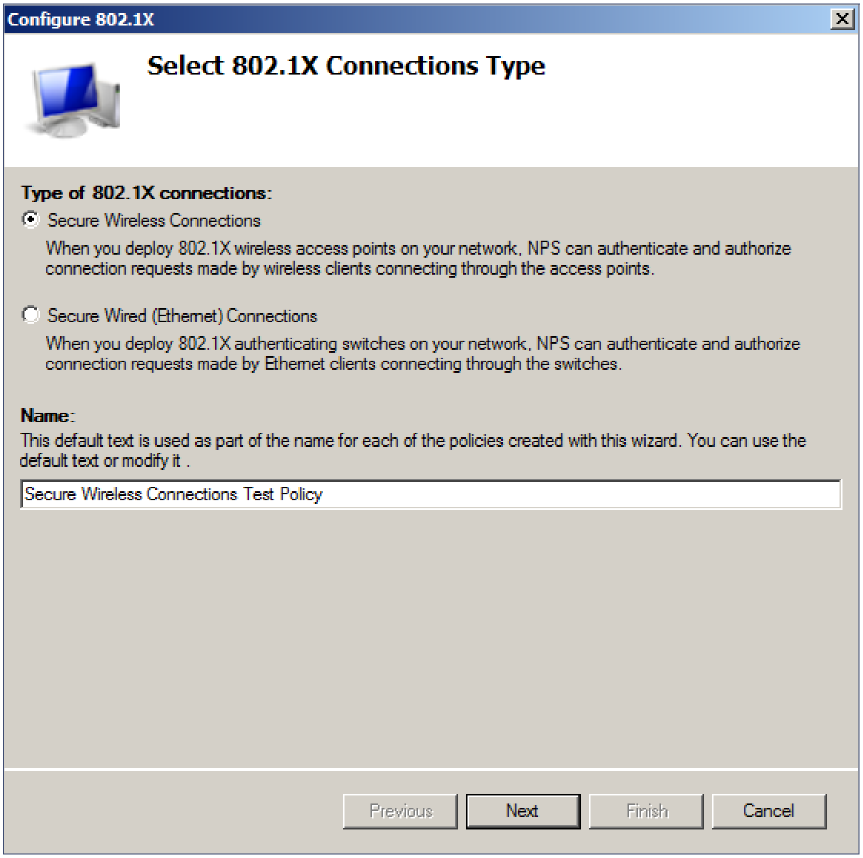
RADIUS server for 802.1X Wireless or Wired Connections

RADIUS server for 802.1X Wireless or Wired Connections

When you configure NPS as a RADIUS server for 802.1X connections, you create network policies that allow NPS to authenticate and authorize connections from wireless access points and authenticating switches (also called RADIUS clients).

4. In the *Select 802.1X Connection Type* window, select *Secure Wireless Connections,* enter a *Name* for the wireless connection, and click *Next*.

FIGURE 13. Select 802.1X Connection Type



Configure 802.1X

Select 802.1X Connections Type

Type of 802.1X connections:

● Secure Wireless Connections

When you deploy 802.1X wireless access points on your network, NPS can authenticate and authorize connection requests made by wireless clients connecting through the access points.

○ Secure Wired (Ethernet) Connections

When you deploy 802.1X authenticating switches on your network, NPS can authenticate and authorize connection requests made by Ethernet clients connecting through the switches.

Name:

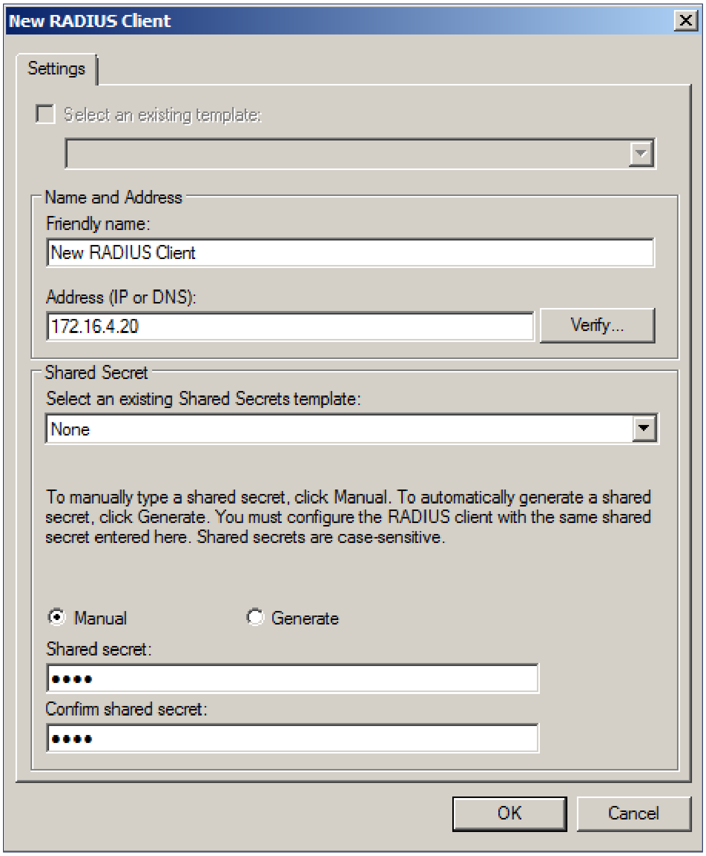
This default text is used as part of the name for each of the policies created with this wizard. You can use the default text or modify it .

Secure Wireless Connections Test Policy

5. In the *Specify 802.1X Switches* window, click *Add* to configure a wireless access point (RADIUS client).
6. In the *New RADIUS Client* window, enter settings for the wireless access point and click *OK*. Repeat this step to add additional RADIUS clients. Click *Next* on the *Specify 802.1X Switches* window to continue.

> **Note >>**
> If you already have a RADIUS client configured, skip to Step 10.

FIGURE 14. New RADIUS Client



New RADIUS Client

Settings

□ Select an existing template:

Name and Address

Friendly name: New RADIUS Client

Address (IP or DNS): 172.16.4.20

Shared Secret

Select an existing Shared Secrets template: None

To manually type a shared secret, click Manual. To automatically generate a shared secret, click Generate. You must configure the RADIUS client with the same shared secret entered here. Shared secrets are case-sensitive.

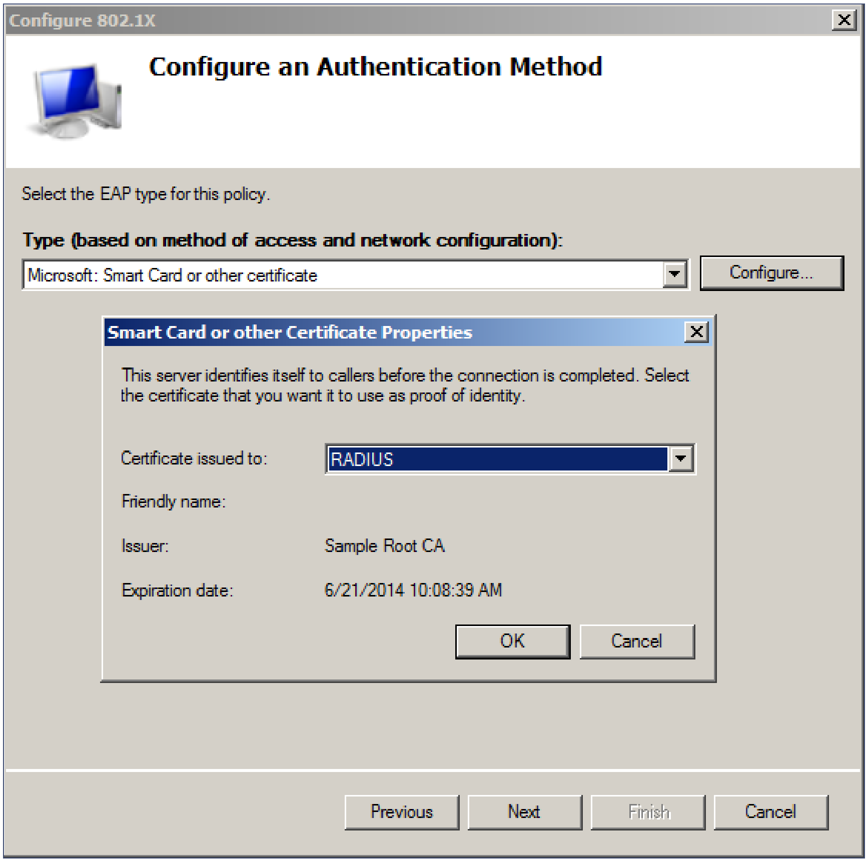
● Manual ○ Generate

Shared secret: ••••

Confirm shared secret: ••••

7. In the *Configure Authentication Method* window, select *Smart Card or other certificate.*
8. To configure a RADIUS client, click *Configure*.
9. In the *Smart Card or other Certificate Properties window*, select the NPS RADIUS server certificate you imported to the Computer Enterprise Trust store. See “Import the RADIUS Server Certificate for the NPS” on page 11. Click *OK*.

FIGURE 15. Configure Authentication Method



Configure 802.1X

Configure an Authentication Method

Select the EAP type for this policy.

Type (based on method of access and network configuration): Microsoft: Smart Card or other certificate

Smart Card or other Certificate Properties

This server identifies itself to callers before the connection is completed. Select the certificate that you want it to use as proof of identity.

Certificate issued to: RADIUS

Friendly name:

Issuer: Sample Root CA

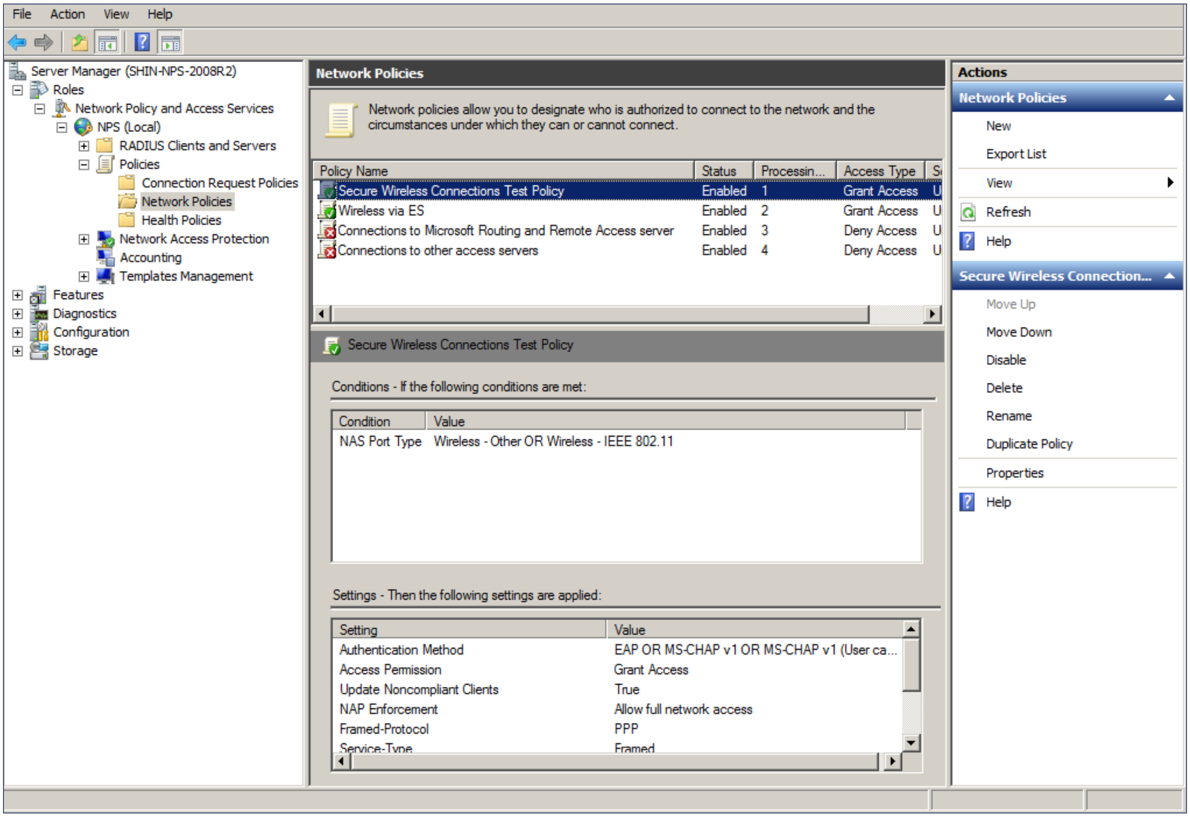
Expiration date: 6/21/2014 10:08:39 AM

10. When you select the server certificate, click *Next* in the *Configure an Authentication Method* window.
11. Set up *User Groups* and *Traffic Controls*, if needed.
12. Click *Finish*. The RADIUS client configuration is added.

Prioritize the 802.1X Configuration

1. From the Server Manager, expand Network Policy and Access Services > NPS (Local) > Policies and select the Network Policies folder.
2. The 802.1X policy you just created should be at the top of the list. If needed, select the policy and select *Move Up* until the policy is at the top of the list.

FIGURE 16. Network Policies



Network policies allow you to designate who is authorized to connect to the network and the circumstances under which they can or cannot connect.

Policy Name	Status	Processin...	Access Type	S
Secure Wireless Connections Test Policy	Enabled	1	Grant Access	U
Wireless via ES	Enabled	2	Grant Access	U
Connections to Microsoft Routing and Remote Access server	Enabled	3	Deny Access	U
Connections to other access servers	Enabled	4	Deny Access	U

Secure Wireless Connections Test Policy

Conditions - If the following conditions are met:

Condition	Value
NAS Port Type	Wireless - Other OR Wireless - IEEE 802.11

Settings - Then the following settings are applied:

Setting	Value
Authentication Method	EAP OR MS-CHAP v1 OR MS-CHAP v1 (User ca...
Access Permission	Grant Access
Update Noncompliant Clients	True
NAP Enforcement	Allow full network access
Framed-Protocol	PPP
Service-Type	Framed

Verify Network Policy

This section describes how to review your network policy and verify that it is configured correctly to work with the Enrollment System.

How to Review the Network Policy

1. From the Server Manager, expand *Network Policy and Access Services* > *NPS (Local)* > *Policies* and select the *Network Policies* folder.
2. Select the 802.1X policy you created in previous steps.
3. Click *Properties*.

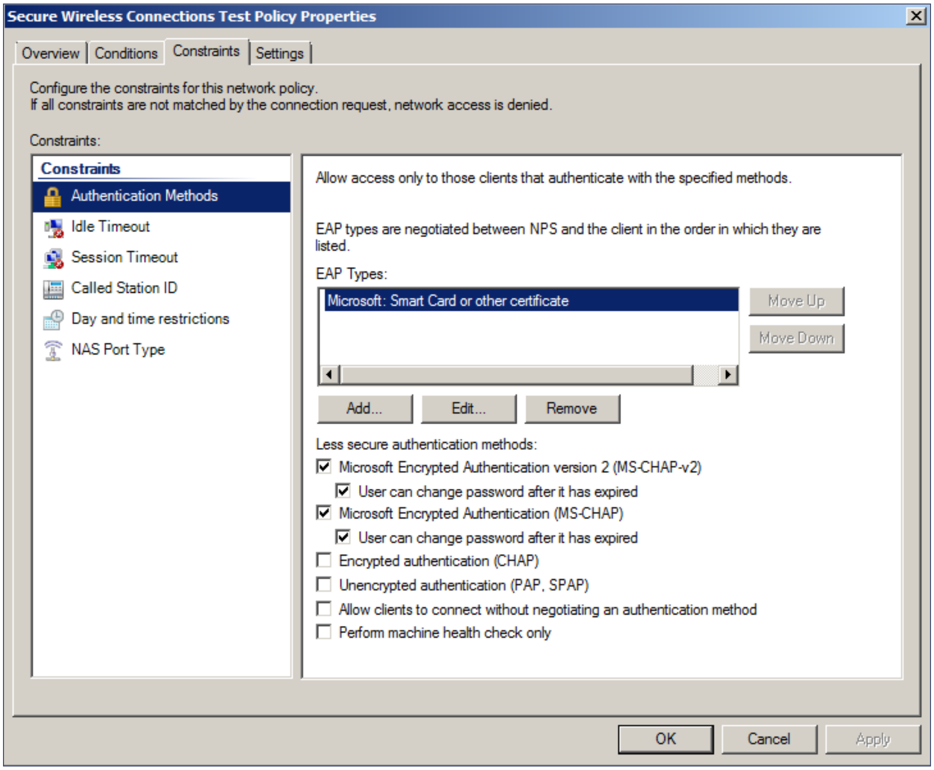
How to Verify Conditions

If using a Connection Request Policy, go to the *Secure Wireless Connections Properties* > *Conditions* tab to verify that your *Conditions* match the Connection Request Policy. See Connection Request Policies, on page 23.

How to Verify Authentication Method

1. On the *Secure Wireless Connections Properties* > *Constraints* tab, select *Authentication Methods*.

FIGURE 17. Secure Wireless Connection Properties



Secure Wireless Connections Test Policy Properties

Configure the constraints for this network policy.
If all constraints are not matched by the connection request, network access is denied.

Constraints:

Allow access only to those clients that authenticate with the specified methods.

EAP types are negotiated between NPS and the client in the order in which they are listed.

EAP Types:

Microsoft: Smart Card or other certificate

Less secure authentication methods:

- ☑ Microsoft Encrypted Authentication version 2 (MS-CHAP-v2)
  - ☑ User can change password after it has expired
- ☑ Microsoft Encrypted Authentication (MS-CHAP)
  - ☑ User can change password after it has expired
- ☐ Encrypted authentication (CHAP)
- ☐ Unencrypted authentication (PAP, SPAP)
- ☐ Allow clients to connect without negotiating an authentication method
- ☐ Perform machine health check only

2. Verify that the *Microsoft Smart Card or other certificate* EAP Type is listed.
3. If it is not listed, click *Add*. On the *Add EAP Type* window, select *Microsoft Smart Card or other certificate* and click *OK*. Select the *Microsoft Smart Card or other certificate* EAP Type and use the *Move Up* button to place it at the top of the list.

   EAP Types are negotiated between NPS and the client in the order in which they are listed.
4. Click *OK*.

How to Verify Network Policy Settings

If using a Connection Request Policy, go to the *Secure Wireless Connections Properties* > *Settings* tab to verify that your *Settings* match the Connection Request Policy.

If *Conditions* and *Constraints* match the connection request, and the *Policy* grants access, these *Settings* are applied.

Connection Request Policies

If you are using the NPS as a RADIUS server to authenticate, you can use the NPS default connection policy.

If you are using the NPS as a RADIUS proxy, you must configure a connection request policy for the remote RADIUS server group. See How to Configure a Connection Request Policy for RADIUS Proxy for more information.

Setting up RADIUS Proxy on NPS

This section describes how to configure Network Policy Server as a RADIUS proxy that forwards connection requests to other RADIUS servers for authentication and authorization.

To configure NPS as a RADIUS proxy, you must:

- Create a remote server group with one or more RADIUS servers to which RADIUS messages are forwarded.
- Create a connection request policy to forward connection requests and accounting information to the remote RADIUS server group.

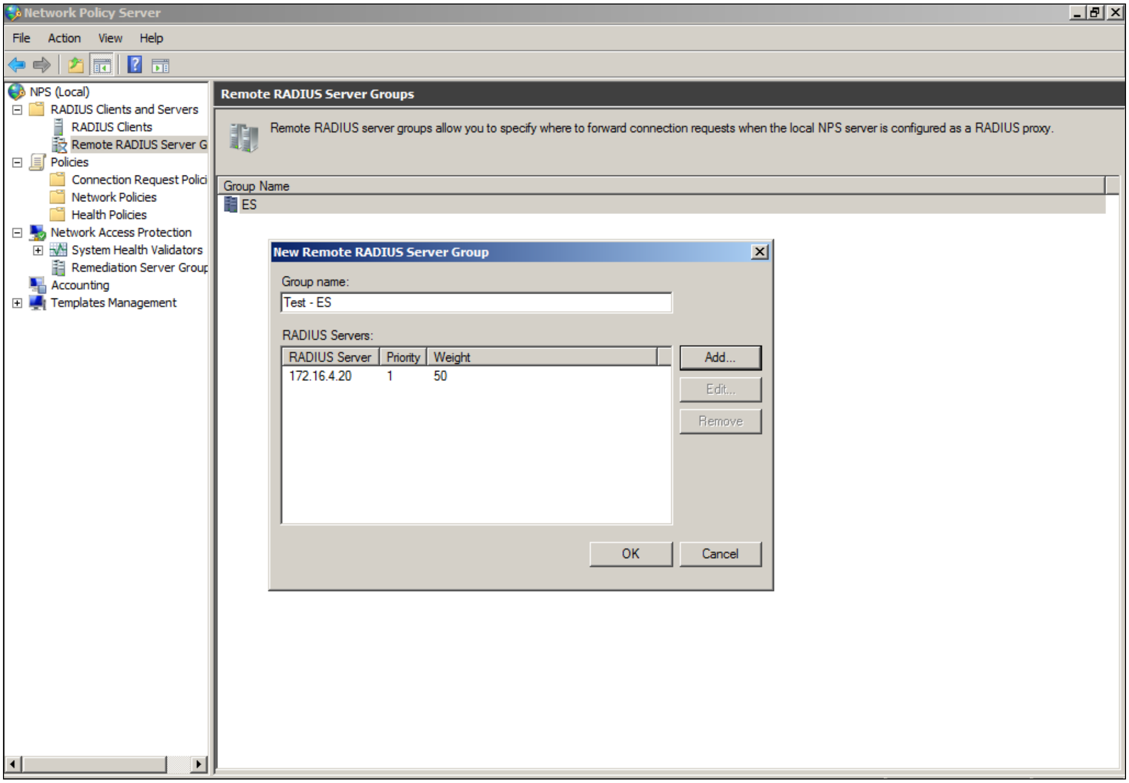
Remote RADIUS Server Groups

Remote RADIUS server groups allow you to specify where to forward connection requests when the local NPS server is configured as a RADIUS proxy.

How to Add a Remote RADIUS Server Group for RADIUS Proxy

1. On the NPS (local), expand *RADIUS Clients and Servers* and select *Remote RADIUS Server Groups.*
2. From the *Action* menu, select *New*. (Alternately, you can right-click and select *New*.)
3. In the *New Remote RADIUS Server Group* window, enter a *Group name* (for example, enter **ES**) and click *Add*.

FIGURE 18. Remote RADIUS Server Group



Remote RADIUS server groups allow you to specify where to forward connection requests when the local NPS server is configured as a RADIUS proxy.

Group name: Test - ES

RADIUS Servers:

RADIUS Server	Priority	Weight
172.16.4.20	1	50

4. In the *Add RADIUS server window*, on the *Address* tab, enter the IP address of the NPS acting as a RADIUS server.
5. On the *Authentication/Accounting* tab, enter the *Shared secret* of the NPS and confirm. Click *OK.*
6. Click OK in the *New Remote RADIUS server* window. The **ES** remote RADIUS server group is added.

Connection Request Policy

Connection request policies allow you to designate whether connection requests are processed locally or forwarded to remote RADIUS servers.

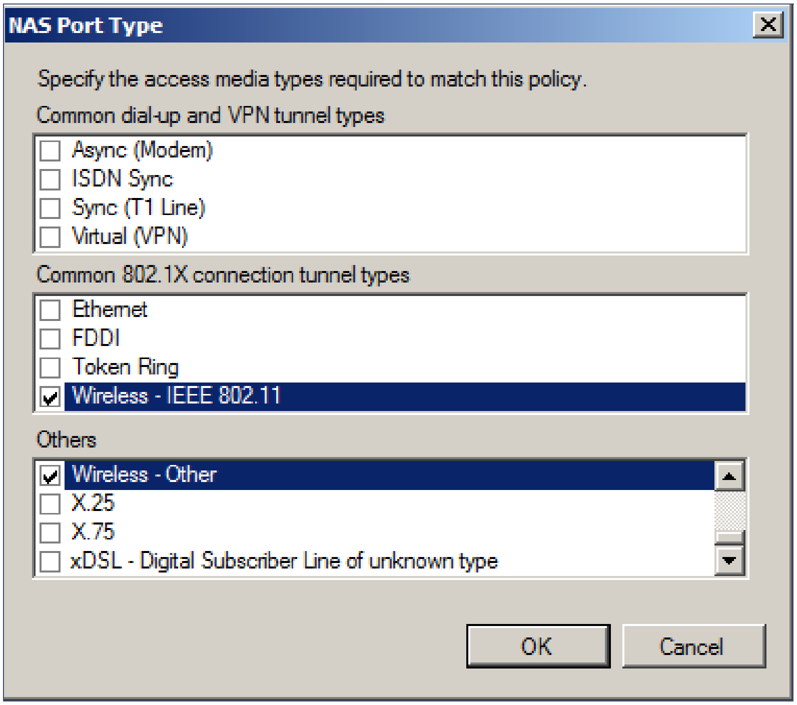
How to Configure a Connection Request Policy for RADIUS Proxy

This section describes how to configure a connection policy request to look for <@guest> in the user name, and, if found, forward the request to the remote radius server group.

1. On the NPS, expand *Policies* and select *Connection Request Policy.*
2. From the *Action* menu, select *New*. (Alternately, you can right-click and select *New*.)

3. In the *New Connection Request Policy* window, enter a *Policy name* and click *Next.*
4. In the *Specify Conditions* window, click *Add*.
5. In the *Select Condition* window, select *NAS Port Type* and click *Add*.
6. In the *NAS Port Type* window, check the box for *Wireless IEEE 802.11* in the *802.1X connection tunnel types* section, and for *Wireless - Other* in the *Others* section. Click *OK*.

FIGURE 19. NAS Port Type



NAS Port Type

Specify the access media types required to match this policy.

Common dial-up and VPN tunnel types

- □ Async (Modem)
- □ ISDN Sync
- □ Sync (T1 Line)
- □ Virtual (VPN)

Common 802.1X connection tunnel types

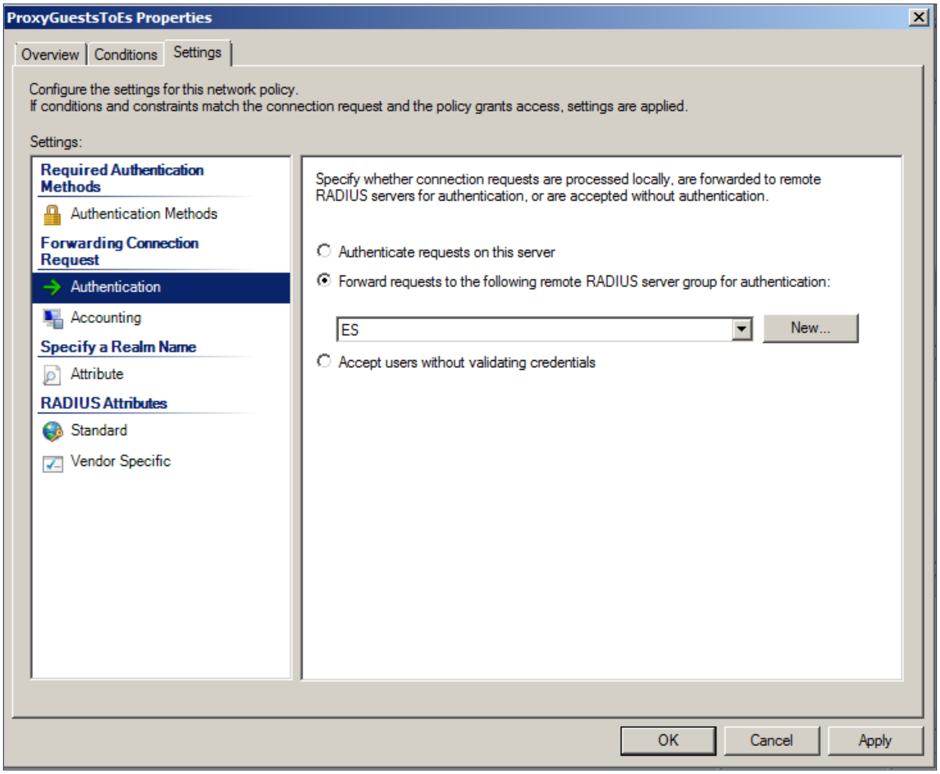
- □ Ethernet
- □ FDDI
- □ Token Ring
- ☑ Wireless - IEEE 802.11

Others

- ☑ Wireless - Other
- □ X.25
- □ X.75
- □ xDSL - Digital Subscriber Line of unknown type

7. In the *Specify Conditions* window, click *Add*.
8. Select *User Name* and click *Add*.
9. In the *User Name* window, enter *.*@guest*. Click *OK*.
10. In the *Specify Conditions* window, click *Next*.
11. In the *Specify Connection Request Forwarding* window, in the left pane, select *Authentication.* In the right pane, select *Forward requests to the following remote RADIUS server group for authentication* and select the *ES* remote RADIUS server group created in a previous step. Click *Next*.

FIGURE 20. Specify Connection Request - Authentication



Configure the settings for this network policy.
If conditions and constraints match the connection request and the policy grants access, settings are applied.

Settings:

Specify whether connection requests are processed locally, are forwarded to remote RADIUS servers for authentication, or are accepted without authentication.

○ Authenticate requests on this server

● Forward requests to the following remote RADIUS server group for authentication:

ES

○ Accept users without validating credentials

12. In the *Configure Settings* window, in the left pane, select Attribute under *Specify a Realm Name.* In the right pane, select *User Name* from the *Attribute* list. Click *Next*.
13. Review the connection request policy configuration in the *Completing Connection Request Policy Wizard* window, and click *Finish*.

With this configuration, *user@guest* is forwarded by the NPS to the Enrollment System for authentication, while *user* is authenticated directly by the NPS.

Tips and Troubleshooting

This section describes issues to consider when testing or troubleshooting the configuration for the Enrollment System integrated with a Network Policy Server.

Validate Server Certificate Setting in the License Server

When testing your configuration, begin with the ‘validate server certificate’ setting unchecked on the XpressConnect License Server. This allows you to troubleshoot any certificate configuration issues for the EAP-TLS/PEAP protocol. Once successful, enable the ‘validate server certificate’ setting in the License Server. After the certificate has been validated, the Network Policy Server (NPS) looks up the name on the certificate in AD and applies network policy.

LDAP

Using LDAP's default port (TCP-389) with a Base DN of the parent Active Directory domain will only show objects from the parent domain. Changing the port to 3268, but keeping the same Base DN allows LDAP access to users from the child AD domain (Reference http://technet.microsoft.com/en-us/library/cc978012.aspx).

Global Catalog queries are directed to port 3268, which explicitly indicates that Global Catalog semantics are required. By default, ordinary LDAP searches are received through port 389. If you bind to port 389, even if you bind to a Global Catalog server, your search includes a single domain directory partition. If you bind to port 3268, your search includes all directory partitions in the forest. If the server you attempt to bind to over port 3268 is not a Global Catalog server, the server refuses the bind.

OSCP Issues

OSCP Validation

The NPS server first attempts to validate a client certificate using the Online Certificate Status Protocol (OSCP). If the OSCP validation is successful, the validation verification is satisfied; otherwise, it attempts to perform a CRL validation of the user or computer certificate.

OCSP provides the ability to revoke certificates. However, if using OCSP affects the performance of your system, you might disable OCSP and use CRL only.

Certificate revocation checking behavior for NPS can be modified with registry settings (http://technet.microsoft.com/en-us/library/cc771995%28v=ws.10%29.aspx).

OSCP Server in the DNS

When the client fetches the OCSP response from the CA, it looks up the domain name of the CA's OCSP server in the DNS, as well as establishing a connection to the OCSP server.

If you receive a message that indicates the server cannot resolve the OSCP URL, check the hostname listed in the OSCP URL for the onboard Root CA you created in the Enrollment System. See Create the Certificate Authority, on page 3. You might need to add this hostname to the DNS of the domain.

Credentials Mismatch

If you receive an error that an authentication failed due to a user credentials mismatch, either the user name provided does not map to an existing user account, or the password was incorrect.

Certificate Template Issues

Common Name

The CN in the certificate template may need to include domain information. This can be specified as *${USERNAME}@domain* within ES on the specific certificate template.

SAN Other Name

If the NPS logs show an issue with credentials, check the *SAN Other Name Pattern* in the certificate template. The variable listed in the *SAN Other Name Pattern* field should match the variable used in the *Common Name Pattern* field.

Missing EKU in the RADIUS Server Certificate

RADIUS certificates must contain Microsoft Server EKU-1.3.6.1.5.5.7.3.1. When you create the server certificate template in the Enrollment System, you must check the box for the Microsoft Server EKU. See Client Certificate Template Settings For NPS, on page 4 for more information.

EAP Method is Not Available on the Server

If you are receiving a message that the EAP message is not available on the server, check the following configuration issues.

Register the NPS With the Domain

If the NPS is not registered to the domain, you might receive an error message that the EAP method is not available on the server.

To see if the NPS is registered with the domain, right-click the NPS server. If the server is registered, the *Register with domain* option is not available.

If there is a problem with your working registration, try deleting and re-adding the registration using the NPS *Administrator* prompt and the commands in this example:

```
net stop ias
netsh ras delete registeredserver domain=x server=y
net start ias

net stop ias
netsh ras add registeredserver domain=samplecorp.local server=SAMPLE-NPS-Server
net start ias
```

RADIUS Server Certificate Missing Private Key

If the RADIUS server certificate is missing the private key, you might receive an error message that the EAP Method is not available on the server, you might be missing the private key for the RADIUS server certificate.

Be sure that the RADIUS server certificate in the Local Computer Personal Certificate Store shows the ’certificate with key’ icon next to it. This indicates that the certificate is signed with the private key. If it does not show the icon, you do not have the private key for the RADIUS certificate. Try downloading the RADIUS certificate and private key in P12 format.

See How to Download the RADIUS Server Certificate, on page 10 for instructions on downloading the certificate from the ES, or use the following command examples from the NPS *Administrator* prompt:

```
certutil -dspublish -f root.cer NTAuthCA
certutil -enterprise -addstore NTAuth root.cer
```

Certificate Chain Not Trusted

If you receive an error that indicates the certificate chain is not trusted, verify that you have the public certificate and any intermediate certificates for the root CA. See Download the Public Key of the Intermediate CA, on page 10 for more information.

Terminology

TABLE 1. **Terminology**

Term	Definition
Active Directory	The Windows implementation of a directory service.
Active Directory® Domain Services	The name for Active Directory in Windows Server 2008.
Certificate	A digital credential that provides information about the identity of an entity and is issued by a certification authority (CA).
Certificate Authority (CA)	An entity that issues and manages certificates, and guarantees the validity of the information in the certificate by signing the certificate with its own private key.
Certificate Chain	A certificate chain is a sequence of certificates, where each certificate in the chain is signed by the subsequent certificate.
Certificate Revocation	The process of invalidating a certificate.
Certificate Store	A database of certificates or certificates and the accompanying private key.
Certificate Template	Certificate templates are used to generate certificates. A template defines the properties embedded into a certificate when it is issued.

TABLE 1. **Terminology (continued)**

Term	Definition
Device Configuration	A concept used with the Enrollment System to group configuration settings. Each network contains a single configuration per operating system. A device configuration within the Enrollment System represents a physical network within your environment.
Dynamic VLAN	Dynamic VLAN assignment places a wireless user into a specific VLAN based on the credentials supplied by the user. This task of assigning users to a specific VLAN is handled by a RADIUS authentication server.
EAP-TLS Authentication	Certificate-based mutual authentication, with security setting negotiation, and key exchange between two endpoints. It uses PKI to secure communication to a RADIUS authentication server.
Expiration Status	Whether or not a certificate is within the validity period.
Grace Period	The time period before and after the expiration date when certificate renewal is allowed.
Group Policy	Managed configurations for users and computers in an Active Directory service environment.
Intermediate CA	A CA below another CA in a certificate chain is called an intermediate (or subordinate) CA. Intermediate CAs are trusted only if they have a valid certification path from a trusted root CA.
Firewall Ports	Allow a specific protocol to communicate with your computer, or network through a firewall.
Network Access Server	A device that provides an access service for a user to a network.
Network Policy Server	Network Policy Server (NPS) is the Microsoft implementation of a Remote Authentication Dial-in User Service (RADIUS) server and proxy.
Online Certificate Status Protocol (OSCP)	Provides certificate validation by obtaining timely information about the revocation status of a certificate.
RADIUS Proxy	A RADIUS proxy acts as an authentication server to the Network Access Server, and a RADIUS client to the RADIUS server.
RADIUS Server	A central server that authenticates user login credentials and authorizes access to the requested system or server. A RADIUS authentication server is an entity that provides an authentication service to a Network Access Server.
Role Service (Windows Server)	Software programs that provide the functionality of a role. When you install a role, you can choose which role services the role provides for other users and computers in your enterprise.
Root CA	The trust anchor for a digital certificate hierarchy.

TABLE 1. **Terminology (continued)**

Term	Definition
Secure Wireless Network	A WPA2-Enterprise wireless network.
Server Certificate	The public portion of the certificate used by the RADIUS server. The server certificate does not contain the private key and is safe to distribute. The RADIUS server provides the server certificate to every device that attempts to connect.
SSID	A unique identifier that wireless networking devices use to establish and maintain wireless connectivity.
XpressConnect License Server	The account management application for the Enrollment System.
XpressConnect Wizard	The network access wizard which is provided to users to automate network access.

Additional Documentation

You can find detailed information in the Enrollment System configuration guides, located on the left-menu *Support* tab of the ES Admin UI.

About Cloudpath

Cloudpath Networks, Inc. provides software solutions and services that simplify the adoption of standards-based security, including WPA2-Enterprise and 802.1X, in diverse BYOD environments. Our goal is to make secure as simple as insecure; simple for network administrators to deploy and simple for users to access.

To learn more about the XpressConnect Enrollment System and how it can simplify your wireless environment, visit www.cloudpath.net or contact a Cloudpath representative.

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