Cisco Identity Services Engine Upgrade Guide, Release 3.0

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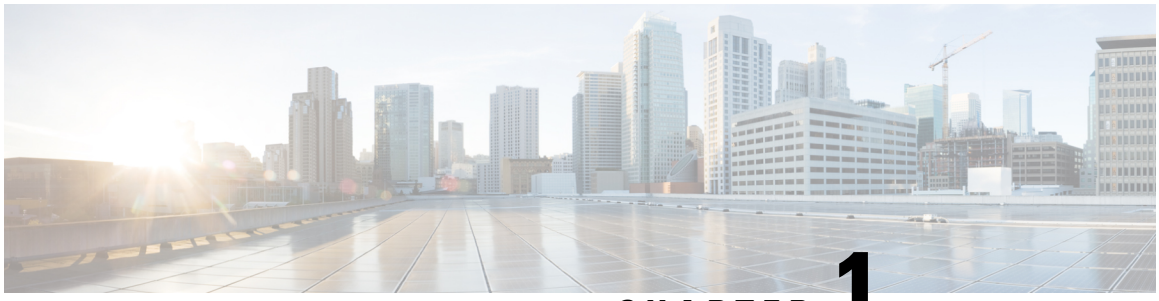

CHAPTER 1

Cisco ISE upgrade overview

This document describes how to upgrade your Cisco Identity Services Engine (Cisco ISE) software on Cisco ISE appliances and virtual machines to Release 3.0. (See the section "What is New in Cisco ISE, Release 3.0" in the *Release Notes for Cisco Identity Services Engine, Release 3.0.*)

Note Cisco ISE, Release 2.3 and later offer a new and enhanced **Policy Sets** window that replaces all the existing network access policies and policy sets. When you upgrade from an earlier release to Release 2.3 or later, all the network access policy configurations (including authentication and authorization conditions, rules, policies, profiles, and exceptions) are migrated to the new **Policy Sets** window in the Cisco ISE GUI. For more information on the new policy model, see the "New Policy Model" section in Cisco Identity Services Engine Administrator Guide, Release 2.3

Upgrading a Cisco ISE deployment is a multistep process and must be performed in the order that is specified in this document. Use the time estimates provided in this document to plan for an upgrade with minimum downtime. For a deployment with multiple Policy Service Nodes (PSNs) that are a part of a PSN group, there is no downtime. If no endpoints are authenticated through a PSN that is being upgraded, the request is processed by another PSN in the node group. The endpoint is reauthenticated and granted network access after the authentication is successful.

Caution If you have a standalone deployment or a deployment with a single PSN, you might experience a downtime for all the authentications when the PSN is being upgraded.

Note When upgrading to Cisco ISE Release 3.2 and above, Root CA regeneration happens automatically in the upgrade flow. Thus, post-upgrade Root CA regeneration is not required.

Different types of deployment

- Standalone Node: A single Cisco ISE node assuming the Administration, Policy Service, and Monitoring persona.
- Multi-Node Deployment: A distributed deployment with several ISE nodes.

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- Communications, services, and additional information, on page 5

Upgrade path

Single-step upgrade

You can directly upgrade to Cisco ISE, Release 3.0 from any of the following releases:

Note If you have Permanent License Reservation or the SSM On-Prem connection method are enabled in the release that you upgrade from, you must disable these features first. Then, upgrade to Cisco ISE Release 3.0 Patch 2 or later to reenable these features in your Cisco ISE.

Permanent License Reservation and the SSM On-Prem connection method are available in the following releases:

- Cisco ISE Releases 2.6 Patch 10 and later
- Cisco ISE Releases 2.7 Patch 4 and later

- Cisco ISE, Release 2.4
- Cisco ISE, Release 2.6
- Cisco ISE, Release 2.7

You can download the upgrade bundle from Cisco.com. The following upgrade bundle is available for Release 3.0:

ise-upgradebundle-2.4.x-2.7.x-to-3.0.0.458.SPA.x86_64.tar.gz—Use this bundle to upgrade from Release 2.4, 2.6 or 2.7 to 3.0

Two-step upgrade

If you are currently using a version earlier than Cisco ISE, Release 2.4, you must first upgrade to one of the releases that are listed above and then upgrade to Release 3.0.

Supported operating system for virtual machines

Cisco ISE runs on the Cisco Application Deployment Engine Operating System (ADE-OS), which is based on Red Hat Enterprise Linux (RHEL). For Cisco ISE 3.0, ADE-OS is based on RHEL 7.6.

The following table shows the RHEL versions used in different versions of Cisco ISE.

Table 1: RHEL Releases

Cisco ISE Release	RHEL Release
Cisco ISE 1.3	RHEL 6.4
Cisco ISE 1.4	RHEL 6.4
Cisco ISE 2.0	RHEL 7.0
Cisco ISE 2.1	RHEL 7.0
Cisco ISE 2.2	RHEL 7.0
Cisco ISE 2.3	RHEL 7.0
Cisco ISE 2.4	RHEL 7.3
Cisco ISE 2.6	RHEL 7.5
Cisco ISE 2.7	RHEL 7.6
Cisco ISE 3.0	RHEL 7.6
Cisco ISE 3.2	RHEL 8.4

For Cisco ISE Release 3.0 and later releases, we recommend that you update to VMware ESXi 7.0.3 or later releases.

If you are upgrading the Cisco ISE nodes on VMware virtual machines (VMs) after the upgrade, you must change the Guest operating system to the supported version of RHEL. To do this, you must power down the VM, change the Guest operating system to the supported RHEL version, and power on the VM.

Note If you have selected **Guest OS RHEL 8** and **Firmware EFI**, ensure that the **Enable UEFI Secure Boot** option is disabled in the **VM Options** tab. This option is enabled by default for Guest operating system RHEL 8 VM. Ensure that you disable the option for the Cisco ISE VM.

Cisco ISE upgrades with RHEL operating system upgrade might take a longer time than the normal upgrade process. Additionally, if there are changes in the Oracle database version, it might take more time to upgrade because the new Oracle package is installed during the operating system upgrade.

Licensing changes

Device administration licenses

The licenses that are used for Cisco ISE Releases 2.x, such as Base, Plus, and Apex, have been replaced with new license types. Cisco ISE Release 3.0 uses Essentials, Advantage, and Premier licenses. See the Chapter "Licensing" in the *Cisco Identity Services Engine Administrator Guide*. For more information on license migration, see the ISE 3.0 License Migration Guide.

You must convert your existing smart or traditional licenses to the new license type through the Cisco Smart Software Manager (CSSM), to enable license consumption in Cisco ISE Release 3.0.

From Cisco ISE, Release 2.4, the number of Device Administration licenses must be equal to the number of device administration nodes (PSNs configured for the device administration service) in a deployment.

If you are currently using a Device Administration license and plan to upgrade to Release 2.4 or above, TACACS+ features will be supported for 50 Device Administration nodes in Release 2.4 and above.

If you install a PAK generated from a new PID, Device Administration license count is displayed as per the quantity available in the PAK file. You can add multiple Device Administration licenses to your deployment based on the number of Device Administration nodes that you require. Evaluation license supports one Device Administration node.

Licenses for VM nodes

Cisco ISE is also shipped as a virtual appliance. For Release 2.4 and above, it is recommended that you install appropriate VM licenses for the VM nodes in your deployment. You must install the VM licenses based on the number of VM nodes and each VM node's resources such as CPU and memory. Otherwise, you will receive warnings and notifications to procure and install the VM license keys in Release 2.4 and later, however, the services are not interrupted.

VM licenses are Infrastructure licenses, therefore, you can install VM licenses irrespective of the endpoint licenses available in your deployment. You can install a VM license even if you have not installed any Evaluation, Base, Plus, or Apex license in your deployment. However, in order to use the features enabled by the Base, Plus, or Apex licenses, you must install the appropriate licenses.

After installing or upgrading to Release 2.4 or above, if there is any mismatch between the number of deployed VM nodes and installed VM licenses, alarms are displayed in the Alarms dashlet for every 14 days. Alarms are also displayed if there are any changes in the VM node’s resources or whenever a VM node is registered or deregistered.

VM licenses are perpetual licenses. VM licensing changes are displayed every time you log in to the Cisco ISE GUI, until you check the **Do not show this message again** check box in the notification dialog box.

If you have not purchased any ISE VM license before, refer to the ISE Ordering Guide to choose the appropriate VM license to be purchased. If you have purchased ISE VM licenses with no Product Authorization Key (PAK) associated, you can request VM PAKs by reaching out to licensing@cisco.com with Sales Order numbers that reflect the ISE VM purchase. This request will be processed to provide one medium VM license key for each ISE VM purchase you made in the past.

VM License Categories

VM licenses are offered under three categories: Small, Medium, and Large. These categories depend on the resources such as hardware appliances, RAM capacity and number of CPUs. For instance, if you are using 3595 equivalent VM node with 8 cores and 64-GB RAM, you might need a Medium category VM license, if you want to replicate the same capabilities on the VM. You need to install multiple VM licenses based on the number of VMs and their resources as per your deployment requirements.

The following table shows the minimum VM resources required for the VM categories:

VM Category	VM License Specifications
Small	• Minimum 16GB RAM and 12 CPU cores for SNS-3515 equivalent. • Minimum 32GB RAM and 16 CPU cores for SNS-3615 equivalent.
Medium	• Minimum 64GB RAM and 16 CPU cores for SNS-3595 equivalent. • Minimum 96GB RAM and 24 CPU cores for SNS-3655 equivalent.

VM Category	VM License Specifications
Large	• Minimum 256GB RAM and 16 CPU cores for MnT in clusters supporting more than 500,000 concurrent sessions. • Minimum 256GB RAM and 24 CPU cores for SNS-3695 equivalent.

For more information about the licenses, see chapter "Cisco ISE Licenses" in the *Cisco Identity Services Engine Administrator Guide*.

Additional references

The following link contains additional resources that you can use when working with Cisco ISE:

https://www.cisco.com/c/en/us/td/docs/security/ise/end-user-documentation/Cisco_ISE_End_User_Documentation.html

Communications, services, and additional information

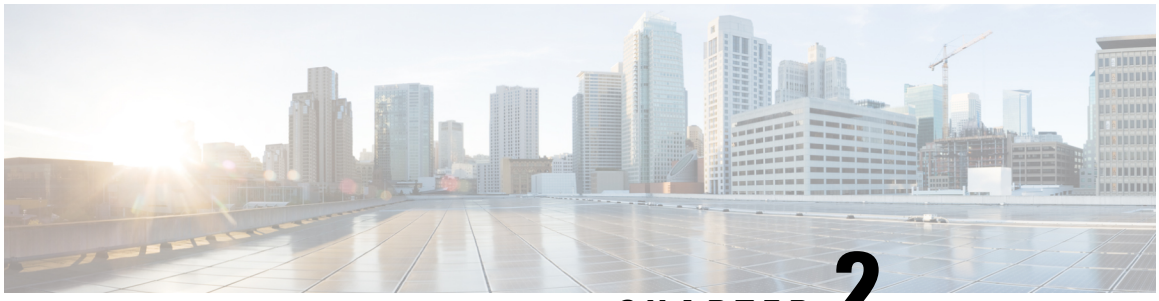
- To receive timely, relevant information from Cisco, sign up at Cisco Profile Manager.
- To get the business impact you're looking for with the technologies that matter, visit Cisco Services.
- To submit a service request, visit Cisco Support.
- To discover and browse secure, validated enterprise-class apps, products, solutions, and services, visit Cisco DevNet.
- To obtain general networking, training, and certification titles, visit Cisco Press.
- To find warranty information for a specific product or product family, access Cisco Warranty Finder.

Cisco Bug Search Tool

Cisco Bug Search Tool (BST) is a gateway to the Cisco bug-tracking system, which maintains a comprehensive list of defects and vulnerabilities in Cisco products and software. The BST provides you with detailed defect information about your products and software.

Documentation feedback

To provide feedback about Cisco technical documentation, use the feedback form available in the right pane of every online document.



CHAPTER 2

Prepare for upgrade

Before you start the upgrade process, ensure that you perform the following tasks:

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- Guidelines to minimize upgrade time and maximize efficiency during upgrade , on page 8
- Validate data to prevent upgrade failures, on page 10
- Change the name of authorization simple condition if a predefined authorization compound condition with the same name exists, on page 13
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- Check load balancer configuration, on page 21
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Health check

Ensure that you run health check for your Cisco ISE deployment prior to the upgrade process in order to identify and resolve any critical issues that may cause upgrade downtime. For more information, see the **Health Check** section in the "Troubleshooting Troubleshooting" chapter in the *Cisco ISE Admin Guide*.

Guidelines to minimize upgrade time and maximize efficiency during upgrade

The following guidelines help you address the issues in your current deployment that you might encounter during the upgrade process. Thus, reducing the overall upgrade downtime with increased efficiency.

- Upgrade to the latest patch in the existing version before starting the upgrade.

Note If you are upgrading from Cisco ISE Release 2.6 Patch 10 and later or 2.7 Patch 4 and later releases and have an SSM On-Prem server configured, you must disconnect the SSM On-Prem server before you begin the upgrade process.

- We recommend that you test the upgrade in a staging environment to identify and fix any upgrade issues before upgrading the production networks.
    - All the nodes in the Cisco ISE deployment should be in the same patch level in order to exchange data.

Note If all the nodes in your deployment are not on the same Cisco ISE version and patch version, you will get a warning message: **Upgrade cannot begin**. This message indicates that the upgrade is in a blocked state. Ensure that all the nodes in the deployment are in the same version (including the patch version, if any) before you begin the upgrade process.

    - Based on the number of PSNs in your deployment and availibilty of personnels, you can install the final version of Cisco ISE you need to upgrade to, apply latest patch, and keep it ready.
    - In case you want to reatain the MnT logs, perform the above tasks for MnT nodes and join the new deployment as MnT nodes. However, if you do not need to retain the operational logs, you can skip the step by re-imaging the MnT nodes.
    - Cisco ISE installation can be done in parallel if you have multi-node deployment without impact to the production deployment. Installing ISE server's in-parallel saves time especially when you are using backup and restore from a previous release.
    - PSN can be added to the new deployment to download the existing polices during the registration process from the PAN. Use ISE latency and bandwidth calculator to understand the latency and bandwidth requirement in Cisco ISE deployment.
    - It is a best practice to archive the old logs and not transit them to the new deployments. This is because operational logs restored in the MnTs are not synchronized to different nodes in case you change the MnT roles later.
    - If you have two Data Centers (DC) with full distributed deployment, upgrade the backup DC and test the use cases before upgrading primary DC.

- Download and store the upgrade software in a local repository before upgrade to speed up the process.

- If you are currently upgarding to Cisco ISE, Release 3.0 or later, you can either use Health Check or Upgrade Readiness Tool (URT) to run system diagnosis before you initiate the upgrade process.
- Use the Upgrade Readiness Tool (URT) to detect and fix any configuration data upgrade issues before you start the upgrade process. Most of the upgrade failures occur because of configuration data upgrade issues. The URT validates the data before upgrade to identify, and report or fix the issue, wherever possible. The URT is available as a separate downloadable bundle that can be run on a Secondary Policy Administration node or standalone node. There is no downtime to run this tool. The following video explains how to use the URT:
https://www.cisco.com/c/en/us/td/docs/security/ise/videos/urt/v1-0/cisco-urt.html

Warning Do not run the URT on the Primary Policy Administration Node. The URT tool does not simulate MnT operational data upgrades.

- When upgrading Cisco ISE using the GUI, note that the timeout for the process per node is four hours. If the process takes more than four hours, the upgrade fails. If upgrading with the Upgrade Readiness Tool (URT) will take you more than four hours, Cisco recommends that you use CLI for this process.
- Take the backup of load balancers before changing the configuration. You can remove the PSNs from the load balancers during the upgrade window and add them back after the upgrade.
- Disable automatic PAN Failover (if configured) and disable Heartbeat between PANs during the upgrade.
- Review the existing policies and rules and remove outdated, redundant, and stale policy and rules.
- Remove unwanted monitoring logs and endpoint data.
- You can take a backup of configuration and operations logs and restore it on a temporary server that is not connected to the network. You can use a remote logging target during the upgrade window.

  You can use the following options after the upgrade to reduce the number of logs that are sent to MnT nodes and improve the performance:

  - Use the MnT collection filters (To view this window, click the **Menu** icon (☰) and choose **Administration** > **System** > **Logging** > **Collection Filters**) to filter incoming logs and avoid duplication of entries in AAA logs.
  - You can create Remote Logging Targets (To view this window, click the **Menu** icon (☰) and choose **Administration** > **System** > **Logging** > **Remote Logging Targets**) and route each individual logging category to specific Logging Target (To view this window, click the **Menu** icon (☰) and choose **System** > **Logging** > **Logging categories**.
  - Enable the **Ignore Repeated Updates** options. To view this window, click the **Menu** icon (☰) and choose **Administration > System > Settings > Protocols > RADIUS** window to avoid repeated accounting updates.

- Download and use the latest upgrade bundle for upgrade. Use the following query in the Bug Search Tool to find the upgrade related defects that are open and fixed: http://cs.co/ise-upgrade-bugsearch
- Test all the use cases for the new deployment with fewer users to ensure service continuity.

Validate data to prevent upgrade failures

Cisco ISE offers an Upgrade Readiness Tool (URT) that you can run to detect and fix any data upgrade issues before you start the upgrade process.

Most of the upgrade failures occur because of data upgrade issues. The URT is designed to validate the data before upgrade to identify, and report or fix the issue, wherever possible.

The URT is available as a separate downloadable bundle that can be run on a Secondary Administration Node, for high availability and other deployments with multiple nodes, or on the Standalone Node for a single-node deployment. No downtime is necessary when running this tool.

Warning In multiple-node deployments, do not run the URT on the Primary Policy Administration Node.

You can run the URT from the Command-Line Interface (CLI) of the Cisco ISE node. The URT does the following:

1. Checks if the URT is run on a supported version of Cisco ISE. The supported versions are Releases 2.4, 2.6 and 2.7.
2. Verifies that the URT is run on a standalone Cisco ISE node or a Secondary Policy Administration Node (secondary PAN).
3. Checks if the URT bundle is less than 45 days old—This check is done to ensure that you use the most recent URT bundle.
4. Checks if all the prerequisites are met.

   The following prerequisites are checked by the URT:

   - Version compatibility
   - Persona checks
   - Disk space

Note Verify the available disk size with Disk Requirement Size. If you are required to increase the disk size, reinstall ISE and restore a config backup.

   - NTP server
   - Memory
   - System and trusted certificate validation

5. Clones the configuration database
6. Copies latest upgrade files to the upgrade bundle

Note If there are no patches in URT bundle then the output will return: `N/A`. This is an expected behaviour while installing a hot patch.

7. Performs a schema and data upgrade on the cloned database
   - (If the upgrade on the cloned database is successful) Provides an estimate of time it should take for the upgrade to end.
   - (If the upgrade is successful) Removes the cloned database.
   - (If the upgrade on cloned database fails) Collects the required logs, prompts for an encryption password, generates a log bundle, and stores it in the local disk.

Download and run the Upgrade Readiness Tool

The Upgrade Readiness Tool (URT) validates the configuration data before you actually run the upgrade to identify any issues that might cause an upgrade failure.

Before you begin

While running the URT, ensure that you simultaneously do not:

- Back up or restore data
- Perform any persona changes

Procedure

Step 1 Create a repository and copy the URT bundle, on page 11

Step 2 Run the Upgrade Readiness Tool, on page 12

Create a repository and copy the URT bundle

Create a repository and copy the URT bundle. For information on how to create a repository, see “Create Repositories” in the Chapter “Maintain and Monitor” in the *Cisco ISE Administrator Guide*.

We recommend that you use FTP for better performance and reliability. Do not use repositories that are located across slow WAN links. We recommend that you use a local repository that is closer to the nodes.

Before you begin

Ensure that you have a good bandwidth connection with the repository.

Procedure

Step 1 Download the URT bundle from the Cisco ISE Download Software Center (ise-urtbundle-3.0.xxx-1.0.0.SPA.x86_64.tar.gz).

Step 2 Optionally, to save time, copy the URT bundle to the local disk on the Cisco ISE node using the following command:

```
copy repository_url/path/ise-urtbundle-3.0.xxx-1.0.0.SPA.x86_64.tar.gz disk:/
```

For example, if you want to use SFTP to copy the upgrade bundle, you can do the following:

```
(Add the host key if it does not exist) crypto host_key add host mySftpserver
copy sftp://aaa.bbb.ccc.ddd/ ise-urtbundle-3.0.xxx-1.0.0.SPA.x86_64.tar.gz disk:/
```

aaa.bbb.ccc.ddd is the IP address or hostname of the SFTP server and ise-urtbundle-3.0.*xxx*-1.0.0.SPA.x86_64.tar.gz is the name of the URT bundle.

Run the Upgrade Readiness Tool

The Upgrade Readiness Tool identifies issues with data that might cause an upgrade failure, and reports or fixes the issues, wherever possible. To run the URT:

Before you begin

Having the URT bundle in the local disk saves time.

Procedure

Enter the **application install** command to install the URT:

```
application install ise-urtbundle-3.0.0.x.SPA.x86_64.tar.gz reponame
```

In case the application is not installed successfully during the above execution, URT returns the cause of upgrade failure. You need to fix the issues and re-run the URT.

Remove the Upgrade Readiness Tool

You must uninstall the URT if the installation failed or if the installed version is outdated. Follow these steps to uninstall URT.

Before you begin

Ensure that URT is included in the installed programs list.

Procedure

Step 1 Enter the following command in the CLI:

```
application remove urt
```

Step 2 Enter **Y** when you are prompted with the following message:

```
Continue with application removal? (y/n)
```

The following message is displayed when the uninstallation is complete:

```
Application successfully uninstalled
```

What to do next

After the unistallation is complete, you can proceed with installing URT, if required.

Change the name of authorization simple condition if a predefined authorization compound condition with the same name exists

Cisco ISE comes with several predefined authorization compound conditions. If you have an authorization simple condition (user defined) in the old deployment that has the same name as that of a predefined authorization compound condition, then the upgrade process fails. Before you upgrade, ensure that you rename the authorization simple conditions that have any of the following predefined authorization compound condition names:

- Compliance_Unknown_Devices
- Non_Compliant_Devices
- Compliant_Devices
- Non_Cisco_Profiled_Phones
- Switch_Local_Web_Authentication
- Catalyst_Switch_Local_Web_Authentication
- Wireless_Access
- BYOD_is_Registered
- EAP-MSCHAPv2
- EAP-TLS
- Guest_Flow
- MAC_in_SAN
- Network_Access_Authentication_Passed

Change VMware virtual machine Guest Operating System and settings

If you are upgrading Cisco ISE nodes on virtual machines, ensure that you change the Guest Operating System to supported Red Hat Enterprise Linux (RHEL) version. To do this, you must power down the VM, update the Guest Operating System, and power on the VM after the change.

RHEL 7 supports only E1000 and VMXNET3 network adapters. Be sure to change the network adapter type before you upgrade.

Remove non-ASCII characters From sponsor group names

Prior to release 2.2, if you have created sponsor groups with non-ASCII characters, before upgrade, be sure to rename the sponsor groups and use only ASCII characters.

Cisco ISE, Release 2.2 and later does not support non-ASCII characters in sponsor group names.

Firewall ports that must be open for communication

If you have a firewall that is deployed between your Primary Administration Node (PAN) and any other node, the following ports must be open before you upgrade:

- TCP 1521—For communication between the PAN and monitoring nodes.
- TCP 443—For communication between the PAN and all other secondary nodes.
- TCP 12001—For global cluster replication.
- TCP 7800 and 7802—(Applicable only if the policy service nodes are part of a node group) For PSN group clustering.

For a full list of ports that Cisco ISE uses, see the chapter "Cisco ISE Ports Reference" in the .

Back up Cisco ISE configuration and operational data from the PAN

Obtain a backup of the Cisco ISE configuration and operational data from the Command Line Interface (CLI) or the GUI. The CLI command is:

backup *backup-name* **repository** *repository-name* {**ise-config | ise-operational**} **encryption-key** {**hash | plain**} *encryption-keyname*

Note When Cisco ISE runs on VMware, VMware snapshots are not supported for backing up ISE data.

VMware snapshot saves the status of a VM at a given point of time. In a multi-node Cisco ISE deployment, data in all the nodes are continuously synchronized with the current database information. Restoring a snapshot might cause database replication and synchronization issues. Cisco recommends that you use the backup functionality included in Cisco ISE for archival and restoration of data.

Using VMware snapshots to back up ISE data results in stopping Cisco ISE services. A reboot is required to bring up the ISE node.

You can also obtain the configuration and operational data backup from the Cisco ISE Admin Portal. Ensure that you have created repositories for storing the backup file. Do not back up using a local repository. You cannot back up the monitoring data in the local repository of a Remote Monitoring node. The following repository types are not supported: CD-ROM, HTTP, HTTPS, or TFTP. This is because these repository types are all either read-only or their protocol does not support the file listing.

1. Choose **Administration > Maintenance > Backup and Restore**.
2. In the Cisco ISE GUI, click the **Menu** icon (☰) and choose**Administration** > **Maintenance** > **Backup and Restore**.
3. Click **Backup Now**.
4. Enter the values as required to perform a backup.
5. Click **OK**.
6. Verify that the backup completed successfully.

   In a distributed deployment, do not change the role of a node or promote a node when the backup is running. Changing node roles will shut down all the processes and might cause some inconsistency in data if a backup is running concurrently. Wait for the backup to complete before you make any node role changes.

Cisco ISE appends the backup filename with a timestamp and stores the file in the specified repository. In addition to the timestamp, Cisco ISE adds a CFG tag for configuration backups and OPS tag for operational backups. Ensure that the backup file exists in the specified repository.

Note Cisco ISE allows you to obtain a backup from an ISE node (A) and restore it on another ISE node (B), both having the same hostnames (but different IP addresses). However, after you restore the backup on node B, do not change the hostname of node B because it might cause issues with certificates and portal group tags.

Back up system logs from the PAN

Obtain a backup of the system logs from the PAN from the Command Line Interface (CLI). The CLI command is:

backup-logs *backup-name* **repository** *repository-name* **encryption-key** { **hash | plain**} *encryption-key name*

CA Certificate Chain

Before upgrading to Cisco ISE 3.0 , ensure that the internal CA certificate chain is valid.

1. In the Cisco ISE GUI, click the **Menu** icon (☰) and choose **Administration** > **System** > **Certificates** > **Certificate Authority Certificates**
2. For each node in the deployment, select the certificate with `Certificate Services Endpoint Sub CA` in the **Friendly Name** column. Click **View** and check if the `Certificate Status is Good` message is visible.
3. If any certificate chain is broken, you must fix the issue before upgrading Cisco ISE. To view this window, click the **Menu** icon (☰) and choose **Administration** > **System** > **Certificates** > **Certificate Management** > **Certificate Signing Requests** > **ISE Root CA**

Check Certificate Validity

The upgrade process fails if any certificate in the Cisco ISE Trusted Certificates or System Certificates store has expired. Ensure that you check the validity in the **Expiration Date** field of the **Trusted Certificates** and **System Certificates** windows (To view this window, click the **Menu** icon (☰) and choose **Administration > System > Certificates > Certificate Management**), and renew them, if necessary, before upgrade.

Also check the validity in the **Expiration Date** field of the certificates in the **CA Certificates** window (To view this window, click the **Menu** icon (☰) and choose **Administration > System > Certificates > Certificate Authority > Certificate Authority Certificates**), and renew them, if necessary, before upgrade.

Delete a Certificate

In order to delete an expired certificate, perform the following steps:

Procedure

Step 1	In the Cisco ISE GUI, click the **Menu** icon (☰) and choose **Administration** > **System** > **Certificates** > **Certificate Management** > **System Certificates**.
Step 2	Select the expired certificate.
Step 3	Click **Delete**.
Step 4	In the Cisco ISE GUI, click the **Menu** icon (☰) and choose **Administration > System > Certificates > Certificate Management > Trusted Certificates**.
Step 5	Select the expired certificate.
Step 6	Click **Delete**.
Step 7	Choose **Administration > System > Certificates > Certificate Authority > Certificate Authority Certificates**.
Step 8	Select the expired certificate.

Step 9 Click **Delete**.

Export certificates from all nodes

We recommend that you export all local certificates (from all the nodes in your deployment) along with their private keys to a secure location. Record the certificate configuration (what service the certificate was used for).

Procedure

Step 1 In the Cisco ISE GUI, click the **Menu** icon (☰) and choose **Administration > System > Certificates > Certificate Management > System Certificates**.

Step 2 Select the certificate and click **Export**.

Step 3 Select **Export Certificates and Private Keys** radio button.

Step 4 Enter the **Private Key Password** and **Confirm Password**.

Step 5 Click **Export**.

Export certificates from Trusted Certificates Store

We recommend that you export all certificates from the Trusted Certificates Store of the PAN. Record the certificate configuration (what service the certificate was used for).

Procedure

Step 1 In the Cisco ISE GUI, click the **Menu** icon (☰) and choose**Administration > System > Certificates > Certificate Management > System Certificates**.

Step 2 Select the certificate and click **Export**.

Step 3 Click **Save File** to export the certificate.

Step 4 In the Cisco ISE GUI, click the **Menu** icon (☰) and choose **Administration > System > Certificates > Certificate Authority > Certificate Authority Certificates**.

Step 5 Select the certificate and click **Export**.

Step 6 Select **Export Certificates and Private Keys** radio button.

Step 7 Enter the **Private Key Password** and **Confirm Password**.

Step 8 Click **Export**.

Step 9 Click **Save File** to export the certificate.

Disable PAN Automatic Failover and Disable scheduled backups before upgrading

You cannot perform deployment changes when running a backup in Cisco ISE. Therefore, you must disable automatic configurations in order to ensure that they do not interfere with the upgrade. Ensure that you disable the following configurations before you upgrade Cisco ISE:

- PAN Automatic Failover—If you have configured the PAN for an automatic failover, be sure to disable the automatic failover option before you upgrade Cisco ISE.
- Scheduled Backups—When planning your deployment upgrade, reschedule the backups after the upgrade. You can choose to disable the backup schedules and recreate them after the upgrade.

  Backups with a schedule frequency of **once** get triggered every time the Cisco ISE application is restarted. Hence, if you have a backup schedule that was configured to run only a single time, be sure to disable it before upgrade.

Configure NTP server and verify availability

During upgrade, the Cisco ISE nodes reboot, migrate, and replicate data from the PAN to the secondary administration node. For these operations, it is important that the NTP server in your network is configured correctly and is reachable. If the NTP server is not set up correctly or is unreachable, the upgrade process fails.

Ensure that the NTP servers in your network are reachable, responsive, and synchronized during upgrade.

Cisco ISE, Release 2.7 and later uses chrony instead of Network Time Protocol daemon (ntpd). Ntpd synchronizes with servers that have a root dispersion up to 10 seconds whereas, chrony synchronizes with servers that have a root dispersion less than 3 seconds. Therefore, we recommend that you use an NTP server with low root dispersion before upgrading to Cisco ISE, Release 2.7 or later, to avoid NTP service disruption. For more information, see Troubleshoot ISE and NTP Server Synchronization Failures on Microsoft Windows.

Upgrade virtual machine

Cisco ISE software has to be in synchronization with the chip and appliance capacity to support latest CPU/Memory capacity available in the UCS Hardware. As ISE version progresses, support for older hardware will be phased out and newer hardware is introduced. It is a good practice to upgrade virtual machine (VM) capacity for better performance. When planning VM upgrades, we highly recommend to use OVA files to install ISE software. Each OVA file is a package that contains files used to describe the VM and reserves the required hardware resources on the appliance for Cisco ISE Software Installation.

For more information about the VM and hardware requirements, see the "Hardware and Virtual Appliance Requirements" in Cisco Identity Services Engine Installation Guide

Cisco ISE VMs need dedicated resources in the VM infrastructure. ISE needs adequate amount of CPU cores akin to hardware appliance for performance and scale. Resource sharing is found to impact performance with high CPU, delays in user authentications, registrations, delay and drops in logs, reporting, dashboard responsiveness, etc. This directly impacts the end-user and admin user experience in your enterprise.

Note It is important that you use reserved resources for CPU, memory and hard disk space during the upgrade instead of shared resources.

Cisco ISE, Release 2.4 and later requires a minimum disk size of 300GB for virtual machines as the local disk allocation is increased to 29GB.

Record profiler configuration

If you use the Profiler service, ensure that you record the profiler configuration for each of your Policy Service nodes from the Admin portal (To view this window, click the **Menu** icon (☰) and choose **Administration > System > Deployment > <node> >**). Select the node and click **Edit Node**. In the **Edit Node** page, go to the **Profiling Configuration** tab. You can make a note of the configuration information or obtain screen shots.

Obtain Active Directory and internal administrator account credentials

If you use Active Directory as your external identity source, ensure that you have the Active Directory credentials and a valid internal administrator account credentials on hand. After upgrade, you might lose Active Directory connections. If this happens, you need the ISE internal administrator account to log in to the Admin portal and Active Directory credentials to rejoin Cisco ISE with Active Directory.

Activate MDM vendor before upgrade

If you use the MDM feature, then before upgrade, ensure that the MDM vendor status is active.

If an MDM server name is used in an authorization policy and the corresponding MDM server is disabled, the upgrade process fails. As a workaround, you can do one of the following:

1. Enable the MDM server before upgrade.
2. Delete the condition that uses the MDM server name attribute from the authorization policy.

Create repository and copy the upgrade bundle

Create a repository to obtain backups and copy the upgrade bundle. For information on how to create a repository, see “Create Repositories” in the Chapter “Maintain and Monitor” in the *Cisco ISE Administrator Guide*.

We recommend that you use FTP for better performance and reliability. Do not use repositories that are located across slow WAN links. We recommend that you use a local repository that is closer to the nodes.

Ensure that your Internet connection to the repository is good.

Note When you download an upgrade bundle from a repository to a node, the download times out if it takes more than 35 minutes to complete. This issue occurs because of poor Internet bandwidth.

Having the upgrade bundle in the local disk saves time during upgrade. Alternatively, you can use the **application upgrade prepare <upgrade bundle name> <repository name>** command to copy the upgrade bundle to the local disk and extract it.

Note

- Ensure that you have a good bandwidth connection with the repository. When you download the upgrade bundle (file size is around 9GB) from the repository to the node, the download times out if it takes more than 35 minutes to complete.
- If you are using a local disk to store your configuration files, the files will be deleted when you perform the upgrade. Hence, we recommend that you create a Cisco ISE repository and copy the files to this repository.

Download the upgrade bundle from Cisco.com.

To upgrade to Release 3.0, use the following upgrade bundle:
ise-upgradebundle-2.x-to-3.0.0.*xxx*.SPA.x86_64.tar.gz

For upgrade, you can copy the upgrade bundle to the Cisco ISE node's local disk using the following command:

copy *repository_url/path/ise-upgradebundle-1.3.x-and-1.4.x-to-2.0.0.291.x86_64.tar.gz* **disk:/**

copy *repository_url/path/ise-upgradebundle-2.x-to-3.0.0.xxx.SPA.x86_64.tar.gz* **disk:/**

For example, if you want to use SFTP to copy the upgrade bundle, you can do the following:

1. (Add the host key if it does not exist) **crypto host_key add host** *mySftpserver*
2. **copy sftp://***aaa.bbb.ccc.ddd/ise-upgradebundle-1.3.x-and-1.4.x-to-2.0.0.291.x86_64.tar.gz* **disk:/**

   aaa.bbb.ccc.ddd is the IP address or hostname of the SFTP server and *ise-upgradebundle-1.3.x-and-1.4.x-to-2.0.0.291.x86_64.tar.gz* is the name of the upgrade bundle.
3. **copy sftp://***aaa.bbb.ccc.ddd/ise-upgradebundle-2.x-to-3.0.0.xxx.SPA.x86_64.tar.gz* **disk:/**

   aaa.bbb.ccc.ddd is the IP address or hostname of the SFTP server and *ise-upgradebundle-2.x-to-3.0.0.xxx.SPA.x86_64.tar.gz* is the name of the upgrade bundle.

Check the available disk size

Ensure that you have allocated the required disk space for virtual machines. See Cisco ISE Installation Guide for more details. If you need to increase the disk size, you will need to reinstall ISE and restore a config backup.

Check load balancer configuration

If you are using any load balancer between the PAN and the Policy Service node (PSN), ensure that the session timeout that is configured on the load balancer does not affect the upgrade process. If the session timeout is set to a lower value, it might affect the upgrade process on the PSNs located behind the load balancer. For example, if a session times out during the database dump from PAN to a PSN, the upgrade process may fail on the PSN.

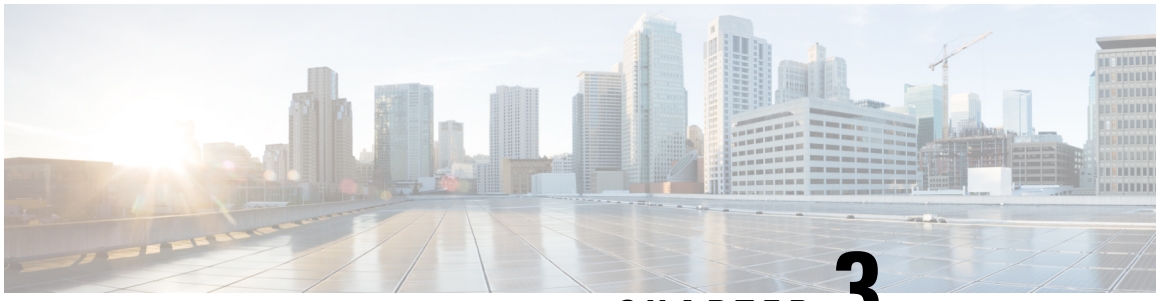
Log retention and resizing MnT hard disk

Upgrade does not need changes to the MnT disk capacity. However, if you are consistently filling up the logs and need greater hardware capacity you can plan out the hard disk size for MnT depending on your log retention needs. It is important to understand that log retention capacity has increased many folds from Cisco ISE, Release 2.2.

You can also active collection filters (To view this window, click the **Menu** icon (☰) and choose **Administration** > **System** > **Logging** > **Collection filters**) for unnecessary logs from different devices that can overwhelm your Cisco ISE MnT.

For more information on collection filter, see "Configure Collection Filters section" in "Maintain & Monitor" Chapter in Cisco Identity Services Engine Administrator Guide

See the ISE storage requirements under Cisco ISE performance and scalability community page. The table lists log retention based on number of endpoints for RADIUS and number of Network devices for TACACS+. Log retention should be calculated for both TACACS+ and/or RADIUS separately.



CHAPTER 3

Upgrade sequence of the nodes

You can upgrade Cisco ISE using GUI, Backup and Restore, or CLI. In case you are using GUI to upgrade you can choose the order of nodes to be upgraded. However, we recommend that you follow the below provided order of the nodes for upgarding your deployment. This will help you to reduce downtime while providing maximum resiliency and ability to roll back.

1. Backup all configuration and monitoring data. You should also export a copy of the internal CA key and certificate chain, and take a backup of the ISE server certificates of all ISE nodes. This task should be done before initiating upgrade in order to ensure that you can easily roll back manually, if necessary.
2. Secondary Administration Node

   At this point, the Primary Administration Node remains at the previous version and can be used for rollback if the upgrade fails.
3. Primary Monitoring Node or Secondary Monitoring Node

   If you have a distributed deployment, upgrade all the nodes that are available in the site that has Secondary Administration Node of your existing Cisco ISE deployment.
4. Policy Service Nodes

   If you are upgrading from Cisco ISE, Release 2.6 to a higher release using the GUI, you can select a group of PSNs to be upgraded simultaneously. This will reduce the overall upgrade downtime.

   After you upgrade a set of Policy Service nodes, verify whether the upgrade is successful (see Verify the upgrade process, on page 39) and run the necessary network tests to ensure that the new deployment is functioning as expected. If the upgrade is successful, you can upgrade the next set of Policy Service nodes.
5. Secondary Monitoring Node or Primary Monitoring Node
6. Primary Administration Node

   Rerun the upgrade verification and network tests after you upgrade the Primary Administration Node.

Note If upgrade fails during the registration of the Primary Administration node (the last node from the old deployment that has to be upgraded), the upgrade is rolled back and the node becomes a standalone node. From the CLI, upgrade the node as a standalone node. Register the node to the new deployment as a Secondary Administration node.

After the upgrade, the Secondary Administration Node becomes the Primary Administration Node, and the original Primary Administration Node becomes the Secondary Administration Node. In the Edit Node window, click Promote to Primary to promote the Secondary Administration Node as the Primary Administration Node (as in your old deployment), if necessary.

If the Administration Nodes also assume the Monitoring persona, then follow the sequence given in the table below:

Node Personas In The Current Deployment	Upgrade Sequence
Secondary Administration/Primary Monitoring Node, Policy Service Nodes, Primary Administration/Secondary Monitoring Node	**1.** Secondary Administration/Primary Monitoring Node **2.** Policy Service Nodes **3.** Primary Administration/Secondary Monitoring Node
Secondary Administration/Secondary Monitoring Node, Policy Service Nodes, Primary Administration/Primary Monitoring Node	**1.** Secondary Administration/Secondary Monitoring Node **2.** Policy Service Nodes **3.** Primary Administration/Primary Monitoring Node
Secondary Administration Node, Primary Monitoring Node, Policy Service Nodes, Primary Administration/Secondary Monitoring Node	**1.** Secondary Administration Node **2.** Primary Monitoring Node **3.** Policy Service Nodes **4.** Primary Administration/Secondary Monitoring Node
Secondary Administration Node, Secondary Monitoring Node, Policy Service Nodes, Primary Administration/Primary Monitoring Node	**1.** Secondary Administration Node **2.** Secondary Monitoring Node **3.** Policy Service Nodes **4.** Primary Administration/Primary Monitoring Node
Secondary Administration/Primary Monitoring Node, Policy Service Nodes, Secondary Monitoring Node, Primary Administration Node	**1.** Secondary Administration/Primary Monitoring Node **2.** Policy Service Nodes **3.** Secondary Monitoring Node **4.** Primary Administration Node

Node Personas In The Current Deployment	Upgrade Sequence
Secondary Administration/Secondary Monitoring Node, Policy Service Nodes, Primary Monitoring Node, Primary Administration Node	1. Secondary Administration/Secondary Monitoring Node 2. Policy Service Nodes 3. Primary Monitoring Node 4. Primary Administration Node

You will get a error message **No Secondary Administration Node in the Deployment** under the following circumstances:

- There is no Secondary Administration node in the deployment.
- The Secondary Administration node is down.
- The Secondary Administration node is upgraded and moved to the upgraded deployment. Typically, this occurs when you use the **Refresh Deployment Details** option after the Secondary Administration node is upgraded.

To resolve this issue, perform one of the tasks, as applicable:

- If the deployment does not have a Secondary Administration node, configure a Secondary Administration node and retry upgrade.
- If the Secondary Administration node is down, bring up the node and retry upgrade.
- If the Secondary Administration node is upgraded and moved to the upgraded deployment, use the CLI to manually upgrade the other nodes in the deployment.

- Choose your upgrade method, on page 25
- Upgrade Cisco ISE deployment using backup and restore method , on page 28
- Upgrade a Cisco ISE deployment from the GUI, on page 31
- Upgrade a Cisco ISE deployment from the CLI, on page 35

Choose your upgrade method

This release of Cisco ISE supports the following upgrade processes. You can choose from the below upgrade processes depending on your technical expertise and time availability for the upgrade.

- Upgrade Cisco ISE using Backup and Restore Procedure (Recommended)
- Upgrade a Cisco ISE deployment from GUI
- Upgrade a Cisco ISE deployment from CLI

Table 2: Cisco ISE Upgrade Method Comparison

Comparison Factors	Backup and Restore (Recommended)	Upgrade using the GUI	Upgrade using CLI
Comparison Synopsis	Fast but more administration required	Long but less administration required	Longer and more administration required
Difficulty	Hard	Easy	Moderate
Minimum Version	Cisco ISE 2.4 and later	Cisco ISE 2.4 and later	Cisco ISE 2.4 and later
VMs	If you have enough capacity, you can pre-stage the new VMs and join them immediately to the new PAN	Each PSN is upgraded sequentially which increases the total upgrade time linearly	Each PSN is upgraded however they can be done in parallel to decrease total upgrade time
Time	Least upgrade downtime because PSNs are imaged with new version and not upgraded	Each PSN is upgraded sequentially which increases the total upgrade time linearly	Each PSN is upgraded however they can be done in parallel to decrease total upgrade time
Personnel	Involvement of multiple stakeholders across business units to transit the configurational settings and operational logs.	Automated upgrade process with fewer manual interventions	Technical expertise on Cisco ISE.
Rollback	Requires reimaging of the nodes.	Easy rollback option.	Easy rollback option.

A detailed comparison of the upgrade methods is as follows:

Upgrade Cisco ISE using backup and restore method

Re-imaging of the Cisco ISE node is done as a part the initial deployment and during troubleshooting, however you can also re-image Cisco ISE node to upgrade a deployment while providing for restoration of the policy onto the new deployment once the new version is deployed.

In case the resources are limited, and new deployment is unable to spin up a parallel ISE node, Secondary PAN & MnT is removed from production deployment to be upgraded before upgrading the other nodes. Nodes are moved into the new deployment; a configuration & operational backup is restored from the previous deployment on respective nodes creating a parallel deployment. This allows to restore the policy sets, custom profiles, network access devices, and endpoints into the new deployment without need for manual intervention.

The advantages of upgrading Cisco ISE using Backup and Restore process are as follows:

- You can restore the configuration setting and the operational logs from the previous ISE deployment. Thus, preventing from data loss.
- You can manually choose the nodes that should be reused for the new deployment.

- You can upgrade multiple PSNs parallelly thus reducing the upgrade downtime.
- You can stage the nodes outside of maintenance windows, reducing the time of the upgrade during the production.

Things to consider before upgrading Cisco ISE using Backup and Restore

Resources Required: The backup and restore upgrade process requires additional resources which can be reserved for the ISE deployment before being released. In the case of reusing existing hardware, additional load will need to be balanced to nodes which remain online. Hence, you need to evaluate the current load and latency limits before the deployment begins in order to ensure that the deployment can handle an increase in number of users per node.

Personnel Required: You will require involvement from multiple business units including network administration, security administration, data centre, and virtualization resources to perform upgrade. In addition, you will need to re-join the node to the new deployment, restore certificates, re-join to active directory, and wait for policy synchronization. This can lead to multiple reloads and requires timeframe that of a net-new deployment.

Rollback Mechanism: Due to the re-imaging of the nodes, all information and configuration setting are erased from the previous deployment. Thus, the rollback mechanism for a backup and restore upgrade is the same procedure as re-imaging of the nodes for the second time.

Best Practice for the Backup and Restore Upgrade Process:

- Create an standalone environment or dedicate load balancers to switch Virtual IP address for RADIUS requests.
- You can start the deployment process well before the maintenance window and point the user load balancer to the new deployment.

Upgrade a Cisco ISE deployment from GUI

You can also upgrade Cisco ISE from the GUI in a single click with some customizable options. In the Cisco ISE GUI, click the **Menu** icon (☰) and choose **ISE Administration** > **Upgrade**. Create a new repository to download the ISO image.

During the upgrade the Secondary PAN is moved into an upgraded deployment automatically and is upgraded first, followed by Primary MnT. As a result, if either of these upgrades fail, it is mandatory that the node will be rolled back to the previous version and re-join to the previous ISE deployment. Later PSN's are moved one by one to the new deployment and upgraded. In case of an upgrade failure, you can also choose to continue or cease the upgrade. This will result in a dual-version of same Cisco ISE deployment, allowing for troubleshooting to occur before the upgrade continues. Once all PSN's are upgraded, the Secondary MnT and Primary PAN is upgraded and joined to the new Cisco ISE deployment.

Given that this upgarde process requires limited technical expertise, a single administrator start the upgrade and assign NOC or SOC engineers to monitor and report the upgrade status or open a TAC case.

The advantages of upgrading Cisco ISE from the GUI are as follows:

- The upgrade is automated with minimal intervention.
- You can choose the upgrade order of the PSNs to ensure continuity whenever possible, especially when redundancy available between data centres.
- A single administrator can execute the upgrade without any additional personnel, third party hypervisors or network access devices.

Things to consider before upgrading Cisco ISE from GUI

Continuation in Failure Scenarios: In case of an upgrade failure, you can also choose to continue or cease the upgrade. This will result in a dual-version of same Cisco ISE deployment, allowing for troubleshooting to occur before the upgrade continues. While the Cisco Upgrade Readiness Tool should indicate any incompatibilities or misconfigurations, if the Proceed field is checked, additional errors may be encountered if due diligence was not acted upon before the upgrade.

Rollback Mechanism: If an upgrade fails on a PAN or MnT node, the nodes are automatically rolled back. However, if a PSN fails to upgrade, the nodes remain on the same Cisco ISE version and can be fixed while impairing redundancy. Cisco ISE is still operational during this time, and therefore rollback abilities are limited without re-imaging.

Time Required: Each PSN takes around 90-120 minutes to upgrade, hence if you have a large number PSNs it takes time to upgrade all of them.

Best Practice for the Upgrade from GUI: If you have a larger number of PSNs, group the PSNs in batches and perform the upgrade.

Upgrade a Cisco ISE deployment from CLI

Upgrading Cisco ISE from the CLI is an elaborate process and requires the administrator to download the upgrade image to the local node, execute the upgrade, and monitor each node individually throughout the upgrade process. While the upgrade sequence is similar in nature to that of the GUI upgrade, this approach operationally intensive from a monitoring and actions point of view.

Upgrading from CLI is recommended for troubleshooting purposes only due to the level of effort required.

The advantages of upgrading Cisco ISE from the CLI are as follows:

- CLI presents additional logging messages to the administrator while the upgrade is performed.
- The nodes which are upgraded can be chosen with more control and upgraded in parallel. Nodes that are not being upgraded can handle additional load as endpoints are rebalanced across the deployment.
- Rolling back at the CLI is much easier due to the ability to instruct scripts to undo previous changes.
- As the image resides on the node locally, copy errors between PAN and PSNs, if any, can be eliminated.

Things to consider before upgrading Cisco ISE from CLI

You need technical expertise and longer time to upgrade your Cisco ISE using CLI.

Upgrade Cisco ISE deployment using backup and restore method

Overview of the backup and restore upgrade method

We recommend backup and restore upgrade process over the other upgrade processes as it helps to reinstate your current Cisco ISE deployment node settings and prevent data loss, in case of any breakage during the upgrade process. This procedure starts by creating configuration and operational backups of the existing Cisco ISE deployment and then apply them to the new deployment.

Best practice for the backup and restore upgrade process:

- Create a standalone environment or dedicate load balancers to switch Virtual IP address for RADIUS requests.
- You can start the deployment process well before the maintenance window and point the user load balancer to the new deployment.
- If you use RSA SecurID Identity Sources, when you add a new PSN, you must generate a new configuration file with all the PSNs at the primary instance of your RSA Authentication Manager.

Note To avoid generating a new RSA configuration every time you add a new PSN, you must know the IP address of all the nodes that you are going to add to the deployment before starting the backup and restore process. Then, you must generate the RSA configuration file using all the IP addresses and upload it to the PAN UI.

Procedure:

1. Generate the Authentication Manager Configuration File at your RSA Authentication Manager Security Console primary instance, with all the IP address of all the nodes, including the nodes that are not in the deployment.
2. Import the new configuration file to the PAN UI.

Note You must clear the node secret on your RSA Authentication Manager before uploading the new RSA configuration file. This helps to create a new node secret and share it between ISE and your RSA Authentication Manager.

Now you can add a new node to the deployment without generating a new configuration file as it is replicated as part of the configuration using the IP addresses that are already present in the imported configuration file.

The following is a broad overview of the steps involved in the Backup and Restore Upgrade method:

1. Deregister a node

In order to remove a node from the deployment, you need to deregister the node. For more information about node deregistration or removal, see the "Remove a Node from Deployment" section in Cisco Identity Services Engine Administrator Guide.

2. Reimage a node

To reimage a Cisco ISE node, you must first remove it from the deployment, and then proceed to installing Cisco ISE. For more information about Cisco ISE installation, see the "Install Cisco ISE " chapter in the Cisco Identity Services Engine Installation Guide.

We recommend that you apply the latest patch of newly installed Cisco ISE Release.

3. Backup and restore the configuration or operational Database

For more information about the backup and restore operations, see the "Backup and Restore Operations" section in Cisco Identity Services Engine Administrator Guide.

4. Assign primary or secondary roles to a node

You can assign primary or secondary role to a node as per your requirement.

For more information about how to assign a role to a Monitoring and Troubleshooting (MnT) node, see the "Manually Modify MnT Role" section in Cisco Identity Services Engine Administrator Guide.

5. Join the Policy Service Nodes

In order to join a Policy Service Node (PSN) to the new deployment, you need to register the node as PSN. For more information about registering or joining a PSN, see the "Register a Secondary Cisco ISE Node" in Cisco Identity Services Engine Administrator Guide.

Note After you upgrade Cisco ISE using the backup and restore method, you must manually sync all the nodes in the deployment.

6. Import certificates

You need to import the system certificates to the newly deployed nodes in the Cisco ISE. For more information about how to import system certficates to a Cisco ISE node, see the "Import a System Certificate" section in Cisco Identity Services Engine Administrator Guide .

Backup and restore upgrade process

This section describes the upgrade process using the recommended backup and restore upgrade method.

If you are currently using Cisco ISE, Release 2.4 or later, you can directly upgrade to Cisco ISE, Release 3.0.

- Upgrade Secondary PAN and MnT Nodes to Cisco ISE, Release 3.0
- Join Policy Service Nodes to Cisco ISE, Release 3.0
- Upgrade Primary PAN and MnT to Cisco ISE, Release 3.0

In case you are using a Cisco ISE version that is not compatible to Cisco ISE Release 3.0, you need to first upgrade to an intermediate version, compatible to Cisco ISE, Release 3.0. And then you can upgrade from the intermediate version to Cisco ISE, Release 3.0. Follow the below steps to upgrade to an intermediate Cisco ISE version.

Upgrade secondary PAN and MnT nodes to Cisco ISE, release 3.0

Procedure

Step 1 Take a backup of Cisco ISE configuration settings and operational logs.

Step 2 De-register Secondary PAN node.

Step 3 Re-image the deregistered secondary PAN node to Cisco ISE, Release 3.0.

Step 4 Restore ISE configuration from the backup data and make this node as the Primary Node for your new deployment.

Step 5 Import ise-https-admin CA certificates from the backup for this node unless you are using wild card certificates.

Step 6 De-register Secondary MnT node.

Step 7 Re-Image the deregistered Secondary MnT node to Cisco ISE, Release 3.0.

Step 8 Restore your current ISE operational backup and join node as Primary MnT for new deployment. This is an optional step and needs to performed only if you need to report of the older logs.

Join Policy Service Nodes to Cisco ISE, release 3.0

In case you have Cisco ISE nodes deployed in multiple sites, join the PSNs available in the site (that has Secondary PAN and MnT nodes) first and then join the PSNs available in the other sites followed by the PSNs available at the site (that has Primary PAN and MnT nodes of your existing Cisco ISE).

Procedure

Step 1 De-register PSNs.

Step 2 Reimage PSN to Cisco ISE, release 3.0 latest patch and join PSN to new Cisco ISE, Release 3.0 deployment.

What to do next

We recommend that you test your partially upgraded deployment at this point. You can do so by checking if logs are present and the upgraded nodes funtion as expected.

Upgrade Primary PAN and MnT to Cisco ISE, release 3.0

Procedure

Step 1 Reimage Primary MnT node and join as Secondary MnT to new deployment.

In case you want to preserve the data for reporting, restore a copy of the operational backup to the Secondary MnT node.

Step 2 Reimage Primary PAN node and join as Secondary PAN to new deployment.

Upgrade a Cisco ISE deployment from the GUI

Upgrade Cisco ISE deployment from the GUI

Cisco ISE offers a GUI-based centralized upgrade from the Admin portal. The upgrade process is much simplified, and the progress of the upgrade and the status of the nodes are displayed on the screen.

Choose **Administration** > **System** > **Upgrade** > **Overview** menu option lists all the nodes in your deployment, the personas that are enabled on them, the version of ISE installed, and the status (indicates whether a node is active or inactive) of the node. You can begin upgrade only if the nodes are in the Active state.

In the Cisco ISE GUI, click the **Menu** icon (☰) and choose **Administration** > **System** > **Upgrade** > **Overview** menu option lists all the nodes in your deployment, the personas that are enabled on them, the version of ISE installed, and the status (indicates whether a node is active or inactive) of the nodes. You can begin upgrade only if the nodes are in the Active state.

The GUI-based upgrade from the Admin portal is supported only if you are currently on Release 2.0 or later and want to upgrade to Release 2.0.1 or later.

Upgrade from Release 2.4, 2.6 or 2.7 to Release 3.0

Before you begin

Ensure that you have read the instructions in the Prepare for Upgrade section.

Procedure

Step 1 In the Cisco ISE GUI, click the **Menu** icon (☰) and choose **Administration** > **System** > **Upgrade**.

Step 2 Click **Proceed**.

Step 3 The **Review Checklist** window is displayed. Read the given instructions carefully.

Step 4 Check the **I have reviewed the checklist** check box, and click **Continue**.

The **Download Bundle to Nodes** window is displayed.

Step 5 Download the upgrade bundle from the repository to the nodes:

a) Check the check box next to the nodes to which you want to download the upgrade bundle.

b) Click **Download**.

The **Select Repository and Bundle** window is displayed.

c) Select the repository.

You can select the same repository or different repositories on different nodes, but you must select the same upgrade bundle on all the nodes.

d) Check the check box next to the bundle that you want to use for the upgrade.

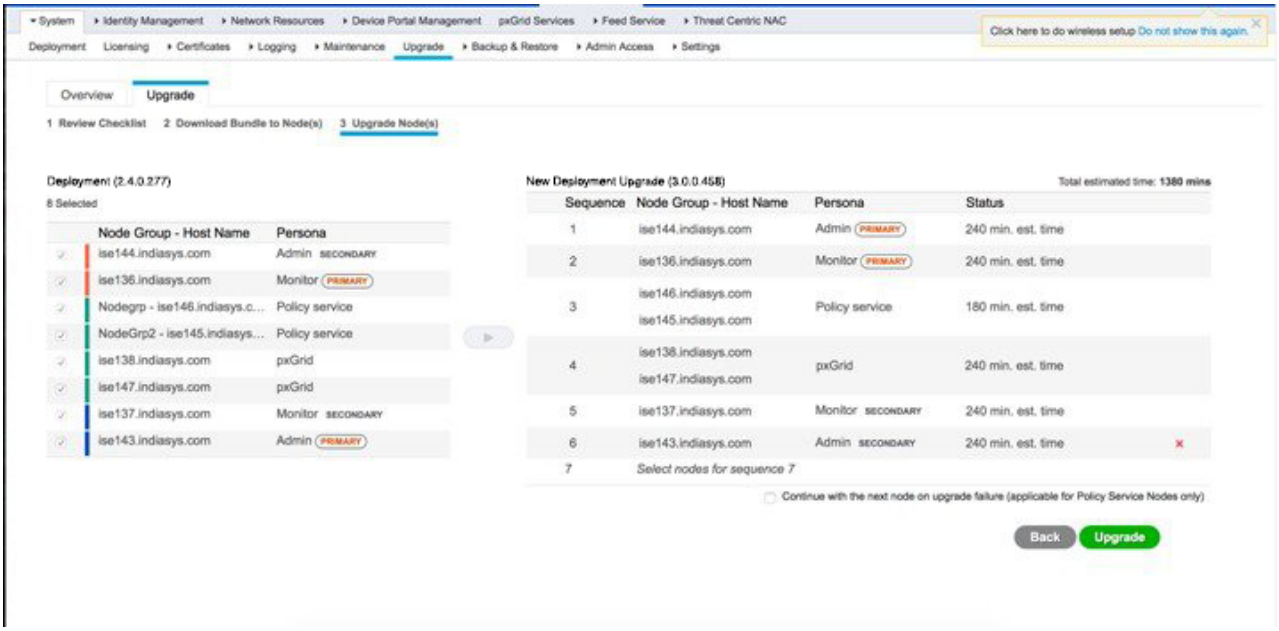
e) Click **Confirm**.

Once the bundle is downloaded to the node, the node status changes to **Ready for Upgrade**.

Step 6 Click **Continue**.

The **Upgrade Nodes** window appears.

Figure 1: Upgrade Window Showing the Repositories Selected for Each Node



Step 7 Choose the upgrade sequence.

When you move a node to the new deployment, a time estimate for the upgrade is displayed on the **Upgrade Nodes** window. You can use this information to plan for an upgrade and minimize downtime. Use the sequence given below if you have a pair of Administration and Monitoring Nodes, and several Policy Service Nodes.

a) By default, the Secondary Administration Node is listed first in the upgrade sequence. After upgrade, this node becomes the Primary Administration Node in the new deployment.
b) The Primary Monitoring Node is the next one in the sequence to be upgraded to the new deployment.
c) Select the Policy Service Nodes and move them to the new deployment. You can alter the sequence in which the Policy Service Nodes are upgraded.

   You can upgrade the Policy Service Nodes in sequence or in parallel. You can select a set of Policy Service Nodes and upgrade them in parallel.

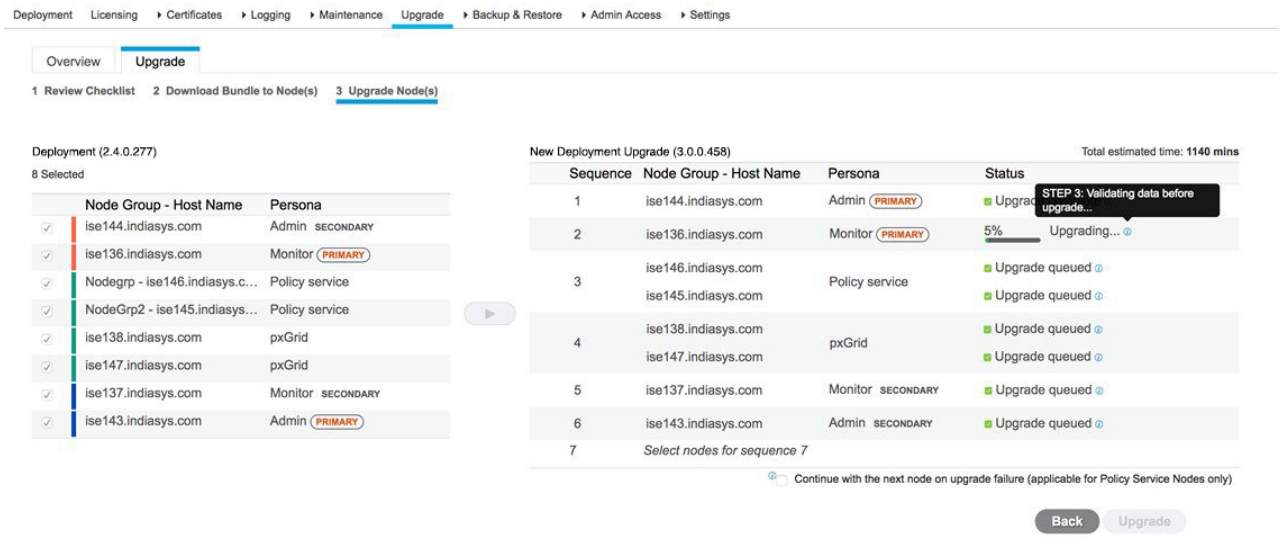
d) Select the Secondary Monitoring Node and move it to the new deployment.
e) Finally, select the Primary Administration Node and move it to the new deployment.

Step 8 Check the **Continue with Upgrade on Failure** check box if you want to continue with the upgrade even if the upgrade fails on any of the Policy Service Nodes in the upgrade sequence.

This option is not applicable to the Secondary Administration Node and the Primary Monitoring Node. If any of these nodes fail, the upgrade process is rolled back. If any of the Policy Service Nodes fail, the Secondary Monitoring Node and the Primary Administration Node are not upgraded and remain in the old deployment.

Step 9 Click **Upgrade** to begin the deployment upgrade.

Figure 2: Upgrade Window Showing the Upgrade Progress.



The upgrade progress is displayed for each node. On successful completion, the node status changes to **Upgrade Complete**.

Note
When you upgrade a node from the Admin portal, if the status does not change for a long time (and remains at 80%), you can check the upgrade logs from the CLI or the status of the upgrade from the console. Log in to the CLI or view the console of the Cisco ISE node to view the progress of upgrade. You can use the **show logging application** command to view the *upgrade-uibackend-cliconsole.log* and *upgrade-postosupgrade-yyyymmdd-xxxxxx.log*.

You can view the following upgrade logs from the CLI using the show logging application command:

- DB Data Upgrade Log
- DB Schema Log
- Post OS Upgrade Log

If you get the warning message: **The node has been reverted back to its pre-upgrade state**, go to the **Upgrade** window, click the **Details** link. Address the issues that are listed in the **Upgrade Failure Details** window. After you fix all the issues, click **Upgrade** to reinitiate the upgrade.

Note
If the posture data update process is running on the Primary Administration Node in the new deployment, you cannot register a node to the Primary Administration Node. You can either wait till the posture update process is over (which might take approximately 20 minutes) or disable the posture auto-update feature from the **Updates** window while upgrading or registering a node to the new deployment. To view this window, click the **Menu** icon (☰) and choose **Administration** > **System** > **Settings** > **Posture** > **Updates**.

Upgrade a Cisco ISE deployment from the CLI

Upgrade process

The upgrade process using CLI depends on the deployment type.

Upgrade a standalone node

You can use the **application upgrade <upgrade bundle name> <repository name>** command directly, or the **application upgrade prepare <upgrade bundle name> <repository name>** and **application upgrade proceed** commands in the specified sequence to upgrade a standalone node.

You can run the **application upgrade <upgrade bundle name> <repository name>** command from the CLI on a standalone node that assumes the Administration, Policy Service, pxGrid, and Monitoring personas. If you choose to run this command directly, we recommend that you copy the upgrade bundle from the remote repository to the Cisco ISE node's local disk before you run the command to save time during upgrade.

Alternatively, you can use the **application upgrade prepare <upgrade bundle name> <repository name>** and **application upgrade proceed** commands. The **application upgrade prepare <upgrade bundle name> <repository name>** command downloads the upgrade bundle and extracts it locally. This command copies the upgrade bundle from the remote repository to the Cisco ISE node's local disk. After you have prepared a node for upgrade, run the **application upgrade proceed** command to complete the upgrade successfully.

We recommend that you run the **application upgrade prepare <upgrade bundle name> <repository name>** and **application upgrade proceed** commands as described below.

Before you begin

Ensure that you have read the instructions in the Prepare for Upgrade section.

Procedure

Step 1 Create a repository on the local disk. For example, you can create a repository called "upgrade."

Example:

```
ise/admin# conf t
Enter configuration commands, one per line.  End with CNTL/Z.
ise/admin(config)# repository upgrade
ise/admin(config-Repository)# url disk:
% Warning: Repositories configured from CLI cannot be used from the ISE web UI and are not replicated
 to other ISE nodes.
If this repository is not created in the ISE web UI, it will be deleted when ISE services restart.
ise/admin(config-Repository)# exit
ise/admin(config)# exit
```

Step 2 From the Cisco ISE CLI, enter **application upgrade prepare <upgrade bundle name> <repository name>** command.

This command copies the upgrade bundle to the local repository "upgrade" that you created in the previous step and lists the MD5 and SHA256 checksum.

Step 3 **Note**

After beginning the upgrade, you can view the progress of the upgrade by logging in via SSH and using the **show application status ise** command. The following message appears: % NOTICE: Identity Services Engine upgrade is in progress...

From the Cisco ISE CLI, enter the **application upgrade proceed** command.

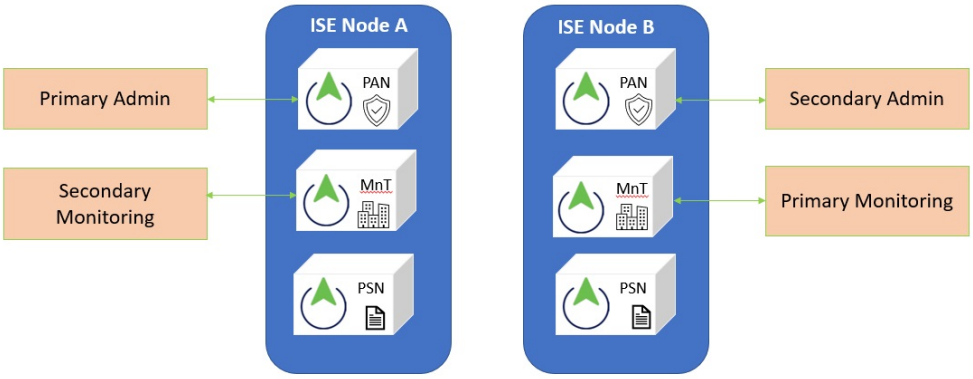
What to do next

Verify the upgrade process, on page 39

Upgrade a two-node deployment

Use the **application upgrade prepare <upgrade bundle name> <repository name>** and **proceed** commands to upgrade a two-node deployment. You do not have to manually deregister the node and register it again. The upgrade software automatically deregisters the node and moves it to the new deployment. When you upgrade a two-node deployment, you should initially upgrade only the Secondary Administration Node(node B). When the secondary node upgrade is complete, you upgrade the primary node thereafter(node A). If you have a deployment set up as shown in the following figure, you can proceed with this upgrade procedure.

Figure 3: Cisco ISE Two-Node Administrative Deployment



Before you begin

- Perform an on-demand backup (manually) of the configuration and operational data from the Primary Administration Node.
- Ensure that the Administration and Monitoring personas are enabled on both the nodes in the deployment.

  If the Administration persona is enabled only on the Primary Administration Node, enable the Administration persona on the secondary node because the upgrade process requires the Secondary Administration Node to be upgraded first.

  Alternatively, if there is only one Administration node in your two-node deployment, then deregister the secondary node. Both the nodes become standalone nodes. Upgrade both the nodes as standalone nodes and set up the deployment after the upgrade.
- If the Monitoring persona is enabled only on one of the nodes, ensure that you enable the Monitoring persona on the other node before you proceed.

Procedure

Step 1 Upgrade the secondary node (node B) from the CLI.

The upgrade process automatically removes Node B from the deployment and upgrades it. Node B becomes the upgraded primary node when it restarts.

Step 2 Upgrade node A.

The upgrade process automatically registers node A to the deployment and makes it the secondary node in the upgraded environment.

Step 3 Promote node A, now to be the primary node in the new deployment.

After the upgrade is complete, if the nodes contain old Monitoring logs, ensure that you run the **application configure ise** command and choose 5 (Refresh Database Statistics) on the nodes.

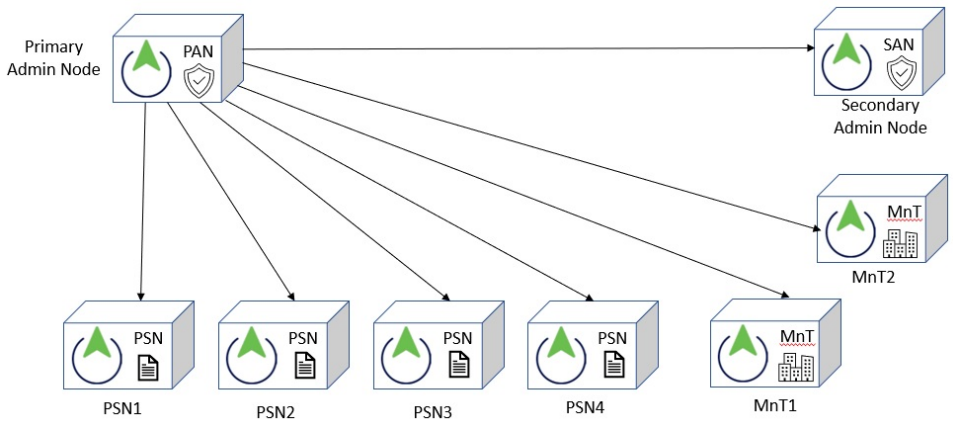
What to do next

Verify the upgrade process, on page 39

Upgrade a distributed deployment

You must first upgrade the Secondary Administration Node (SAN)to the new release. For example, if you have a deployment setup as shown in the following figure, with one Primary Administration Node (PAN), one Secondary Administration Node, four Policy Service Nodes (PSNs) , one Primary Monitoring Node (MnT1), and one Secondary Monitoring Node (MnT2), you can proceed with the following upgrade procedure.

Figure 4: Cisco ISE Deployment Before Upgrade



Note Do not manually deregister the node before an upgrade. Use the **application upgrade prepare <upgrade bundle name> <repository name>** and **proceed** commands to upgrade to the new release. The upgrade process deregisters the node automatically and moves it to the new deployment. If you manually deregister the node before an upgrade, ensure that you have the license file for the Primary Administration Node before beginning the upgrade process. If you do not have the file on hand (for example, if your license was installed by a Cisco partner vendor), contact the Cisco Technical Assistance Center for assistance.

Before you begin

- If you do not have a Secondary Administration Node in the deployment, configure a Policy Service Node to be the Secondary Administration Node before beginning the upgrade process.
- Ensure that you have read and complied with the instructions given in the Prepare for Upgrade section.
- When you upgrade a complete Cisco ISE deployment, Domain Name System (DNS) server resolution (both forward and reverse lookups) is mandatory; otherwise, the upgrade fails.

Procedure

Step 1 Upgrade the SAN from the CLI.

The upgrade process automatically deregisters SAN from the deployment and upgrades it. SAN becomes the primary node of the new deployment when it restarts. Because each deployment requires at least one Monitoring node, the upgrade process enables the Monitoring persona on SAN even if it was not enabled on this node in the old deployment. If the Policy Service persona was enabled on SAN in the old deployment, this configuration is retained after upgrading to the new deployment.

Step 2 Upgrade one of your Monitoring nodes (MnT1 and MnT2) to the new deployment.

We recommend that you upgrade your Primary Monitoring Node before the Secondary Monitoring Node (this is not possible if your Primary Administration Node in the old deployment functions as your Primary Monitoring Node as well). Your primary Monitoring node starts to collect the logs from the new deployment and you can view the details from the Primary Administration Node dashboard.

If you have only one Monitoring node in your old deployment, before you upgrade it, ensure that you enable the Monitoring persona on PAN, which is the Primary Administration Node in the old deployment. Node persona changes result in a Cisco ISE application restart. Wait for PAN to come up before you proceed. Upgrading the Monitoring node to the new deployment takes longer than the other nodes because operational data has to be moved to the new deployment.

If node B, the Primary Administration Node in the new deployment, did not have the Monitoring persona enabled in the old deployment, disable the Monitoring persona on it. Node persona changes result in a Cisco ISE application restart. Wait for the Primary Administration Node to come up before you proceed.

Step 3 Upgrade the Policy Service Nodes (PSNs) next. You can upgrade several PSNs in parallel, but if you upgrade all the PSNs concurrently, your network will experience a downtime.

After the upgrade, the PSNs are registered with the primary node of the new deployment SAN, and the data from the primary node is replicated to all the PSNs. The PSNs retain their personas, node group information, and profiling probe configurations.

Step 4 If you have a second Monitoring node in your old deployment, you must do the following:

a) Enable the Monitoring persona on PAN, which is the primary node in your old deployment.

A deployment requires at least one Monitoring node. Before you upgrade the second Monitoring node from the old deployment, enable this persona on the primary node itself. Node persona changes result in a Cisco ISE application restart. Wait for the primary ISE node to come up again.

b) Upgrade the Secondary Monitoring Node from the old deployment to the new deployment.

Except for the Primary Administration Node, you must have upgraded all the other nodes to the new deployment.

Step 5 Finally, upgrade the Primary Administration Node.

This node is upgraded and added to the new deployment as a Secondary Administration Node. You can promote the Secondary Administration Node to be the primary node in the new deployment.

After the upgrade is complete, if the Monitoring nodes that were upgraded contain old logs, ensure that you run the **application configure ise** command and choose 5 (Refresh Database Statistics) on the Monitoring nodes.

What to do next

Verify the upgrade process, on page 39

Verify the upgrade process

We recommend that you run some network tests to ensure that the deployment functions as expected and that users are able to authenticate and access resources on your network.

If an upgrade fails because of configuration database issues, the changes are rolled back automatically.

Procedure

Perform any of the following options in order to verify whether the upgrade was successful.

- Check the ade.log file for the upgrade process. To display the ade.log file, enter the following command from the Cisco ISE CLI: **show logging system ade/ADE.log.?**

You can grep for **STEP** to view the progress of the upgrade:

- `info:[application:install:upgrade:preinstall.sh] STEP 0: Running pre-checks`
- `info:[application:operation:preinstall.sh] STEP 1: Stopping ISE application...`
- `info:[application:operation:preinstall.sh] STEP 2: Verifying files in bundle...`
- `info:[application:operation:isedbupgrade-newmodel.sh] STEP 3: Validating data before upgrade...`
- `info:[application:operation:isedbupgrade-newmodel.sh] STEP 4: De-registering node from current deployment.`
- `info:[application:operation:isedbupgrade-newmodel.sh] STEP 5: Taking backup of the configuration data...`
- `info:[application:operation:isedbupgrade-newmodel.sh] STEP 6: Registering this node to primary of new deployment...`

- `info:[application:operation:isedbupgrade-newmodel.sh] STEP 7: Downloading configuration data from primary of new deployment...`
- `info:[application:operation:isedbupgrade-newmodel.sh] STEP 8: Importing configuration data...`
- `info:[application:operation:isedbupgrade-newmodel.sh] STEP 9: Running ISE configuration data upgrade for node specific data...`
- `info:[application:operation:isedbupgrade-newmodel.sh] STEP 10: Running ISE M&T database upgrade...`
- `info:[application:install:upgrade:post-osupgrade.sh] POST ADEOS UPGRADE STEP 1: Upgrading Identity Services Engine software...`
- `info:[application:operation:post-osupgrade.sh] POST ADEOS UPGRADE STEP 2: Importing upgraded data to 64 bit database...`
- Search for this string to ensure that the upgrade is successful:

```
Upgrade of Identity Services Engine completed
      successfully.
```

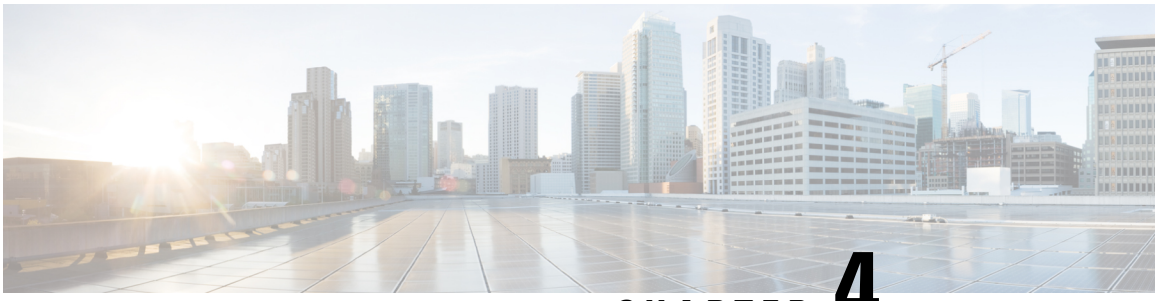
- Enter the **show version** command to verify the build version.
- Enter the **show application status ise** command to verify that all the services are running.

Roll back to the previous version

In rare cases, you might have to reimage the Cisco ISE appliance by using the previous version of ISO image and restoring the data from the backup file. After restoring the data, you can register with the old deployment, and enable the personas as done in the old deployment. Hence, we recommend that you back up the Cisco ISE configuration and monitoring data before you start the upgrade process.

Sometimes, upgrade failures that occur because of issues in the configuration and monitoring database are not rolled back automatically. When this occurs, you get a notification stating that the database is not rolled back, along with an upgrade failure message. In such scenarios, you should manually reimage your system, install Cisco ISE, and restore the configuration data and monitoring data (if the Monitoring persona is enabled).

Before you attempt to rollback or recovery, generate a support bundle by using the **backup-logs** command, and place the support bundle in a remote repository.



CHAPTER 4

Cisco ISE Software Patches

Cisco ISE software patches are always cumulative. Cisco ISE allows you to perform patch installation and rollback from CLI or GUI.

You can install patches on Cisco ISE servers in your deployment from the Primary PAN. To install a patch from the Primary PAN, you must download the patch from Cisco.com to the system that runs your client browser.

If you are installing the patch from the GUI, the patch is automatically installed on the Primary PAN first. The system then installs the patch on the other nodes in the deployment in the order listed in the GUI. You cannot control the order in which the nodes are updated. You can also manually install, roll back, and view patch version. In the Cisco ISE GUI, click the **Menu** icon (☰) and choose **Administrator > System > Maintenance > Patch management**.

If you are installing the patch from the CLI, you can control the order in which the nodes are updated. However, we recommend that you install the patch on the Primary PAN first. The order of installation on the rest of the nodes is irrelevant. You can install the patch on multiple nodes simultaneously, to speed up the process.

If you want to validate the patch on some of the nodes before upgrading the entire deployment, you can use the CLI to install the patch on selected nodes. Use the following CLI command to install the patch:

```
patch install <patch_bundle> <repository_that_stores_patch_file>
```

For more information, see the "install Patch" section in the "Cisco ISE CLI Commands in EXEC Mode" chapter in Cisco Identity Services Engine CLI Reference Guide.

You can install the required patch version directly. For example, if you are currently using Cisco ISE 2.x and would like to install Cisco ISE 2.x patch 5, you can directly install Cisco ISE 2.x patch 5, without installing the previous patches (in this example, Cisco ISE 2.x patches 1 – 4). To view the patch version in the CLI, use the following CLI command:

```
show version
```


- Software Patch Installation Guidelines, on page 42
- Install a Software Patch, on page 42
- Roll Back Software Patches, on page 43
- View Patch Install and Rollback Changes, on page 44

Software Patch Installation Guidelines

When you install a patch on an ISE node, the node is rebooted after the installation is complete. You might have to wait for a few minutes before you can log in again. You can schedule patch installations during a maintenance window to avoid temporary outage.

Ensure that you install patches that are applicable for the Cisco ISE version that is deployed in your network. Cisco ISE reports any mismatch in versions as well as any errors in the patch file.

You cannot install a patch with a version that is lower than the patch that is currently installed on Cisco ISE. Similarly, you cannot roll back changes of a lower-version patch if a higher version is currently installed on Cisco ISE. For example, if patch 3 is installed on your Cisco ISE servers, you cannot install or roll back patch 1 or 2.

When you install a patch from the Primary PAN that is part of a distributed deployment, Cisco ISE installs the patch on the primary node and then all the secondary nodes in the deployment. If the patch installation is successful on the Primary PAN, Cisco ISE then continues patch installation on the secondary nodes. If it fails on the Primary PAN, the installation does not proceed to the secondary nodes. However, if the installation fails on any of the secondary nodes for any reason, it still continues with the next secondary node in your deployment.

When you install a patch from the Primary PAN that is part of a two-node deployment, Cisco installs the patch on the primary node and then on the secondary node. If the patch installation is successful on the Primary PAN, Cisco then continues patch installation on the secondary node. If it fails on the Primary PAN, the installation does not proceed to the secondary node.

Install a Software Patch

Before you begin

- You must have the Super Admin or System Admin administrator role assigned.
- In the Cisco ISE GUI, click the **Menu** icon (☰) and choose **Administration** > **System** > **Deployment** > **PAN Failover**, and ensure that the **Enable PAN Auto Failover** check box is unchecked. The PAN auto-failover configuration must be disabled for the duration of this task.

Procedure

Step 1 In the Cisco ISE GUI, click the **Menu** icon (☰) and choose **Administration** > **System** > **Maintenance** > **Patch Management** > **Install.**

Step 2 Click **Browse** and choose the patch that you downloaded from Cisco.com.

Step 3 Click **Install** to install the patch.

After the patch is installed on the PAN, Cisco ISE logs you out and you have to wait for a few minutes before you can log in again.

Note

When patch installation is in progress, **Show Node Status** is the only function that is accessible on the Patch Management page.

Step 4 In the Cisco ISE GUI, click the **Menu** icon (☰) and choose **Administration** > **System** > **Maintenance** > **Patch Management** to return to the Patch Installation page.

Step 5 Click the radio button next to the patch that you have installed and click **Show Node Status** to verify whether installation is complete.

Roll Back Software Patches

When you roll back a patch from the PAN that is part of a deployment with multiple nodes, Cisco ISE rolls back the patch on the primary node and then all the secondary nodes in the deployment.

Before you begin

- You must have either the Super Admin or System Admin administrator role assigned.

Procedure

Step 1 In the Cisco ISE GUI, click the **Menu** icon (☰) and choose**Administration** > **System** > **Maintenance** > **Patch Management**.

Step 2 Click the radio button for the patch version whose changes you want to roll back and click **Rollback**.

Note
When a patch rollback is in progress, **Show Node Status** is the only function that is accessible on the Patch Management page.

After the patch is rolled back from the PAN, Cisco ISE logs you out and you have to wait a few minutes before you can log in again.

Step 3 After you log in, click the **Alarms** link at the bottom of the page to view the status of the rollback operation.

Step 4 To view the progress of the patch rollback, choose the patch in the Patch Management page and click **Show Node Status**.

Step 5 Click the radio button for the patch and click **Show Node Status** on a secondary node to ensure that the patch is rolled back from all the nodes in your deployment.

If the patch is not rolled back from any of the secondary nodes, ensure that the node is up and repeat the process to roll back the changes from the remaining nodes. Cisco ISE only rolls back the patch from the nodes that still have this version of the patch installed.

Software Patch Rollback Guidelines

To roll back a patch from Cisco ISE nodes in a deployment, you must first roll back the change from the PAN. If this is successful, the patch is then rolled back from the secondary nodes. If the rollback process fails on

the PAN, the patches are not rolled back from the secondary nodes. However, if the patch rollback fails on any secondary node, it still continues to roll back the patch from the next secondary node in your deployment.

While Cisco ISE rolls back the patch from the secondary nodes, you can continue to perform other tasks from the PAN GUI. The secondary nodes will be restarted after the rollback.

View Patch Install and Rollback Changes

To view reports related to installed patches, perform the following steps.

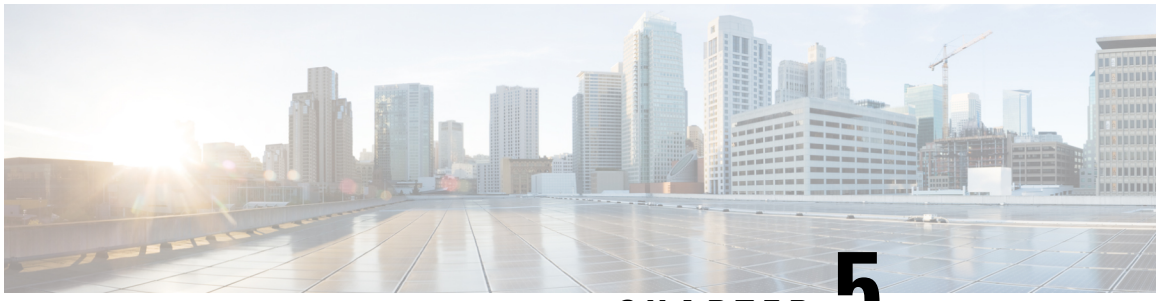
Before you begin

You must have either the Super Admin or System Admin administrator role assigned. You can install or rollback patches In the Cisco ISE GUI, click the **Menu** icon (☰) and choose **Administration** > **System** > **Maintenance** > **Patch Management** window. You can also view the status (installed/in-progress/not installed) of a particular patch on each node in the deployment, by selecting a specific patch and clicking the **Show Node Status** button.

Procedure

Step 1 In the Cisco ISE GUI, click the **Menu** icon (☰) and choose **Operations** > **Reports** > **Audit** > **Operations Audit**. By default, records for the last seven days are displayed.

Step 2 Click the **Filter** drop-down, and choose **Quick Filter** or **Advanced Filter** and use the required keyword, for example, patch install iniated, to generate a report containing the installed patches.



CHAPTER 5

Post-Upgrade Settings and Configurations

Perform the following tasks after upgrading Cisco ISE.

- Convert to new license types, on page 45
- Verify virtual machine settings, on page 45
- Browser setup, on page 46
- Re-join Active Directory, on page 46
- Reverse DNS lookup, on page 47
- Restore certificates, on page 47
- Regenerate the root CA chain, on page 48
- Threat-Centric NAC, on page 49
- SMNP Originating Policy Services Node setting, on page 49
- Profiler feed service, on page 49
- Client provisioning , on page 49
- Cipher suites, on page 50
- Monitoring and troubleshooting, on page 50
- Refresh policies to Trustsec NADs, on page 51
- Update Supplicant Provisioning Wizards, on page 51
- Profiler endpoint ownership synchronization/ replication, on page 51

Convert to new license types

- Convert your old licenses to the new license types through the Cisco Smart Software Manager (CSSM).
- Enable the new licenses in your Cisco ISE administrators' portal.

For more information on the Cisco ISE license types, refer to the Cisco ISE Administration Guide, Release 3.0.

Verify virtual machine settings

If you are upgrading Cisco ISE nodes on virtual machines, ensure that you change the Guest Operating System to Red Hat Enterprise Linux (RHEL) 7 (64-bit) or Red Hat Enterprise Linux (RHEL) 6 (64-bit). To do this, you must power down the VM, change the Guest Operating System to the supported RHEL version, and power on the VM after the change.

RHEL 7 supports only E1000 and VMXNET3 network adapters. Be sure to change the network adapter type before you upgrade.

If you are running ISE on an ESXi 5.x server (5.1 U2 minimum), you must upgrade the VMware hardware version to 9 before you can select RHEL 7 as the Guest OS.

Browser setup

After upgrade, clear the browser cache, close the browser, and open a new browser session, before you access the Cisco ISE Admin portal. Also verify that you are using a supported browser, which are listed in the release notes: https://www.cisco.com/c/en/us/support/security/identity-services-engine/products-release-notes-list.html

Re-join Active Directory

If you use Active Directory as your external identity source, and the connection to Active Directory is lost, then you must join all Cisco ISE nodes with Active Directory again. After the joins are complete, perform the external identity source call flows to ensure the connection.

- After upgrade, if you log in to the Cisco ISE user interface using an Active Directory administrator account, your login fails because Active Directory join is lost during upgrade. You must use the internal administrator account to log in to Cisco ISE and join Active Directory with it.
- If you enabled certificate-based authentication for administrative access to Cisco ISE, and used Active Directory as your identity source, then you will not be able to launch the ISE login page after upgrade. This because the join to Active Directory is lost during upgrade. To restore joins to Active Directory, connect to the Cisco ISE CLI, and start the ISE application in safe mode by using the following command:

  application start ise safe

  After Cisco ISE starts in safe mode, perform the following tasks:

  - Log in to the Cisco ISE user interface using the internal administrator account.

    If you do not remember your password or if your administrator account is locked, see "Administrator Access to Cisco ISE" in the Administrators Guide for information on how to reset an administrator password.

  - Join Cisco ISE with Active Directory.

  For more information about joining Active Directory, see:

  Configure Active Directory as an External Identity Source

Certificate Attributes Used with Active Directory

Cisco ISE identifies users using the attributes SAM, CN, or both. Cisco ISE, Release 2.2 Patch 5 and above, and 2.3 Patch 2 and above, use the `sAMAccountName` attribute as the default attribute. In earlier releases, both SAM and CN attributes were searched by default. This behavior has changed in Release 2.2 Patch 5 and above, and 2.3 Patch 2 and above, as part of CSCvf21978 bug fix. In these releases, only the sAMAccountName attribute is used as the default attribute.

You can configure Cisco ISE to use SAM, CN, or both, if your environment requires it. When SAM and CN are used, and the value of the SAMAccountName attribute is not unique, Cisco ISE also compares the CN attribute value.

To configure attributes for Active Directory identity search:

- 1. Choose **Administration** > **Identity Management** > **External Identity Sources** > **Active Directory** . In the **Active Directory** window, click **Advanced Tools**, and choose **Advanced Tuning**. Enter the following details:
  - **ISE Node**—Choose the ISE node that is connecting to Active Directory.
  - **Name**—Enter the registry key that you are changing. To change the Active Directory search attributes, enter: `REGISTRY.Services\lsass\Parameters\Providers\ActiveDirectory\IdentityLookupField`
  - **Value**—Enter the attributes that ISE uses to identify a user:
    - *SAM*—To use only SAM in the query (this option is the default).
    - *CN*—To use only CN in the query.
    - *SAMCN*—To use CN and SAM in the query.
  - **Comment**—Describe what you are changing, for example: Changing the default behavior to SAM and CN.
- 2. Click **Update Value** to update the registry.

  A pop-up window appears. Read the message and accept the change. The AD connector service in ISE restarts.

Reverse DNS lookup

Ensure that you have Reverse DNS lookup configured for all Cisco ISE nodes in your distributed deployment for all DNS server(s). Otherwise, you may run into deployment-related issues after upgrade.

Restore certificates

Restore certificates on the PAN

When you upgrade a distributed deployment, the Primary Administration Node's (PAN) root CA certificates are not added to the Trusted Certificates store if both of the following conditions are met:

- Secondary Administration Node is promoted to be the PAN in the new deployment.
- Session services are disabled on the Secondary Administration Node.

If the certificates are not in the store, you may see authentication failures with the following errors:

- `Unknown CA in the chain during a BYOD flow`
- `OCSP unknown error during a BYOD flow`

You can see these messages when you click the **More Details** link from the **Live Logs** page for failed authentications.

To restore the PAN's root CA certificates, generate a new Cisco ISE Root CA certificate chain. In the Cisco ISE GUI, click the **Menu** icon (☰) and choose **Administration** > **Certificates** > **Certificate Signing Requests** > **Replace ISE Root CA certificate chain**.

Restore certificates and keys to secondary administration node

If you are using a secondary administration node, obtain a backup of the Cisco ISE CA certificates and keys from the PAN, and restore it on the Secondary Administration Node. This allows the Secondary Administration Node to function as the root CA or subordinate CA of an external PKI if the primary PAN fails, and you promote the Secondary Administration Node to be the PAN.

For more information about backing up and restoring certificates and keys, see:

Backup and Restore of Cisco ISE CA Certificates and Keys

Regenerate the root CA chain

In specific upgrade scenarios, you must regenerate the root CA chain after the upgrade process is complete. Regenerate the root CA chain by following these steps:

1. From the Cisco ISE main menu, choose **Administration** > **System** > **Certificates** > **Certificate Management** > **Certificate Signing Request**.
2. Click **Generate Certificate Signing Request (CSR)**.
3. Choose **ISE Root CA** in the **Certificate(s) will be used for** drop-down list.
4. Click **Replace ISE root CA Certificate Chain**.

Table 3: Root CA Chain Regeneration Scenarios

Upgrade scenario	Mode
Full upgrade process	Deployment
Split upgrade process	Deployment
Configuration database restoration process	Standalone
Node Promotion: Promoting a secondary PAN to primary PAN after the split upgrade process	Deployment
Change in the domain name or hostname of any Cisco ISE node	Standalone and Deploym

After the upgrade process, you might encounter the following events:

1. No data in live logs.
2. Queue link errors.
3. Health status is unavailable.
4. No date available in the system summary for some nodes.

You must reset the MnT Database and replace the ISE Root CA certificate chain to resolve the queue link error and reinstate the information.

Threat-Centric NAC

If you have enabled the Threat-Centric NAC (TC-NAC) service, after you upgrade, the TC-NAC adapters might not be functional. You must restart the adapters from the Threat-Centric NAC pages of the ISE GUI. Select the adapter and click Restart to start the adapter again.

SMNP Originating Policy Services Node setting

If you had manually configured the Originating Policy Services Node value under SNMP settings, this configuration is lost during upgrade. You must reconfigure the SNMP settings.

For more information, see:

See SNMP Settings under Network Device Definition Settings.

Profiler feed service

Update the profiler feed service after upgrade to ensure that the most up-to-date OUIs are installed.

From the Cisco ISE Admin portal:

Procedure

Step 1 In the Cisco ISE GUI, click the **Menu** icon (☰) and choose **Administration** > **FeedService** > **Profiler**. Ensure that the profiler feed service is enabled.

Step 2 Click **Update Now**.

Client provisioning

Check the native supplicant profile that is used in the client provisioning policy and ensure that the wireless SSID is correct. For iOS devices, if the network that you are trying to connect is hidden, check the **Enable if target network is hidden** check box in the **iOS Settings** area.

Update client provisioning resources on ISE:

Online updates

Procedure

Step 1 In the Cisco ISE GUI, click the **Menu** icon (☰) and choose **Policy > Policy Elements > Results > Client Provisioning > Resources** to configure the client provisioning resources.

Step 2 Click **Add**.

Step 3 Choose **Agent Resources From Cisco Site**.

Step 4 In the **Download Remote Resources** window, select the Cisco Temporal Agent resource.

Step 5 Click **Save** and verify that the downloaded resource appears in the Resources page.

Offline updates

Procedure

Step 1 Choose **Policy** > **Policy Elements** > **Results** > **Client Provisioning** > **Resources** to configure the client provisioning resources.

Step 2 In the Cisco ISE GUI, click the **Menu** icon (☰) and choose **Policy** > **Policy Elements** > **Results** > **Client Provisioning** > **Resources** to configure the client provisioning resources.

Step 3 Click **Add**.

Step 4 Choose **Agent Resources from Local Disk**.

Step 5 From the **Category** drop-down, choose **Cisco Provided Packages**.

Cipher suites

If you have legacy devices, such as old IP phones, that use these deprecated ciphers authenticating against Cisco ISE,authentication fails because these devices use legacy ciphers. To allow Cisco ISE to authenticate legacy devices after upgrading, ensure that you update the **Allowed Protocols** configuration as follows:

Procedure

Step 1 In the Cisco ISE GUI, click the **Menu** icon (☰) and choose **Policy** > **Policy Elements** > **Results** > **Authentication** > **Allowed Protocols**.

Step 2 Edit the Allowed Protocols service and check the **Allow weak ciphers for EAP** check box.

Step 3 Click **Submit**.

Related Topics

Release Notes for Cisco Identity Services Engine
Cisco Identity Services Engine Network Component Compatibility

Monitoring and troubleshooting

- Reconfigure email settings, favorite reports, and data purge settings.

- Check the threshold and filters for specific alarms that you need. All the alarms are enabled by default after an upgrade.
- Customize reports, based on your needs. If you had customized the reports in the old deployment, the upgrade process overwrites the changes that you made.

Restore MnT Backup

With the operational data backup of MnT data that you created before update, restore the backup.

For more information, see:

Backup and Restore Operations in the Cisco ISE Administrator Guide.

Refresh policies to Trustsec NADs

Run the following commands, in the following order, to download the policies on Cisco TrustSec-enabled Layer 3 interfaces in the system:

- `no cts role-based enforcement`
- `cts role-based enforcement`

Update Supplicant Provisioning Wizards

When you upgrade to a new release, or apply a patch, the Supplicant Provisioning Wizards (SPW) are not updated. You must manually update the SPWs, then create new native supplicant profiles and new client provisioning policies that reference the new SPWs. New SPWs are available on the ISE download page.

Profiler endpoint ownership synchronization/ replication

When you upgrade to Cisco ISE 2.7 and later version, as part of JEDIS framework the port 6379 is required to be opened between all nodes in the deployment for to-and-fro communication.

Profiler endpoint ownership synchronization/ replication