Newer Design Guide Available

Cisco Smart Business Architecture has become part of the Cisco Validated Designs program.

For up-to-date guidance on the designs described in this guide, see http://cvddocs.com/fw/Aug13-138

For information about the Cisco Validated Design program, go to http://www.cisco.com/go/cvd

SBA

SBA

SOLUTIONS

BYOD

BYOD—Identity and Authentication Deployment Guide

SMART BUSINESS ARCHITECTURE

February 2013 Series

Preface

Who Should Read This Guide

This Cisco® Smart Business Architecture (SBA) guide is for people who fill a variety of roles:

- Systems engineers who need standard procedures for implementing solutions
- Project managers who create statements of work for Cisco SBA implementations
- Sales partners who sell new technology or who create implementation documentation
- Trainers who need material for classroom instruction or on-the-job training

In general, you can also use Cisco SBA guides to improve consistency among engineers and deployments, as well as to improve scoping and costing of deployment jobs.

Release Series

Cisco strives to update and enhance SBA guides on a regular basis. As we develop a series of SBA guides, we test them together, as a complete system. To ensure the mutual compatibility of designs in Cisco SBA guides, you should use guides that belong to the same series.

The Release Notes for a series provides a summary of additions and changes made in the series.

All Cisco SBA guides include the series name on the cover and at the bottom left of each page. We name the series for the month and year that we release them, as follows:

month year Series

For example, the series of guides that we released in February 2013 is the "February Series".

You can find the most recent series of SBA guides at the following sites:

Customer access: http://www.cisco.com/go/sba

Partner access: http://www.cisco.com/go/sbachannel

How to Read Commands

Many Cisco SBA guides provide specific details about how to configure Cisco network devices that run Cisco IOS, Cisco NX-OS, or other operating systems that you configure at a command-line interface (CLI). This section describes the conventions used to specify commands that you must enter.

Commands to enter at a CLI appear as follows:

```
configure terminal
```

Commands that specify a value for a variable appear as follows:

```
ntp server 10.10.48.17
```

Commands with variables that you must define appear as follows:

```
class-map [highest class name]
```

Commands shown in an interactive example, such as a script or when the command prompt is included, appear as follows:

```
Router# enable
```

Long commands that line wrap are underlined. Enter them as one command:

```
wrr-queue random-detect max-threshold 1 100 100 100 100 100
100 100 100
```

Noteworthy parts of system output or device configuration files appear highlighted, as follows:

```
interface Vlan64
  ip address 10.5.204.5 255.255.255.0
```

Comments and Questions

If you would like to comment on a guide or ask questions, please use the SBA feedback form.

If you would like to be notified when new comments are posted, an RSS feed is available from the SBA customer and partner pages.

Table of Contents

What’s In This SBA Guide

Cisco SBA Solutions

Cisco SBA helps you design and quickly deploy a full-service business network. A Cisco SBA deployment is prescriptive, out-of-the-box, scalable, and flexible.

Cisco SBA incorporates LAN, WAN, wireless, security, data center, application optimization, and unified communication technologies—tested together as a complete system. This component-level approach simplifies system integration of multiple technologies, allowing you to select solutions that solve your organization’s problems—without worrying about the technical complexity.

Cisco SBA Solutions are designs for specific problems found within the most common technology trends. Often, Cisco SBA addresses more than one use case per solution because customers adopt new trends differently and deploy new technology based upon their needs.

Route to Success

To ensure your success when implementing the designs in this guide, you should first read any guides that this guide depends upon—shown to the left of this guide on the route below. As you read this guide, specific prerequisites are cited where they are applicable.

About This Guide

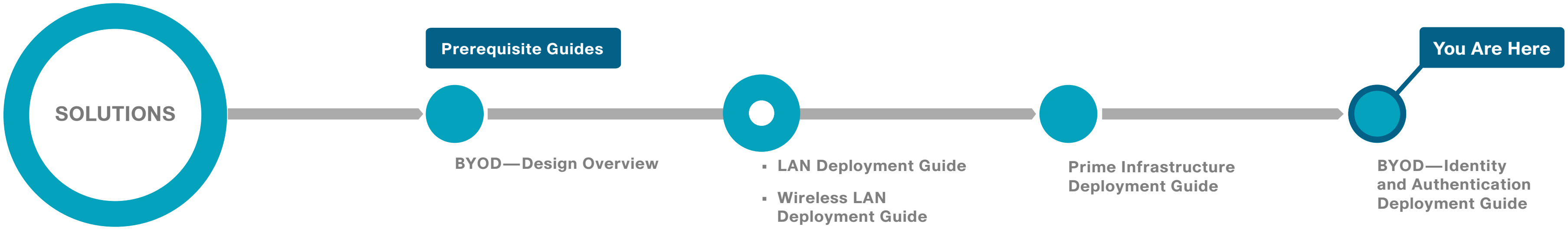
This *deployment guide* contains one or more deployment chapters, which each include the following sections:

- Business Overview—Describes the business use case for the design. Business decision makers may find this section especially useful.
- Technology Overview—Describes the technical design for the business use case, including an introduction to the Cisco products that make up the design. Technical decision makers can use this section to understand how the design works.
- Deployment Details—Provides step-by-step instructions for deploying and configuring the design. Systems engineers can use this section to get the design up and running quickly and reliably.

You can find the most recent series of Cisco SBA guides at the following sites:

Customer access: http://www.cisco.com/go/sba

Partner access: http://www.cisco.com/go/sbachannel


SOLUTIONS
Prerequisite Guides
BYOD—Design Overview
LAN Deployment Guide
Wireless LAN Deployment Guide
Prime Infrastructure Deployment Guide
You Are Here
BYOD—Identity and Authentication Deployment Guide

Introduction

Note

This guide is based on the *Cisco SBA—Borderless Networks LAN and Wireless LAN 802.1X Deployment Guide*. The goal of this guide is to show you how a BYOD business problem can be solved by using Cisco Smart Business Architecture. Cisco has previously developed solutions to solve issues that are similar to the various BYOD business problems. Cisco SBA uses 802.1X to solve the BYOD problem of identifying, authenticating, and authorizing devices.

There is a trend in the marketplace today that is often referred to as *Bring Your Own Device* (BYOD). BYOD is a spectrum of business problems that can be solved in various ways. These range from accessing guest wireless networks to providing device authentication and identification. The goal is to provide a common work environment, regardless of the type of device being used. This could be accomplished by providing a virtualized desktop or by allowing users to self-register devices for use on the network.

Organizations are experiencing an unprecedented transformation in the network landscape. In the past, IT typically provided network resources only to corporate-managed PCs, such as laptops and desktops. Today, employees are requiring access from both corporate managed and unmanaged devices, including mobile devices like smart phones and tablets. This rapid proliferation of mobile devices capable of supporting applications drastically increases workforce mobility and productivity, but it also presents an enormous challenge to IT organizations seeking to enforce security policies across a growing population of devices, operating systems, and connectivity profiles.

The distinction between a work device and a personal device has evolved. This evolution of mobile device usage and the introduction of mobile devices into the workplace has caused a paradigm shift in how IT views what qualifies as a network "end point device" and also what it means to "be at work."

An organization needs to know not only who is accessing their wired and wireless networks, but also when the networks are accessed and from where. In addition, with the wide adoption of nontraditional devices, such as smart phones and tablets, and people bringing their own devices to access the network, organizations need to know how many of these devices are connecting. With this information, the organization can create policy to prevent connection by nontraditional devices, limit connection to approved devices, or make access to network resources easier for these non-traditional devices. This presents a challenge for IT organizations that seek to provide end-users with a consistent network access experience and the freedom to use any device, while still enforcing stringent security policies to protect corporate intellectual property. Further complicating the situation is delivering both consistent access and enforcing proper security policy based on the specific user-access scenario (wired, wireless, guest, local, branch, and remote users).

To balance the productivity gains versus the security risks, IT needs to implement a solution that allows for seamless on-boarding of users and devices, simplicity of on-going operations, and the ability to extend end-user applications to any user or any device at any time.

Other Cisco SBA Solutions guides addressing BYOD business problems include:

- *BYOD—Internal Corporate Access Deployment Guide*
- *BYOD—Advanced Guest Wireless Deployment Guide*
- *BYOD—Remote Mobile Access Deployment Guide*
- *BYOD—Virtual Desktop Access Deployment Guide*

Business Overview

With an increasingly mobile workforce and a diverse number of platforms used to gain access to the network, organizations are looking for ways to monitor and control network access. An organization needs to know not only who is accessing their wired and wireless networks, but also when the networks were accessed and from where. In addition, with the wide adoption of devices such as smart phones and tablets and with people bringing their own devices to access the network, organizations need to know how many of these devices are connecting. With this information, the organization can create a policy to prevent connection by nontraditional devices, limit connection to approved devices, or make access to network resources easier for these nontraditional devices.

Organizations are being driven by industry and regulatory compliance (PCI, Sarbanes-Oxley) to be able to report on who is accessing the organization's information, where they are accessing it from, and what type of device they are using to access it. Government mandates such as Federal Information Processing Standard (FIPS) and Federal Information Security Management Act (FISMA) are also requiring agencies and entities working with government agencies to track this information. In some cases, an organization may choose to limit access to certain information in order to adhere to these regulations.

This information is also key data that can be used to generate advanced security policies. Organizations see this as a daunting task requiring the use of several advanced technologies and often delay implementing a solution simply because they don't know where to begin.

This guide is the first step in deploying a complete identity-based architecture. Future projects will address additional use cases that will focus on the features that will provide for things such as enforcement, guest access, and confidentiality.

Technology Overview

Cisco Identity Services Engine (ISE) is an identity and access control policy platform that enables organizations to enforce compliance, enhance infrastructure security, and streamline their service operations. Cisco ISE is a core component of Cisco TrustSec. Its architecture allows an organization to gather real-time contextual information from the network, users, and devices to make proactive policy decisions by tying identity into network elements such as access switches, wireless controllers, and VPN gateways.

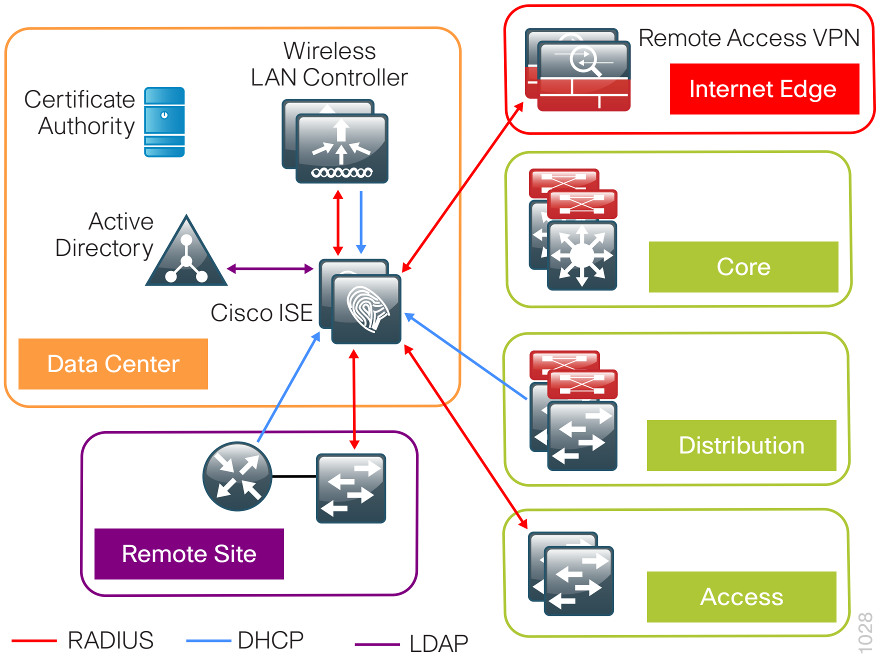
This deployment uses Cisco ISE as the authentication, authorization, and accounting server for the wired and wireless networks using RADIUS. Cisco ISE acts as a proxy to the existing Active Directory (AD) services to maintain a centralized identity store for all network services.

In addition to authentication, this deployment uses Cisco ISE to profile devices in order to determine the specific type of devices that are accessing the network. This is done by examining network traffic for certain criteria, based on certain characteristics. Cisco ISE currently has probes for Dynamic Host Configuration Protocol (DHCP), HTTP, RADIUS, Domain Name System (DNS), Simple Name Management Protocol (SNMP) traps and queries, Network Mapper (Nmap) scans, and Cisco IOS NetFlow. To analyze the traffic, the engine can be deployed as an inline policy enforcement device, or the traffic can be forwarded to the engine. As an example, the network infrastructure is configured to send DHCP and Cisco Discovery Protocol (CDP) data via RADIUS to Cisco ISE for analysis. The engine then evaluates the RADIUS data and can identify the device based off of the data in the RADIUS packet. For example, Cisco IP Phones are identified by their DHCP class identifier.

In the LAN, there are three modes for deploying Cisco TrustSec: monitor mode, low-impact mode, and closed mode. Cisco recommends a phased deployment model that can allow for limited impact on network access while gradually introducing authentication/authorization on the network. An organization's goals might be met by implementing only some of the overall functionality of Cisco TrustSec and a successful deployment does not require all three modes to be deployed. This document covers the deployment phases of monitor mode and low-impact mode both at the headquarters site and the remote sites, with Cisco ISE being centralized in the data center. The deployment in use deploys two features within Cisco IOS on the switches in the access layer at both the headquarters sites as well as the remote sites. The first is MAC Authentication Bypass (MAB), which authenticates the device on the switch port by the MAC address. Monitor mode logs the MAC addresses that connect and grant access to any device that connects. The second feature is 802.1X open mode, which allows the switch port to give unrestricted access to the network even though authentication and authorization have not been performed. This enables the deployment of identity without affecting existing connectivity. This phased approach allows you to prepare for moving to another mode in the future. In addition to these features, this deployment also deploys the Security Group Access (SGA) features of Security Group Tags (SGT) and Security Group Exchange Protocol (SXP) in low-impact mode in order to enforce the access policy. Packets for a particular group are marked with an SGT in the TrustSec header. SXP is used to pass tagged packets across devices that do not support marking SGTs by binding the IP address of the device to the SGT and then passing the packets along to a device that does support SGTs. Devices then enforce a security policy using these tags. In the organization, these switch configurations will be managed by Cisco Prime LAN Management Solution (LMS) 4.2 and the new TrustSec Work Center. Cisco Prime LMS simplifies the deployment of identity by performing a network-readiness assessment for an identity deployment, providing templates for the various modes—monitor, low-impact, closed—and providing a step-by-step wizard to configure the various components required.

You accomplish integrating Cisco ISE into the wireless network by using Cisco ISE as the RADIUS server for wireless 802.1X authentication, authorization, and accounting. You configure this on every wireless LAN controller (WLC) in the network, at both headquarters and the remote sites. The one exception is for the controller used for guest access. You can also configure the WLCs to forward DHCP requests to Cisco ISE in order to enable the profiling of wireless endpoints.

Figure 1 - Cisco ISE integration into Cisco SBA



Notes

Deployment Details

The deployment described here bases all IP addressing off of the *Cisco SBA—Borderless Networks LAN Deployment Guide.* Any IP addresses used in this guide are examples; you should use addressing that is applicable to your architecture.

Cisco ISE has different personas, or modes, for which it can be configured: administration, policy service, and monitoring. For a standalone configuration where the appliance is all personas, the maximum number of endpoints that can be supported is 2000. To support a greater number of endpoints, you will need to divide the personas across multiple appliances. In this example, there is a primary and secondary policy service and administration node and a primary and secondary monitoring node. This will allow the deployment to scale to 10,000 endpoints. If your deployment does not require support for more than 2000 endpoints, then you can just have a primary and secondary set of engines that support all the personas.

Table 1 - Cisco ISE engine IP addresses and hostnames

Device	IP address	Hostname
Primary Cisco ISE administration and policy service node	10.4.48.41	ise-1.cisco.local
Secondary Cisco ISE administration and policy service node	10.4.48.42	ise-2.cisco.local
Primary Cisco ISE monitoring node	10.4.48.43	ise-3.cisco.local
Secondary Cisco ISE monitoring node	10.4.48.44	ise-4.cisco.local

Enable Authentication

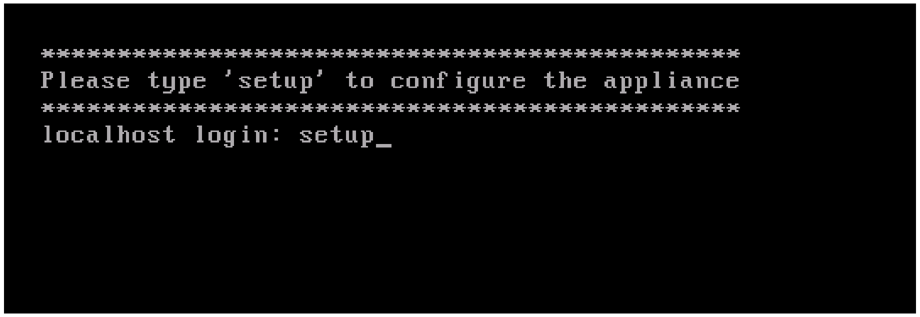
Process

Deploying Cisco Identity Services Engine

1. Set up initial primary engine
2. Set up the remaining engines
3. Configure certificate trust list
4. Configure Cisco ISE deployment nodes
5. Install Cisco ISE license
6. Configure network devices in Cisco ISE
7. Configure Cisco ISE to use Active Directory
8. Disable IP Phone authorization policy

Procedure 1 Set up initial primary engine

Step 1: Boot the Cisco ISE and then, at the initial prompt, enter **setup.** The installation begins.



```
**********************************************
Please type 'setup' to configure the appliance
**********************************************
localhost login: setup_
```

Step 2: Enter the host name, IP address, subnet mask, and default router of the engine.

```
Enter hostname[]: ise-1
Enter IP address[]: 10.4.48.41
Enter IP default netmask[]: 255.255.255.0
Enter IP default gateway[]: 10.4.48.1
```

Step 3: Enter DNS information.

```
Enter default DNS domain[]: cisco.local
Enter primary nameserver[]: 10.4.48.10
Add/Edit another nameserver? Y/N : n
```

Step 4: Configure time.

```
Enter primary NTP server[time.nist.gov]: ntp.cisco.local
Add/Edit secondary NTP server? Y/N : n
Enter system timezone[UTC]: PST8PDT
```

Tech Tip

Time zone abbreviations can be found in the *Cisco Identity Services Engine CLI Reference Guide, Release 1.1.x*:

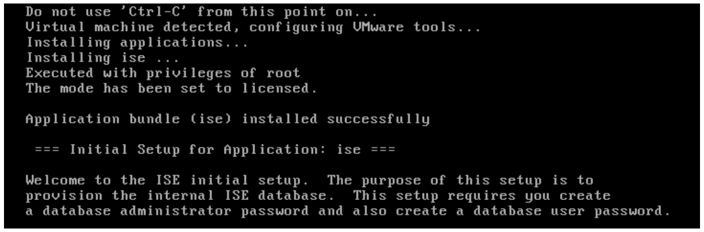
http://www.cisco.com/en/US/docs/security/ise/1.1/cli_ref_guide/ise_cli_app_a.html#wp1571855

Step 5: Configure an administrator account.

You must configure an administrator account in order to access to the CLI console. This account is not the same as the one used to access the GUI.

```
Enter username[admin]: admin
Enter password: [password]
Enter password again: [password]
```

Cisco ISE completes the installation and reboots. This process takes several minutes. You are asked to enter a new database administrator password and a new database user password during the provisioning of the internal database. Do not press **Control-C** during the installation, or the installation aborts.



```
Do not use 'Ctrl-C' from this point on...
Virtual machine detected, configuring VMware tools...
Installing applications...
Installing ise ...
Executed with privileges of root
The mode has been set to licensed.

Application bundle (ise) installed successfully

 === Initial Setup for Application: ise ===

Welcome to the ISE initial setup.  The purpose of this setup is to
provision the internal ISE database.  This setup requires you create
a database administrator password and also create a database user password.
```

The primary engine is now installed.

Procedure 2 Set up the remaining engines

The procedure for setting up the remaining engines is the same as the primary, with the only difference being the IP address and host name configured for the engine. To set up the remaining engines, follow Procedure 1, "Cisco ISE integration into Cisco SBA," and use the values supplied in Table 1 for the remaining engines.

Procedure 3 Configure certificate trust list

The engines use public key infrastructure (PKI) to secure communications between them. Initially in this deployment, you use local certificates, and you must configure a trust relationship between all of the engines. To do this, you need to import the local certificates from the secondary administration node and the two monitoring nodes into the primary administration node.

Step 1: In your browser, connect to the secondary engine's GUI at http://ise-2.cisco.local.

Step 2: In **Administration > System**, select **Certificates**.

Step 3: In the Local Certificates window, select the local certificate by selecting the box next to the name of the secondary engine, **ise-2.cisco.local,** and then click **Export**.

Step 4: Choose **Export Certificate Only**, and then click **Export.**

Step 5: When the browser prompts you to save the file to a location on the local machine, choose where to store the file and make a note of it. You will be importing this file into the primary engine.

Step 6: In a browser, access the primary engine's GUI at http://ise-1.cisco.local.

Step 7: In **Administration > System**, select **Certificates**.

Step 8: In the Certificate Operations pane on the left, click **Certificate Store,** and then click **Import**.

Step 9: Next to the Certificate File box, click **Browse**, and then locate the certificate exported from the secondary engine. It has an extension of .pem. Click **Submit**.

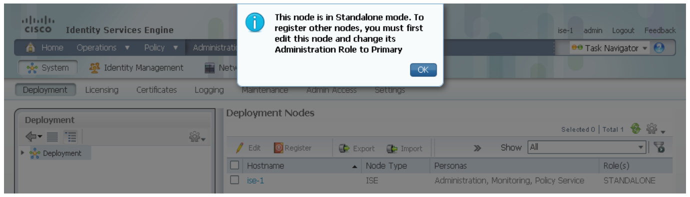
Step 10: Repeat this procedure for the remaining engines, ise-3.cisco.local and ise-4.cisco.local.

Procedure 4 Configure Cisco ISE deployment nodes

You can configure the personas of Cisco ISE—administration, monitoring, and policy service—to run all on a single engine or to be distributed amongst several engines. For this example installation, you will deploy a pair of engines for administration and policy service with one serving as primary and the other secondary and another pair of engines for monitoring with one serving as primary and the other secondary.

Step 1: Connect to http://ise-1.cisco.local.

Step 2: From the **Administration** menu, choose **System**, and then choose **Deployment**. A message appears notifying you that the node is currently stand-alone. Click **OK**.


CISCO Identity Services Engine
ise-1 admin Logout Feedback
Home Operations Policy Administration
Task Navigator
System Identity Management Netw
Deployment Licensing Certificates Logging Maintenance Admin Access Settings
Deployment
Deployment
Selected 0 | Total 1
Edit Register Export Import
Show All
OK

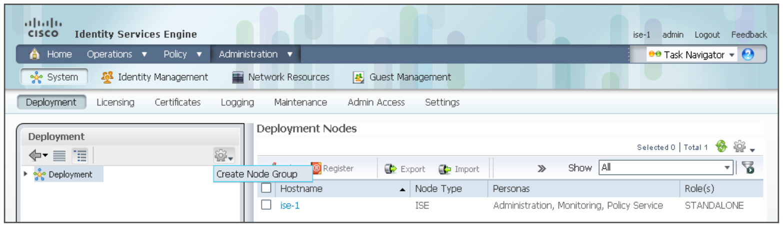
This node is in Standalone mode. To register other nodes, you must first edit this node and change its Administration Role to Primary

Deployment Nodes

Hostname	Node Type	Personas	Role(s)
ise-1	ISE	Administration, Monitoring, Policy Service	STANDALONE

Step 3: In the Deployment pane, click the gear icon, and then select **Create Node Group**.

In order for the two Cisco ISE devices to share policy and state information, they must be in a node group. The nodes use IP multicast to distribute this information, so they need to be able to communicate via IP multicast.


CISCO Identity Services Engine
ise-1 admin Logout Feedback
Home Operations Policy Administration
Task Navigator
System Identity Management Network Resources Guest Management
Deployment Licensing Certificates Logging Maintenance Admin Access Settings
Deployment
Deployment
Create Node Group
Selected 0 | Total 1
Register Export Import
Show All

Deployment Nodes

Hostname	Node Type	Personas	Role(s)
ise-1	ISE	Administration, Monitoring, Policy Service	STANDALONE

Step 4: Configure the node group with the node group name ISE-Group and the default multicast address of 228.10.11.12, and then click **Submit**.

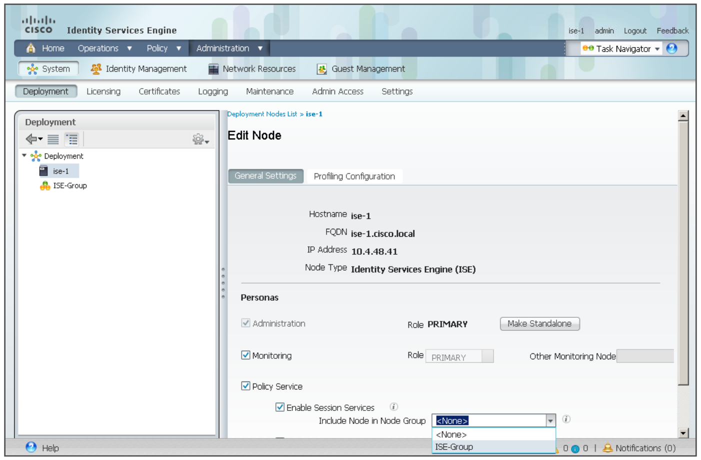
Step 5: A pop-up window lets you know the group was created successfully. Click **OK**.

Step 6: In the **Deployment** pane on the left, expand **Deployment**. A list of the current deployment nodes appears.

Step 7: Click **ise-1**. This enables you to configure this deployment node.

Step 8: On the General Settings tab, in the Personas section, next to the Administration Role, click **Make Primary**.

Step 9: In the **Include Node in Node Group** list, choose **ISE-Group**.

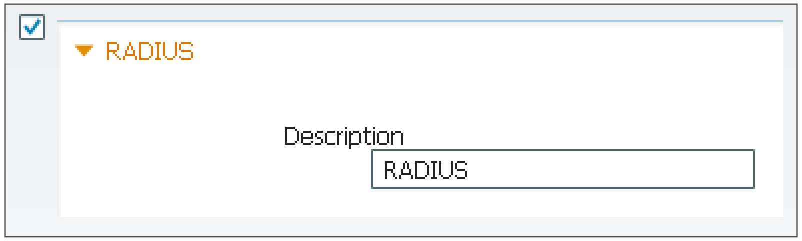

Identity Services Engine
ise-1 admin Logout Feedback
Home Operations Policy Administration
Task Navigator
System Identity Management Network Resources Guest Management
Deployment Licensing Certificates Logging Maintenance Admin Access Settings
Deployment
Deployment
ise-1
ISE-Group
Deployment Nodes List > ise-1
Edit Node
General Settings Profiling Configuration
Help
0 0 Notifications (0)

Hostname ise-1
FQDN ise-1.cisco.local
IP Address 10.4.48.41
Node Type Identity Services Engine (ISE)

Personas
☑ Administration Role PRIMARY Make Standalone
☑ Monitoring Role PRIMARY Other Monitoring Node
☑ Policy Service
☑ Enable Session Services
Include Node in Node Group <None>
<None>
ISE-Group

Next, you'll configure which methods are used to profile network endpoints.

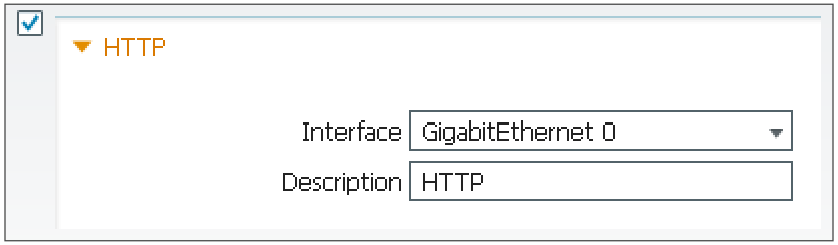
Step 10: On the Profiling Configuration tab, select **RADIUS**, use the default parameters, and then click **Save**.



☑ RADIUS

Description RADIUS

Step 11: Select **HTTP**, use the default parameters, and then click **Save**.

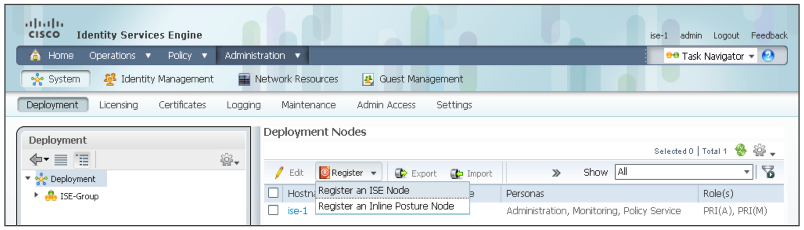


☑ HTTP

Interface GigabitEthernet 0
Description HTTP

Step 12: In the Edit Node window, click **Deployment Nodes List**. The Deployment Nodes window appears.

Step 13: Click **Register,** and then choose **Register an ISE Node**.

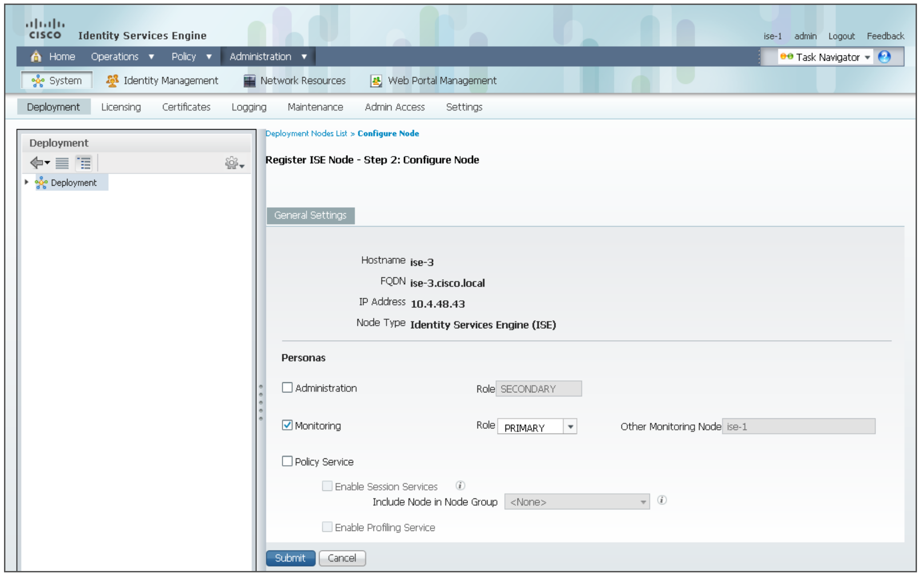

Identity Services Engine
ise-1 admin Logout Feedback
Home Operations Policy Administration
Task Navigator
System Identity Management Network Resources Guest Management
Deployment Licensing Certificates Logging Maintenance Admin Access Settings
Deployment
Deployment
ISE-Group
Deployment Nodes
Selected 0 | Total 1
Edit Register Export Import
Show All
Register an ISE Node
Register an Inline Posture Node

Hostname	Personas	Role(s)
ise-1	Administration, Monitoring, Policy Service	PRI(A), PRI(M)

Step 14: Enter the IP address or host name of the primary monitoring Cisco ISE engine from Table 1 (in this example, ise-3.cisco.local) and the credentials for the admin account, and then click **Next**.

Step 15: Select **Monitoring**, and then in the **Role** list, choose **Primary**. Make sure **Administration** and **Policy Service** are not selected.

Step 16: Click **Submit**. The node registers, and a pop-up window displays letting you know that the process was successful. Click **OK**.


Identity Services Engine
ise-1 admin Logout Feedback
Home Operations Policy Administration
Task Navigator
System Identity Management Network Resources Web Portal Management
Deployment Licensing Certificates Logging Maintenance Admin Access Settings
Deployment
General Settings
Submit
Cancel

Deployment Nodes List > Configure Node

Register ISE Node - Step 2: Configure Node

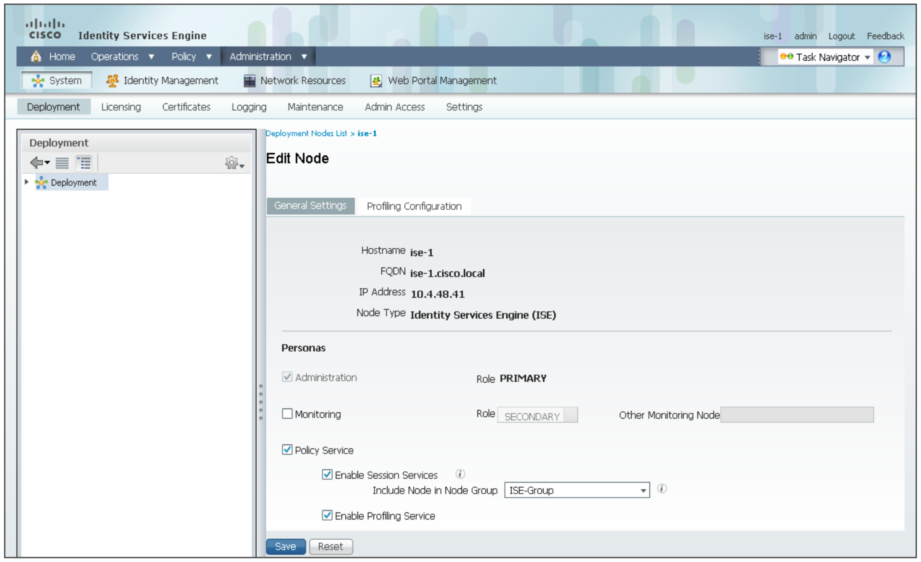
Hostname ise-3
FQDN ise-3.cisco.local
IP Address 10.4.48.43
Node Type Identity Services Engine (ISE)

Personas

□ Administration Role SECONDARY
☑ Monitoring Role PRIMARY Other Monitoring Node ise-1
□ Policy Service
□ Enable Session Services
Include Node in Node Group <None>
□ Enable Profiling Service

Step 17: In the Deployment Node window, click **ise-1**.

Step 18: Clear **Monitoring**, and then click **Save**. The node updates, and a message displays letting you know that the process was successful. Click **OK**. The node restarts.


Identity Services Engine
ise-1 admin Logout Feedback
Home Operations Policy Administration
Task Navigator
System Identity Management Network Resources Web Portal Management
Deployment Licensing Certificates Logging Maintenance Admin Access Settings
Deployment
General Settings
Profiling Configuration
Save
Reset

Deployment Nodes List > ise-1

Edit Node

Hostname ise-1
FQDN ise-1.cisco.local
IP Address 10.4.48.41
Node Type Identity Services Engine (ISE)

Personas

☑ Administration Role PRIMARY
□ Monitoring Role SECONDARY Other Monitoring Node
☑ Policy Service
☑ Enable Session Services
Include Node in Node Group ISE-Group
☑ Enable Profiling Service

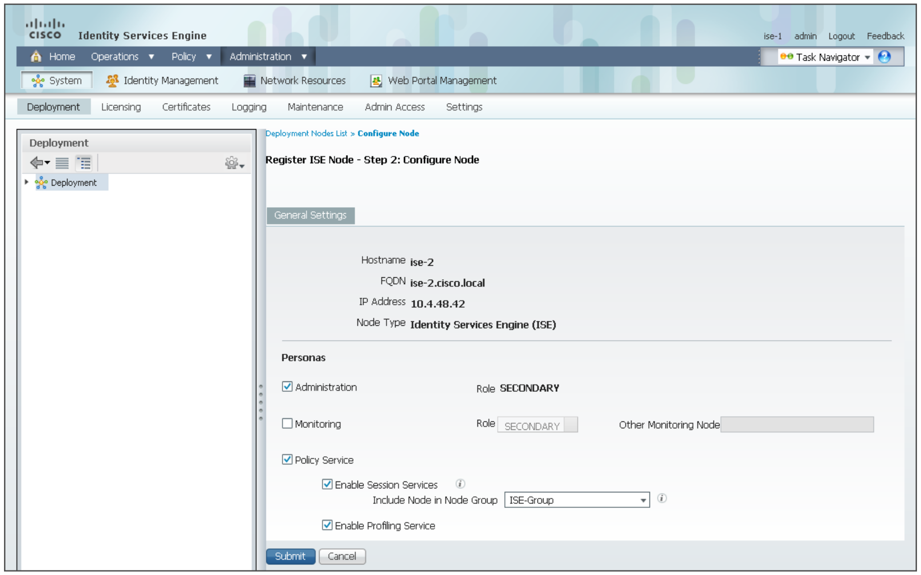
Step 19: Log in to the console, and then in the **Administration** menu, in the System section, choose **Deployment**.

Step 20: In the Deployment Node window, click **Register**, and then choose **Register an ISE Node**.

Step 21: Enter the IP address or host name of the secondary administration Cisco ISE from Table 1 (in this example, ise-2.cisco.local) and the credentials for the admin account, and then click **Next**.

Step 22: Select only **Administration** and **Policy Service**. In the Administration section, in the **Role** list, choose **Secondary**, and then in the Policy Service section, in the **Node Group** list, choose **ISE-Group**.

Step 23: Click **Submit**. The node registers, and a pop-up window displays letting you know that the process was successful. Click **OK**.



Identity Services Engine
ise-1 admin Logout Feedback
Home Operations Policy Administration
Task Navigator
System Identity Management Network Resources Web Portal Management
Deployment Licensing Certificates Logging Maintenance Admin Access Settings
Deployment
Deployment
General Settings
Personas
Submit Cancel

Deployment Nodes List > Configure Node

Register ISE Node - Step 2: Configure Node

Hostname ise-2

FQDN ise-2.cisco.local

IP Address 10.4.48.42

Node Type Identity Services Engine (ISE)

☑ Administration Role SECONDARY

□ Monitoring Role SECONDARY Other Monitoring Node

☑ Policy Service

☑ Enable Session Services

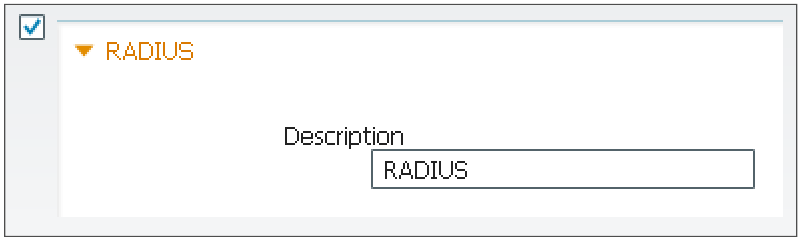
Include Node in Node Group ISE-Group

☑ Enable Profiling Service

Step 24: Next, you'll configure which methods are used to profile network endpoints for the secondary policy service node.

Step 25: In the **Deployment Nodes** list, click **ise-2**.

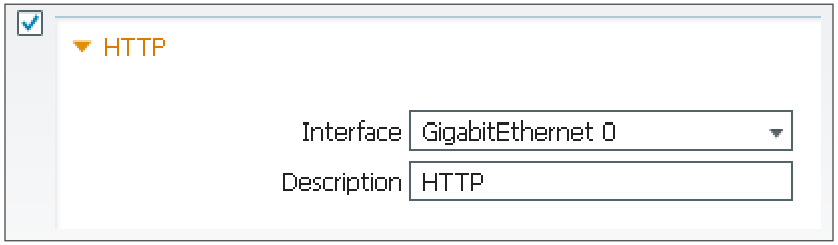
Step 26: On the Profiling Configuration tab, select **RADIUS**, and use the default parameters.



☑ RADIUS

Description RADIUS

Step 27: Select **HTTP**, use the default parameters, and then click **Save**.



☑ HTTP

Interface GigabitEthernet 0

Description HTTP

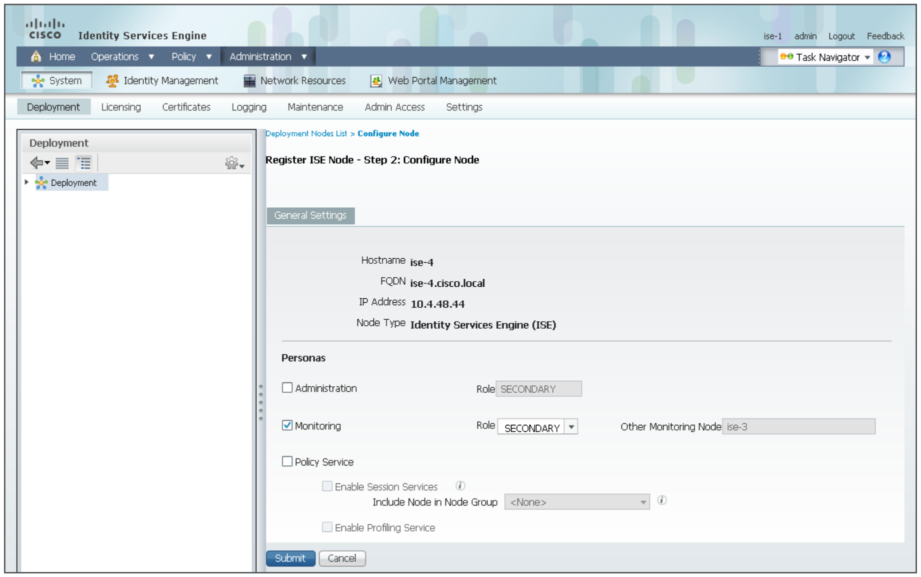
Step 28: In the Edit Node window, click **Deployment Nodes List**. The Deployment Nodes window appears.

Step 29: In the Deployment Nodes window, click **Register**, and then choose **Register an ISE Node**.

Step 30: Enter the IP address or host name of the secondary monitoring Cisco ISE from Table 1 (in this example, ise-4.cisco.local) and the credentials for the admin account, and then click **Next**.

Step 31: Select **Monitoring**, and then in the **Role** list, choose **Secondary**. Make sure **Administration** and **Policy Service** are not selected.

Step 32: Click **Submit**. The node registers, and a pop-up window displays letting you know that the process was successful. Click **OK**.



Identity Services Engine
ise-1 admin Logout Feedback
Home Operations Policy Administration
Task Navigator
System Identity Management Network Resources Web Portal Management
Deployment Licensing Certificates Logging Maintenance Admin Access Settings
Deployment
Deployment
General Settings
Personas
Submit Cancel

Deployment Nodes List > Configure Node

Register ISE Node - Step 2: Configure Node

Hostname ise-4

FQDN ise-4.cisco.local

IP Address 10.4.48.44

Node Type Identity Services Engine (ISE)

□ Administration Role SECONDARY

☑ Monitoring Role SECONDARY Other Monitoring Node ise-3

□ Policy Service

□ Enable Session Services

Include Node in Node Group <None>

□ Enable Profiling Service

You have now deployed all Cisco ISE nodes: a pair of redundant administration and policy service nodes and a pair of redundant monitoring nodes.

Procedure 5 Install Cisco ISE license

Cisco ISE comes with a 90-day demo license for both the Base and Advanced packages. To go beyond 90 days, you need to obtain a license from Cisco. In a redundant configuration, you only need to install the license on the primary administration node.

Tech Tip

When installing a Base license and an Advanced license, the Base license must be installed first.

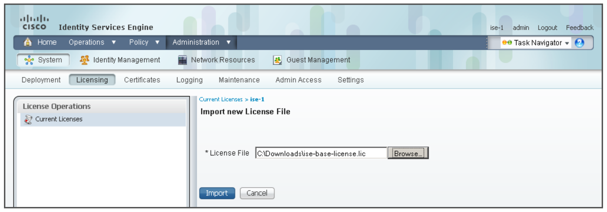
Step 1: Mouse over **Administration**, and then, from the System section of the menu, choose **Licensing**.

Notice that you only see one node here since only the primary administration node requires licensing.

Step 2: Click the name of the Cisco ISE server. This enables you to edit the license details.

Step 3: Under Licensed Services, click **Add Service**.

Step 4: Click **Browse**, locate your license file, and then click **Import**.


Identity Services Engine
ise-1 admin Logout Feedback
Home Operations ▼ Policy ▼ Administration ▼
Task Navigator
System Identity Management Network Resources Guest Management
Deployment Licensing Certificates Logging Maintenance Admin Access Settings
License Operations
Current Licenses
Browse...
Import Cancel

Current Licenses > ise-1

Import new License File

* License File C:\Downloads\ise-base-license.lic

Step 5: If you have multiple licenses to install, repeat the process for each.

Procedure 6 Configure network devices in Cisco ISE

Configure Cisco ISE to accept authentication requests from network devices. RADIUS requires a shared secret key to enable encrypted communications. Each network device that will use Cisco ISE for authentication will need to have this key.

Step 1: Mouse over **Administration**, and then, from the Network Resources section of the menu, choose **Network Devices**.

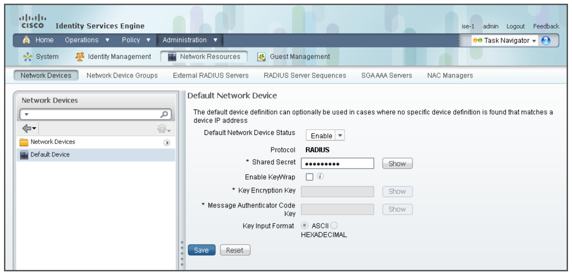
Step 2: In the left pane, click **Default Device**.

Tech Tip

Each network device can be configured individually, or devices can be grouped by location, by device type, or by using IP address ranges. The other option is to use the Default Device to configure the parameters for devices that aren't specifically configured. All network devices in this example use the same key, so for simplicity, this example uses the Default Device.

Step 3: In the **Default Network Device Status** list, choose **Enable**.

Step 4: Enter the RADIUS shared secret, and then click **Save**.


Identity Services Engine
ise-1 admin Logout Feedback
Home Operations ▼ Policy ▼ Administration ▼
Task Navigator
System Identity Management Network Resources Guest Management
Network Devices Network Device Groups External RADIUS Servers RADIUS Server Sequences SGA AAA Servers NAC Managers
Network Devices
Network Devices
Default Device
Show
Show
Show
Save Reset

Default Network Device

The default device definition can optionally be used in cases where no specific device definition is found that matches a device IP address

Default Network Device Status Enable

Protocol RADIUS

* Shared Secret ●●●●●●●●●

Enable KeyWrap □

* Key Encryption Key

* Message Authenticator Code Key

Key Input Format ● ASCII ○ HEXADECIMAL

Procedure 7 Configure Cisco ISE to use Active Directory

Cisco ISE will use the existing Active Directory (AD) server as an external authentication server. First, you must configure the external authentication server.

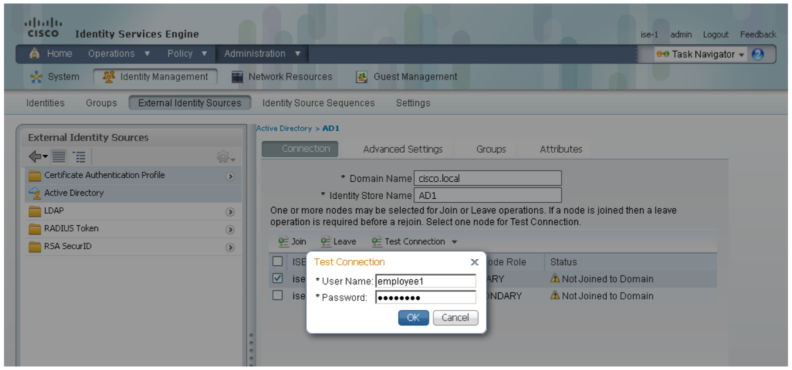
Step 1: Mouse over **Administration**, and then, from the Identity Management section of the menu, choose **External Identity Sources**.

Step 2: In the left panel, click **Active Directory**.

Step 3: On the Connection tab, enter the AD domain (for example, cisco.local) and the name of the server (for example, AD1), and then click **Save Configuration**.

Step 4: Verify these settings by selecting the box next to the node, clicking **Test Connection**, and then choosing **Basic Test**.

Step 5: Enter the credentials for a domain user, and then click **OK**.


cisco Identity Services Engine
ise-1 admin Logout Feedback
Home Operations Policy Administration
Task Navigator
System Identity Management Network Resources Guest Management
Identities Groups External Identity Sources Identity Source Sequences Settings
External Identity Sources
Certificate Authentication Profile
Active Directory
LDAP
RADIUS Token
RSA SecurID
Active Directory > AD1
Connection Advanced Settings Groups Attributes
Join Leave Test Connection
ISE ode Role Status
OK Cancel

* Domain Name cisco.local

* Identity Store Name AD1

One or more nodes may be selected for Join or Leave operations. If a node is joined then a leave operation is required before a rejoin. Select one node for Test Connection.

☑ ise ARY ⚠ Not Joined to Domain

□ ise NDARY ⚠ Not Joined to Domain

Test Connection

* User Name: employee1

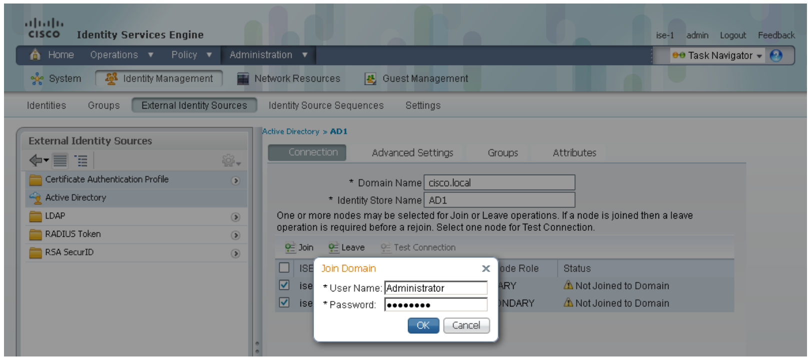
* Password: ••••••••

Step 6: A message appears letting you know whether or not the test was successful. Click **Close**.

Step 7: Select the box next each node, and then click **Join**.

Step 8: Enter the credentials for a domain administrator account. Cisco ISE is now joined to the AD domain.

Step 9: A message appears letting you know whether or not the join was successful. Click **Close**.


cisco Identity Services Engine
ise-1 admin Logout Feedback
Home Operations Policy Administration
Task Navigator
System Identity Management Network Resources Guest Management
Identities Groups External Identity Sources Identity Source Sequences Settings
External Identity Sources
Certificate Authentication Profile
Active Directory
LDAP
RADIUS Token
RSA SecurID
Active Directory > AD1
Connection Advanced Settings Groups Attributes
Join Leave Test Connection
ISE ode Role Status
OK Cancel

* Domain Name cisco.local

* Identity Store Name AD1

One or more nodes may be selected for Join or Leave operations. If a node is joined then a leave operation is required before a rejoin. Select one node for Test Connection.

☑ ise ARY ⚠ Not Joined to Domain

☑ ise NDARY ⚠ Not Joined to Domain

Join Domain

* User Name: Administrator

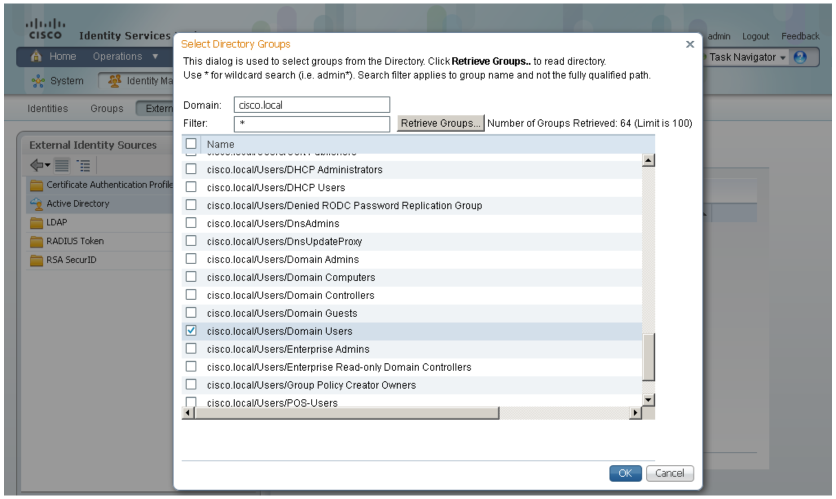
* Password: ••••••••

Next, you select which groups from AD that Cisco ISE will use for authentication.

Step 10: Click the Groups tab, click **Add**, and then click **Select Groups from Directory**.

Step 11: Search for the groups you wish to add. The domain box is already filled in. The default filter is a wildcard to list all groups. Click **Retrieve Groups** to get a list of all groups in your domain.

Step 12: Select the groups you want to use for authentication, and then click **OK**. For example, for all users in the domain, select the group **<domain>/Users/Domain Users**.



Select Directory Groups

This dialog is used to select groups from the Directory. Click **Retrieve Groups..** to read directory.
Use * for wildcard search (i.e. admin*). Search filter applies to group name and not the fully qualified path.

Domain: cisco.local

Filter: *

Number of Groups Retrieved: 64 (Limit is 100)

□ Name

□ cisco.local/Users/DHCP Administrators
□ cisco.local/Users/DHCP Users
□ cisco.local/Users/Denied RODC Password Replication Group
□ cisco.local/Users/DnsAdmins
□ cisco.local/Users/DnsUpdateProxy
□ cisco.local/Users/Domain Admins
□ cisco.local/Users/Domain Computers
□ cisco.local/Users/Domain Controllers
□ cisco.local/Users/Domain Guests
☑ cisco.local/Users/Domain Users
□ cisco.local/Users/Enterprise Admins
□ cisco.local/Users/Enterprise Read-only Domain Controllers
□ cisco.local/Users/Group Policy Creator Owners
□ cisco.local/Users/POS-Users

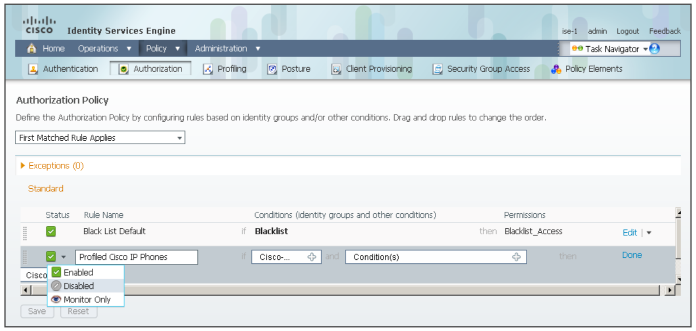
Step 13: Click **Save Configuration**.

Procedure 8 Disable IP Phone authorization policy

There is a default policy in place for Cisco IP Phones that have been profiled. This profile applies a downloadable access list on the port to which the phone is connected. Since there is no policy enforcement taking place at this point, this rule should be disabled.

Step 1: On the menu bar, mouse over **Policy**, and then click **Authorization**.

Step 2: For the **Profiled Cisco IP Phones** rule, click **Edit**, click the green check mark icon, choose **Disabled**, click **Done**, and then click **Save**.



Authorization Policy

Define the Authorization Policy by configuring rules based on identity groups and/or other conditions. Drag and drop rules to change the order.

First Matched Rule Applies

Status	Rule Name		Conditions (identity groups and other conditions)		Permissions
✓	Black List Default	if	**Blacklist**	then	Blacklist_Access
✓	Profiled Cisco IP Phones	if	Cisco-... and Condition(s)	then	

☑ Enabled
⊘ Disabled
◉ Monitor Only

Process

Enabling Visibility to the LAN

1. Configure MAC Authentication Bypass
2. Configure 802.1X for wired users
3. Enable RADIUS in the access layer
4. Enable identity
5. Disable port security timers
6. Configure identity on Catalyst 4500

Cisco ISE now has a baseline configuration. The next step is to configure Cisco ISE with an authentication policy and to configure the switches for identity by using Cisco Prime LMS 4.2 and the Cisco TrustSec Work Center.

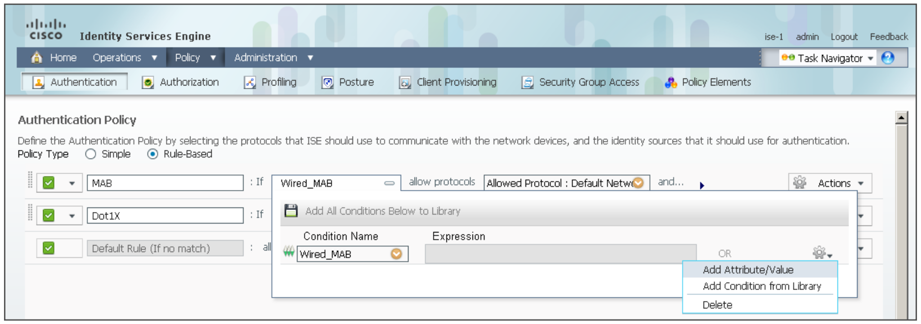
Procedure 1 Configure MAC Authentication Bypass

MAC Authentication Bypass (MAB) allows you to configure specific machine MAC addresses on the switch to bypass the authentication process. For monitor mode, this is required, since you aren't enforcing authentication. You configure MAB to allow any MAC address to authenticate for both the wired and wireless networks.

Step 1: Mouse over **Policy**, and then choose **Authentication**. The Policy Type is Rule-Based.

There are already two default rules in place, MAB and Dot1X.

Step 2: Next to Wired_MAB, click the + symbol. To the right of the Wired_MAB condition name, click the gear symbol, and then choose **Add Condition from Library**.


cisco Identity Services Engine
ise-1 admin Logout Feedback
Home Operations Policy Administration
Task Navigator
Authentication Authorization Profiling Posture Client Provisioning Security Group Access Policy Elements
Actions
Add Attribute/Value
Add Condition from Library
Delete

Authentication Policy

Define the Authentication Policy by selecting the protocols that ISE should use to communicate with the network devices, and the identity sources that it should use for authentication.

Policy Type ○ Simple ● Rule-Based

MAB : If Wired_MAB allow protocols Allowed Protocol : Default Netw and...

Dot1X : If

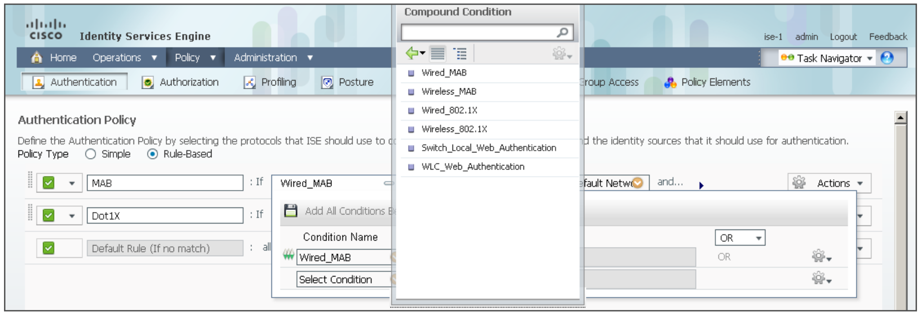
Default Rule (If no match)

Add All Conditions Below to Library

Condition Name	Expression
Wired_MAB	OR

Step 3: In the **Select Condition** list, next to Compound Condition, click the > symbol.

Step 4: Choose **Wireless_MAB,** and then click anywhere to continue.


cisco Identity Services Engine
ise-1 admin Logout Feedback
Home Operations Policy Administration
Task Navigator
Authentication Authorization Profiling Posture Security Group Access Policy Elements
Actions

Compound Condition

- Wired_MAB
- Wireless_MAB
- Wired_802.1X
- Wireless_802.1X
- Switch_Local_Web_Authentication
- WLC_Web_Authentication

Authentication Policy

Define the Authentication Policy by selecting the protocols that ISE should use to communicate with the network devices, and the identity sources that it should use for authentication.

Policy Type ○ Simple ● Rule-Based

MAB : If Wired_MAB ... Default Netw and...

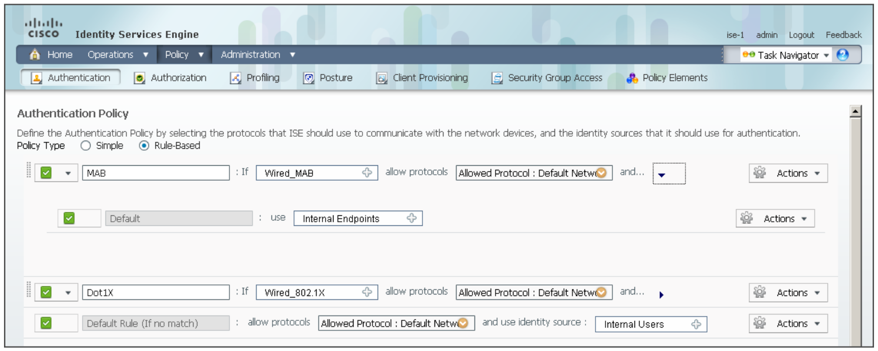
Dot1X : If

Default Rule (If no match)

Add All Conditions

Condition Name	
Wired_MAB	OR
Select Condition	OR

Step 5: For the MAB policy, click the black triangle to the right of the **and...**. This brings up the identity store used for the MAB rule.


cisco Identity Services Engine
ise-1 admin Logout Feedback
Home Operations Policy Administration
Task Navigator
Authentication Authorization Profiling Posture Client Provisioning Security Group Access Policy Elements
Actions

Authentication Policy

Define the Authentication Policy by selecting the protocols that ISE should use to communicate with the network devices, and the identity sources that it should use for authentication.

Policy Type ○ Simple ● Rule-Based

MAB : If Wired_MAB allow protocols Allowed Protocol : Default Netw and...

Default : use Internal Endpoints

Dot1X : If Wired_802.1X allow protocols Allowed Protocol : Default Netw and...

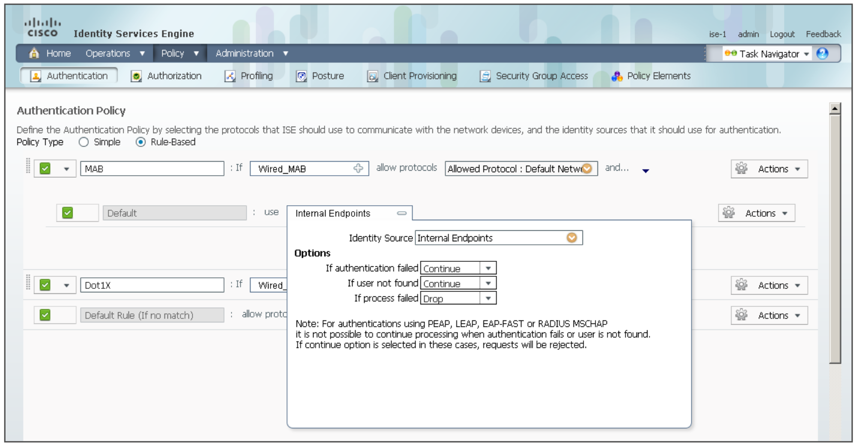
Default Rule (If no match) : allow protocols Allowed Protocol : Default Netw and use identity source : Internal Users

Next, you change the options on the Internal Users database, which is used for profiling.

Step 6: Next to Internal Endpoints, click the **+**.

Step 7: In this example deployment, all endpoints are allowed to authenticate. Set the following values, click anywhere in the window in order to continue, and then click **Save**:

- If authentication failed—Continue
- If user not found—Continue
- If process failed—Drop


cisco Identity Services Engine
ise-1 admin Logout Feedback
Home Operations Policy Administration
Task Navigator
Authentication Authorization Profiling Posture Client Provisioning Security Group Access Policy Elements
Actions

Authentication Policy

Define the Authentication Policy by selecting the protocols that ISE should use to communicate with the network devices, and the identity sources that it should use for authentication.

Policy Type ○ Simple ● Rule-Based

MAB : If Wired_MAB allow protocols Allowed Protocol : Default Netw and...

Default : use Internal Endpoints

Identity Source Internal Endpoints

Options

If authentication failed Continue

If user not found Continue

If process failed Drop

Note: For authentications using PEAP, LEAP, EAP-FAST or RADIUS MSCHAP it is not possible to continue processing when authentication fails or user is not found. If continue option is selected in these cases, requests will be rejected.

Dot1X : If Wired_

Default Rule (If no match) : allow prot

Procedure 2 Configure 802.1X for wired users

There is already a Dot1X rule configured on the engine. Although in this example deployment you aren't deploying any wired endpoints with 802.1X supplicants at this point, you should still configure this rule to prepare for the next phase of an identity deployment.

Step 1: Mouse over **Policy**, and then, from the menu, choose **Authentication**.

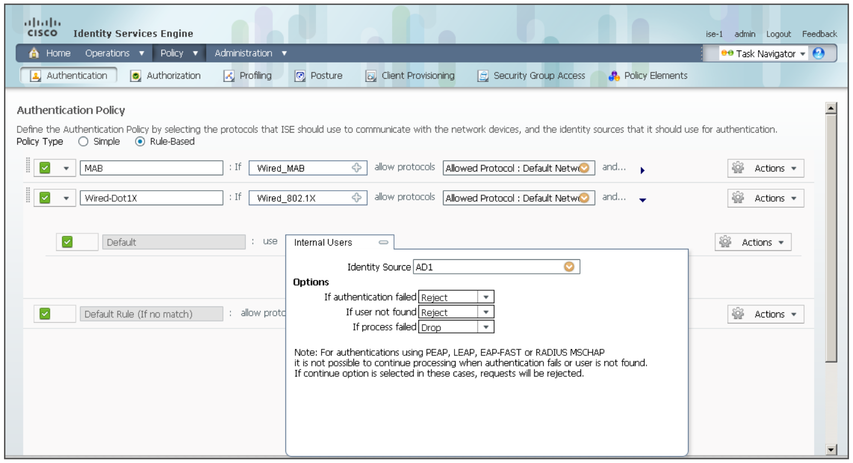
Step 2: Rename the rule Wired-Dot1X. This differentiates the rule from a wireless 802.1X rule.

Step 3: For the **Wired-Dot1X** rule, click the black triangle to the right of the **and...**. This brings up the identity store used for this rule.

The default identity store is the internal user database. For 802.1X, use the Active Directory server that you defined earlier.

Step 4: Next to Internal Users, click the **+** symbol. This enables you to edit the identity store and the parameters.

Step 5: In the **Identity Source** list, choose the previously defined AD server **AD1**, use the default options for this identity source, click anywhere in the window to continue, and then click **Save**.


Identity Services Engine
ise-1 admin Logout Feedback
Home Operations Policy Administration
Task Navigator
Authentication Authorization Profiling Posture Client Provisioning Security Group Access Policy Elements
Actions

Authentication Policy

Define the Authentication Policy by selecting the protocols that ISE should use to communicate with the network devices, and the identity sources that it should use for authentication.

Policy Type ○ Simple ● Rule-Based

☑ MAB : If Wired_MAB allow protocols Allowed Protocol : Default Netw and...

☑ Wired-Dot1X : If Wired_802.1X allow protocols Allowed Protocol : Default Netw and...

☑ Default : use Internal Users

Identity Source AD1

Options

If authentication failed Reject

If user not found Reject

If process failed Drop

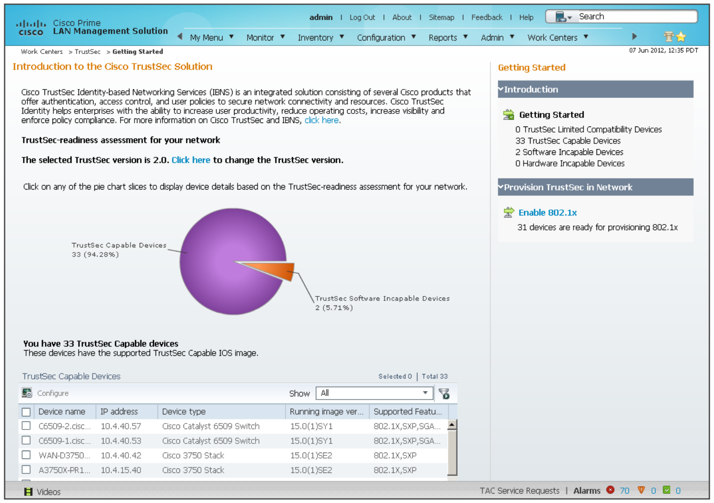
Note: For authentications using PEAP, LEAP, EAP-FAST or RADIUS MSCHAP it is not possible to continue processing when authentication fails or user is not found. If continue option is selected in these cases, requests will be rejected.

☑ Default Rule (If no match) : allow proto

Procedure 3 Enable RADIUS in the access layer

Step 1: In a web browser, connect to Cisco Prime LMS, for example: https://lms.cisco.local.

Step 2: Mouse over **Work Centers**, and then, from the TrustSec section, choose **Getting Started**. This shows the network's Cisco TrustSec-readiness assessment, which verifies that the software versions support the identity features and that the switches are capable of running RADIUS.


Cisco Prime LAN Management Solution
admin Log Out About Sitemap Feedback Help Search
My Menu Monitor Inventory Configuration Reports Admin Work Centers
Work Centers > TrustSec > Getting Started
07 Jun 2012, 12:35 PDT
TrustSec Capable Devices 33 (94.28%)
TrustSec Software Incapable Devices 2 (5.71%)
Videos
TAC Service Requests Alarms 70 0 0

Introduction to the Cisco TrustSec Solution

Cisco TrustSec Identity-based Networking Services (IBNS) is an integrated solution consisting of several Cisco products that offer authentication, access control, and user policies to secure network connectivity and resources. Cisco TrustSec Identity helps enterprises with the ability to increase user productivity, reduce operating costs, increase visibility and enforce policy compliance. For more information on Cisco TrustSec and IBNS, click here.

TrustSec-readiness assessment for your network

The selected TrustSec version is 2.0. Click here to change the TrustSec version.

Click on any of the pie chart slices to display device details based on the TrustSec-readiness assessment for your network.

You have 33 TrustSec Capable devices
These devices have the supported TrustSec Capable IOS image.

TrustSec Capable Devices — Selected 0 | Total 33

Configure — Show All

☐	Device name	IP address	Device type	Running image ver...	Supported Featu...
☐	C6509-2.cisc...	10.4.40.57	Cisco Catalyst 6509 Switch	15.0(1)SY1	802.1X,SXP,SGA...
☐	C6509-1.cisc...	10.4.40.53	Cisco Catalyst 6509 Switch	15.0(1)SY1	802.1X,SXP,SGA...
☐	WAN-D3750...	10.4.40.42	Cisco 3750 Stack	15.0(1)SE2	802.1X,SXP
☐	A3750X-PR1...	10.4.15.40	Cisco 3750 Stack	15.0(1)SE2	802.1X,SXP

Getting Started

Introduction

Getting Started
0 TrustSec Limited Compatibility Devices
33 TrustSec Capable Devices
2 Software Incapable Devices
0 Hardware Incapable Devices

Provision TrustSec in Network

Enable 802.1x
31 devices are ready for provisioning 802.1x

Tech Tip

Cisco Prime LMS 4.2 supports TrustSec 2.0 features. The TrustSec 2.0 feature set did not include support for the Cisco Catalyst 4500 Series Switches. Alternate procedures are listed in this guide for configuring these switches.

Next, you configure identity by enabling RADIUS on the switch.

Step 3: Mouse over **Work Centers**, and then, from the TrustSec section, choose **RADIUS Configuration**.

Step 4: In the RADIUS-capable devices table, select the switches for which you want to enable RADIUS, and then click **Next**.

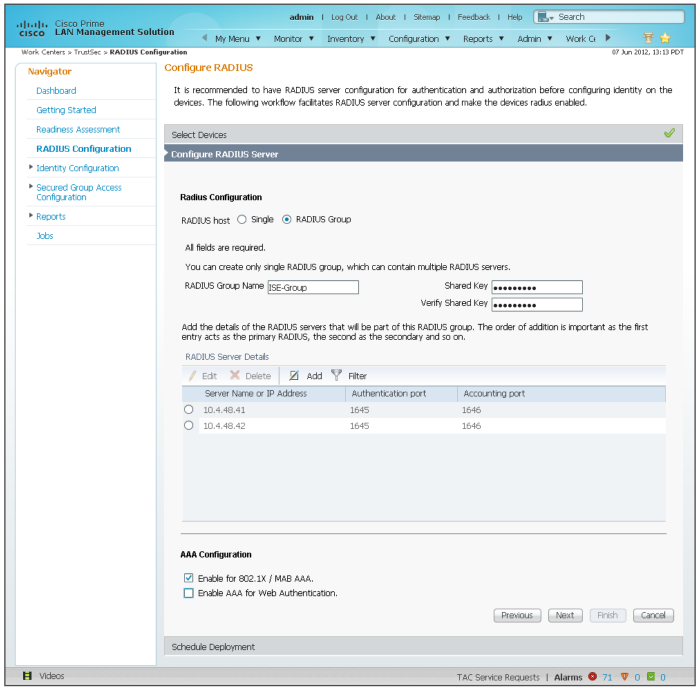
Step 5: On the Configure RADIUS page, select **RADIUS Group**, and in the **RADIUS Group Name** box, enter **ISE-Group**, and then in the **Shared Key** box, use the value used in previous procedures.

Step 6: In the RADIUS Server Details section, click **Add**.

Step 7: In the pop-up window, for the RADIUS server IP address, enter 10.4.48.41, and then click **Save and add another**.

Step 8: For the second RADIUS server, enter 10.4.48.42, and then click **Save**. The RADIUS server group has been configured.

Step 9: In the AAA Configuration section, make sure that only **Enable for 802.1X / MAB AAA** is selected. A message about not configuring AAA for web authentication appears. Click **OK**.


Cisco Prime
LAN Management Solution
admin | Log Out | About | Sitemap | Feedback | Help
Search
My Menu ▼ Monitor ▼ Inventory ▼ Configuration ▼ Reports ▼ Admin ▼ Work Ce
Work Centers > TrustSec > RADIUS Configuration
07 Jun 2012, 13:13 PDT
Navigator
Dashboard
Getting Started
Readiness Assessment
RADIUS Configuration
Identity Configuration
Secured Group Access Configuration
Reports
Jobs
Edit
Delete
Add
Filter
Previous
Next
Finish
Cancel
Videos
TAC Service Requests | Alarms 71 0 0

Configure RADIUS

It is recommended to have RADIUS server configuration for authentication and authorization before configuring identity on the devices. The following workflow facilitates RADIUS server configuration and make the devices radius enabled.

Select Devices ✓

Configure RADIUS Server

Radius Configuration

RADIUS host ○ Single ● RADIUS Group

All fields are required.

You can create only single RADIUS group, which can contain multiple RADIUS servers.

RADIUS Group Name: ISE-Group
Shared Key: ●●●●●●●●●
Verify Shared Key: ●●●●●●●●●

Add the details of the RADIUS servers that will be part of this RADIUS group. The order of addition is important as the first entry acts as the primary RADIUS, the second as the secondary and so on.

RADIUS Server Details

	Server Name or IP Address	Authentication port	Accounting port
○	10.4.48.41	1645	1646
○	10.4.48.42	1645	1646

AAA Configuration

☑ Enable for 802.1X / MAB AAA.
☐ Enable AAA for Web Authentication.

Schedule Deployment

Step 10: On the Configure RADIUS page, click **Next**.

Tech Tip

You can review the CLI commands that will be pushed to the switch by clicking **Preview CLI**.

Step 11: Enter a job description, and then click **Finish**. Deployment begins immediately.

Step 12: When you receive the message regarding the addition of AAA commands, click **Yes**, and then on the pop-up window generated after the job is created, click **OK**.

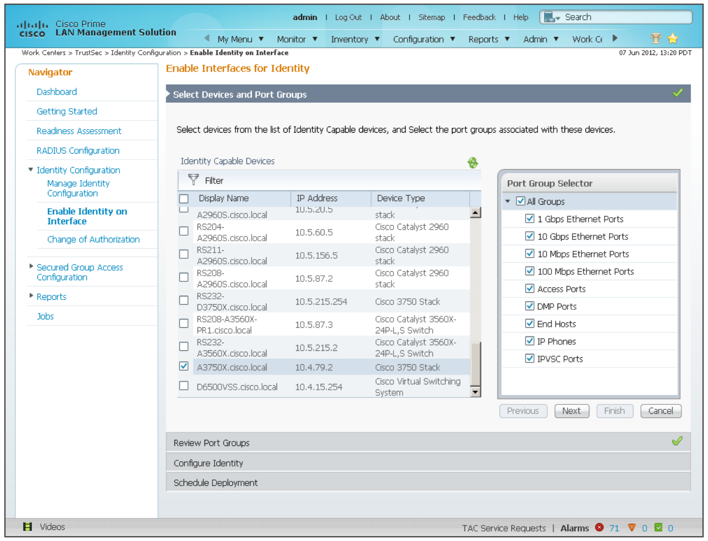
Procedure 4 Enable identity

The identity configuration enables monitor mode on the switch. This enables both 802.1X and MAC Authentication Bypass (MAB); however, no authentication policy is enabled. This allows the ports to be monitored with no disruption to current network activity.

Step 1: Mouse over **Work Centers**, and then, under the TrustSec section, choose **Identity Configuration**.

Step 2: In the Navigator pane, click **Enable Identity on Interfaces**.

Step 3: In the **Filter** list, choose the switch that was previously configured for RADIUS, in the **Port Group Selector** pane, select **All Groups**, and then click **Next**.


Cisco Prime
LAN Management Solution
admin | Log Out | About | Sitemap | Feedback | Help
Search
My Menu ▼ Monitor ▼ Inventory ▼ Configuration ▼ Reports ▼ Admin ▼ Work Ce
Work Centers > TrustSec > Identity Configuration > Enable Identity on Interface
07 Jun 2012, 13:20 PDT
Navigator
Dashboard
Getting Started
Readiness Assessment
RADIUS Configuration
Identity Configuration
Manage Identity Configuration
Enable Identity on Interface
Change of Authorization
Secured Group Access Configuration
Reports
Jobs
Videos
TAC Service Requests | Alarms 71 0 0

Enable Interfaces for Identity

Select Devices and Port Groups

Select devices from the list of Identity Capable devices, and Select the port groups associated with these devices.

Identity Capable Devices

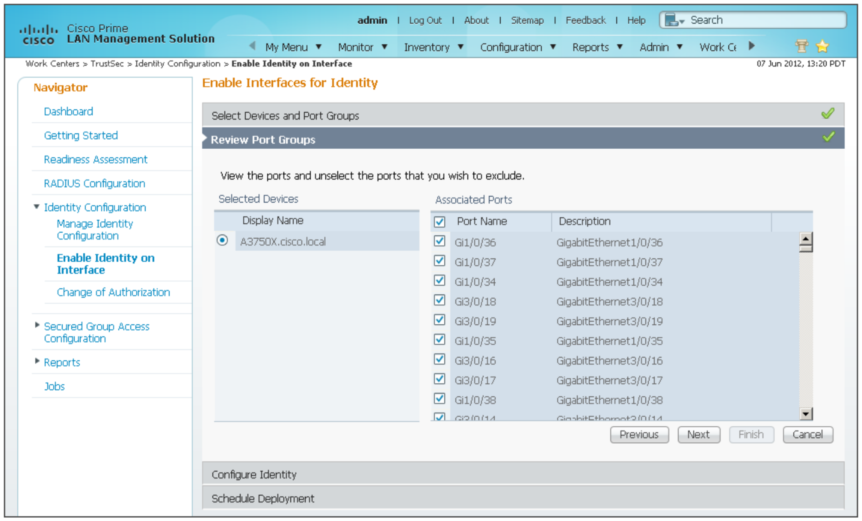
Filter

□	Display Name	IP Address	Device Type
□	A2960S.cisco.local	10.5.20.5	stack
□	RS204-A2960S.cisco.local	10.5.60.5	Cisco Catalyst 2960 stack
□	RS211-A2960S.cisco.local	10.5.156.5	Cisco Catalyst 2960 stack
□	RS208-A2960S.cisco.local	10.5.87.2	Cisco Catalyst 2960 stack
□	RS232-D3750X.cisco.local	10.5.215.254	Cisco 3750 Stack
□	RS208-A3560X-PR1.cisco.local	10.5.87.3	Cisco Catalyst 3560X-24P-L,S Switch
□	RS232-A3560X.cisco.local	10.5.215.2	Cisco Catalyst 3560X-24P-L,S Switch
☑	A3750X.cisco.local	10.4.79.2	Cisco 3750 Stack
□	D6500VSS.cisco.local	10.4.15.254	Cisco Virtual Switching System

Port Group Selector

- ☑ All Groups
  - ☑ 1 Gbps Ethernet Ports
  - ☑ 10 Gbps Ethernet Ports
  - ☑ 10 Mbps Ethernet Ports
  - ☑ 100 Mbps Ethernet Ports
  - ☑ Access Ports
  - ☑ DMP Ports
  - ☑ End Hosts
  - ☑ IP Phones
  - ☑ IPVSC Ports

Step 4: Select the check boxes next to the ports for which you want to enable identity, and then click **Next**.


Cisco Prime
LAN Management Solution
admin | Log Out | About | Sitemap | Feedback | Help
Search
My Menu ▼ Monitor ▼ Inventory ▼ Configuration ▼ Reports ▼ Admin ▼ Work Ce
Work Centers > TrustSec > Identity Configuration > Enable Identity on Interface
07 Jun 2012, 13:20 PDT
Navigator
Dashboard
Getting Started
Readiness Assessment
RADIUS Configuration
Identity Configuration
Manage Identity Configuration
Enable Identity on Interface
Change of Authorization
Secured Group Access Configuration
Reports
Jobs
Select Devices and Port Groups

Enable Interfaces for Identity

Review Port Groups

View the ports and unselect the ports that you wish to exclude.

Selected Devices

	Display Name
●	A3750X.cisco.local

Associated Ports

☑	Port Name	Description
☑	Gi1/0/36	GigabitEthernet1/0/36
☑	Gi1/0/37	GigabitEthernet1/0/37
☑	Gi1/0/34	GigabitEthernet1/0/34
☑	Gi3/0/18	GigabitEthernet3/0/18
☑	Gi3/0/19	GigabitEthernet3/0/19
☑	Gi1/0/35	GigabitEthernet1/0/35
☑	Gi3/0/16	GigabitEthernet3/0/16
☑	Gi3/0/17	GigabitEthernet3/0/17
☑	Gi1/0/38	GigabitEthernet1/0/38
☑	Gi3/0/14	GigabitEthernet3/0/14

Next, you configure monitor mode.

Step 5: In the Identity mode to be configured section, move the **Security Mode** slider to **Monitor**, which is the default.

Step 6: In the Authentication profile and host mode section, set the following values:

- Define Authentication Profile—802.1X, then MAB
- Define Host Mode—MultiAuth
- Action to be taken on security violation—No Change

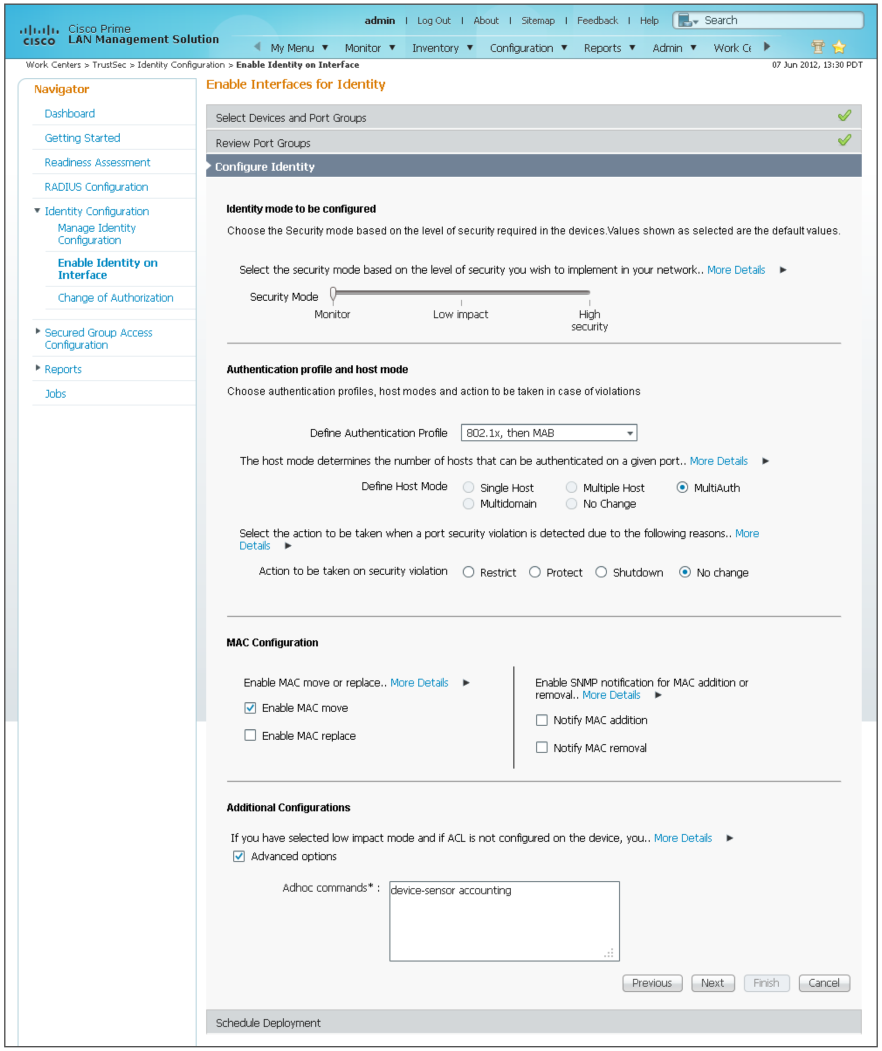
In the MAC Configuration section, make sure only **Enable MAC Move** is selected.

Step 7: In the Additional Configurations section, select **Advanced Options**, and then in the **Adhoc commands** box, enter the following command, and then click **Next**.

```
device-sensor accounting
```

Tech Tip

For device profiling, you need to enable the IOS Sensor feature on the switch to include DHCP and CDP information in the RADIUS messages sent from the switch to Cisco ISE. The IOS Sensor feature relies on information from the DHCP snooping feature that was enabled in the *LAN Deployment Guide*. This feature is not supported on the Cisco Catalyst 2960S access layer switches. If you want to use device profiling in the access layer, you will need to deploy Cisco Catalyst 3560, 3750, or 4500 Series Switches.


Cisco Prime
LAN Management Solution
admin | Log Out | About | Sitemap | Feedback | Help
Search
My Menu ▼ Monitor ▼ Inventory ▼ Configuration ▼ Reports ▼ Admin ▼ Work Ce
Work Centers > TrustSec > Identity Configuration > Enable Identity on Interface
07 Jun 2012, 13:30 PDT
Navigator
Dashboard
Getting Started
Readiness Assessment
RADIUS Configuration
Identity Configuration
Manage Identity Configuration
Enable Identity on Interface
Change of Authorization
Secured Group Access Configuration
Reports
Jobs

Enable Interfaces for Identity

Select Devices and Port Groups ✓

Review Port Groups ✓

Configure Identity

Identity mode to be configured

Choose the Security mode based on the level of security required in the devices.Values shown as selected are the default values.

Select the security mode based on the level of security you wish to implement in your network.. More Details ▶

Security Mode: Monitor | Low impact | High security

Authentication profile and host mode

Choose authentication profiles, host modes and action to be taken in case of violations

Define Authentication Profile: 802.1x, then MAB

The host mode determines the number of hosts that can be authenticated on a given port.. More Details ▶

Define Host Mode: ○ Single Host ○ Multiple Host ● MultiAuth ○ Multidomain ○ No Change

Select the action to be taken when a port security violation is detected due to the following reasons.. More Details ▶

Action to be taken on security violation: ○ Restrict ○ Protect ○ Shutdown ● No change

MAC Configuration

Enable MAC move or replace.. More Details ▶

☑ Enable MAC move

□ Enable MAC replace

Enable SNMP notification for MAC addition or removal.. More Details ▶

□ Notify MAC addition

□ Notify MAC removal

Additional Configurations

If you have selected low impact mode and if ACL is not configured on the device, you.. More Details ▶

☑ Advanced options

Adhoc commands* : device-sensor accounting

Previous | Next | Finish | Cancel

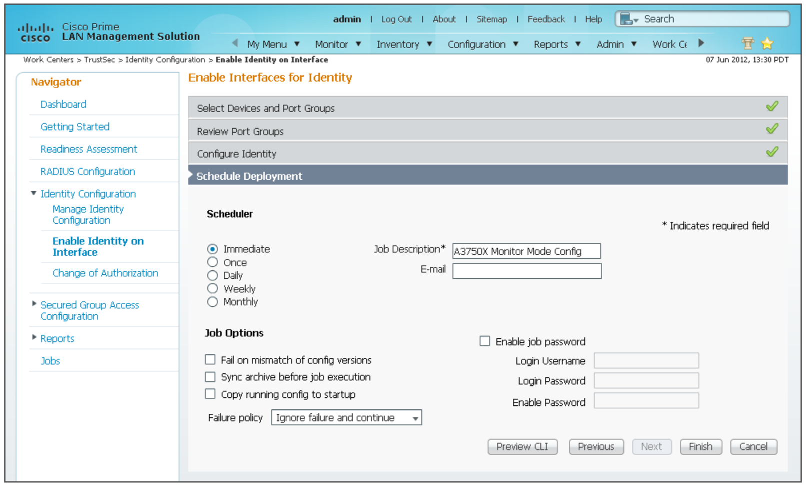
Schedule Deployment

Identity configuration is complete. Next, you create a deployment job in order to deliver the configuration to the switch.

Step 8: In the **Job Description** box, enter a description, click **Finish**, and then click **OK**.

Tech Tip

You can review the CLI commands that will be pushed to the switch by clicking **Preview CLI**.


Cisco Prime
LAN Management Solution
admin | Log Out | About | Sitemap | Feedback | Help
Search
My Menu ▼ Monitor ▼ Inventory ▼ Configuration ▼ Reports ▼ Admin ▼ Work Ce
Work Centers > TrustSec > Identity Configuration > Enable Identity on Interface
07 Jun 2012, 13:30 PDT
Navigator
Dashboard
Getting Started
Readiness Assessment
RADIUS Configuration
Identity Configuration
Manage Identity Configuration
Enable Identity on Interface
Change of Authorization
Secured Group Access Configuration
Reports
Jobs

Enable Interfaces for Identity

Select Devices and Port Groups ✓

Review Port Groups ✓

Configure Identity ✓

Schedule Deployment

Scheduler

* Indicates required field

● Immediate
○ Once
○ Daily
○ Weekly
○ Monthly

Job Description*: A3750X Monitor Mode Config

E-mail:

Job Options

□ Fail on mismatch of config versions

□ Sync archive before job execution

□ Copy running config to startup

Failure policy: Ignore failure and continue

□ Enable job password

Login Username:

Login Password:

Enable Password:

Preview CLI | Previous | Next | Finish | Cancel

The global commands added to the switch configuration at the completion of the previous two procedures are as follows.

```
radius-server host 10.4.48.41 auth-port 1645 acct-port 1646
radius-server host 10.4.48.42 auth-port 1645 acct-port 1646
radius-server key [key]
aaa group server radius ISE-Group
 server 10.4.48.41 auth-port 1645 acct-port 1646
 server 10.4.48.42 auth-port 1645 acct-port 1646

aaa authentication dot1x default group ISE-Group
aaa authorization network default group ISE-Group
aaa authorization configuration default group ISE-Group
aaa accounting dot1x default start-stop group ISE-Group

radius-server vsa send accounting
radius-server vsa send authentication

authentication mac-move permit
dot1x system-auth-control
device-sensor accounting
```

The interface commands added at the completion of the previous two procedures are as follows.

```
interface [interface]
 authentication host-mode multi-auth
 authentication open
 authentication order dot1x mab
 authentication port-control auto
 mab
 dot1x pae authenticator
```

Procedure 5 Disable port security timers

The current Cisco SBA design incorporates the use of port security to provide a level of security and prevent rogue devices from being connected. However, 802.1X also provides this functionality and there can be conflicts when both are enabled on a port at the same time. This is particularly true of inactivity timers since both port security and 802.1X each have their own set of timers. The conflict causes 802.1X to re-authenticate every time the port security time out is reached. To avoid this issue, port security timers need to be disabled.

Step 1: Connect to the Cisco Prime LMS server by browsing to https://lms.cisco.local.

Step 2: Navigate to **Configuration > Tools > NetConfig**. This opens the Job Browser.

Step 3: Click **Create.** This enables you to configure a new job.

Step 4: Select **Port based**, and then click **Go**.

Step 5: In the tree, next to All Devices, click the **+** symbol, select the switch you are configuring, and then click **Next**.

Tech Tip

In this example, only one switch is being configured, but you can select multiple switches to accommodate a large deployment. The Group Selector allows you to choose switches by pre-defined groups or by model.

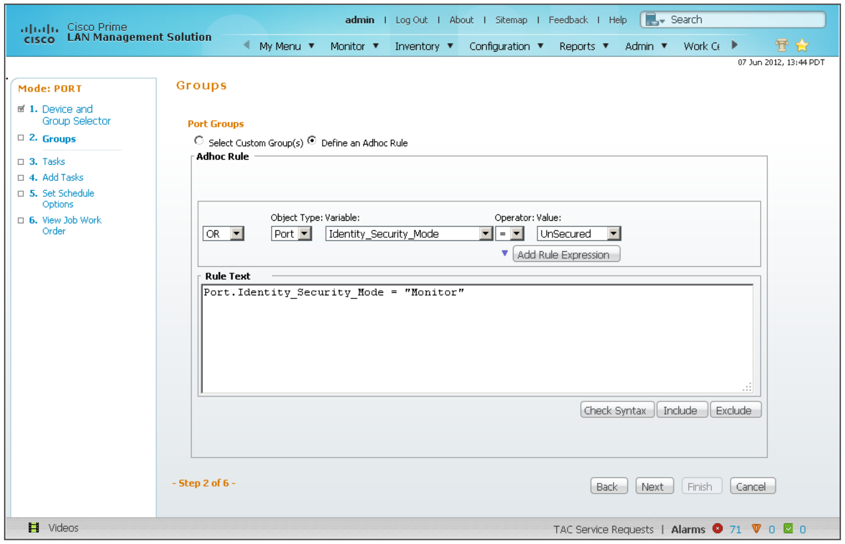
Step 6: Select **Define an Ad-Hoc Rule**. A new screen is displayed.

Step 7: For the ad-hoc rule, in the **Object Type** list, choose **Port**.

Step 8: In the **Variable** list, choose **Identity_Security_Mode**.

Step 9: In the **Operator** list, choose **=**, and then in the **Value** list, choose **Monitor**.

Step 10: Click **Add Rule Expression**, and then click **Next**.



OR | Port | Identity_Security_Mode | = | UnSecured

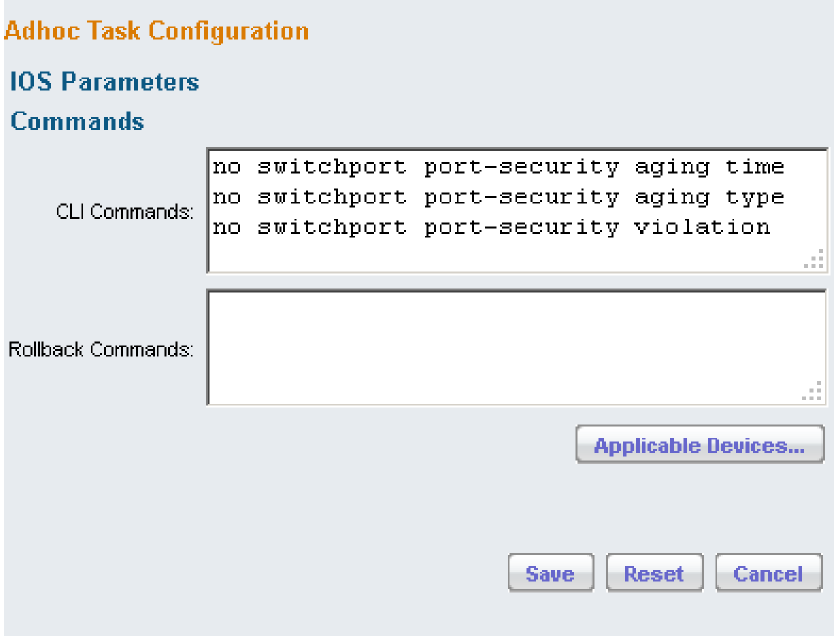
```
Port.Identity_Security_Mode = "Monitor"
```

Step 11: In the Task Selector, select **Adhoc Task**, and then click **Next**.

Step 12: Click **Add Instance**, and then, in the new window, enter the CLI commands necessary to remove the port security configuration.

```
no switchport port-security aging time
no switchport port-security aging type
no switchport port-security violation
```

Step 13: Click **Applicable Devices**, select the switch to which you want to apply this configuration, click **Close**, and then click **Save**.

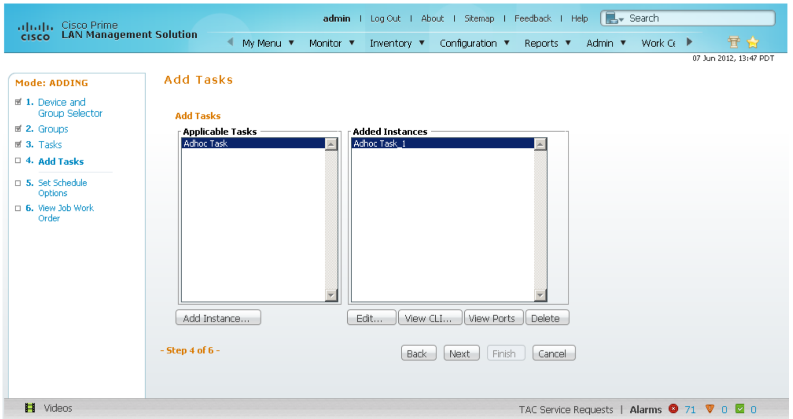


CLI Commands:

```
no switchport port-security aging time
no switchport port-security aging type
no switchport port-security violation
```

Rollback Commands:

Step 14: After returning to the Add Tasks window, click **Next**.



Applicable Tasks: Adhoc Task

Added Instances: Adhoc Task_1

Step 15: Fill in a description for the job, and then click **Next**. The job is submitted for immediate deployment.

Step 16: Click **Finish**, and then when you receive a notice that the job was submitted successfully, click **OK**.

Procedure 6 Configure identity on Catalyst 4500

Cisco TrustSec Work Center supports TrustSec 2.0 features, but does not support Cisco Catalyst 4500. However, Catalyst 4500 does support all of the features in use. You have to configure these by using the NetConfig feature of Cisco LMS. This procedure covers enabling RADIUS, configuring 802.1X in monitor mode, and disabling port security.

Step 1: Connect to the Cisco Prime LMS server by browsing to https://lms.cisco.local:1741.

Step 2: Mouse over **Configuration**, and then, from the Tools section, choose **NetConfig**.

Step 3: In the NetConfig Job Browser, click **Create**.

Step 4: Select **Device Based** for the NetConfig Job Type, and then click **Go**.

Step 5: In the Device Selector, expand **All Devices**, select the devices where you want to enable identity.

Step 6: In the Task Selector, expand **All Tasks**, select **Adhoc**, and then click **Next**.

Step 7: Click **Add Instance**, and then, in the new window, enter the CLI commands necessary to configure identity.

```
radius-server host 10.4.48.41 auth-port 1645 acct-port 1646
radius-server host 10.4.48.42 auth-port 1645 acct-port 1646
radius-server key [key]
aaa group server radius ISE-Group
 server 10.4.48.41 auth-port 1645 acct-port 1646
 server 10.4.48.42 auth-port 1645 acct-port 1646

aaa authentication dot1x default group ISE-Group
aaa authorization network default group ISE-Group
aaa authorization configuration default group ISE-Group
aaa accounting dot1x default start-stop group ISE-Group
radius-server vsa send accounting
radius-server vsa send authentication

authentication mac-move permit
dot1x system-auth-control
device-sensor accounting
```

Step 8: Click **Applicable Devices**, select the switch to which you want to apply this configuration, and then click **Close**.

Step 9: For the command mode, choose **Config**, and then click **Save**.

Step 10: After returning to the Add Tasks window, click **Next**.

Step 11: Fill in a description for the job, and then click **Next**. The job is submitted for immediate deployment.

Step 12: Click **Finish**, and then when you receive a notice that the job was submitted successfully, click **OK**.

Step 13: Navigate to **Configuration > Tools > NetConfig**. This opens the Job Browser.

Step 14: Click **Create.** This enables you to configure a new job.

Step 15: Select **Port based**, and then click **Go**.

Step 16: In the tree, next to All Devices, click the **+** symbol, select the switch you are configuring, and then click **Next**.

Tech Tip

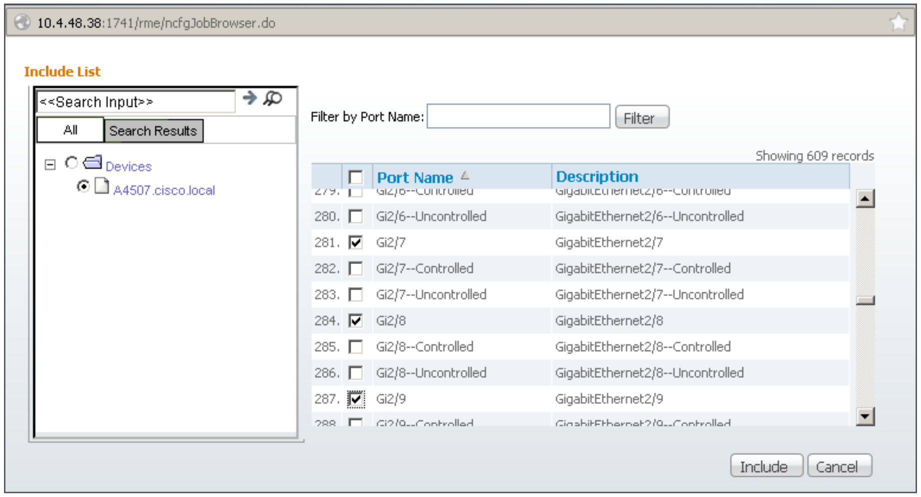
In this example, only one switch is being configured, but you can select multiple switches to accommodate a large deployment. The Group Selector allows you to choose switches by pre-defined groups or by model.

Step 17: Select **Define an Ad-Hoc Rule**. A new screen is displayed.

Step 18: For the ad-hoc rule, in the **Rule text** section, click **Include**.

Step 19: In the Include List section, expand **Devices**, and then select the switch you want to configure for identity.

Step 20: Choose the ports you want to configure for identity, and then click **Include**. The window closes.



	☐	Port Name	Description
279.	☐	Gi2/6--Controlled	GigabitEthernet2/6--Controlled
280.	☐	Gi2/6--Uncontrolled	GigabitEthernet2/6--Uncontrolled
281.	☑	Gi2/7	GigabitEthernet2/7
282.	☐	Gi2/7--Controlled	GigabitEthernet2/7--Controlled
283.	☐	Gi2/7--Uncontrolled	GigabitEthernet2/7--Uncontrolled
284.	☑	Gi2/8	GigabitEthernet2/8
285.	☐	Gi2/8--Controlled	GigabitEthernet2/8--Controlled
286.	☐	Gi2/8--Uncontrolled	GigabitEthernet2/8--Uncontrolled
287.	☑	Gi2/9	GigabitEthernet2/9
288.	☐	Gi2/9--Controlled	GigabitEthernet2/9--Controlled

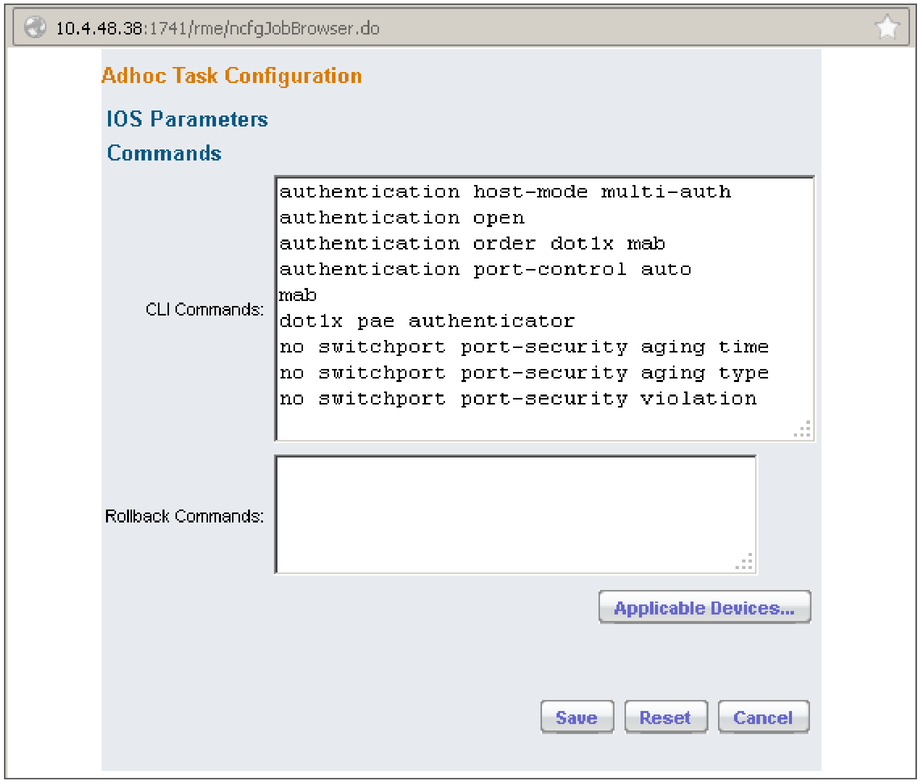
Step 21: Move to step 3 of the wizard by clicking **Next**.

Step 22: In the Task Selector, select **Adhoc Task**, and then click **Next**.

Step 23: Click **Add Instance**, and then, in the new window, enter the CLI commands necessary in order to enable monitor mode and remove the port security configuration.

```
authentication host-mode multi-auth
authentication open
authentication order dot1x mab
authentication port-control auto
mab
dot1x pae authenticator
no switchport port-security aging time
no switchport port-security aging type
no switchport port-security violation
```

Step 24: Click **Applicable Devices**, select the switch to which you want to apply this configuration, click **Close**, and then click **Save**.

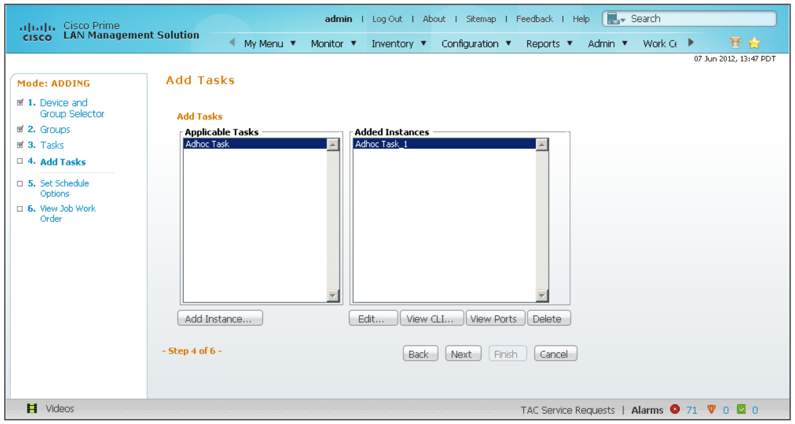


CLI Commands:

```
authentication host-mode multi-auth
authentication open
authentication order dot1x mab
authentication port-control auto
mab
dot1x pae authenticator
no switchport port-security aging time
no switchport port-security aging type
no switchport port-security violation
```

Rollback Commands:

Step 25: After returning to the Add Tasks window, click **Next**.



Step 26: Fill in a description for the job, and then click **Next**. The job is submitted for immediate deployment.

Step 27: Click **Finish**, and then when you receive a notice that the job was submitted successfully, click **OK**.

Step 28: Repeat this procedure for each Cisco Catalyst 4500 switch where you need to configure identity.

Process

Enabling Visibility to the Wireless Network

1. Configure 802.1X for wireless endpoints
2. Disable EAP-TLS on Cisco ISE
3. Add ISE as RADIUS authentication server
4. Add Cisco ISE as RADIUS accounting server
5. Enable client profiling

To authenticate wireless clients, you need to configure the wireless LAN controllers (WLC) to use the new Cisco ISE servers as RADIUS servers for authentication and accounting. The existing entry is disabled so that if there are any issues after moving to Cisco ISE, you can quickly restore the original configuration. Additionally, you configure the WLCs for DHCP profiling so that profiling information can be obtained from the DHCP requests from these clients and sent to the Cisco ISE.

Procedure 1 Configure 802.1X for wireless endpoints

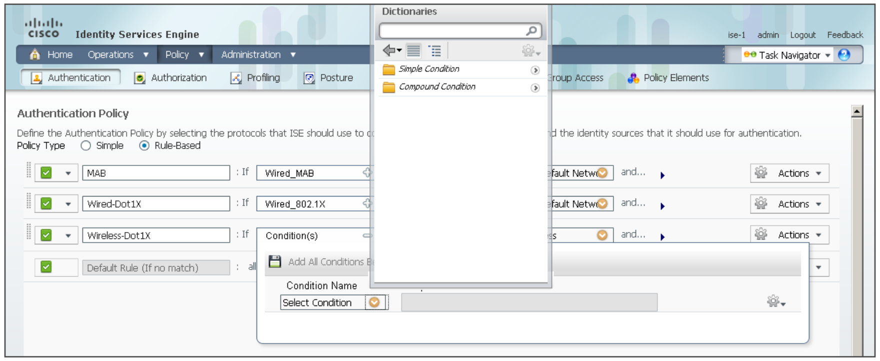
To differentiate wireless users in the authentication logs, create a rule to identify when wireless users authenticate.

Step 1: In a browser, access the primary engine's GUI at http://ise-1.cisco.local and navigate to **Policy > Authentication** to open the Authentication Policy page.

Step 2: For the Default Rule, click the **Actions** button, and then choose **Insert new row above**. A new rule, Standard Policy 1, is created.

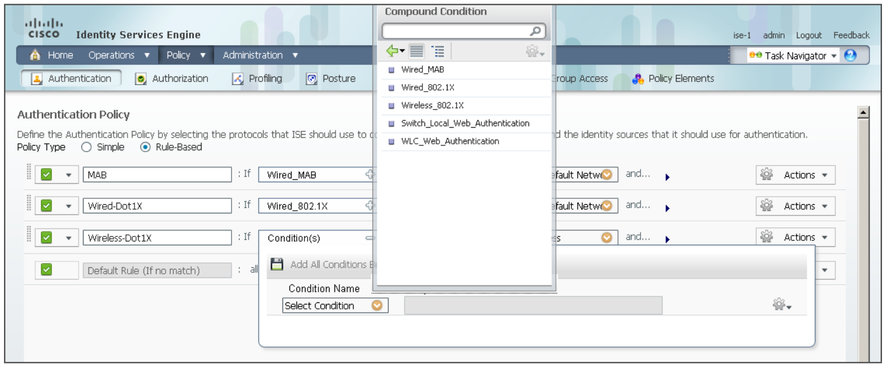
Step 3: Rename Standard Policy 1 to Wireless-Dot1X. In the **Condition(s)** box, click the **+** symbol, and then choose **Select Existing Condition from Library**.

Step 4: In the **Select Condition** list, next to Compound Condition, click the **>** symbol.



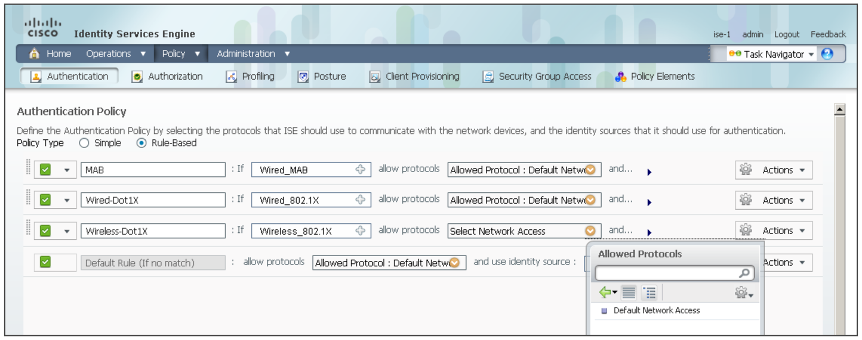
Define the Authentication Policy by selecting the protocols that ISE should use to c... the identity sources that it should use for authentication.

Step 5: Choose **Wireless_802.1X,** and then click anywhere to continue.



Define the Authentication Policy by selecting the protocols that ISE should use to c... the identity sources that it should use for authentication.

Step 6: In the **Select Network Access** list, next to Allowed Protocols, click the **>** symbol, and then select **Default Network Access**.


Identity Services Engine
ise-1 admin Logout Feedback
Home Operations ▾ Policy ▾ Administration ▾
Task Navigator ▾
Authentication Authorization Profiling Posture Client Provisioning Security Group Access Policy Elements

Authentication Policy

Define the Authentication Policy by selecting the protocols that ISE should use to communicate with the network devices, and the identity sources that it should use for authentication.

Policy Type ○ Simple ● Rule-Based

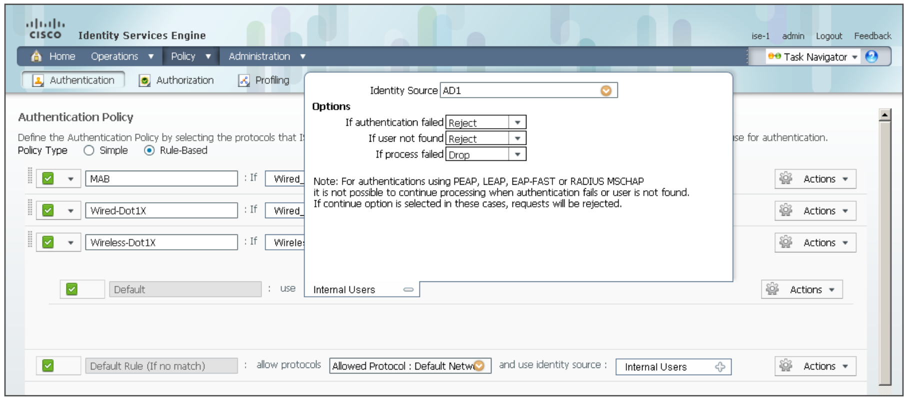
☑ MAB	: If Wired_MAB	allow protocols	Allowed Protocol : Default Netw	and...	Actions ▾
☑ Wired-Dot1X	: If Wired_802.1X	allow protocols	Allowed Protocol : Default Netw	and...	Actions ▾
☑ Wireless-Dot1X	: If Wireless_802.1X	allow protocols	Select Network Access	and...	Actions ▾
☑ Default Rule (If no match)	: allow protocols	Allowed Protocol : Default Netw	and use identity source :		Actions ▾

Step 7: For the **Wireless-Dot1X** rule, to the right of and..., click the black triangle. This displays the identity store used for this rule.

Step 8: Next to Internal Users, click the **+** symbol.

Step 9: In the **Identity Source** list, choose the previously defined AD server, for example, AD1.

Step 10: Use the default options for this identity source, continue by clicking anywhere in the window, and then click **Save**.


Identity Services Engine
ise-1 admin Logout Feedback
Home Operations ▾ Policy ▾ Administration ▾
Task Navigator ▾
Authentication Authorization Profiling

Authentication Policy

Define the Authentication Policy by selecting the protocols that I... se for authentication.

Policy Type ○ Simple ● Rule-Based

Identity Source AD1

Options

If authentication failed Reject

If user not found Reject

If process failed Drop

Note: For authentications using PEAP, LEAP, EAP-FAST or RADIUS MSCHAP it is not possible to continue processing when authentication fails or user is not found. If continue option is selected in these cases, requests will be rejected.

☑ MAB	: If Wired_			Actions ▾
☑ Wired-Dot1X	: If Wired_			Actions ▾
☑ Wireless-Dot1X	: If Wirele			Actions ▾
☑ Default	: use Internal Users			Actions ▾
☑ Default Rule (If no match)	: allow protocols Allowed Protocol : Default Netw	and use identity source :	Internal Users	Actions ▾

Procedure 2 Disable EAP-TLS on Cisco ISE

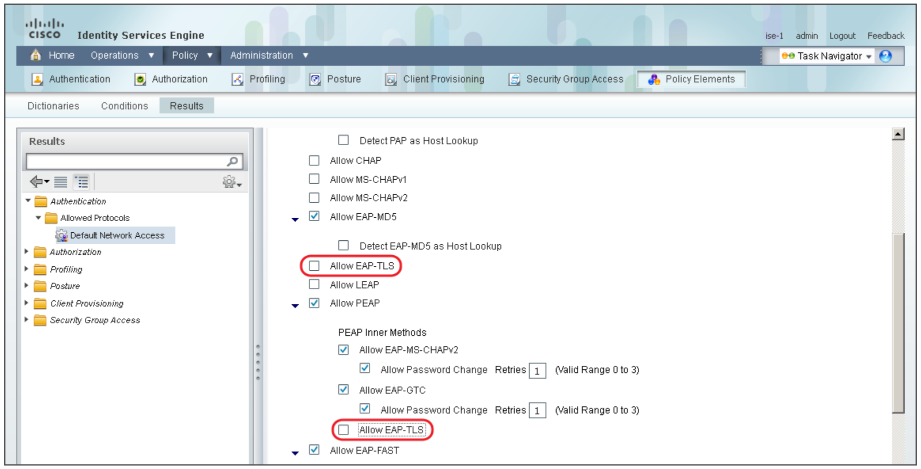
For wireless deployments that aren't currently using digital certificates, you need to disable EAP-TLS in order to allow clients to log in. You will be deploying digital certificates in a later phase of this deployment.

Step 1: On the menu bar, mouse over **Policy**, and then, from the Policy Elements section of the menu, choose **Results**.

Step 2: In the left pane, double-click **Authentication.** This expands the options.

Step 3: Double-click **Allowed Protocols**, and then select **Default Network Access**.

Step 4: Clear the global **Allow EAP-TLS** check box and under the PEAP settings, clear the **Allow EAP-TLS** check box, and then click **Save**.


Identity Services Engine
ise-1 admin Logout Feedback
Home Operations ▾ Policy ▾ Administration ▾
Task Navigator ▾
Authentication Authorization Profiling Posture Client Provisioning Security Group Access Policy Elements
Dictionaries Conditions Results
Results
Authentication
Allowed Protocols
Default Network Access
Authorization
Profiling
Posture
Client Provisioning
Security Group Access

☐ Detect PAP as Host Lookup

☐ Allow CHAP

☐ Allow MS-CHAPv1

☐ Allow MS-CHAPv2

☑ Allow EAP-MD5

☐ Detect EAP-MD5 as Host Lookup

☐ Allow EAP-TLS

☐ Allow LEAP

☑ Allow PEAP

PEAP Inner Methods

☑ Allow EAP-MS-CHAPv2

☑ Allow Password Change Retries 1 (Valid Range 0 to 3)

☑ Allow EAP-GTC

☑ Allow Password Change Retries 1 (Valid Range 0 to 3)

☐ Allow EAP-TLS

☑ Allow EAP-FAST

Procedure 3 Add ISE as RADIUS authentication server

Perform this procedure for every wireless LAN controller (WLC) in the architecture with the exception of the standalone guest WLC, if you have deployed one.

Step 1: Navigate to the WLC console by browsing to https://wlc1.cisco.local.

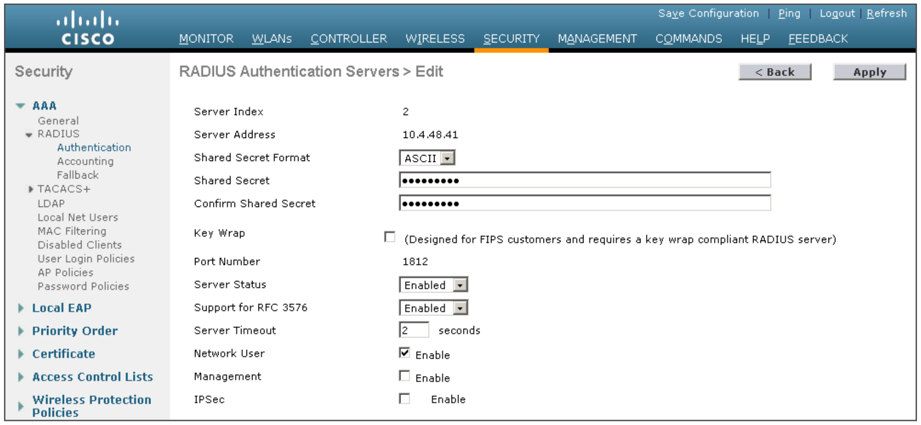
Step 2: On the menu bar, click **Security**.

Step 3: In the left pane, under the RADIUS section, click **Authentication**.

Step 4: Click **New.** A new server is added.

Step 5: In the **Server IP Address** box, enter **10.4.48.41**, and then enter your RADIUS shared secret.

Step 6: Next to Management, clear the **Enable** box, and then click **Apply**.



RADIUS Authentication Servers > Edit

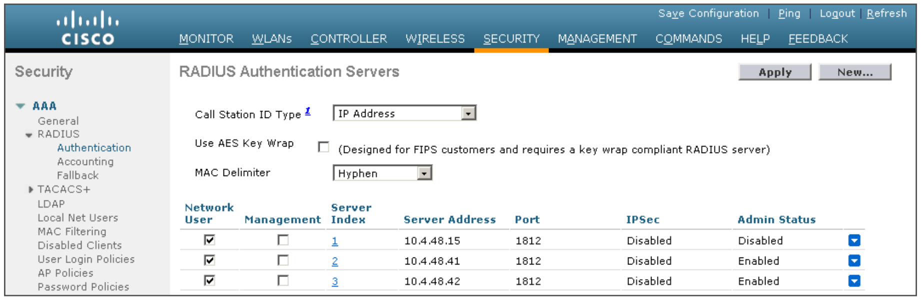
Server Index	2
Server Address	10.4.48.41
Shared Secret Format	ASCII
Shared Secret	•••••••••
Confirm Shared Secret	•••••••••
Key Wrap	□ (Designed for FIPS customers and requires a key wrap compliant RADIUS server)
Port Number	1812
Server Status	Enabled
Support for RFC 3576	Enabled
Server Timeout	2 seconds
Network User	☑ Enable
Management	□ Enable
IPSec	□ Enable

Step 7: Repeat Step 4 through Step 6 in order to add the secondary engine, 10.4.48.42, to the WLC configuration.

After adding Cisco ISE as a RADIUS server, disable the current RADIUS server in use. By disabling the server instead of deleting it, you can easily switch back if needed. Perform this procedure for every wireless LAN controller (WLC) in the architecture with the exception of the standalone guest WLC, if you have deployed one.

Step 8: On the RADIUS Authentication Servers screen, click the Server Index of the original RADIUS server, and then, for Server Status, select **Disabled**. Click **Apply**.

Step 9: On the RADIUS Authentication Servers screen, click **Apply**.



RADIUS Authentication Servers

Call Station ID Type: IP Address

Use AES Key Wrap: □ (Designed for FIPS customers and requires a key wrap compliant RADIUS server)

MAC Delimiter: Hyphen

Network User	Management	Server Index	Server Address	Port	IPSec	Admin Status
☑	□	1	10.4.48.15	1812	Disabled	Disabled
☑	□	2	10.4.48.41	1812	Disabled	Enabled
☑	□	3	10.4.48.42	1812	Disabled	Enabled

Procedure 4 Add Cisco ISE as RADIUS accounting server

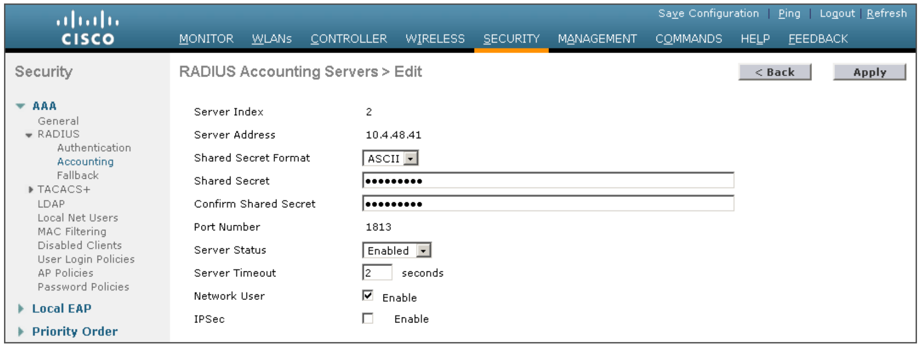
Perform this procedure for every wireless LAN controller (WLC) in the architecture, with the exception of the standalone guest WLC, if you have deployed one.

Step 1: On the menu bar, click **Security**.

Step 2: In the left pane, under the RADIUS section, click **Accounting**.

Step 3: Click **New.** This adds a new server.

Step 4: In the **Server IP Address** box, enter **10.4.48.41**, enter your RADIUS shared secret, and then click **Apply.**



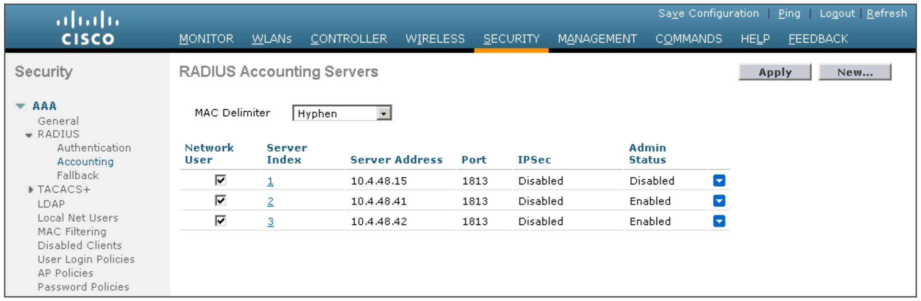
RADIUS Accounting Servers > Edit

Server Index	2
Server Address	10.4.48.41
Shared Secret Format	ASCII
Shared Secret	•••••••••
Confirm Shared Secret	•••••••••
Port Number	1813
Server Status	Enabled
Server Timeout	2 seconds
Network User	☑ Enable
IPSec	□ Enable

Step 5: Repeat Step 3 through Step 4 in order to add the secondary engine, 10.4.48.42, to the WLC configuration.

Step 6: On the RADIUS Accounting Servers screen, click the Server Index of the original RADIUS server, and then, for Server Status, select **Disabled**. Click **Apply**.

Step 7: On the RADIUS Accounting Servers screen, click **Apply**.



RADIUS Accounting Servers

MAC Delimiter: Hyphen

Network User	Server Index	Server Address	Port	IPSec	Admin Status
☑	1	10.4.48.15	1813	Disabled	Disabled
☑	2	10.4.48.41	1813	Disabled	Enabled
☑	3	10.4.48.42	1813	Disabled	Enabled

Procedure 5 Enable client profiling

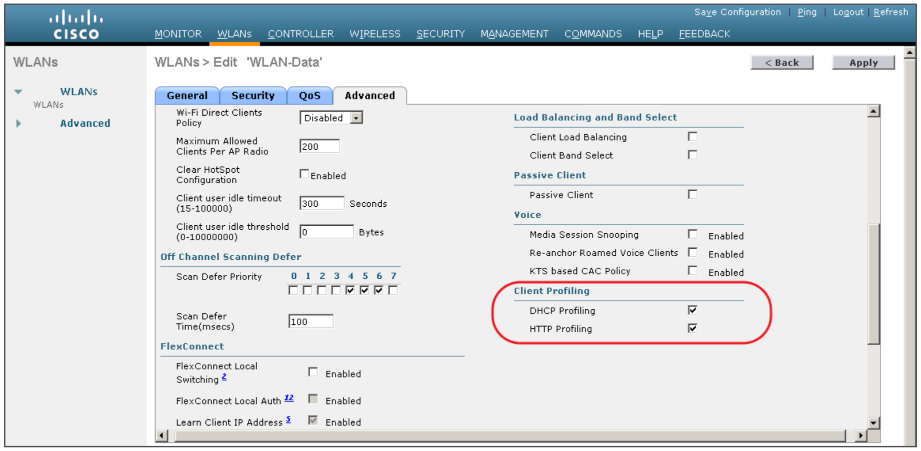
You need to enable client profiling on the WLC in order to send DHCP and HTTP information to the engine for endpoint profiling.

Step 1: On the WLC, navigate to **WLANs**, and then select the WLAN ID for the SSIDs you wish to monitor.

Step 2: On the Advanced tab, in the Client Profiling section, select **DHCP Profiling**.

Step 3: When the message appears about enabling DHCP Reqd and disabling Local Auth, click **OK**.

Step 4: In the Client Profiling section, select **HTTP Profiling,** and then click **Apply**.



WLANs > Edit 'WLAN-Data'

Wi-Fi Direct Clients Policy: Disabled
Maximum Allowed Clients Per AP Radio: 200
Clear HotSpot Configuration: □ Enabled
Client user idle timeout (15-100000): 300 Seconds
Client user idle threshold (0-10000000): 0 Bytes

Off Channel Scanning Defer
Scan Defer Priority: 0 □ 1 □ 2 □ 3 □ 4 ☑ 5 ☑ 6 ☑ 7 □
Scan Defer Time(msecs): 100

FlexConnect
FlexConnect Local Switching [2]: □ Enabled
FlexConnect Local Auth [12]: □ Enabled
Learn Client IP Address [5]: ☑ Enabled

Load Balancing and Band Select
Client Load Balancing □
Client Band Select □

Passive Client
Passive Client □

Voice
Media Session Snooping □ Enabled
Re-anchor Roamed Voice Clients □ Enabled
KTS based CAC Policy □ Enabled

Client Profiling
DHCP Profiling ☑
HTTP Profiling ☑

Step 5: When a message appears saying that the WLANs need to be disabled, click **OK**.

The network infrastructure is now enabled for monitoring the network to determine what types of devices are connecting. Additionally, authentication using Cisco ISE is enabled for the wireless network. This is a good place in the deployment to test the deployment and monitor network access. Some organizations may not need to implement the next phase and choose to stop here.

Process

Deploying Digital Certificates

1. Install certificate authority
2. Install trusted root certificate for domain
3. Install trusted root on AD server
4. Request a certificate for ISE from the CA
5. Download CA root certificate
6. Issue certificate for Cisco ISE
7. Install trusted root certificate in Cisco ISE
8. Install local certificate in Cisco ISE
9. Delete old certificate and request

In the next phase of deployment, you configure the infrastructure to support the use of digital certificates for user and machine authentication. Using digital certificates when deploying 802.1X is a Cisco best practice. In this example deployment, you will be deploying digital certificates to Microsoft Windows XP and Windows 7 endpoints as well as to Apple Mac OS X devices. The certificate authority (CA) you will be using is the one built into Windows Server 2008 Enterprise, and you will install it as a standalone server.

Procedure 1 Install certificate authority

There are six different role services that can be installed when configuring the certificate authority. For this deployment, you will install all of them.

Step 1: Install an enterprise root certificate authority on a Windows 2008 R2 Enterprise server.

Reader Tip

For more information about installing a certificate authority, see the Microsoft Windows Server 2008 Active Directory Certificate Services Step-by-Step Guide:

http://technet.microsoft.com/en-us/library/cc772393%28WS.10%29.aspx

Procedure 2 Install trusted root certificate for domain

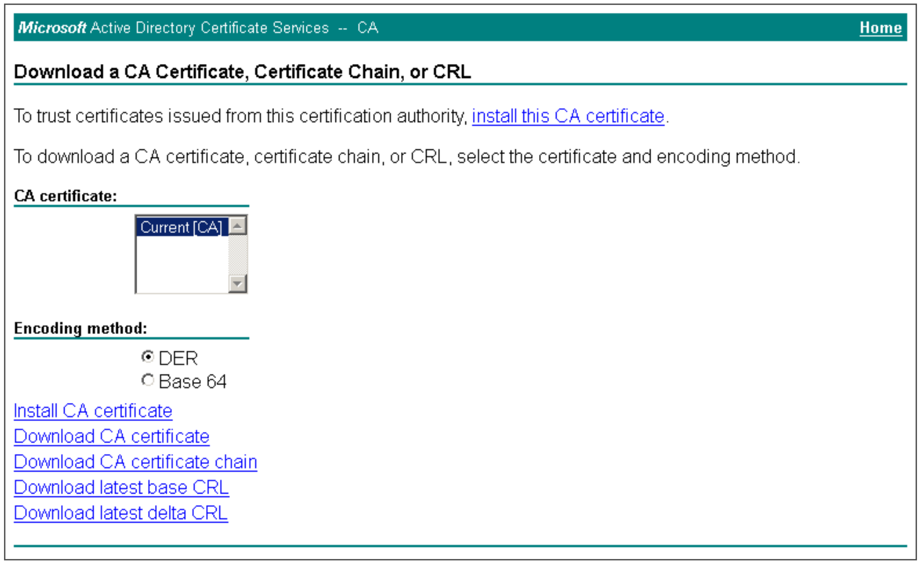
Install a trusted root certificate on the AD controller in order to distribute it to the clients so that certificates from the CA server will be trusted.

Step 1: On the console of the AD controller, launch a web browser, and then connect to the certificate authority at the following:
https://ca.cisco.local/certsrv

Step 2: Click **Download a CA certificate, certificate chain, or CRL**.

Step 3: Make sure the current certificate is selected and the **DER** encoding method is selected.

Step 4: Click **Download CA Certificate,** and then save the certificate file on the AD controller.



Microsoft Active Directory Certificate Services -- CA

Download a CA Certificate, Certificate Chain, or CRL

To trust certificates issued from this certification authority, install this CA certificate.

To download a CA certificate, certificate chain, or CRL, select the certificate and encoding method.

CA certificate:

Current [CA]

Encoding method:

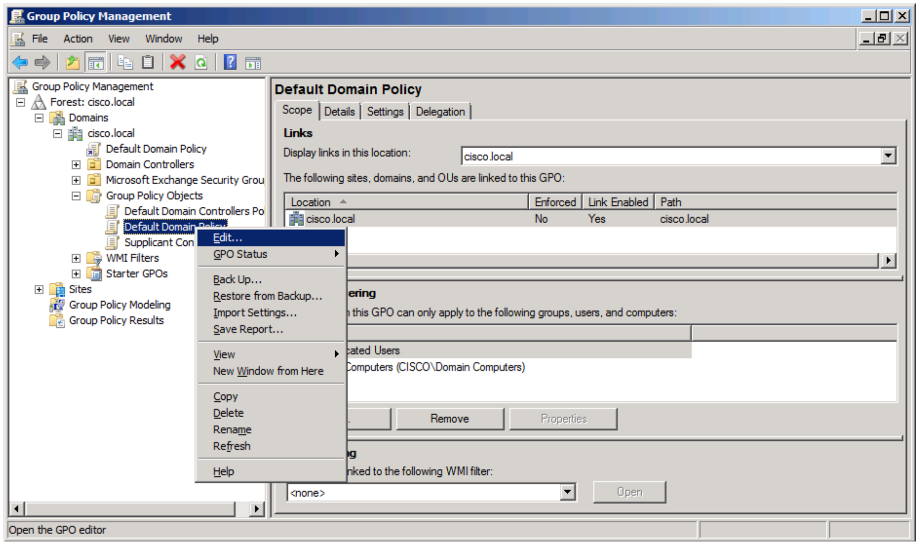
● DER
○ Base 64

Install CA certificate
Download CA certificate
Download CA certificate chain
Download latest base CRL
Download latest delta CRL

Step 5: On the AD console, navigate to **Start > Administrative Tools > Group Policy Management**.

Step 6: Expand **Forest > Domains >** [local domain] **> Group Policy Objects**.

Step 7: Right-click **Default Domain Policy,** and then choose **Edit**.



Group Policy Management

Default Domain Policy

Links

Display links in this location: cisco.local

The following sites, domains, and OUs are linked to this GPO:

Location	Enforced	Link Enabled	Path
cisco.local	No	Yes	cisco.local

ering

this GPO can only apply to the following groups, users, and computers:

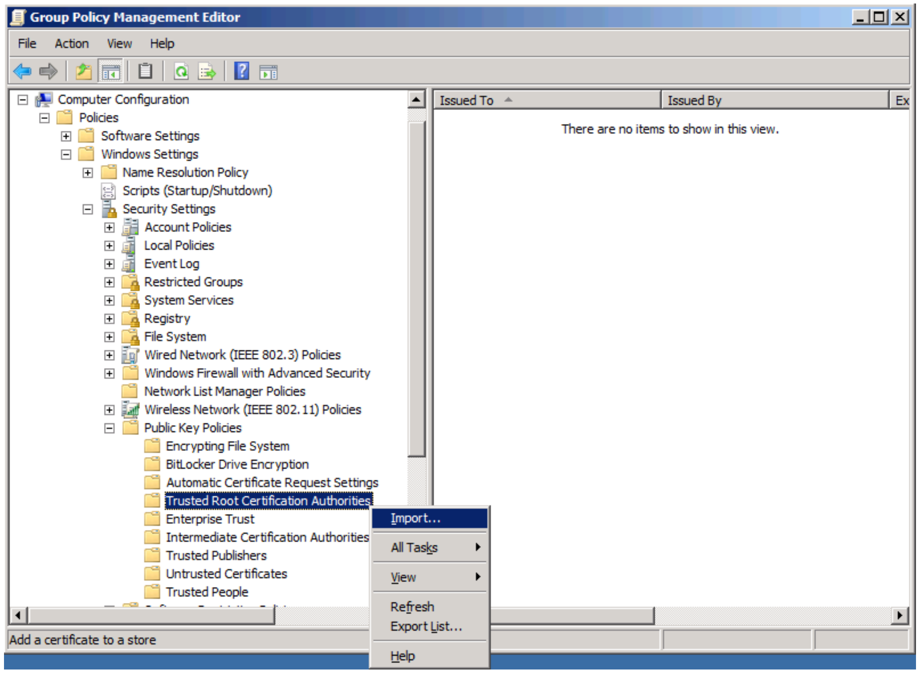
cated Users
Computers (CISCO\Domain Computers)

nked to the following WMI filter:

<none>

Open the GPO editor

Step 8: Navigate to **Computer Configuration > Policies > Windows Settings > Security Settings > Public Key Policies,** right-click **Trusted Root Certification Authorities,** and then choose **Import**. The Certificate Import Wizard launches.

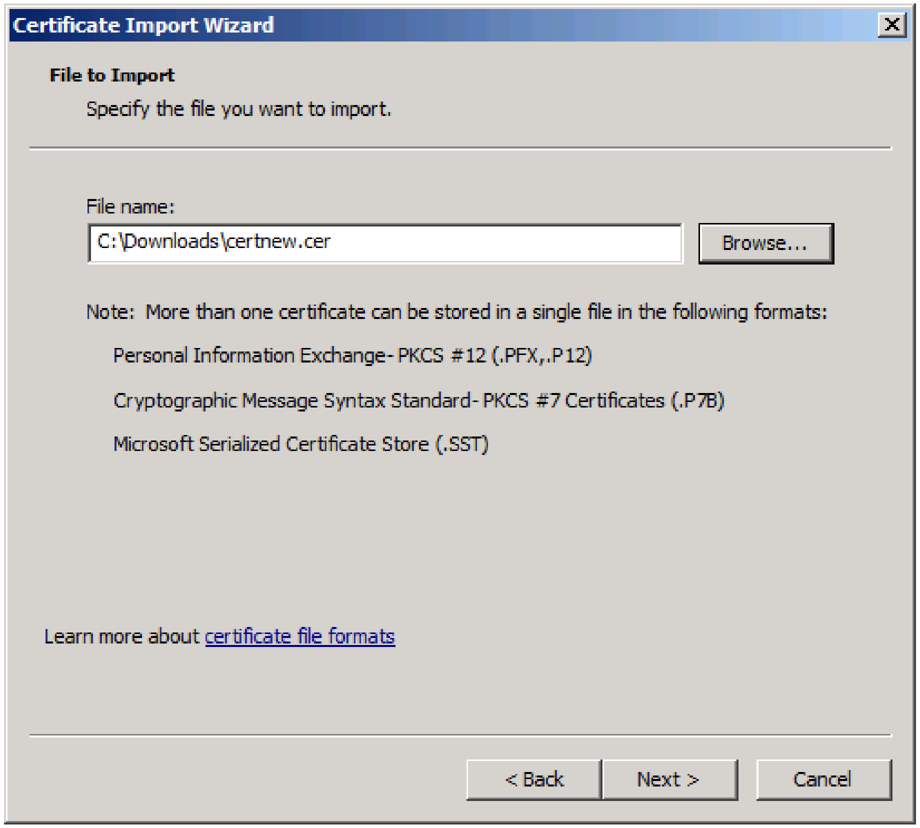


There are no items to show in this view.

Add a certificate to a store

Step 9: Click **Next**.

Step 10: Click **Browse**, locate the trusted root certificate saved in Step 2, and then click **Next**.



File to Import

Specify the file you want to import.

File name: C:\Downloads\certnew.cer

Note: More than one certificate can be stored in a single file in the following formats:

Personal Information Exchange- PKCS #12 (.PFX,.P12)

Cryptographic Message Syntax Standard- PKCS #7 Certificates (.P7B)

Microsoft Serialized Certificate Store (.SST)

Learn more about certificate file formats

Step 11: Place the certificate in the Trusted Root Certification Authorities certificate store, and then click **Next**.

Step 12: Click **Finish.** The certificate imports.

Step 13: Click **OK** to close the wizard.

Procedure 3 Install trusted root on AD server

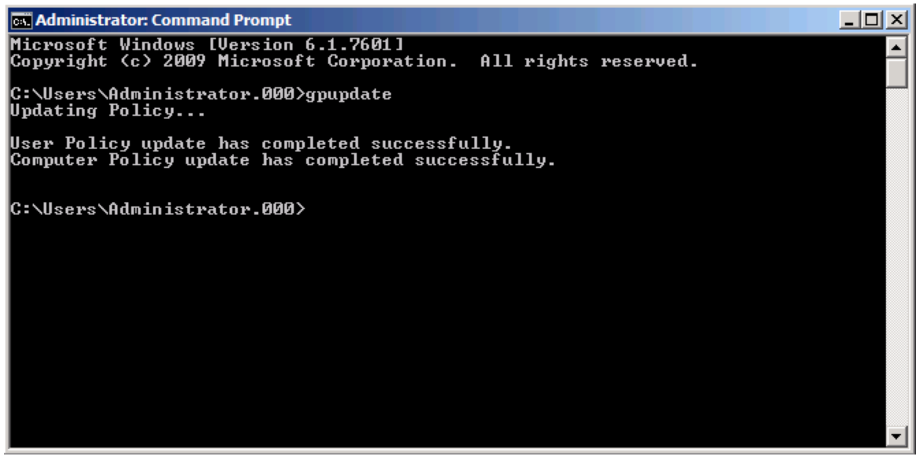
In addition to configuring AD server to distribute the trusted root certificate to workstations, you need to install the certificate directly on the AD server. A group policy object (GPO) update takes care of this automatically. In this procedure, you will force the update to run immediately.

Step 1: On the AD console, navigate to **Start > Run**.

Step 2: Type **cmd**, and then press **Enter**. A command window opens.

Step 3: Update the group policy.

```
C:\> gpupdate
```



```
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation.  All rights reserved.

C:\Users\Administrator.000>gpupdate
Updating Policy...

User Policy update has completed successfully.
Computer Policy update has completed successfully.


C:\Users\Administrator.000>
```

Procedure 4 Request a certificate for ISE from the CA

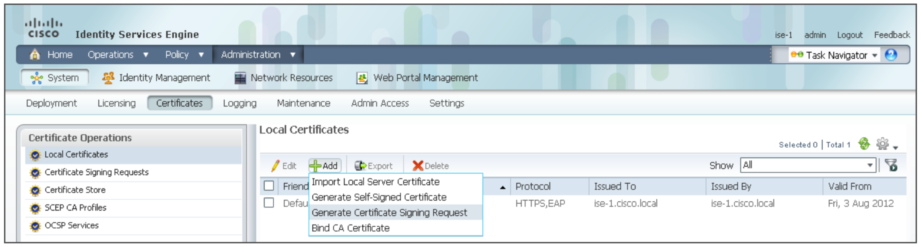
In order to obtain a certificate from the CA, Cisco ISE needs to generate a signing request that will be used by the CA to generate a certificate.

Step 1: Connect to https://ise-1.cisco.local.

Step 2: Mouse over **Administration**, and then, from the System section of the menu, choose **Certificates**.

Step 3: Under **Certificate Operations**, select **Local Certificates**.

Step 4: Click **Add,** and then choose **Generate Certificate Signing Request**.



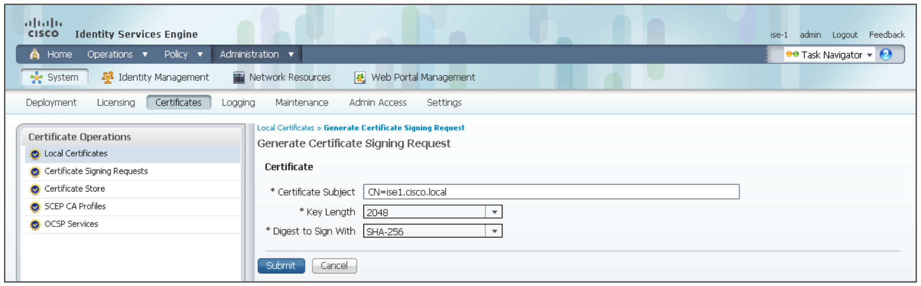
Local Certificates

Selected 0 | Total 1

Show All

□	Friend	Protocol	Issued To	Issued By	Valid From
□	Defau	HTTPS,EAP	ise-1.cisco.local	ise-1.cisco.local	Fri, 3 Aug 2012

Step 5: In the **Certificate Subject** box, after the "CN=", enter the fully qualified domain name (FQDN) of the Cisco ISE server, and then click **Submit**.



Generate Certificate Signing Request

Certificate

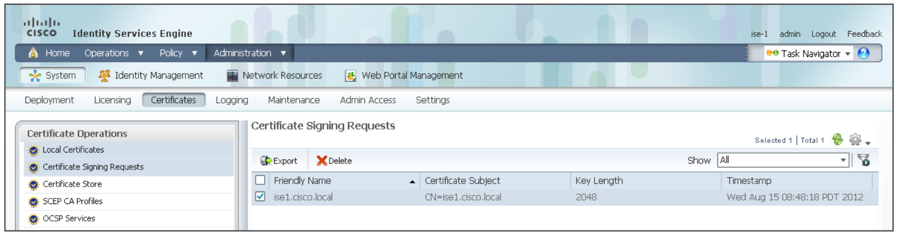
* Certificate Subject: CN=ise1.cisco.local

* Key Length: 2048

* Digest to Sign With: SHA-256

Step 6: On the message acknowledging that the certificate was successfully generated, click **OK.**

Step 7: Click **Certificate Signing Requests**, select the check box next to the new request, and then click **Export**.



Certificate Signing Requests

Selected 1 | Total 1

Show All

□	Friendly Name	Certificate Subject	Key Length	Timestamp
☑	ise1.cisco.local	CN=ise1.cisco.local	2048	Wed Aug 15 08:48:18 PDT 2012

Step 8: Save the file to your local machine. You will use this file to generate a certificate on the CA for Cisco ISE.

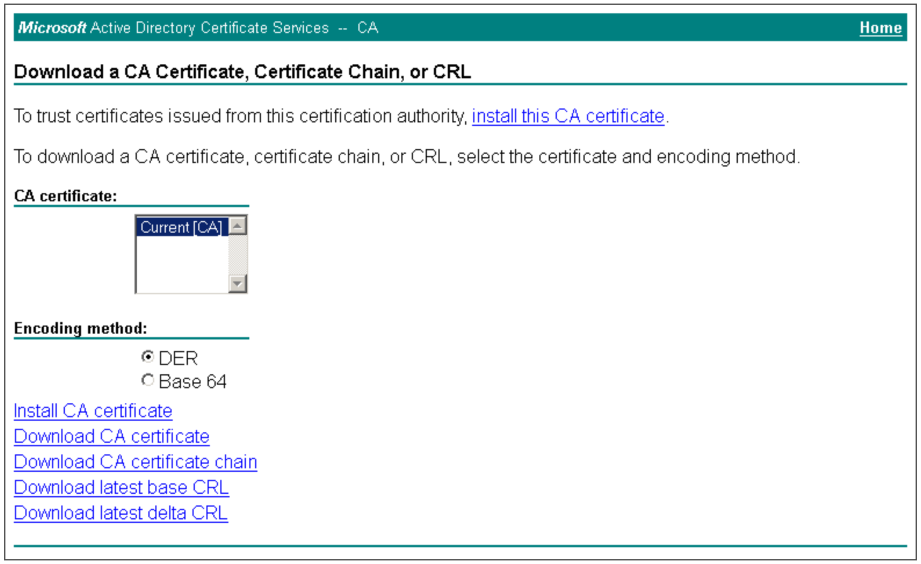
Procedure 5 Download CA root certificate

Step 1: Browse to https://ca.cisco.local/certsrv.

Step 2: Click **Download a CA certificate, certificate chain, or CRL**.

Step 3: Make sure the current certificate is selected and the **DER** encoding method is selected.

Step 4: Click **Download CA Certificate,** and then save the certificate file on the local machine.



Microsoft Active Directory Certificate Services -- CA **Home**

Download a CA Certificate, Certificate Chain, or CRL

To trust certificates issued from this certification authority, install this CA certificate.

To download a CA certificate, certificate chain, or CRL, select the certificate and encoding method.

CA certificate:

Current [CA]

Encoding method:

● DER
○ Base 64

Install CA certificate
Download CA certificate
Download CA certificate chain
Download latest base CRL
Download latest delta CRL

Procedure 6 Issue certificate for Cisco ISE

Step 1: Click **Home.** The CA's home screen displays.

Step 2: Click **Request a certificate**.

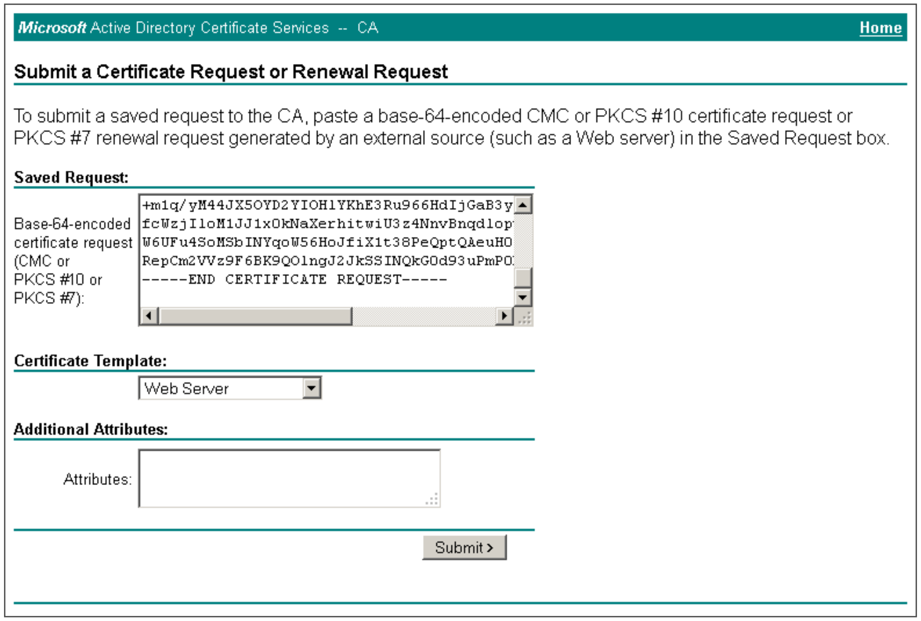
Step 3: Click **advanced certificate request**.

Step 4: In a text editor, such as Notepad, open the certificate file saved in Procedure 4, "Request a certificate for ISE from the CA."

Step 5: Select all the text, and then copy it to the clipboard.

Step 6: In the browser, on the Submit a Certificate Request or Renewal Request page, in the **Saved Request** box, paste the certificate contents.

Step 7: In the **Certificate Template** list, choose **Web Server**, and then click **Submit**.



Microsoft Active Directory Certificate Services -- CA **Home**

Submit a Certificate Request or Renewal Request

To submit a saved request to the CA, paste a base-64-encoded CMC or PKCS #10 certificate request or PKCS #7 renewal request generated by an external source (such as a Web server) in the Saved Request box.

Saved Request:

Base-64-encoded certificate request (CMC or PKCS #10 or PKCS #7):

```
+m1q/yM44JX5OYD2YIOHlYKhE3Ru966HdIjGaB3y
fcWzjIloM1JJ1xOkNaXerhitwiU3z4NnvBnqdlop
W6UFu4SoMSbINYqoW56HoJfiX1t38PeQptQAeuHO
RepCm2VVz9F6BK9QOlngJ2JkSSINQkGOd93uPmPO
-----END CERTIFICATE REQUEST-----
```

Certificate Template:

Web Server

Additional Attributes:

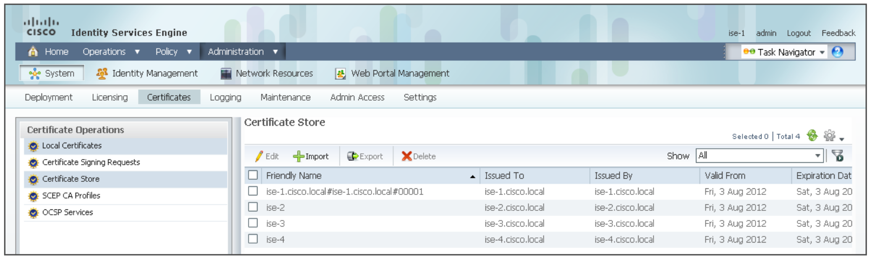
Attributes:

Step 8: Select **DER encoded**, and then click **Download certificate.** The certificate saves to your local machine.

Procedure 7 Install trusted root certificate in Cisco ISE

Step 1: In the Cisco ISE interface, mouse over **Administration**, and then, from the System section of the menu, choose **Certificates**.

Step 2: Click **Certificate Store,** and then click **Import**.


Identity Services Engine
ise-1 admin Logout Feedback
Home Operations Policy Administration
Task Navigator
System Identity Management Network Resources Web Portal Management
Deployment Licensing Certificates Logging Maintenance Admin Access Settings
Certificate Operations
Local Certificates
Certificate Signing Requests
Certificate Store
SCEP CA Profiles
OCSP Services
Edit Import Export Delete
Show All

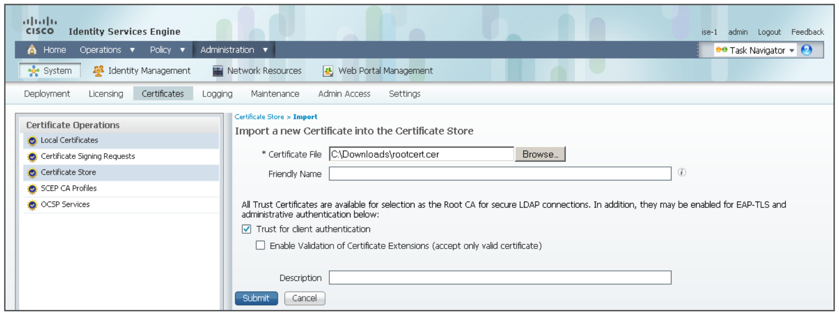
Certificate Store

Selected 0 | Total 4

□	Friendly Name	Issued To	Issued By	Valid From	Expiration Dat
□	ise-1.cisco.local#ise-1.cisco.local#00001	ise-1.cisco.local	ise-1.cisco.local	Fri, 3 Aug 2012	Sat, 3 Aug 20
□	ise-2	ise-2.cisco.local	ise-2.cisco.local	Fri, 3 Aug 2012	Sat, 3 Aug 20
□	ise-3	ise-3.cisco.local	ise-3.cisco.local	Fri, 3 Aug 2012	Sat, 3 Aug 20
□	ise-4	ise-4.cisco.local	ise-4.cisco.local	Fri, 3 Aug 2012	Sat, 3 Aug 20

Step 3: Click **Browse,** and then locate the root CA certificate saved in Procedure 5, "Download CA root certificate."

Step 4: Select **Trust for client authentication**, and then click **Submit**.


Identity Services Engine
ise-1 admin Logout Feedback
Home Operations Policy Administration
Task Navigator
System Identity Management Network Resources Web Portal Management
Deployment Licensing Certificates Logging Maintenance Admin Access Settings
Certificate Operations
Local Certificates
Certificate Signing Requests
Certificate Store
SCEP CA Profiles
OCSP Services
Browse...
Submit
Cancel

Certificate Store > Import

Import a new Certificate into the Certificate Store

* Certificate File: C:\Downloads\rootcert.cer

Friendly Name:

All Trust Certificates are available for selection as the Root CA for secure LDAP connections. In addition, they may be enabled for EAP-TLS and administrative authentication below:

☑ Trust for client authentication

□ Enable Validation of Certificate Extensions (accept only valid certificate)

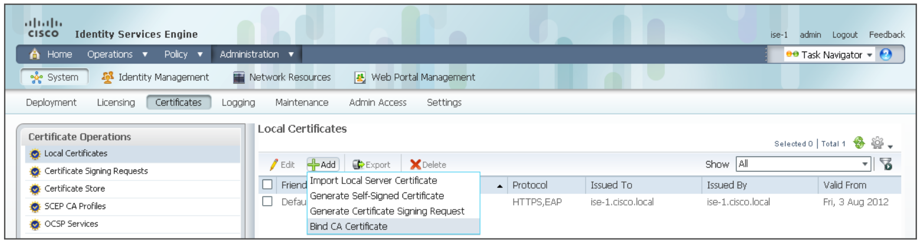
Description:

Procedure 8 Install local certificate in Cisco ISE

Step 1: In the Cisco ISE interface, mouse over **Administration**, and then, from the System section of the menu, choose **Certificates**.

Step 2: Click **Local Certificates**.

Step 3: Click **Add,** and then choose **Bind CA Certificate**.


Identity Services Engine
ise-1 admin Logout Feedback
Home Operations Policy Administration
Task Navigator
System Identity Management Network Resources Web Portal Management
Deployment Licensing Certificates Logging Maintenance Admin Access Settings
Certificate Operations
Local Certificates
Certificate Signing Requests
Certificate Store
SCEP CA Profiles
OCSP Services
Edit Add Export Delete
Import Local Server Certificate
Generate Self-Signed Certificate
Generate Certificate Signing Request
Bind CA Certificate
Show All

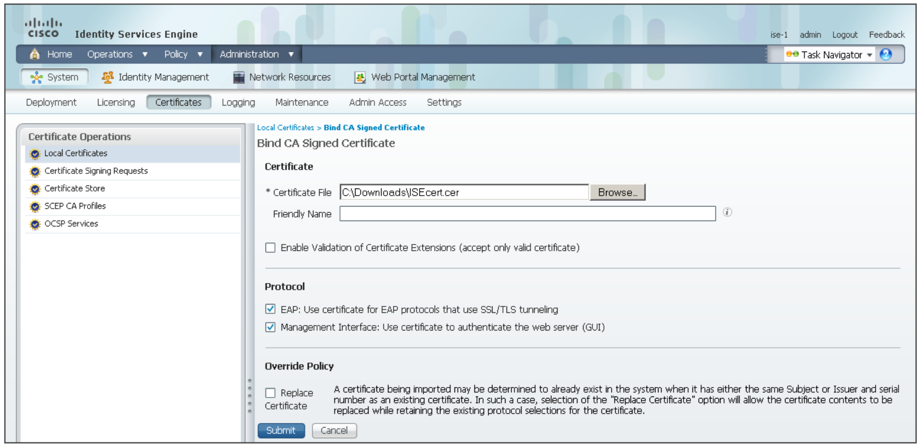
Local Certificates

Selected 0 | Total 1

□	Friend	Protocol	Issued To	Issued By	Valid From
□	Defau	HTTPS,EAP	ise-1.cisco.local	ise-1.cisco.local	Fri, 3 Aug 2012

Step 4: Click **Browse** and locate the certificate saved from Procedure 6, "Issue certificate for Cisco ISE."

Step 5: In the Protocol section, select both **EAP** and **Management Interface**. When you receive a message that selecting the Management Interface check box will require the Cisco ISE appliance to restart, click **OK**, and then click **Submit**.


Identity Services Engine
ise-1 admin Logout Feedback
Home Operations Policy Administration
Task Navigator
System Identity Management Network Resources Web Portal Management
Deployment Licensing Certificates Logging Maintenance Admin Access Settings
Certificate Operations
Local Certificates
Certificate Signing Requests
Certificate Store
SCEP CA Profiles
OCSP Services
Browse...
Submit
Cancel

Local Certificates > Bind CA Signed Certificate

Bind CA Signed Certificate

Certificate

* Certificate File: C:\Downloads\ISEcert.cer

Friendly Name:

□ Enable Validation of Certificate Extensions (accept only valid certificate)

Protocol

☑ EAP: Use certificate for EAP protocols that use SSL/TLS tunneling

☑ Management Interface: Use certificate to authenticate the web server (GUI)

Override Policy

□ Replace Certificate — A certificate being imported may be determined to already exist in the system when it has either the same Subject or Issuer and serial number as an existing certificate. In such a case, selection of the "Replace Certificate" option will allow the certificate contents to be replaced while retaining the existing protocol selections for the certificate.

Step 6: When you receive a message that the Cisco ISE appliance will restart, click **OK**.

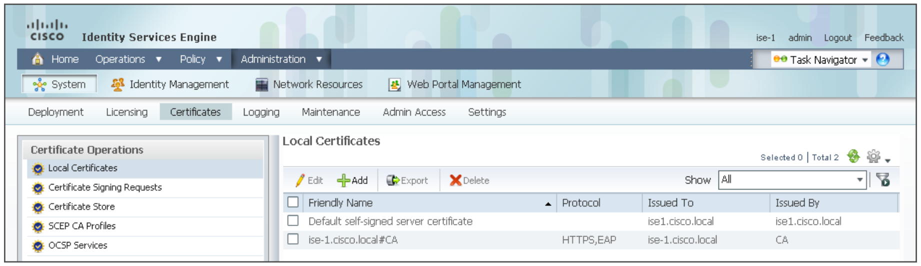
Procedure 9 Delete old certificate and request

Now that you have imported the local certificate into Cisco ISE, you need to delete the old self-signed certificate as well as the certificate signing request generated previously.

Step 1: In the Cisco ISE interface, mouse over **Administration**, and then, in the System section, choose **Certificates**.

Step 2: Click **Local Certificates**.

Step 3: Select the box next to the self-signed certificate. This is the certificate issued by the Cisco ISE appliance and not the certificate issued by the CA that was just imported.



Local Certificates

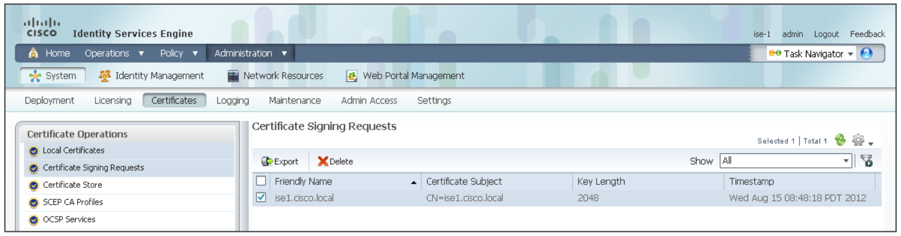
Selected 0 | Total 2

□	Friendly Name	Protocol	Issued To	Issued By
□	Default self-signed server certificate		ise1.cisco.local	ise1.cisco.local
□	ise-1.cisco.local#CA	HTTPS,EAP	ise-1.cisco.local	CA

Step 4: Click **Delete,** and then click **OK**.

Step 5: Click **Certificate Signing Requests**.

Step 6: Select the box next to the certificate signing request that was created in Procedure 4, "Request a certificate for ISE from the CA."



Certificate Signing Requests

Selected 1 | Total 1

□	Friendly Name	Certificate Subject	Key Length	Timestamp
☑	ise1.cisco.local	CN=ise1.cisco.local	2048	Wed Aug 15 08:48:18 PDT 2012

Step 7: Click **Delete,** and then click **OK**.

Process

Enabling 802.1X Authentication

1. Create user authentication policies
2. Create machine authentication policies
3. Enable certificates
4. Enable EAP-TLS

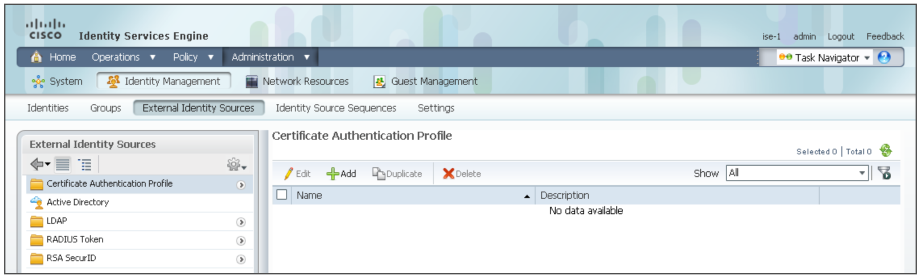
You will configure Cisco ISE policies to support 802.1X authentication using digital certificates for both wired and wireless users.

Procedure 1 Create user authentication policies

An authentication profile is used to determine how a certificate will be used for authentication. You will create an authentication profile for user authentication using certificates.

Step 1: In Cisco ISE, mouse over **Administration**, and then, in the Identity Management section, choose **External Identity Sources**.

Step 2: In the left pane, click **Certificate Authentication Profile,** and then click **Add**.



Certificate Authentication Profile

Selected 0 | Total 0

□	Name	Description
		No data available

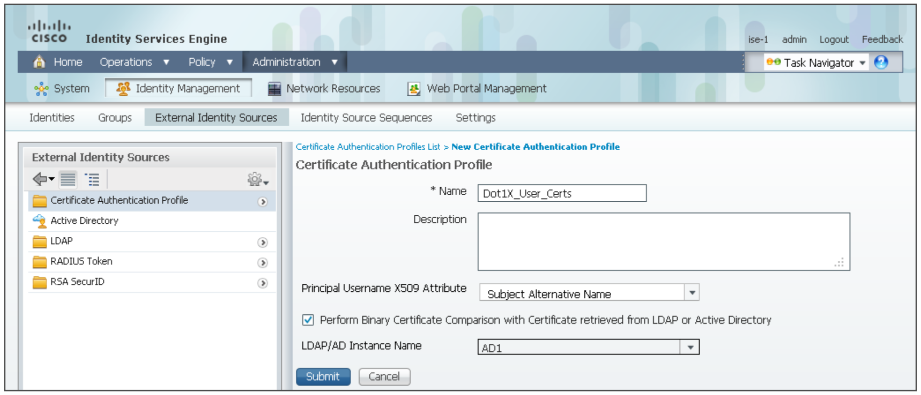
Step 3: Give the profile a meaningful name, and in the **Principal Username X509 Attribute** list, choose **Subject Alternative Name**.

Step 4: Select **Perform Binary Certificate Comparison with Certificate retrieved from LDAP or Active Directory**, and then, in the **LDAP/AD Instance Name** list, choose previously defined AD server **AD1**.

Tech Tip

When using certificates for authentication, Cisco ISE does not need to proxy the authentication request to Active Directory. However, without contacting Active Directory, you won't get additional information about the user, such as group membership. By performing the certificate comparison with Active Directory, you can get that information and be able to use it for policy decisions.

Step 5: Click **Submit**.


Identity Services Engine
ise-1 admin Logout Feedback
Home Operations Policy Administration
Task Navigator
System Identity Management Network Resources Web Portal Management
Identities Groups External Identity Sources Identity Source Sequences Settings
External Identity Sources
Certificate Authentication Profile
Active Directory
LDAP
RADIUS Token
RSA SecurID

Certificate Authentication Profiles List > **New Certificate Authentication Profile**

Certificate Authentication Profile

* Name: Dot1X_User_Certs

Description:

Principal Username X509 Attribute: Subject Alternative Name

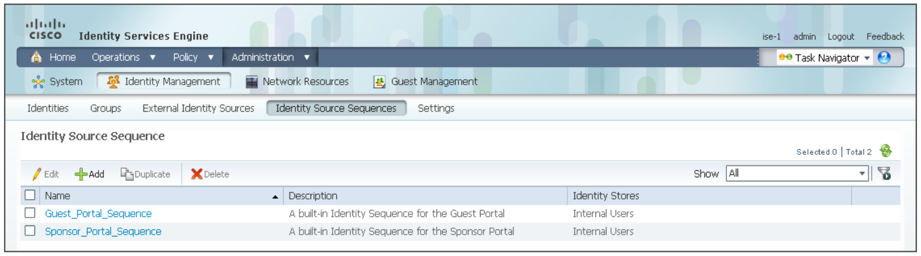
☑ Perform Binary Certificate Comparison with Certificate retrieved from LDAP or Active Directory

LDAP/AD Instance Name: AD1

Submit Cancel

An identity source sequence allows certificates to be used as an identity store and also allows for a backup identity store if a primary identity store is unavailable.

Step 6: Click **Identity Source Sequences**, and then click **Add**.


Identity Services Engine
ise-1 admin Logout Feedback
Home Operations Policy Administration
Task Navigator
System Identity Management Network Resources Guest Management
Identities Groups External Identity Sources Identity Source Sequences Settings
Selected 0 | Total 2
Edit Add Duplicate Delete
Show All

Identity Source Sequence

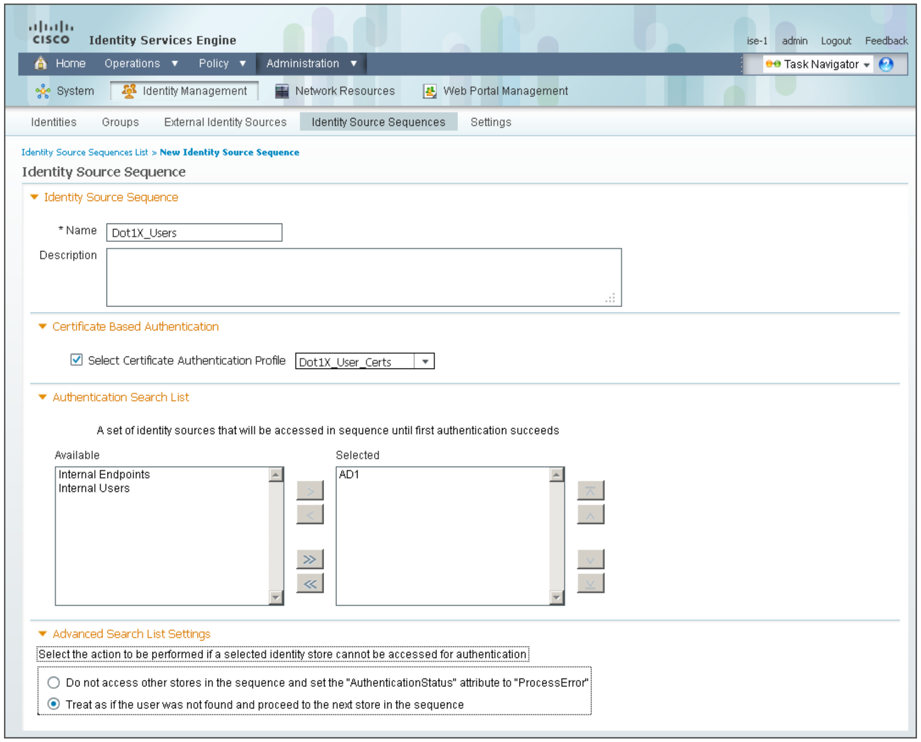
Name	Description	Identity Stores
Guest_Portal_Sequence	A built-in Identity Sequence for the Guest Portal	Internal Users
Sponsor_Portal_Sequence	A built-in Identity Sequence for the Sponsor Portal	Internal Users

Step 7: Give the sequence a meaningful name.

Step 8: In the Certificate Based Authentication section, select **Select Certificate Authentication Profile**, and then choose the profile created in Step 2 through Step 5.

Step 9: In the Authentication Search List section, in the **Available** list, double-click the AD server. It moves into the **Selected** list.

Step 10: In the Advanced Search List Settings section, select **Treat as if the user was not found and proceed to the next store in the sequence**, and then click **Submit**.


cisco Identity Services Engine
ise-1 admin Logout Feedback
Home Operations ▾ Policy ▾ Administration ▾
Task Navigator ▾
System Identity Management Network Resources Web Portal Management
Identities Groups External Identity Sources Identity Source Sequences Settings

Identity Source Sequences List > New Identity Source Sequence

Identity Source Sequence

Identity Source Sequence

* Name Dot1X_Users

Description

Certificate Based Authentication

☑ Select Certificate Authentication Profile Dot1X_User_Certs

Authentication Search List

A set of identity sources that will be accessed in sequence until first authentication succeeds

Available	Selected
Internal Endpoints Internal Users	AD1

Advanced Search List Settings

Select the action to be performed if a selected identity store cannot be accessed for authentication

○ Do not access other stores in the sequence and set the "AuthenticationStatus" attribute to "ProcessError"

● Treat as if the user was not found and proceed to the next store in the sequence

Procedure 2 Create machine authentication policies

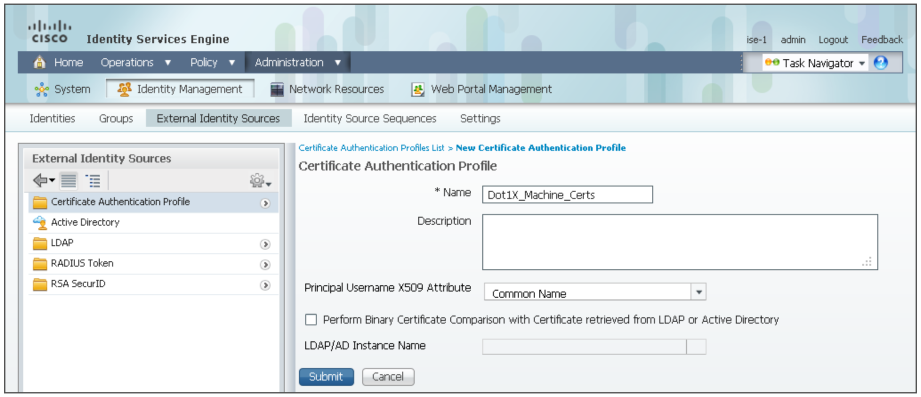
You will create an authentication profile for machine authentication using certificates.

Step 1: In Cisco ISE, mouse over **Administration**, and then, in the Identity Management section, choose **External Identity Sources**.

Step 2: In the left pane, click **Certificate Authentication Profile,** and then click **Add**.

Step 3: Give the profile a meaningful name, and in the **Principal Username X509 Attribute** list, choose **Common Name**.

Step 4: Click **Submit**.


cisco Identity Services Engine
ise-1 admin Logout Feedback
Home Operations ▾ Policy ▾ Administration ▾
Task Navigator ▾
System Identity Management Network Resources Web Portal Management
Identities Groups External Identity Sources Identity Source Sequences Settings
External Identity Sources
Certificate Authentication Profile
Active Directory
LDAP
RADIUS Token
RSA SecurID

Certificate Authentication Profiles List > New Certificate Authentication Profile

Certificate Authentication Profile

* Name Dot1X_Machine_Certs

Description

Principal Username X509 Attribute Common Name

□ Perform Binary Certificate Comparison with Certificate retrieved from LDAP or Active Directory

LDAP/AD Instance Name

Submit Cancel

An identity source sequence allows certificates to be used as an identity store and also allows for a backup identity store if a primary identity store is unavailable.

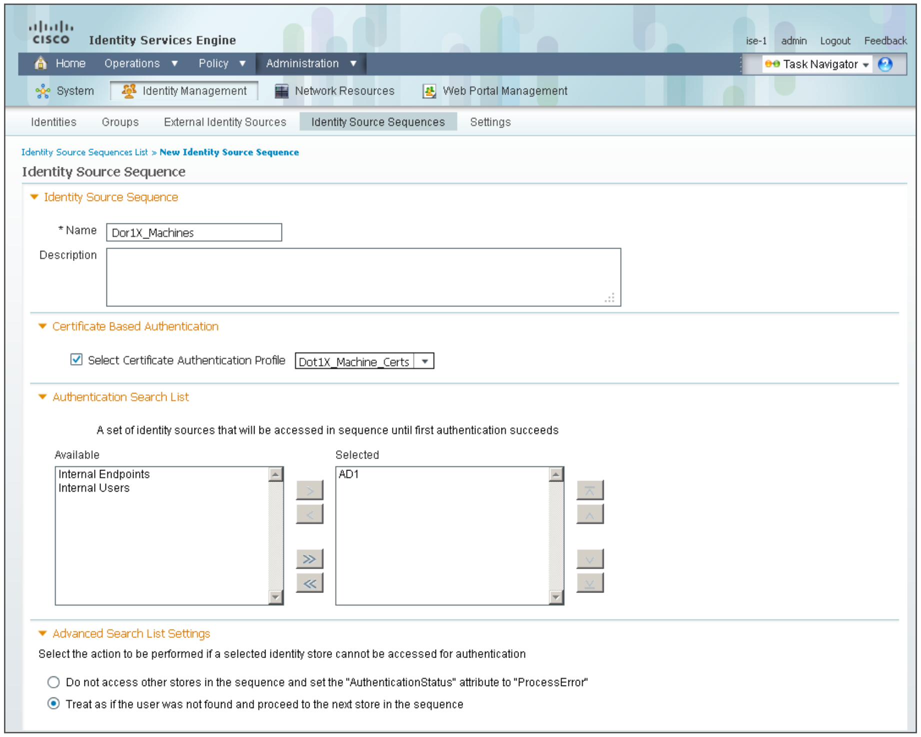
Step 5: Click **Identity Source Sequences**, and then click **Add**.

Step 6: Give the sequence a meaningful name.

Step 7: In the Certificate Based Authentication section, select **Select Certificate Authentication Profile**, and then choose the profile created in Step 2 through Step 4.

Step 8: In the Authentication Search List section, in the **Available** list, double-click the AD server. It moves into the **Selected** list.

Step 9: In the Advanced Search List Settings section, select **Treat as if the user was not found and proceed to the next store in the sequence**, and then click **Submit**.



Identity Source Sequences List > **New Identity Source Sequence**

Identity Source Sequence

▾ Identity Source Sequence

* Name Dor1X_Machines

Description

▾ Certificate Based Authentication

☑ Select Certificate Authentication Profile Dot1X_Machine_Certs ▾

▾ Authentication Search List

A set of identity sources that will be accessed in sequence until first authentication succeeds

Available	Selected
Internal Endpoints Internal Users	AD1

▾ Advanced Search List Settings

Select the action to be performed if a selected identity store cannot be accessed for authentication

○ Do not access other stores in the sequence and set the "AuthenticationStatus" attribute to "ProcessError"

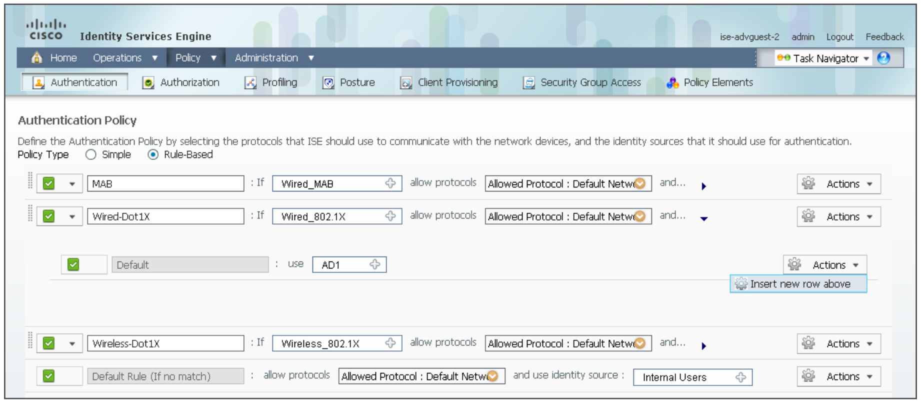
● Treat as if the user was not found and proceed to the next store in the sequence

Procedure 3 Enable certificates

Now that you have created certificate authentication profiles and identity source sequences for digital certificates, you need to enable the 802.1X authentication policies for machine authentication and user authentication for both wired and wireless users.

Step 1: Mouse over **Policy**, and then choose **Authentication**.

Step 2: For the **Wired-Dot1X** rule, to the right of and..., click the black triangle. This brings up the identity store used for this rule. Next to the Default rule, in the **Actions** list, choose **Insert new rule above**.



Authentication Policy

Define the Authentication Policy by selecting the protocols that ISE should use to communicate with the network devices, and the identity sources that it should use for authentication.

Policy Type ○ Simple ● Rule-Based

☑ MAB : If Wired_MAB allow protocols Allowed Protocol : Default Netw and...

☑ Wired-Dot1X : If Wired_802.1X allow protocols Allowed Protocol : Default Netw and...

☑ Default : use AD1

☑ Wireless-Dot1X : If Wireless_802.1X allow protocols Allowed Protocol : Default Netw and...

☑ Default Rule (If no match) : allow protocols Allowed Protocol : Default Netw and use identity source : Internal Users

Step 3: Give the rule a name, and then next to the Enter Condition box, click the box symbol. The Expression Builder opens.

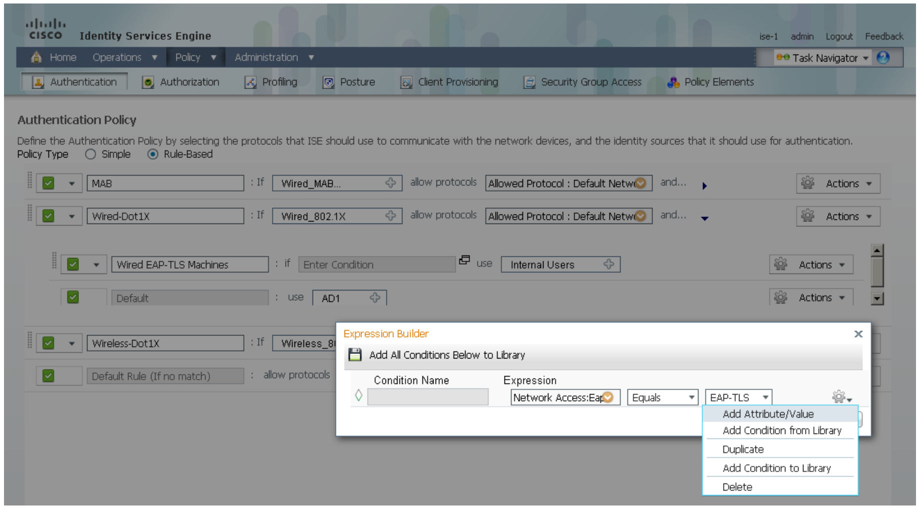
Step 4: Click **Create New Condition (Advance Option)**.

Step 5: In the **Expression** list, next to **Select Attribute**, click the arrow**.**

Step 6: Next to Network Access, click the arrow, and then choose **EapAuthentication**.

Step 7: In the second list, choose **Equals,** and in the last list, choose **EAP-TLS**.

Step 8: Click the gear icon at the end of the condition, and then choose **Add Attribute/Value**.


Identity Services Engine
ise-1 admin Logout Feedback
Home Operations Policy Administration
Task Navigator
Authentication Authorization Profiling Posture Client Provisioning Security Group Access Policy Elements
Actions
Add Attribute/Value
Add Condition from Library
Duplicate
Add Condition to Library
Delete

Authentication Policy

Define the Authentication Policy by selecting the protocols that ISE should use to communicate with the network devices, and the identity sources that it should use for authentication.

Policy Type ○ Simple ● Rule-Based

MAB : If Wired_MAB... allow protocols Allowed Protocol : Default Netw and...

Wired-Dot1X : If Wired_802.1X allow protocols Allowed Protocol : Default Netw and...

Wired EAP-TLS Machines : if Enter Condition use Internal Users

Default : use AD1

Wireless-Dot1X : If Wireless_8

Default Rule (If no match) : allow protocols

Expression Builder

Add All Conditions Below to Library

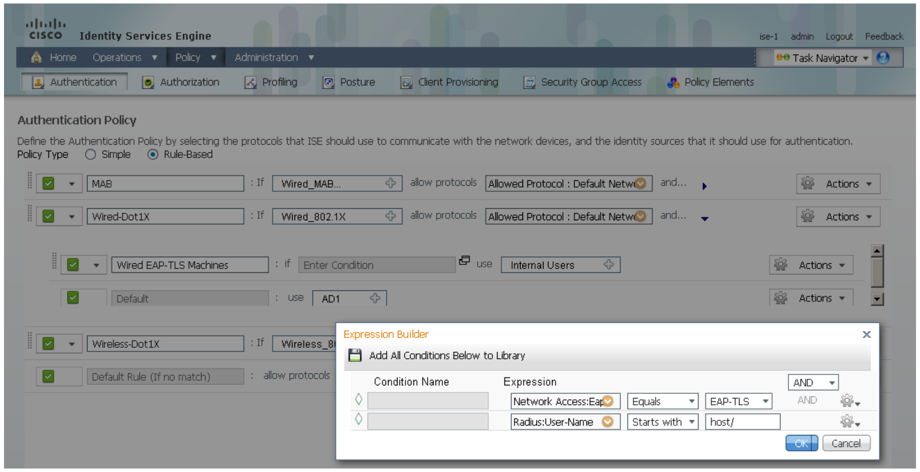
Condition Name | Expression

Network Access:Eap | Equals | EAP-TLS

Step 9: In the **Expression** list, next to Select Attribute, click the arrow**.**

Step 10: Next to Radius, click the arrow, and then select **User-name**.

Step 11: In the second list, choose **Starts with,** and in the last box, type **host/** and then click **OK**.


Identity Services Engine
ise-1 admin Logout Feedback
Home Operations Policy Administration
Task Navigator
Authentication Authorization Profiling Posture Client Provisioning Security Group Access Policy Elements
Actions
OK
Cancel

Authentication Policy

Define the Authentication Policy by selecting the protocols that ISE should use to communicate with the network devices, and the identity sources that it should use for authentication.

Policy Type ○ Simple ● Rule-Based

MAB : If Wired_MAB... allow protocols Allowed Protocol : Default Netw and...

Wired-Dot1X : If Wired_802.1X allow protocols Allowed Protocol : Default Netw and...

Wired EAP-TLS Machines : if Enter Condition use Internal Users

Default : use AD1

Wireless-Dot1X : If Wireless_8

Default Rule (If no match) : allow protocols

Expression Builder

Add All Conditions Below to Library

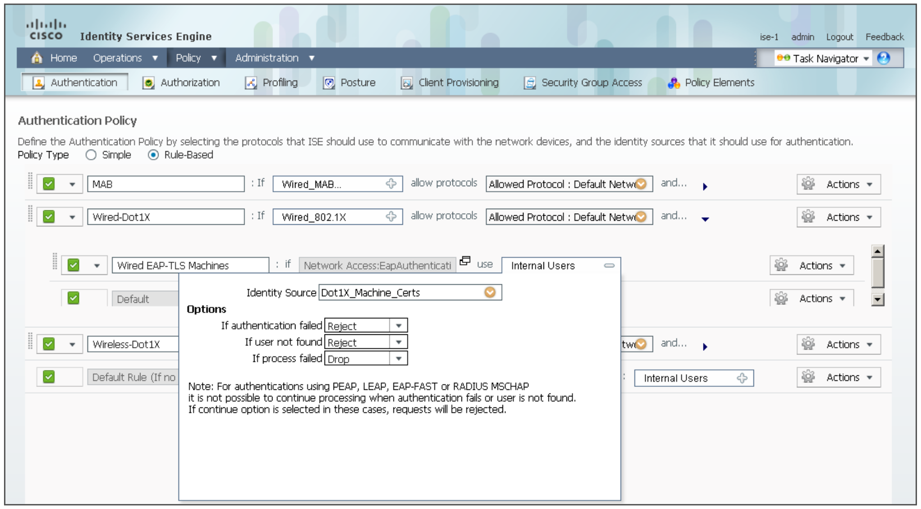
Condition Name | Expression | AND

Network Access:Eap | Equals | EAP-TLS | AND

Radius:User-Name | Starts with | host/

Step 12: Next to Internal Users, click the + symbol.

Step 13: In the **Identity Source** list, choose the identity source sequence for machine authentication that you created in Procedure 2, “Create machine authentication policies,” use the default options for this identity source, and then click anywhere in the window to continue.


Identity Services Engine
ise-1 admin Logout Feedback
Home Operations Policy Administration
Task Navigator
Authentication Authorization Profiling Posture Client Provisioning Security Group Access Policy Elements
Actions

Authentication Policy

Define the Authentication Policy by selecting the protocols that ISE should use to communicate with the network devices, and the identity sources that it should use for authentication.

Policy Type ○ Simple ● Rule-Based

MAB : If Wired_MAB... allow protocols Allowed Protocol : Default Netw and...

Wired-Dot1X : If Wired_802.1X allow protocols Allowed Protocol : Default Netw and...

Wired EAP-TLS Machines : if Network Access:EapAuthenticati use Internal Users

Default

Wireless-Dot1X ... and...

Default Rule (If no ... Internal Users

Identity Source Dot1X_Machine_Certs

Options

If authentication failed Reject

If user not found Reject

If process failed Drop

Note: For authentications using PEAP, LEAP, EAP-FAST or RADIUS MSCHAP it is not possible to continue processing when authentication fails or user is not found. If continue option is selected in these cases, requests will be rejected.

Step 14: You now create a rule for wired user authentication.

Step 15: Next to the Default rule, in the **Actions** list, choose **Insert new rule above**.

Step 16: Give the rule a name, and then next to the Enter Condition box, click the box symbol. The Expression Builder opens.

Step 17: Click **Create New Condition (Advance Option)**.

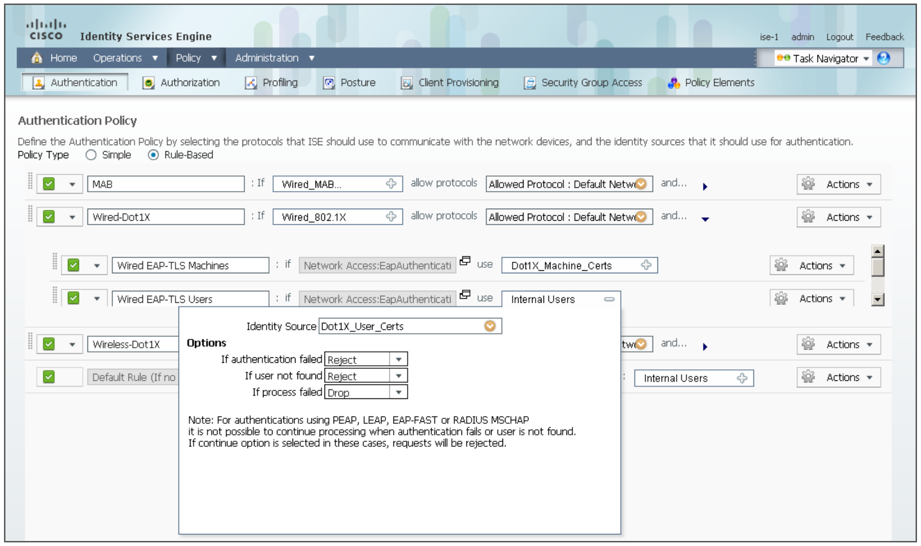
Step 18: In the **Expression** list, next to Select Attribute, click the arrow**.**

Step 19: Next to Network Access, click the arrow, and then choose **EapAuthentication**.

Step 20: In the second list, choose **Equals,** and in the last list, choose **EAP-TLS**, and then click **OK**.

Step 21: Next to Internal Users, click the **+** symbol.

Step 22: In the **Identity Source** list, choose the identity source sequence for machine authentication that you created in Procedure 1, "Create user authentication policies," use the default options for this identity source, and then click anywhere in the window to continue.


cisco Identity Services Engine
ise-1 admin Logout Feedback
Home Operations ▾ Policy ▾ Administration ▾
Task Navigator ▾
Authentication Authorization Profiling Posture Client Provisioning Security Group Access Policy Elements

Authentication Policy

Define the Authentication Policy by selecting the protocols that ISE should use to communicate with the network devices, and the identity sources that it should use for authentication.

Policy Type ○ Simple ● Rule-Based

☑ MAB : If Wired_MAB... allow protocols Allowed Protocol : Default Netw and... Actions

☑ Wired-Dot1X : If Wired_802.1X allow protocols Allowed Protocol : Default Netw and... Actions

☑ Wired EAP-TLS Machines : if Network Access:EapAuthenticati use Dot1X_Machine_Certs Actions

☑ Wired EAP-TLS Users : if Network Access:EapAuthenticati use Internal Users Actions

Identity Source Dot1X_User_Certs

Options

If authentication failed Reject

If user not found Reject

If process failed Drop

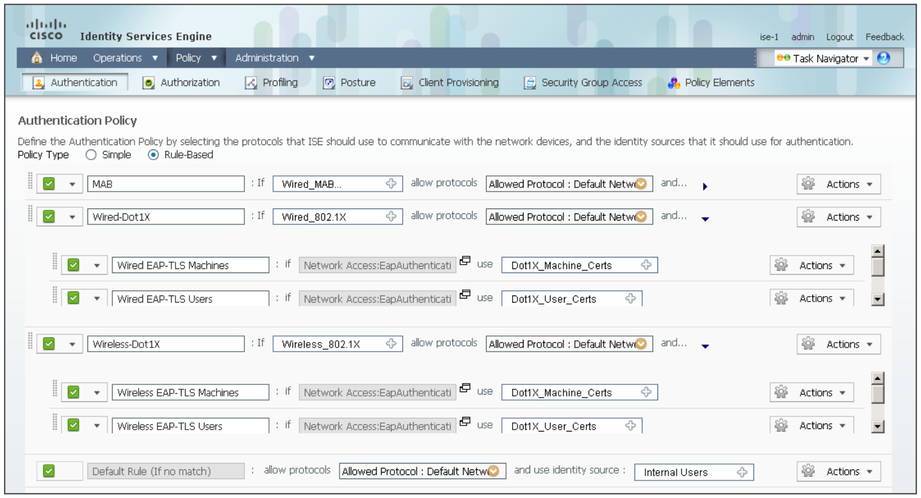
Note: For authentications using PEAP, LEAP, EAP-FAST or RADIUS MSCHAP
it is not possible to continue processing when authentication fails or user is not found.
If continue option is selected in these cases, requests will be rejected.

☑ Wireless-Dot1X and... Actions

☑ Default Rule (If no Internal Users Actions

Step 23: Click **Save.**

Step 24: Repeat Step 2 through Step 22 for the Wireless-Dot1X rule.


cisco Identity Services Engine
ise-1 admin Logout Feedback
Home Operations ▾ Policy ▾ Administration ▾
Task Navigator ▾
Authentication Authorization Profiling Posture Client Provisioning Security Group Access Policy Elements

Authentication Policy

Define the Authentication Policy by selecting the protocols that ISE should use to communicate with the network devices, and the identity sources that it should use for authentication.

Policy Type ○ Simple ● Rule-Based

☑ MAB : If Wired_MAB... allow protocols Allowed Protocol : Default Netw and... Actions

☑ Wired-Dot1X : If Wired_802.1X allow protocols Allowed Protocol : Default Netw and... Actions

☑ Wired EAP-TLS Machines : if Network Access:EapAuthenticati use Dot1X_Machine_Certs Actions

☑ Wired EAP-TLS Users : if Network Access:EapAuthenticati use Dot1X_User_Certs Actions

☑ Wireless-Dot1X : If Wireless_802.1X allow protocols Allowed Protocol : Default Netw and... Actions

☑ Wireless EAP-TLS Machines : if Network Access:EapAuthenticati use Dot1X_Machine_Certs Actions

☑ Wireless EAP-TLS Users : if Network Access:EapAuthenticati use Dot1X_User_Certs Actions

☑ Default Rule (If no match) : allow protocols Allowed Protocol : Default Netw and use identity source : Internal Users Actions

Procedure 4 Enable EAP-TLS

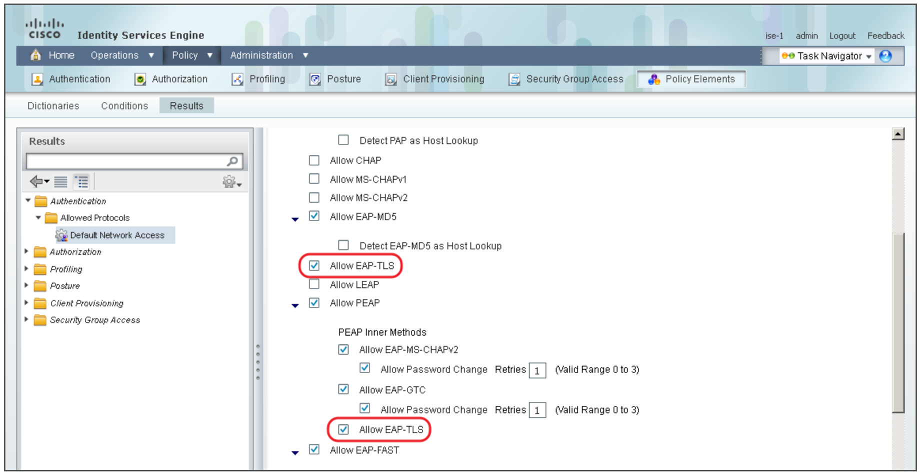
In a previous section, you disabled EAP-TLS. Now that you are using digital certificates, you need to re-enable it.

Step 1: On the menu bar, mouse over **Policy,** and then in the Policy Elements section, choose **Results**.

Step 2: In the left pane, double-click **Authentication. This** expands the options.

Step 3: Double-click **Allowed Protocols**, and then choose **Default Network Access**.

Step 4: Select the global **Allow EAP-TLS** check box and, under the PEAP settings, select the **Allow EAP-TLS** check box, and then click **Save**.


cisco Identity Services Engine
ise-1 admin Logout Feedback
Home Operations ▾ Policy ▾ Administration ▾
Task Navigator ▾
Authentication Authorization Profiling Posture Client Provisioning Security Group Access Policy Elements
Dictionaries Conditions Results
Results
Authentication
Allowed Protocols
Default Network Access
Authorization
Profiling
Posture
Client Provisioning
Security Group Access

☐ Detect PAP as Host Lookup

☐ Allow CHAP

☐ Allow MS-CHAPv1

☐ Allow MS-CHAPv2

☑ Allow EAP-MD5

☐ Detect EAP-MD5 as Host Lookup

☑ Allow EAP-TLS

☐ Allow LEAP

☑ Allow PEAP

PEAP Inner Methods

☑ Allow EAP-MS-CHAPv2

☑ Allow Password Change Retries 1 (Valid Range 0 to 3)

☑ Allow EAP-GTC

☑ Allow Password Change Retries 1 (Valid Range 0 to 3)

☑ Allow EAP-TLS

☑ Allow EAP-FAST

Process

Configuring Group Policy Objects

1. Create template for workstations
2. Create template for user auto-enrollment
3. Configure GPOs for wired endpoints
4. Configure GPOs for wireless endpoints

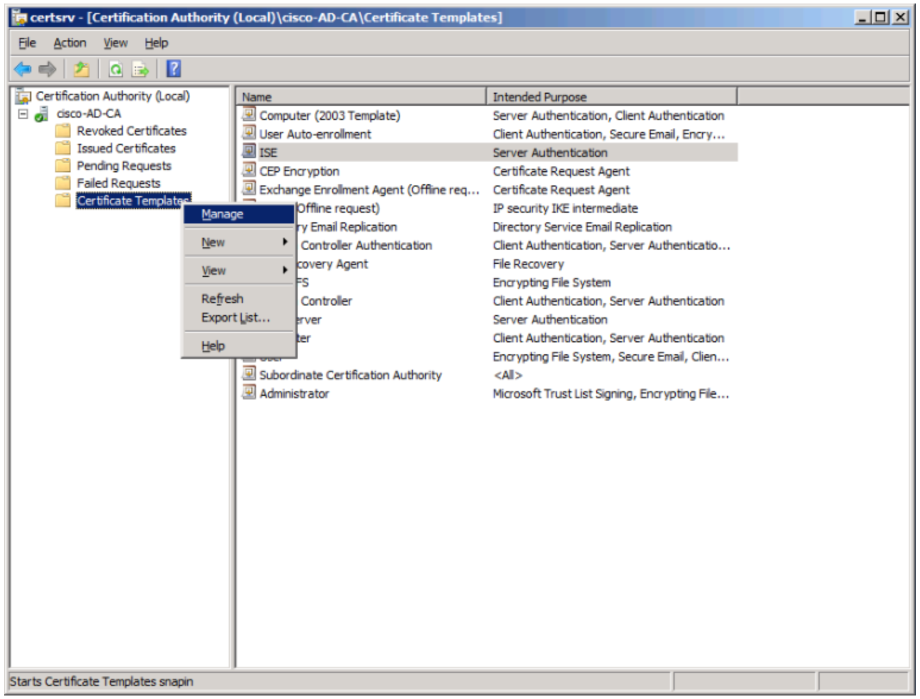
In this deployment, you will be using group policy objects (GPOs) to distribute certificates and to configure the native 802.1X supplicant for Windows XP and later endpoints that are members of the domain. Machine certificates are distributed when the machine joins the domain, and user certificates are deployed to the endpoint where the user logs in to the domain. The steps in this example deployment describe how to edit the Default Domain Policy so that it will apply to all users, but you could create a new policy object and apply it to a subset of users if you prefer.

Procedure 1 Create template for workstations

You need to create a certificate template on the CA to be used to distribute machine certificates to workstations that join the Active Directory (AD) domain.

Step 1: On the CA console, navigate to **Start > Administrative Tools > Certification Authority**.

Step 2: Expand the CA server, right-click **Certificate Templates**, and then choose **Manage**. The Certificate Templates Console opens.



Name	Intended Purpose
Computer (2003 Template)	Server Authentication, Client Authentication
User Auto-enrollment	Client Authentication, Secure Email, Encry...
ISE	Server Authentication
CEP Encryption	Certificate Request Agent
Exchange Enrollment Agent (Offline req...	Certificate Request Agent
Offline request)	IP security IKE intermediate
y Email Replication	Directory Service Email Replication
Controller Authentication	Client Authentication, Server Authenticatio...
covery Agent	File Recovery
FS	Encrypting File System
Controller	Client Authentication, Server Authentication
rver	Server Authentication
ter	Client Authentication, Server Authentication
	Encrypting File System, Secure Email, Clien...
Subordinate Certification Authority	<All>
Administrator	Microsoft Trust List Signing, Encrypting File...

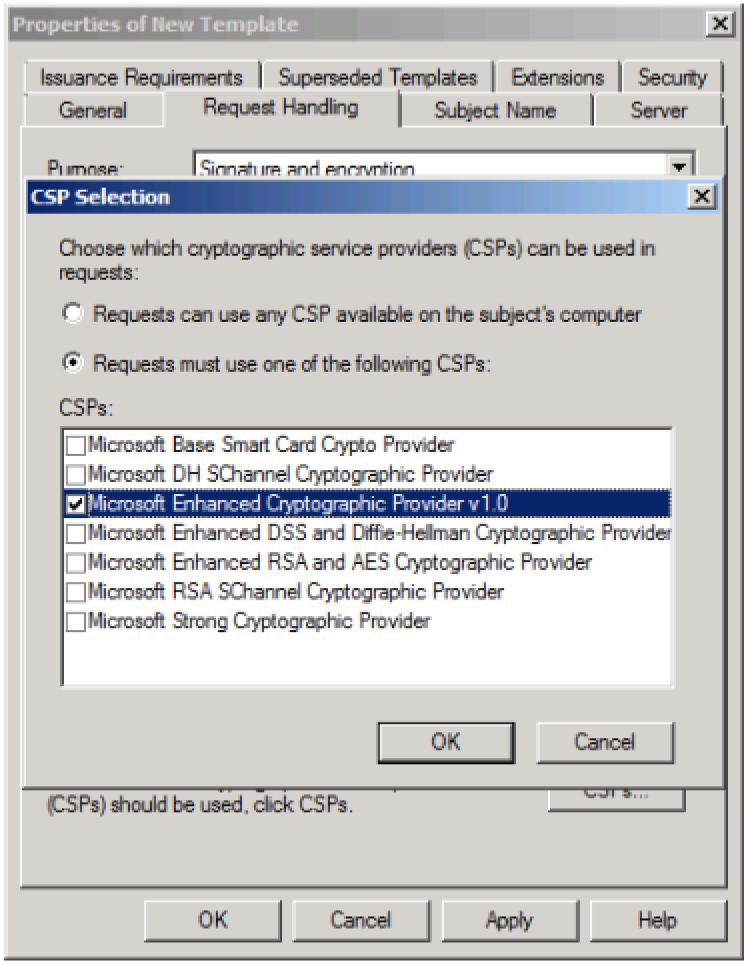
Step 3: Right-click the Computer template, and then choose **Duplicate Template**.

Step 4: For compatibility, make sure that **Windows 2003 Server Enterprise** is selected.

Step 5: In the Properties of New Template window, click the **General** tab, and then give the template a name.

Step 6: On the Request Handling tab, select **Allow private key to be exported,** and then click **CSPs**.

Step 7: Select **Requests must use one of the following CSPs** and **Microsoft Enhanced Cryptographic Provider v1.0**, and then click **OK**.



Purpose: Signature and encryption

Choose which cryptographic service providers (CSPs) can be used in requests:

○ Requests can use any CSP available on the subject's computer

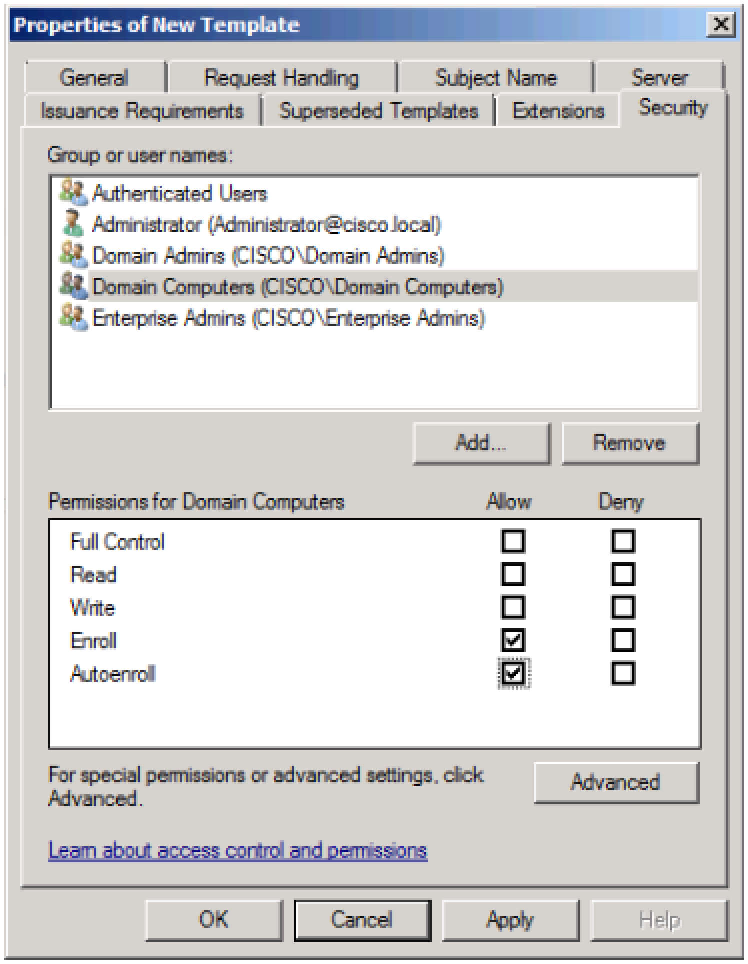
● Requests must use one of the following CSPs:

CSPs:

- □ Microsoft Base Smart Card Crypto Provider
- □ Microsoft DH SChannel Cryptographic Provider
- ☑ Microsoft Enhanced Cryptographic Provider v1.0
- □ Microsoft Enhanced DSS and Diffie-Hellman Cryptographic Provider
- □ Microsoft Enhanced RSA and AES Cryptographic Provider
- □ Microsoft RSA SChannel Cryptographic Provider
- □ Microsoft Strong Cryptographic Provider

(CSPs) should be used, click CSPs.

Step 8: On the Security tab, click **Domain Computers,** and then for both **Enroll** and **Autoenroll**, make sure **Allow** is selected.



Group or user names:

- Authenticated Users
- Administrator (Administrator@cisco.local)
- Domain Admins (CISCO\Domain Admins)
- Domain Computers (CISCO\Domain Computers)
- Enterprise Admins (CISCO\Enterprise Admins)

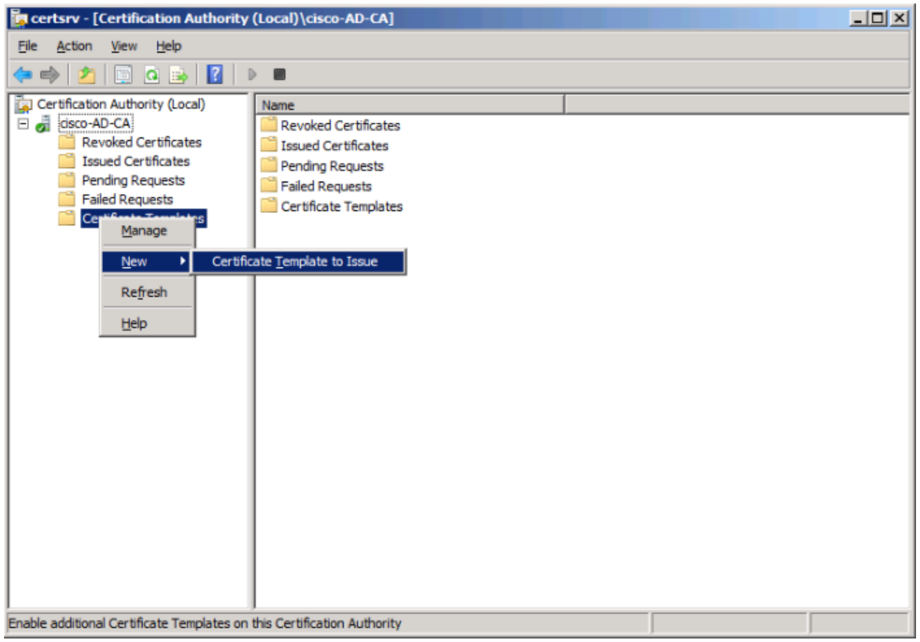
Permissions for Domain Computers	Allow	Deny
Full Control	□	□
Read	□	□
Write	□	□
Enroll	☑	□
Autoenroll	☑	□

For special permissions or advanced settings, click Advanced.

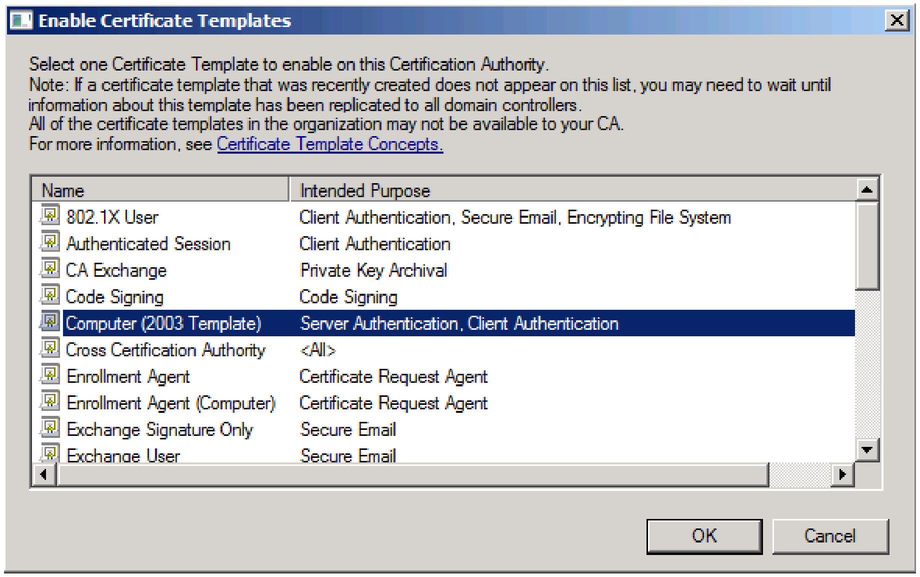
Step 9: Use the defaults for the remaining tabs, and then click **OK**.

Step 10: Close the Certificate Templates Console.

Step 11: In the Certificate Authority console, right-click **Certificate Templates**, and then choose **New > Certificate Template to Issue**.



Step 12: Choose the previously defined template, and then click **OK**.



Enable Certificate Templates

Select one Certificate Template to enable on this Certification Authority.
Note: If a certificate template that was recently created does not appear on this list, you may need to wait until information about this template has been replicated to all domain controllers.
All of the certificate templates in the organization may not be available to your CA.
For more information, see Certificate Template Concepts.

Name	Intended Purpose
802.1X User	Client Authentication, Secure Email, Encrypting File System
Authenticated Session	Client Authentication
CA Exchange	Private Key Archival
Code Signing	Code Signing
Computer (2003 Template)	Server Authentication, Client Authentication
Cross Certification Authority	<All>
Enrollment Agent	Certificate Request Agent
Enrollment Agent (Computer)	Certificate Request Agent
Exchange Signature Only	Secure Email
Exchange User	Secure Email

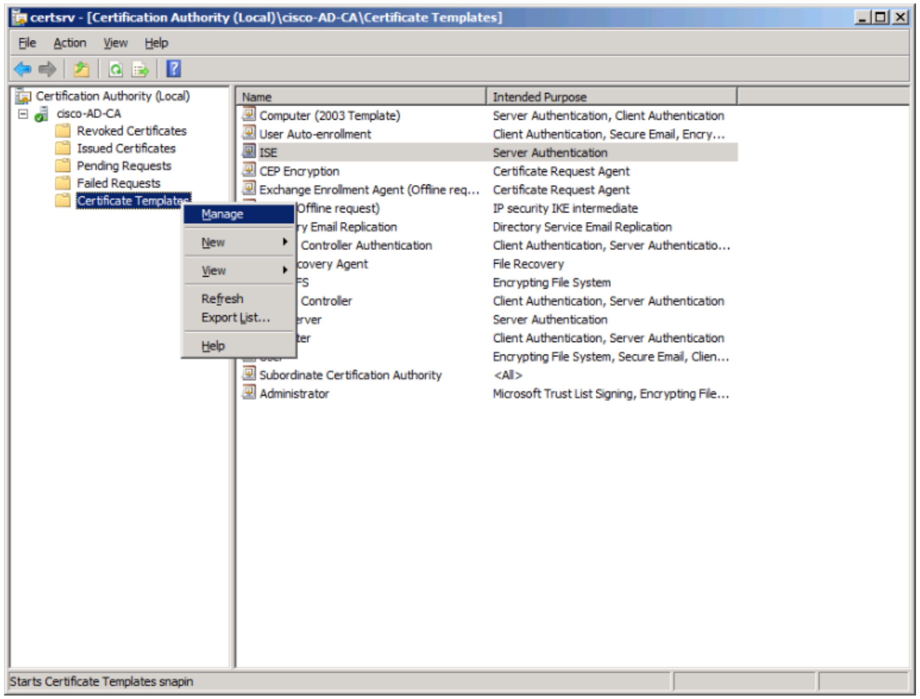
When machines join the domain or when the GPO policy is refreshed (the default period is 90 minutes), the machine receives a machine certificate to allow for 802.1X machine authentication.

Procedure 2 Create template for user auto-enrollment

This deployment uses group policy objects (GPOs) to have domain users auto-enroll to obtain a certificate when they log in to the domain. To enable auto-enrollment, you need to create a certificate template for these users.

Step 1: On the CA console, navigate to **Start > Administrative Tools > Certification Authority**.

Step 2: Expand the CA server, right-click **Certificate Templates,** and then choose **Manage**. The Certificate Templates Console opens.



Name	Intended Purpose
Computer (2003 Template)	Server Authentication, Client Authentication
User Auto-enrollment	Client Authentication, Secure Email, Encry...
ISE	Server Authentication
CEP Encryption	Certificate Request Agent
Exchange Enrollment Agent (Offline req...	Certificate Request Agent
Offline request)	IP security IKE intermediate
y Email Replication	Directory Service Email Replication
Controller Authentication	Client Authentication, Server Authenticatio...
covery Agent	File Recovery
FS	Encrypting File System
Controller	Client Authentication, Server Authentication
rver	Server Authentication
ter	Client Authentication, Server Authentication
	Encrypting File System, Secure Email, Clien...
Subordinate Certification Authority	<All>
Administrator	Microsoft Trust List Signing, Encrypting File...

Step 3: Right-click the User template, and then choose **Duplicate Template**.

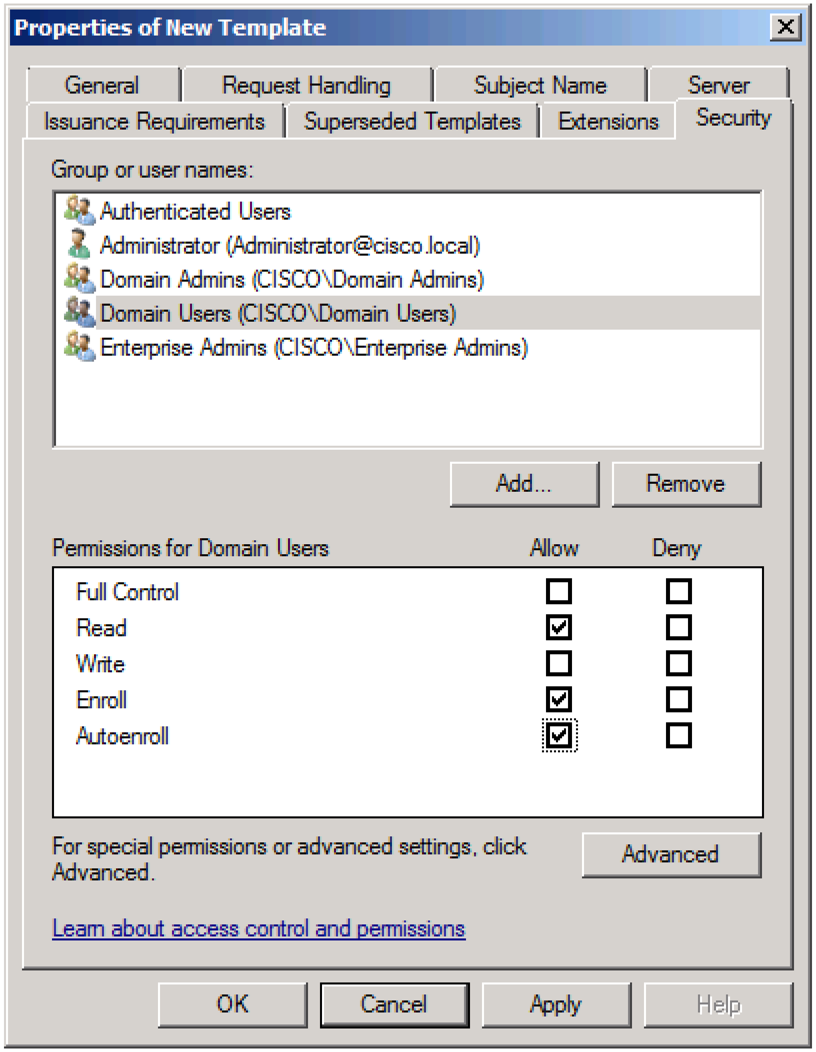
Step 4: For compatibility with Windows XP, make sure that **Windows 2003 Server Enterprise** is selected.

Step 5: In the Properties of New Template window, click the **General** tab, and then give the template a name.

Step 6: On the Request Handling tab, select **Allow private key to be exported**, make sure **Enroll subject without requiring any user input** is selected, and then click **CSPs**.

Step 7: Select **Requests must use one of the following CSPs** and **Microsoft Enhanced Cryptographic Provider v1.0**, and then click **OK**.

Step 8: On the Security tab, click **Domain Users**, and then for **Read**, **Enroll**, and **Autoenroll**, make sure **Allow** is selected.



Group or user names:

- Authenticated Users
- Administrator (Administrator@cisco.local)
- Domain Admins (CISCO\Domain Admins)
- Domain Users (CISCO\Domain Users)
- Enterprise Admins (CISCO\Enterprise Admins)

Permissions for Domain Users	Allow	Deny
Full Control	□	□
Read	☑	□
Write	□	□
Enroll	☑	□
Autoenroll	☑	□

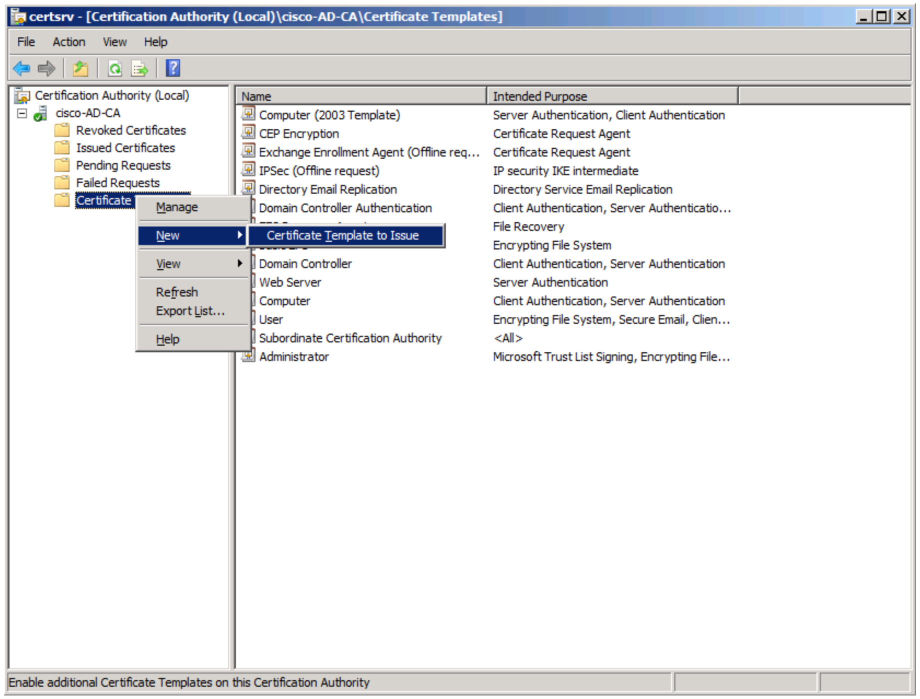
For special permissions or advanced settings, click Advanced.

Learn about access control and permissions

Step 9: Use the defaults for the remaining tabs, and then click **OK**.

Step 10: Close the Certificate Templates Console.

Step 11: In the Certificate Authority console, right-click **Certificate Templates**, and then choose **New > Certificate Template to Issue**.

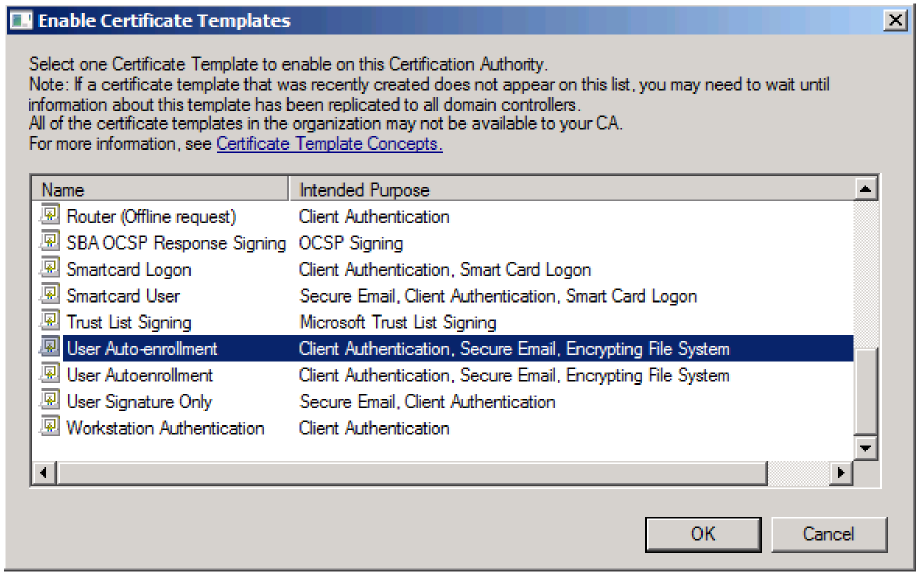


certsrv - [Certification Authority (Local)\cisco-AD-CA\Certificate Templates]

Name	Intended Purpose
Computer (2003 Template)	Server Authentication, Client Authentication
CEP Encryption	Certificate Request Agent
Exchange Enrollment Agent (Offline req...	Certificate Request Agent
IPSec (Offline request)	IP security IKE intermediate
Directory Email Replication	Directory Service Email Replication
Domain Controller Authentication	Client Authentication, Server Authenticatio...
	File Recovery
	Encrypting File System
Domain Controller	Client Authentication, Server Authentication
Web Server	Server Authentication
Computer	Client Authentication, Server Authentication
User	Encrypting File System, Secure Email, Clien...
Subordinate Certification Authority	<All>
Administrator	Microsoft Trust List Signing, Encrypting File...

Enable additional Certificate Templates on this Certification Authority

Step 12: Choose the previously defined template, and then click **OK**.



Enable Certificate Templates

Select one Certificate Template to enable on this Certification Authority.
Note: If a certificate template that was recently created does not appear on this list, you may need to wait until information about this template has been replicated to all domain controllers.
All of the certificate templates in the organization may not be available to your CA.
For more information, see Certificate Template Concepts.

Name	Intended Purpose
Router (Offline request)	Client Authentication
SBA OCSP Response Signing	OCSP Signing
Smartcard Logon	Client Authentication, Smart Card Logon
Smartcard User	Secure Email, Client Authentication, Smart Card Logon
Trust List Signing	Microsoft Trust List Signing
User Auto-enrollment	Client Authentication, Secure Email, Encrypting File System
User Autoenrollment	Client Authentication, Secure Email, Encrypting File System
User Signature Only	Secure Email, Client Authentication
Workstation Authentication	Client Authentication

Users will have a certificate pushed to them the next time they log in to the domain or after the GPO policy is refreshed. If the user logs in to multiple endpoints, the certificate is deployed to each of them.

Procedure 3 Configure GPOs for wired endpoints

This deployment uses GPOs to configure the 802.1X supplicant on wired endpoints running Windows XP SP3 and higher.

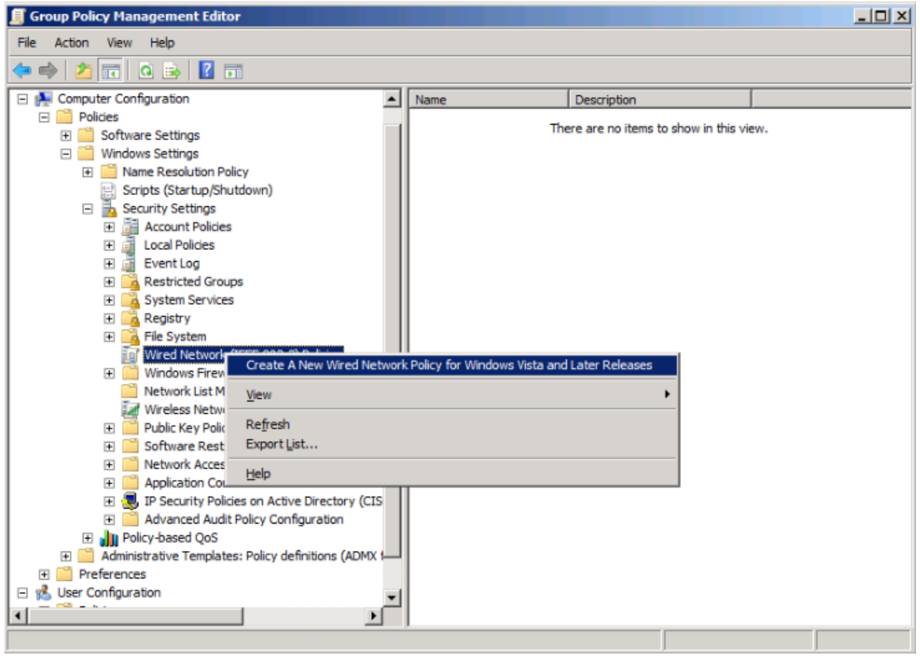
Step 1: On the CA console, navigate to **Start > Administrative Tools > Group Policy Management**.

Step 2: Expand **Forest** > **Domain** > **local domain** > **Group Policy Objects**.

Step 3: Right-click **Default Domain Policy** and click **Edit.** The Group Policy Management Editor opens.

Step 4: In the Group Policy Management Editor, navigate to **Computer Configuration > Policies > Windows Settings > Security Settings**.

Step 5: Right-click **Wired Network (IEEE 802.3e) Policies**, and then choose **Create a New Wired Network Policy for Windows Vista and Later Releases**.



There are no items to show in this view.

Step 6: On the General tab, give the policy a name and description, and then make sure **Use Windows Wired Auto Config service for clients** is selected.

Step 7: On the Security tab, make sure **Enable of IEEE 802.1X authentication for network access** is selected.

Step 8: In the **Network Authentication Method** list, choose **Microsoft: Smart Card or other certificate**.

Step 9: In the **Authentication Mode** list, choose **User or computer authentication**.

Step 10: Click **Properties**.

Step 11: Make sure **Use a certificate on this computer** is selected, and then make sure **Use simple certificate selection** and **Validate server certificate** are selected.

Step 12: In the **Trusted Root Certification Authorities** list, next to the root certificate for the CA, select the check box.

Step 13: Click **OK**. The certificate properties window closes.

Step 14: In the policy properties window, click **Apply,** and then click **OK** again.

Procedure 4 Configure GPOs for wireless endpoints

This deployment uses GPOs to configure the 802.1X supplicant for wireless endpoints running Windows XP SP3 and higher.

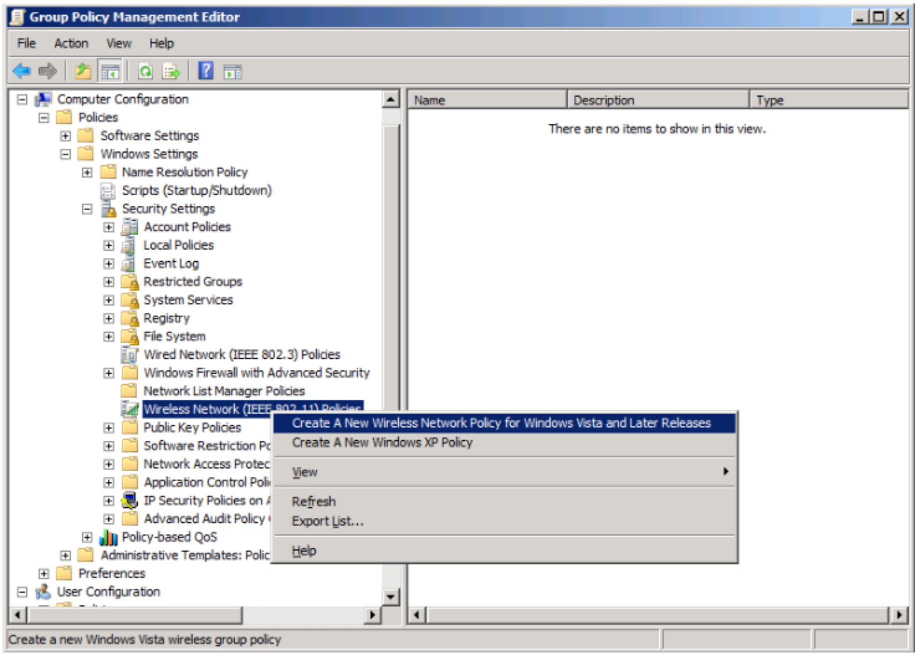
Step 1: On the CA console, navigate to **Start > Administrative Tools > Group Policy Management**.

Step 2: Expand **Forest** > **Domain** > **local domain** > **Group Policy Objects**.

Step 3: Right-click **Default Domain Policy**. The Group Policy Management Editor opens.

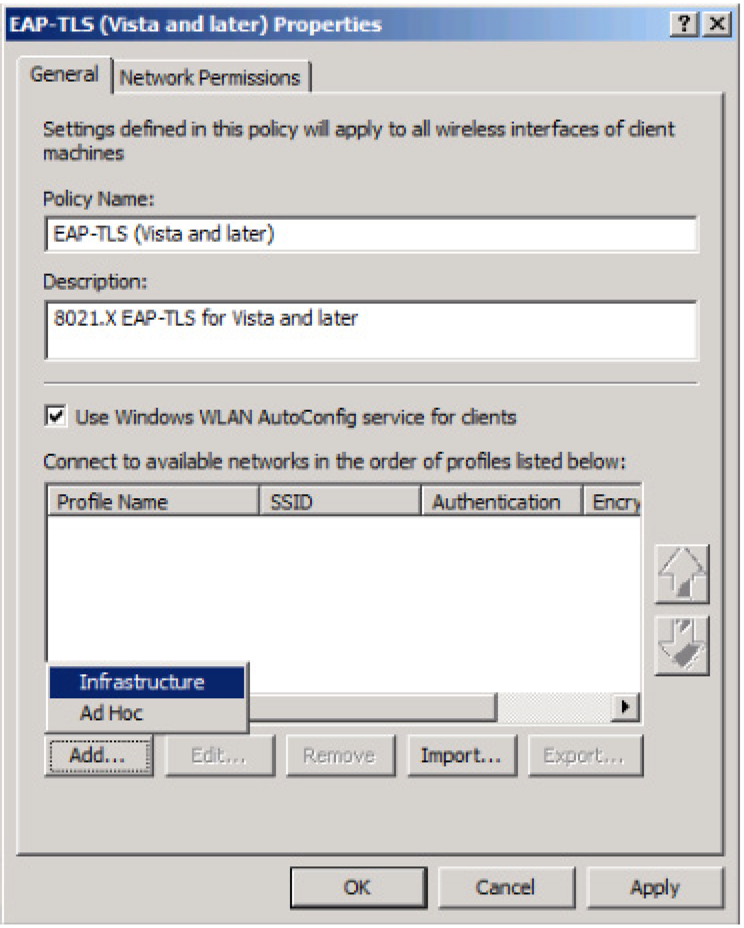
Step 4: In the Group Policy Management Editor, navigate to **Computer Configuration > Policies > Windows Settings > Security Settings**.

Step 5: Right-click **Wireless Network (IEEE 802.11) Policies,** and then choose **Create a New Wireless Network Policy for Windows Vista and Later Releases**.


Group Policy Management Editor
File Action View Help
Computer Configuration
Policies
Software Settings
Windows Settings
Name Resolution Policy
Scripts (Startup/Shutdown)
Security Settings
Account Policies
Local Policies
Event Log
Restricted Groups
System Services
Registry
File System
Wired Network (IEEE 802.3) Policies
Windows Firewall with Advanced Security
Network List Manager Policies
Wireless Network (IEEE 802.11) Policies
Public Key Policies
Software Restriction Pc
Network Access Protec
Application Control Poli
IP Security Policies on A
Advanced Audit Policy
Policy-based QoS
Administrative Templates: Polic
Preferences
User Configuration
Name Description Type
There are no items to show in this view.
Create A New Wireless Network Policy for Windows Vista and Later Releases
Create A New Windows XP Policy
View
Refresh
Export List...
Help
Create a new Windows Vista wireless group policy

Step 6: On the General tab, give the policy a name and description, and then make sure **Use Windows WLAN AutoConfig service for clients** is selected.

Step 7: Click **Add**, and then choose **Infrastructure**.



Settings defined in this policy will apply to all wireless interfaces of client machines

Policy Name: EAP-TLS (Vista and later)

Description: 8021.X EAP-TLS for Vista and later

☑ Use Windows WLAN AutoConfig service for clients

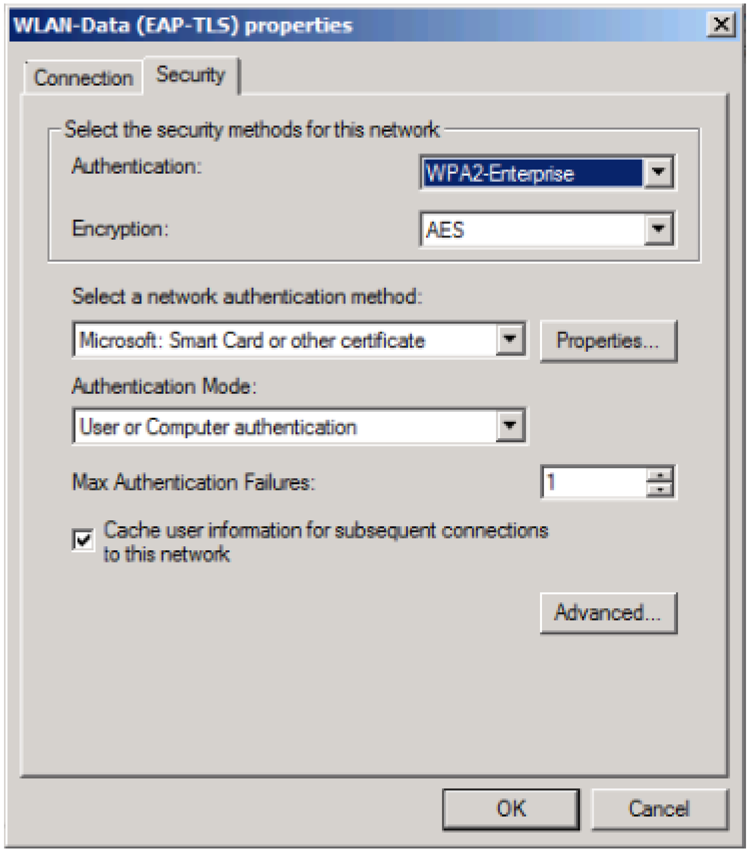
Connect to available networks in the order of profiles listed below:

Step 8: Give the profile a name, enter the name of the SSID for the wireless network, and then click **Add**.

Step 9: On the Security tab, in the **Authentication** list, choose **WPA2-Enterprise,** and then in the **Encryption** list, choose **AES**.

Step 10: In the **Select a network authentication method** list, choose **Microsoft: Smart Card or other certificate**.

Step 11: In the **Authentication Mode** list, choose **User or Computer authentication**.


WLAN-Data (EAP-TLS) properties

Select the security methods for this network

Authentication: WPA2-Enterprise

Encryption: AES

Select a network authentication method:

Microsoft: Smart Card or other certificate

Authentication Mode:

User or Computer authentication

Max Authentication Failures: 1

☑ Cache user information for subsequent connections to this network

Step 12: Click **Properties**.

Step 13: Make sure **Use a certificate on this computer** is selected, and then make sure **Use simple certificate selection** and **Validate server certificate** are selected.

Step 14: In the **Trusted Root Certification Authorities** list, next to the root certificate for the CA, select the check box.

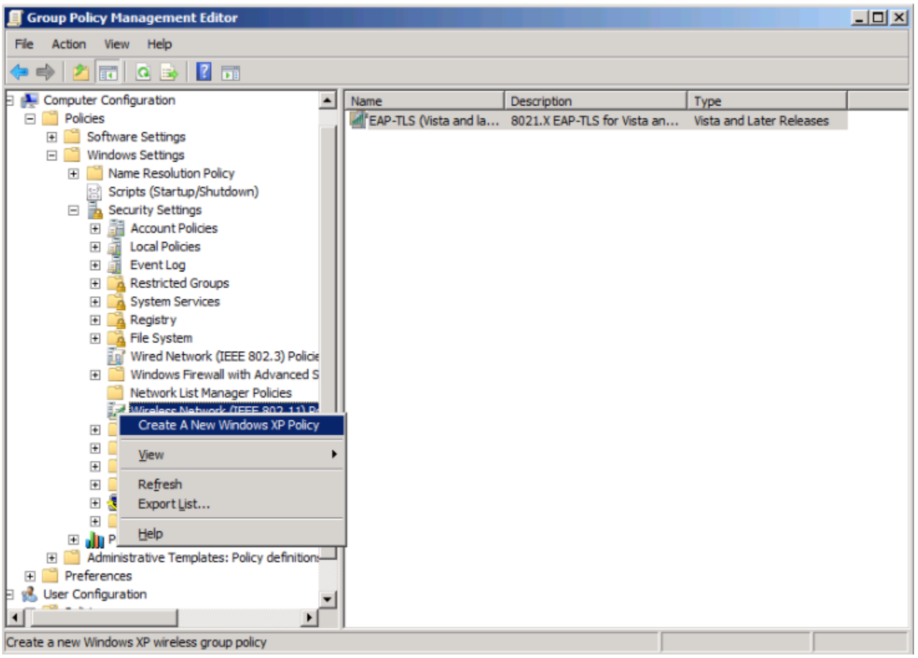
Step 15: Click **OK**. The certificate properties window closes.

Step 16: Click **OK**. The profile properties window closes.

Step 17: In the policy properties window, click **Apply,** and then click **OK**.

Next, you create a policy for Windows XP clients.

Step 18: Right-click **Wireless Network (IEEE 802.11) Policies**, and then choose **Create a New Windows XP Policy**.

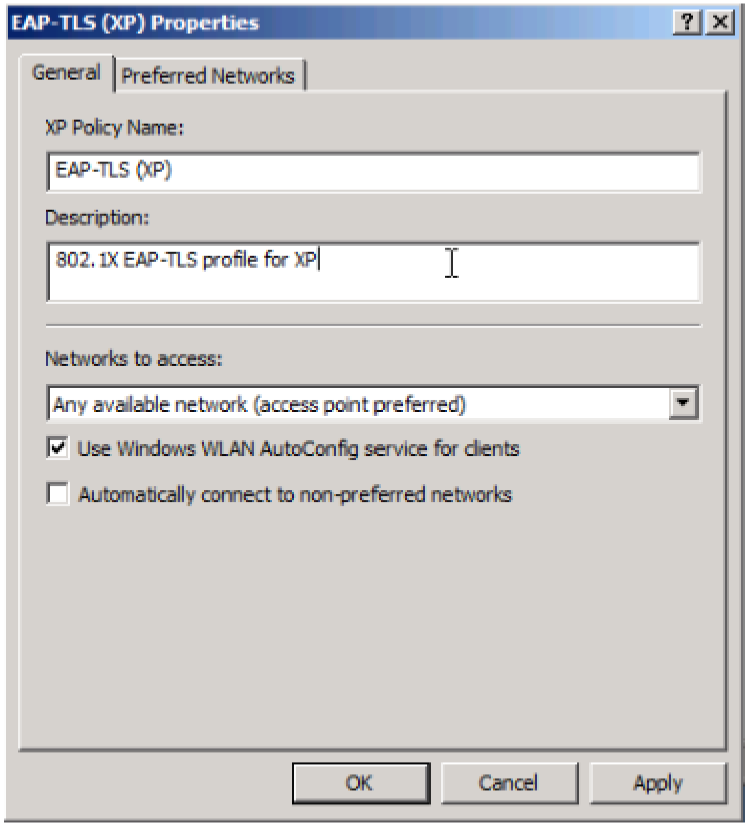

Group Policy Management Editor

Name	Description	Type
EAP-TLS (Vista and la...	8021.X EAP-TLS for Vista an...	Vista and Later Releases

Create a new Windows XP wireless group policy

Step 19: On the General tab, give the policy a name and description, and then make sure **Use Windows WLAN AutoConfig service for clients** is selected.

Step 20: In the **Networks to access** list, choose **Any available network (access point preferred)**.



EAP-TLS (XP) Properties

General | Preferred Networks

XP Policy Name: EAP-TLS (XP)

Description: 802.1X EAP-TLS profile for XP

Networks to access: Any available network (access point preferred)

☑ Use Windows WLAN AutoConfig service for clients

☐ Automatically connect to non-preferred networks

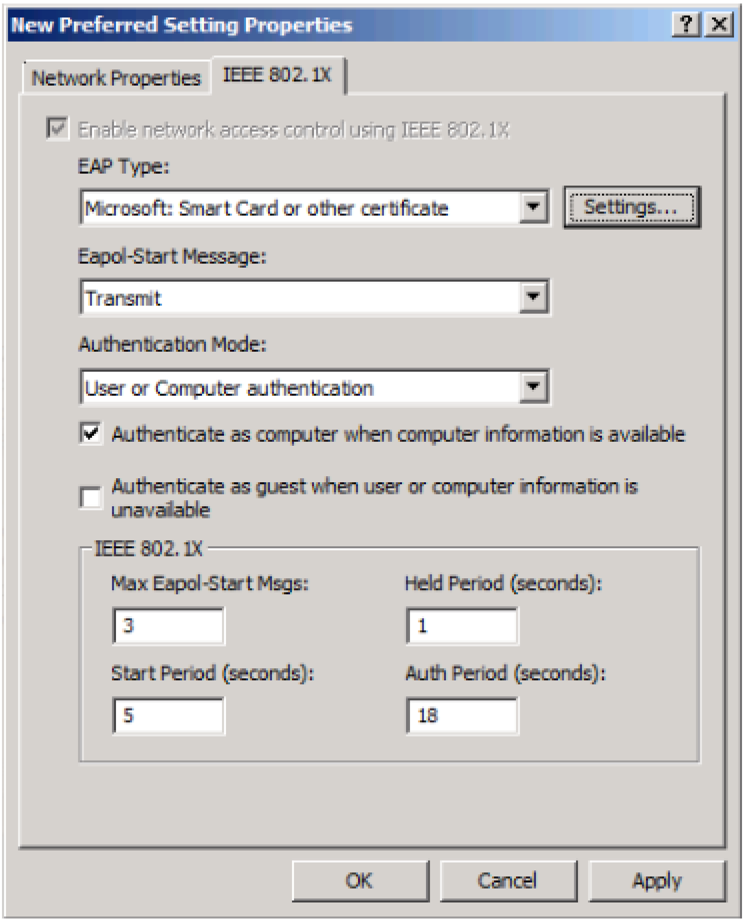
Step 21: On the Preferred Networks tab, click **Add,** and then select **Infrastructure**.

Step 22: Enter the SSID for the network and give a description.

Step 23: In the **Authentication** list, choose **WPA2**, and then in the **Encryption** list, choose **AES**.

Step 24: On the IEEE 802.1X tab, in the **EAP type** list, choose **Microsoft: Smart Card or other certificate**.

Step 25: In the **Authentication Mode** list, choose **User or Computer authentication**.



New Preferred Setting Properties

Network Properties | IEEE 802.1X

☑ Enable network access control using IEEE 802.1X

EAP Type: Microsoft: Smart Card or other certificate

Eapol-Start Message: Transmit

Authentication Mode: User or Computer authentication

☑ Authenticate as computer when computer information is available

☐ Authenticate as guest when user or computer information is unavailable

IEEE 802.1X

Max Eapol-Start Msgs: 3

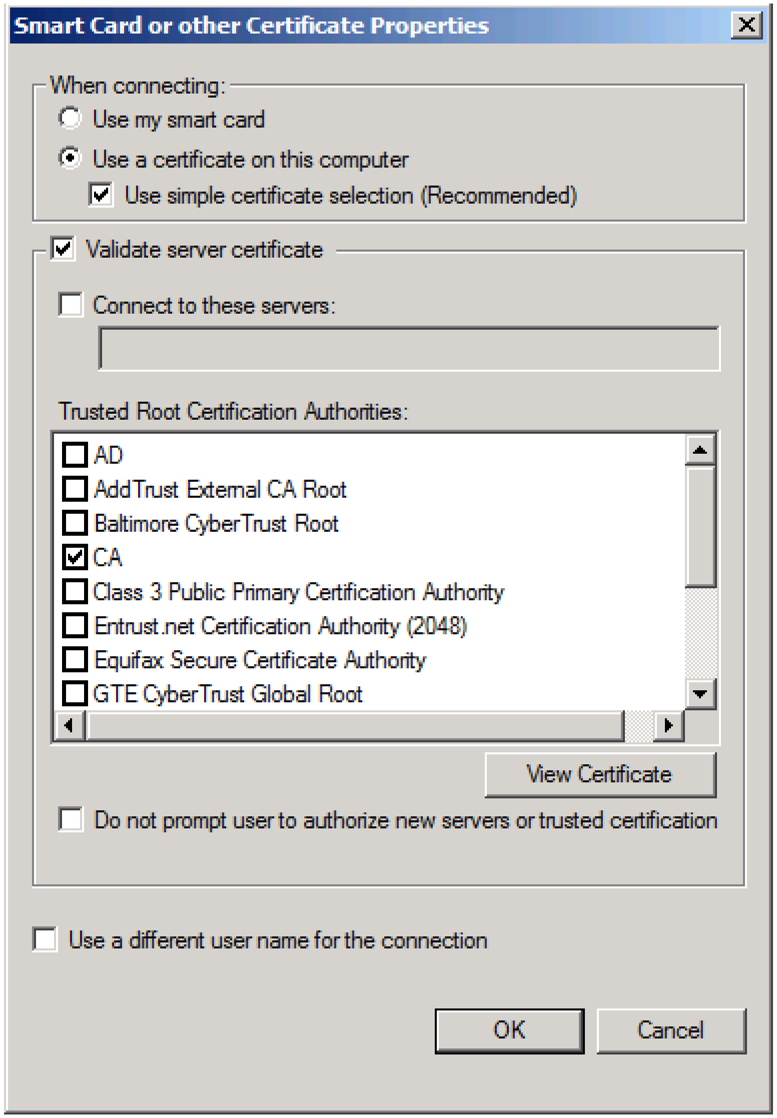
Held Period (seconds): 1

Start Period (seconds): 5

Auth Period (seconds): 18

Step 26: Click **Settings**, make sure **Use a certificate on this computer** is selected, and then make sure **Use simple certificate selection** and **Validate server certificate** are selected.

Step 27: In the **Trusted Root Certification Authorities** list, next to the root certificate for the CA, select the check box, and then click **OK**.



Smart Card or other Certificate Properties

When connecting:

○ Use my smart card

● Use a certificate on this computer

☑ Use simple certificate selection (Recommended)

☑ Validate server certificate

□ Connect to these servers:

Trusted Root Certification Authorities:

□ AD
□ AddTrust External CA Root
□ Baltimore CyberTrust Root
☑ CA
□ Class 3 Public Primary Certification Authority
□ Entrust.net Certification Authority (2048)
□ Equifax Secure Certificate Authority
□ GTE CyberTrust Global Root

□ Do not prompt user to authorize new servers or trusted certification

□ Use a different user name for the connection

Step 28: In the profile properties window, click **Apply,** and then click **OK**.

Step 29: In the policy properties window, click **Apply,** and then click **OK**.

At this point, all endpoints running Windows XP SP3 and later will have a 802.1X supplicant configuration pushed to them the next time they log in to the domain or after the GPO policy is refreshed.

Process

Deploying Cisco AnyConnect on Windows Endpoints

1. Install Cisco AnyConnect
2. Install Profile Editor
3. Create wired profile
4. Create wireless profile

Cisco AnyConnect Secure Mobility Client 3.1 can be used as an 802.1X supplicant on Windows endpoints, using the Network Access Manager module. In this example deployment, the Network Access Manager is configured with both wired and wireless profiles using digital certificates.

Procedure 1 Install Cisco AnyConnect

To use Cisco AnyConnect Secure Mobility Client 3.1 as your 802.1X supplicant on Windows endpoints, you need to download the latest version from Cisco.com along with the Profile Editor. The client is distributed as an ISO image and will need to either be burned to a disk or mounted as a disk image by using a utility that provides this function. You need to be logged in as an administrator to install AnyConnect Secure Mobility Client.

The latest Cisco AnyConnect Secure Mobility client and Profile Editor can be downloaded from the following location:
http://software.cisco.com/download/release.html?mdfid=283000185&softwareid=282364313&release=3.1.02040

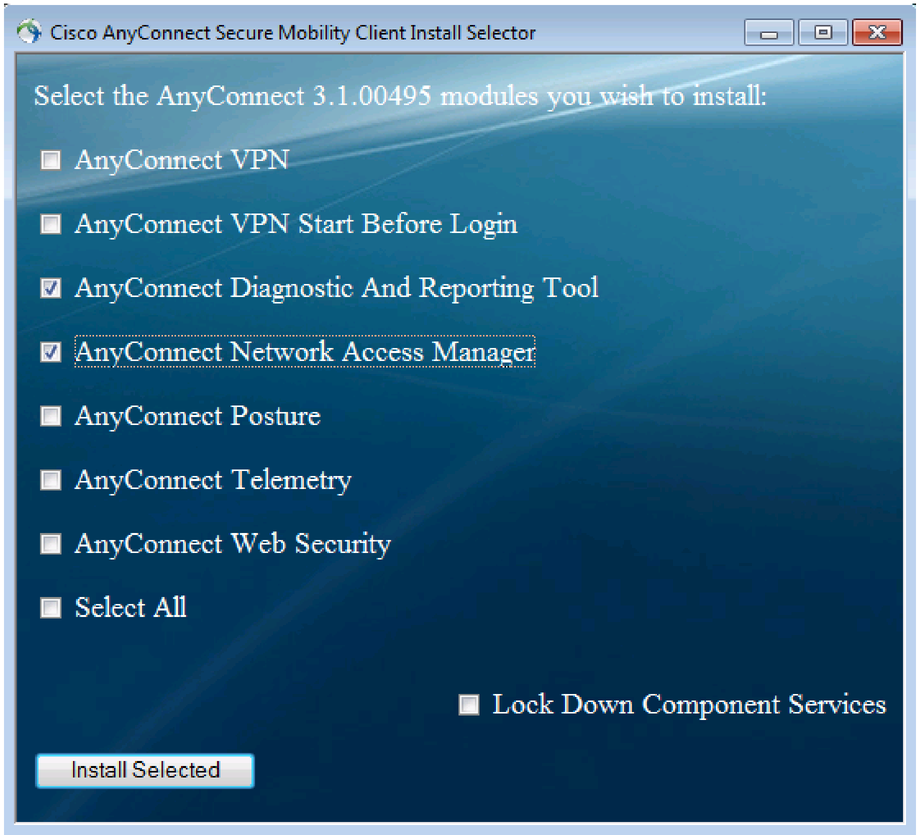
Tech Tip

To deploy the Cisco AnyConnect Secure Mobility Client to multiple workstations with the same policy, you can create a customized installation package. You need to copy all the files from the installation disk to a folder on the hard drive, for example, C:\AnyConnect. Then, follow the procedure above to edit the profile. Copy the file (C:\ProgramData\Cisco\Cisco AnyConnect Secure Mobility Client\Network Access Manager\system\configuration.xml) to C:\AnyConnect\Profiles\nam\configuration.xml.

Copy the contents of C:\AnyConnect to some form of removable media, for instance, CD, DVD, USB drive, etc. You can then take this new installer package and run the installation on a workstation. The custom configuration file is loaded and ready for use.

Step 1: Start the installer for the Cisco AnyConnect Secure Mobility Client by launching the Setup program on the disk.

Step 2: Select **AnyConnect Diagnostic and Reporting Tool** and **AnyConnect Network Access Manager**, and then clear all of the other check boxes.



Cisco AnyConnect Secure Mobility Client Install Selector

Select the AnyConnect 3.1.00495 modules you wish to install:

- □ AnyConnect VPN
- □ AnyConnect VPN Start Before Login
- ☑ AnyConnect Diagnostic And Reporting Tool
- ☑ AnyConnect Network Access Manager
- □ AnyConnect Posture
- □ AnyConnect Telemetry
- □ AnyConnect Web Security
- □ Select All

□ Lock Down Component Services

Step 3: Click **Install Selected**, verify the components selected to install, and then click **OK**.

Step 4: Click **Accept**. This accepts the license agreement.

Step 5: After the installation completes, click **OK**. You may be asked to restart the computer.

Procedure 2 Install Profile Editor

Step 1: Locate the Profile Editor Installer downloaded previously, and then double-click it. The installation process starts.

The installation requires Java Runtime Environment 1.6 or higher. If you don't have it installed, you are prompted to install it.

Step 2: If you are prompted to install Java Runtime Environment 1.6 or higher, click **Next**. This installs it.

Step 3: Click **Next.** The installation of Profile Editor continues.

Step 4: Click **Typical**, and then click **Install**.

Step 5: Click **Finish**. The installation completes.

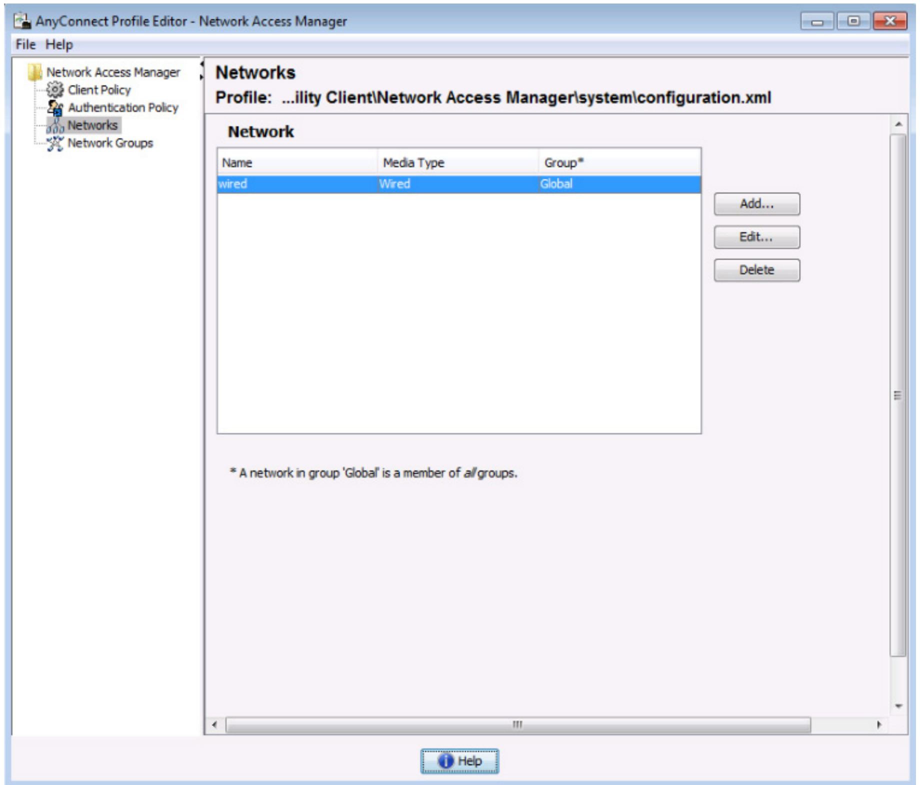
Procedure 3 Create wired profile

Step 1: Launch the Profile Editor by navigating to **Start > All Programs > Cisco > Cisco AnyConnect Profiler Editor > Network Access Manager Profile Editor**.

Step 2: From the **File** menu, choose **Open**, and then select **C:\ProgramData\Cisco\Cisco AnyConnect Secure Mobility Client\Network Access Manager\system\configuration.xml**.

Step 3: Click **Networks**.

Step 4: Select the wired profile, and then click **Edit**.



Networks

Profile: ...ility Client\Network Access Manager\system\configuration.xml

Network

Name	Media Type	Group*
wired	Wired	Global

* A network in group 'Global' is a member of *all* groups.

Step 5: Enter a name for the profile, and then click **Next**.

Step 6: Select **Authenticating Network**, and then click **Next**.

Step 7: Select **Machine and User Connection**, and then click **Next**.

Step 8: For the machine authentication method, select **EAP-TLS**, and then click **Next**.

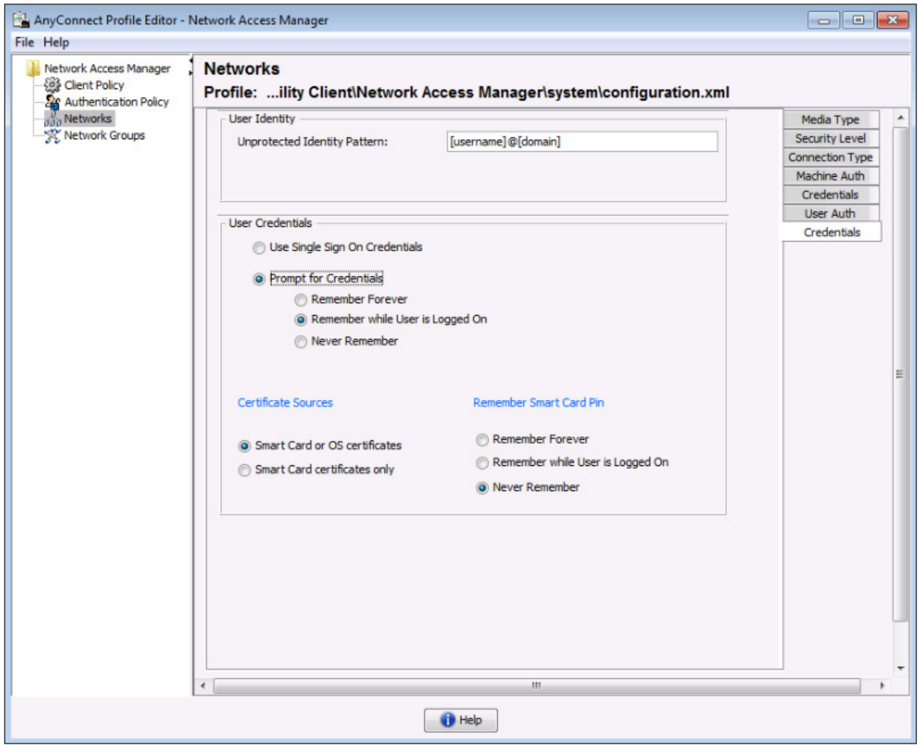
Step 9: For machine identity, enter an unprotected identity pattern. In this deployment, use **host.[domain]**, and then click **Next**.

Step 10: For the user authentication method, select **EAP-TLS**, and then click **Next**.

Step 11: For user identity, enter an unprotected identity pattern. In this deployment, use [username]@[domain].

Step 12: In the User Credentials section, select **Prompt for Credentials**, and then select **Remember while User is Logged On**.

Step 13: Under **Certificate Sources**, select **Smart Card or OS certificates**, and then click **Done**.


AnyConnect Profile Editor - Network Access Manager

Networks

Profile: ...ility Client\Network Access Manager\system\configuration.xml

User Identity

Unprotected Identity Pattern: [username]@[domain]

User Credentials

○ Use Single Sign On Credentials

● Prompt for Credentials

○ Remember Forever

● Remember while User is Logged On

○ Never Remember

Certificate Sources

● Smart Card or OS certificates

○ Smart Card certificates only

Remember Smart Card Pin

○ Remember Forever

○ Remember while User is Logged On

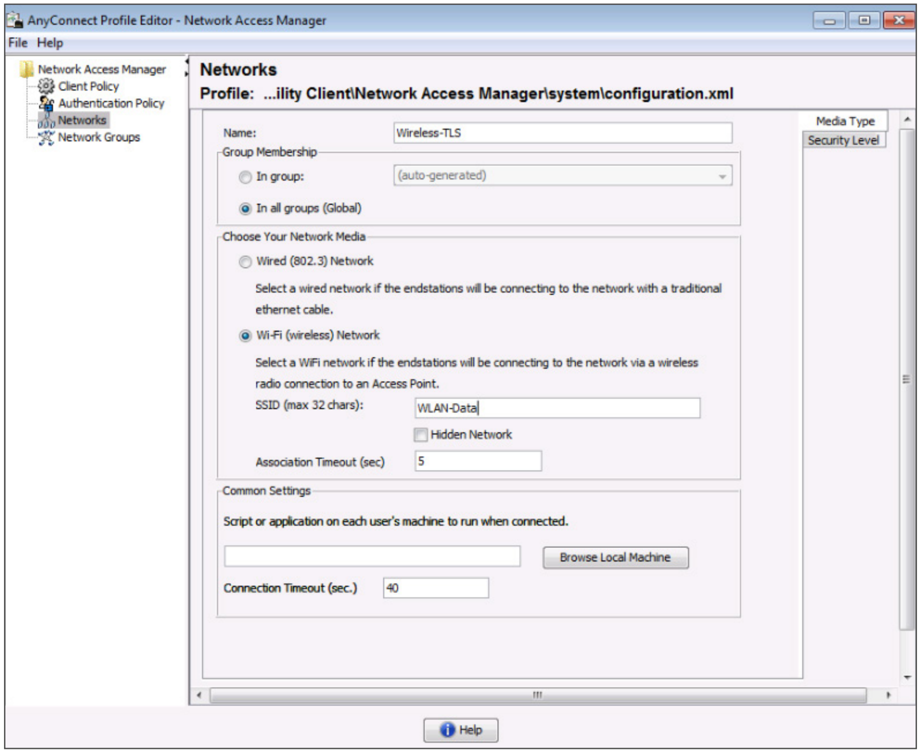
● Never Remember

Procedure 4 Create wireless profile

Step 1: In the Profile Editor, click **Add**. This creates a new wireless profile.

Step 2: Enter a name for the profile, and then, for group membership, select **In all groups (Global)**.

Step 3: In the Choose Your Network Media section, select **Wi-Fi (wireless) Network**, enter the **SSID** of the wireless network, and then click **Next**.


AnyConnect Profile Editor - Network Access Manager

Networks

Profile: ...ility Client\Network Access Manager\system\configuration.xml

Name: Wireless-TLS

Group Membership

○ In group: (auto-generated)

● In all groups (Global)

Choose Your Network Media

○ Wired (802.3) Network

Select a wired network if the endstations will be connecting to the network with a traditional ethernet cable.

● Wi-Fi (wireless) Network

Select a WiFi network if the endstations will be connecting to the network via a wireless radio connection to an Access Point.

SSID (max 32 chars): WLAN-Data

□ Hidden Network

Association Timeout (sec) 5

Common Settings

Script or application on each user's machine to run when connected.

Connection Timeout (sec.) 40

Step 4: Select **Authenticating Network**, for the association mode, choose **WPA2 Enterprise (AES)**, and then click **Next**.

Step 5: Select **Machine and User Connection**, and then click **Next**.

Step 6: For the machine authentication method, select **EAP-TLS**, and then click **Next**.

Step 7: For machine identity, enter an unprotected identity pattern. In this deployment, use host.[domain], and then click **Next**.

Step 8: For the user authentication method, select **EAP-TLS**, and then click **Next**.

Step 9: For user identity, enter an unprotected identity pattern. In this deployment, use [username]@[domain].

Step 10: In the User Credentials section, select **Prompt for Credentials**, and then select **Remember while User is Logged On**.

Step 11: Under **Certificate Sources**, select **Smart Card or OS certificates**, and then click **Done**.

Step 12: From the **File** menu, choose **Save**. This updates the configuration file.

At this point, all Windows endpoints now have certificates deployed and are enabled to use 802.1X authentication. On the wireless network, any device that doesn't have a certificate uses PEAP to gain access to the network. Monitor mode is running on the wired network, so endpoints that aren't configured for 802.1X still get access by using MAC Authentication Bypass (MAB).

Process

Configuring Mac Workstations for 802.1X Authentication

1. Install root certificate on Mac OS X
2. Request user certificate

If you have Apple Mac endpoints, you have to manually obtain a certificate and configure 802.1X authentication. The example deployment shows how you would do this for Mac OS X 10.8.

Procedure 1 Install root certificate on Mac OS X

To install a trusted root certificate on Mac OS X 10.8, you need to manually request the certificate from the CA and install the certificate in the keychain.

Step 1: On the Mac, browse to the CA at http://ca.cisco.local/certsrv.

Step 2: Click **Download a CA certificate, certificate chain, or CRL**.

Step 3: Make sure the current certificate is selected and the **DER** encoding method is selected.

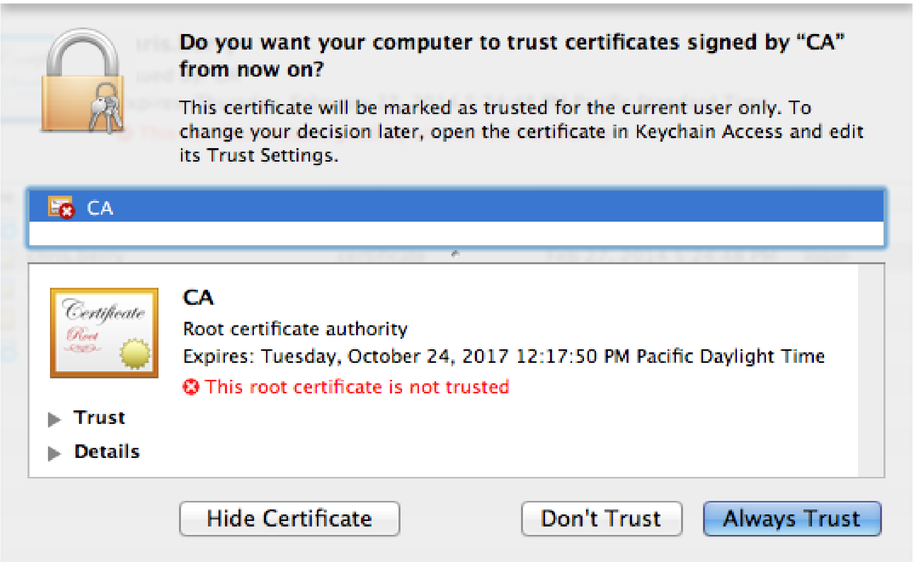
Step 4: Click **Download CA Certificate,** and then save the certificate file.

Step 5: Locate the certificate file, and then double-click it. This launches the Keychain Access utility.

Step 6: Click **Always Trust**.

Tech Tip

You may be prompted for credentials of a user with permission to change the certificate trust settings.



Do you want your computer to trust certificates signed by "CA" from now on?

This certificate will be marked as trusted for the current user only. To change your decision later, open the certificate in Keychain Access and edit its Trust Settings.

CA

CA

Root certificate authority

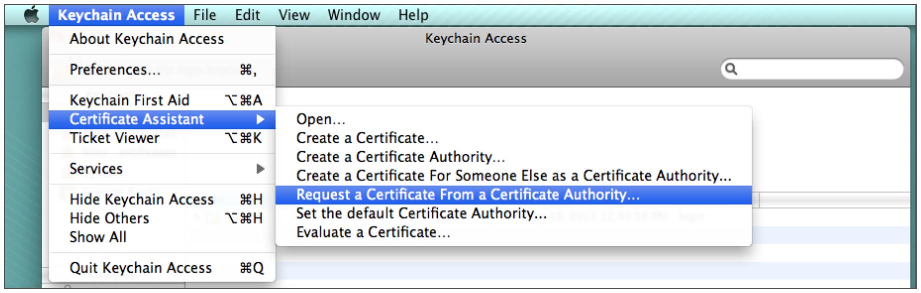
Expires: Tuesday, October 24, 2017 12:17:50 PM Pacific Daylight Time

This root certificate is not trusted

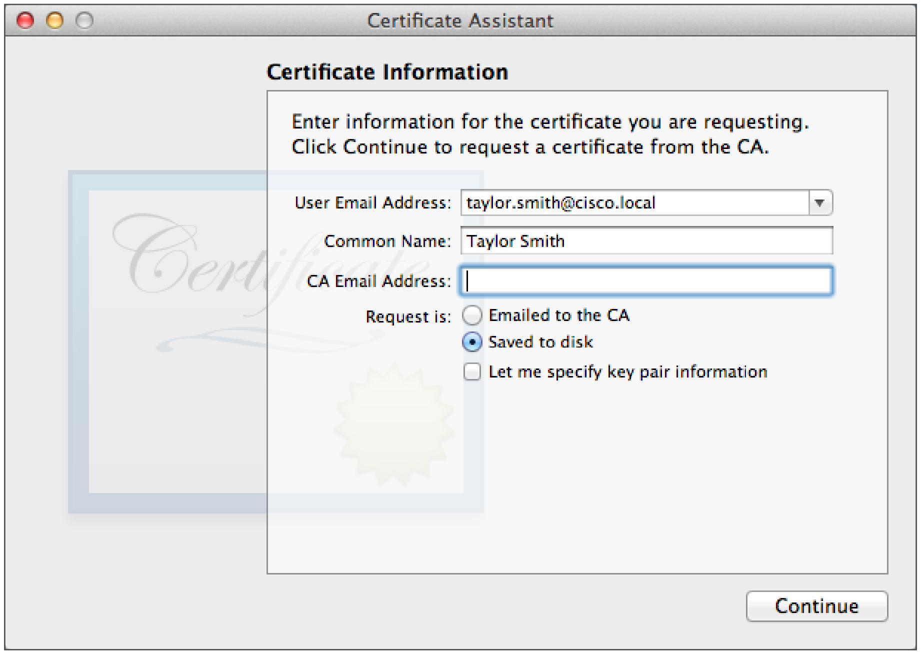
Procedure 2 Request user certificate

Next, you need to obtain a user certificate for the Mac. To do this, first you need to generate a certificate signing request, and then request the certificate from the CA.

Step 1: In the Keychain Access utility, from the **Keychain Access** menu, choose **Certificate Assistant > Request a Certificate from a Certificate Authority**.



Step 2: In the Certificate Assistant, enter the Mac user's email address and common name (typically the user's first and last names), select **Saved to Disk**, and then click **Continue**.



Certificate Information

Enter information for the certificate you are requesting.
Click Continue to request a certificate from the CA.

User Email Address: taylor.smith@cisco.local

Common Name: Taylor Smith

CA Email Address:

Request is: ○ Emailed to the CA
● Saved to disk
□ Let me specify key pair information

Step 3: Enter a file name and location, and then click **Save**.

Step 4: Click **Done**.

Step 5: On the Mac, browse to http://ca.cisco.local/certsrv.

Step 6: Authenticate to the CA as the user for which you wish to obtain a certificate.

Tech Tip

If you still have the browser window open from when you downloaded the trusted root certificate, click **Home** in the upper right corner. This returns you to the main page of the CA.

Step 7: Click **Request a certificate**.

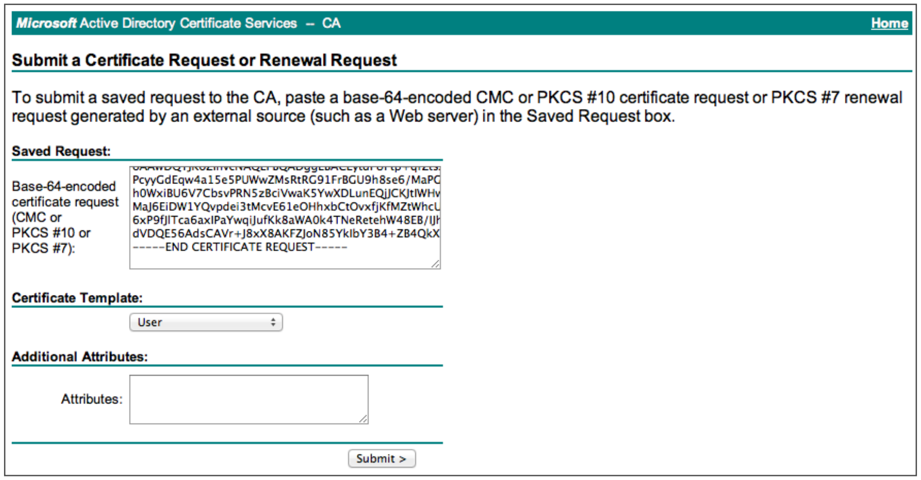
Step 8: Click **advanced certificate request**.

Step 9: In a text editor, such as TextEdit, open the certificate request file saved in Step 3.

Step 10: Select all the text, and then copy it to the clipboard.

Step 11: In the browser, on the Submit a Certificate Request or Renewal Request page, in the **Saved Request** box, paste the certificate contents.

Step 12: In the **Certificate Template** list, choose **User,** and then click **Submit**.



Submit a Certificate Request or Renewal Request

To submit a saved request to the CA, paste a base-64-encoded CMC or PKCS #10 certificate request or PKCS #7 renewal request generated by an external source (such as a Web server) in the Saved Request box.

Saved Request:

Base-64-encoded certificate request (CMC or PKCS #10 or PKCS #7):

PcyyGdEqw4a15e5PUWwZMsRtRG91FrBGU9h8se6/MaPC
h0WxiBU6V7CbsvPRN5zBciVwaK5YwXDLunEQjJCKJtlWHv
MaJ6EiDW1YQvpdei3tMcvE61eOHhxbCtOvxfjKfMZtWhcU
6xP9fJlTca6axlPaYwqiJufKk8aWA0k4TNeRetehW48EB/IJh
dVDQE56AdsCAVr+J8xX8AKFZJoN85YklbY3B4+ZB4QkX
-----END CERTIFICATE REQUEST-----

Certificate Template:

User

Additional Attributes:

Attributes:

Step 13: Select **DER encoded,** and then click **Download certificate**. This saves the certificate.

Step 14: In Finder, locate the saved certificate, and then double-click it. The Keychain Access utility imports the certificate.

Configure Mac OS X Supplicant

When accessing an 802.1X enabled network, Mac OS X will prompt you for a username and password. You will be connected to the network using PEAP and this will be stored in a configuration profile. To configure the 802.1X to use certificates and EAP-TLS in Mac OS X 10.8, you will manually create a configuration profile. This process is documented in detail in the white paper 802.1X Authentication available from Apple.

Any device that doesn't have a certificate that wishes to use 802.1X will use PEAP to gain access to the network. Monitor mode is running on the wired network, so endpoints that aren't configured for 802.1X still get access by using MAC Authentication Bypass (MAB).

Enable Authorization

The network infrastructure is now configured for 8021.X authentication in monitor mode, and you have installed certificates on the endpoints and configured their 802.1X supplicants. Upon successful authentication, the endpoint is granted full network access. However, monitor mode allows for endpoints that fail 802.1X to access the network using MAB. This is a good point in the deployment to stop to verify that certificates are deployed to all endpoints and supplicants are configured correctly without impacting the users' network connectivity. You can monitor the logs to determine who is failing authentication and then correct those issues.

The next step would be to deploy some form of authorization to control what authenticated endpoints can access on the network. This next phase is called *low-impact mode*. In low-impact mode, endpoints are authenticated with either 802.1X or MAB. MAB is used for devices that require network access but either don't support 802.1X or don't have 802.1X configured. In this example, we are using MAB to authenticate IP phones and wireless access points that we will identify with device profiling. Any other device will have to successfully authenticate with 802.1X, or it will not have access to the network. After authentication, the endpoint is given full access to the network, but prior to authentication, the endpoint will only have access to the services necessary for authentication.

Process

Enabling Authorization for Cisco IP Phones

1. Enable Cisco IP Phone policy

There is a built-in policy in Cisco ISE for Cisco IP Phones that was disabled in a previous section. You will enable this policy and create an authorization profile for Cisco IP Phones.

Procedure 1 Enable Cisco IP Phone policy

Step 1: Connect to http://ise-1.cisco.local.

Step 2: From the Policy menu, select **Authorization**.

Step 3: For the Profiled Cisco IP Phones rule, click **Edit**.

Step 4: Click the grey circle icon at the front of the rule, and then choose **Enabled**.

Step 5: Click **Done**, and then click **Save**.

Process

Enabling Authorization for Wireless Access Points

1. Create an identity group
2. Create authorization profile
3. Create authorization policy

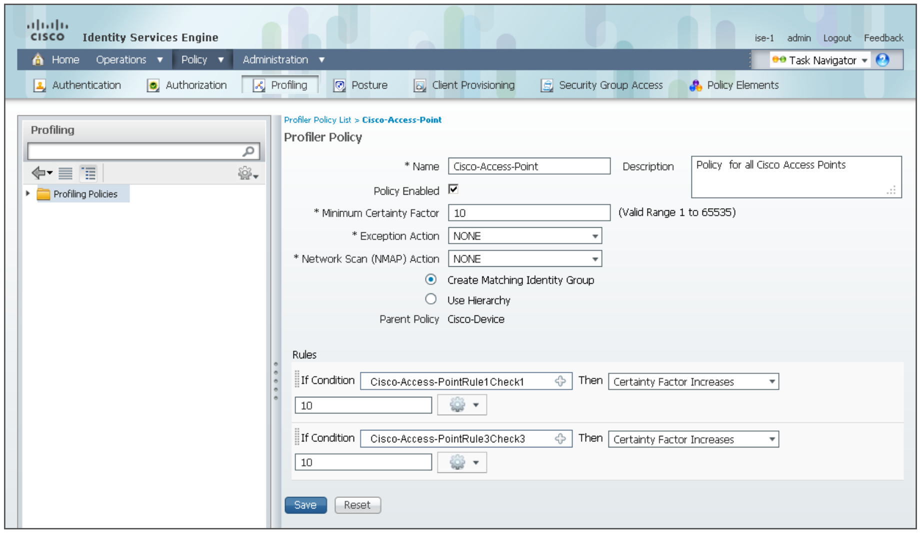
You will create an authorization profile for wireless access points (APs) that is similar to the one for Cisco IP Phones.

Procedure 1 Create an identity group

Step 1: On the menu bar, mouse over **Policy**, and then select **Profiling**.

Step 2: In the **endpoint policies** list, choose **Cisco-Access-Point**.

Step 3: Make sure **Create Matching Identity Group** is selected, and then click **Save**.



Profiler Policy List > Cisco-Access-Point

Profiler Policy

* Name: Cisco-Access-Point

Description: Policy for all Cisco Access Points

Policy Enabled: ☑

* Minimum Certainty Factor: 10 (Valid Range 1 to 65535)

* Exception Action: NONE

* Network Scan (NMAP) Action: NONE

● Create Matching Identity Group

○ Use Hierarchy

Parent Policy: Cisco-Device

Rules

If Condition: Cisco-Access-PointRule1Check1 Then: Certainty Factor Increases 10

If Condition: Cisco-Access-PointRule3Check3 Then: Certainty Factor Increases 10

Procedure 2 Create authorization profile

An authorization profile defines the specific access policies granted to the device. You will create a policy for access points to permit full access. Although there is already a built-in profile like this, creating a new one will allow you to modify the policy if you choose to make a more restrictive policy in the future.

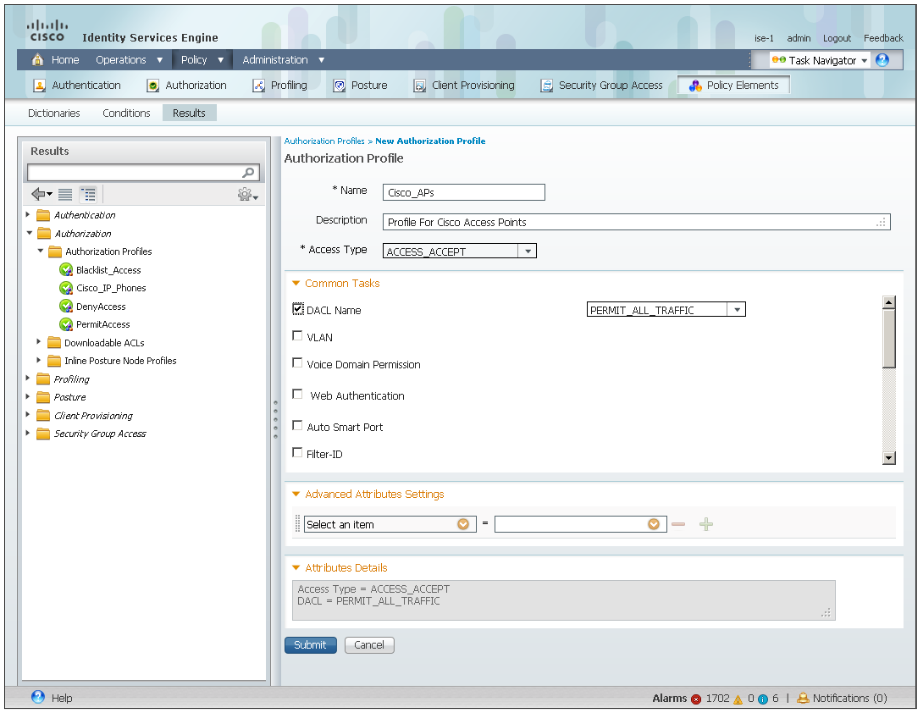
Step 1: On the menu bar, mouse over **Policy**, and then in the Policy Elements section, select **Results**.

Step 2: In the panel on the left, double-click **Authorization**, and then double-click **Authorization Profiles**.

Step 3: Click **Add**.

Step 4: Name the profile Cisco_APs and give a description.

Step 5: Select **DACL Name** and in the list, make sure **PERMIT_ALL_TRAFFIC** is selected, and then click **Submit**.



Identity Services Engine
ise-1 admin Logout Feedback
Home Operations Policy Administration
Task Navigator
Authentication Authorization Profiling Posture Client Provisioning Security Group Access Policy Elements
Dictionaries Conditions Results
Results
Authentication
Authorization
Authorization Profiles
Blacklist_Access
Cisco_IP_Phones
DenyAccess
PermitAccess
Downloadable ACLs
Inline Posture Node Profiles
Profiling
Posture
Client Provisioning
Security Group Access
Authorization Profiles > New Authorization Profile
Authorization Profile
Common Tasks
Advanced Attributes Settings
Select an item
Attributes Details
Submit
Cancel
Help
Alarms 1702 0 6 Notifications (0)

* Name: Cisco_APs

Description: Profile For Cisco Access Points

* Access Type: ACCESS_ACCEPT

☑ DACL Name: PERMIT_ALL_TRAFFIC

□ VLAN

□ Voice Domain Permission

□ Web Authentication

□ Auto Smart Port

□ Filter-ID

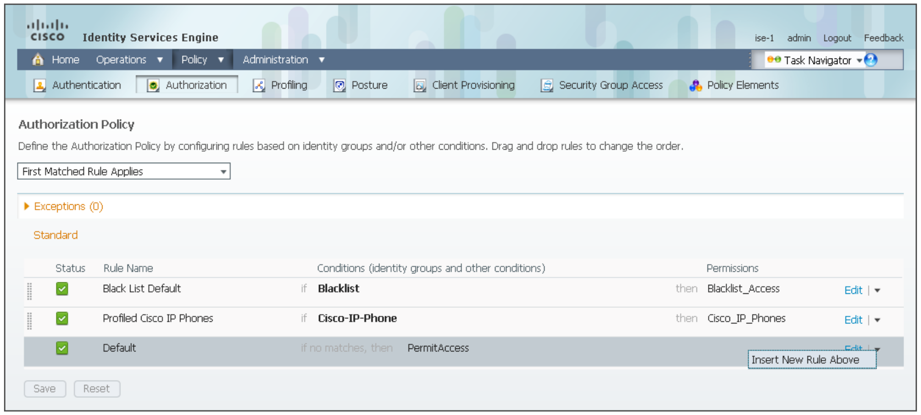
Attributes Details:

Access Type = ACCESS_ACCEPT
DACL = PERMIT_ALL_TRAFFIC

Procedure 3 Create authorization policy

Step 1: On the menu bar, mouse over **Policy**, and then select **Authorization**.

Step 2: For the Default rule, on the right, click the black triangle symbol, and then select **Insert New Rule Above**. A new rule named Standard Rule 1 is created.



Identity Services Engine
ise-1 admin Logout Feedback
Home Operations Policy Administration
Task Navigator
Authentication Authorization Profiling Posture Client Provisioning Security Group Access Policy Elements
Exceptions (0)
Standard
Edit
Insert New Rule Above
Save
Reset

Authorization Policy

Define the Authorization Policy by configuring rules based on identity groups and/or other conditions. Drag and drop rules to change the order.

First Matched Rule Applies

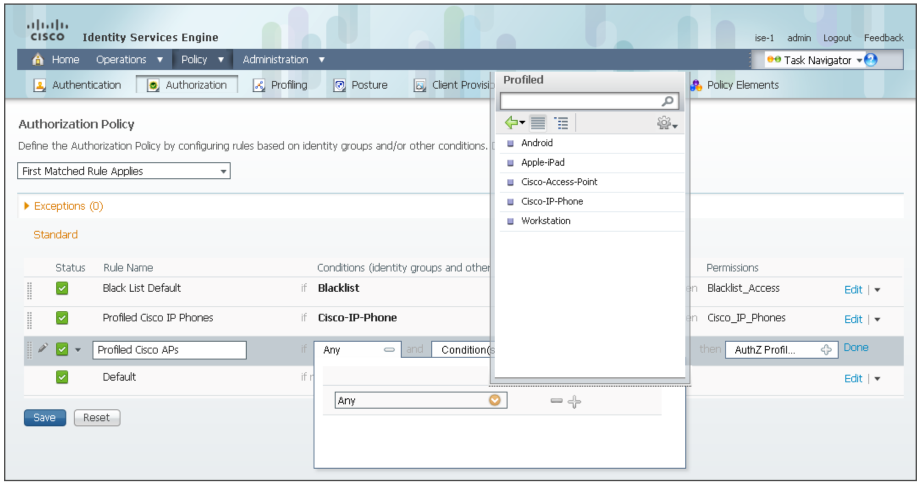
Status	Rule Name		Conditions (identity groups and other conditions)		Permissions
✓	Black List Default	if	Blacklist	then	Blacklist_Access
✓	Profiled Cisco IP Phones	if	Cisco-IP-Phone	then	Cisco_IP_Phones
✓	Default		if no matches, then		PermitAccess

Step 3: Rename the rule Profiled Cisco APs.

Step 4: For the new rule, in the Conditions column, next to **Any**, click the **+** symbol.

Step 5: From the list, next to **Endpoint Identity Groups**, click the > symbol and then next to Profiled, click the > symbol.

Step 6: Choose **Cisco-Access-Point**.



Identity Services Engine
ise-1 admin Logout Feedback
Home Operations Policy Administration
Task Navigator
Authentication Authorization Profiling Posture Client Provisioning Policy Elements
Exceptions (0)
Standard
Edit
Done
Save
Reset

Authorization Policy

Define the Authorization Policy by configuring rules based on identity groups and/or other conditions.

First Matched Rule Applies

Profiled

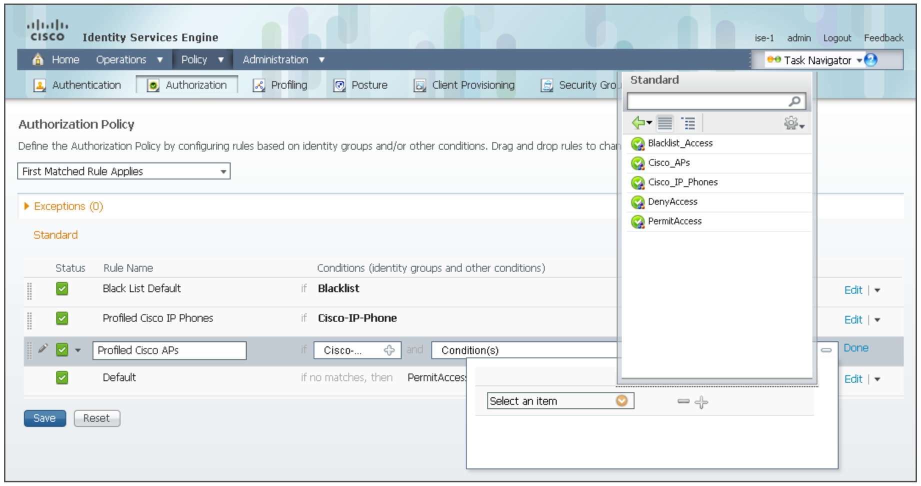
- Android
- Apple-iPad
- Cisco-Access-Point
- Cisco-IP-Phone
- Workstation

Status	Rule Name		Conditions (identity groups and other		Permissions
✓	Black List Default	if	Blacklist		Blacklist_Access
✓	Profiled Cisco IP Phones	if	Cisco-IP-Phone		Cisco_IP_Phones
✓	Profiled Cisco APs	if	Any and Condition(s	then	AuthZ Profil...
✓	Default	if			

Any

Step 7: Under the Permissions column, next to AuthZ Profile, click the **+** symbol.

Step 8: In the list, next to Standard, click the **>** symbol, and then choose **Cisco_APs**.


Identity Services Engine
ise-1 admin Logout Feedback
Home Operations Policy Administration
Task Navigator
Authentication Authorization Profiling Posture Client Provisioning Security Gro
Standard
Blacklist_Access
Cisco_APs
Cisco_IP_Phones
DenyAccess
PermitAccess
Select an item
Save Reset

Authorization Policy

Define the Authorization Policy by configuring rules based on identity groups and/or other conditions. Drag and drop rules to chan

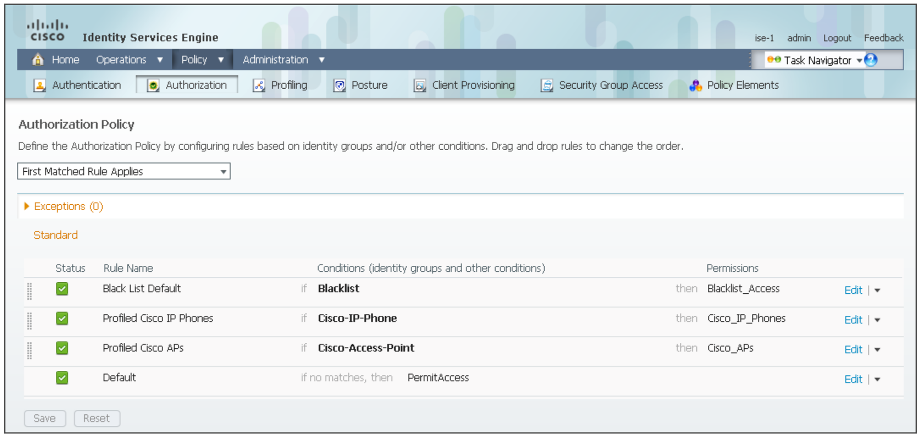
First Matched Rule Applies

Exceptions (0)

Standard

Status	Rule Name		Conditions (identity groups and other conditions)		
☑	Black List Default	if	**Blacklist**		Edit
☑	Profiled Cisco IP Phones	if	**Cisco-IP-Phone**		Edit
☑	Profiled Cisco APs	if	Cisco-... and Condition(s)		Done
☑	Default	if no matches, then	PermitAcces		Edit

Step 9: Click **Done**, and then click **Save**.


Identity Services Engine
ise-1 admin Logout Feedback
Home Operations Policy Administration
Task Navigator
Authentication Authorization Profiling Posture Client Provisioning Security Group Access Policy Elements
Save Reset

Authorization Policy

Define the Authorization Policy by configuring rules based on identity groups and/or other conditions. Drag and drop rules to change the order.

First Matched Rule Applies

Exceptions (0)

Standard

Status	Rule Name		Conditions (identity groups and other conditions)		Permissions	
☑	Black List Default	if	**Blacklist**	then	Blacklist_Access	Edit
☑	Profiled Cisco IP Phones	if	**Cisco-IP-Phone**	then	Cisco_IP_Phones	Edit
☑	Profiled Cisco APs	if	**Cisco-Access-Point**	then	Cisco_APs	Edit
☑	Default	if no matches, then	PermitAccess			Edit

Process

Modifying the MAB Authentication Policy

1. Modify MAB authentication rule

Because you have deployed monitor mode, the current MAB authentication policy allows endpoints access to the network even if they fail authentication. Now that you will be implementing low-impact mode, you need to modify the MAB policy to reject endpoints that fail authentication. This change works with the authorization policies for Cisco IP Phones and access points to be the only devices allowed on the network without performing 802.1X authentication.

Procedure 1 Modify MAB authentication rule

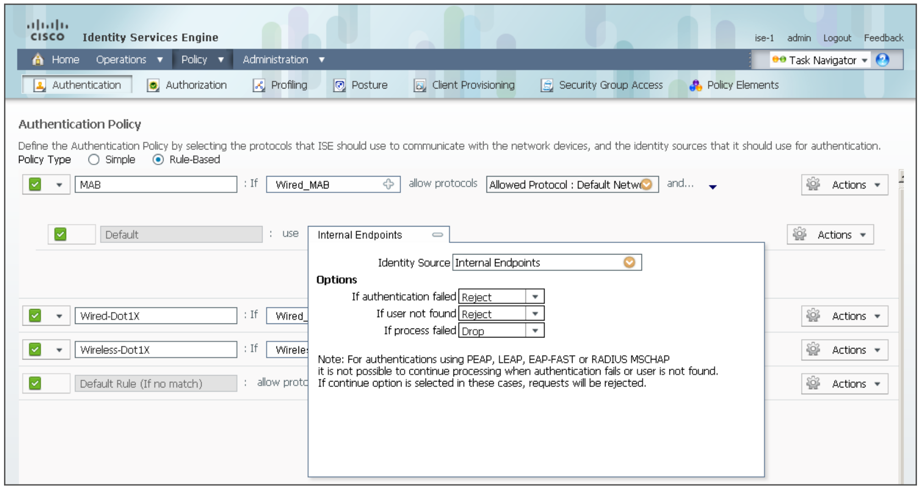
Step 1: On the menu bar, mouse over **Policy**, and then select **Authentication**.

Step 2: On the **MAB** rule, to the right of the and..., click the black triangle. This displays the identity store for this rule.

Step 3: Next to Internal Endpoints, click the **+** symbol.

Step 4: In the **If authentication failed** and **If user not found** lists, choose **Reject**.

Step 5: Click anywhere in the window to continue, and then click **Save**.


cisco Identity Services Engine
ise-1 admin Logout Feedback
Home Operations ▾ Policy ▾ Administration ▾
Task Navigator ▾
Authentication Authorization Profiling Posture Client Provisioning Security Group Access Policy Elements
Actions ▾

Authentication Policy

Define the Authentication Policy by selecting the protocols that ISE should use to communicate with the network devices, and the identity sources that it should use for authentication.

Policy Type ○ Simple ● Rule-Based

☑ MAB : If Wired_MAB allow protocols Allowed Protocol : Default Netw and...

☑ Default : use Internal Endpoints

Identity Source Internal Endpoints

Options

If authentication failed Reject

If user not found Reject

If process failed Drop

Note: For authentications using PEAP, LEAP, EAP-FAST or RADIUS MSCHAP
it is not possible to continue processing when authentication fails or user is not found.
If continue option is selected in these cases, requests will be rejected.

☑ Wired-Dot1X : If Wired_

☑ Wireless-Dot1X : If Wirele

☑ Default Rule (If no match) : allow proto

Process

Enabling Authorization for Wired Endpoints

1. Create authorization profile
2. Create authorization policy
3. Enable low-impact mode
4. Enable low impact mode on Catalyst 4500
5. Enable change of authorization
6. Enable CoA on Catalyst 4500

You will enable authorization for wired endpoints that authenticate using digital certificates. At this stage, once authenticated, the endpoint will be granted full access to the network. This policy can be modified if you choose a more restrictive policy in the future.

Procedure 1 Create authorization profile

An authorization profile defines the specific access policies granted to the device. You will create a profile for wired endpoints to permit full access.

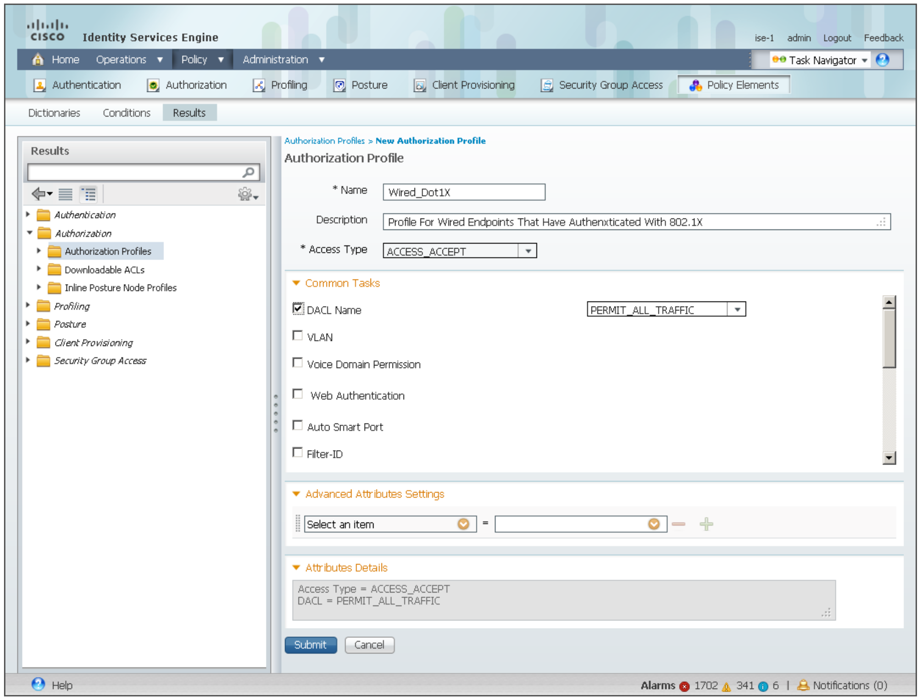
Step 1: On the menu bar, mouse over **Policy**, and then in the Policy Elements section, select **Results**.

Step 2: In the panel on the left, double-click **Authorization**, and then double-click **Authorization Profiles**.

Step 3: Click **Add**.

Step 4: Name the profile Wired_Dot1X and give a description.

Step 5: Select **DACL Name** and in the list, make sure **PERMIT_ALL_TRAFFIC** is selected, and then click **Submit**.


cisco Identity Services Engine
ise-1 admin Logout Feedback
Home Operations ▾ Policy ▾ Administration ▾
Task Navigator ▾
Authentication Authorization Profiling Posture Client Provisioning Security Group Access Policy Elements
Dictionaries Conditions Results
Results
Authentication
Authorization
Authorization Profiles
Downloadable ACLs
Inline Posture Node Profiles
Profiling
Posture
Client Provisioning
Security Group Access
Submit Cancel
Help
Alarms 1702 341 6 | Notifications (0)

Authorization Profiles > New Authorization Profile

Authorization Profile

* Name Wired_Dot1X

Description Profile For Wired Endpoints That Have Authenxticated With 802.1X

* Access Type ACCESS_ACCEPT

Common Tasks

☑ DACL Name PERMIT_ALL_TRAFFIC

☐ VLAN

☐ Voice Domain Permission

☐ Web Authentication

☐ Auto Smart Port

☐ Filter-ID

Advanced Attributes Settings

Select an item =

Attributes Details

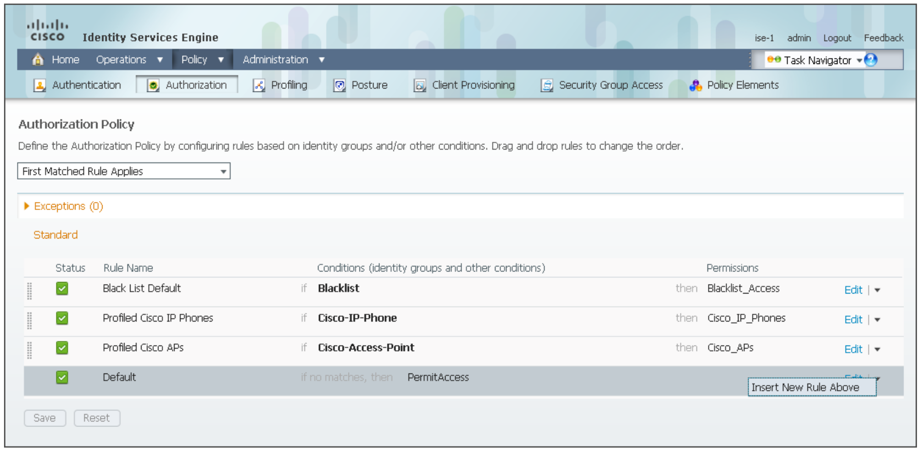
Access Type = ACCESS_ACCEPT
DACL = PERMIT_ALL_TRAFFIC

Procedure 2 Create authorization policy

Now you need to define an authorization policy for wired endpoints and apply the authorization profile.

Step 1: On the menu bar, mouse over **Policy**, and then select **Authorization**.

Step 2: For the Default rule, on the right, click the black triangle symbol, and then select **Insert New Rule Above**. A new rule named Standard Rule 1 is created.



Authorization Policy

Define the Authorization Policy by configuring rules based on identity groups and/or other conditions. Drag and drop rules to change the order.

First Matched Rule Applies

Exceptions (0)

Standard

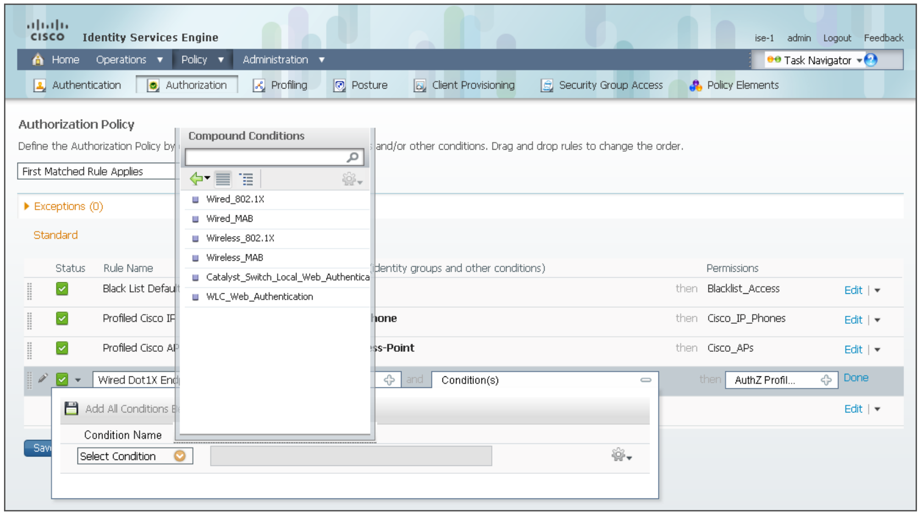
Status	Rule Name	Conditions (identity groups and other conditions)	Permissions
☑	Black List Default	if Blacklist	then Blacklist_Access
☑	Profiled Cisco IP Phones	if Cisco-IP-Phone	then Cisco_IP_Phones
☑	Profiled Cisco APs	if Cisco-Access-Point	then Cisco_APs
☑	Default	if no matches, then PermitAccess	

Step 3: Rename the rule Wired Dot1X Endpoints.

Step 4: For the new rule, in the Conditions column, next to Condition(s), click the + symbol.

Step 5: Click **Select Existing Condition from Library**.

Step 6: In the list, next to Compound Conditions, click the > symbol, and then choose **Wired_802.1X**.



Authorization Policy

Define the Authorization Policy by … and/or other conditions. Drag and drop rules to change the order.

First Matched Rule Applies

Exceptions (0)

Standard

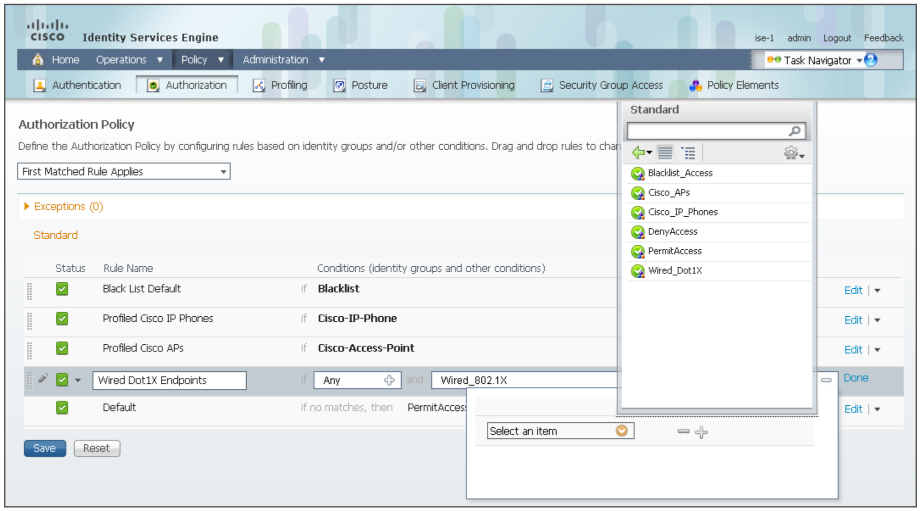
Compound Conditions

- Wired_802.1X
- Wired_MAB
- Wireless_802.1X
- Wireless_MAB
- Catalyst_Switch_Local_Web_Authentica
- WLC_Web_Authentication

Status	Rule Name	…dentity groups and other conditions)	Permissions
☑	Black List Defau		then Blacklist_Access
☑	Profiled Cisco IP	hone	then Cisco_IP_Phones
☑	Profiled Cisco AP	ss-Point	then Cisco_APs
☑	Wired Dot1X End	and Condition(s)	then AuthZ Profil...

Step 7: Under the Permissions column, next to AuthZ Profile, click the + symbol.

Step 8: In the list, next to Standard, click the > symbol, and then choose Wired_Dot1X.



Authorization Policy

Define the Authorization Policy by configuring rules based on identity groups and/or other conditions. Drag and drop rules to char

First Matched Rule Applies

Exceptions (0)

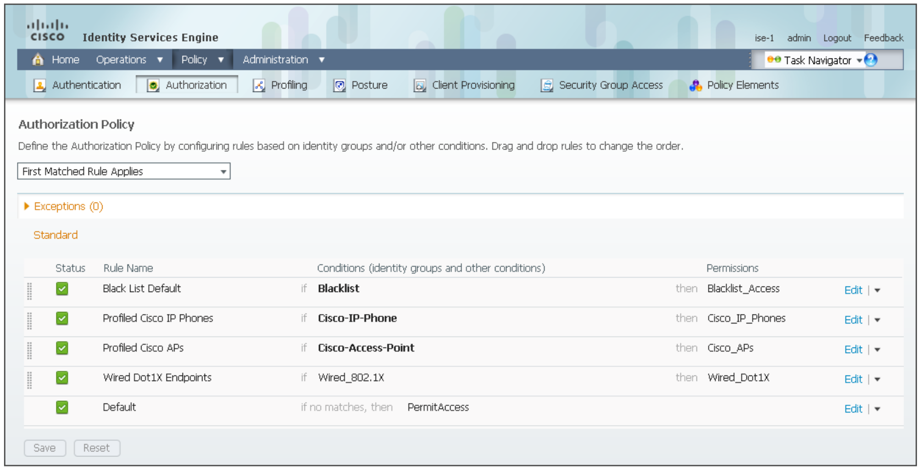
Standard

Standard

- Blacklist_Access
- Cisco_APs
- Cisco_IP_Phones
- DenyAccess
- PermitAccess
- Wired_Dot1X

Status	Rule Name	Conditions (identity groups and other conditions)
☑	Black List Default	if Blacklist
☑	Profiled Cisco IP Phones	if Cisco-IP-Phone
☑	Profiled Cisco APs	if Cisco-Access-Point
☑	Wired Dot1X Endpoints	if Any and Wired_802.1X
☑	Default	if no matches, then PermitAcces

Step 9: Click **Done**, and then click **Save**.


Identity Services Engine
ise-1 admin Logout Feedback
Home Operations ▼ Policy ▼ Administration ▼
Task Navigator
Authentication Authorization Profiling Posture Client Provisioning Security Group Access Policy Elements

Authorization Policy

Define the Authorization Policy by configuring rules based on identity groups and/or other conditions. Drag and drop rules to change the order.

First Matched Rule Applies

Exceptions (0)

Standard

Status	Rule Name		Conditions (identity groups and other conditions)		Permissions	
☑	Black List Default	if	**Blacklist**	then	Blacklist_Access	Edit | ▾
☑	Profiled Cisco IP Phones	if	**Cisco-IP-Phone**	then	Cisco_IP_Phones	Edit | ▾
☑	Profiled Cisco APs	if	**Cisco-Access-Point**	then	Cisco_APs	Edit | ▾
☑	Wired Dot1X Endpoints	if	Wired_802.1X	then	Wired_Dot1X	Edit | ▾
☑	Default	if no matches, then	PermitAccess			Edit | ▾

Procedure 3 Enable low-impact mode

You will now configure the switches for low-impact mode 802.1X using Cisco Prime LMS 4.2 and the Cisco TrustSec Work Center. You need to create an access list to limit what traffic is permitted on a port before it is authenticated. You only want to enable what is required for the port to go through the authentication process. Typically, this means allowing DHCP, DNS, and TFTP to support Preboot Execution Environment, and access to the AD domain controller. For troubleshooting, you also allow ICMP echo and echo-reply traffic. You deny all other traffic and log the denials in order to determine if there is legitimate traffic that is getting denied and then make changes to the access list.

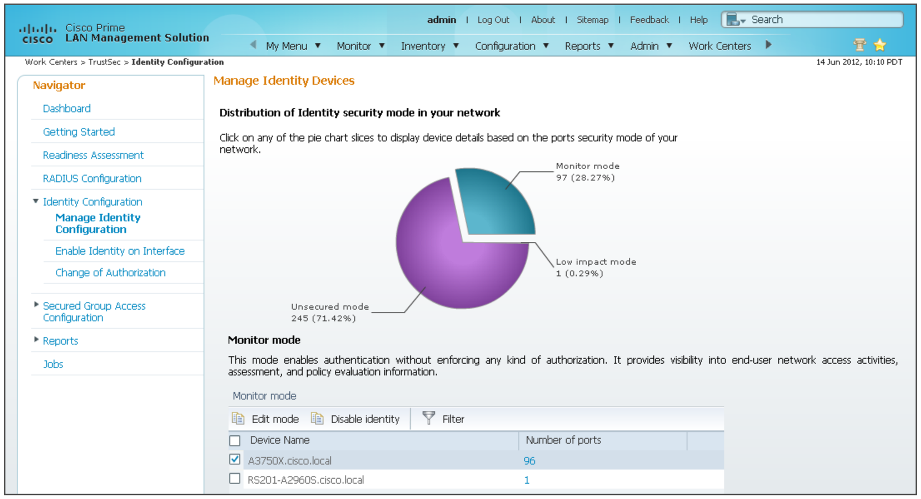
Step 1: Connect to Cisco Prime LMS with a web browser, for example: https://lms.cisco.local.

Step 2: Mouse over **Work Centers** and in the TrustSec section, click **Identity Configuration**.

Step 3: In the Navigator panel on the left, click **Manage Identity Configuration**.

Step 4: In the pie chart, click the Monitor Mode slice. A list of the devices that have ports configured for this mode appears.

Step 5: Select each switch with ports that you wish to move from monitor mode to low-impact mode, and then click **Edit Mode**.


Cisco Prime
LAN Management Solution
admin | Log Out | About | Sitemap | Feedback | Help
Search
My Menu ▼ Monitor ▼ Inventory ▼ Configuration ▼ Reports ▼ Admin ▼ Work Centers
Work Centers > TrustSec > Identity Configuration
14 Jun 2012, 10:10 PDT
Navigator
Dashboard
Getting Started
Readiness Assessment
RADIUS Configuration
Identity Configuration
Manage Identity Configuration
Enable Identity on Interface
Change of Authorization
Secured Group Access Configuration
Reports
Jobs
Monitor mode
97 (28.27%)
Low impact mode
1 (0.29%)
Unsecured mode
245 (71.42%)

Manage Identity Devices

Distribution of Identity security mode in your network

Click on any of the pie chart slices to display device details based on the ports security mode of your network.

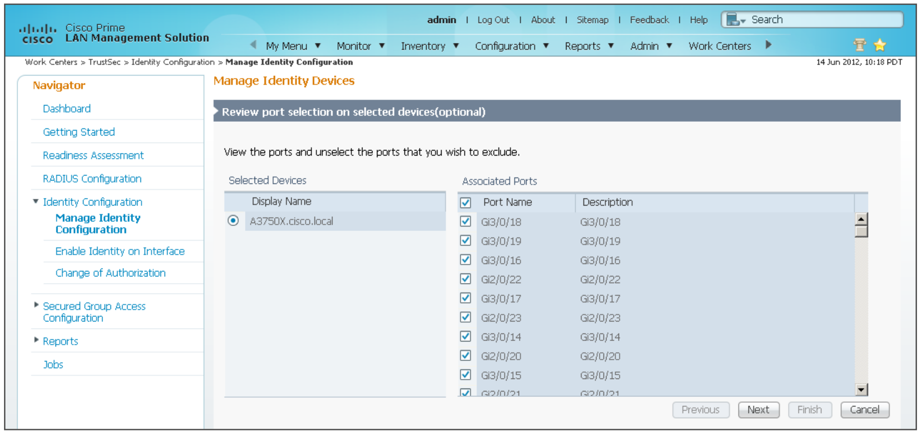
Monitor mode

This mode enables authentication without enforcing any kind of authorization. It provides visibility into end-user network access activities, assessment, and policy evaluation information.

Monitor mode

☐	Device Name	Number of ports
☑	A3750X.cisco.local	96
☐	RS201-A2960S.cisco.local	1

Step 6: Select the check boxes next to the ports that you want to edit, and then click **Next**.


Cisco Prime
LAN Management Solution
admin | Log Out | About | Sitemap | Feedback | Help
Search
My Menu ▼ Monitor ▼ Inventory ▼ Configuration ▼ Reports ▼ Admin ▼ Work Centers
Work Centers > TrustSec > Identity Configuration > Manage Identity Configuration
14 Jun 2012, 10:18 PDT
Navigator
Dashboard
Getting Started
Readiness Assessment
RADIUS Configuration
Identity Configuration
Manage Identity Configuration
Enable Identity on Interface
Change of Authorization
Secured Group Access Configuration
Reports
Jobs

Manage Identity Devices

Review port selection on selected devices(optional)

View the ports and unselect the ports that you wish to exclude.

Selected Devices

	Display Name
●	A3750X.cisco.local

Associated Ports

☑	Port Name	Description
☑	Gi3/0/18	Gi3/0/18
☑	Gi3/0/19	Gi3/0/19
☑	Gi3/0/16	Gi3/0/16
☑	Gi2/0/22	Gi2/0/22
☑	Gi3/0/17	Gi3/0/17
☑	Gi2/0/23	Gi2/0/23
☑	Gi3/0/14	Gi3/0/14
☑	Gi2/0/20	Gi2/0/20
☑	Gi3/0/15	Gi3/0/15
☑	Gi2/0/21	Gi2/0/21

Step 7: In the Identity mode to be configured section, move the **Security Mode** slider to **Low impact**, and then in the **Associated ACL** box, enter **PreAuth**.

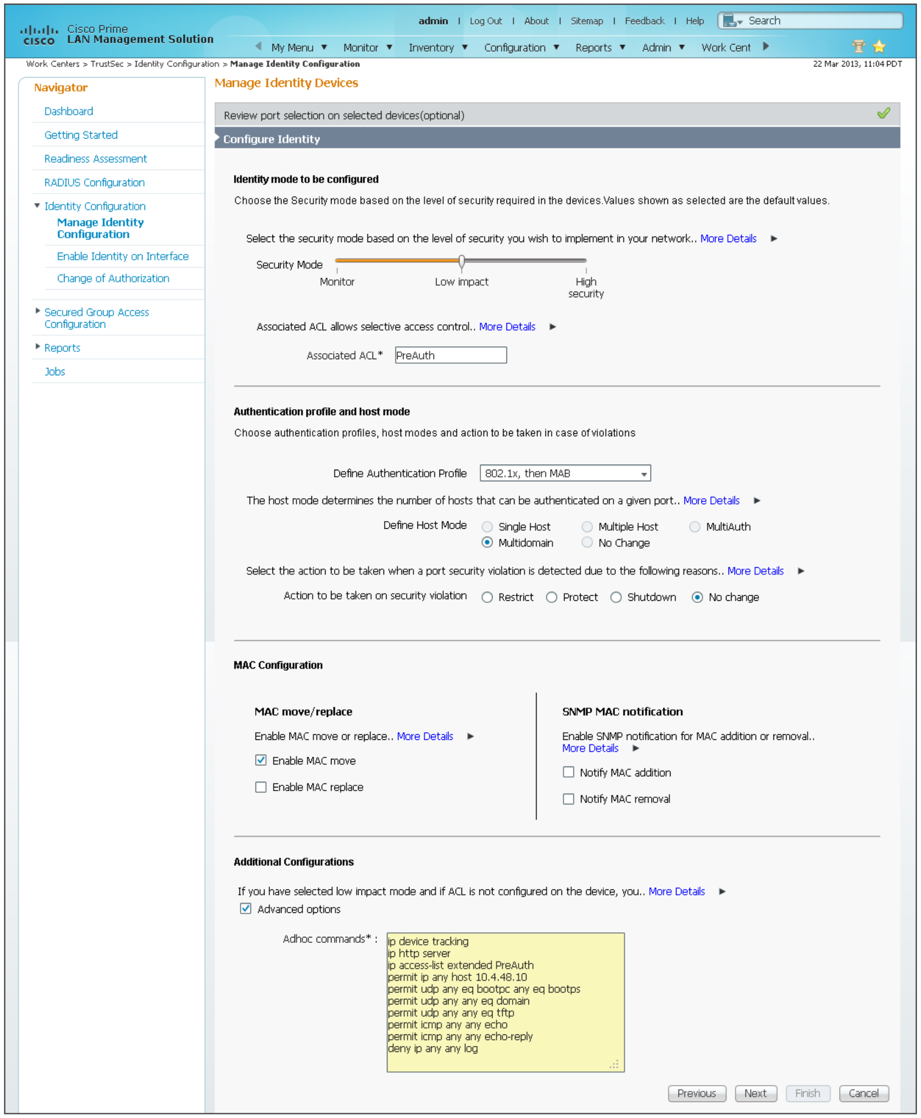
Step 8: . In the Authentication profile and host mode section, set the following values:

- Define Authentication Profile—**802.1X, then MAB**
- Define Host Mode—**Multidomain**
- Action to be taken on security violation—**No Change**

Step 9: In the MAC Configuration section, make sure only **Enable MAC Move** is selected.

Step 10: In the Additional Configurations section, select **Advanced Options**. In the **Adhoc commands** box, enter the following commands, and then click **Next**.

```
ip device tracking
ip access-list extended PreAuth
permit ip any host 10.4.48.10
permit udp any eq bootpc any eq bootps
permit udp any any eq domain
permit udp any any eq tftp
permit icmp any any echo
permit icmp any any echo-reply
deny ip any any log
```



Manage Identity Devices

Review port selection on selected devices(optional)

Configure Identity

Identity mode to be configured

Choose the Security mode based on the level of security required in the devices.Values shown as selected are the default values.

Select the security mode based on the level of security you wish to implement in your network.. More Details

Security Mode: Monitor — Low impact — High security

Associated ACL allows selective access control.. More Details

Associated ACL*: PreAuth

Authentication profile and host mode

Choose authentication profiles, host modes and action to be taken in case of violations

Define Authentication Profile: 802.1x, then MAB

The host mode determines the number of hosts that can be authenticated on a given port.. More Details

Define Host Mode: ○ Single Host ○ Multiple Host ○ MultiAuth ● Multidomain ○ No Change

Select the action to be taken when a port security violation is detected due to the following reasons.. More Details

Action to be taken on security violation: ○ Restrict ○ Protect ○ Shutdown ● No change

MAC Configuration

MAC move/replace

Enable MAC move or replace.. More Details

☑ Enable MAC move

☐ Enable MAC replace

SNMP MAC notification

Enable SNMP notification for MAC addition or removal.. More Details

☐ Notify MAC addition

☐ Notify MAC removal

Additional Configurations

If you have selected low impact mode and if ACL is not configured on the device, you.. More Details

☑ Advanced options

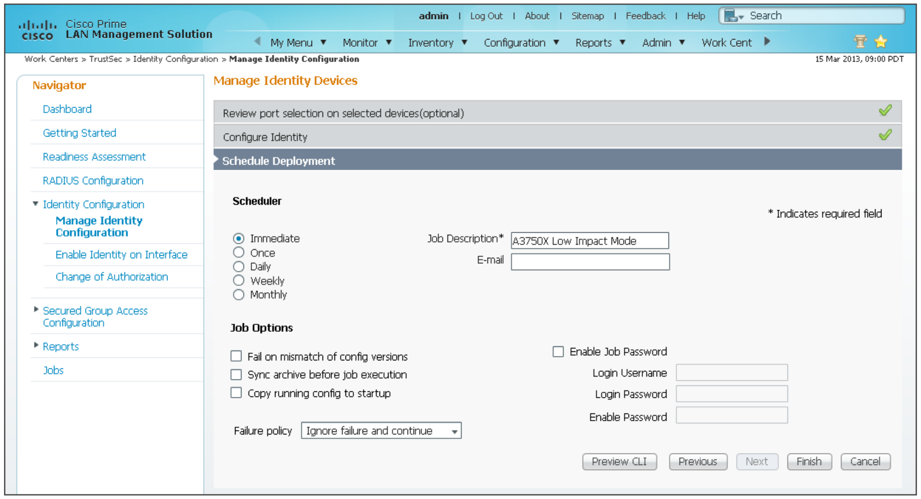
Adhoc commands* :

```
ip device tracking
ip http server
ip access-list extended PreAuth
permit ip any host 10.4.48.10
permit udp any eq bootpc any eq bootps
permit udp any any eq domain
permit udp any any eq tftp
permit icmp any any echo
permit icmp any any echo-reply
deny ip any any log
```

Step 11: In the **Job Description** box, enter a description, and then click **Finish**. The job is submitted and a confirmation message appears. Click **OK**.

Tech Tip

You can review the CLI commands that will be pushed to the switch by clicking **Preview CLI**.



Scheduler

* Indicates required field

● Immediate
○ Once
○ Daily
○ Weekly
○ Monthly

Job Description* A3750X Low Impact Mode

E-mail

Job Options

□ Fail on mismatch of config versions
□ Sync archive before job execution
□ Copy running config to startup

□ Enable Job Password
Login Username
Login Password
Enable Password

Failure policy Ignore failure and continue

The global commands added to the switch configuration at the completion of this procedure are as follows.

```
ip device tracking
ip access-list extended PreAuth
 permit ip any host 10.4.48.10
 permit udp any eq bootpc any eq bootps
 permit udp any any eq domain
 permit udp any any eq tftp
 permit icmp any any echo
 permit icmp any any echo-reply
 deny ip any any log
```

The interface commands added at the completion of this procedure are as follows.

```
interface [interface]
 ip access-group PreAuth in
 authentication host-mode multi-domain
```

Procedure 4 Enable low impact mode on Catalyst 4500

The TrustSec Work Center supports TrustSec 2.0 features, which does not include support for Cisco Catalyst 4500. However, Catalyst 4500 does support all of the features in use. You will have to configure these using the NetConfig feature of Cisco LMS. This procedure covers configuring 802.1X in low impact mode.

Step 1: Connect to the Cisco Prime LMS server by browsing to https://lms.cisco.local:1741.

Step 2: Mouse over **Configuration**, and then, from the Tools section, choose **NetConfig**.

Step 3: In the NetConfig Job Browser, click **Create**.

Step 4: Select **Device Based** for the NetConfig Job Type, and then click **Go**.

Step 5: In the Device Selector, expand **All Devices**, select the devices where you want to enable low impact mode.

Step 6: In the Task Selector, expand **All Tasks**, select **Adhoc**, and then click **Next**.

Step 7: Click **Add Instance**, and then, in the new window, enter the CLI commands necessary to configure low impact mode.

```
ip device tracking
ip access-list extended PreAuth
permit ip any host 10.4.48.10
permit udp any eq bootpc any eq bootps
permit udp any any eq domain
permit udp any any eq tftp
permit icmp any any echo
permit icmp any any echo-reply
deny ip any any log
```

Step 8: Click **Applicable Devices**, select the switch to which you want to apply this configuration, and then click **Close**.

Step 9: For the command mode, choose **Config**, and then click **Save**.

Step 10: After returning to the Add Tasks window, click **Next**.

Step 11: Fill in a description for the job, and then click **Next**. The job is submitted for immediate deployment.

Step 12: Click **Finish**, and then when you receive a notice that the job was submitted successfully, click **OK**.

Step 13: Navigate to **Configuration > Tools > NetConfig**. This opens the Job Browser.

Step 14: Click **Create.** This enables you to configure a new job.

Step 15: Select **Port based**, and then click **Go**.

Step 16: In the tree, next to All Devices, click the **+** symbol, select the switch you are configuring, and then click **Next**.

Tech Tip

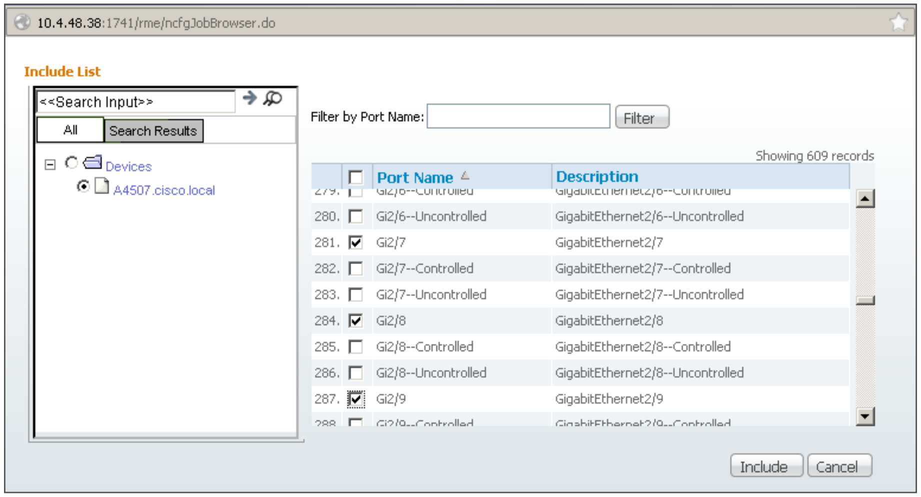
In this example, only one switch is being configured, but you can select multiple switches to accommodate a large deployment. The Group Selector allows you to choose switches by pre-defined groups or by model.

Step 17: Select **Define an Ad-Hoc Rule**. This brings up a new screen.

Step 18: For the ad-hoc rule, in the **Rule text** section, click **Include**.

Step 19: In the Include List section, expand **Devices**, and then select the switch you want to configure for low impact mode.

Step 20: Choose the ports you want to configure for low impact mode, and then click **Include**. The window closes.



	☐	Port Name	Description
279.	☐	Gi2/6--Controlled	GigabitEthernet2/6--Controlled
280.	☐	Gi2/6--Uncontrolled	GigabitEthernet2/6--Uncontrolled
281.	☑	Gi2/7	GigabitEthernet2/7
282.	☐	Gi2/7--Controlled	GigabitEthernet2/7--Controlled
283.	☐	Gi2/7--Uncontrolled	GigabitEthernet2/7--Uncontrolled
284.	☑	Gi2/8	GigabitEthernet2/8
285.	☐	Gi2/8--Controlled	GigabitEthernet2/8--Controlled
286.	☐	Gi2/8--Uncontrolled	GigabitEthernet2/8--Uncontrolled
287.	☑	Gi2/9	GigabitEthernet2/9
288.	☐	Gi2/9--Controlled	GigabitEthernet2/9--Controlled

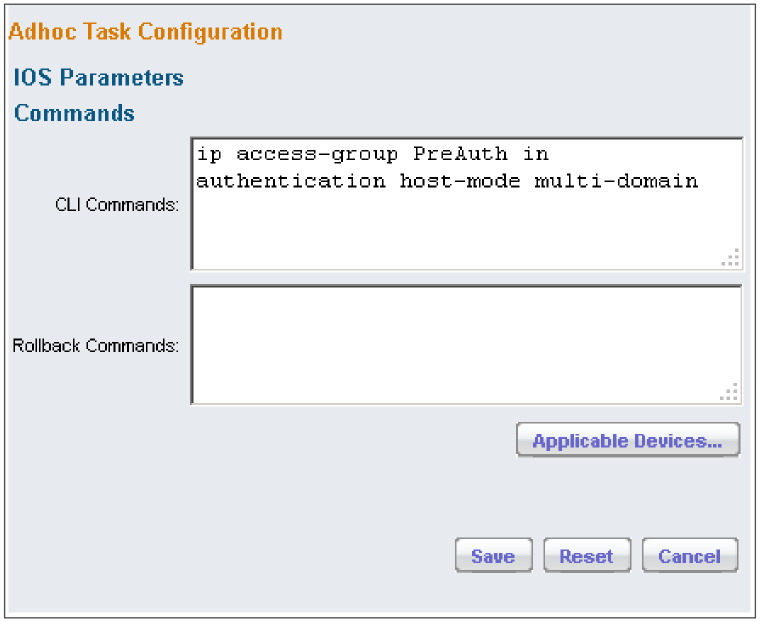
Step 21: Move to step 3 of the wizard by clicking **Next**.

Step 22: In the Task Selector, select **Adhoc Task**, and then click **Next**.

Step 23: Click **Add Instance**, and then, in the new window, enter the CLI commands necessary in order to enable monitor mode and to remove the port security configuration.

```
ip access-group PreAuth in
authentication host-mode multi-domain
```

Step 24: Click **Applicable Devices**, select the switch to which you want to apply this configuration, click **Close**, and then click **Save**.



Adhoc Task Configuration

IOS Parameters

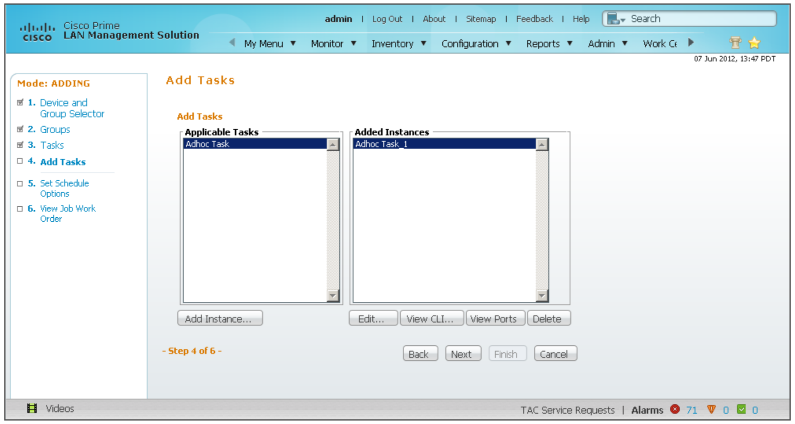
Commands

CLI Commands:

```
ip access-group PreAuth in
authentication host-mode multi-domain
```

Rollback Commands:

Step 25: After returning to the Add Tasks window, click **Next**.



Cisco Prime
LAN Management Solution
admin | Log Out | About | Sitemap | Feedback | Help
Search
My Menu ▼ Monitor ▼ Inventory ▼ Configuration ▼ Reports ▼ Admin ▼ Work Ce

07 Jun 2012, 13:47 PDT

Mode: ADDING

- ☑ 1. Device and Group Selector
- ☑ 2. Groups
- ☑ 3. Tasks
- □ 4. Add Tasks
- □ 5. Set Schedule Options
- □ 6. View Job Work Order

Add Tasks

Add Tasks

Applicable Tasks: Adhoc Task

Added Instances: Adhoc Task_1

Add Instance...
Edit...
View CLI...
View Ports
Delete

- Step 4 of 6 -

Back
Next
Finish
Cancel
Videos
TAC Service Requests | Alarms 71 0 0

Step 26: Fill in a description for the job, and then click **Next**. The job is submitted for immediate deployment.

Step 27: Click **Finish**, and then when you receive a notice that the job was submitted successfully, click **OK**.

Step 28: Repeat this procedure for each Cisco Catalyst 4500 where you need to configure low impact mode.

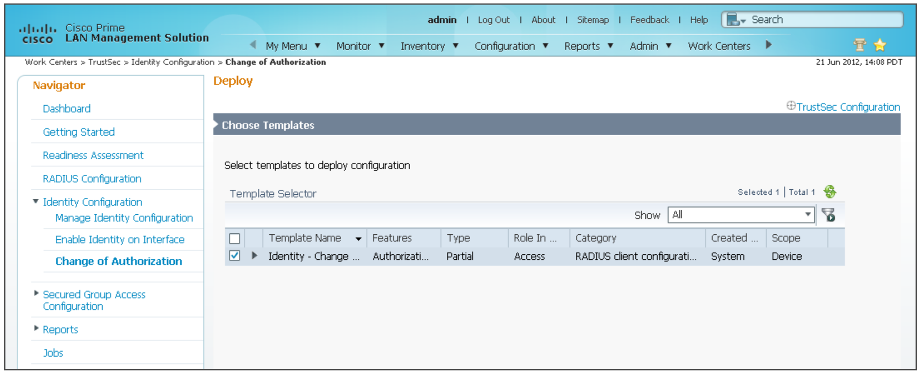
Procedure 5 Enable change of authorization

Authorization requires the use of RADIUS Change of Authorization (CoA) in order to change the state of the port after authentication. This is not enabled by default, and you will need to enable it. You can do this by using the TrustSec Work Center of Cisco Prime LMS 4.2.

Step 1: In Cisco Prime LMS, mouse over **Work Centers**, and then, in the TrustSec section, click **Identity Configuration**.

Step 2: In the Navigator panel on the left, click **Change of Authorization**.

Step 3: Select the built-in **Identity** template, and then click **Next**.



Cisco Prime
LAN Management Solution
admin | Log Out | About | Sitemap | Feedback | Help
Search
My Menu ▼ Monitor ▼ Inventory ▼ Configuration ▼ Reports ▼ Admin ▼ Work Centers

Work Centers > TrustSec > Identity Configuration > **Change of Authorization**

21 Jun 2012, 14:08 PDT

Navigator

- Dashboard
- Getting Started
- Readiness Assessment
- RADIUS Configuration
- Identity Configuration
  - Manage Identity Configuration
  - Enable Identity on Interface
  - Change of Authorization
- Secured Group Access Configuration
- Reports
- Jobs

Deploy

TrustSec Configuration

Choose Templates

Select templates to deploy configuration

Template Selector

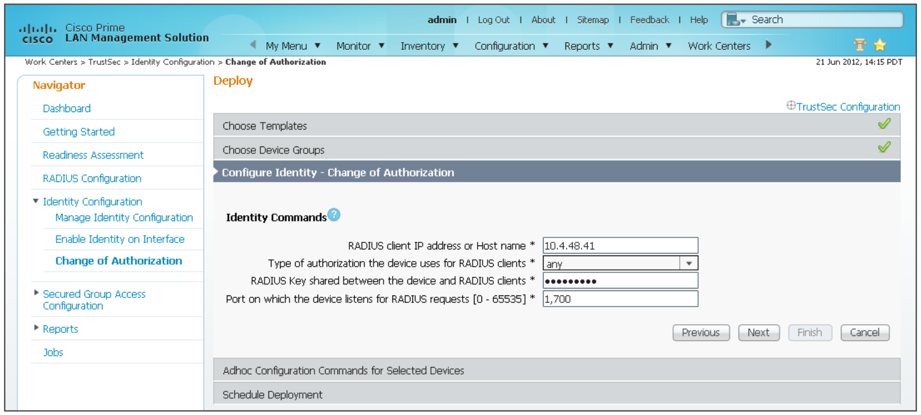
Selected 1 | Total 1

Show: All

□		Template Name	Features	Type	Role In ...	Category	Created ...	Scope
☑	▸	Identity - Change ...	Authorizati...	Partial	Access	RADIUS client configurati...	System	Device

Step 4: In the Device Selector, expand **All Devices**, select the switches you want to enable for CoA, and then click **Next**.

Step 5: Enter the IP address of the primary Cisco ISE administration node, provide the RADIUS key, and then click **Next**.



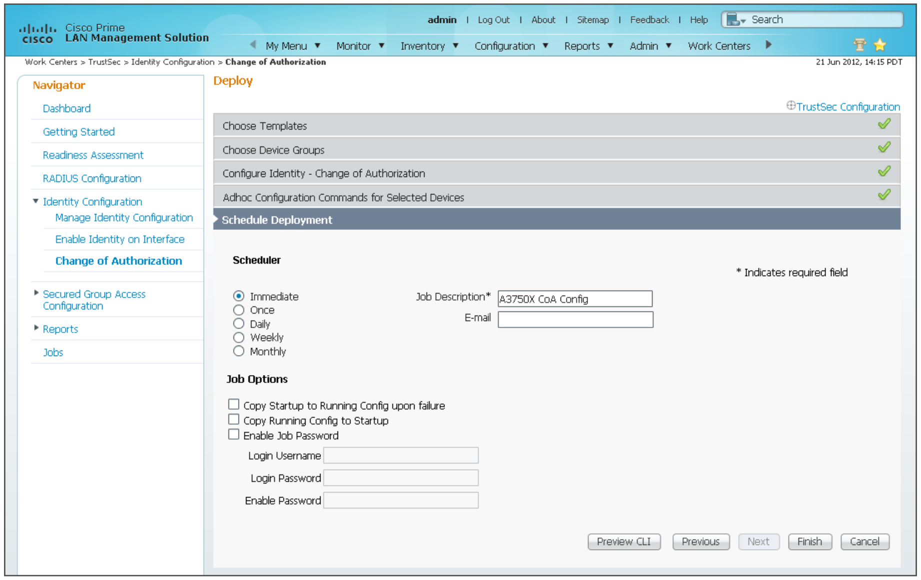
Cisco Prime LAN Management Solution
admin | Log Out | About | Sitemap | Feedback | Help | Search
My Menu ▾ Monitor ▾ Inventory ▾ Configuration ▾ Reports ▾ Admin ▾ Work Centers
Work Centers > TrustSec > Identity Configuration > Change of Authorization
21 Jun 2012, 14:15 PDT
Navigator
Dashboard
Getting Started
Readiness Assessment
RADIUS Configuration
Identity Configuration
Manage Identity Configuration
Enable Identity on Interface
Change of Authorization
Secured Group Access Configuration
Reports
Jobs
Deploy
TrustSec Configuration
Choose Templates ✓
Choose Device Groups ✓
Configure Identity - Change of Authorization
Previous
Next
Finish
Cancel
Adhoc Configuration Commands for Selected Devices
Schedule Deployment

Identity Commands

RADIUS client IP address or Host name * 10.4.48.41
Type of authorization the device uses for RADIUS clients * any
RADIUS Key shared between the device and RADIUS clients * ●●●●●●●●●
Port on which the device listens for RADIUS requests [0 - 65535] * 1,700

Step 6: The Adhoc Configuration page allows you to add commands to the device in addition to the ones generated by the wizard. At this point, you don't need additional commands. Click **Next**.

Step 7: Give the job a description, and then click **Finish**.



Cisco Prime LAN Management Solution
admin | Log Out | About | Sitemap | Feedback | Help | Search
My Menu ▾ Monitor ▾ Inventory ▾ Configuration ▾ Reports ▾ Admin ▾ Work Centers
Work Centers > TrustSec > Identity Configuration > Change of Authorization
21 Jun 2012, 14:15 PDT
Navigator
Dashboard
Getting Started
Readiness Assessment
RADIUS Configuration
Identity Configuration
Manage Identity Configuration
Enable Identity on Interface
Change of Authorization
Secured Group Access Configuration
Reports
Jobs
Deploy
TrustSec Configuration
Choose Templates ✓
Choose Device Groups ✓
Configure Identity - Change of Authorization ✓
Adhoc Configuration Commands for Selected Devices ✓
Schedule Deployment
Preview CLI
Previous
Next
Finish
Cancel

Scheduler

* Indicates required field

● Immediate
○ Once
○ Daily
○ Weekly
○ Monthly

Job Description* A3750X CoA Config
E-mail

Job Options

□ Copy Startup to Running Config upon failure
□ Copy Running Config to Startup
□ Enable Job Password

Login Username
Login Password
Enable Password

Step 8: Repeat these steps for the secondary Cisco ISE administration node.

The global commands added to the switch configuration at the completion of this procedure are as follows.

```
aaa server radius dynamic-author
  client 10.4.48.41 server-key [key]
  client 10.4.48.42 server-key [key]
  auth-type any
```

Procedure 6 Enable CoA on Catalyst 4500

The TrustSec Work Center supports TrustSec 2.0 features, which does not include support for Cisco Catalyst 4500. However, Catalyst 4500 does support all of the features in use. You will have to configure these using the NetConfig feature of Cisco LMS. This procedure covers configuring RADIUS change of authorization.

Step 1: Connect to the Cisco Prime LMS server by browsing to https://lms.cisco.local:1741.

Step 2: Mouse over **Configuration**, and then, from the Tools section, choose **NetConfig**.

Step 3: In the NetConfig Job Browser, click **Create**.

Step 4: Select **Device Based** for the NetConfig Job Type, and then click **Go**.

Step 5: In the Device Selector, expand **All Devices**, select the devices where you want to enable change of authorization.

Step 6: In the Task Selector, expand **All Tasks**, select **Adhoc**, and then click **Next**.

Step 7: Click **Add Instance**, and then, in the new window, enter the CLI commands necessary to enable change of authorization.

```
aaa server radius dynamic-author
  client 10.4.48.41 server-key [key]
  client 10.4.48.42 server-key [key]
  auth-type any
```

Step 8: Click **Applicable Devices**, select the switch to which you want to apply this configuration, click **Close**, choose **Config** for the command mode, and then click **Save**.

Step 9: After returning to the Add Tasks window, click **Next**.

Step 10: Fill in a description for the job, and then click **Next**. The job is submitted for immediate deployment.

Step 11: Click **Finish**, and then when you receive a notice that the job was submitted successfully, click **OK**.

Step 12: Repeat this procedure for each Cisco Catalyst 4500 switch where you want to enable RADIUS change of authorization.

Process

Enabling Authorization for Wireless Endpoints

1. Create authorization profile
2. Create authorization policy

You will enable authorization for wireless endpoints that authenticate using digital certificates. At this stage, once authenticated, the endpoint will be granted full access to the network. This policy can be modified if you choose a more restrictive policy in the future.

Procedure 1 Create authorization profile

An authorization profile defines the specific access policies granted to the device. You will create a policy for wireless endpoints to permit full access. By default, a client is given full access when joining the wireless network, so you will not need to define an access list at this point.

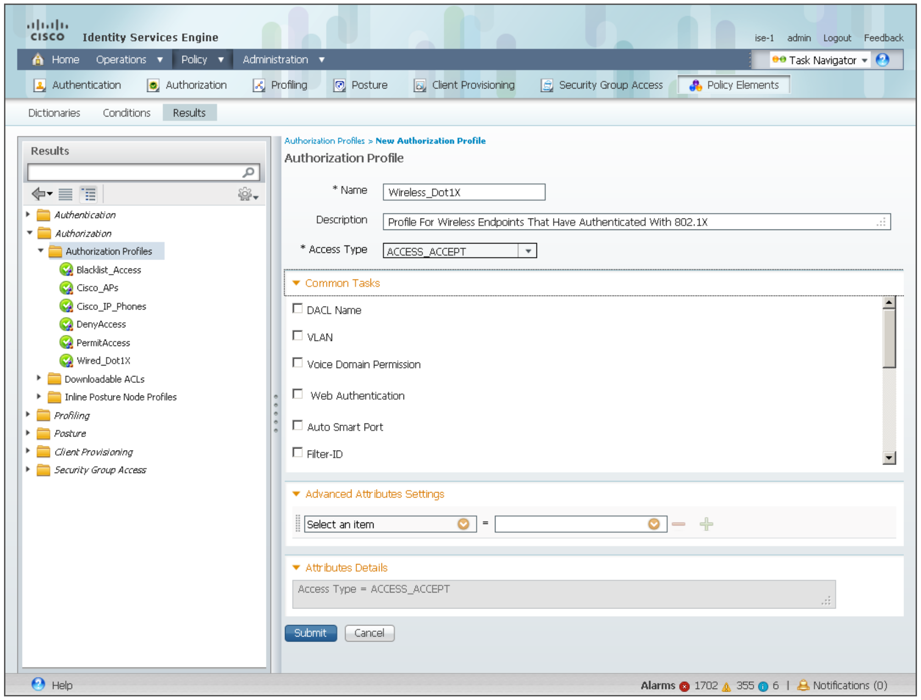
Step 1: In a browser, access the primary engine's GUI at http://ise-1.cisco.local. On the menu bar, mouse over **Policy**, and then in the Policy Elements section, select **Results**.

Step 2: In the panel on the left, double-click **Authorization**, and then double-click **Authorization Profiles**.

Step 3: Click **Add**.

Step 4: Name the profile **Wireless_Dot1X** and give a description.

Step 5: In the **Access Type** list, make sure **ACCESS_ACCEPT** is selected, and then click **Submit**.



* Name: Wireless_Dot1X

Description: Profile For Wireless Endpoints That Have Authenticated With 802.1X

* Access Type: ACCESS_ACCEPT

□ DACL Name

□ VLAN

□ Voice Domain Permission

□ Web Authentication

□ Auto Smart Port

□ Filter-ID

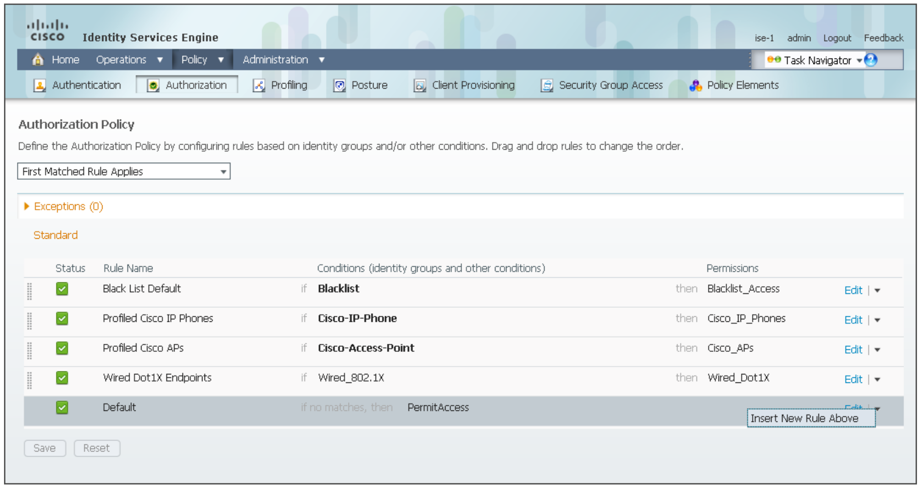
Access Type = ACCESS_ACCEPT

Procedure 2 Create authorization policy

Now you need to define an authorization policy for wireless endpoints and apply the authorization profile.

Step 1: On the menu bar, mouse over **Policy**, and then select **Authorization**.

Step 2: For the Default rule, on the right, click the black triangle symbol, and then select **Insert New Rule Above**. A new rule named Standard Rule 1 is created.


Cisco Identity Services Engine
ise-1 admin Logout Feedback
Home Operations ▾ Policy ▾ Administration ▾
Task Navigator ▾
Authentication Authorization Profiling Posture Client Provisioning Security Group Access Policy Elements
Save Reset
Insert New Rule Above

Authorization Policy

Define the Authorization Policy by configuring rules based on identity groups and/or other conditions. Drag and drop rules to change the order.

First Matched Rule Applies ▾

▸ Exceptions (0)

Standard

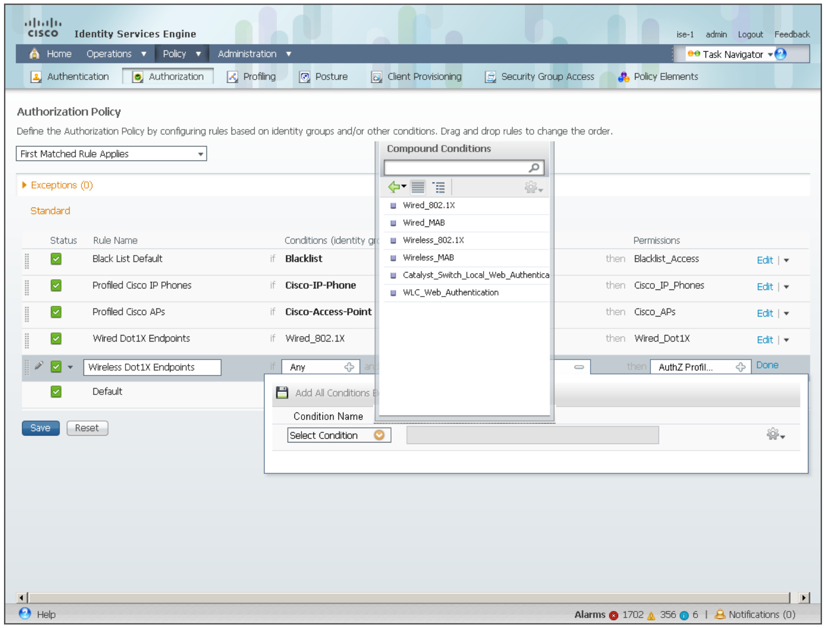
Status	Rule Name		Conditions (identity groups and other conditions)		Permissions	
☑	Black List Default	if	**Blacklist**	then	Blacklist_Access	Edit | ▾
☑	Profiled Cisco IP Phones	if	**Cisco-IP-Phone**	then	Cisco_IP_Phones	Edit | ▾
☑	Profiled Cisco APs	if	**Cisco-Access-Point**	then	Cisco_APs	Edit | ▾
☑	Wired Dot1X Endpoints	if	Wired_802.1X	then	Wired_Dot1X	Edit | ▾
☑	Default	if no matches, then	PermitAccess			

Step 3: Rename the rule **Wireless Dot1X Endpoints**.

Step 4: For the new rule, in the Conditions column, next to Condition(s), click the + symbol.

Step 5: Click **Select Existing Condition from Library**.

Step 6: In the list, next to Compound Conditions, click the > symbol, and then choose **Wireless_802.1X**.


Cisco Identity Services Engine
ise-1 admin Logout Feedback
Home Operations ▾ Policy ▾ Administration ▾
Task Navigator ▾
Authentication Authorization Profiling Posture Client Provisioning Security Group Access Policy Elements
Compound Conditions
Add All Conditions B
Save Reset
Done
Help
Alarms 1702 356 6 | Notifications (0)

Authorization Policy

Define the Authorization Policy by configuring rules based on identity groups and/or other conditions. Drag and drop rules to change the order.

First Matched Rule Applies ▾

▸ Exceptions (0)

Standard

Status	Rule Name		Conditions (identity gr		Permissions	
☑	Black List Default	if	**Blacklist**	then	Blacklist_Access	Edit | ▾
☑	Profiled Cisco IP Phones	if	**Cisco-IP-Phone**	then	Cisco_IP_Phones	Edit | ▾
☑	Profiled Cisco APs	if	**Cisco-Access-Point**	then	Cisco_APs	Edit | ▾
☑	Wired Dot1X Endpoints	if	Wired_802.1X	then	Wired_Dot1X	Edit | ▾
☑	Wireless Dot1X Endpoints	if	Any	then	AuthZ Profil...	Done
☑	Default					

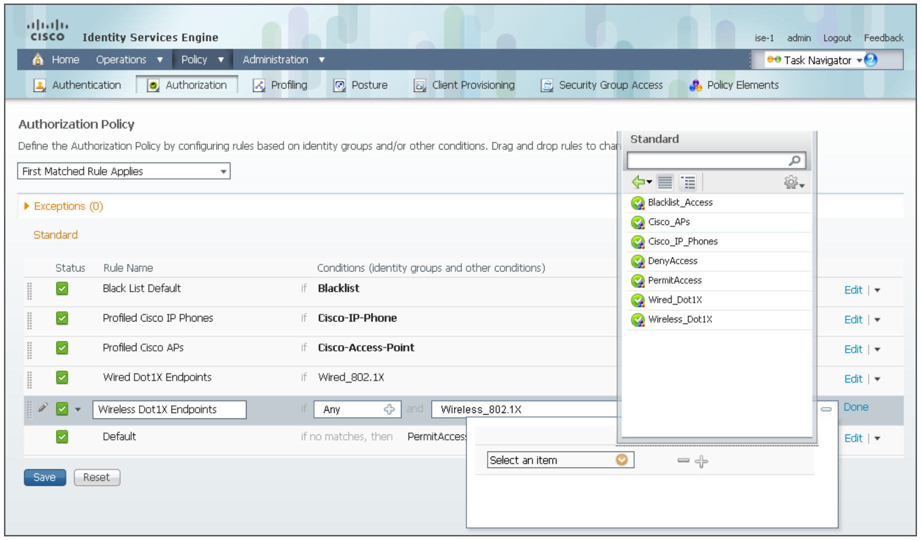
Compound Conditions:

- Wired_802.1X
- Wired_MAB
- Wireless_802.1X
- Wireless_MAB
- Catalyst_Switch_Local_Web_Authentica
- WLC_Web_Authentication

Condition Name: Select Condition

Step 7: Under the Permissions column, next to AuthZ Profile, click the + symbol.

Step 8: In the list, next to Standard, click the > symbol, and then choose **Wireless_Dot1X**.



Authorization Policy

Define the Authorization Policy by configuring rules based on identity groups and/or other conditions. Drag and drop rules to chan

First Matched Rule Applies

▸ Exceptions (0)

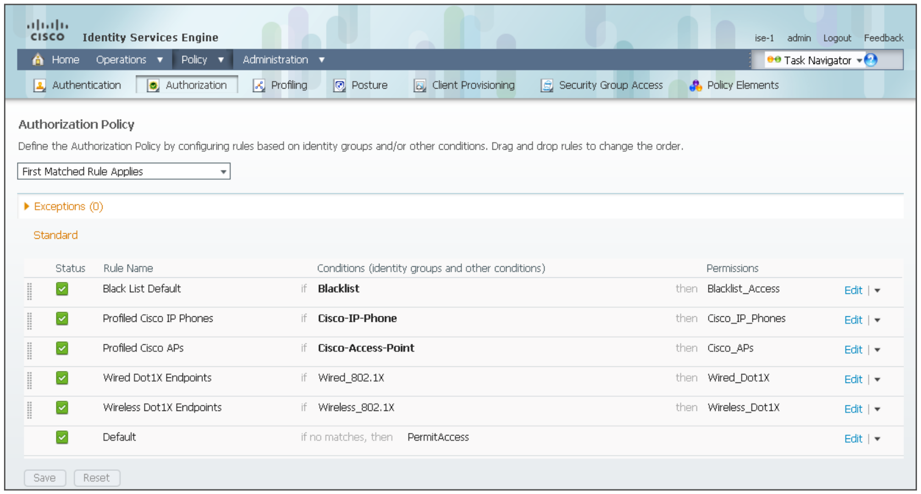
Standard

Status	Rule Name		Conditions (identity groups and other conditions)	
☑	Black List Default	if	**Blacklist**	Edit | ▾
☑	Profiled Cisco IP Phones	if	**Cisco-IP-Phone**	Edit | ▾
☑	Profiled Cisco APs	if	**Cisco-Access-Point**	Edit | ▾
☑	Wired Dot1X Endpoints	if	Wired_802.1X	Edit | ▾
☑	Wireless Dot1X Endpoints	if	Any and Wireless_802.1X	Done
☑	Default	if no matches, then	PermitAcces	Edit | ▾

Standard

- Blacklist_Access
- Cisco_APs
- Cisco_IP_Phones
- DenyAccess
- PermitAccess
- Wired_Dot1X
- Wireless_Dot1X

Step 9: Click **Done**, and then click **Save**.



Authorization Policy

Define the Authorization Policy by configuring rules based on identity groups and/or other conditions. Drag and drop rules to change the order.

First Matched Rule Applies

▸ Exceptions (0)

Standard

Status	Rule Name		Conditions (identity groups and other conditions)		Permissions	
☑	Black List Default	if	**Blacklist**	then	Blacklist_Access	Edit | ▾
☑	Profiled Cisco IP Phones	if	**Cisco-IP-Phone**	then	Cisco_IP_Phones	Edit | ▾
☑	Profiled Cisco APs	if	**Cisco-Access-Point**	then	Cisco_APs	Edit | ▾
☑	Wired Dot1X Endpoints	if	Wired_802.1X	then	Wired_Dot1X	Edit | ▾
☑	Wireless Dot1X Endpoints	if	Wireless_802.1X	then	Wireless_Dot1X	Edit | ▾
☑	Default	if no matches, then	PermitAccess			Edit | ▾

Process

Modify Authorization Policy to be Closed

1. Modify default rule

The current authorization policy is an open policy. The default rule at the end specifies that if an incoming authorization request doesn't match one of the specific rules defined, it would then just permit access to the network. Now that you have enabled low-impact mode, you will need to change this rule to deny access to any request that doesn't match one of the specific rules.

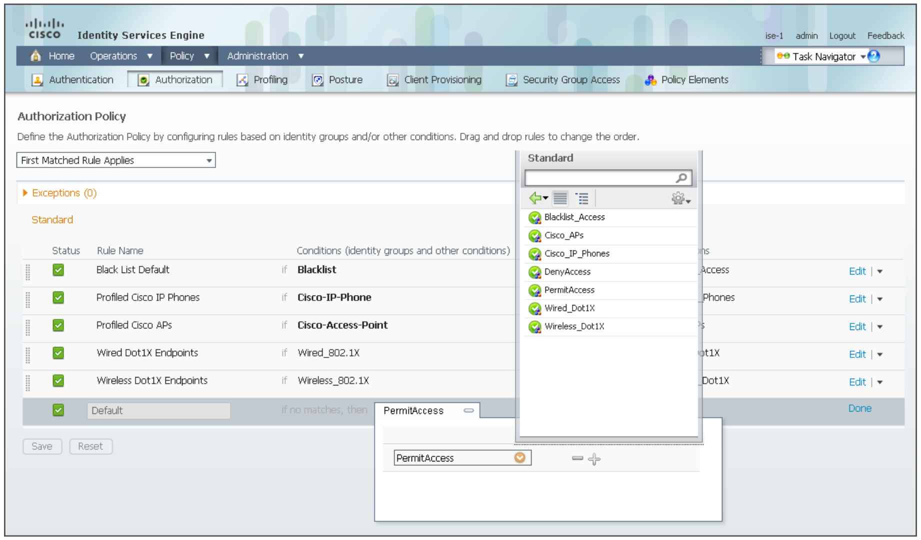
Procedure 1 Modify default rule

Step 1: On the menu bar, mouse over **Policy**, and then select **Authorization**.

Step 2: For the default rule, click **Edit**.

Step 3: In the Conditions column, next to PermitAccess, click the **+** symbol.

Step 4: In the list, next to Standard, click the **>** symbol, and then choose **DenyAccess**.



Authorization Policy

Define the Authorization Policy by configuring rules based on identity groups and/or other conditions. Drag and drop rules to change the order.

First Matched Rule Applies

Exceptions (0)

Standard

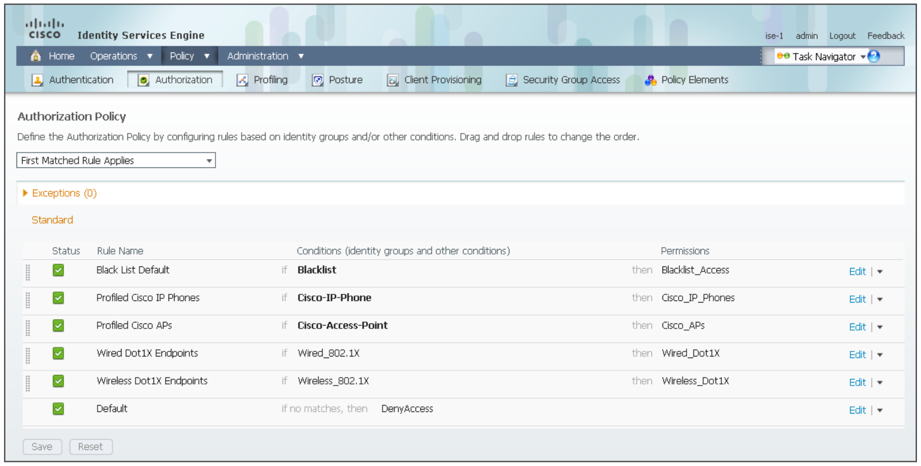
Status	Rule Name		Conditions (identity groups and other conditions)	ns
☑	Black List Default	if	**Blacklist**	Access
☑	Profiled Cisco IP Phones	if	**Cisco-IP-Phone**	Phones
☑	Profiled Cisco APs	if	**Cisco-Access-Point**	s
☑	Wired Dot1X Endpoints	if	Wired_802.1X	ot1X
☑	Wireless Dot1X Endpoints	if	Wireless_802.1X	Dot1X
☑	Default	if no matches, then	PermitAccess	

Standard

- Blacklist_Access
- Cisco_APs
- Cisco_IP_Phones
- DenyAccess
- PermitAccess
- Wired_Dot1X
- Wireless_Dot1X

PermitAccess

Step 5: Click **Done**, and then click **Save**.



Authorization Policy

Define the Authorization Policy by configuring rules based on identity groups and/or other conditions. Drag and drop rules to change the order.

First Matched Rule Applies

Exceptions (0)

Standard

Status	Rule Name		Conditions (identity groups and other conditions)		Permissions	
☑	Black List Default	if	**Blacklist**	then	Blacklist_Access	Edit | ▾
☑	Profiled Cisco IP Phones	if	**Cisco-IP-Phone**	then	Cisco_IP_Phones	Edit | ▾
☑	Profiled Cisco APs	if	**Cisco-Access-Point**	then	Cisco_APs	Edit | ▾
☑	Wired Dot1X Endpoints	if	Wired_802.1X	then	Wired_Dot1X	Edit | ▾
☑	Wireless Dot1X Endpoints	if	Wireless_802.1X	then	Wireless_Dot1X	Edit | ▾
☑	Default	if no matches, then	DenyAccess			Edit | ▾

Process

Enabling EAP Chaining

1. Enable EAP Chaining
2. Create authentication policy
3. Create authorization profile
4. Create authorization rule
5. Configure AnyConnect wired profile
6. Configure AnyConnect wireless profile

You have deployed both machine certificates and user certificates to Microsoft Windows workstations. However, only one of the certificates is used for authentication—the user certificate when a user is logged in and the machine certificate when one isn't. EAP Chaining allows you to authenticate using both certificates by using the Cisco AnyConnect Secure Mobility Client 3.1.

Procedure 1 Enable EAP Chaining

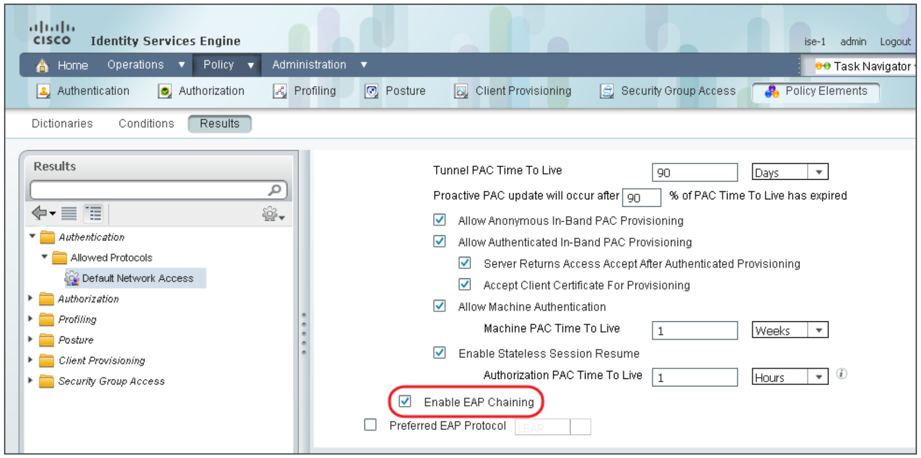
Step 1: Connect to https://ise-1.cisco.local.

Step 2: On the menu bar, mouse over **Policy**, and then, from the Policy Elements section of the menu, choose **Results**.

Step 3: In the left pane, double-click **Authentication**. This expands the options.

Step 4: Double-click **Allowed Protocols**, and then select **Default Network Access**.

Step 5: Select **Enable EAP Chaining**, and then click **Save**.



Tunnel PAC Time To Live 90 Days

Proactive PAC update will occur after 90 % of PAC Time To Live has expired

☑ Allow Anonymous In-Band PAC Provisioning

☑ Allow Authenticated In-Band PAC Provisioning

☑ Server Returns Access Accept After Authenticated Provisioning

☑ Accept Client Certificate For Provisioning

☑ Allow Machine Authentication

Machine PAC Time To Live 1 Weeks

☑ Enable Stateless Session Resume

Authorization PAC Time To Live 1 Hours

☑ Enable EAP Chaining

□ Preferred EAP Protocol LEAP

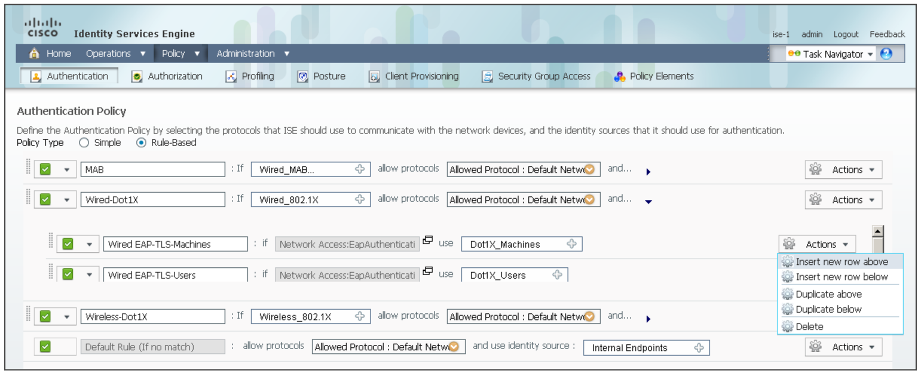
Procedure 2 Create authentication policy

You have authentication rules defined for both machine and user authentication. You need to create a new rule for EAP chaining for both wired and wireless endpoints.

Step 1: Mouse over **Policy**, and then choose **Authentication**.

Step 2: For the **Wired-Dot1X** rule, to the right of and..., click the black triangle. This brings up the identity store used for this rule.

Step 3: Next to the first rule, in the **Actions** list, choose **Insert new row above**.


Identity Services Engine
ise-1 admin Logout Feedback
Home Operations Policy Administration
Task Navigator
Authentication Authorization Profiling Posture Client Provisioning Security Group Access Policy Elements
Actions
Insert new row above
Insert new row below
Duplicate above
Duplicate below
Delete

Authentication Policy

Define the Authentication Policy by selecting the protocols that ISE should use to communicate with the network devices, and the identity sources that it should use for authentication.

Policy Type ○ Simple ● Rule-Based

☑ MAB : If Wired_MAB... allow protocols Allowed Protocol : Default Netw and...

☑ Wired-Dot1X : If Wired_802.1X allow protocols Allowed Protocol : Default Netw and...

☑ Wired EAP-TLS-Machines : if Network Access:EapAuthenticati use Dot1X_Machines

☑ Wired EAP-TLS-Users : if Network Access:EapAuthenticati use Dot1X_Users

☑ Wireless-Dot1X : If Wireless_802.1X allow protocols Allowed Protocol : Default Netw and...

☑ Default Rule (If no match) : allow protocols Allowed Protocol : Default Netw and use identity source : Internal Endpoints

Step 4: Give the rule a name, and then next to the Enter Condition box, click the box symbol. The Expression Builder opens.

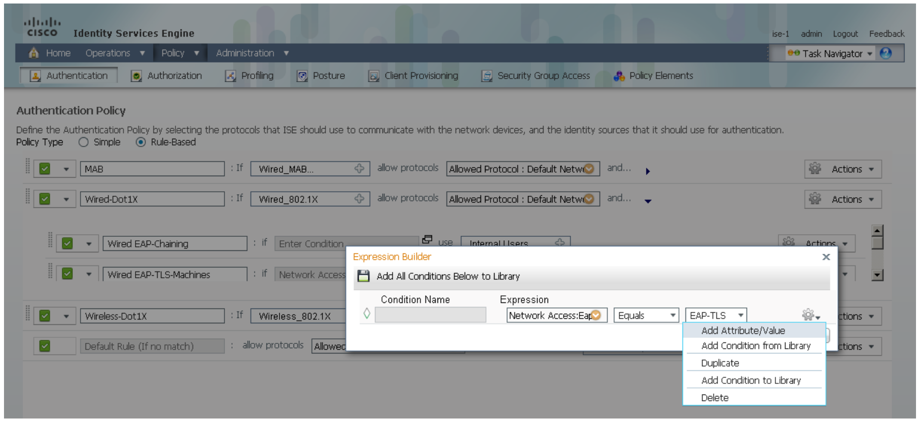
Step 5: Click **Create New Condition (Advance Option)**.

Step 6: In the **Expression** list, next to Select Attribute, click the arrow**.**

Step 7: Next to Network Access, click the arrow, and then select **EapAuthentication**.

Step 8: In the second list, choose **Equals,** and then in the last list, choose **EAP-TLS**.

Step 9: Click the gear icon at the end of the condition, and then choose **Add Attribute/Value**.


Identity Services Engine
ise-1 admin Logout Feedback
Home Operations Policy Administration
Task Navigator
Authentication Authorization Profiling Posture Client Provisioning Security Group Access Policy Elements
Actions
Expression Builder
Add All Conditions Below to Library
Add Attribute/Value
Add Condition from Library
Duplicate
Add Condition to Library
Delete

Authentication Policy

Define the Authentication Policy by selecting the protocols that ISE should use to communicate with the network devices, and the identity sources that it should use for authentication.

Policy Type ○ Simple ● Rule-Based

☑ MAB : If Wired_MAB... allow protocols Allowed Protocol : Default Netw and...

☑ Wired-Dot1X : If Wired_802.1X allow protocols Allowed Protocol : Default Netw and...

☑ Wired EAP-Chaining : if Enter Condition use Internal Users

☑ Wired EAP-TLS-Machines : if Network Access

☑ Wireless-Dot1X : If Wireless_802.1X

☑ Default Rule (If no match) : allow protocols Allowed

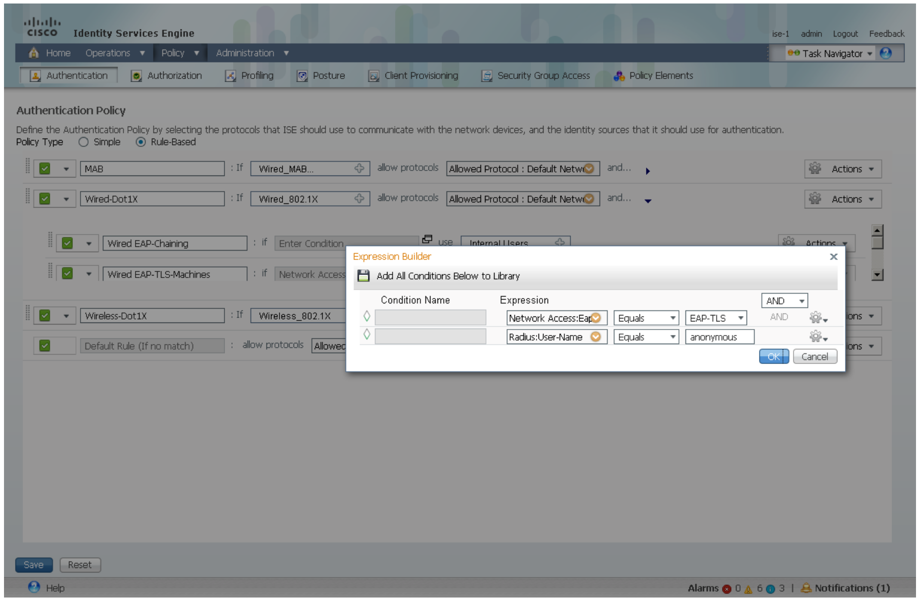
Condition Name | Expression

Network Access:Eap Equals EAP-TLS

Step 10: In the **Expression** list, next to Select Attribute, click the arrow**.**

Step 11: Next to Radius, click the arrow, and then choose **User-name**.

Step 12: In the second list, choose **Equals,** and then in the last box, type **anonymous**, and then click **OK**.



Authentication Policy

Define the Authentication Policy by selecting the protocols that ISE should use to communicate with the network devices, and the identity sources that it should use for authentication.

Policy Type ○ Simple ● Rule-Based

MAB : If Wired_MAB... allow protocols Allowed Protocol : Default Netw and...

Wired-Dot1X : If Wired_802.1X allow protocols Allowed Protocol : Default Netw and...

Wired EAP-Chaining : if Enter Condition use Internal Users

Wired EAP-TLS-Machines : if Network Access

Wireless-Dot1X : If Wireless_802.1X

Default Rule (If no match) : allow protocols Allowed

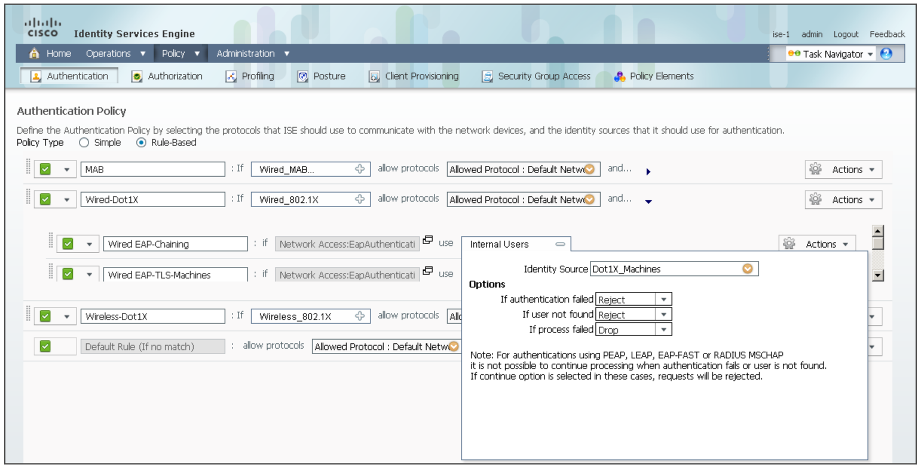
Expression Builder

Add All Conditions Below to Library

Condition Name	Expression			AND
	Network Access:Eap	Equals	EAP-TLS	AND
	Radius:User-Name	Equals	anonymous	

Step 13: Next to Internal Users, click the **+** symbol.

Step 14: In the **Identity Source** list, choose the identity source sequence for machine authentication that you created in Procedure 2, "Create machine authentication policies," use the default options for this identity source, and then click anywhere in the window to continue.



Authentication Policy

Define the Authentication Policy by selecting the protocols that ISE should use to communicate with the network devices, and the identity sources that it should use for authentication.

Policy Type ○ Simple ● Rule-Based

MAB : If Wired_MAB... allow protocols Allowed Protocol : Default Netw and...

Wired-Dot1X : If Wired_802.1X allow protocols Allowed Protocol : Default Netw and...

Wired EAP-Chaining : if Network Access:EapAuthenticati use Internal Users

Wired EAP-TLS-Machines : if Network Access:EapAuthenticati use

Wireless-Dot1X : If Wireless_802.1X allow protocols All

Default Rule (If no match) : allow protocols Allowed Protocol : Default Netw

Identity Source Dot1X_Machines

Options

If authentication failed Reject

If user not found Reject

If process failed Drop

Note: For authentications using PEAP, LEAP, EAP-FAST or RADIUS MSCHAP it is not possible to continue processing when authentication fails or user is not found. If continue option is selected in these cases, requests will be rejected.

Step 15: Click **Save.**

Step 16: Repeat Step 2 through Step 15 for the Wireless-Dot1X rule.

Procedure 3 Create authorization profile

An authorization profile defines the specific access policies granted to the device. You will create a policy to permit full access for devices that pass both user and machine authentication. Although there is already a built-in profile that permits full access, creating a new one will allow you to modify the policy if you choose to make a more restrictive policy in the future.

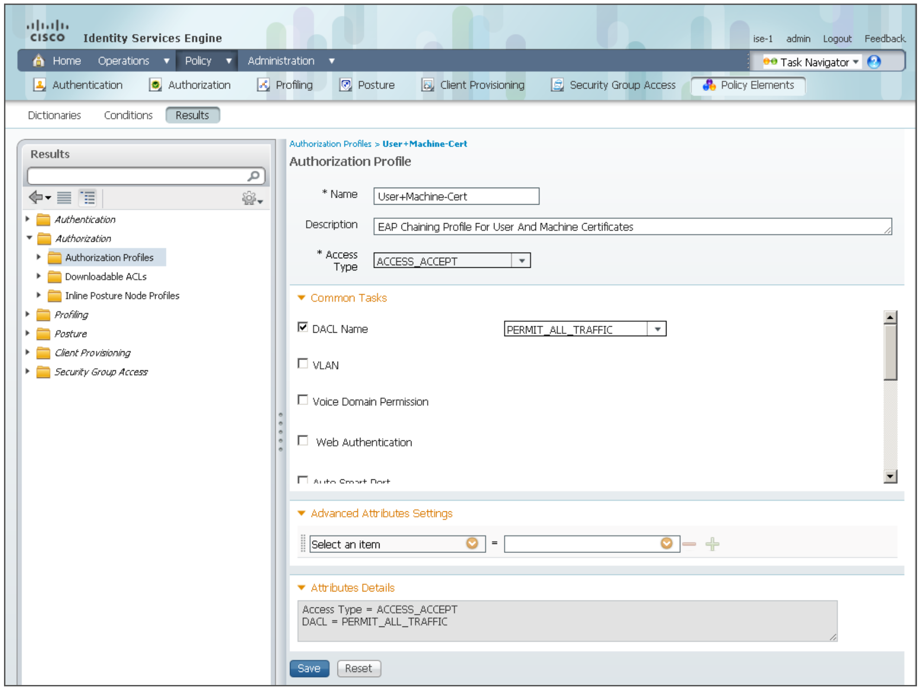
Step 1: On the menu bar, mouse over **Policy**, and then in the Policy Elements section, click **Results**.

Step 2: In the panel on the left, double-click **Authorization**, and then double-click **Authorization Profiles**.

Step 3: Click **Add**.

Step 4: Name the profile User+Macine-Cert and give a description.

Step 5: Select **DACL Name** and in the list, choose **PERMIT_ALL_TRAFFIC**, and then click **Submit**.



Authorization Profile

* Name: User+Machine-Cert

Description: EAP Chaining Profile For User And Machine Certificates

* Access Type: ACCESS_ACCEPT

☑ DACL Name: PERMIT_ALL_TRAFFIC

☐ VLAN

☐ Voice Domain Permission

☐ Web Authentication

☐ Auto Smart Port

Select an item =

Access Type = ACCESS_ACCEPT
DACL = PERMIT_ALL_TRAFFIC

Procedure 4 Create authorization rule

Now you need to define an authorization policy and apply the authorization profile.

Step 1: On the menu bar, mouse over **Policy**, and then select **Authorization**.

Step 2: For the Profiled Cisco APs rule, on the right, click the black triangle symbol, and then select **Insert New Rule Below**. A new rule named Standard Rule 1 is created.

Step 3: Rename the rule EAP Chaining Machine andUser.

Step 4: For the new rule, in the Conditions column, next to Condition(s), click the **+** symbol.

Step 5: Click **Create New Condition (Advance Option)**.

Step 6: Under Expression, next to Select Attribute, click the arrow. The menu opens.

Step 7: Next to Network Access, click the **>** symbol, and then choose **EapAuthentication**.

Step 8: In the first list, choose **Equals**, and then, in the second list, choose **EAP-TLS**.

Step 9: Click the gear icon at the end of the rule, and then select **Add Attribute/Value**.

Step 10: In the new rule, under Expression, next to Select Attribute, click the arrow. The menu opens.

Step 11: Next to Network Access, click the **>** symbol, and then choose **EapTunnel**.

Step 12: In the first list, choose **Equals**, and then, in the second list, choose **EAP-FAST**.

Step 13: Click the gear icon at the end of the rule, and then select **Add Attribute/Value**.

Step 14: In the new rule, under Expression, next to Select Attribute, click the arrow. The menu opens.

Step 15: Next to Network Access, click the **>** symbol, and then choose **EapChainingResult**.

Step 16: In the first list, choose **Equals**, and then, in the second list, choose **User and machine both succeeded** then click anywhere to continue.

Step 17: In the Permissions section, next to AuthZ Profile(s), click the **+** symbol.

Step 18: In the **Select an item** list, next to Standard, click the **>** symbol.

Step 19: Choose the User+Machine-Cert authorization profile that you created in Procedure 3, "Create authorization profile."

Step 20: Click **Done**, and then click **Save**.

Procedure 5 Configure AnyConnect wired profile

The AnyConnect client was installed in the process “Deploying Cisco AnyConnect on Windows Endpoints.” You now configure the Cisco AnyConnect Secure Mobility Client to use EAP Chaining.

Step 1: On the client running AnyConnect, Launch the Profile Editor by navigating to **Start > All Programs > Cisco > Cisco AnyConnect Profiler Editor > Network Access Manager Profile Editor**.

Step 2: From the **File** menu, choose **Open**, and then select **C:\ProgramData\Cisco\Cisco AnyConnect Secure Mobility Client\Network Access Manager\system\configuration.xml**.

Step 3: First, you will create a wired profile for EAP Chaining.

Step 4: Click **Networks**, and then click **Add**.

Step 5: Enter a name for the profile, select **Wired (802.3) Network**, and then click **Next**.

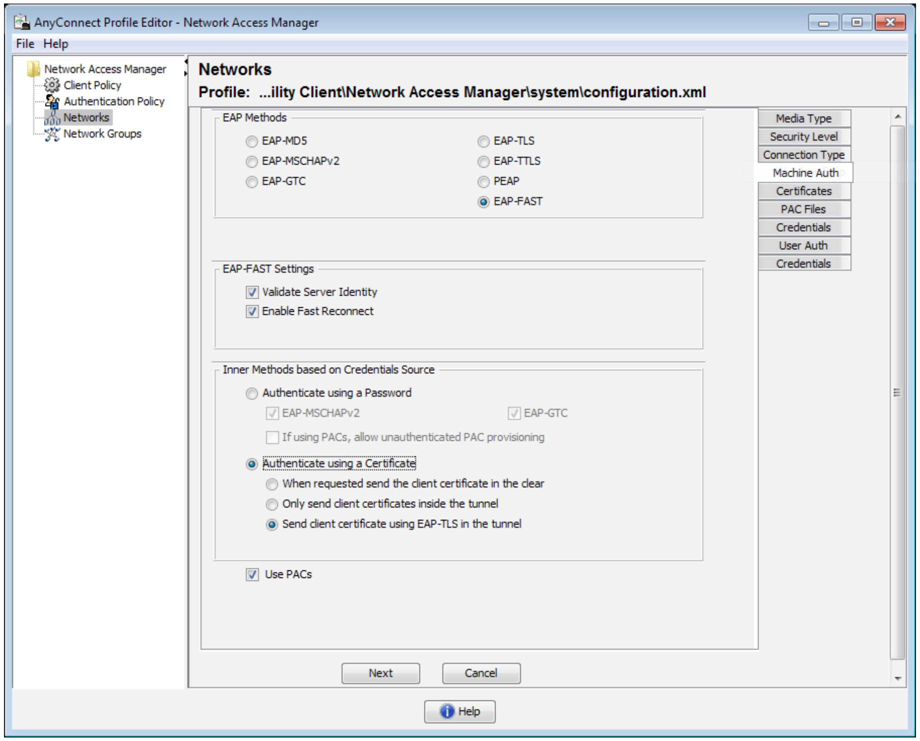
Step 6: Select **Authenticating Network**, and then click **Next**.

Step 7: Select **Machine and User Connection**, and then click **Next**.

Step 8: For the machine authentication method, select **EAP-FAST**.

Step 9: In the Inner Methods based on Credentials Source section, select **Authenticate using a certificate** and **Send client certificate using EAP-TLS in the tunnel**.

Step 10: Make sure **Use PACs** is selected, and then click **Next**.



Networks

Profile: ...ility Client\Network Access Manager\system\configuration.xml

EAP Methods

○ EAP-MD5 ○ EAP-TLS
○ EAP-MSCHAPv2 ○ EAP-TTLS
○ EAP-GTC ○ PEAP
● EAP-FAST

EAP-FAST Settings

☑ Validate Server Identity
☑ Enable Fast Reconnect

Inner Methods based on Credentials Source

○ Authenticate using a Password
☑ EAP-MSCHAPv2 ☑ EAP-GTC
□ If using PACs, allow unauthenticated PAC provisioning

● Authenticate using a Certificate
○ When requested send the client certificate in the clear
○ Only send client certificates inside the tunnel
● Send client certificate using EAP-TLS in the tunnel

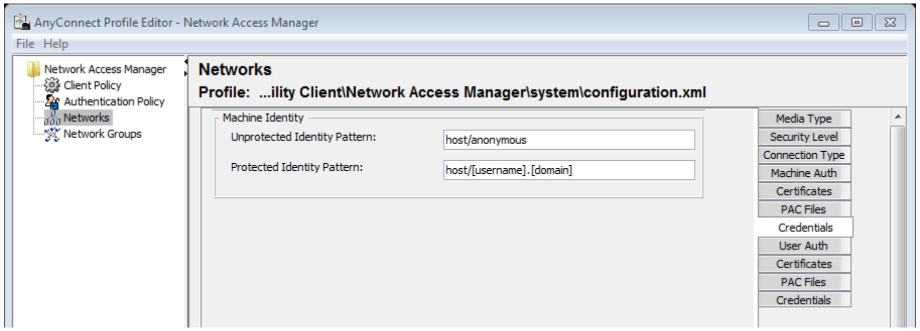
☑ Use PACs

Step 11: For the Certificates tab, click **Next**. This accepts the default values.

Step 12: For the PAC Files tab, click **Next**. This accepts the default values.

Step 13: Enter an unprotected identity pattern. In this deployment, use host/anonymous.

Step 14: Enter a protected identity pattern. In this deployment, use host/[username].[domain], and then click **Next**.



Networks

Profile: ...ility Client\Network Access Manager\system\configuration.xml

Machine Identity

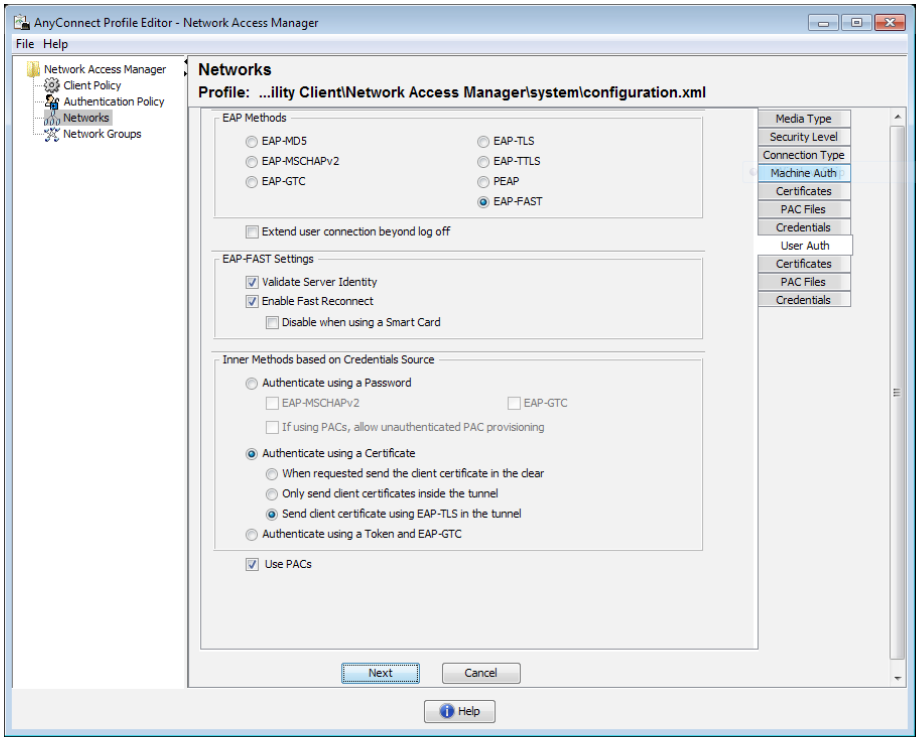
Unprotected Identity Pattern: host/anonymous

Protected Identity Pattern: host/[username].[domain]

Step 15: For the user authentication method, select **EAP-FAST**.

Step 16: In the Inner Methods based on Credentials Source section, select **Authenticate using a certificate** and **Send client certificate using EAP-TLS in the tunnel**.

Step 17: Make sure **Use PACs** is selected, and then click **Next**.



Networks

Profile: ...ility Client\Network Access Manager\system\configuration.xml

EAP Methods

○ EAP-MD5 ○ EAP-TLS

○ EAP-MSCHAPv2 ○ EAP-TTLS

○ EAP-GTC ○ PEAP

● EAP-FAST

□ Extend user connection beyond log off

EAP-FAST Settings

☑ Validate Server Identity

☑ Enable Fast Reconnect

□ Disable when using a Smart Card

Inner Methods based on Credentials Source

○ Authenticate using a Password

□ EAP-MSCHAPv2 □ EAP-GTC

□ If using PACs, allow unauthenticated PAC provisioning

● Authenticate using a Certificate

○ When requested send the client certificate in the clear

○ Only send client certificates inside the tunnel

● Send client certificate using EAP-TLS in the tunnel

○ Authenticate using a Token and EAP-GTC

☑ Use PACs

Step 18: For the Certificates tab, click **Next**. This accepts the default values.

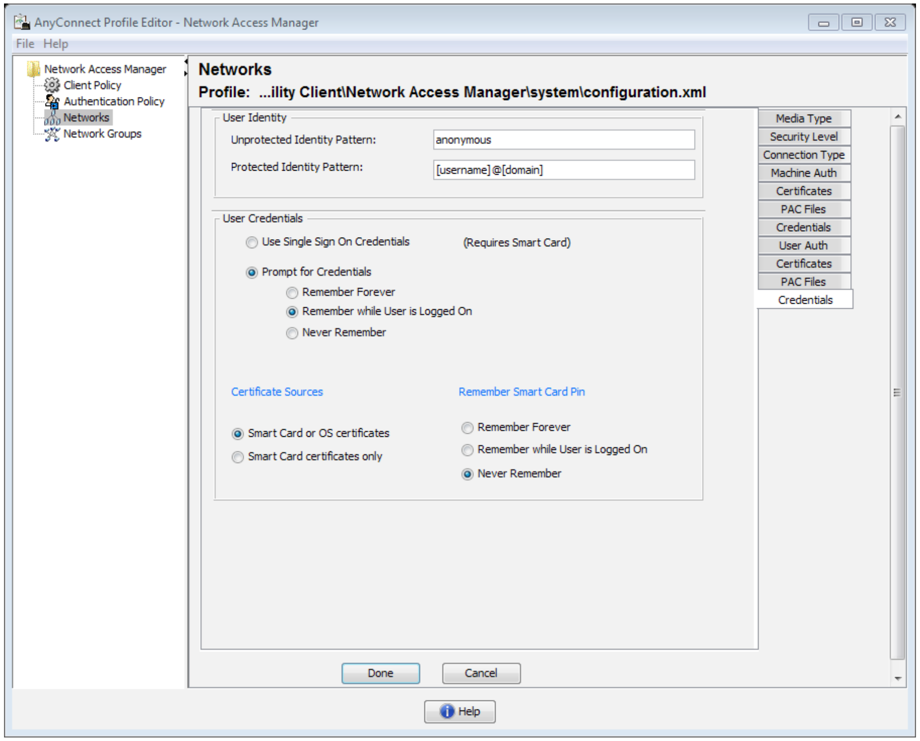
Step 19: For the PAC Files tab, click **Next**. This accepts the default values.

Step 20: Enter an unprotected identity pattern. In this deployment, use anonymous.

Step 21: Enter a protected identity pattern. In this deployment, use [username]@[domain].

Step 22: In the User Credentials section, select **Prompt for Credentials**, and then select **Remember while User is Logged On**.

Step 23: Under **Certificate Sources**, select **Smart Card or OS certificates**, and then click **Done**.



Networks

Profile: ...ility Client\Network Access Manager\system\configuration.xml

User Identity

Unprotected Identity Pattern: anonymous

Protected Identity Pattern: [username]@[domain]

User Credentials

○ Use Single Sign On Credentials (Requires Smart Card)

● Prompt for Credentials

○ Remember Forever

● Remember while User is Logged On

○ Never Remember

Certificate Sources

● Smart Card or OS certificates

○ Smart Card certificates only

Remember Smart Card Pin

○ Remember Forever

○ Remember while User is Logged On

● Never Remember

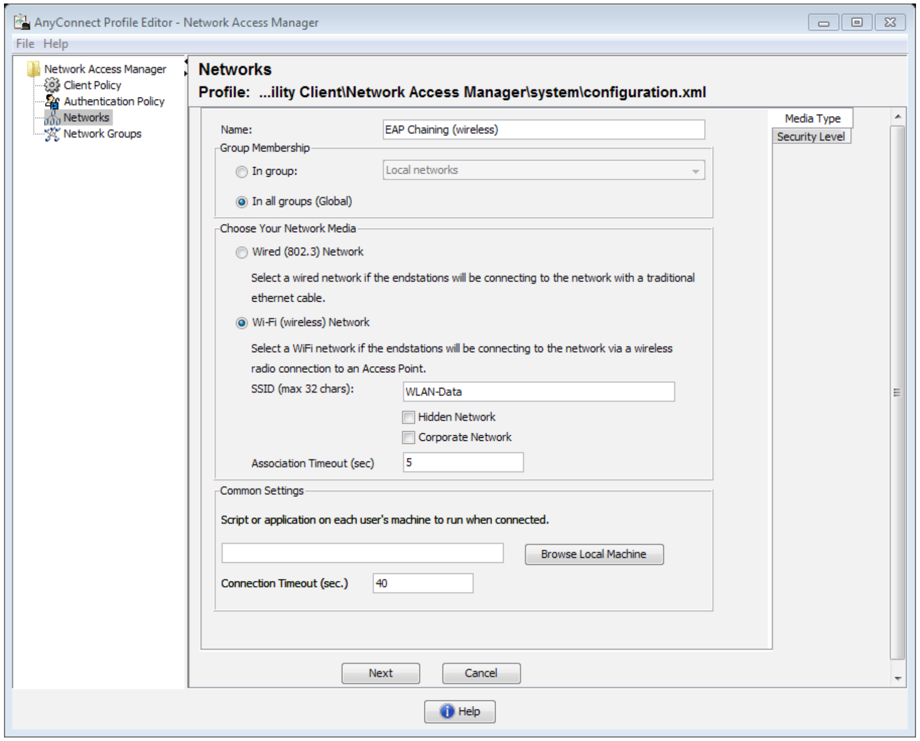
Procedure 6 Configure AnyConnect wireless profile

You will now create a wireless profile for EAP Chaining.

Step 1: Click **Networks**, and then click **Add**.

Step 2: Enter a name for the profile.

Step 3: In the Choose Your Network Media section, select **Wi-Fi (wireless) Network**. For SSID, enter your wireless SSID, and then click **Next**.



Networks

Profile: ...ility Client\Network Access Manager\system\configuration.xml

Name: EAP Chaining (wireless)

Group Membership

○ In group: Local networks

● In all groups (Global)

Choose Your Network Media

○ Wired (802.3) Network

Select a wired network if the endstations will be connecting to the network with a traditional ethernet cable.

● Wi-Fi (wireless) Network

Select a WiFi network if the endstations will be connecting to the network via a wireless radio connection to an Access Point.

SSID (max 32 chars): WLAN-Data

□ Hidden Network

□ Corporate Network

Association Timeout (sec) 5

Common Settings

Script or application on each user's machine to run when connected.

Connection Timeout (sec.) 40

Step 4: Select **Authenticating Network**, choose **WPA2 Enterprise (AES)** for Association Mode, and then click **Next**.

Step 5: Select **Machine and User Connection**, and then click **Next**.

Step 6: For the machine authentication method, select **EAP-FAST**.

Step 7: In the Inner Methods based on Credentials Source section, select **Authenticate using a certificate** and **Send client certificate using EAP-TLS in the tunnel**.

Step 8: Make sure **Use PACs** is selected, and then click **Next**.

Step 9: For the Certificates tab, click **Next**. This accepts the default values.

Step 10: For the PAC Files tab, click **Next**. This accepts the default values.

Step 11: Enter an unprotected identity pattern. In this deployment, use host/anonymous.

Step 12: Enter a protected identity pattern. In this deployment, use host/[username].[domain], and then click **Next**.

Step 13: For the user authentication method, select **EAP-FAST**.

Step 14: In the Inner Methods based on Credentials Source section, select **Authenticate using a certificate** and **Send client certificate using EAP-TLS in the tunnel**.

Step 15: Make sure **Use PACs** is selected, and then click **Next**.

Step 16: For the Certificates tab, click **Next**. This accepts the default values.

Step 17: For the PAC Files tab, click **Next**. This accepts the default values.

Step 18: Enter an unprotected identity pattern. In this deployment, use anonymous.

Step 19: Enter a protected identity pattern. In this deployment, use [username]@[domain].

Step 20: In the User Credentials section, select **Prompt for Credentials**, and then select **Remember while User is Logged On**.

Step 21: Under **Certificate Sources**, select **Smart Card or OS certificates**, and then click **Done**.

Step 22: From the **File** menu, choose **Save**. This updates the configuration file.

Process

Enabling Downloadable Access Lists

1. Add Active Directory groups to ISE
2. Create wired access list
3. Create authorization profile
4. Create authorization policy
5. Configure WLC for authorization

You have now configured access for any user who authenticates successfully to be granted full access to the network. The next step will be to provide differentiated access to users based on their Active Directory (AD) group. You will create an authorization policy that verifies the user's AD group and then applies an access list to the switch or wireless access point for that user.

Procedure 1 Add Active Directory groups to ISE

Step 1: In a browser, access the primary engine's GUI at http://ise-1.cisco.local.

Step 2: Mouse over **Administration**, and then, from the Identity Management section of the menu, choose **External Identity Sources**.

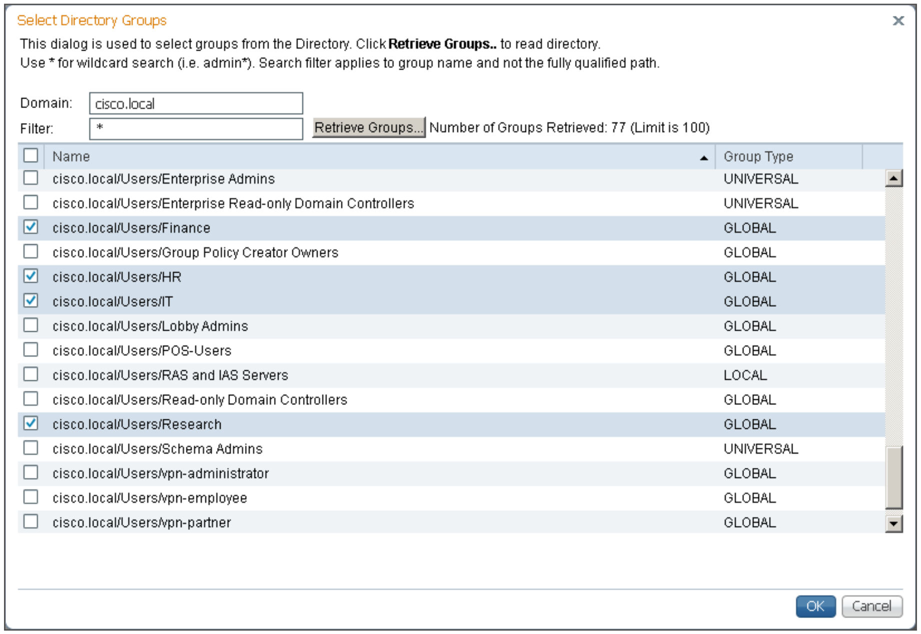
Step 3: In the left panel, click **Active Directory**.

Step 4: Click the Groups tab, click **Add**, and then click **Select Groups from Directory**.

Step 5: Search for the groups you wish to add. The domain box is already filled in. The default filter is a wildcard to list all groups. Click **Retrieve Groups** to get a list of all groups in your domain.

Step 6: Select the groups you want to use for authentication, and then click **OK**. In this example deployment, select the following groups:

- cisco.local/Users/Finance
- cisco.local/Users/HR
- cisco.local/Users/IT
- cisco.local/Users/Research



Select Directory Groups

This dialog is used to select groups from the Directory. Click **Retrieve Groups..** to read directory.
Use * for wildcard search (i.e. admin*). Search filter applies to group name and not the fully qualified path.

Domain: cisco.local
Filter: *

Retrieve Groups... Number of Groups Retrieved: 77 (Limit is 100)

□	Name	Group Type
□	cisco.local/Users/Enterprise Admins	UNIVERSAL
□	cisco.local/Users/Enterprise Read-only Domain Controllers	UNIVERSAL
☑	cisco.local/Users/Finance	GLOBAL
□	cisco.local/Users/Group Policy Creator Owners	GLOBAL
☑	cisco.local/Users/HR	GLOBAL
☑	cisco.local/Users/IT	GLOBAL
□	cisco.local/Users/Lobby Admins	GLOBAL
□	cisco.local/Users/POS-Users	GLOBAL
□	cisco.local/Users/RAS and IAS Servers	LOCAL
□	cisco.local/Users/Read-only Domain Controllers	GLOBAL
☑	cisco.local/Users/Research	GLOBAL
□	cisco.local/Users/Schema Admins	UNIVERSAL
□	cisco.local/Users/vpn-administrator	GLOBAL
□	cisco.local/Users/vpn-employee	GLOBAL
□	cisco.local/Users/vpn-partner	GLOBAL

Step 7: Click **Save Configuration**.

Procedure 2 Create wired access list

You will need to create an access list to deploy on the switches that will limit what portions of the network members of the group can access. The access list will use standard IOS syntax.

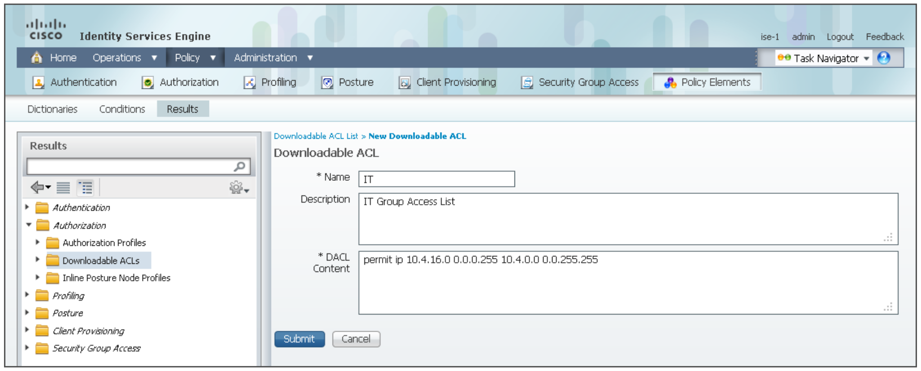
Step 1: On the menu bar, mouse over **Policy**, and then, in the Policy Elements section, choose **Results**.

Step 2: In the left pane, double-click **Authorization,** and then select **Downloadable ACLs**.

Step 3: Click **Add**.

Step 4: Enter a name (example: IT) and a description for the policy.

Step 5: In the DACL content section, enter the ACL by using IOS syntax, and then click **Submit**.



Downloadable ACL

* Name: IT

Description: IT Group Access List

* DACL Content: permit ip 10.4.16.0 0.0.0.255 10.4.0.0 0.0.255.255

Procedure 3 Create authorization profile

An authorization profile defines the specific access policies granted to the device. You will create a policy to apply an access list to the access device to limit what the endpoint has access to on the network.

Step 1: On the menu bar, mouse over **Policy**, and then, in the Policy Elements section, choose **Results**.

Step 2: In the left pane, double-click **Authorization,** and then select **Authorization Profiles**.

Step 3: Click **Add**.

Step 4: Enter a name (example: IT) and a description for the policy.

Step 5: In the Common Task section, select **DACL Name**, and then select the ACL that you configured in Procedure 2, "Create wired access list." In the example, the ACL is "IT."

Step 6: In the Common Task section, select **Airespace ACL Name**, and then enter the name of the ACL that you are applying to the WLC. In this example, the ACL is "IT."

Step 7: Click **Submit**.

Procedure 4 Create authorization policy

Step 1: On the menu bar, mouse over **Policy**, and then click **Authorization**.

Step 2: For the Wired Dot1X Endpoints rule, on the right, click the black triangle symbol, and then select **Insert New Rule Above**. A new rule named Standard Rule 1 is created.

Step 3: Rename Standard Rule 1 to IT.

Step 4: In the **Condition(s)** list, choose the **+** symbol, and then click **Create New Condition (Advance Option)**.

Step 5: Under Expression, next to Select Attribute, click the arrow. The menu opens.

Step 6: Next to AD1, click the **>** symbol, and then choose **ExternalGroups**.

Step 7: In the first list, choose **Equals**, and then, in the second list, choose **cisco.local/Users/IT**.

Step 8: In the Permissions section, next to AuthZ Profile(s), click the **+** symbol.

Step 9: In the **Select an item** list, next to Standard, choose the > symbol.

- Select the IT authorization profile that was created in Procedure 3, “Create authorization profile.”

Step 10: Click **Done**, and then click **Save**.

Step 11: For each group that you want to define a policy for, repeat Procedure 2, “Create wired access list,” Procedure 3, “Create authorization profile,” and Procedure 4, “Create authorization policy.” In this example deployment, you will create additional policies for the Finance, HR, and Research groups.

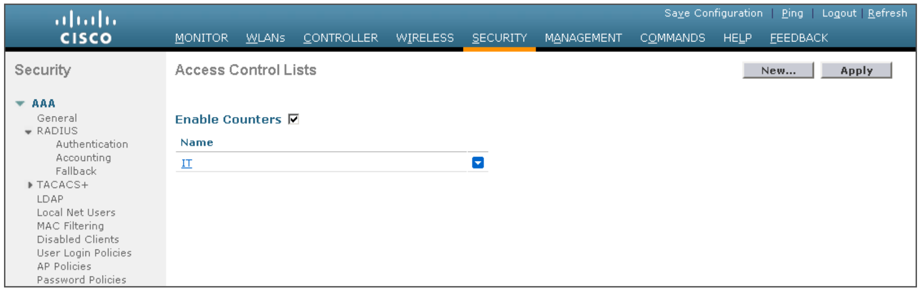
Procedure 5 Configure WLC for authorization

Configure every WLC in the environment, with the exception of the guest WLC in the DMZ, with access lists to support these newly defined policies. Each ACL that is referenced by the authorization profiles needs to be defined on the WLC. When clients in the campus, and at remote sites with a local controller, connect to the WLC and authenticate, Cisco ISE passes a RADIUS attribute requesting the ACL be applied for this client.

Step 1: In your browser, enter https://wlc1.cisco.local. This takes you to the WLC console.

Step 2: On the menu bar, click **Security**.

Step 3: In the left pane, expand **Access Control Lists**, and then click **Access Control Lists**.



Access Control Lists

Enable Counters ☑

Name
IT

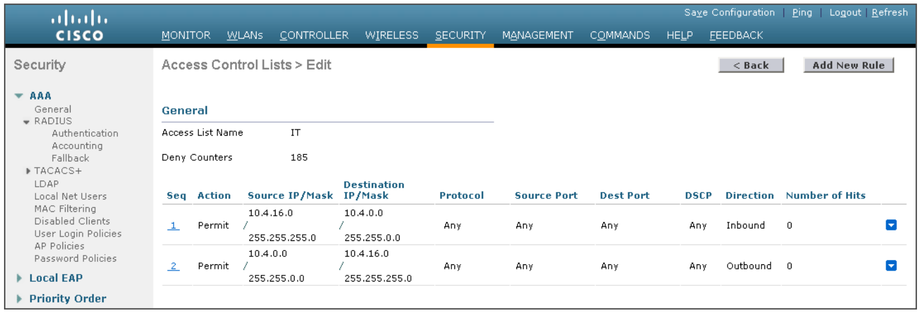
Step 4: Click **New**.

Step 5: Name the access list, and then click **Apply**.

Step 6: Click the name in the list. This allows you to edit the newly created access list.

Step 7: Click **Add New Rule**.

Step 8: Create a new access list rule based on your security policy, and then click **Apply**. In our example deployment, members of the IT group are only allowed access to the internal network (10.4.0.0/16).



Access Control Lists > Edit

General

Access List Name IT

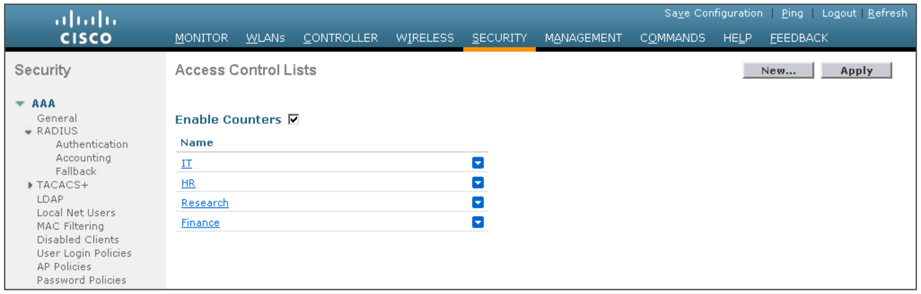
Deny Counters 185

Seq	Action	Source IP/Mask	Destination IP/Mask	Protocol	Source Port	Dest Port	DSCP	Direction	Number of Hits
1	Permit	10.4.16.0 / 255.255.255.0	10.4.0.0 / 255.255.0.0	Any	Any	Any	Any	Inbound	0
2	Permit	10.4.0.0 / 255.255.0.0	10.4.16.0 / 255.255.255.0	Any	Any	Any	Any	Outbound	0

Tech Tip

The access list needs to have entries for the traffic in both directions, so make sure you have pairs of access list rules for both inbound and outbound traffic. Also, there is an implicit "deny all" rule at the end of the access list so any traffic not explicitly permitted is denied.

Step 9: Repeat Step 3 through Step 8 in this procedure for each access list that you defined in the authorization profiles in Cisco ISE.



Access Control Lists

Enable Counters ☑

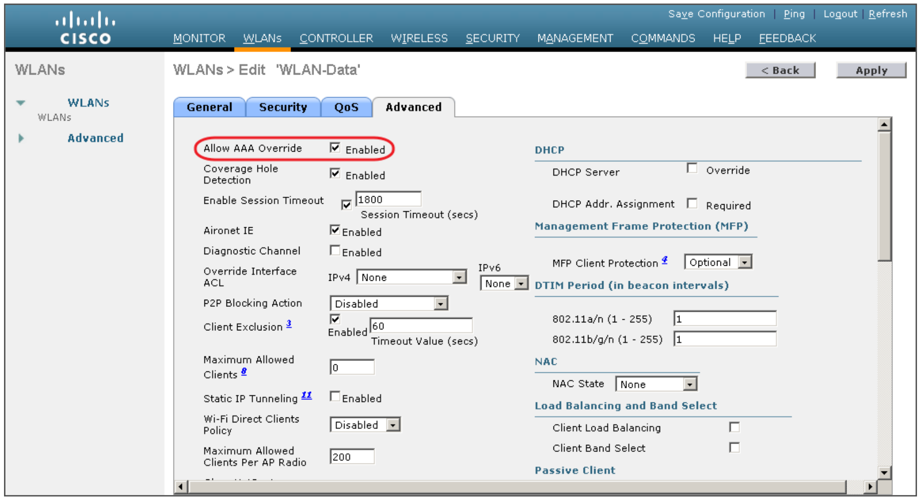
Name
IT
HR
Research
Finance

Next, you enable WLC in order to allow Cisco ISE to use RADIUS to override the current settings, so that the access list can be applied to the wireless LAN.

Step 10: On the menu bar, click **WLANs**.

Step 11: Click the WLAN ID of the wireless network that the wireless personal devices are accessing.

Step 12: Click **Advanced**, and then select **Allow AAA Override**.


Save Configuration | Ping | Logout | Refresh
MONITOR WLANs CONTROLLER WIRELESS SECURITY MANAGEMENT COMMANDS HELP FEEDBACK
WLANs
WLANs
WLANs
Advanced
< Back
Apply
General
Security
QoS
Advanced

WLANs > Edit 'WLAN-Data'

Allow AAA Override ☑ Enabled

Coverage Hole Detection ☑ Enabled

Enable Session Timeout ☑ 1800 Session Timeout (secs)

Aironet IE ☑ Enabled

Diagnostic Channel □ Enabled

Override Interface ACL IPv4 None IPv6 None

P2P Blocking Action Disabled

Client Exclusion 3 ☑ Enabled 60 Timeout Value (secs)

Maximum Allowed Clients 8 0

Static IP Tunneling 11 □ Enabled

Wi-Fi Direct Clients Policy Disabled

Maximum Allowed Clients Per AP Radio 200

DHCP

DHCP Server □ Override

DHCP Addr. Assignment □ Required

Management Frame Protection (MFP)

MFP Client Protection 4 Optional

DTIM Period (in beacon intervals)

802.11a/n (1 - 255) 1

802.11b/g/n (1 - 255) 1

NAC

NAC State None

Load Balancing and Band Select

Client Load Balancing □

Client Band Select □

Passive Client

Step 13: Click **Apply**, and then click **Save Configuration.**

Process

Enabling Security Group Access

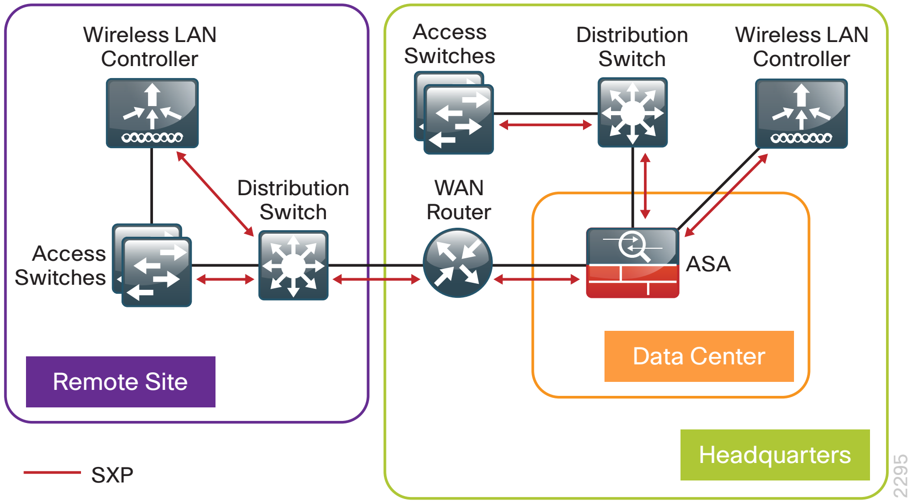
1. Define Security Group Tags
2. Add ASA as network device
3. Modify authorization policy
4. Configure SXP on IOS devices
5. Configure SXP on WLCs
6. Configure SXP on ASA
7. Configure firewall policy
8. Monitoring SGTs on Cisco ASA
9. Monitoring SGTs on the switches
10. Monitoring SGTs on the WLC

Security Group Access (SGA) technology allows user identity information to be associated with their network traffic and then passed throughout the network. This information can then be used to enforce an access policy using Security Group Tags (SGT) and Security Group Access Control Lists (SGACL).

The SGT Exchange Protocol (SXP) is used to propagate the IP-to-SGT bindings across network devices that do not support SGTs. In this example, we are passing SGT information from the access layer devices to Cisco ASA in the data center.

SXP establishes a peering relationship between two devices to exchange the IP-to-SGT bindings. There are two roles in the relationship: the speaker and the listener. The speaker passes the IP-to-SGT bindings to the listener. In our example, the access layer switch needs to pass these bindings to Cisco ASA in the data center. You could have the switch peer directly with the ASA appliance, however, that may not scale well in larger environments. It is a best practice to minimize the number or peers a device has by aggregating connections. For example, campus access layer switches would peer with a distribution switch, which then would peer with the ASA appliance.

Or, access layer switches at a remote site would peer with a distribution switch at the site, which would peer with the WAN aggregation router at the headquarters, which would then peer with the ASA appliance.



Procedure 1 Define Security Group Tags

Step 1: In a browser, access the primary engine's GUI at http://ise-1.cisco.local.

Step 2: On the menu bar, mouse over **Policy**, and then in the Policy Elements section, select **Results**.

Step 3: In the panel on the left, double-click **Security Group Access**, and then click **Security Groups**.

Step 4: Click **Add**.

Step 5: Give the group a name and description, and then click **Submit**.

Step 6: Repeat Step 4 and Step 5 for each tag you wish to create. In this example deployment, you create tags for each of the following groups: Finance_Users, HR_Users, IT_Users, Research_Users, and Network_Devices.

Procedure 2 Add ASA as network device

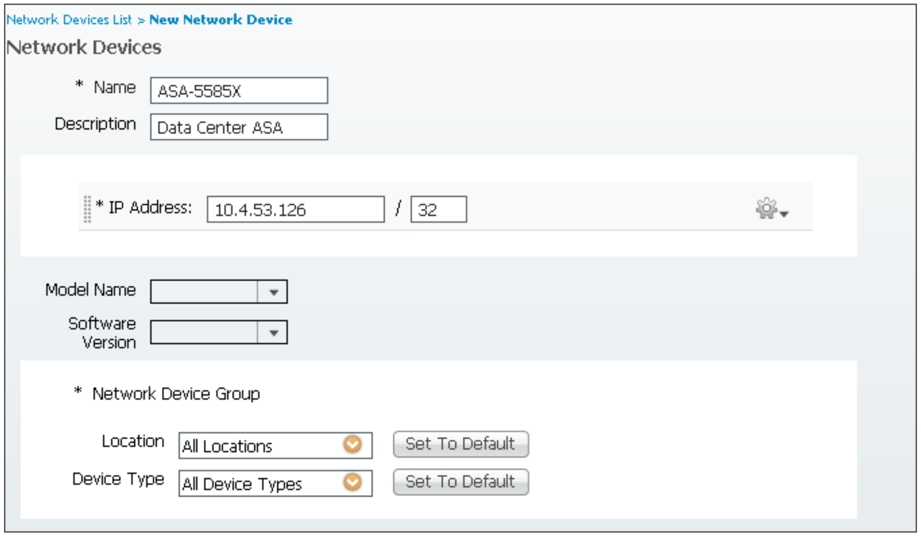
In order to allow Cisco ISE to provide SGT enforcement on Cisco ASA, the ASA appliance needs to be added as a network device in ISE.

Step 1: On the menu bar, mouse over **Administration**, and then in the Network Resources section, click **Network Devices**.

Step 2: Click **Add**.

Step 3: Enter the hostname of the ASA appliance and give it a description.

Step 4: For the IP address, enter **10.4.53.126**.



Network Devices List > **New Network Device**

Network Devices

* Name: ASA-5585X

Description: Data Center ASA

* IP Address: 10.4.53.126 / 32

Model Name:

Software Version:

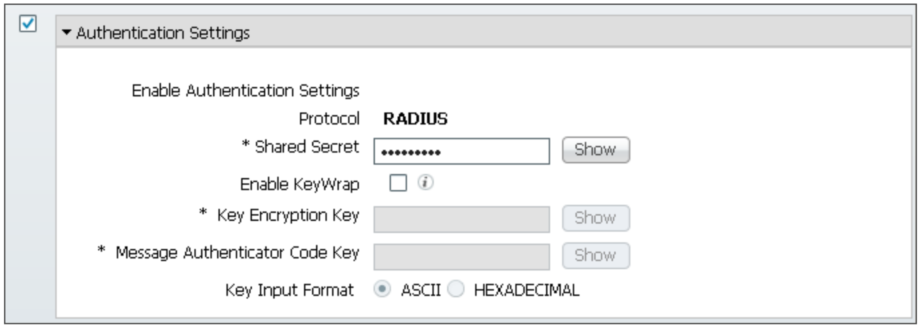
* Network Device Group

Location: All Locations — Set To Default

Device Type: All Device Types — Set To Default

Step 5: Select **Authentication Settings**.

Step 6: Enter the RADIUS shared secret.



☑ Authentication Settings

Enable Authentication Settings

Protocol: **RADIUS**

* Shared Secret: ••••••••• — Show

Enable KeyWrap: □

* Key Encryption Key: — Show

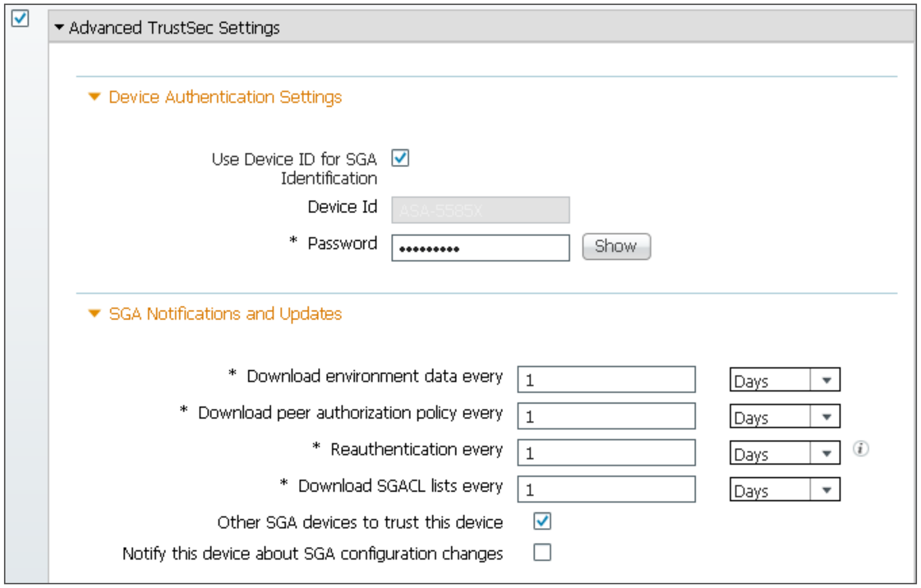
* Message Authenticator Code Key: — Show

Key Input Format: ● ASCII ○ HEXADECIMAL

Step 7: Select **Advanced TrustSec Settings**.

Step 8: In the Device Authentication Settings section, make sure **Use Device ID for SGA Identification** is selected, and enter a password.

Step 9: In the SGA Notifications and Updates section, accept the default values.



☑ Advanced TrustSec Settings

Device Authentication Settings

Use Device ID for SGA Identification: ☑

Device Id: ASA-5585X

* Password: ••••••••• — Show

SGA Notifications and Updates

* Download environment data every: 1 Days

* Download peer authorization policy every: 1 Days

* Reauthentication every: 1 Days

* Download SGACL lists every: 1 Days

Other SGA devices to trust this device: ☑

Notify this device about SGA configuration changes: □

Step 10: In the Out of Band (OOB) SGA PAC section, click **Generate PAC**.

Step 11: Enter an encryption key and the PAC time to live, and then click **Generate PAC**.

Step 12: You are prompted to save the file to your local machine. Choose a location, and then click **OK**.

Step 13: Click **Submit**.

Procedure 3 Modify authorization policy

In Procedure 4, "Create authorization policy," of the previous section, you created authorization policies that limited network access based on Active Directory group membership by using access lists. In this procedure, you will modify those policies to instead use SGTs.

Step 1: On the menu bar, mouse over **Policy**, and then click **Authorization**.

Step 2: For the IT rule, click **Edit**.

Step 3: In the Permissions column, click the **+** symbol next to IT.

Step 4: Click the **+** symbol to add a new permission.

Step 5: Expand the drop-down menu and click the **>** symbol next to Security Group.

Step 6: Select **IT_Users**.

Step 7: Click **Done**, and then click **Save**.

Step 8: Repeat Step 2 through Step 7 for each policy you need to modify to support SGTs. In this example deployment, you will edit the Finance, HR and Research policies.

Procedure 4 Configure SXP on IOS devices

Step 1: Connect to the Cisco Prime LMS server by browsing to https://lms.cisco.local:1741.

Step 2: Mouse over **Configuration**, and then, from the Tools section, choose **NetConfig**.

Step 3: In the NetConfig Job Browser, click **Create**.

Step 4: Select **Device Based** for the NetConfig Job Type, and then click **Go**.

Step 5: In the Device Selector, expand **All Devices**, and then select the devices where you want to enable SXP.

Step 6: In the Task Selector, expand **All Tasks**, select **Adhoc**, and then click **Next**.

Step 7: Click **Add Instance**, and then, in the new window, enter the CLI commands necessary to enable SXP.

```
cts sxp enable
cts sxp default password <password>
cts sxp default source-ip <IP-address-of-switch>
cts sxp connection peer <IP-address-of-peer> password default
mode local {speaker|listener}
```

Step 8: Click **Applicable Devices**, select the switch to which you want to apply this configuration, click **Close**, choose **Config** for the command mode, and then click **Save**.

Step 9: After returning to the Add Tasks window, click **Next**.

Step 10: Fill in a description for the job, and then click **Next**. The job is submitted for immediate deployment.

Step 11: Click **Finish**, and then when you receive a notice that the job was submitted successfully, click **OK**.

Step 12: Repeat this procedure for each IOS device where you need to configure SXP.

Procedure 5 Configure SXP on WLCs

Step 1: Navigate to the WLC console by browsing to https://wlc1.cisco.local.

Step 2: On the menu bar, click **Security**.

Step 3: In the left pane, click **TrustSec SXP**.

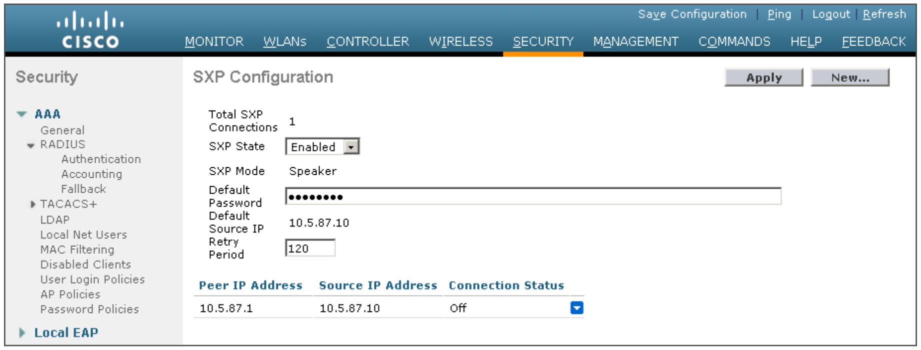
Step 4: In the SXP State pull-down, select **Enabled**.

Step 5: Enter the default password. This password must match what is configured on the peer.

Step 6: Add a new peer by clicking **New**.

Step 7: Enter the IP address of the peer, and then click **Apply**. The SXP Configuration page appears.

Step 8: Click **Apply**.



SXP Configuration

Total SXP Connections	1
SXP State	Enabled
SXP Mode	Speaker
Default Password	••••••••
Default Source IP	10.5.87.10
Retry Period	120

Peer IP Address	Source IP Address	Connection Status
10.5.87.1	10.5.87.10	Off

Procedure 6 Configure SXP on ASA

Step 1: You now configure SXP on Cisco ASA and create a policy that limits access to servers in the data center based on the SGTs.

Step 2: In a browser, navigate to the Cisco ASA management console at https://DC-ASA5585X.cisco.local, and then click **Run ASDM**.

Step 3: Navigate to **Configuration > Firewall > Identity by TrustSec**.

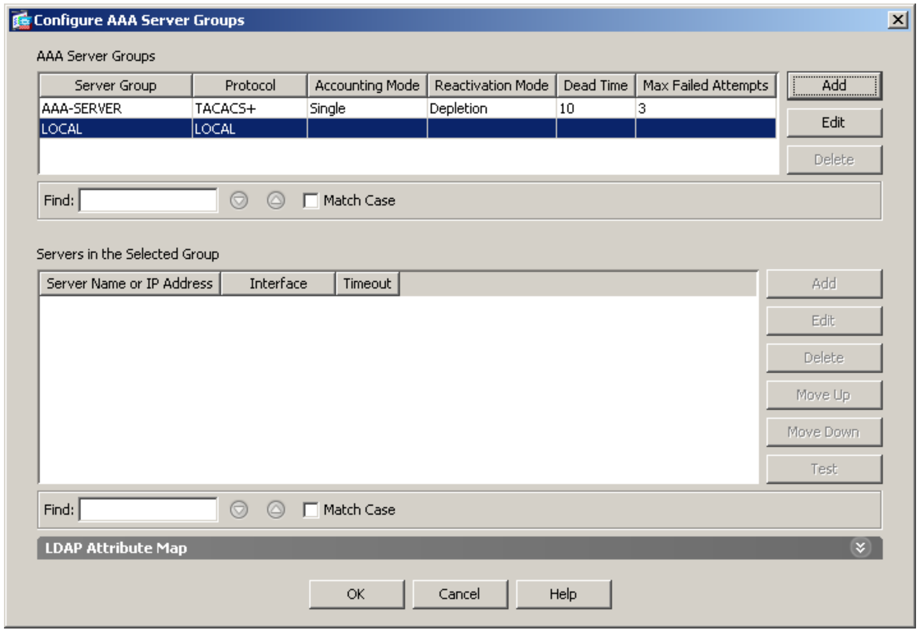
Step 4: Select **Enable SGT Exchange Protocol (SXP)**.

Step 5: For the Default Source field, enter the IP address of the interface of the Cisco ASA appliance used for management.

Step 6: Enter a password, and then verify it.

Step 7: In the Server Group Setup section, click **Manage**.

Step 8: In the Configure AAA Server Group window, click **Add**.



AAA Server Groups

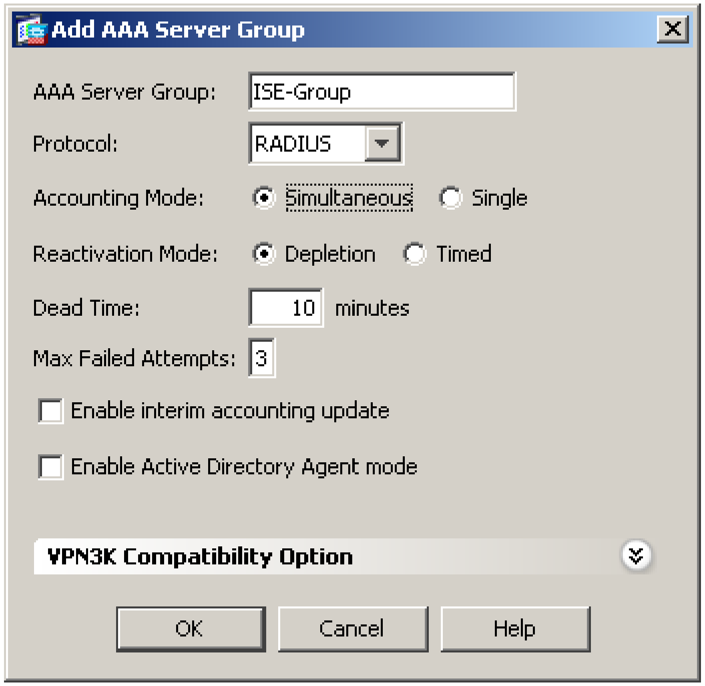
Server Group	Protocol	Accounting Mode	Reactivation Mode	Dead Time	Max Failed Attempts
AAA-SERVER	TACACS+	Single	Depletion	10	3
LOCAL	LOCAL				

Servers in the Selected Group

Server Name or IP Address	Interface	Timeout

Step 9: In the AAA Server Group field, enter **ISE-Group**.

Step 10: For Accounting Mode, select **Simultaneous**, and then click **OK**.



Add AAA Server Group

AAA Server Group: ISE-Group

Protocol: RADIUS

Accounting Mode: ● Simultaneous ○ Single

Reactivation Mode: ● Depletion ○ Timed

Dead Time: 10 minutes

Max Failed Attempts: 3

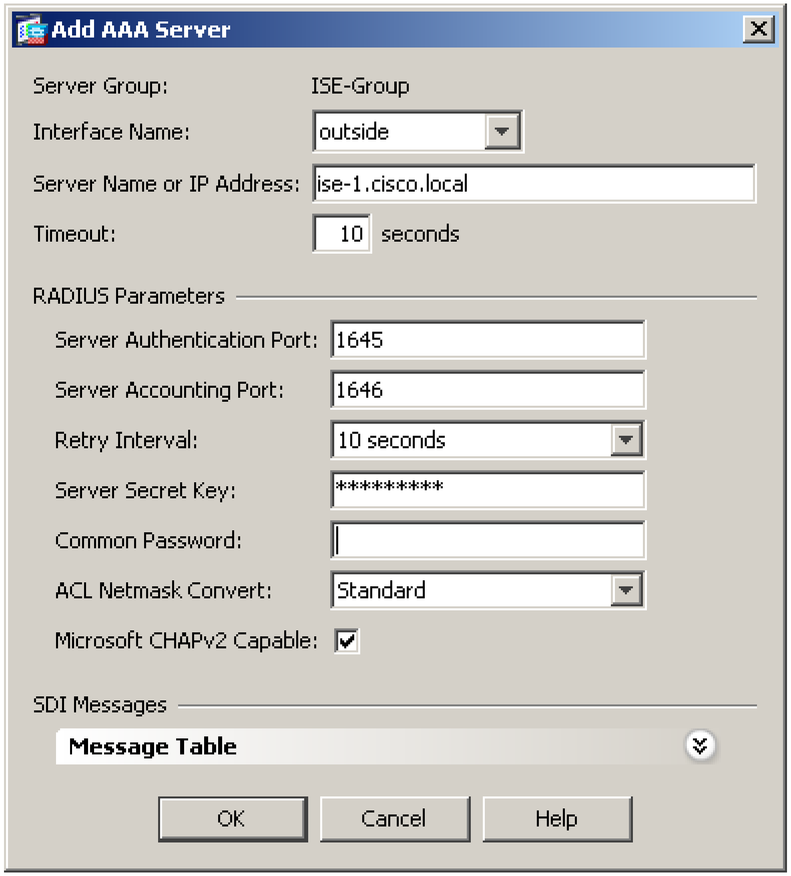
□ Enable interim accounting update

□ Enable Active Directory Agent mode

Step 11: In the Selected Group section, for Servers, click **Add**.

Step 12: In the list, choose the firewall interface **outside**.

Step 13: In the RADIUS Parameters sections, enter the **Shared Secret Key**, accept the defaults for the remaining parameters, and then click **OK**.



Add AAA Server

Server Group: ISE-Group

Interface Name: outside

Server Name or IP Address: ise-1.cisco.local

Timeout: 10 seconds

RADIUS Parameters

Server Authentication Port: 1645

Server Accounting Port: 1646

Retry Interval: 10 seconds

Server Secret Key: *********

Common Password:

ACL Netmask Convert: Standard

Microsoft CHAPv2 Capable: ☑

SDI Messages

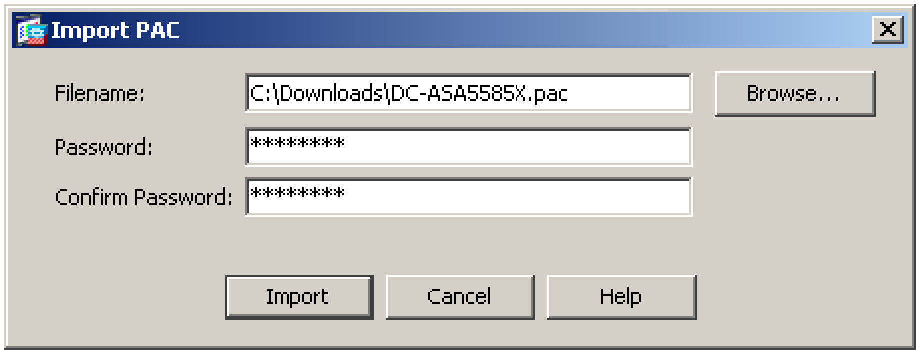
Step 14: Repeat Step 10 through Step 12 for the secondary Cisco ISE administration node, ise-2.cisco.local.

Step 15: Click **OK**. The Configure AAA Server Groups window closes.

Step 16: Click **Import PAC**.

Step 17: Click Browse, and then locate the PAC file you saved to your machine in Step 12, Procedure 2, "Add ASA as network device."

Step 18: Enter the PAC password, and then confirm it. Click **Import**.



Import PAC

Filename: C:\Downloads\DC-ASA5585X.pac

Password: ********

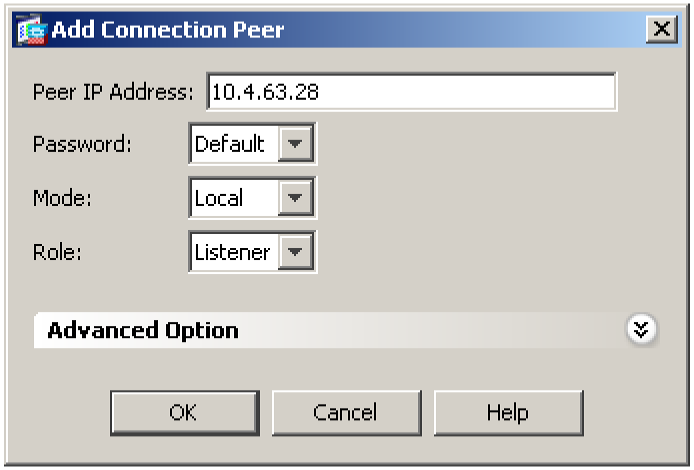
Confirm Password: ********

Step 19: Now you will add SXP peers to Cisco ASA.

Step 20: Click **Add**.

Step 21: Enter the IP address of the peer.

Step 22: For Password, choose **Default**, for Mode, choose **Local**, and for Role, choose **Listener**, and then click **OK**.



Add Connection Peer

Peer IP Address: 10.4.63.28

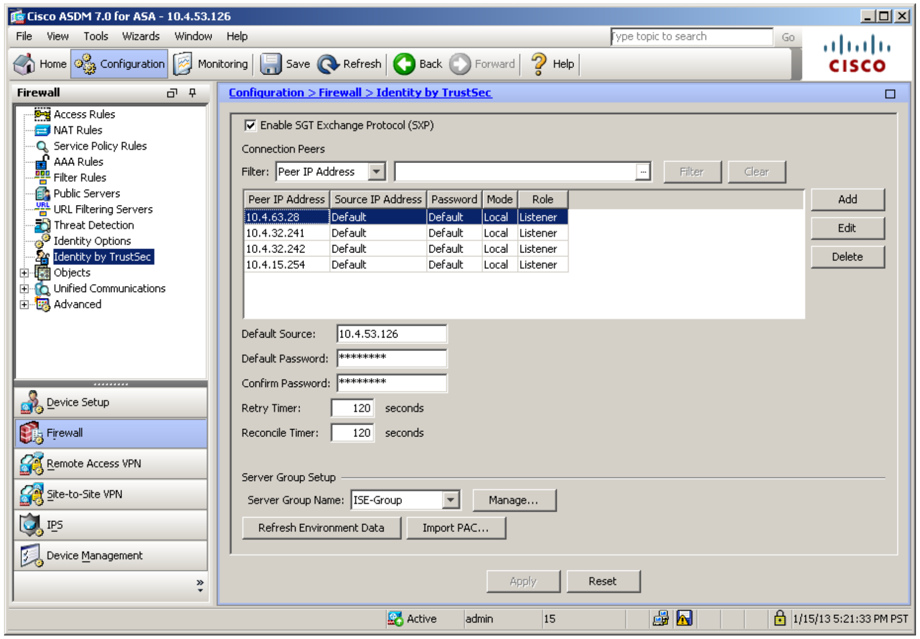
Password: Default

Mode: Local

Role: Listener

Step 23: Repeat Step 18 through Step 20 for each peer you need to add.

Step 24: Click **Apply**.



Cisco ASDM 7.0 for ASA - 10.4.53.126

Configuration > Firewall > Identity by TrustSec

☑ Enable SGT Exchange Protocol (SXP)

Connection Peers

Filter: Peer IP Address

Peer IP Address	Source IP Address	Password	Mode	Role
10.4.63.28	Default	Default	Local	Listener
10.4.32.241	Default	Default	Local	Listener
10.4.32.242	Default	Default	Local	Listener
10.4.15.254	Default	Default	Local	Listener

Default Source: 10.4.53.126

Default Password: ********

Confirm Password: ********

Retry Timer: 120 seconds

Reconcile Timer: 120 seconds

Server Group Setup

Server Group Name: ISE-Group

Active admin 15 1/15/13 5:21:33 PM PST

Procedure 7 Configure firewall policy

Step 1: In the *Cisco SBA -- Data Center Deployment Guide*, organizational servers were defined. In this procedure, you will create policy to limit access to each server based on SGTs. In this example, you will create a rule for the server for the IT group.

Step 2: In Cisco ASDM, navigate to **Configuration > Firewall > Access Rules**.

Step 3: Click **Add**.

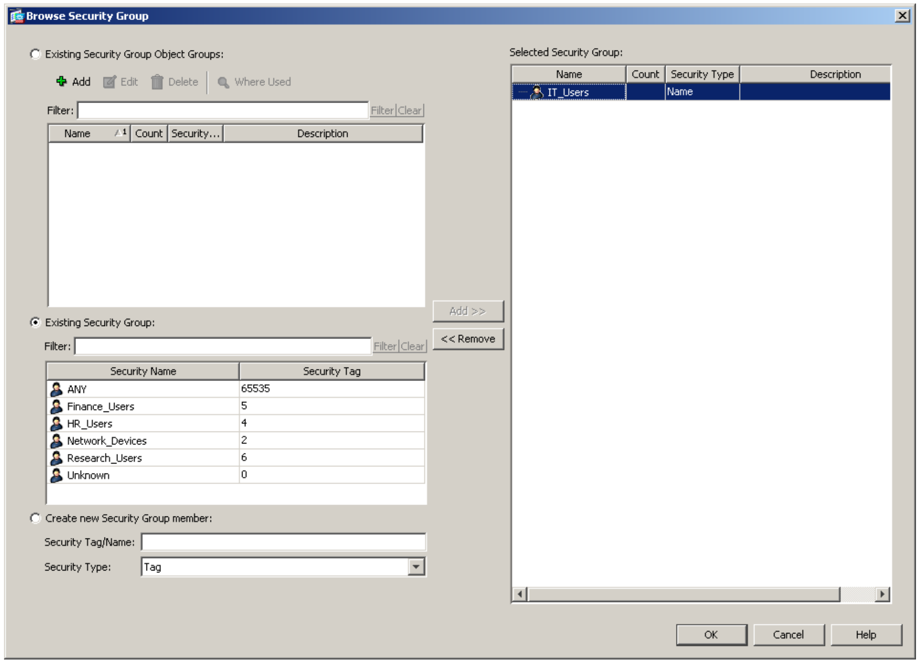
Step 4: From the Interface menu, choose **Any**.

Step 5: Select the **Permit** action.

Step 6: In the Source Criteria section, enter **any** for the Source, and then click the ellipses at the end of Security Group.

Step 7: Choose **Existing Security Group**.

Step 8: Select **IT_Users**, and then click **Add**.



● Existing Security Group:

Security Name	Security Tag
ANY	65535
Finance_Users	5
HR_Users	4
Network_Devices	2
Research_Users	6
Unknown	0

○ Create new Security Group member:

Security Tag/Name:

Security Type: Tag

Selected Security Group:

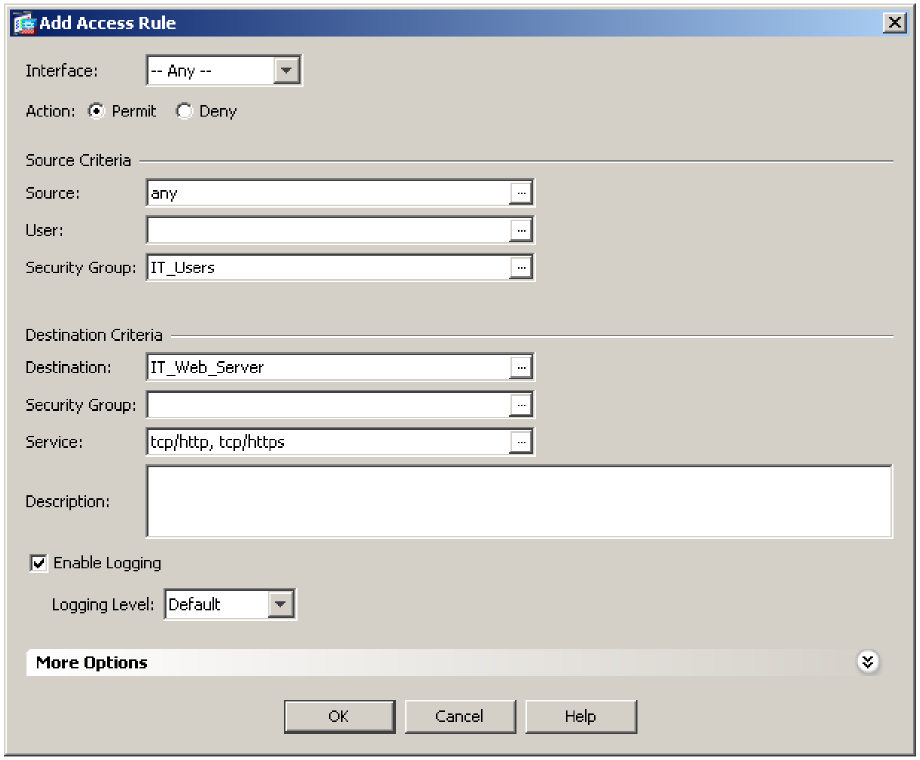
Name	Count	Security Type	Description
IT_Users		Name	

Step 9: Click **OK**. The Add Access Rule window opens.

Step 10: In the Destination Criteria section, click the ellipses for the Destination.

Step 11: Double-click **IT_Web_Server**, and then click **OK**. The Add Access Rule window appears.

Step 12: For the service, enter **tcp/http, tcp/https**, and then click **OK**.



Interface: -- Any --

Action: ● Permit ○ Deny

Source Criteria

Source: any

User:

Security Group: IT_Users

Destination Criteria

Destination: IT_Web_Server

Security Group:

Service: tcp/http, tcp/https

Description:

☑ Enable Logging

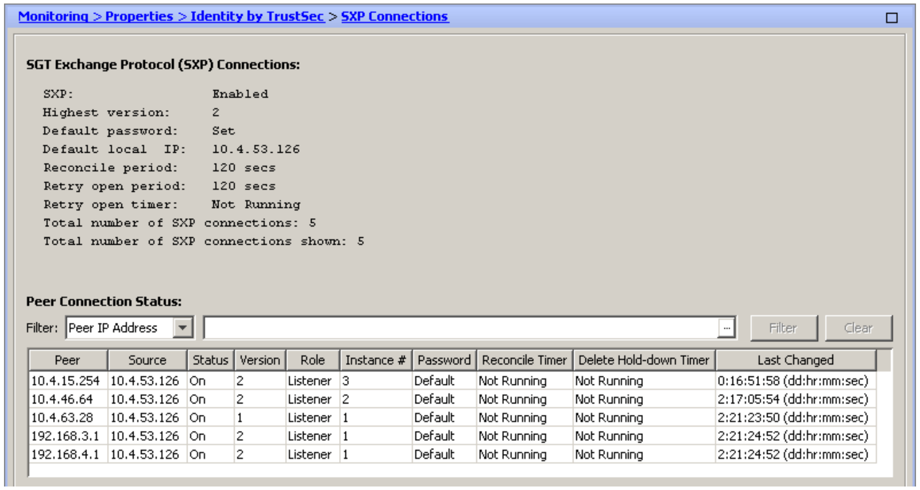
Logging Level: Default

Step 13: Repeat Step 2 through Step 11 for each server that you wish to create an SGT policy for. In this deployment, the remaining groups are Finance, HR, and Research.

Procedure 8 Monitoring SGTs on Cisco ASA

You will use ASDM to verify SXP is working properly and SGTs are being passed to Cisco ASA.

Step 1: In Cisco ASDM, navigate to **Monitoring > Properties > Identity by TrustSec > SXP Connections**. This shows all the current SXP connections to the ASA.


Monitoring > Properties > Identity by TrustSec > SXP Connections
Filter:
Peer IP Address
Filter
Clear

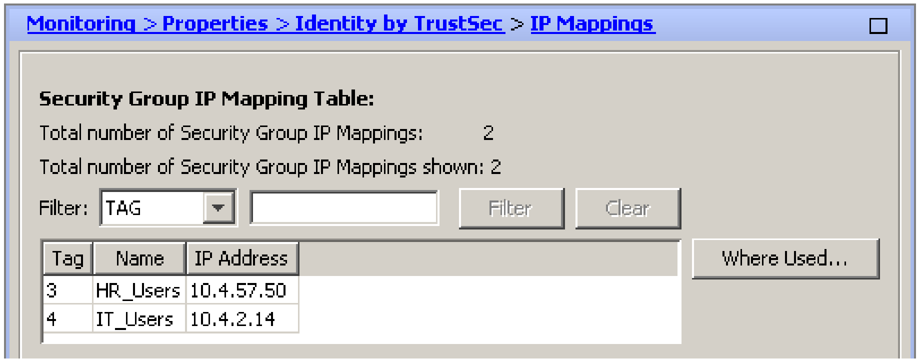
SGT Exchange Protocol (SXP) Connections:

```
  SXP:                  Enabled
  Highest version:      2
  Default password:     Set
  Default local  IP:    10.4.53.126
  Reconcile period:     120 secs
  Retry open period:    120 secs
  Retry open timer:     Not Running
  Total number of SXP connections: 5
  Total number of SXP connections shown: 5
```

Peer Connection Status:

Peer	Source	Status	Version	Role	Instance #	Password	Reconcile Timer	Delete Hold-down Timer	Last Changed
10.4.15.254	10.4.53.126	On	2	Listener	3	Default	Not Running	Not Running	0:16:51:58 (dd:hr:mm:sec)
10.4.46.64	10.4.53.126	On	2	Listener	2	Default	Not Running	Not Running	2:17:05:54 (dd:hr:mm:sec)
10.4.63.28	10.4.53.126	On	1	Listener	1	Default	Not Running	Not Running	2:21:23:50 (dd:hr:mm:sec)
192.168.3.1	10.4.53.126	On	2	Listener	1	Default	Not Running	Not Running	2:21:24:52 (dd:hr:mm:sec)
192.168.4.1	10.4.53.126	On	2	Listener	1	Default	Not Running	Not Running	2:21:24:52 (dd:hr:mm:sec)

Step 2: In Cisco ASDM, navigate to **Monitoring > Properties > Identity by TrustSec > IP Mappings**. This shows all the current IP to SGT mappings passed to the ASA.


Monitoring > Properties > Identity by TrustSec > IP Mappings
Filter:
TAG
Filter
Clear
Where Used...

Security Group IP Mapping Table:

Total number of Security Group IP Mappings: 2

Total number of Security Group IP Mappings shown: 2

Tag	Name	IP Address
3	HR_Users	10.4.57.50
4	IT_Users	10.4.2.14

Procedure 9 Monitoring SGTs on the switches

From the command line of the switch, you monitor SXP connections and the SGT assignments using a few show commands.

Step 1: Verify the SGT assigned to a switch port after user authorization on an access layer switch.

```
show authentication session interface <interface>
```

```
A3750X#show authentication session interface GigabitEthernet 2/0/1
            Interface:  GigabitEthernet2/0/1
          MAC Address:  0050.56b9.007c
           IP Address:  10.4.2.13
            User-Name:  alex.reed
               Status:  Authz Success
               Domain:  DATA
      Security Policy:  Should Secure
      Security Status:  Unsecure
       Oper host mode:  multi-auth
     Oper control dir:  both
        Authorized By:  Authentication Server
          Vlan Policy:  N/A
                  SGT:  0004-0
      Session timeout:  N/A
         Idle timeout:  N/A
    Common Session ID:  0A040F06000001778A321722
      Acct Session ID:  0x00000B5D
               Handle:  0xCB000178
```

Step 2: Verify the SXP connections on a switch.

```
show cts sxp connections
```

```
D6500VSS#show cts sxp connections
 SXP              : Enabled
 Highest Version Supported: 3
 Default Password : Set
 Default Source IP: 10.4.15.254
Connection retry open period: 120 secs
Reconcile period: 120 secs
Retry open timer is not running
----------------------------------------------
Peer IP          : 10.4.15.5
Source IP        : 10.4.15.254
Conn status      : On
Conn version     : 2
Local mode       : SXP Listener
Connection inst# : 4
TCP conn fd      : 3
TCP conn password: default SXP password
Duration since last state change: 11:20:31:22 (dd:hr:mm:sec)

----------------------------------------------
Peer IP          : 10.4.15.6
Source IP        : 10.4.15.254
Conn status      : On
Conn version     : 3
Local mode       : SXP Listener
Connection inst# : 6
TCP conn fd      : 1
TCP conn password: default SXP password
Duration since last state change: 11:20:31:22 (dd:hr:mm:sec)

----------------------------------------------
Peer IP          : 10.4.53.126
Source IP        : 10.4.15.254
Conn status      : On
Conn version     : 2
Local mode       : SXP Speaker
Connection inst# : 1
TCP conn fd      : 2
TCP conn password: default SXP password
Duration since last state change: 11:20:31:22 (dd:hr:mm:sec)

----------------------------------------------
Peer IP          : 10.4.79.5
Source IP        : 10.4.15.254
Conn status      : On
Conn version     : 3
Local mode       : SXP Listener
Connection inst# : 1
TCP conn fd      : 4
TCP conn password: default SXP password
Duration since last state change: 11:20:23:02 (dd:hr:mm:sec)


Total num of SXP Connections = 4
```

Procedure 10 Monitoring SGTs on the WLC

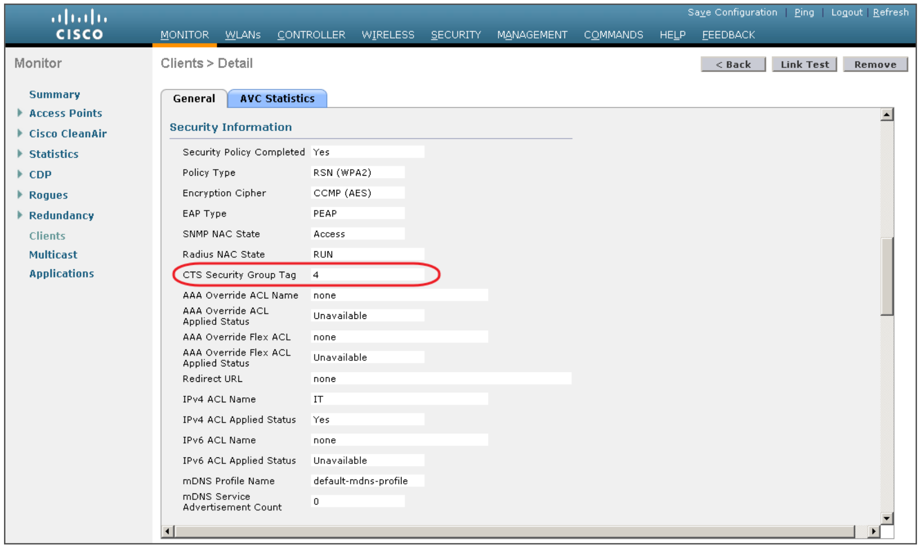
You use the GUI of the WLC to monitor the SGT assignments and SXP connections.

First, verify the SGT assigned to a client after user authorization on a WLC.

Step 1: In the web console, click **Monitor**, and then click **Clients.**

Step 2: Click the client MAC address. The Details window opens.

Step 3: Scroll down to the Security Information section.



Clients > Detail

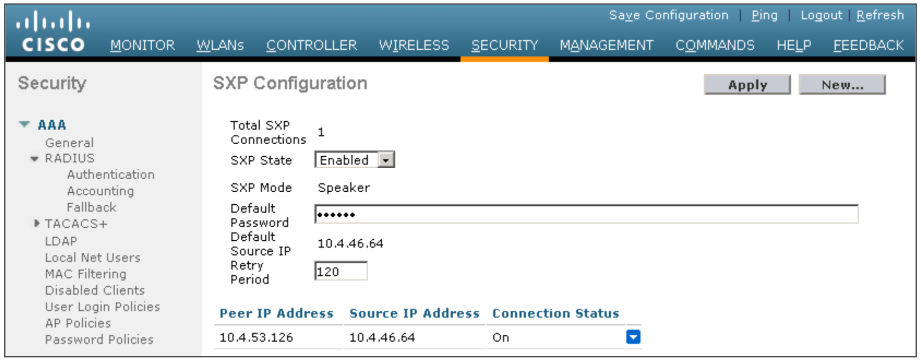
Security Information

Security Policy Completed	Yes
Policy Type	RSN (WPA2)
Encryption Cipher	CCMP (AES)
EAP Type	PEAP
SNMP NAC State	Access
Radius NAC State	RUN
CTS Security Group Tag	4
AAA Override ACL Name	none
AAA Override ACL Applied Status	Unavailable
AAA Override Flex ACL	none
AAA Override Flex ACL Applied Status	Unavailable
Redirect URL	none
IPv4 ACL Name	IT
IPv4 ACL Applied Status	Yes
IPv6 ACL Name	none
IPv6 ACL Applied Status	Unavailable
mDNS Profile Name	default-mdns-profile
mDNS Service Advertisement Count	0

Next, verify SXP connections from the WLC.

Step 4: In the web console, click **Security**.

Step 5: In the navigation pane on the left, click **TrustSec SXP**.



SXP Configuration

Total SXP Connections	1
SXP State	Enabled
SXP Mode	Speaker
Default Password	••••••
Default Source IP	10.4.46.64
Retry Period	120

Peer IP Address	Source IP Address	Connection Status
10.4.53.126	10.4.46.64	On

Process

Monitoring Network Access

1. View the Cisco ISE dashboard
2. Configure identity groups
3. Add a custom profile
4. Examining the authentication log
5. Create custom authentication reports
6. Identify endpoints
7. Create device-type reports

The configuration of the network infrastructure is complete. Now it's time to answer the what, when, where, and who questions regarding network access by using the reporting functionality of Cisco ISE to gain a better understanding of current activity on the network.

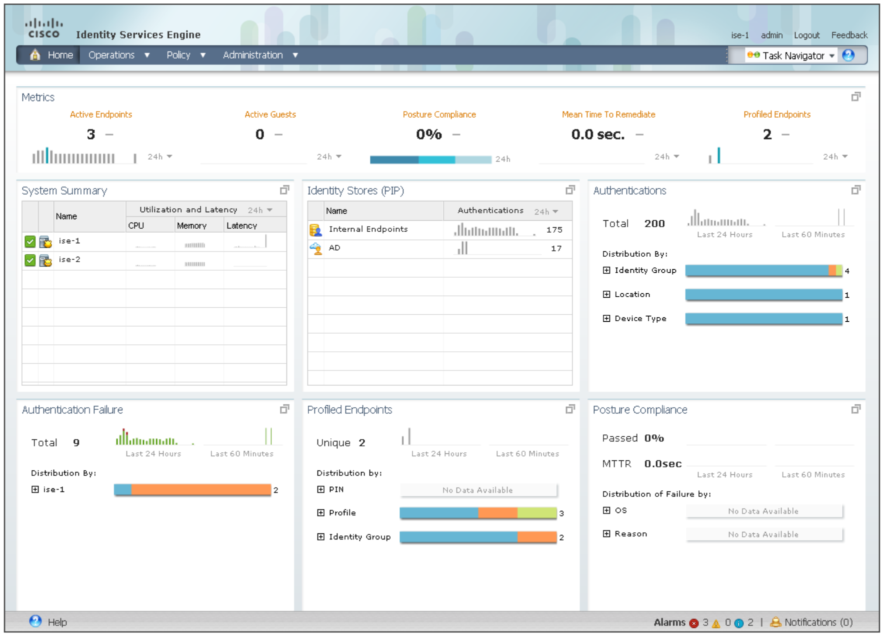
Cisco ISE is now configured to authenticate users and to profile endpoints based on RADIUS and DHCP information. The reporting capabilities of Cisco ISE allow you to determine what type of device is connecting to your network, when it connects, and where it connects from. Also, you will know who is connecting to your network and what authentication method was used.

Procedure 1 View the Cisco ISE dashboard

The first place to view this information is on the Cisco ISE home dashboard. It gives a summary view of the health status of the servers in the group, how devices are authenticating, and what types of devices have been profiled.

Step 1: On the menu bar, click **Home**.

Step 2: If you want to view additional information for a section, click the upper-right corner of that section. The section expands.



Procedure 2 Configure identity groups

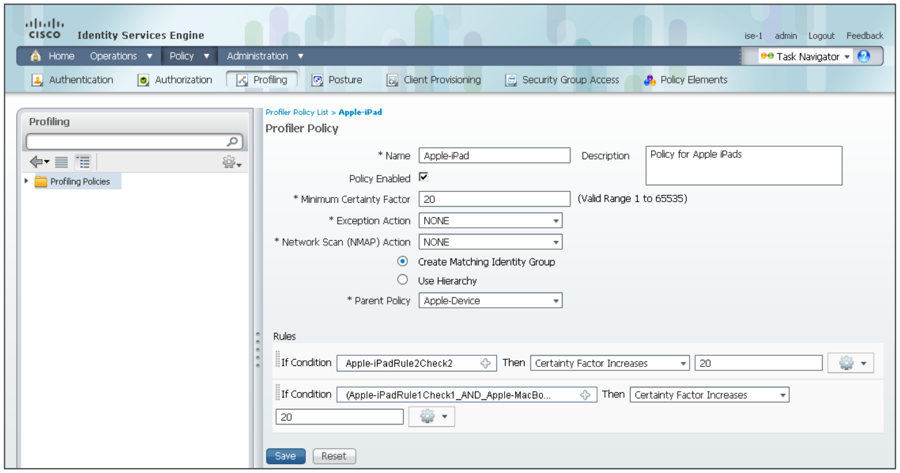
Cisco ISE has more in-depth reporting options to give more details on the devices connecting to the network. To help identify the endpoints, you can use identity groups to classify profiled endpoints and to generate reports.

The example below describes how to do this for an Apple iPad. The procedure for other types of devices is similar.

Step 1: In the menu bar, mouse over **Policy**, and then choose **Profiling**.

Step 2: Click **Apple-iPad.** This enables you to edit this policy.

Step 3: Select **Create Matching Identity Group**, and then click **Save**.


Identity Services Engine
ise-1 admin Logout Feedback
Home Operations Policy Administration
Task Navigator
Authentication Authorization Profiling Posture Client Provisioning Security Group Access Policy Elements
Profiling
Profiling Policies

Profiler Policy List > Apple-iPad

Profiler Policy

* Name: Apple-iPad Description: Policy for Apple iPads

Policy Enabled ☑

* Minimum Certainty Factor: 20 (Valid Range 1 to 65535)

* Exception Action: NONE

* Network Scan (NMAP) Action: NONE

● Create Matching Identity Group

○ Use Hierarchy

* Parent Policy: Apple-Device

Rules

If Condition Apple-iPadRule2Check2 Then Certainty Factor Increases 20

If Condition (Apple-iPadRule1Check1_AND_Apple-MacBo... Then Certainty Factor Increases 20

Save Reset

You can repeat these steps for other endpoint types as needed. You can also investigate the rules used to profile the endpoint to understand the process. In the case of the Apple iPad, Cisco ISE uses two rules. One is based on DHCP information, and the other is based on HTTP.

Procedure 3 Add a custom profile

Although there are many pre-defined profiles, you may find that a device you want to profile doesn't have an existing profile. You can create a new one using unique characteristics of the device. Review some of the existing profiles to get an idea of the options and methods available to you for device profiling.

The example below creates a profile for the Amazon Kindle Fire by using information obtained from the device's DHCP request and from HTTP requests.

Step 1: Connect to https://ise-1.cisco.local.

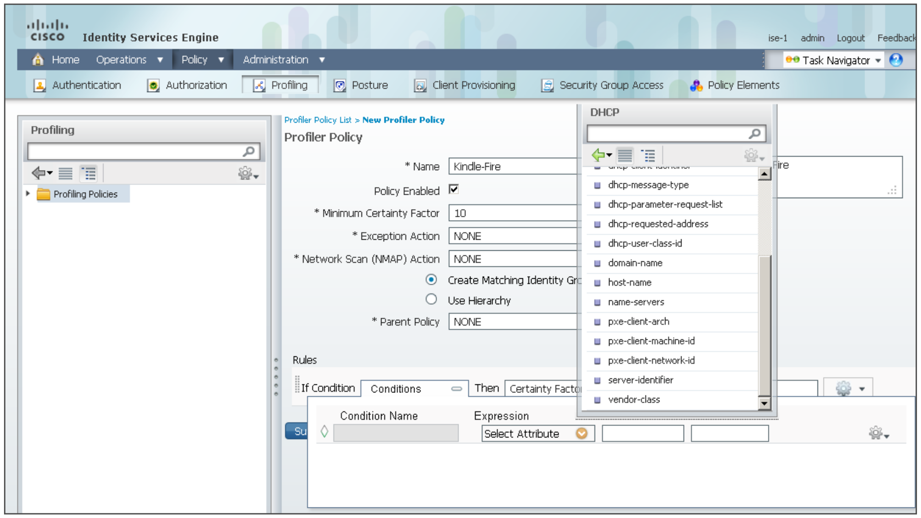
Step 2: Mouse over **Policy**, and then, from the drop-down menu, choose **Profiling**.

Step 3: Click **Add**.

Step 4: Give the policy the name **Kindle-Fire** and a description.

Step 5: In the rules section, next to Conditions, click the + symbol, and then click **Create New Condition (Advance Option)**.

Step 6: In the **Expression** list, next to DHCP, click the **>** symbol, and then choose **host-name**.


Identity Services Engine
ise-1 admin Logout Feedback
Home Operations Policy Administration
Task Navigator
Authentication Authorization Profiling Posture Client Provisioning Security Group Access Policy Elements
Profiling
Profiling Policies
Profiler Policy List > New Profiler Policy

Profiler Policy

* Name Kindle-Fire

Policy Enabled ☑

* Minimum Certainty Factor 10

* Exception Action NONE

* Network Scan (NMAP) Action NONE

● Create Matching Identity Group

○ Use Hierarchy

* Parent Policy NONE

Rules

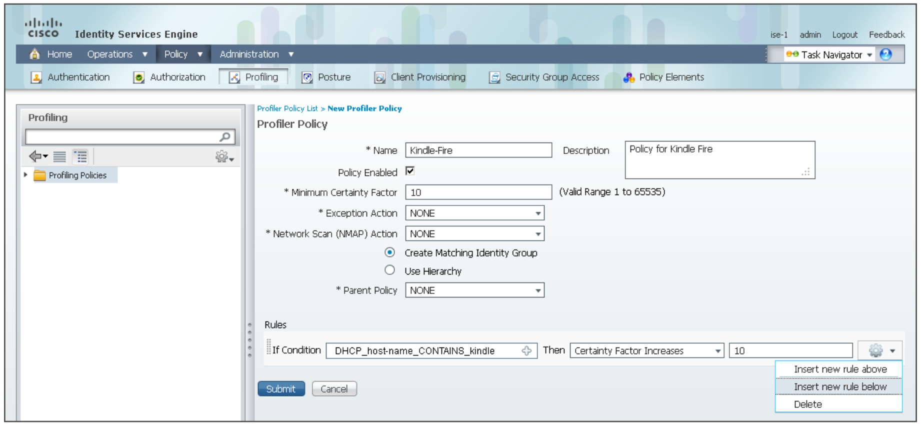
If Condition Conditions Then Certainty Factor

Condition Name | Expression Select Attribute

Step 7: In the second list, choose **CONTAINS**, and then, in the final box, enter **kindle**.

Step 8: Choose **Certainty Factor Increases**, and then set the value to **10**.

Step 9: Click the gear icon at the end of the rule, and then select **Insert new rule below**.


Identity Services Engine
ise-1 admin Logout Feedback
Home Operations Policy Administration
Task Navigator
Authentication Authorization Profiling Posture Client Provisioning Security Group Access Policy Elements
Profiling
Profiling Policies
Profiler Policy List > New Profiler Policy

Profiler Policy

* Name Kindle-Fire Description Policy for Kindle Fire

Policy Enabled ☑

* Minimum Certainty Factor 10 (Valid Range 1 to 65535)

* Exception Action NONE

* Network Scan (NMAP) Action NONE

● Create Matching Identity Group

○ Use Hierarchy

* Parent Policy NONE

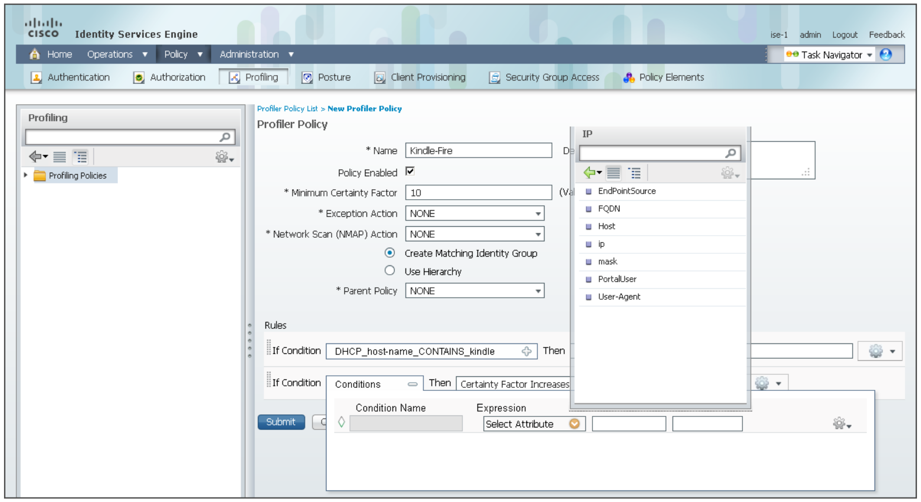
Rules

If Condition DHCP_host-name_CONTAINS_kindle Then Certainty Factor Increases 10

Insert new rule above
Insert new rule below
Delete
Submit
Cancel

Step 10: Next to Conditions, click the + symbol, and then click **Create New Condition (Advance Option)**.

Step 11: In the **Expression** list, next to IP, click the **>** symbol, and then choose **User-Agent**.


Identity Services Engine
ise-1 admin Logout Feedback
Home Operations Policy Administration
Task Navigator
Authentication Authorization Profiling Posture Client Provisioning Security Group Access Policy Elements
Profiling
Profiling Policies
Profiler Policy List > New Profiler Policy

Profiler Policy

* Name Kindle-Fire

Policy Enabled ☑

* Minimum Certainty Factor 10

* Exception Action NONE

* Network Scan (NMAP) Action NONE

● Create Matching Identity Group

○ Use Hierarchy

* Parent Policy NONE

Rules

If Condition DHCP_host-name_CONTAINS_kindle Then

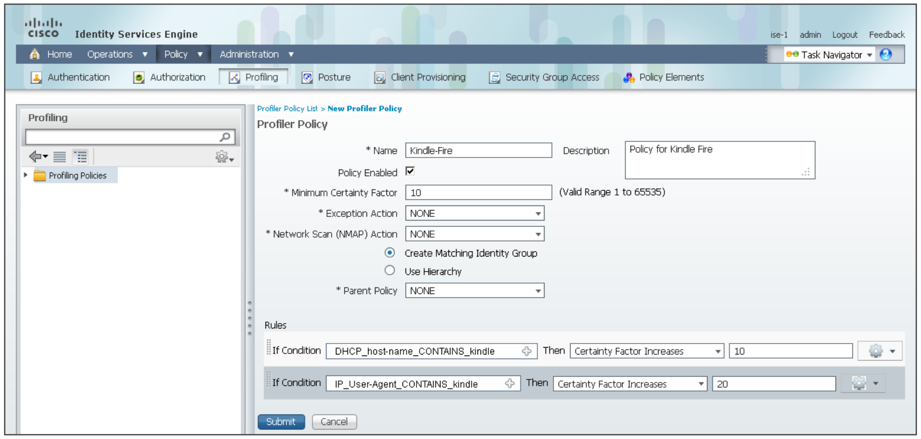
If Condition Conditions Then Certainty Factor Increases

Condition Name | Expression Select Attribute

IP
EndPointSource
FQDN
Host
ip
mask
PortalUser
User-Agent
Submit

Step 12: In the second list, choose **CONTAINS**, and then, in the final box, enter **kindle**.

Step 13: Choose **Certainty Factor Increases**, set the value to **20**, and then click **Submit**.


Identity Services Engine
ise-1 admin Logout Feedback
Home Operations Policy Administration
Task Navigator
Authentication Authorization Profiling Posture Client Provisioning Security Group Access Policy Elements
Profiling
Profiling Policies
Profiler Policy List > New Profiler Policy

Profiler Policy

* Name Kindle-Fire Description Policy for Kindle Fire

Policy Enabled ☑

* Minimum Certainty Factor 10 (Valid Range 1 to 65535)

* Exception Action NONE

* Network Scan (NMAP) Action NONE

● Create Matching Identity Group

○ Use Hierarchy

* Parent Policy NONE

Rules

If Condition DHCP_host-name_CONTAINS_kindle Then Certainty Factor Increases 10

If Condition IP_User-Agent_CONTAINS_kindle Then Certainty Factor Increases 20

Procedure 4 Examining the authentication log

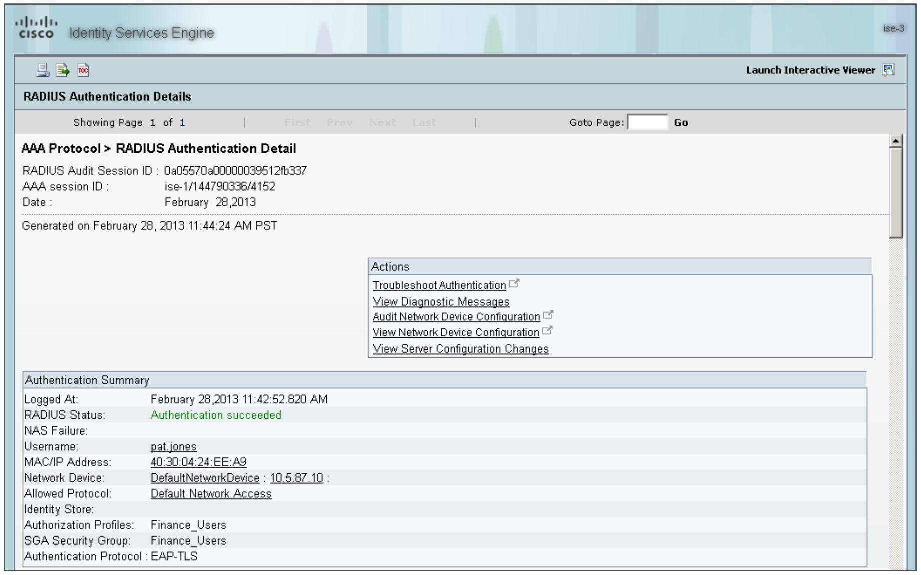
Step 1: On the menu bar, mouse over **Operations**, and then choose **Authentications**. The authentication log displays. The default option is to display the last 20 records from the last 24 hours.

For devices that authenticated via MAB, the MAC address of the client is listed as the user name and the endpoint. For devices that authenticated via RADIUS over wireless or VPN, the user name is displayed.

If the device was able to be profiled, that information is displayed.

Step 2: In the details column of the MAB record, click the “paper with magnifying glass” icon. This displays detailed authentication information for the record.

In the Authentication Summary section, the network device lists the IP address and the port of the switch that the endpoint is connected to.


cisco Identity Services Engine
ise-3
Launch Interactive Viewer
Showing Page 1 of 1 | First Prev Next Last | Goto Page: Go

RADIUS Authentication Details

AAA Protocol > RADIUS Authentication Detail

RADIUS Audit Session ID :	0a05570a00000039512fb337
AAA session ID :	ise-1/144790336/4152
Date :	February 28,2013

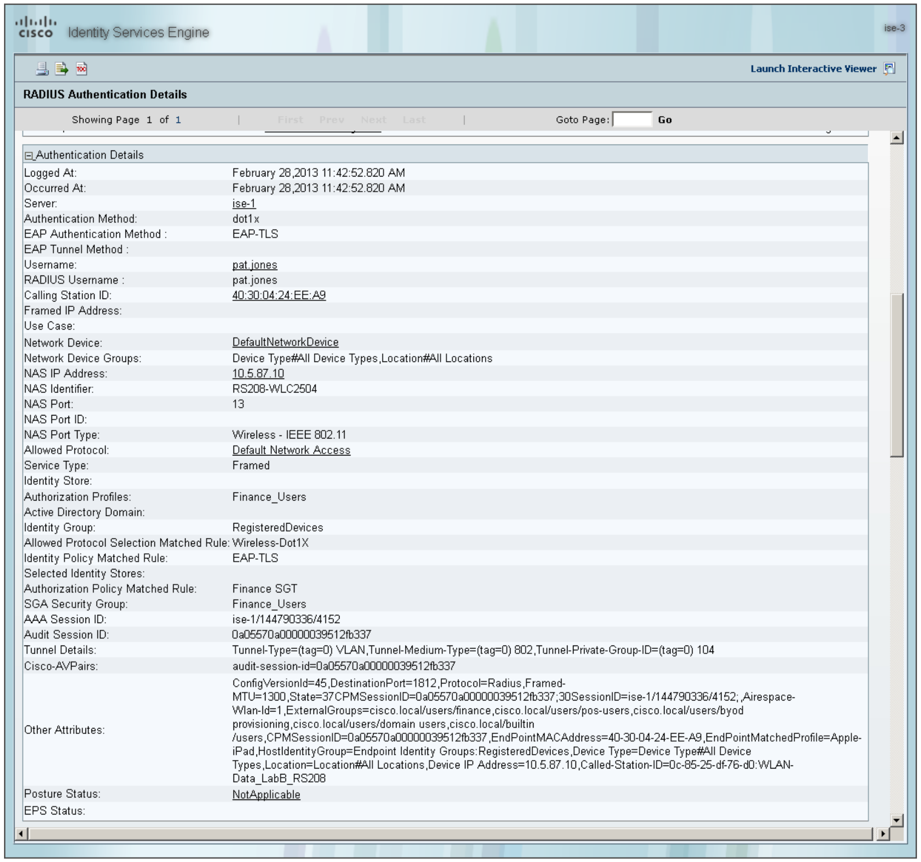
Generated on February 28, 2013 11:44:24 AM PST

Actions
- Troubleshoot Authentication
- View Diagnostic Messages
- Audit Network Device Configuration
- View Network Device Configuration
- View Server Configuration Changes

Authentication Summary

Logged At:	February 28,2013 11:42:52.820 AM
RADIUS Status:	Authentication succeeded
NAS Failure:	
Username:	pat.jones
MAC/IP Address:	40:30:04:24:EE:A9
Network Device:	DefaultNetworkDevice : 10.5.87.10 :
Allowed Protocol:	Default Network Access
Identity Store:	
Authorization Profiles:	Finance_Users
SGA Security Group:	Finance_Users
Authentication Protocol :	EAP-TLS

You can find additional details, such as the Identity Group and Identity Policy, in the Authentication Details section.


cisco Identity Services Engine
ise-3
Launch Interactive Viewer
Showing Page 1 of 1 | First Prev Next Last | Goto Page: Go

RADIUS Authentication Details

Authentication Details

Logged At:	February 28,2013 11:42:52.820 AM
Occurred At:	February 28,2013 11:42:52.820 AM
Server:	ise-1
Authentication Method:	dot1x
EAP Authentication Method :	EAP-TLS
EAP Tunnel Method :	
Username:	pat.jones
RADIUS Username :	pat.jones
Calling Station ID:	40:30:04:24:EE:A9
Framed IP Address:	
Use Case:	
Network Device:	DefaultNetworkDevice
Network Device Groups:	Device Type#All Device Types,Location#All Locations
NAS IP Address:	10.5.87.10
NAS Identifier:	RS208-WLC2504
NAS Port:	13
NAS Port ID:	
NAS Port Type:	Wireless - IEEE 802.11
Allowed Protocol:	Default Network Access
Service Type:	Framed
Identity Store:	
Authorization Profiles:	Finance_Users
Active Directory Domain:	
Identity Group:	RegisteredDevices
Allowed Protocol Selection Matched Rule:	Wireless-Dot1X
Identity Policy Matched Rule:	EAP-TLS
Selected Identity Stores:	
Authorization Policy Matched Rule:	Finance SGT
SGA Security Group:	Finance_Users
AAA Session ID:	ise-1/144790336/4152
Audit Session ID:	0a05570a00000039512fb337
Tunnel Details:	Tunnel-Type=(tag=0) VLAN,Tunnel-Medium-Type=(tag=0) 802,Tunnel-Private-Group-ID=(tag=0) 104
Cisco-AVPairs:	audit-session-id=0a05570a00000039512fb337
Other Attributes:	ConfigVersionId=45,DestinationPort=1812,Protocol=Radius,Framed-MTU=1300,State=37CPMSessionID=0a05570a00000039512fb337;30SessionID=ise-1/144790336/4152;,Airespace-Wlan-Id=1,ExternalGroups=cisco.local/users/finance,cisco.local/users/pos-users,cisco.local/users/byod provisioning,cisco.local/users/domain users,cisco.local/builtin /users,CPMSessionID=0a05570a00000039512fb337,EndPointMACAddress=40-30-04-24-EE-A9,EndPointMatchedProfile=Apple-iPad,HostIdentityGroup=Endpoint Identity Groups:RegisteredDevices,Device Type=Device Type#All Device Types,Location=Location#All Locations,Device IP Address=10.5.87.10,Called-Station-ID=0c-85-25-df-76-d0:WLAN-Data_LabB_RS208
Posture Status:	NotApplicable
EPS Status:	

Similar data can be found for endpoints that have authenticated with RADIUS. The user name is displayed in these records as well as the Extensible Authentication Protocol (EAP) method used.

Procedure 5 Create custom authentication reports

The default authentication log view is limited to displaying only the most recent entries. To get in-depth reporting, you need to create a custom report.

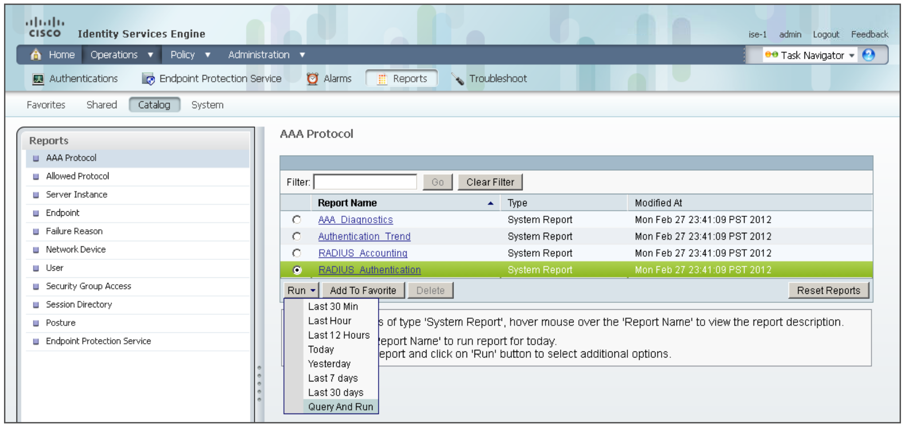
Step 1: On the menu bar, mouse over **Operations**, and then, in the Reports section, choose **Catalog**.

Step 2: In the left pane, select **AAA Protocol**.

Step 3: Select **RADIUS Authentication**.

Step 4: Click **Run**. Different time ranges for producing the default report are displayed.

Step 5: If you wish to use one of the default time ranges, choose that time range.



AAA Protocol

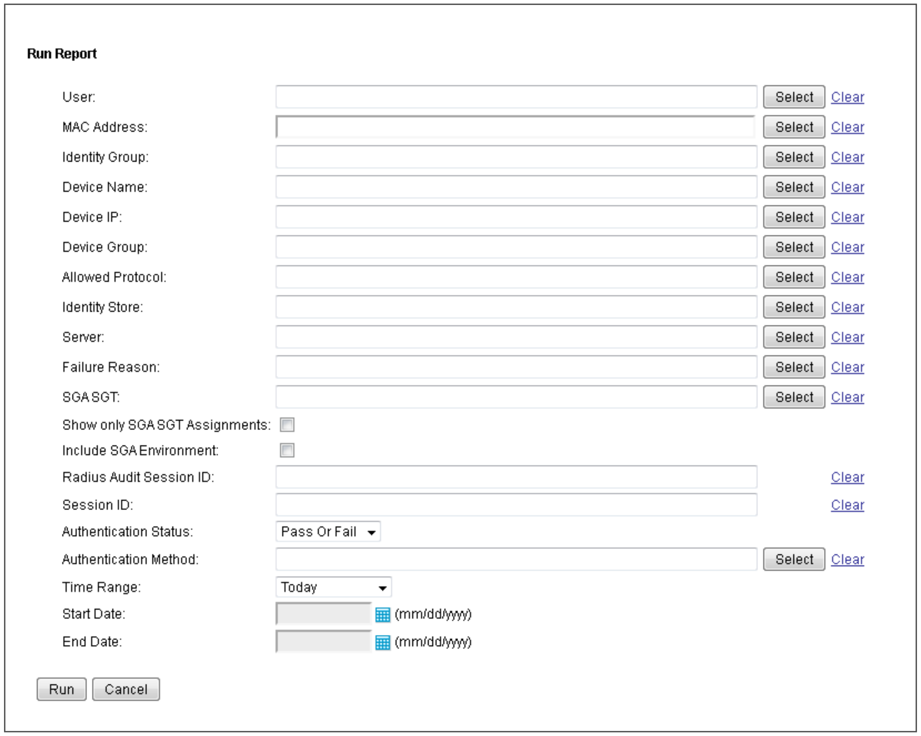
	Report Name	Type	Modified At
○	AAA_Diagnostics	System Report	Mon Feb 27 23:41:09 PST 2012
○	Authentication_Trend	System Report	Mon Feb 27 23:41:09 PST 2012
○	RADIUS_Accounting	System Report	Mon Feb 27 23:41:09 PST 2012
●	RADIUS_Authentication	System Report	Mon Feb 27 23:41:09 PST 2012

s of type 'System Report', hover mouse over the 'Report Name' to view the report description.
eport Name' to run report for today.
eport and click on 'Run' button to select additional options.

If you wish to select a time range that is not listed, choose **Query and Run**. All the parameters available for the report display.

Step 6: After choosing the parameters you want, click **Run** to generate the report.

Figure 2 - RADIUS report parameters



Run Report

User:		Select	Clear
MAC Address:		Select	Clear
Identity Group:		Select	Clear
Device Name:		Select	Clear
Device IP:		Select	Clear
Device Group:		Select	Clear
Allowed Protocol:		Select	Clear
Identity Store:		Select	Clear
Server:		Select	Clear
Failure Reason:		Select	Clear
SGA SGT:		Select	Clear
Show only SGA SGT Assignments:	□		
Include SGA Environment:	□		
Radius Audit Session ID:			Clear
Session ID:			Clear
Authentication Status:	Pass Or Fail		
Authentication Method:		Select	Clear
Time Range:	Today		
Start Date:	(mm/dd/yyyy)		
End Date:	(mm/dd/yyyy)		

Procedure 6 Identify endpoints

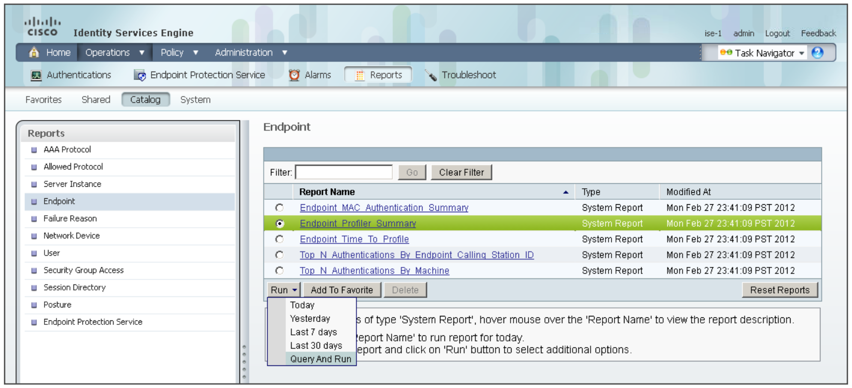
Using information gleaned from the RADIUS and DHCP requests, Cisco ISE can identify what types of devices are connecting to the network. This can assist in determining the network security policy based on the type of device that is in use.

Step 1: On the menu bar, mouse over **Operations**, and then, in the Reports section, choose **Catalog**.

Step 2: In the left pane, click **Endpoint**. This displays the available endpoint reports.

Step 3: Select **Endpoint Profiler Summary**, and then click **Run**.

Step 4: Select the desired time period to run the report.


Cisco Identity Services Engine
ise-1 admin Logout Feedback
Home Operations ▼ Policy ▼ Administration ▼
Task Navigator
Authentications Endpoint Protection Service Alarms Reports Troubleshoot
Favorites Shared Catalog System
Reports
AAA Protocol
Allowed Protocol
Server Instance
Endpoint
Failure Reason
Network Device
User
Security Group Access
Session Directory
Posture
Endpoint Protection Service
Endpoint
Filter: Go Clear Filter
Run ▼ Add To Favorite Delete Reset Reports
Today
Yesterday
Last 7 days
Last 30 days
Query And Run

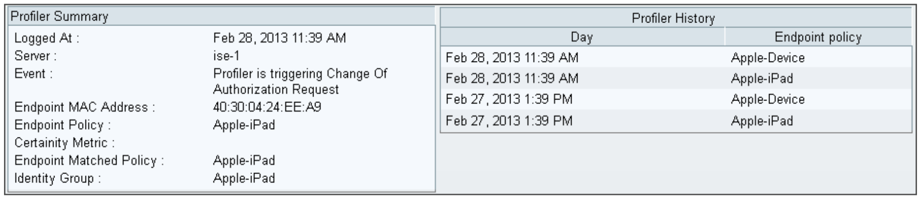
	Report Name	Type	Modified At
○	Endpoint_MAC_Authentication_Summary	System Report	Mon Feb 27 23:41:09 PST 2012
●	Endpoint_Profiler_Summary	System Report	Mon Feb 27 23:41:09 PST 2012
○	Endpoint_Time_To_Profile	System Report	Mon Feb 27 23:41:09 PST 2012
○	Top_N_Authentications_By_Endpoint_Calling_Station_ID	System Report	Mon Feb 27 23:41:09 PST 2012
○	Top_N_Authentications_By_Machine	System Report	Mon Feb 27 23:41:09 PST 2012

s of type 'System Report', hover mouse over the 'Report Name' to view the report description.
eport Name' to run report for today.
eport and click on 'Run' button to select additional options.

Step 5: Once the report is generated, you can view the details of a profiled endpoint by clicking the magnifying glass icon.

The details given in the summary section are the MAC address, the endpoint policy, and the identity group for the endpoint. Additional details, such as IP address and network access devices, are available in the Endpoint Details section. For wireless and remote-access VPN endpoints that authenticated with RADIUS, the user name is also listed.

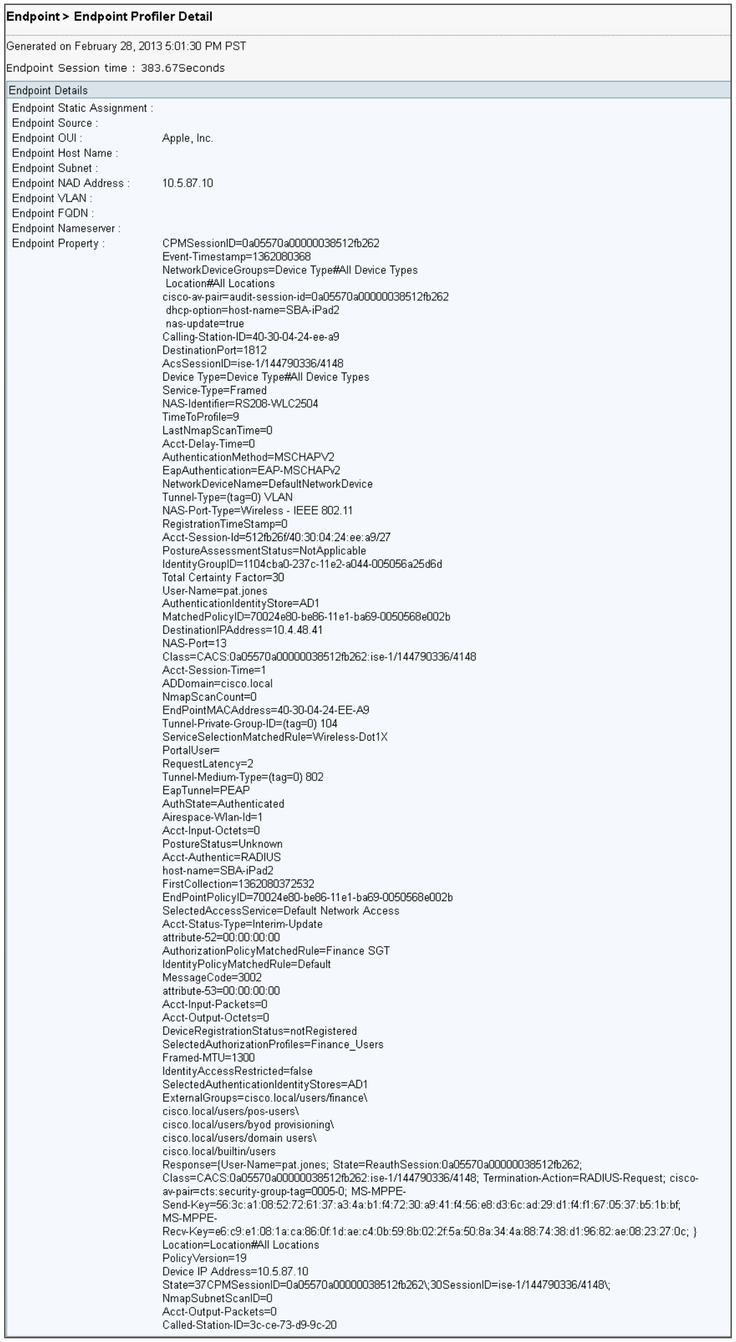
Figure 3 - Endpoint profile summary



Profiler Summary	
Logged At :	Feb 28, 2013 11:39 AM
Server :	ise-1
Event :	Profiler is triggering Change Of Authorization Request
Endpoint MAC Address :	40:30:04:24:EE:A9
Endpoint Policy :	Apple-iPad
Certainity Metric :	
Endpoint Matched Policy :	Apple-iPad
Identity Group :	Apple-iPad

Profiler History	
Day	Endpoint policy
Feb 28, 2013 11:39 AM	Apple-Device
Feb 28, 2013 11:39 AM	Apple-iPad
Feb 27, 2013 1:39 PM	Apple-Device
Feb 27, 2013 1:39 PM	Apple-iPad

Figure 4 - Endpoint Details



```
Endpoint > Endpoint Profiler Detail

Generated on February 28, 2013 5:01:30 PM PST
Endpoint Session time : 383.67Seconds

Endpoint Details
 Endpoint Static Assignment :
 Endpoint Source :
 Endpoint OUI :              Apple, Inc.
 Endpoint Host Name :
 Endpoint Subnet :
 Endpoint NAD Address :      10.5.87.10
 Endpoint VLAN :
 Endpoint FQDN :
 Endpoint Nameserver :
 Endpoint Property :         CPMSessionID=0a05570a00000038512fb262
                             Event-Timestamp=1362080368
                             NetworkDeviceGroups=Device Type#All Device Types
                              Location#All Locations
                             cisco-av-pair=audit-session-id=0a05570a00000038512fb262
                              dhcp-option=host-name=SBA-iPad2
                              nas-update=true
                             Calling-Station-ID=40-30-04-24-ee-a9
                             DestinationPort=1812
                             AcsSessionID=ise-1/144790336/4148
                             Device Type=Device Type#All Device Types
                             Service-Type=Framed
                             NAS-Identifier=RS208-WLC2504
                             TimeToProfile=9
                             LastNmapScanTime=0
                             Acct-Delay-Time=0
                             AuthenticationMethod=MSCHAPV2
                             EapAuthentication=EAP-MSCHAPv2
                             NetworkDeviceName=DefaultNetworkDevice
                             Tunnel-Type=(tag=0) VLAN
                             NAS-Port-Type=Wireless - IEEE 802.11
                             RegistrationTimeStamp=0
                             Acct-Session-Id=512fb26f/40:30:04:24:ee:a9/27
                             PostureAssessmentStatus=NotApplicable
                             IdentityGroupID=1104cba0-237c-11e2-a044-005056a25d6d
                             Total Certainty Factor=30
                             User-Name=pat.jones
                             AuthenticationIdentityStore=AD1
                             MatchedPolicyID=70024e80-be86-11e1-ba69-0050568e002b
                             DestinationIPAddress=10.4.48.41
                             NAS-Port=13
                             Class=CACS:0a05570a00000038512fb262:ise-1/144790336/4148
                             Acct-Session-Time=1
                             ADDomain=cisco.local
                             NmapScanCount=0
                             EndPointMACAddress=40-30-04-24-EE-A9
                             Tunnel-Private-Group-ID=(tag=0) 104
                             ServiceSelectionMatchedRule=Wireless-Dot1X
                             PortalUser=
                             RequestLatency=2
                             Tunnel-Medium-Type=(tag=0) 802
                             EapTunnel=PEAP
                             AuthState=Authenticated
                             Airespace-Wlan-Id=1
                             Acct-Input-Octets=0
                             PostureStatus=Unknown
                             Acct-Authentic=RADIUS
                             host-name=SBA-iPad2
                             FirstCollection=1362080372532
                             EndPointPolicyID=70024e80-be86-11e1-ba69-0050568e002b
                             SelectedAccessService=Default Network Access
                             Acct-Status-Type=Interim-Update
                             attribute-52=00:00:00:00
                             AuthorizationPolicyMatchedRule=Finance SGT
                             IdentityPolicyMatchedRule=Default
                             MessageCode=3002
                             attribute-53=00:00:00:00
                             Acct-Input-Packets=0
                             Acct-Output-Octets=0
                             DeviceRegistrationStatus=notRegistered
                             SelectedAuthorizationProfiles=Finance_Users
                             Framed-MTU=1300
                             IdentityAccessRestricted=false
                             SelectedAuthenticationIdentityStores=AD1
                             ExternalGroups=cisco.local/users/finance\
                             cisco.local/users/pos-users\
                             cisco.local/users/byod provisioning\
                             cisco.local/users/domain users\
                             cisco.local/builtin/users
                             Response={User-Name=pat.jones; State=ReauthSession:0a05570a00000038512fb262;
                             Class=CACS:0a05570a00000038512fb262:ise-1/144790336/4148; Termination-Action=RADIUS-Request; cisco-
                             av-pair=cts:security-group-tag=0005-0; MS-MPPE-
                             Send-Key=56:3c:a1:08:52:72:61:37:a3:4a:b1:f4:72:30:a9:41:f4:56:e8:d3:6c:ad:29:d1:f4:f1:67:05:37:b5:1b:bf;
                             MS-MPPE-
                             Recv-Key=e6:c9:e1:08:1a:ca:86:0f:1d:ae:c4:0b:59:8b:02:2f:5a:50:8a:34:4a:88:74:38:d1:96:82:ae:08:23:27:0c; }
                             Location=Location#All Locations
                             PolicyVersion=19
                             Device IP Address=10.5.87.10
                             State=37CPMSessionID=0a05570a00000038512fb262\;30SessionID=ise-1/144790336/4148\;
                             NmapSubnetScanID=0
                             Acct-Output-Packets=0
                             Called-Station-ID=3c-ce-73-d9-9c-20
```

Procedure 7 Create device-type reports

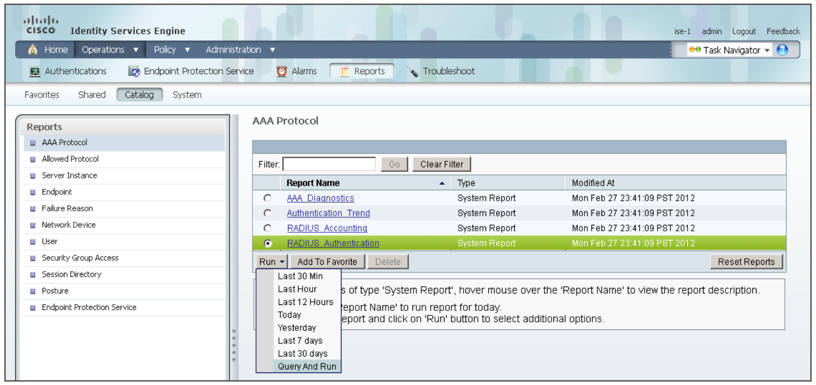
You can create reports to identify specific devices based on the identity groups configured previously. This example uses the group created to identify Apple iPads.

Step 1: On the menu bar, mouse over **Operations**, and then, in the Reports section, choose **Catalog**.

Step 2: In the left pane, click **AAA Protocol**.

Step 3: Select **RADIUS Authentication**.

Step 4: Click **Run,** and then choose **Query and Run**.



AAA Protocol

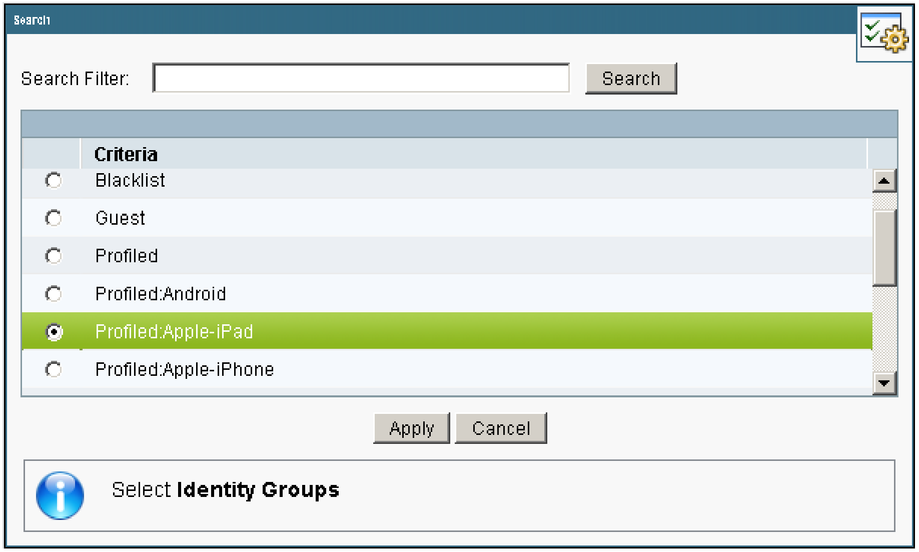
	Report Name	Type	Modified At
○	AAA_Diagnostics	System Report	Mon Feb 27 23:41:09 PST 2012
○	Authentication_Trend	System Report	Mon Feb 27 23:41:09 PST 2012
○	RADIUS_Accounting	System Report	Mon Feb 27 23:41:09 PST 2012
●	RADIUS_Authentication	System Report	Mon Feb 27 23:41:09 PST 2012

s of type 'System Report', hover mouse over the 'Report Name' to view the report description.
eport Name' to run report for today.
eport and click on 'Run' button to select additional options.

Step 5: For the identity group you want to query, next the Identity Group field, click **Select**. A search window appears.

Step 6: Leave the search field empty, and then click **Search**. The search returns all groups.

Step 7: Select the group **Profiled:AppleiPad**, and then click **Apply**.

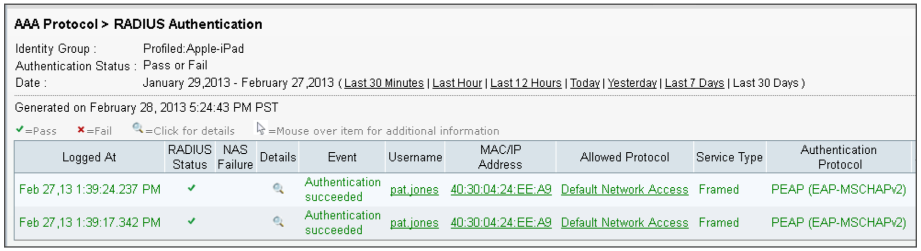


	Criteria
○	Blacklist
○	Guest
○	Profiled
○	Profiled:Android
●	Profiled:Apple-iPad
○	Profiled:Apple-iPhone

Select **Identity Groups**

Step 8: Select a time range for the report, and then click **Run.** The report generates.

Figure 5 - Sample report



AAA Protocol > RADIUS Authentication

Identity Group : Profiled:Apple-iPad
Authentication Status : Pass or Fail
Date : January 29,2013 - February 27,2013 (Last 30 Minutes | Last Hour | Last 12 Hours | Today | Yesterday | Last 7 Days | Last 30 Days)

Generated on February 28, 2013 5:24:43 PM PST

✓=Pass ✗=Fail 🔍=Click for details ↖=Mouse over item for additional information

Logged At	RADIUS Status	NAS Failure	Details	Event	Username	MAC/IP Address	Allowed Protocol	Service Type	Authentication Protocol
Feb 27,13 1:39:24.237 PM	✓		🔍	Authentication succeeded	pat.jones	40:30:04:24:EE:A9	Default Network Access	Framed	PEAP (EAP-MSCHAPv2)
Feb 27,13 1:39:17.342 PM	✓		🔍	Authentication succeeded	pat.jones	40:30:04:24:EE:A9	Default Network Access	Framed	PEAP (EAP-MSCHAPv2)

Appendix A: Product List

Network Management

Functional Area	Product Description	Part Numbers	Software
Identity Management	Cisco Identity Services Engine Virtual Appliance	ISE-VM-K9=	1.1.2.145
	Cisco ISE Base License for 2500 Endpoints	L-ISE-BSE-2500=	
	Cisco ISE Base License for 3500 Endpoints	L-ISE-BSE-3500=	
	Cisco ISE Base License for 5000 Endpoints	L-ISE-BSE-5K=	
	Cisco ISE Base License for 10,000 Endpoints	L-ISE-BSE-10K=	
	Cisco ISE Advanced 3-year License for 2500 Endpoints	L-ISE-ADV3Y-2500=	
	Cisco ISE Advanced 3-year License for 3500 Endpoints	L-ISE-ADV3Y-3500=	
	Cisco ISE Advanced 3-year License for 5000 Endpoints	L-ISE-ADV3Y-5K=	
	Cisco ISE Advanced 3-year License for 10,000 Endpoints	L-ISE-ADV3Y-10K=	
Network Management	Cisco Prime Infrastructure 1.1	R-PI-1.1-K9	4.2
	Prime Infrastructure 1.1 Software – 50 Device Base License	R-PI-1.1-50-K9	
	Prime Infrastructure 1.1 Software – 100 Device Base License	R-PI-1.1-100-K9	
	Prime Infrastructure 1.1 Software – 500 Device Base License	R-PI-1.1-500-K9	
	Prime Infrastructure 1.1 Software – 1K Device Base License	R-PI-1.1-1K-K9	
	Prime Infrastructure 1.1 Software – 2.5K Device Base License	R-PI-1.1-2.5K-K9	
	Prime Infrastructure 1.1 Software – 5K Device Base License	R-PI-1.1-5K-K9	

LAN Access Layer

Functional Area	Product Description	Part Numbers	Software
Modular Access Layer Switch	Cisco Catalyst 4507R+E 7-slot Chassis with 48Gbps per slot	WS-C4507R+E	3.3.0.SG(15.1-1SG) IP Base license
	Cisco Catalyst 4500 E-Series Supervisor Engine 7L-E	WS-X45-SUP7L-E	
	Cisco Catalyst 4500 E-Series 48 Ethernet 10/100/1000 (RJ45) PoE+ ports	WS-X4648-RJ45V+E	
	Cisco Catalyst 4500 E-Series 48 Ethernet 10/100/1000 (RJ45) PoE+,UPoE ports	WS-X4748-UPOE+E	

Functional Area	Product Description	Part Numbers	Software
Stackable Access Layer Switch	Cisco Catalyst 3750-X Series Stackable 48 Ethernet 10/100/1000 PoE+ ports	WS-C3750X-48PF-S	15.0(2)SE IP Base license
	Cisco Catalyst 3750-X Series Stackable 24 Ethernet 10/100/1000 PoE+ ports	WS-C3750X-24P-S	
	Cisco Catalyst 3750-X Series Two 10GbE SFP+ and Two GbE SFP ports network module	C3KX-NM-10G	
	Cisco Catalyst 3750-X Series Four GbE SFP ports network module	C3KX-NM-1G	
Standalone Access Layer Switch	Cisco Catalyst 3560-X Series Standalone 48 Ethernet 10/100/1000 PoE+ ports	WS-C3560X-48PF-S	15.0(2)SE IP Base license
	Cisco Catalyst 3560-X Series Standalone 24 Ethernet 10/100/1000 PoE+ ports	WS-C3560X-24P-S	
	Cisco Catalyst 3750-X Series Two 10GbE SFP+ and Two GbE SFP ports network module	C3KX-NM-10G	
	Cisco Catalyst 3750-X Series Four GbE SFP ports network module	C3KX-NM-1G	
Stackable Access Layer Switch	Cisco Catalyst 2960-S Series 48 Ethernet 10/100/1000 PoE+ ports and Two 10GbE SFP+ Uplink ports	WS-C2960S-48FPD-L	15.0(2)SE LAN Base license
	Cisco Catalyst 2960-S Series 48 Ethernet 10/100/1000 PoE+ ports and Four GbE SFP Uplink ports	WS-C2960S-48FPS-L	
	Cisco Catalyst 2960-S Series 24 Ethernet 10/100/1000 PoE+ ports and Two 10GbE SFP+ Uplink ports	WS-C2960S-24PD-L	
	Cisco Catalyst 2960-S Series 24 Ethernet 10/100/1000 PoE+ ports and Four GbE SFP Uplink ports	WS-C2960S-24PS-L	
	Cisco Catalyst 2960-S Series Flexstack Stack Module	C2960S-STACK	

Wireless LAN Controllers

Functional Area	Product Description	Part Numbers	Software
On Site, Remote Site, or Guest Controller	Cisco 5500 Series Wireless Controller for up to 500 Cisco access points	AIR-CT5508-500-K9	7.4.100.0
	Cisco 5500 Series Wireless Controller for up to 250 Cisco access points	AIR-CT5508-250-K9	
	Cisco 5500 Series Wireless Controller for up to 100 Cisco access points	AIR-CT5508-100-K9	
	Cisco 5500 Series Wireless Controller for up to 50 Cisco access points	AIR-CT5508-50-K9	
	Cisco 5500 Series Wireless Controller for up to 25 Cisco access points	AIR-CT5508-25-K9	
	Cisco 5500 Series Wireless Controller for up to 12 Cisco access points	AIR-CT5508-12-K9	
	Cisco 5500 Series Wireless Controller for High Availability	AIR-CT5508-HA-K9	

Functional Area	Product Description	Part Numbers	Software
On Site Controller, Guest Controller	Cisco 2500 Series Wireless Controller for up to 50 Cisco access points	AIR-CT2504-50-K9	7.4.100.0
	Cisco 2500 Series Wireless Controller for up to 25 Cisco access points	AIR-CT2504-25-K9	
	Cisco 2500 Series Wireless Controller for up to 15 Cisco access points	AIR-CT2504-15-K9	
	Cisco 2500 Series Wireless Controller for up to 5 Cisco access points	AIR-CT2504-5-K9	

Wireless LAN Access Points

Functional Area	Product Description	Part Numbers	Software
Wireless Access Points	Cisco 3600 Series Access Point Dual Band 802.11a/g/n and CleanAir with Internal Antennas	AIR-CAP3602I-x-K9	7.4.100.0
	Cisco 3600 Series Access Point Dual Band 802.11a/g/n and CleanAir with External Antennas	AIR-CAP3602E-x-K9	
	Cisco 2600 Series Access Point Dual Band 802.11a/g/n and CleanAir with Internal Antennas	AIR-CAP2602I-x-K9	
	Cisco 2600 Series Access Point Dual Band 802.11a/g/n and CleanAir with External Antennas	AIR-CAP2602E-x-K9	
	Cisco 1600 Series Access Point Dual-band controller-based 802.11a/g/n with Internal Antennas	AIR-CAP1602I-x-K9	
	Cisco 1600 Series Access Point Dual-band controller-based 802.11a/g/n with External Antennas	AIR-CAP1602E-x-K9	

Data Center Services

Functional Area	Product Description	Part Numbers	Software
Firewall	Cisco ASA 5585-X Security Plus IPS Edition SSP-40 and IPS SSP-40 bundle	ASA5585-S40P40-K9	ASA 9.0(1) IPS 7.1(6) E4
	Cisco ASA 5585-X Security Plus IPS Edition SSP-20 and IPS SSP-20 bundle	ASA5585-S20P20X-K9	
	Cisco ASA 5585-X Security Plus IPS Edition SSP-10 and IPS SSP-10 bundle	ASA5585-S10P10XK9	

Appendix B: Changes

This appendix summarizes the changes to this guide since the previous Cisco SBA series.

- We upgraded the Cisco ISE appliances to software version 1.1.2.145.
- We upgraded the Cisco Wireless LAN Controllers to software version 7.4.1.52.
- We upgraded the Cisco Catalyst 2960-S Series, 3560-X Series, and 3750-X Series switches to Cisco IOS version 15.0(2)SE.
- We upgraded the Cisco ASA 5500 Series firewall to software version 9.0(1).
- We upgraded the Cisco AnyConnect Secure Mobility Client 3.1.00495.
- We added Security Group Access (SGA) support to our low-impact mode deployment of 802.1X, using Security Group Tags (SGT) and Security Group Firewall (SG-FW) to enforce our access policy.
- We added EAP Chaining support for Microsoft Windows endpoints using the Cisco AnyConnect Mobility Client, allowing them to authenticate using both a machine certificate and a user certificate.

Notes

Feedback

Please use the feedback form to send comments and suggestions about this guide.

SMART BUSINESS ARCHITECTURE

Americas Headquarters
Cisco Systems, Inc.
San Jose, CA

Asia Pacific Headquarters
Cisco Systems (USA) Pte. Ltd.
Singapore

Europe Headquarters
Cisco Systems International BV Amsterdam,
The Netherlands

Cisco has more than 200 offices worldwide. Addresses, phone numbers, and fax numbers are listed on the Cisco Website at www.cisco.com/go/offices.

ALL DESIGNS, SPECIFICATIONS, STATEMENTS, INFORMATION, AND RECOMMENDATIONS (COLLECTIVELY, "DESIGNS") IN THIS MANUAL ARE PRESENTED "AS IS," WITH ALL FAULTS. CISCO AND ITS SUPPLiERS DISCLAIM ALL WARRANTIES, INCLUDING, WITHOUT LIMITATION, THE WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT OR ARISING FROM A COURSE OF DEALING, USAGE, OR TRADE PRACTICE. IN NO EVENT SHALL CISCO OR ITS SUPPLIERS BE LIABLE FOR ANY INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES, INCLUDING, WITHOUT LIMITATION, LOST PROFITS OR LOSS OR DAMAGE TO DATA ARISING OUT OF THE USE OR INABILITY TO USE THE DESIGNS, EVEN IF CISCO OR ITS SUPPLIERS HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. THE DESIGNS ARE SUBJECT TO CHANGE WITHOUT NOTICE. USERS ARE SOLELY RESPONSIBLE FOR THEIR APPLICATION OF THE DESIGNS. THE DESIGNS DO NOT CONSTITUTE THE TECHNICAL OR OTHER PROFESSIONAL ADVICE OF CISCO, ITS SUPPLIERS OR PARTNERS. USERS SHOULD CONSULT THEIR OWN TECHNICAL ADVISORS BEFORE IMPLEMENTING THE DESIGNS. RESULTS MAY VARY DEPENDING ON FACTORS NOT TESTED BY CISCO.

Any Internet Protocol (IP) addresses used in this document are not intended to be actual addresses. Any examples, command display output, and figures included in the document are shown for illustrative purposes only. Any use of actual IP addresses in illustrative content is unintentional and coincidental.