Software Activation Configuration Guide (Cisco ASR 920 Routers)

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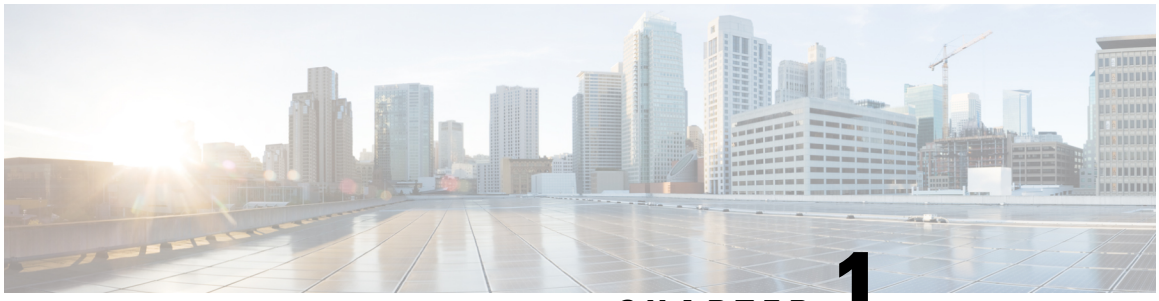


CHAPTER 1

Cisco IOS Software Activation Conceptual Overview

The Cisco IOS Software Activation feature is an orchestrated collection of processes and components to activate Cisco software feature sets by obtaining and validating Cisco software licenses. With this feature, you can enable licensed features and register licenses in these ways:

- By using the Cisco Product License Registration portal.
- By entering Cisco EXEC commands on the device.
- By using Cisco License Manager to register, obtain, and install licenses in a bulk fashion for network-wide deployments.

This document provides an overview of the Cisco software licensing processes and describes the role of the Cisco IOS Software Activation feature in those processes.

Information About the Cisco Software Licensing Process

Cisco Software Licensing Concepts

Cisco Product License Registration Portal

Use the Cisco Product License Registration portal at *http://www.cisco.com/go/license* to perform these licensing operations:

- Get a license through product authorization key (PAK) registration
- Register for a return merchandise authorization (RMA) replacement license
- Manage a license (look up a license and upload a rehost ticket)
- Migrate a license

You must have a Cisco.com account before you can access the portal.

Product Authorization Key

Interaction with the Cisco Product License Registration portals might require a PAK, which is provided when you order and purchase the right to use a feature set for a particular platform. The PAK serves as a receipt and is an important component in the process to obtain and upgrade a license.

You can also purchase a bulk PAK to fulfill multiple licenses on a device.

Unique Device Identifier

Cisco software performs license verification checks by comparing a stored unique device identifier (UDI)--a unique and unchangeable identifier assigned to all Cisco hardware devices--with the UDI of the device.

The UDI has two main components: the product ID (PID) and the serial number (SN). For most Cisco hardware devices, the UDI is printed on a label located on the back of the device and can be displayed by using the **show license udi** command.

Note When registering a license, you must use the correct UDI.

Cisco Software License Validation

Cisco software licensing uses a system of validation keys to provide a simple mechanism for deploying new feature sets that offers Cisco customers increased functionality for upgrading and maintaining their software.

Some feature sets on a Cisco device might need the license key before they can be enabled. You obtain the license key by using the Cisco licensing portal. The portal issues a license key for a specific Cisco software feature set, and the license is locked to the device UDI. (This is known as a node-locked license.)

Cisco License Manager

The Cisco License Manager, a client/server-based application that is available free to Cisco customers, can automatically discover Cisco devices on a network and can simplify the task of collecting the license key.

For more information, see the *User Guide for Cisco License Manager*.

Software End-User License Agreement

As part of the licensing process, you must accept terms and conditions set forth in the end-user license agreement. You implicitly accept the agreement when you first use a new device. However, you must explicitly accept the agreement before a feature set can be activated for evaluation and extension temporary licenses.

You can read the terms and conditions of the end-user license agreement at this URL: http://www.cisco.com/en/US/docs/general/warranty/English/EU1KEN_.html.

License Models for Images and Features

Cisco IOS Universal Image-Based Licenses

The Cisco IOS universal image contains *all* fixed feature images in one image. You can access the required functionality based on the license installed on the device. A higher-level feature-set license inherits the content of the lower-level feature sets it contains. The figure below shows an example of the feature sets and fixed feature images that can make the universal image.

A platform can have a single universal image, which is a superset of all fixed feature images. Fixed feature images are an older packaging form in which the image contains only part of a systems capabilities. The fixed feature images supported by platform are predetermined and vary between platforms. A particular fixed feature image functionality is enabled based on license availability.

The software packaging simplifies the image selection process by consolidating the total number of packages and by using consistent package names across all hardware products.

The image-based license is used to help bring up all the subsystems that correspond to the image-level license that you purchase. Image licenses are enforced only during boot time.

The feature sets available for upgrading Cisco devices are listed on the Cisco IOS Software Packaging web page at this URL: http://www.cisco.com/en/US/products/sw/iosswrel/ps5460/index.html.

Feature-Based Licenses

Once the image-based license is used and the appropriate subsystems are activated, individual feature licenses are used to activate individual features.

License keys enable or disable individual features. Features check for their licenses before enabling themselves and adjust their behavior based on the following:

- Activation of a permanent license
- Expiration of a time-limited evaluation license
- Validity of a subscription license

License Types

Permanent Licenses

Permanent licenses are perpetual; that is, no usage period is associated with them. Once permanent licenses are installed, they provide all the permissions needed to access features in the software image. All permanent licenses are node locked and validated by the Cisco licensing infrastructure during software installation. Once a permanent license is installed, you do not need to upgrade for subsequent releases.

Cisco manufacturing preinstalls the appropriate permanent license on the ordered device for the purchased feature set. No customer interaction with the software activation processes is required to enable a license on new hardware.

Temporary Licenses

Temporary licenses are limited to a specific usage period (for example, 60 days). You must accept the end-user license agreement before the temporary licenses can be activated.

There are three types of temporary licenses: those embedded in Cisco images, evaluation licenses obtained from the Cisco Product License Registration portal, and extension licenses that are obtained from the Cisco Technical Assistant Center (TAC).

Although the embedded license can also be used for evaluation purposes, we recommend that you use the embedded license for emergency use only and obtain an evaluation license from the self-serve Cisco Product Licensing Registration portal.

These sections further define the types of temporary licenses:

Built-in Licenses for Emergencies

To avoid network downtime in the event of device failure and if the replaced device does not have the same licenses as the failed device, you can use a built-in license (an evaluation license) in the software image. Using it ensures that you can configure the needed features without requiring a license key. However, you must still accept an end-user license agreement and must acknowledge that there is a 60-day usage limit for this type of license.

Note You must go to the Cisco Product License Registration portal to obtain a permanent RMA replacement license.

Evaluation Licenses

Evaluation licenses are also temporary, and you use them to evaluate a feature set on new hardware.

You obtain evaluation licenses from the Cisco licensing portal: Licensing Portal for Demo Licenses

Note You must go to the Cisco Product License Registration portal prior to the expiration of the evaluation license to upgrade the license status.

Extension Licenses

When the time allowed for an evaluation licenses expires, you can work with TAC to obtain an extension license. Similar to an evaluation license, extension licenses are node locked and valid for a specific period (for example, 60 days) based on usage.

Note You must obtain approval to use an extension license.

Uncounted or Counted Licenses

Feature-based licenses are either uncounted licenses or counted licenses. Uncounted licenses do not have any count. Counted licenses have an attribute to fulfill for a certain number of counts. In other words, a count is associated with them that indicates the instances of that feature available for use in the system.

Pay as You Grow Model

The pay-as-you-grow model allows you to upgrade your hardware and software capacity by using a license key. You need not complete an RMA to add new hardware. You can purchase the upgrade, have it electronically

delivered, and use the license key to enable increased capacity. The Cisco wireless controller is one example in which you can dynamically increase to 12, 25, 50, 100, or 250 access points for wireless services.

Subscription Licenses

The subscription license provides software enforcement for licensed features for a calendar period.

These node-locked license types are supported in a subscription license:

- Evaluation subscription license
- Extension subscription license
- Paid subscription license

Software Activation Processes

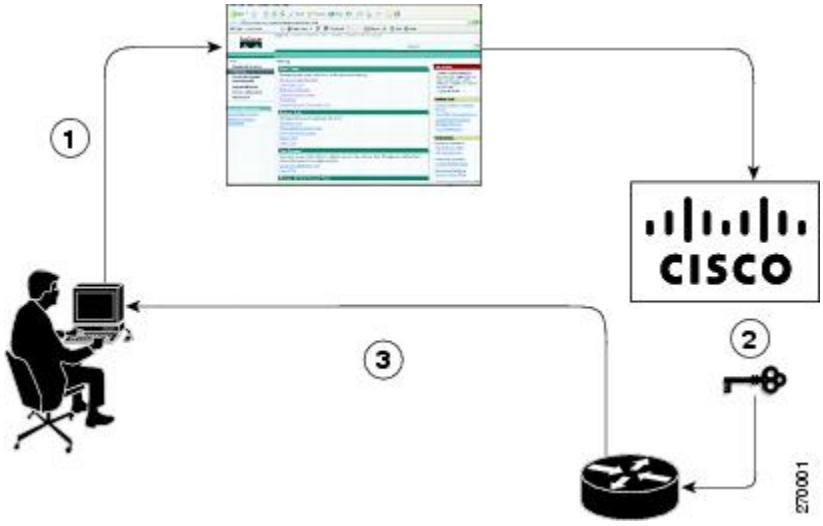
Software activation enables the various feature sets on a device by using license keys.

Note You can apply feature or maintenance upgrades to the software at any time. Maintenance upgrades do not require any interaction with the software activation process.

Manufacturing Preinstalled Licenses

The figure below shows the overall license work flow for manufacturing preinstalled licenses.

Figure 1: Manufacturing Preinstalled License Work Flow



The work flow for manufacturing preinstalled licensing involves these steps:

1. You place an order for a Cisco device through the Cisco sales ordering tool.
2. Manufacturing information technology systems pick up the order information and build the device. Manufacturing also retrieves a license key for the device being assembled by contacting a license server and then installing the code on the device. The device is shipped to you.

3. You install and configure the device, and place the device in production. There is no requirement to activate or register the software prior to use. A new device is ready for deployment upon receipt.

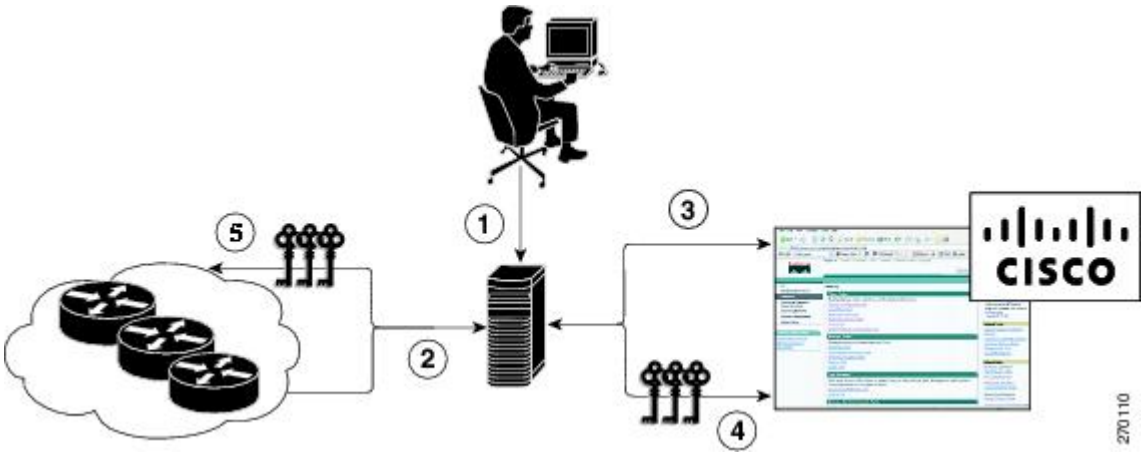
Automated Software Activation by Using Cisco License Manager

Cisco License Manager transparently interacts with the Cisco Product Licensing Registration portal for many devices. With the Cisco License Manager application deployed, you can automate many of the steps for upgrading and registering software licenses. For example, you can enter the PAK and select the device on which to install the license.

For a network-wide deployment, the Cisco License Manager can automate all license-related work flows by securely communicating to the licensing back-end fulfillment systems at Cisco.com and by deploying the obtained licenses to managed devices on a network-wide basis. The application also keeps an inventory of deployed licenses and generates license reports.

The figure below shows the license upgrade work flow for automated upgrades through Cisco License Manager.

Figure 2: License Upgrade Work Flow for Automated Upgrades through Cisco License Manager



The workflow for license upgrades for automated license transfers involves these steps:

1. Cisco License Manager identifies the source and destination devices and stock keeping units (SKUs) to transfer.
2. Cisco License Manager automatically determines the device credentials of the source device.
3. Cisco License Manager automatically communicates with Cisco.com to obtain the permissions ticket, which is used to start the rehost process. It applies the permissions ticket to the source device to obtain the rehost ticket.
4. Cisco License Manager automatically sends the rehost ticket along with the destination device UDI to automatically obtain the license keys from the Cisco Product Licensing Registration portal.
5. Cisco License Manager automatically installs the license key on the destination device.

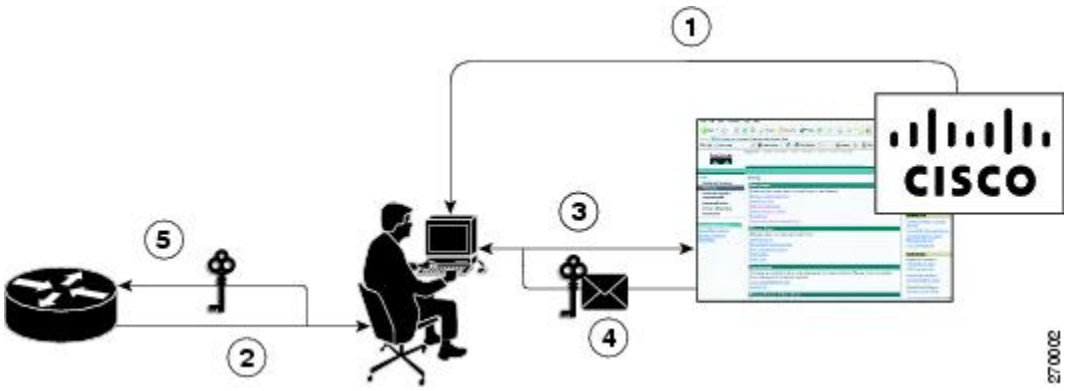
For more information, see the *User Guide for Cisco License Manager* at http://www.cisco.com/en/US/products/ps7138/products_user_guide_list.html.

License Software Activation by Using EXEC Commands

You install the license by using Cisco EXEC commands after receiving your license key electronically through e-mail or through paper and mail delivery.

The figure below shows the license upgrade process work flow for manual license fulfillment.

Figure 3: License Upgrade Work Flow for Manual License Fulfillment



The license upgrade process work flow for manual license fulfillment involves these steps:

1. You purchase the required PAKs for the desired type of license. Some licenses do not require a PAK, but they might need a contract instead.
2. You obtain the UDI from the device.
3. You enter the UDI and PAK into the Cisco Product License Registration portal. If it is a contract license, follow the links to non-PAK-based licenses and submit the UDI of the device.
4. The portal retrieves the SKUs associated with the PAK. You then select the SKU and enter the UDI, a unique and unchangeable identifier of the device where the license should be installed. A license key is then e-mailed to you, and you use that key to install the license.
5. You install the license file returned from the license portal to the device by using the CLI.

License Transfer Between Devices

Cisco supports two scenarios to transfer licenses between devices:

1. The first scenario has both the source and destination devices active and functional. In this scenario, the license is revoked on the source device, and a new permanent license is issued for the destination device.
2. The second is a failure scenario in which one of the devices is unavailable. In this scenario, the license from the failed device is transferred to the RMA or to the replaced device by using the RMA License Transfer process on the Cisco Product License Registration portal.

These scenarios are described in the following sections:

License Transfer Between Two Working Devices

Cisco supports fully automated, customer-initiated, no-questions-asked transfer of licenses. Transferring a license between two working devices is accomplished by using a process known as *rehosting*. The rehosting

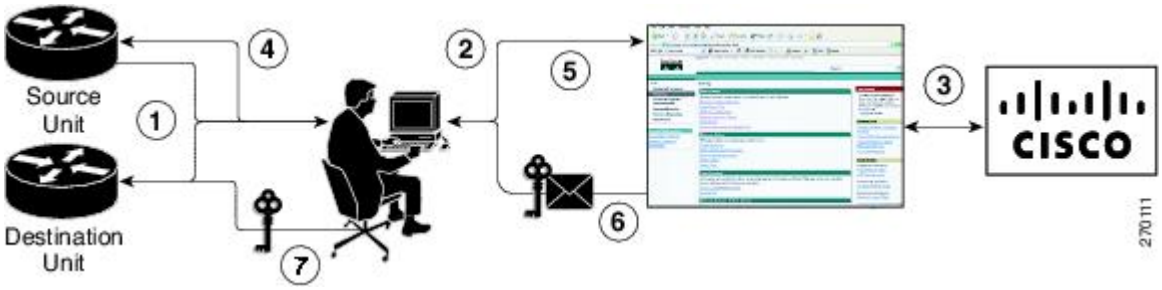
process transfers a license from one UDI to another by revoking the license from the source device and installing it on a new device.

You perform a license transfer (rehosting) by using one of the following:

- Cisco Product License Registration portal
- Cisco IOS License Call Home commands
- Cisco License Manager application

The figure below shows the processes involved for rehosting (transferring) a license.

Figure 4: License Transfer Work Flow



The following summary is for a license transfer process by using the Cisco Product License Registration portal:

1. You obtain the UDI and device credentials from the source and destination devices by using the CLI.
2. You contact the Product License Registration page on Cisco.com, and you enter the source device credentials and the UDI into the license transfer portal tool.
3. The portal displays licenses that can be transferred from the source device.
4. Select the licenses that need to be transferred. A permission ticked is issued. You can use this permission ticket to start the rehost process by using the CLI.
5. You apply the permissions ticket to the source device by using the **license revoke** command. The source device then provides a rehost ticket indicating proof of revocation. A 60-day grace period license is also installed on the device to allow enough time to transfer the licenses to the destination device.
6. You enter the rehost ticket into the license transfer portal tool on Cisco.com along with the destination device UDI.
7. You receive the license key through e-mail.
8. You install the license key on the destination device.

After you execute the **license call-home resend** command, the source device contacts the Cisco Product License Registration portal and obtains a license key for the destination device after revoking it from the source device. The license key stored on the source device can then be installed on the destination device to complete the transfer.

By using Cisco License Manager, you can select the source and destination devices from a GUI wizard for automated processing.

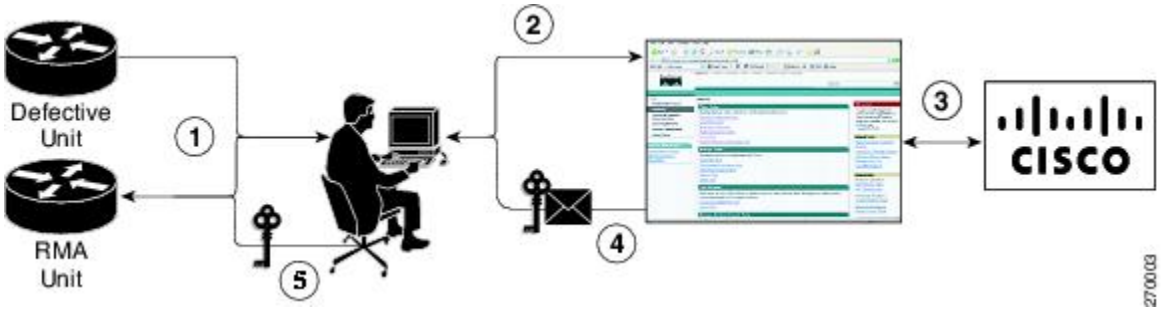
RMA License Transfer Between a Failed and a Working Device

Before you can transfer a software license from a failed device to a new device, you must enter UDI information from both devices into the Cisco Product License Registration portal. The portal issues the RMA replacement licenses (http://www.cisco.com/go/license).

If you need assistance to obtain a license, contact Cisco technical support at: http://www.cisco.com/cisco/web/support/index.html .

The figure below shows the license transfer work flow for RMA replacement licenses.

Figure 5: License Transfer Work Flow for RMA Replacement Licenses



The RMA replacement license process involves these steps:

1. You obtain the UDI of the defective and RMA devices.
2. You enter the UDI into the RMA license portal tool on Cisco.com.
3. The license portal determines licenses associated with the defective device.
4. The license portal issues replacement licenses.
5. You install the new license on the new device.

License Resend Request

If an original license is lost or misplaced, you can enter EXEC commands to request that all licenses for a specific UDI be re-sent. The command also stores the received license lines in a location that you specify.

Cisco License Manager also allows you to perform this function with an easy-to-use GUI.

Note You must have Internet access to place a license resend request.

Additional References

Related Documents

Related Topic	Document Title
Cisco IOS commands	*Master Commands List, All Releases*
Software activation commands	*Software Activation Command Reference*
Software activation configuration	"Configuring the Cisco IOS Software Activation Feature" module

MIBs

MIB	MIBs Link
CISCO-LICENSE-MGMT-MIB	To locate and download MIBs for selected platforms, Cisco software releases, and feature sets, use the Cisco MIB Locator at this URL: http://www.cisco.com/go/mibs

Technical Assistance

Description	Link
The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

Feature Information for Cisco IOS Software Activation

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Glossary

Cisco License Manager —Software tool that provides a GUI to track and manage licenses.

license file —File generated by Cisco licensing tools, which is used to install a license on a product. The license file contains of one or more license lines.

license key —A unique value that enables usage and entitlement for a set of Cisco software features.

license line —Characters arranged in a particular format that hold the license for a single feature within it. A line has all the necessary fields and attributes that make it a valid, tamperproof, and complete license. A single line can exist independently.

license manager —An application used to track and manage licenses for customers.

license server —Software tool at the hardware manufacturing site that generates product licenses.

license storage —File that stores a collection of license lines. A license file exists on a licensed device. This file exists in permanent storage.

node locked —The explicit binding of a unique license to a unique hardware platform. Node-locked licenses are locked to one of the UDIs in the system. Non-node locked licenses are not locked to any UDI.

PAK —Product authorization key, which is provided to you when you order and purchase the right to use a feature set for a particular platform. The PAK serves as a receipt and is used as part of the process to obtain a license.

permission ticket file —File generated by Cisco licensing that is used to get a rehost ticket during a manual rehosting process. The permission ticket file contains one or more adding and removing license operations for rehosting.

perpetual license —License where use rights are permanent. These licenses can be used as long as required.

persistence storage —File that lives for the lifetime of the device that has a license and survives image changes. This file should exist in a write once storage area. The persistence file holds the license history for that device, along with certain information about license removals, expiries, rehost, and so on.

rehost —Process where a valid license is transferred from one platform to another. This implies the license is no longer valid on the original platform.

removable storage —Portable device such as compact flash or USB used to store and access data.

RMA —Return Merchandise Authorization, which is the process whereby you can return a defective product.

signature server —Generates the licenses for products and is found at Cisco manufacturing sites. Also called a permission file generator.

SKU —Stock keeping unit. A unique, individual part number used to track and monitor inventory. A Cisco software licensing SKU maps to one or more software features.

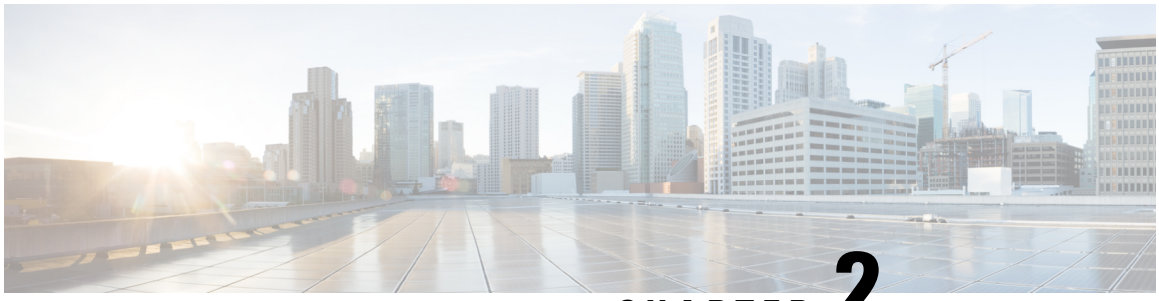
stack —A switch stack is a set of up to nine Catalyst 3750 switches connected through their StackWise ports.

subscription-based licenses —Time-based license that requires the subscriber to periodically renew or the license will expire after an agreed-upon time.

SWIFT —Software Infrastructure and Fulfillment Technology. The Cisco licensing infrastructure that is accessed through HTTPS over the Internet. The Cisco License Manager application interacts with the Cisco licensing infrastructure on behalf of many devices. You can interact directly with the Cisco licensing infrastructure service by using Cisco software commands.

UDI —Unique device identifier, which is a Cisco-wide schema to identify products. The UDI contains a product ID, version ID, and a serial number. The UDI does not change during deployment in the field. Note that when the term UDI is used in the context of licensing, it typically refers to only the product ID and serial number.

universal image —A single software image containing all Cisco functionality levels. These levels can be enabled by installing the appropriate license.



CHAPTER 2

Configuring the Cisco IOS Software Activation Feature

This document describes the tasks used to activate software by using the Cisco IOS Software Activation feature, license keys, and Cisco EXEC commands. When you activate software from a Cisco device, you can license software without the need for additional application software.

Restrictions for Cisco IOS Software Activation

Not all Cisco hardware platforms can use the Cisco IOS Software Activation feature. Use the Cisco Feature Navigator at http://www.cisco.com/go/cfn and the table in the Feature Information for Cisco IOS Software Activation section to determine which platforms and images support the Cisco IOS Software Activation feature.

For the stackable switches that support the Cisco IOS Software Activation feature, one switch must act as primary and the others as secondaries. The primary switch performs management and administrative operations on itself as well as on the secondary switches.

Information About the Cisco IOS Software Activation

License Activation MIB Support

The Cisco IOS Software Activation feature introduces the CISCO-LICENSE-MGMT-MIB to allow SNMP-based license management and administrative tasks. A description of this MIB can be found by using tools at this URL: http://tools.cisco.com/ITDIT/MIBS/servlet/index

Use the MIB Locator tool and the Search for MIB selection box to select CISCO-LICENSE-MGMT-MIB .

The unique device identifier (UDI) is also associated with the Entity Name and Product Description data elements for the management information base (MIB) system. The MIB nomenclature for Entity Name is entPhysicalName and for Product Description is entPhysicalDescr.

How to Activate Software from a Cisco IOS Device

Installing and Upgrading Licenses by Using Software Activation Commands

Before you begin

Read and understand the license activation process concepts in the in the "Cisco IOS Software Activation Conceptual Overview" module.

To install or upgrade a license by using the **license install** command, you must have already received the license file from the Cisco Product License Registration portal at http://www.cisco.com/go/license (or you already backed up the license by using the **license save** command).

If you use Microsoft Entourage and receive the license file from Cisco in an e-mail attachment, the license file will contain UTF-8 marking. These extra bytes in the license file cause it to be unusable during license installation. To work around this issue, you can use a text editor to remove the extra characters and then install the license file. For more information about UTF-8 encoding, go to this URL: http://www.w3.org/International/questions/qa-utf8-bom.

Note The installation process does not install duplicate licenses. This message appears when duplicate licenses are detected:

```
Installing...Feature:xxx-xxx-xxx...Skipped:Duplicate
```

Note A standby device reboots twice when there is a mismatch of licenses.

Procedure

Step 1 Obtain the PAK.

The PAK is provided to you when you order or purchase the right to use a feature set for a particular platform.

- The PAK serves as a receipt and is used as part of the process to obtain a license.

Step 2 **enable**

Example:

```
Device> enable
```

Enables privileged EXEC mode.

- Enter your password if prompted.

Step 3 **show license udi**

Example:

```
Device# show license udi
```

Displays all the UDI values that can be licensed in a system.

- You need the UDI of the device as part of the process to obtain a license.

Step 4 Convert the PAK to a license by entering the PAK and the UDI into the Cisco Product License Registration portal: *http://www.cisco.com/go/license*

After entering the appropriate information, you will receive an e-mail containing the license information that you can use to install the license:

- Copy the license file received from the Cisco Product License Registration portal to the appropriate file system on the device.

or

- Click the **Install** button on the web page.

Step 5 **license install** *stored-location-url*

Example:

```
Device# license install tftp://infra-sun/<user>/license/5400/38a.lic
```

Installs the license.

- Accept the end-user license agreement if prompted.

Step 6 **configure terminal**

Example:

```
Device# configure terminal
```

Enters the global configuration mode.

Step 7 **license boot level** {**metroaggrservices**}

Example:

```
Device(config)# license boot level metroaggrservices
```

Activates the metroaggrservices license on the device upon the next reload.

Step 8 **write memory**

Example:

```
Device# write memory
```

Saves the running configuration to NVRAM.

Step 9 **reload**

Example:

```
Device# reload
```

(Optional) Restarts the device to enable the new feature set.

Note A reload is not required when moving from an evaluation license to a permanent license of the same license level.

Managing Licenses by Using Software Activation Commands

Adding a Comment to a License File

Procedure

Step 1 **enable**

Example:

```
Device> enable
```

Enables privileged EXEC mode.

- Enter your password if prompted.

Step 2 **license comment add** *feature-name comment* [**switch** *switch-num*]

Example:

```
Device# license comment add gsmamrnb-codec-pack "Use this permanent license"
```

Adds or deletes information about a specific license.

- (Only on Cisco Catalyst 3750-E switch platforms) If a switch number is specified, this command is executed on the specified switch.
- When the license is present in license storage and multiple license lines are stored, you are prompted to select a license line. To select the license, type the number at the Select Index to Add Comment prompt.

Step 3 **show license file** [**switch** *switch-num*]

Example:

```
Device# show license file
```

Displays comments added to a Cisco software license file.

- If the device is a switch, this command obtains statistics from the specified switch.

Saving All Licenses to a Specified Storage Area

Procedure

Step 1 **enable**

Example:

```
Device> enable
```

Enables privileged EXEC mode.

- Enter your password if prompted.

Step 2 **license save** *file-sys://lic-location* [**switch** *switch-num*]

Example:

```
Device# license save flash:all_licenses.lic
```

Saves copies of all licenses in a device and stores them in a format required by the command in the specified storage location. Saved licenses are restored by using the **license install** command.

- *lic-location* : The license storage location can be a directory or a URL that points to a file system. Use the **?** command to see the storage locations supported by your device.
- (Optional) **switch** *switch-num*: sends this request to a specific switch in a switch stack.

Saving License Credential Information Associated with a Device to a Specified Storage Area

Before you begin

Before you can start the rehost or resend process, a device credential is required. Cisco software licensing requires that the license files generated by the Cisco back-end licensing system for its devices be secure and tamper-resistant. Security features are in place to authenticate a license by means of encrypted license credentials. If it becomes necessary to transfer a license from one device to another (which is called rehosting), a permission ticket is required. To generate the permission ticket, the Cisco back-end licensing system requires the device credential information.

Procedure

Step 1 **enable**

Example:

```
Device> enable
```

Enables privileged EXEC mode.

- Enter your password if prompted.

Step 2 **license save credential** *file-sys://lic-location* [**switch** *switch-num*]

Example:

```
Device# license save credential flash:cred.lic
```

Saves credential information associated with a device to a specified URL.

- *lic-location* : The license storage location can be a directory or a URL that points to a file system. Use the **?** command to see the storage locations supported by your device.
- (Optional)**switch** *switch-num*: sends this request to a specific switch in a switch stack.

Displaying All Licenses in a Device

Procedure

Step 1 **enable**

Example:

```
Device> enable
```

Enables privileged EXEC mode.

- Enter your password if prompted.

Step 2 **show license all**

Example:

```
Device# show license all
```

Displays information about all licenses in the device.

Displaying Detailed Information about Licensed Features

Procedure

Step 1 **enable**

Example:

```
Device> enable
```

Enables privileged EXEC mode.

- Enter your password if prompted.

Step 2 **show license detail** [*feature-name*]

Example:

```
Device# show license detail
```

Displays detailed information about all licensed features or the specified licensed feature.

Displaying Licensed Feature Sets Available in an Image

Procedure

Step 1 **enable**

Example:

```
Device> enable
```

Enables privileged EXEC mode.

- Enter your password if prompted.

Step 2 **show license feature**

Example:

```
Device# show license feature
```

Displays a list of licensed features available in an image.

Removing Licenses by Using Software Activation Commands

Removing a License Entry from a Permanent License File

Note

- The **license clear** command lists all licenses, but some licenses, such as built-in licenses, cannot be cleared.
- Only licenses that have been added by using the **license install** command are removed. Evaluation licenses are not removed.
- If a license is not in use, the **license clear** command displays all the licenses related to this feature and prompts you to make a selection. Different prompts are displayed, depending upon whether single or multiple licenses are available in the device. The selected licenses are removed from the device.
- If a license is in use, the **license clear** command might fail. However, depending on the application policy using the license, some licenses might be cleared.
- When a switch is specified, the **license clear** command is issued on that switch. When a mixed stack platform is used, the primary switch must have installed the minimum licensing features required to support the licensing operations of the secondary switches. When this command is issued from a primary switch, the switch number is required to clear a license on that switch.

Procedure

Step 1 **enable**

Example:

```
Device> enable
```

Enables privileged EXEC mode.

- Enter your password if prompted.

Step 2 **license clear** *feature-name* [**switch** *switch-num*]

Example:

```
Device# license clear gsmamrnb-codec-pack
```

Removes a license entry from license storage once it has been verified that the license line is valid and was explicitly installed.

- The optional **switch** *switch-num* keyword and argument send this request to a specific switch in a switch stack.
- You must select the index number of the license to clear. Enter the number at the Select Index to Clear prompt.

Step 3 **show license detail**

Example:

```
Device# show license detail
```

Verifies that the license has been cleared.

Rehosting (Revoking and Transferring) a License

Before you begin

Read and understand the license transfer between devices concepts in the "Cisco IOS Software Activation Conceptual Overview" module.

Cisco software licensing requires that the license files generated by the Cisco back-end licensing system for its devices be secure and tamper-resistant. Security features are in place to authenticate a license by means of encrypted license credentials. Rehosting requires a permission ticket. To generate the permission ticket, the Cisco back-end licensing system requires the device credential information. Use the **license save credential** command to save device credential information to a specified file system.

Procedure

Step 1 **enable**

Example:

```
Device> enable
```

Enables privileged EXEC mode.

- Enter your password if prompted.

Step 2 **license revoke revoke** *permission-file-url output-rehost-ticket-url*

Example:

```
Device# license revoke tftp://infra-sun/ramanp/pt.lic flash:rt.lic
```

Revokes and transfers a license by using the permission ticket provided by the Cisco back-end licensing system. It removes the original, permanent license from the device and provides a license for the new device.

- An end-user license agreement is displayed for all grace-period licenses in the permission ticket.
- You must read and accept the agreement. If you do not accept the agreement, the rehost operation stops.

Troubleshooting License Operations by Using Software Activation Commands

Procedure

Step 1 **enable**

Example:

```
Device> enable
```

Enables privileged EXEC mode.

- Enter your password if prompted.

Step 2 **show license file** [**switch** *switch-num*]

Example:

```
Device# show license file
```

Displays license entries and license details stored in a Cisco software license file. If the device is a switch, this command obtains statistics from the specified switch.

Step 3 **show license statistics**

Example:

```
Device# show license statistics
```

Displays license statistics information. The display includes relevant statistics for error counts and is useful for troubleshooting licensing-related problems.

Step 4 **show license status** [**switch** *switch-num*]

Example:

```
Device# show license status
```

Displays the status of licenses in the system. If the device is a switch, this command obtains status from the specified switch.

Step 5 **debug license** {**all** | **core** | **errors** | **events**}

Example:

```
Device# debug license errors
```

Enables controlled software license debugging activity on a device.

Step 6 **no debug license** {**all** | **core** | **errors** | **events**}

Example:

```
Device# no debug license errors
```

Disables license debugging activity on a device.

Configuring Examples for Software Licensing

Example: Installing and Upgrading Licenses

The following example shows how to use the **license install** command to install a license saved in TFTP on the device. The display is truncated for easier readability:

```
Device# license install tftp://infra-sun/<user>/license/5400/38a.lic
Installing licenses from "tftp://infra-sun/<user>/license/5400/38a.lic"
Loading <user>/license/5400/38a.lic from 172.19.211.47 (via GigabitEthernet0/0): !
[OK - 1192 bytes]
Extension licenses are being installed in the device with UDI "AS54XM-AC-RPS:JAE0948QXKD"
for the following features:
 Feature Name: gsmamrnb-codec-pack
PLEASE  READ THE  FOLLOWING TERMS  CAREFULLY. . .
ACCEPT? [yes/no]: yes
Issue 'license feature gsmamrnb-codec-pack' command to enable the license
Installing...Feature:gsmamrnb-codec-pack...Successful:Supported
```

Example: Adding a Comment to a License File

The following example shows how to use the **license comment** command to add or delete information about a specific license. The command checks that a license associated with the specified feature is present in license storage. If a switch number is specified, this command is executed on the specified switch.

As the example shows, when the license is present and multiple license lines are stored, you are prompted to select a license line. This action helps to distinguish licenses. Type the number at the Select Index to Add Comment prompt to select the license.

```
Device# license comment add gsmamrnb-codec-pack "Use this permanent license"
Feature: gsmamrnb-codec-pack
    1  License Type: Evaluation
 License State: Inactive
     Evaluation total period: 20 hours 0  minute
     Evaluation period left: 20 hours 0  minute
 License Addition: Additive
 Comment:
 Store Index: 0
 Store Name: Primary License Storage
    2  License Type: Permanent
 License State: Active, Not in Use
 License Addition: Exclusive
 Comment:
 Store Index: 1
 Store Name: Primary License Storage
Select Index to Add Comment [1-2]: 2
% Success: Adding comment "Use this permanent license" succeeded
Device# show license file
License Store: Primary License Storage
  Store Index: 0
```

```
    License: 11 gsmamrnb-codec-pack 1.0 LONG TRIAL DISABLED 20 DISABLED STANDA
             LONE ADD INFINITE_KEYS INFINITE_KEYS NEVER NEVER NiL SLM_CODE CL_
             ND_LCK NiL *1YCHJRBMWKZAED2400 NiL NiL NiL 5_MINS <UDI><PID>AS54X
             M-AC-RPS</PID><SN>JAE0948QXKD</SN></UDI> ,Jx8qaVf:iXWaH9PsXjkVnmz
             7gWh:cxdf9nUkzY6o8fRuQbu,7wTUz237Cz6g9VjfrCk,0a2Pdo,Ow6LWxcCRFL:x
             cTxwnffn9i,4,aUWv8rL50opDUdAsFnxLsvoFRkcAfm$<WLC>AQEBIQAB//9NA+1m
             Uwfs/lD0dmdF9kyX8wDrua1TZhnnAy6Mxs1dTboIcRaahKxJJdj4Oi1w3wscqvPiA
             mWSaEmUT56rstk6gvmj+EQKRfD9A0ime1czrdKxfILT0LaXT416nwmfp92Tya6vIQ
             4FnlBdqJ1sMzXeSq8PmVcTU9A4o9hil9vKur8N9F885D9GVF0bJHciT5M=</WLC>
    Comment: Use this permanent license.
       Hash: E1WjIQo4qsl9g8cpnpoogP/0DeY=
Device#
```

Example: Saving All Licenses to a Specified Storage Area

The following example shows how to use the **license save** command to save copies of all licenses to the flash file system:

```
Device# license save flash:all_licenses.lic
license lines saved ..... to flash:all_licenses.lic
```

Example: Removing Licenses

The following examples shows how to use the **license clear** command to remove a license entry from license storage once it has been verified that the license line is valid and was explicitly installed.

You must select the index number of the license to clear. Type the number at the Select Index to Clear prompt as shown in this example.

```
Device# license clear standard
Feature: standard
    1  License Type: Evaluation
 License State: Inactive
     Evaluation total period: 20 hours 0  minute
     Evaluation period left: 20 hours 0  minute
 License Addition: Additive
 Comment:
 Store Index: 0
 Store Name: Primary License Storage
    2  License Type: Permanent
 License State: Active, Not in Use
 License Addition: Exclusive
 Comment:
 Store Index: 1
 Store Name: Primary License Storage
Select Index to Clear [1-2]: 1
Are you sure you want to clear? (yes/[no]): yes
Device# show license detail
Feature: premium               Period left:  1 hour   0 minute
Index:  1       Feature: premium                          Version: 1.0
        License Type: Evaluation
        License State: Active, Not in Use, EULA not accepted
            Evaluation total period:  1 hour   0 minute
            Evaluation period left:  1 hour   0 minute
        License Count: Non-Counted
        License Priority: None
        Store Index: 0
        Store Name: Evaluation License Storage
```

Example: Rehosting (Revoking and Transferring) a License

The following example shows how to use the **license revoke** command to revoke a license stored in TFTP and how to transfer it to a license stored in flash memory. You might need to read and accept the terms and conditions of the license type being transferred. The following example is truncated for readability:

```
Device# license revoke tftp://infra-sun/ramanp/pt.lic flash:rt.lic
Following Permanent license(s) will be revoked from this device
 Feature Name: gsmamrnb-codec-pack
Following Extension license(s) will be installed in this device
 Feature Name: gsmamrnb-codec-pack
PLEASE  READ THE  FOLLOWING TERMS  CAREFULLY. . .
ACCEPT? [yes/no]: yes
Issue 'license feature gsmamrnb-codec-pack' command to enable the license
Rehost ticket saved ..... to flash:rt.lic
```

Example: Generic Command Enhanced with Licensing Information

The generic commands described in the following sections are enhanced with licensing information:

reload

The **reload** command shows the expired licenses, followed by expiring licenses sorted by the period left and end date:

```
Device# reload
The following license(s) are expiring or have expired.
Features with expired licenses may not work after Reload.
Feature: uc,Status: expiring, Period Left: 7  wks 5  days
Proceed with reload? [confirm]
```

Note During the reload of Cisco ASR-920-24SZ-IM, ASR-920-24SZ-M, ASR-920-24TZ-M Series Router, there could be a IDPROM Access failure for Fan. To recover from this error, the router needs to be reloaded again.

show running-config

The **show running-config** command displays the unique device identifier (UDI) of a device. If the configuration file was copied from a different device, a warning is displayed upon reload. A UDI mismatch warning is also displayed during reload if the startup-config file has a different UDI than the platform UDI.

```
Device# show running-config
Building configuration...

Current configuration : 1764 bytes
!
! Last configuration change at 15:20:26 IST Thu Aug 1 2019
! NVRAM config last updated at 15:36:45 IST Mon Jul 22 2019
!
version 16.9
no service pad
service timestamps debug datetime msec
service timestamps log datetime msec
no platform punt-keepalive disable-kernel-core
```

```
platform bfd-debug-trace 1
platform xconnect load-balance-hash-algo mac-ip-instanceid
platform tcam-parity-error enable
platform tcam-threshold alarm-frequency 1
platform shell
!
hostname ASR920
!
boot-start-marker
boot-end-marker
!
!
vrf definition Mgmt-intf
 !
 address-family ipv4
 exit-address-family
 !
 address-family ipv6
 exit-address-family
!
!
no aaa new-model
clock timezone IST 5 30
!
!
!
!
!
!
!
!
!
!
!
!
!
!
!
!
!
multilink bundle-name authenticated
!
!
!
license udi pid ASR-920-4SZ-D sn CAT2211U7WD
no license smart enable
file prompt quiet
!
!
spanning-tree extend system-id
sdm prefer default
diagnostic bootup level minimal
!
!
!
redundancy
```

show tech-support

The **show tech-support** command displays the output of the **show license udi**, **show license status**, **show license feature**, **show license file**, **show license detail**, and the **show license statistics** commands.

```
Device# show tech-support
```

```
------------------ show license udi ------------------

SlotID   PID      SN        UDI
-------------------------------------------------------------------------------
*0    ASR-920-4SZ-D         CAT2211U7WD     ASR-920-4SZ-D:CAT2211U7WD


------------------ show license udi standby ------------------



------------------ show license status ------------------

  License Type Supported
 permanent               Non-expiring node locked license
 extension               Expiring node locked license
 evaluation              Expiring non node locked license
 evalRightToUse          Right to use evaluation non node locked license
 rightToUse              Right to use non node locked license

  License Operation Supported
 install    Install license
 clear      Clear license
 annotate   Comment license
 save       Save license
 revoke     Revoke license

  Device status
 Device Credential type: IMAGE
 Device Credential Verification: PASS
 Rehost Type: DC_OR_IC


------------------ show license status standby ------------------



------------------ show license feature ------------------


Feature name             Enforcement  Evaluation  Subscription   Enabled  RightToUse
advancedmetroipaccess    yes          yes         no             yes      no
metroipaccess            yes          yes         no             no       no
metroaccess              no           yes         no             no       no
1588                     yes          yes         no             no       no
10GEupgradelicense       yes          no          no             no       no
2portGE-4ports10GE       yes          no          no             yes      no


------------------ show license feature standby ------------------



------------------ show license file ------------------

License Store: Primary License Storage
  Store Index: 0
    License: 11 2portGE-4ports10GE 1.0 LONG NORMAL STANDALONE EXCL INFINITE_KE
             YS INFINITE_KEYS NEVER NEVER NiL SLM_CODE CL_ND_LCK NiL *17FU47V3
             CUF3HEZ400 NiL NiL NiL 5_MINS <UDI><PID>ASR-920-4SZ-D</PID><SN>CA
             T2211U7WD</SN></UDI> VQogQJa91F3yuYf3g:aWf9qOXg0bRnKs25ZhhWXQ6vfa
             wtSiGCTcJ6UX0Wsc5SdJV:aGsY56VDTPALe9s5h7maVC7WPHrQG9hDQBB1NUiiJTL
             pyzm4CCG3xA8H6w8Ujj7GVA$<WLC>AQEBISAB///ePuFEFLa1WYTTBsUwysYIlwUT
             u4NOSAmnH54EqMR+ddrdmYvQIWIKvh/Ta02F6X3ePuFEFLa1WYTTBsUwysYIlwUTu
```

```
            4NOSAnIcMf6vWuUuI1lxR4RgKX59uDYrlsEJot7Qno/vtYl8B0vN08xyEcTl52bmL
            3dfDsAumQ+9NeEXWOHMixGAsjTr+jONlkzusU=</WLC>
    Comment:
       Hash: M6TSnLClnXd4krgImjtXxTWRmcQ=
  Store Index: 1
    License: 11 advancedmetroipaccess 1.0 LONG NORMAL STANDALONE EXCL INFINITE
            _KEYS INFINITE_KEYS NEVER NEVER NiL SLM_CODE CL_ND_LCK NiL *17FU4
            7V3CUF3HEZ400 NiL NiL NiL 5_MINS <UDI><PID>ASR-920-4SZ-D</PID><SN
            >CAT2211U7WD</SN></UDI> BfkkXOhIiIUBcTUrSQLif:aZz0Kyvtju4rD7lMmvK
            mLytEIMPkuNEY3dSawv,OHtVUP3zh,qGeYcsPmpi3tGL2V8kxRbVvJXV,wrXJ3O6o
            us3,P7EQtt,Ho,9wCO2BwDbpfz$<WLC>AQEBISAB///ePuFEFLa1WYTTBsUwysYIl
            wUTu4NOSAkSLhrKyrLBd3+nroEfw8/8Av4nEYBFF/nePuFEFLa1WYTTBsUwysYIlw
            UTu4NOSAnIcMf6vWuUuI1lxR4RgKX59uDYrlsEJot7Qno/vtYl8B0vN08xyEcTl52
            bmL3dfDsAumQ+9NeEXWOHMixGAsjTr+jONlkzusU=</WLC>
    Comment:
       Hash: cuBh2U4PcOLuo1aYMZLYQ5MeBMw=
License Store: Built-In License Storage
  Store Index: 0
    License: 11 advancedmetroipaccess 1.0 LONG TRIAL DISABLED 1440 DISABLED ST
            ANDALONE ADD INFINITE_KEYS INFINITE_KEYS NEVER NEVER NiL SLM_CODE
             DEMO NiL NiL Ni NiL NiL 5_MINS NiL q7AiZERv7M3asfmTNiBq3AIfzXaMn
            771WFbW0QLSFTf8XRd,uBSGsOh5VadJXolSVH$<WLC>AQEBIf8B//+GAlABZF9TUb
            kV9DfLeeIHyU2S2mDnooo9JUxWfflSYbGg+v4MuWI3L+D6KJGVjyyRqwInXo3s+ns
            LU7rOtdOxoIxYZAo3LYmUJ+MFzsqlhKoJVlPyEvQ8H21MNUjVbhoN0gyIWsyiJaM8
            AQIkVBQFzhr10GYolVzdzfJfEPQIx6tZ++/Vtc/q3SF/5Ko8XCY=</WLC>
    Comment:
       Hash: 5J2d3ZfjOzgP5xlaiJQSlaiGh5s=
  Store Index: 1
    License: 11 metroipaccess 1.0 LONG TRIAL DISABLED 1440 DISABLED STANDALONE
             ADD INFINITE_KEYS INFINITE_KEYS NEVER NEVER NiL SLM_CODE DEMO Ni
            L NiL Ni NiL NiL 5_MINS NiL IAWD3vd7KQItmcShIC,OfF3GzO4u8QWwFBsvd
            Sb:hJ37cc9g9tgFm5xuhx8xlkEYVn$<WLC>AQEBIf8B//9ryCDjMpbNbltG4CTDc9
            WNRCMQWn9rrxz5QrHYihBHk4fxDPzR1Gd7iVy5zb+iA/+RqwInXo3s+nsLU7rOtdO
            xoIxYZAo3LYmUJ+MFzsqlhKoJVlPyEvQ8H21MNUjVbhoN0gyIWsyiJaM8AQIkVBQF
            zhr10GYolVzdzfJfEPQIx6tZ++/Vtc/q3SF/5Ko8XCY=</WLC>
    Comment:
       Hash: CLI5/I7/N6UcLXt3j/1AejmDR6k=
  Store Index: 2
    License: 11 metroaccess 1.0 LONG TRIAL DISABLED 1440 DISABLED STANDALONE A
            DD INFINITE_KEYS INFINITE_KEYS NEVER NEVER NiL SLM_CODE DEMO NiL
            NiL Ni NiL NiL 5_MINS NiL Tc5IK2dLk8:24bhasctP3uWtPe9GRDccbeQIO7f
            aqBVjFFz3A9YK6ZNpXbSE4lknLI$<WLC>AQEBIf8B//+w2jF8oVWArFb7oStekvG+
            x8aEAlunD5s0KOQ9r9p1tUnWCR7/QRzS8kYzXtPMYKSRqwInXo3s+nsLU7rOtdOxo
            IxYZAo3LYmUJ+MFzsqlhKoJVlPyEvQ8H21MNUjVbhoN0gyIWsyiJaM8AQIkVBQFzh
            r10GYolVzdzfJfEPQIx6tZ++/Vtc/q3SF/5Ko8XCY=</WLC>
    Comment:
       Hash: kKMjObqq6eiTdHduukDWLPZub/k=


------------------ show license file standby ------------------



------------------ show license detail ------------------

Index: 1  Feature: 2portGE-4ports10GE               Version: 1.0
 License Type: Permanent
 License State: Active, In Use
 License Count: Non-Counted
 License Priority: Medium
 Store Index: 0
 Store Name: Primary License Storage
Index: 2  Feature: advancedmetroipaccess            Version: 1.0
 License Type: Permanent
```

```
 License State: Active, In Use
 License Count: Non-Counted
 License Priority: Medium
 Store Index: 1
 Store Name: Primary License Storage
Index: 3  Feature: advancedmetroipaccess             Version: 1.0
 License Type: Evaluation
 License State: Inactive
     Evaluation total period: 8  weeks 4  days
     Evaluation period left: 0  minute  0  second
     Period used: 8  weeks 4  days
 License Count: Non-Counted
 License Priority: Low
 Store Index: 0
 Store Name: Built-In License Storage
Index: 4  Feature: metroaccess                       Version: 1.0
 License Type: Evaluation
 License State: Active, Not in Use, EULA not accepted
     Evaluation total period: 8  weeks 4  days
     Evaluation period left: 8  weeks 4  days
     Period used: 0  minute  0  second
 License Count: Non-Counted
 License Priority: None
 Store Index: 2
 Store Name: Built-In License Storage
Index: 5  Feature: metroipaccess                     Version: 1.0
 License Type: Evaluation
 License State: Active, Not in Use, EULA not accepted
     Evaluation total period: 8  weeks 4  days
     Evaluation period left: 8  weeks 4  days
     Period used: 0  minute  0  second
 License Count: Non-Counted
 License Priority: None
 Store Index: 1
 Store Name: Built-In License Storage


------------------ show license detail standby ------------------

% Error: No license for standby found - License feature not found

------------------ show license statistics ------------------

  Administrative statistics
 Install success count:   0
 Install failure count:   0
 Install duplicate count: 0
 Comment add count:       0
 Comment delete count:    0
 Clear count:             0
 Save count:              0
 Save cred count:         0

  Client statistics
 Request success count:   2
 Request failure count:   0
 Release count:           0
 Global Notify count:     1



------------------ show license statistics standby ------------------
```

show license udi

The **show license udi** command displays the license UDI information:

```
Device> show license udi
SlotID   PID                   SN                      UDI
-------------------------------------------------------------------------------
0        ASR-920-4SZ-D         CAT2211U7WD     ASR-920-4SZ-D:CAT2211U7WD
```

Additional References

Related Documents

Related Topic	Document Title
Cisco License Manager application	*User Guide for Cisco License Manager*
Software activation conceptual overview	"Cisco IOS Software Activation Conceptual Overview" module
Software activation commands	*Software Activation Command Reference*
Cisco IOS commands	*Master Commands List, All Releases*
Integrated Services Routers licensing	*Software Activation on Cisco Integrated Services Routers*

MIBs

MIB	MIBs Link
CISCO-LICENSE-MGMT-MIB	To locate and download MIBs for selected platforms, Cisco software releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

Technical Assistance

Description	Link
The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

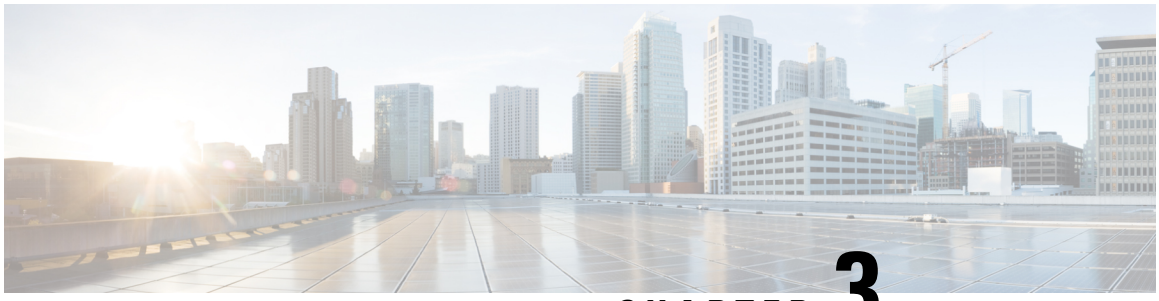
Feature Information for Cisco IOS Software Activation

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Table 1: Feature Information for Cisco IOS Software Activation

Feature Name	Releases	Feature Information
Cisco IOS Software Activation	Cisco IOS XE Release 3.13.0S	This feature was introduced on the Cisco ASR 920 Series Aggregation Services Router (ASR-920-12CZ-A, ASR-920-12CZ-D, ASR-920-4SZ-A, ASR-920-4SZ-D).



CHAPTER 3

Configuring Call Home

The Call Home feature provides e-mail-based and web-based notification of critical system events. A versatile range of message formats are available for optimal compatibility with pager services, standard e-mail, or XML-based automated parsing applications. Common uses of this feature may include direct paging of a network support engineer, e-mail notification to a Network Operations Center, XML delivery to a support website, and utilization of Cisco Smart Call Home services for direct case generation with the Cisco Systems Technical Assistance Center (TAC).

Finding Feature Information in This Module

Your Cisco IOS software release may not support all of the features documented in this module. To reach links to specific feature documentation in this module and to see a list of the releases in which each feature is supported, see *Feature Information for Call Home*.

Finding Support Information for Platforms and Cisco IOS and Catalyst OS Software Images

Use Cisco Feature Navigator to find information about platform support and Cisco IOS and Catalyst OS software image support. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn. An account on Cisco.com is not required.

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see Bug Search Tool and the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the feature information table.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to https://cfnng.cisco.com/. An account on Cisco.com is not required.

Prerequisites for Call Home

How you configure Call Home depends on how you intend to use the feature. Consider the following requirements before you configure Call Home:

- Obtain e-mail, phone, and street address information for the Call Home contact to be configured so that the receiver can determine the origin of messages received.
- Identify the name or IPv4 address of a primary Simple Mail Transfer Protocol (SMTP) server and any backup servers, if using e-mail message delivery.
- Configure a trustpoint certificate authority (CA) if using secure HTTP (HTTPS) message delivery. For example, this procedure is required if you are using the HTTPS server for Cisco Smart Call Home Service in the CiscoTAC-1 profile for Call Home.
- Verify IP connectivity from the router to the e-mail server(s) or the destination HTTP server.
- If Cisco Smart Call Home is used, verify an active service contract exists for the device being configured.

Restrictions for Call Home

The Call Home feature does not work when the router is connected to an On-Prem server with the following default configuration:

```
crypto pki trustpoint SLA-TrustPoint
 enrollment terminal
 revocation-check crl
!
```

Use the following configuration as a workaround for the above instance:

```
crypto pki trustpoint SLA-TrustPoint
 enrollment terminal
 revocation-check none
!
```

Information About Call Home

Call Home provides e-mail-based and web-based notification of critical system events. A versatile range of message formats are available for optimal compatibility with pager services, standard e-mail, or XML-based automated parsing applications. Common uses of this feature may include direct paging of a network support engineer, e-mail notification to a Network Operations Center, XML delivery to a support website, and utilization of Cisco Smart Call Home services for direct case generation with the Cisco Systems Technical Assistance Center (TAC).

The Call Home feature can deliver alert messages containing information on configuration, environmental conditions, inventory, syslog, and crash events.

The Call Home feature can deliver alerts to multiple recipients, referred to as *Call Home destination profiles* , each with configurable message formats and content categories. A predefined destination profile (CiscoTAC-1) is provided, and you also can define your own destination profiles. The CiscoTAC-1 profile is used to send alerts to the backend server of the Smart Call Home service, which can be used to create service requests to Cisco TAC, the service will depend on the Smart Call Home service support in place for your device and the severity of the alert.

Flexible message delivery and format options make it easy to integrate specific support requirements.

Benefits of Using Call Home

The Call Home feature offers the following benefits:

- Multiple message-format options:
  - Short Text—Suitable for pagers or printed reports.
  - Plain Text—Full formatted message information suitable for human reading.
  - XML—Matching readable format using Extensible Markup Language (XML) and Adaptive Markup Language (AML) document type definitions (DTDs). The XML format enables communication with the Cisco Smart Call Home server.
- Multiple concurrent message destinations.
- Multiple message categories, including configuration, environmental conditions, inventory, syslog, and crash events
- Filtering of messages by severity and pattern matching.
- Scheduling of periodic message sending.

Obtaining Smart Call Home Services

If you have a service contract directly with Cisco, you can register for the Smart Call Home service. Smart Call Home analyzes Smart Call Home messages and provides background information and recommendations. For critical issues, Automatic Service Requests are generated with the Cisco TAC.

Smart Call Home offers the following features:

- Continuous device health monitoring and real-time alerts.
- Analysis of Smart Call Home messages and, if needed, Automatic Service Request generation routed to the correct TAC team, including detailed diagnostic information to speed problem resolution.
- Secure message transport directly from your device or through an HTTP proxy server or a downloadable Transport Gateway (TG). You can use a TG aggregation point to support multiple devices or in cases where security dictates that your devices may not be connected directly to the Internet.
- Web-based access to Smart Call Home messages and recommendations, inventory, and configuration information for all Smart Call Home devices provides access to associated field notices, security advisories, and end-of-life information.

You need the following items to register for Smart Call Home:

- SMARTnet contract number for your router.
- Your e-mail address
- Your Cisco.com username

For information on how to configure and register a Cisco ASR 1000 Series Router for Smart Call Home, see the Smart Call Home Quick Start Configuration Guide

How to Configure Call Home

Configuring the Management Interface VRF

The Call Home feature requires use of the Gigabit Ethernet Management interface virtual routing and forwarding (VRF) instance. The Gigabit Ethernet Management interface is automatically part of its own VRF named "Mgmt-intf."

To configure the Management interface VRF, complete the following steps:

or

ipv6 address {*X:X:X:X::X* **link-local** | *X:X:X:X::X/prefix* [**anycast** | **eui-64**] | **autoconfig** [**default**]}

Procedure

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 2	**interface GigabitEthernet 0** **Example:** `Router(config)# interface GigabitEthernet0`	(Required) Specifies the Gigabit Ethernet Management interface on the router.
Step 3	**vrf forwarding Mgmt-intf** **Example:** `Router(config-if)# vrf forwarding Mgmt-intf`	(Required) Associates the Mgmt-intf VRF with the Gigabit Ethernet Management interface. This command is configured by default.
Step 4	Do one of the following: • **ip address** *ip-address mask* [**secondary** [**vrf** *vrf-name*]] • **ipv6 address** {*X:X:X:X::X* **link-local** | *X:X:X:X::X/prefix* [**anycast** | **eui-64**] | **autoconfig** [**default**]} **Example:** `Router(config-if)# ip address 10.10.10.10 0.0.0.0`	(Required) Specifies the IPv4 or IPv6 addressing for the interface.

What To Do Next

To find out more about the Gigabit Ethernet Management interface or perform additional related configuration tasks on the management interface, see the Using the Management Ethernet Interface .

Configuring a Destination Profile

A destination profile contains the required delivery information for an alert notification. You can configure multiple destination profiles of one or more type.

You can create and define a new destination profile or copy and use another destination profile. If you define a new destination profile, you must assign a profile name.

Note The Call Home feature provides a predefined profile named CiscoTAC-1 that is inactive by default. The CiscoTAC-1 profile is intended for use with the Smart Call Home service, which requires certain additional configuration steps to enable the service with the Call Home feature. For more information about this profile, see the Using the Predefined CiscoTAC-1 Destination Profile, on page 46.

You can configure the following attributes for a destination profile:

- Profile name—A string that uniquely identifies each user-defined destination profile. The profile name is limited to 31 characters and is not case-sensitive. You cannot use **all** as a profile name.
- Transport method—The transport mechanism, either e-mail or HTTP (including HTTPS), for delivery of alerts.
  - For user-defined destination profiles, e-mail is the default, and you can enable one or both transport mechanisms. If you disable both methods, e-mail is enabled.
  - For the predefined Cisco TAC profile, you can enable either transport mechanism, but not both.
- Destination address—The actual address related to the transport method to which the alert should be sent.
- Message formatting—The message format used for sending the alert. The format options for a user-defined destination profile are long-text, short-text, or XML. The default is XML. For the predefined Cisco TAC profile, only XML is allowed. If you use the Cisco Smart Call Home service, the destination profile must use the XML message format.
- Message size—The maximum destination message size. The valid range is 50 to 3,145,728 bytes and the default is 3,145,728 bytes.

This section includes the following tasks:

Configuring a Destination Profile to Send Email Messages

To configure Call Home to send email messages, complete the following tasks:

Configuring the Mail Server

To use the e-mail message transport, you must configure at least one Simple Mail Transfer Protocol (SMTP) e-mail server address. You can specify up to four backup e-mail servers, for a maximum of five total mail-server definitions.

Consider the following guidelines when configuring the mail server:

- Backup e-mail servers can be defined by repeating the **mail-server** command using different priority numbers.
- The **mail-server priority** *number* parameter can be configured from 1 to 100. The server with the highest priority (lowest priority number) is tried first.

Procedure

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 2	**call-home** **Example:** `Router(config)# call-home`	Enters call home configuration mode.
Step 3	**mail-server** {*ipv4-address* | *name*} **priority** *number* **Example:** `Router(cfg-call-home)# mail-server stmp.example.com priority 1`	Specifies an e-mail server and its relative priority among configured e-mail servers, where: • *ipv4-address* —Specifies the IPv4 address of the mail server. • *name* —Specifies the mail server's fully qualified domain name (FQDN) of 64 characters or less. • *number* —Assigns a number between 1 (highest priority) and 100 (lowest priority).

What to do next

Example:

The following example shows the configuration of a primary mail server (named "smtp.example.com") and secondary mail server at IP address 192.168.0.1:

```
Router# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)# call-home
Router(cfg-call-home)# mail-server smtp.example.com priority 1
Router(cfg-call-home)# mail-server 192.168.0.1 priority 2
Router(cfg-call-home)# exit
Router(config)#
```

Associating the Management Interface VRF With Call Home

The Call Home feature requires the management interface VRF (Mgmt-intf) to provide e-mail messaging support. If you have not configured the management interface VRF, see the Configuring the Management Interface VRF, on page 36.

To associate the management interface VRF with Call Home, complete the following steps:

Procedure

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 2	**call-home** **Example:** `Router(config)# call-home`	Enters call home configuration mode.
Step 3	**vrf Mgmt-intf** **Example:** `Router(cfg-call-home)# vrf Mgmt-intf`	(Required) Associates the Mgmt-intf VRF for the email transport method using Call Home.

Configuring a Destination Profile for E-mail

To configure a destination profile for e-mail transport, complete the following steps:

Procedure

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 2	**call-home** **Example:** `Router(config)# call-home`	Enters call home configuration mode.
Step 3	**profile** *name* **Example:** `Router(config-call-home)# profile profile1`	Enters call home destination profile configuration mode for the specified destination profile name. If the specified destination profile does not exist, it is created.

	Command or Action	Purpose
Step 4	**destination transport-method email** **Example:** `Router(cfg-call-home-profile)# destination transport-method email`	(Optional) Configures the message transport method for email. This is the default.
Step 5	**destination address email** *email-address* **Example:** `Router(cfg-call-home-profile)# destination address email myaddress@example.com`	(Required) Configures the destination e-mail address to which Call Home messages are sent.
Step 6	**destination preferred-msg-format** {**long-text** | **short-text** | **xml**} **Example:** `Router(cfg-call-home-profile)# destination preferred-msg-format xml`	(Optional) Configures a preferred message format. The default is XML.
Step 7	**destination message-size** *bytes* **Example:** `Router(cfg-call-home-profile)# destination message-size 3145728`	(Optional) Configures a maximum destination message size (from 50 to 3145728 bytes) for the destination profile. The default is 3145728 bytes.
Step 8	**active** **Example:** `Router(cfg-call-home-profile)# active`	(Optional) Enables the destination profile. By default, a user-defined profile is enabled when it is created.
Step 9	**exit** **Example:** `Router(cfg-call-home-profile)# exit`	Exits call home destination profile configuration mode and returns to call home configuration mode.
Step 10	**end** **Example:** `Router(cfg-call-home)# end`	Returns to privileged EXEC mode.

Configuring Other Email Options

For the e-mail transport method, you can also configure the from and reply-to e-mail addresses by completing the following steps:

Procedure

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 2	**call-home** **Example:** `Router(config)# call-home`	Enters call home configuration mode.
Step 3	**sender from** *email-address* **Example:** `Router(cfg-call-home)# sender from username@example.com`	(Optional) Assigns the e-mail address that will appear in the from field in Call Home e-mail messages. If no address is specified, the contact e-mail address is used.
Step 4	**sender reply-to** *email-address* **Example:** `Router(cfg-call-home)# sender reply-to username@example.com`	(Optional) Assigns the e-mail address that will appear in the reply-to field in Call Home e-mail messages.

Configuring a Destination Profile to Send HTTP Messages

To configure Call Home to send HTTP (or HTTPS) messages, complete the following tasks:

Configuring the HTTP Source Interface

If you are using HTTP or HTTPS to send Call Home messages, then you must configure the VRF management interface as the HTTP client source interface.

Procedure

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 2	**ip http client source-interface** *type number* **Example:** `Router(config)# ip http client`	Configures the source interface for the HTTP client. **Note** This interface should be the VRF management interface.

	Command or Action	Purpose
	`source-interface gigabitethernet 0`	
Step 3	**end** **Example:** `Router(cfg-call-home)# end`	Returns to privileged EXEC mode.

Configuring a Destination Profile for HTTP

To configure a destination profile for http transport, complete the following steps:

Procedure

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 2	**call-home** **Example:** `Router(config)# call-home`	Enters call home configuration mode.
Step 3	**profile** *name* **Example:** `Router(config-call-home)# profile test`	Enters call home destination profile configuration mode for the specified destination profile. If the specified destination profile does not exist, it is created.
Step 4	**destination transport-method http** **Example:** `Router(cfg-call-home-profile)# destination transport-method http`	Enables the HTTP message transport method.
Step 5	**destination address http** *url* **Example:**	Configures the destination URL to which Call Home messages are sent.

	Command or Action	Purpose
	`Router(cfg-call-home-profile)# destination address http https://example.url.com`	**Note** When entering a destination URL, include either **http://** or **https://**, depending on whether the server is a secure server. If the destination is a secure server, you must also configure a trustpoint CA.
Step 6	**destination preferred-msg-format** {**long-text** | **short-text** | **xml**} **Example:** `Router(cfg-call-home-profile)# destination preferred-msg-format xml`	(Optional) Configures a preferred message format. The default is XML.
Step 7	**destination message-size** *bytes* **Example:** `Router(cfg-call-home-profile)# destination message-size 3,145,728`	(Optional) Configures a maximum destination message size for the destination profile.
Step 8	**active** **Example:** `Router(cfg-call-home-profile)# active`	Enables the destination profile. By default, a profile is enabled when it is created.
Step 9	**exit** **Example:** `Router(cfg-call-home-profile)# exit`	Exits call home destination profile configuration mode and returns to call home configuration mode.
Step 10	**end** **Example:** `Router(cfg-call-home)# end`	Returns to privileged EXEC mode.

Configuring a Trustpoint Certificate Authority

If you are using the HTTP transport method and specifying an HTTPS destination URL, then you will also need to configure a trustpoint certificate authority (CA).

For more information about how to configure a trustpoint CA, see the Declare and Authenticate a CA Trustpoint. That section describes how to configure a CA trustpoint for a secure Cisco server to use with the Smart Call Home service, but can be applied to other secure server configuration as needed by your site using the required certificate for your secure server.

Working With Destination Profiles

This section describes some of the tasks that you can complete with destination profiles:

Activating and Deactivating a Destination Profile

Except for the predefined CiscoTAC-1 profile, all Call Home destination profiles are automatically activated once you create them. If you do not want to use a profile right way, you can deactivate the profile. The CiscoTAC-1 profile is inactive by default and must be activated to be used.

To activate or deactivate a destination profile, complete the following steps:

Procedure

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 2	**call-home** **Example:** `Router(config)# call-home`	Enters call home configuration mode.
Step 3	**profile** *name* **Example:** `Router(config-call-home)# profile test`	Enters call home destination profile configuration mode for the specified destination profile. If the specified destination profile does not exist, it is created.
Step 4	**active** **Example:** `Router(cfg-call-home-profile)# active`	Enables the destination profile. By default, a new profile is enabled when it is created.
Step 5	no active **Example:** `Router(cfg-call-home-profile)# no active`	Disables the destination profile.
Step 6	**end** **Example:** `Router(cfg-call-home)# end`	Exits call home destination profile configuration mode and returns to privileged EXEC mode.

Copying a Destination Profile

To create a new destination profile by copying an existing profile, complete the following steps:

Procedure

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 2	**call-home** **Example:** `Router(config)# call-home`	Enters call home configuration mode.
Step 3	**copy profile** *source-profile target-profile* **Example:** `Router(cfg-call-home)# copy profile profile1 profile2`	Creates a new destination profile with the same configuration settings as the existing destination profile, where: • *source-profile* —Specifies the existing name of the profile. • *target-profile* —Specifies a name for the new copy of the profile.

Renaming a Destination Profile

To change the name of an existing profile, complete the following steps:

Procedure

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 2	**call-home** **Example:** `Router(config)# call-home`	Enters call home configuration mode.
Step 3	**rename profile** *source-profile target-profile* **Example:** `Router(cfg-call-home)# rename profile2 testprofile`	Renames an existing source file, where: • *source-profile* —Specifies the existing name of the profile. • *target-profile* —Specifies a new name for the existing profile.

Using the Predefined CiscoTAC-1 Destination Profile

The CiscoTAC-1 profile is automatically configured in the Call Home feature for your use with the Cisco Smart Call Home service. This profile includes certain information, such as the destination e-mail address and HTTPS URL, and default alert groups for communication with the Smart Call Home service. Some of these attributes, such as the destination e-mail address, HTTPS URL, and message format cannot be modified.

You can use either email or http transport to communicate with the Smart Call Home service backend server. By default, the CiscoTAC-1 profile is inactive and uses email as the default transport method. To use email transport, you only need to enable the profile. However, to use this profile with the Cisco Smart Call Home service secure server (via HTTPS), you not only must enable the profile, but you must also change the transport method to HTTP as shown in the following example:

```
Router# configure terminal
Router(config)# call-home
Router(config-call-home)# profile CiscoTAC-1
Router(cfg-call-home-profile)# destination transport-method http
Router(cfg-call-home-profile)# active
```

For more information about additional requirements for Configuring the Smart Call Home service, see the How To Configure Call Home to Support the Smart Call Home Service section.

Verifying the Call Home Profile Configuration

To verify the profile configuration for Call Home, use the **show call-home profile** command. See Displaying Call Home Configuration Information for more information and examples.

Subscribing to Alert Groups

An alert group is a predefined subset of Call Home alerts supported in all routers. Different types of Call Home alerts are grouped into different alert groups depending on their type. The following alert groups are available on the router:

- Configuration
- Diagnostic
- Environment
- Inventory
- Syslog

The triggering events for each alert group are listed in the Alert Group Trigger Events and Commands, on page 65, and the contents of the alert group messages are listed in the Message Contents, on page 67.

You can select one or more alert groups to be received by a destination profile.

Note A Call Home alert is only sent to destination profiles that have subscribed to the alert group containing that Call Home alert. In addition, the alert group must be enabled.

Periodic Notification

When you subscribe a destination profile to either the Configuration or the Inventory alert group, you can choose to receive the alert group messages asynchronously or periodically at a specified time. The sending period can be one of the following:

- Daily—Specify the time of day to send, using an hour:minute format hh:mm, with a 24-hour clock (for example, 14:30).
- Weekly—Specify the day of the week and time of day in the format day hh:mm, where the day of the week is spelled out (for example, monday).
- Monthly—Specify the numeric date, from 1 to 31, and the time of day, in the format date hh:mm.

Message Severity Threshold

When you subscribe a destination profile to the Environment or Syslog alert group, you can set a threshold for the sending of alert group messages based on the message's level of severity. Any message with a severity lower than the specified threshold of the destination profile is not sent to the destination.

Note When syslog level is changed via IOS CLI, the new value is propagated to non-IOS processes as well, with the result that these processes no longer send syslog messages of lower priority to IOS to process, thus "saving" CPU cycles for IOS.

The table below lists the keywords used to configure the severity, which range from catastrophic (level 9, highest level of urgency) to debugging (level 0, lowest level of urgency). If no severity threshold is configured, the default is debugging (level 0). However, the default is not recommended due to the number of messages that will be triggered.

Note Call Home severity levels are not the same as system message logging severity levels.

Table 2: Severity and Syslog Level Mapping

Level	Keyword	Syslog Level	Description
9	**catastrophic**	N/A	Network-wide catastrophic failure.
8	**disaster**	N/A	Significant network impact.
7	**fatal**	Emergency (0)	System is unusable.
6	**critical**	Alert (1)	Critical conditions, immediate attention needed.
5	**major**	Critical (2)	Major conditions.
4	**minor**	Error (3)	Minor conditions.
3	**warning**	Warning (4)	Warning conditions.
2	**notification**	Notice (5)	Basic notification and informational messages. Possibly independently insignificant.

Level	Keyword	Syslog Level	Description
1	**normal**	Information (6)	Normal event signifying return to normal state.
0	**debugging**	Debug (7)	Debugging messages.

Syslog Pattern Matching

When you subscribe a destination profile to the Syslog alert group, you can optionally specify a text pattern to be matched within each syslog message. If you configure a pattern, a Syslog alert group message is sent only if it contains the specified pattern and meets the severity threshold. If the pattern contains spaces, you must enclose it within double quotation marks(“ ”) when configuring it. You can specify up to five patterns for each destination profile.

To subscribe a destination profile to one or more alert groups, complete the following steps:

Procedure

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 2	**call-home** **Example:** `Device(config)# call-home`	Enters call home configuration mode.
Step 3	**alert-group** {**all** | **configuration** | **environment** | **inventory** | **syslog**} **Example:** `Device(cfg-call-home)# alert-group all`	Enables the specified alert group. Use the all keyword to enable all alert groups. By default, all alert groups are enabled.
Step 4	**profile** *name* **Example:** `Device(cfg-call-home)# profile profile1`	Enters call home destination profile configuration mode for the specified destination profile.
Step 5	**subscribe-to-alert-group all** **Example:** `Device(cfg-call-home-profile)# subscribe-to-alert-group all`	(Optional) Subscribes this destination profile to all available alert groups. **Note** Alternatively, you can also subscribe to alert groups individually by specific type as described in steps 6 through 9.

	Command or Action	Purpose
Step 6	**subscribe-to-alert-group configuration** [**periodic** {**daily** *hh:mm* | **monthly** *date hh:mm* | **weekly** *day hh:mm*}] **Example:** `Device(cfg-call-home-profile)# subscribe-to-alert-group configuration periodic daily 12:00`	Subscribes this destination profile to the Configuration alert group, with an optional **periodic** value.
Step 7	**subscribe-to-alert-group diagnostic** [**severity** {**catastrophic** | **critical** | **debugging** | **disaster** | **fatal** | **major** | **minor** | **normal** | **notification** | **warning**}] **Example:** `Device(cfg-call-home-profile)# subscribe-to-alert-group diagnostic severity critical`	Subscribes this destination profile to the Diagnostic alert group, with an optional **severity** level.
Step 8	**subscribe-to-alert-group environment** [**severity** {**catastrophic** | **critical** | **debugging** | **disaster** | **fatal** | **major** | **minor** | **normal** | **notification** | **warning**}] **Example:** `Device(cfg-call-home-profile)# subscribe-to-alert-group environment severity major`	Subscribes this destination profile to the Environment alert group, with an optional **severity** level.
Step 9	**subscribe-to-alert-group inventory** [**periodic** {**daily** *hh:mm* | **monthly** *date hh:mm* | **weekly** *day hh:mm*}] **Example:** `Device(cfg-call-home-profile)# subscribe-to-alert-group inventory periodic monthly 1 12:00`	Subscribes this destination profile to the Inventory alert group, with an optional **periodic** value.
Step 10	**subscribe-to-alert-group syslog** [**severity** {**catastrophic** | **critical** | **debugging** | **disaster** | **fatal** | **major** | **minor** | **normal** | **notification** | **warning**}][**pattern** *string*] **Example:** `Device(cfg-call-home-profile)# subscribe-to-alert-group syslog`	Subscribes this destination profile to the Syslog alert group, with an optional **severity** level. You can specify a pattern to be matched in the syslog message, up to a maximum of five patterns per profile. If the pattern contains spaces, you must enclose it within double quotation marks (“ ”).

Configuring Contact Information

Each router must include a contact email address. You can optionally include a phone number, street address, contract ID, customer ID, and site ID.

To assign the contact information, complete the following steps:

Procedure

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Router> configure terminal`	Enters global configuration mode.
Step 2	**call-home** **Example:** `Router(config)# call-home`	Enters call home configuration mode.
Step 3	**contact-email-addr** *email-address* **Example:** `Router(cfg-call-home)# contact-email-addr username@example.com`	Assigns the customer's email address. Enter up to 200 characters in email address format with no spaces.
Step 4	**phone-number** +*phone-number* **Example:** `Router(cfg-call-home)# phone-number +1-222-333-4444`	(Optional) Assigns the customer's phone number. **Note** The number must start with a plus (**+**) prefix, and may contain only dashes (-) and numbers. Enter up to 16 characters. If you include spaces, you must enclose your entry within double quotation marks (" ").
Step 5	**street-address** *street-address* **Example:** `Router(cfg-call-home)# street-address "1234 Any Street, Any city, Any state, 12345"`	(Optional) Assigns the customer's street address where RMA equipment can be shipped. Enter up to 200 characters. If you include spaces, you must enclose your entry within double quotation marks (" ").
Step 6	**customer-id** *text* **Example:** `Router(cfg-call-home)# customer-id Customer1234`	(Optional) Identifies the customer ID. Enter up to 64 characters. If you include spaces, you must enclose your entry within double quotation marks (" ").

	Command or Action	Purpose
Step 7	**site-id** *text* **Example:** `Router(cfg-call-home)# site-id Site1ManhattanNY`	(Optional) Identifies the customer site ID. Enter up to 200 characters. If you include spaces, you must enclose your entry within double quotation marks (“ ”).
Step 8	**contract-id** *text* **Example:** `Router(cfg-call-home)# contract-id Company1234`	(Optional) Identifies the customer’s contract ID for the router. Enter up to 64 characters. If you include spaces, you must enclose your entry within double quotation marks (“ ”).

Example

The following example shows the configuration of contact information:

```
Device# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Device(config)# call-home
Device(cfg-call-home)# contact-email-addr username@example.com
Device(cfg-call-home)# phone-number +1-222-333-4444
Device(cfg-call-home)# street-address “1234 Any Street, Any city, Any state, 12345”
Device(cfg-call-home)# customer-id Customer1234
Device(cfg-call-home)# site-id Site1ManhattanNY
Device(cfg-call-home)# contract-id Company1234
Device(cfg-call-home)# exit
```

Configuring the Number of Call Home Messages Sent Per Minute

The Call Home feature defaults to a maximum of 20 messages per minute. If you want to change that value, complete the following steps:

Procedure

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 2	**call-home** **Example:** `Router(config)# call-home`	Enters call home configuration mode.
Step 3	**rate-limit** *number* **Example:** `Router(cfg-call-home)# rate-limit 40`	Specifies a limit on the number of messages sent per minute. Range 1 to 60. The default is 20.

Sending Call Home Communications Manually

You can manually send several types of Call Home communications. To send Call Home communications, complete the tasks in this section. This section contains the following subsections:

Sending a Call Home Test Message Manually

You can use the **call-home test** command to send a user-defined Call Home test message.

Procedure

	Command or Action	Purpose
Step 1	**call-home test** [**"***test-message***"**] **profile** *name* **Example:** `Router# call-home test profile profile1`	Sends a test message to the specified destination profile. The user-defined test message text is optional, but must be enclosed in quotes (" ") if it contains spaces. If no user-defined message is configured, a default message is sent.

Sending Call Home Alert Group Messages Manually

You can use the **call-home send** command to manually send a specific alert group message.

Note the following guidelines when manually sending a Call Home alert group message:

- Configuration, , and inventory alert groups can be sent manually.
- When you manually trigger an alert group message and you specify a destination profile name, a message is sent to the destination profile regardless of the active status, subscription status, or severity setting of the profile.

- When you manually trigger a configuration or inventory alert group message and do not specify a destination profile name, a message is sent to all active profiles that have either a normal or periodic subscription to the specified alert group.
- When you manually trigger a diagnostic alert group message and do not specify a destination profile name, a message is sent to all active profiles that have a lower severity subscription than the severity of the diagnostic results of the specified slot.

To manually trigger Call Home alert group messages, complete the following steps:

Procedure

	Command or Action	Purpose
Step 1	**call-home send alert-group configuration** [**profile** *name*] **Example:** `Device# call-home send alert-group configuration profile CiscoTAC-1`	Sends a configuration alert group message to one destination profile if specified, or to all subscribed destination profiles.
Step 2	**call-home send alert-group inventory** [**profile** *name*] **Example:** `Device# call-home send alert-group inventory`	Sends an inventory alert group message to one destination profile if specified, or to all subscribed destination profiles.

Submitting Call Home Analysis and Report Requests

The **call-home request** command allows you to submit the system information to Cisco Systems. The report provides helpful analysis and information specific to your system. You can request various reports, including security alerts, known bugs, recommendations, and the command references.

Note the following guidelines when manually sending Call Home analysis and report requests:

- If a **profile** *name* is specified, the request is sent to the profile. If no profile is specified, the request is sent to the Cisco TAC profile. The Call-home request can have a recipient profile that is not enabled. The recipient profile specifies the email address where the transport gateway is configured. The recipient profile allows the request message to be forwarded to the Cisco TAC and you can receive the reply from the Smart Call Home service.
- The **ccoid** *user-id* is the registered identifier of the Smart Call Home user. If the *user-id* is specified, the response is sent to the email address of the registered user. If no *user-id* is specified, the response is sent to the contact email address of the device.
- Based on the keyword specifying the type of report that is requested, the following information is returned:
  - **config-sanity**—Information on the recommendations for the current running configuration.
  - **bugs-list**—Known bugs in the running version and in the currently applied features.
  - **command-reference**—Reference links to all commands in the running configuration.

- **product-advisory**—Product Security Incident Response Team (PSIRT) notices. The PSIRT includes End of Life (EOL) or End of Sales (EOS) notices, or field notices (FN) that may affect devices in your network.

To submit a request for analysis and report information from the Cisco Output Interpreter tool, complete the following steps:

Procedure

	Command or Action	Purpose

Step 1	**call-home request output-analysis "***show-command***"**
	Example:
	`[profile name] [ccoid user-id]`
	Example:
	`Device# call-home request output-analysis "show diag" profile TG`
		Sends the output of the specified **show** command for analysis. The **show** command must be contained in quotes (").

Step 2	**call-home request** {**config-sanity** | **bugs-list** | **command-reference** | **product-advisory**}
	Example:
	`[profile name] [ccoid user-id]`
	Example:
	`Device# call-home request config-sanity profile TG`
		Sends the output of a predetermined set of commands, such as the **show running-config all** and **show version** commands, for analysis. In addition, the **call home request product-advisory** subcommand includes all inventory alert group commands. The keyword that is specified after the **call-home request** command specifies the type of report requested.

Example

The following example shows a request for analysis of a user-specified **show** command:

```
Router# call-home request output-analysis "show diag" profile TG
```

Sending the Output of a Command to Cisco or an E-Mail Address

You can use the **call-home send** command to execute a CLI command and e-mail the command output to Cisco or to an e-mail address that you specify.

Note the following guidelines when sending the output of a command:

- The specified CLI command can be any run command, including commands for all modules. The command must be contained in quotes ("").
- If an e-mail address is specified, the command output is sent to that address. If no e-mail address is specified, the output is sent to the Cisco TAC (attach@cisco.com). The e-mail is sent in long text format with the service number, if specified, in the subject line.

- The service number is required only if no e-mail address is specified, or if a Cisco TAC e-mail address is specified.

To execute a CLI command and e-mail the command output, complete the following step:

Procedure

	Command or Action	Purpose
Step 1	**call-home send "***command***"** **Example:** {**email** *email-addr* [**tac-service-request** *request-number*] | **tac-service-request** *request-number* [**email** *email-addr*]} **Example:** Router# **call-home send "show call-home" email support@example.com**	Executes the specified CLI command and e-mails the output, where: • **email** *email-addr* —Specifies the email address to which the command output should be sent. This keyword is optional if used after entering the **tac-service-request** option. • **tac-service-request** *request-number* —Specifies the TAC service request number that will appear in the subject line of the email. This keyword is optional if used after entering the **email** option.

Example

The following example shows how to send the output of a CLI command to a user-specified e-mail address:

Router# **call-home send "show diag" email support@example.com**

How To Configure Call Home to Support the Smart Call Home Service

This section provides an overview of the minimum steps required to configure the Call Home feature on a Cisco device, and other required supporting configuration to communicate securely with the Smart Call Home service using HTTPS:

Prerequisites

Before you configure and use the Smart Call Home Service, be sure that you have completed the following prerequisites:

- Verify that you have an active Cisco Systems service contract for the device being configured.
- Verify that you have IP connectivity to the Cisco HTTPS server.
- Obtain the latest Cisco Systems server security certificate. In Cisco IOS XE Release 2.6.0, the following shows the latest text for the Cisco Systems server security certificate:

```
MIIDAjCCAmsCEH3Z/gfPqB63EHln+6eJNMYwDQYJKoZIhvcNAQEFBQAwgcExCzAJ
BgNVBAYTAlVTMRcwFQYDVQQKEw5WZXJpU2lnbiwgSW5jLjE8MDoGA1UECxMzQ2xh
c3MgMyBQdWJsaWMgUHJpbWFyeSBDZXJ0aWZpY2F0aW9uIEF1dGhvcml0eSAtIEcy
MTowOAYDVQQLEzEoYykgMTk5OCBWZXJpU2lnbiwgSW5jLiAtIEZvciBhdXRob3Jp
emVkIHVzZSBvbmx5MR8wHQYDVQQLExZWZXJpU2lnbiBUcnVzdCBOZXR3b3JrMB4X
DTk4MDUxODAwMDAwMFoXDTI4MDgwMTIzNTk1OVowgcExCzAJBgNVBAYTAlVTMRcw
FQYDVQQKEw5WZXJpU2lnbiwgSW5jLjE8MDoGA1UECxMzQ2xhc3MgMyBQdWJsaWMg
```

```
UHJpbWFyeSBDZXJ0aWZpY2F0aW9uIEF1dGhvcml0eSAtIEcyMTowOAYDVQQLEzEo
YykgMTk5OCBWZXJpU2lnbiwgSW5jLiAtIEZvciBhdXRob3JpemVkIHVzZSBvbmx5
MR8wHQYDVQQLExZWZXJpU2lnbiBUcnVzdCBOZXR3b3JrMIGfMA0GCSqGSIb3DQEB
AQUAA4GNADCBiQKBgQDMXtERXVxp0KvTuWpMmR9ZmDCOFoUgRm1HP9SFIIThbbP4
pO0M8RcPO/mn+SXXwc+EY/J8Y8+iR/LGWzOOZEAEaMGAuWQcRXfH2G71lSk8UOg0
13gfqLptQ5GVj0VXXn7F+8qkBOvqlzdUMG+7AUcyM83cV5tkaWH4mx0ciU9cZwID
AQABMA0GCSqGSIb3DQEBBQUAA4GBAFFNzb5cy5gZnBWyATl4Lk0PZ3BwmcYQWpSk
U01UbSuvDV1Ai2TT1+7eVmGSX6bEHRBhNtMsJzzoKQm5EWR0zLVznxxIqbxhAe7i
F6YM40AIOw7n60RzKprxaZLvcRTDOaxxp5EJb+RxBrO6WVcmeQD2+A2iMzAo1KpY
oJ2daZH9
```

Configure and Enable Call Home

To establish the Cisco Smart Call Home service, there are certain steps that must be performed to configure and enable the Call Home feature on the router.

The CiscoTAC-1 profile is predefined in the Call Home feature to communicate using email to the back-end server for the Smart Call Home service. The URL to the Cisco HTTPS back-end server is also predefined. This profile is inactive by default.

However, unlike other profiles that you can configure in Call Home to support both transport methods, the CiscoTAC-1 profile can only use one transport method at a time. Therefore, to use this profile with the Cisco Smart Call Home HTTPS server, you must change the transport method from email to HTTP and enable the profile. In addition, you must minimally specify a contact e-mail address and enable the Call Home feature.

Procedure

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 2	**call-home** **Example:** `Router(config)# call-home`	Enters call home configuration mode.
Step 3	**profile CiscoTAC-1** **Example:** `Router(config-call-home)# profile CiscoTAC-1`	Enters call home destination profile configuration mode for the CiscoTAC-1 destination profile.
Step 4	**destination transport-method http** **Example:** `Router(cfg-call-home-profile)# destination transport-method http`	(Required only if using HTTPS) Configures the message transport method for http.

	Command or Action	Purpose
Step 5	**active** **Example:** `Router(cfg-call-home-profile)# active`	Enables the destination profile.
Step 6	**exit** **Example:** `Router(cfg-call-home-profile)# exit`	Exits call home destination profile configuration mode and returns to call home configuration mode.
Step 7	**contact-email-addr** *email-address* **Example:** `Router(cfg-call-home)# contact-email-addr username@example.com`	Assigns the customer's e-mail address. Enter up to 200 characters in e-mail address format with no spaces.
Step 8	**exit** **Example:** `Router(cfg-call-home)# exit`	Exits call home configuration mode and returns to global configuration mode.
Step 9	service call-home **Example:** `Router(config)# service call-home`	Enables the Call Home feature.
Step 10	**exit** **Example:** `Router(config)# exit`	Exits global configuration mode and returns to privileged EXEC mode.
Step 11	copy running-config startup-config **Example:** `Router# copy running-config startup-config`	Saves the configuration to NVRAM.

Enabling and Disabling Call Home

To enable or disable the Call Home feature, complete the following steps:

Procedure

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 2	**service call-home** **Example:** `Router(config)# service call-home`	Enables the Call Home feature.
Step 3	**no service call-home** **Example:** `Router(config)# no service call-home`	Disables the Call Home feature.

Declare and Authenticate a CA Trustpoint

To establish communication with the Cisco HTTPS server for Smart Call Home service, you must declare and authenticate the Cisco server security certificate.

Procedure

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 2	**crypto pki trustpoint** *name* **Example:** `Router(config)# crypto pki trustpoint cisco`	Declares a CA trustpoint on your router and enters CA trustpoint configuration mode.
Step 3	**enrollment terminal** **Example:** `Router(ca-trustpoint)# enrollment terminal`	Specifies a manual cut-and-paste method of certificate enrollment.
Step 4	**exit** **Example:** `Router(ca-trustpoint)# exit`	Exits CA trustpoint configuration mode and returns to global configuration mode.

	Command or Action	Purpose
Step 5	**crypto pki authenticate** *name* **Example:** `Router(config)# crypto pki authenticate cisco`	Authenticates the named CA. **Note** The CA name should match the *name* specified in the **crypto pki trustpoint** command.

Step 6	At the prompt, paste the security certificate text.
	Example:
	`Enter the base 64 encoded CA certificate.`
	Example:
	`End with a blank line or the word "quit" on a line by itself`
	Example:
	`<Paste certificate text here>`
		Specifies the security certificate text.

Step 7	**quit** **Example:** `quit`	Specifies the end of the security certificate text.
Step 8	**yes** **Example:** `% Do you accept this certificate? [yes/no]: yes`	Confirms acceptance of the entered security certificate.
Step 9	**end** **Example:** `Router# end`	Exits global configuration mode and returns to privileged EXEC mode.
Step 10	copy running-config startup-config **Example:** `Router# copy running-config startup-config`	Saves the configuration to NVRAM.

Example: Declaring and authenticating the Cisco server security certificate

The following example shows the configuration for declaring and authenticating the Cisco server security certificate:

```
Router# configure terminal
```

```
Router(config)# crypto pki trustpoint cisco
Router(ca-trustpoint)# enrollment terminal
Router(ca-trustpoint)# exit
Router(config)# crypto pki authenticate cisco
Enter the base 64 encoded CA certificate.
End with a blank line or the word "quit" on a line by itself
MIIDAjCCAmsCEH3Z/gfPqB63EHln+6eJNMYwDQYJKoZIhvcNAQEFBQAwgcExCzAJ
BgNVBAYTAlVTMRcwFQYDVQQKEw5WZXJpU2lnbiwgSW5jLjE8MDoGA1UECxMzQ2xh
c3MgMyBQdWJsaWMgUHJpbWFyeSBDZXJ0aWZpY2F0aW9uIEF1dGhvcml0eSAtIEcy
MTowOAYDVQQLEzEoYykgMTk5OCBWZXJpU2lnbiwgSW5jLiAtIEZvciBhdXRob3Jp
emVkIHVzZSBvbmx5MR8wHQYDVQQLExZWZXJpU2lnbiBUcnVzdCBOZXR3b3JrMB4X
DTk4MDUxODAwMDAwMFoXDTI4MDgwMTIzNTk1OVowgcExCzAJBgNVBAYTAlVTMRcw
FQYDVQQKEw5WZXJpU2lnbiwgSW5jLjE8MDoGA1UECxMzQ2xhc3MgMyBQdWJsaWMg
UHJpbWFyeSBDZXJ0aWZpY2F0aW9uIEF1dGhvcml0eSAtIEcyMTowOAYDVQQLEzEo
YykgMTk5OCBWZXJpU2lnbiwgSW5jLiAtIEZvciBhdXRob3JpemVkIHVzZSBvbmx5
MR8wHQYDVQQLExZWZXJpU2lnbiBUcnVzdCBOZXR3b3JrMIGfMA0GCSqGSIb3DQEB
AQUAA4GNADCBiQKBgQDMXtERXVxp0KvTuWpMmR9ZmDCOFoUgRm1HP9SFIIThbbP4
pO0M8RcPO/mn+SXXwc+EY/J8Y8+iR/LGWzOOZEAEaMGAuWQcRXfH2G71lSk8UOg0
13gfqLptQ5GVj0VXXn7F+8qkBOvqlzdUMG+7AUcyM83cV5tkaWH4mx0ciU9cZwID
AQABMA0GCSqGSIb3DQEBBQUAA4GBAFFNzb5cy5gZnBWyATl4Lk0PZ3BwmcYQWpSk
U01UbSuvDV1Ai2TT1+7eVmGSX6bEHRBhNtMsJzzoKQm5EWR0zLVznxxIqbxhAe7i
F6YM40AIOw7n60RzKprxaZLvcRTDOaxxp5EJb+RxBrO6WVcmeQD2+A2iMzAo1KpY
oJ2daZH9
quit
Certificate has the following attributes:
       Fingerprint MD5: A2339B4C 747873D4 6CE7C1F3 8DCB5CE9
      Fingerprint SHA1: 85371CA6 E550143D CE280347 1BDE3A09 E8F8770F
% Do you accept this certificate? [yes/no]: yes
Trustpoint CA certificate accepted.
% Certificate successfully imported
Router(config)# end
Router# copy running-config startup-config
```

Start Smart Call Home Registration

To start the Smart Call Home registration process, manually send an inventory alert-group message to the CiscoTAC-1 profile.

Procedure

	Command or Action	Purpose
Step 1	**call-home send alert-group inventory profile CiscoTAC-1** **Example:** `Device# call-home send alert-group inventory profile CiscoTAC-1`	Sends an inventory alert group message to the CiscoTAC-1 destination profile.

What To Do Next

To receive an email from Cisco Systems and follow the instructions to complete the device registration in the Smart Call Home web application:

- Launch the Smart Call Home web application at the following URL:

https://tools.cisco.com/sch/

- Accept the Legal Agreement.

- Confirm device registration for Call Home devices with pending registration.

For more information about using the Smart Call Home web application, see *Smart Call Home User Guide* . This user guide also includes configuration examples for sending Smart Call Home messages directly from your device or through a transport gateway (TG) aggregation point. You can use a TG aggregation point in cases requiring support for multiple devices or in cases where security requirements mandate that your devices must not be connected directly to the Internet.

Displaying Call Home Configuration Information

You can use variations of the **show call-home** command to display Call Home configuration information.

To display the configured Call Home information, use one or more of the following commands:

Procedure

	Command or Action	Purpose
Step 1	**show call-home** **Example:** `Device# show call-home`	Displays the Call Home configuration in summary.
Step 2	**show call-home detail** **Example:** `Device# show call-home detail`	Displays the Call Home configuration in detail.
Step 3	**show call-home alert-group** **Example:** `Device# show call-home alert-group`	Displays the available alert groups and their status.
Step 4	**show call-home mail-server status** **Example:** `Device# show call-home mail-server status`	Checks and displays the availability of the configured e-mail server(s).
Step 5	**show call-home profile** {**all** | *name*} **Example:** `Device# show call-home profile all`	Displays the configuration of the specified destination profile. Use the **all** keyword to display the configuration of all destination profiles.
Step 6	**show call-home statistics** **Example:** `Device# show call-home statistics`	Displays the statistics of Call Home events.

Configuration Examples for Call Home

The following examples show the sample output when using different options of the **show call-home** command.

Examples

The following examples show the sample output when using different options of the **show call-home** command.

Configured Call Home Information in Summary

```
Router# show call-home
Current call home settings:
    call home feature : disable
    call home message's from address: username@example.com
    call home message's reply-to address: username@example.com
    vrf for call-home messages: Mgmt-intf
    contact person's email address: username@example.com
    contact person's phone number: +14085551234
    street address: 1234 Any Street Any city Any state 12345
    customer ID: customer@example.com
    contract ID: 123456789
    site ID: example.com
    Mail-server[1]: Address: smtp.example.com Priority: 1
    Mail-server[2]: Address: 192.168.0.1 Priority: 2
    Rate-limit: 20 message(s) per minute
Available alert groups:
    Keyword                  State   Description
    ------------------------ ------- --------------------------------
    configuration            Enable  configuration info
    diagnostic               Enable  diagnostic info
    environment              Enable  environmental info
    inventory                Enable  inventory info
    syslog                   Enable  syslog info
Profiles:
    Profile Name: campus-noc
    Profile Name: CiscoTAC-1
```

Configured Call Home Information in Detail

```
Router# show call-home detail
Current call home settings:
    call home feature : disable
    call home message's from address: username@example.com
    call home message's reply-to address: username@example.com
    vrf for call-home messages: Mgmt-intf
    contact person's email address: username@example.com
    contact person's phone number: +14085551234
    street address: 1234 Any Street Any city Any state 12345
    customer ID: customer@example.com
    contract ID: 123456789
    site ID: example.com
    Mail-server[1]: Address: smtp.example.com Priority: 1
    Mail-server[2]: Address: 192.168.0.1 Priority: 2
    Rate-limit: 20 message(s) per minute
Available alert groups:
    Keyword                  State   Description
    ------------------------ ------- --------------------------------
    configuration            Enable  configuration info
    diagnostic               Enable  diagnostic info
    environment              Enable  environmental info
    inventory                Enable  inventory info
    syslog                   Enable  syslog info
```

```
Profiles:
Profile Name: campus-noc
    Profile status: ACTIVE
    Preferred Message Format: long-text
    Message Size Limit: 3145728 Bytes
    Transport Method: email
    Email address(es): username@example.com
    HTTP  address(es): Not yet set up
    Alert-group               Severity
    ------------------------  ------------
    inventory                 normal
    Syslog-Pattern            Severity
    ------------------------  ------------
    N/A                       N/A
Profile Name: CiscoTAC-1
    Profile status: INACTIVE
    Preferred Message Format: xml
    Message Size Limit: 3145728 Bytes
    Transport Method: email
    Email address(es): callhome@cisco.com
    HTTP  address(es): https://tools.cisco.com/its/service/oddce/services/DDCEService
    Periodic configuration info message is scheduled every 23 day of the month at 10:28
    Periodic inventory info message is scheduled every 23 day of the month at 10:13
    Alert-group               Severity
    ------------------------  ------------
    diagnostic                minor
    environment               minor
    inventory                 normal
    Syslog-Pattern            Severity
    ------------------------  ------------
    .*                        major
```

Available Call Home Alert Groups

```
Router# show call-home alert-group
Available alert groups:
    Keyword                  State   Description
    ------------------------ ------- --------------------------------
    configuration            Enable  configuration info
    crash                    Enable  crash and traceback info
    environment              Enable  environmental info
    inventory                Enable  inventory info
    snapshot                 Enable  snapshot info
    syslog                   Enable  syslog info
```

E-Mail Server Status Information

```
Router# show call-home mail-server status
Please wait. Checking for mail server status ...
Translating "smtp.example.com"
    Mail-server[1]: Address: smtp.example.com Priority: 1 [Not Available]
    Mail-server[2]: Address: 192.168.0.1 Priority: 2 [Not Available]
```

Information About All Destination Profiles (Predefined and User-Defined)

```
Router# show call-home profile all
Profile Name: campus-noc
    Profile status: ACTIVE
    Preferred Message Format: long-text
    Message Size Limit: 3145728 Bytes
    Transport Method: email
    Email address(es): username@example.com
    HTTP  address(es): Not yet set up
```

```
    Alert-group               Severity
    ------------------------  ------------
    inventory                 normal
    Syslog-Pattern            Severity
    ------------------------  ------------
    N/A                       N/A
Profile Name: CiscoTAC-1
    Profile status: INACTIVE
    Preferred Message Format: xml
    Message Size Limit: 3145728 Bytes
    Transport Method: email
    Email address(es): callhome@cisco.com
    HTTP  address(es): https://tools.cisco.com/its/service/oddce/services/DDCEService
    Periodic configuration info message is scheduled every 23 day of the month at 12:13
    Periodic inventory info message is scheduled every 23 day of the month at 11:58
    Alert-group               Severity
    ------------------------  ------------
    diagnostic                minor
    environment               minor
    inventory                 normal
    Syslog-Pattern            Severity
    ------------------------  ------------
    .*                        major
Router#
```

Information About a User-Defined Destination Profile

```
Router# show call-home profile campus-noc
Profile Name: campus-noc
    Profile status: ACTIVE
    Preferred Message Format: long-text
    Message Size Limit: 3145728 Bytes
    Transport Method: email
    Email address(es): username@example.com
    HTTP  address(es): Not yet set up
    Alert-group               Severity
    ------------------------  ------------
    inventory                 normal
    Syslog-Pattern            Severity
    ------------------------  ------------
    N/A                       N/A
```

Call Home Statistics

```
Router# show call-home statistics
Message Types    Total                Email                HTTP
-------------   -------------------- -------------------- ------------------
Total Success   6                    6                    0
    Config      4                    4                    0
    Diagnostic  0                    0                    0
    Environment 0                    0                    0
    Inventory   2                    2                    0
    SysLog      0                    0                    0
    Test        0                    0                    0
    Request     0                    0                    0
    Send-CLI    0                    0                    0
Total In-Queue  0                    0                    0
    Config      0                    0                    0
    Diagnostic  0                    0                    0
    Environment 0                    0                    0
    Inventory   0                    0                    0
    SysLog      0                    0                    0
    Test        0                    0                    0
```

```
    Request      0                    0                    0
    Send-CLI     0                    0                    0
Total Failed     0                    0                    0
    Config       0                    0                    0
    Diagnostic   0                    0                    0
    Environment  0                    0                    0
    Inventory    0                    0                    0
    SysLog       0                    0                    0
    Test         0                    0                    0
    Request      0                    0                    0
    Send-CLI     0                    0                    0
Total Ratelimit
      -dropped   0                    0                    0
    Config       0                    0                    0
    Diagnostic   0                    0                    0
    Environment  0                    0                    0
    Inventory    0                    0                    0
    SysLog       0                    0                    0
    Test         0                    0                    0
    Request      0                    0                    0
    Send-CLI     0                    0                    0
Last call-home message sent time: 2010-01-11 18:32:32 GMT+00:00
```

Default Settings

Lists of default Call Home settings.

Parameters	Default
Call Home feature status	Disabled
User-defined profile status	Active
Predefined Cisco TAC profile status	Inactive
Transport method	E-mail
Message format type	XML
Destination message size for a message sent in long text, short text, or XML format	3,145,728
Alert group status	Enabled
Call Home message severity threshold	0 (debugging)
Message rate limit for messages per minute	20
AAA Authorization	Disabled
Call Home syslog message throttling	Enabled
Data privacy level	Normal

Alert Group Trigger Events and Commands

Call Home trigger events are grouped into alert groups, with each alert group assigned CLI commands to execute when an event occurs. The CLI command output is included in the transmitted message. Table 3: Call

Home Alert Groups, Events, and Actions , on page 66 lists the trigger events included in each alert group, including the severity level of each event and the executed CLI commands for the alert group.

Table 3: Call Home Alert Groups, Events, and Actions

Alert Group	Call Home Trigger Event	Syslog Event	Severity	Description and CLI Commands Executed
Configuration	—	—	—	User-generated request for configuration. (Sent to TAC.) CLI commands executed: **show platform show inventory show running-config all show startup-config show version**
Crash	Reload System crash and device reload		7	Crash dump reporting allows crash information to be collected and send to Cisco backend when a system is reloaded due to reload. **Note** Kernal crash can't be processed. CLI commands executed: **show version show logging show region show inventory show stack**
Environmental	—	—	—	Events related to power, fan, and environment sensing elements, such as temperature alarms. (Sent to TAC.) CLI commands executed: **show platform show environment show inventory show logging**
—	—	%ENVIRONMENTAL-1-ALERT	1	Any sensor in fp/cc/rp has exceeded a certain threshold and resulted in this environmental alert.
—	ENVM	%ENVIRONMENTAL-1-SENSORFAIL	1	Any sensor in fp/cc/rp has failed and resulted in this environmental alert.
—	—	%ENVIRONMENTAL-1-SENSOROK	1	Any sensor in fp/cc/rp has recovered and resulted in this environmental alert.
Inventory	—	—	—	Inventory status should be provided whenever a unit is cold-booted, or when FRUs are inserted or removed. This is considered a noncritical event, and the information is used for status and entitlement. (Sent to TAC.) CLI commands executed: **show platform show inventory oid show version show diag all eeprom detail**

Alert Group	Call Home Trigger Event	Syslog Event	Severity	Description and CLI Commands Executed
Syslog	—	—	—	Event logged to syslog. CLI commands executed: **show inventory show logging**
—	SYSLOG	LOG_EMERG	0	System is unusable.
—	SYSLOG	LOG_ALERT	1	Action must be taken immediately.
—	SYSLOG	LOG_CRIT	2	Critical conditions.
—	SYSLOG	LOG_ERR	3	Error conditions.
—	SYSLOG	LOG_WARNING	4	Warning conditions.
—	SYSLOG	LOG_NOTICE	5	Normal but signification condition.
—	SYSLOG	LOG_INFO	6	Informational.
—	SYSLOG	LOG_DEBUG	7	Debug-level messages.
Test	—	TEST	—	User-generated test message. (Sent to TAC.) CLI commands executed: **show platform show inventory show version**

Message Contents

The following tables display the content formats of alert group messages:

- The **Format for a Short Text Message** table describes the content fields of a short text message.
- The **Common Fields for All Long Text and XML Messages** table describes the content fields that are common to all long text and XML messages. The fields specific to a particular alert group message are inserted at a point between the common fields. The insertion point is identified in the table.
- The **Inserted Fields for a Reactive or Proactive Event Message** table describes the inserted content fields for reactive messages (system failures that require a TAC case) and proactive messages (issues that might result in degraded system performance).
- The **Inserted Fields for an Inventory Event Message** table describes the inserted content fields for an inventory message.

This section also includes the following subsections that provide sample messages:

Table 4: Format for a Short Text Message

Data Item	Description
Device identification	Configured device name
Date/time stamp	Time stamp of the triggering event

Data Item	Description
Error isolation message	Plain English description of triggering event
Alarm urgency level	Error level such as that applied to a system message

Table 5: Common Fields for All Long Text and XML Messages

Data Item (Plain Text and XML)	Description (Plain Text and XML)	MML Tag (XML Only)
Time stamp	Date and time stamp of event in ISO time notation: *YYYY-MM-DD HH:MM:SS GMT+HH:MM*.	CallHome/EventTime
Message name	Name of message. Specific event names are listed in the **Alert Group Trigger Events and Commands** section.	For short text message only
Message type	Specifically “Call Home”.	CallHome/Event/Type
Message subtype	Specific type of message: full, delta, test	CallHome/Event/SubType
Message group	Specifically “reactive”. Optional, because default is “reactive”.	Not applicable. For long-text message only
Severity level	Severity level of message.	Body/Block/Severity
Source ID	Product type for routing through the workflow engine. This is typically the product family name.	For long-text message only
Device ID	Unique device identifier (UDI) for end device generating message. This field should be empty if the message is nonspecific to a fabric switch. The format is *type@Sid@seria* l. • *type* is the product model number from backplane IDPROM. • **@** is a separator character. • *Sid* is C, identifying the serial ID as a chassis serial number. • *serial* is the number identified by the Sid field. Example: ASR1006@C@FOX105101DH	CallHome/CustomerData/ ContractData/DeviceId

Data Item (Plain Text and XML)	Description (Plain Text and XML)	MML Tag (XML Only)
Customer ID	Optional user-configurable field used for contract information or other ID by any support service.	CallHome/CustomerData/ ContractData/CustomerId
Contract ID	Optional user-configurable field used for contract information or other ID by any support service.	CallHome/CustomerData/ ContractData/ContractId
Site ID	Optional user-configurable field used for site IDs supplied by Cisco Systems or other data meaningful to alternate support services.	CallHome/CustomerData/ ContractData/SiteId
Server ID	If the message is generated from the fabric switch, this is the unique device identifier (UDI) of the switch. The format is *type@Sid@seria* l. • *type* is the product model number from backplane IDPROM. • **@** is a separator character. • *Sid* is C, identifying the serial ID as a chassis serial number. • *serial* is the number identified by the Sid field. Example: ASR1006@C@FOX105101DH	For long text message only
Message description	Short text describing the error.	CallHomeMessageDescription
Device name	Node that experienced the event. This is the host name of the device.	CallHome/CustomerData/ SystemInfo/NameName
Contact name	Name of person to contact for issues associated with the node experiencing the event.	CallHome/CustomerData/ SystemInfo/Contact
Contact e-mail	E-mail address of person identified as contact for this unit.	CallHome/CustomerData/ SystemInfo/ContactEmail
Contact phone number	Phone number of the person identified as the contact for this unit.	CallHome/CustomerData/ SystemInfoContactPhoneNumber
Street address	Optional field containing street address for RMA part shipments associated with this unit.	CallHome/CustomerData/ SystemInfo/StreetAddress

Data Item (Plain Text and XML)	Description (Plain Text and XML)	MML Tag (XML Only)	
Model name	Model name of the router. This is the "specific model as part of a product family name.	CallHome/Device/Cisco_Chassis/ Model	
Serial number	Chassis serial number of the unit.	CallHome/Device/Cisco_Chassis/ SerialNumber	
Chassis part number	Top assembly number of the chassis.	CallHome/Device/Cisco_Chassis/ AdditionalInformation/AD@name= "PartNumber"	
System object ID	System Object ID that uniquely identifies the system.	CallHome/Device/Cisco_Chassis/ AdditionalInformation/AD@name= "sysObjectID"	
System description	System description for the managed element.	CallHome/Device/Cisco_Chassis/ AdditionalInformation/AD@name= "sysDescr"	
Fields specific to a particular alert group message are inserted here.	The following fields may be repeated if multiple CLI commands are executed for this alert group.		
	Command output name	The exact name of the issued CLI command.	/aml/Attachments/Attachment/Name
	Attachment type	Attachment type. Usually "inline".	/aml/Attachments/Attachment@type
	MIME type	Normally "text" or "plain" or encoding type.	/aml/Attachments/Attachment/ Data@encoding
	Command output text	Output of command automatically executed.	/mml/attachments/attachment/atdata

Table 6: Inserted Fields for a Reactive or Proactive Event Message

Data Item (Plain Text and XML)	Description (Plain Text and XML)	MML Tag (XML Only)
Chassis hardware version	Hardware version of chassis.	CallHome/Device/Cisco_Chassis/ HardwareVersion
Supervisor module software version	Top-level software version.	CallHome/Device/Cisco_Chassis/ AdditionalInformation/AD@name= "SoftwareVersion"
Affected FRU name	Name of the affected FRU generating the event message.	CallHome/Device/Cisco_Chassis/ Cisco_Card/Model

Data Item (Plain Text and XML)	Description (Plain Text and XML)	MML Tag (XML Only)
Affected FRU serial number	Serial number of affected FRU.	CallHome/Device/Cisco_Chassis/ Cisco_Card/SerialNumber
Affected FRU part number	Part number of affected FRU.	CallHome/Device/Cisco_Chassis/ Cisco_Card/PartNumber
FRU slot	Slot number of FRU generating the event message.	CallHome/Device/Cisco_Chassis/ Cisco_Card/LocationWithinContainer
FRU hardware version	Hardware version of affected FRU.	CallHome/Device/Cisco_Chassis/ Cisco_Card/HardwareVersion
FRU software version	Software version(s) running on affected FRU.	CallHome/Device/Cisco_Chassis/ Cisco_Card/SoftwareIdentity/ VersionString

Table 7: Inserted Fields for an Inventory Event Message

Data Item (Plain Text and XML)	Description (Plain Text and XML)	MML Tag (XML Only)
Chassis hardware version	Hardware version of chassis.	CallHome/Device/Cisco_Chassis/ HardwareVersion
Supervisor module software version	Top-level software version.	CallHome/Device/Cisco_Chassis/ AdditionalInformation/AD@name= “SoftwareVersion”
FRU name	Name of the affected FRU generating the event message.	CallHome/Device/Cisco_Chassis/ Cisco_Card/Model
FRU s/n	Serial number of FRU.	CallHome/Device/Cisco_Chassis/ Cisco_Card/SerialNumber
FRU part number	Part number of FRU.	CallHome/Device/Cisco_Chassis/ Cisco_Card/PartNumber
FRU slot	Slot number of FRU.	CallHome/Device/Cisco_Chassis/ Cisco_Card/LocationWithinContainer
FRU hardware version	Hardware version of FRU.	CallHome/Device/Cisco_Chassis/ CiscoCard/HardwareVersion
FRU software version	Software version(s) running on FRU.	CallHome/Device/Cisco_Chassis/ Cisco_Card/SoftwareIdentity/ VersionString

Sample Syslog Alert Notification in Long Text Format

The following example shows a Syslog alert notification in long text format:

```
TimeStamp : 2014-07-09 09:17 GMT+00:00
Message Name : syslog
Message Type : Call Home
Message Group : reactive
Severity Level : 4
```

```
Source ID : ASR920
Device ID : ASR-920@C@CAT1740U01D
Customer ID :
Contract ID :
Site ID :
Server ID : ASR-920@C@CAT1740U01D
Event Description : *Jul  9 09:17:03.055: %LINK-3-UPDOWN: Interface GigabitEthernet0/0/11,
 changed state to up System Name : Router Contact Email : vmalshet@cisco.com Contact Phone
 :
Street Address :
Affected Chassis : ASR-920
Affected Chassis Serial Number : CAT1740U01D Affected Chassis Part No : 68-3992-01 Affected
 Chassis Hardware Version : 1.0 Supervisor Software Version : 15.5(20140708:133902) Command
 Output Name : show logging Attachment Type : command output MIME Type : text/plain Command
 Output Text : show logging Syslog logging: enabled (0 messages dropped, 1 messages
rate-limited, 0 flushes, 0 overruns, xml disabled, filtering disabled)

No Active Message Discriminator.

No Inactive Message Discriminator.


    Console logging: level debugging, 183 messages logged, xml disabled,
                     filtering disabled
    Monitor logging: level debugging, 0 messages logged, xml disabled,
                     filtering disabled
    Buffer logging:  level debugging, 48 messages logged, xml disabled,
                    filtering disabled
    Exception Logging: size (4096 bytes)
    Count and timestamp logging messages: disabled
    Persistent logging: disabled
    Trap logging: level informational, 114 message lines logged
        Logging Source-Interface:       VRF Name:

Log Buffer (1000000 bytes):

*Jul  9 08:25:11.492: %SYS-5-LOG_CONFIG_CHANGE: Buffer logging: level debugging, xml disabled,
 filtering disabled, size (1000000) *Jul  9 08:25:17.639: %SYS-5-CONFIG_I: Configured from
 console by console *Jul  9 08:27:13.757: DEBUG - Found job name 9, to be triggered in 1049
 secs, changing to 1 seconds *Jul  9 08:27:13.757: DEBUG - *Jul  9 08:27:14.758: DEBUG -
Invoking callback 0x3B9887B0 for job 9 *Jul  9 08:27:14.758: DEBUG - *Jul  9 08:27:14.957:
 %SSH-5-DISABLED: SSH 1.99 has been disabled *Jul  9 08:27:21.719: %SSH-5-ENABLED: SSH 1.99
 has been enabled *Jul  9 08:27:21.910: %PKI-4-NOCONFIGAUTOSAVE: Configuration was modified.
  Issue "write memory" to save new IOS PKI configuration *Jul  9 08:27:21.910: DEBUG - Found
 job name 9, to be triggered in 1 secs, changing to 1189 seconds *Jul  9 08:27:21.910: DEBUG
 - *Jul  9 08:30:36.996: DEBUG - Found job name 9, to be triggered in 1189 secs, changing
to 1 seconds *Jul  9 08:30:36.997: DEBUG - *Jul  9 08:30:37.995: DEBUG - Invoking callback
 0x3B9887B0 for job 9 *Jul  9 08:30:37.996: DEBUG - *Jul  9 08:30:38.198: %SSH-5-DISABLED:
 SSH 1.99 has been disabled *Jul  9 08:30:41.734: %SSH-5-ENABLED: SSH 1.99 has been enabled
 *Jul  9 08:30:41.935: %PKI-4-NOCONFIGAUTOSAVE: Configuration was modified.  Issue "write
memory" to save new IOS PKI configuration *Jul  9 08:30:41.935: DEBUG - Found job name 9,
to be triggered in 1 secs, changing to 928 seconds *Jul  9 08:30:41.935: DEBUG - *Jul  9
08:46:09.936: DEBUG - Invoking callback 0x3B9887B0 for job 9 *Jul  9 08:46:09.936: DEBUG -
 *Jul  9 08:46:10.136: %SSH-5-DISABLED: SSH 1.99 has been disabled *Jul  9 08:46:14.301:
%SSH-5-ENABLED: SSH 1.99 has been enabled *Jul  9 08:46:14.483: %PKI-4-NOCONFIGAUTOSAVE:
Configuration was modified.  Issue "write memory" to save new IOS PKI configuration *Jul
9 08:46:14.483: DEBUG - Found job name 9, to be triggered in 928 secs, changing to 1033
seconds *Jul  9 08:46:14.483: DEBUG - *Jul  9 09:03:27.484: DEBUG - Invoking callback
0x3B9887B0 for job 9 *Jul  9 09:03:27.484: DEBUG - *Jul  9 09:03:27.688: %SSH-5-DISABLED:
SSH 1.99 has been disabled *Jul  9 09:03:33.000: %SSH-5-ENABLED: SSH 1.99 has been enabled
 *Jul  9 09:03:33.190: %PKI-4-NOCONFIGAUTOSAVE: Configuration was modified.  Issue "write
memory" to save new IOS PKI configuration *Jul  9 09:03:33.191: DEBUG - Found job name 9,
to be triggered in 1033 secs, changing to 1144 seconds *Jul  9 09:03:33.191: DEBUG - *Jul
 9 09:07:03.174: DEBUG - Invoking callback 0x3B988508 for job 12 *Jul  9 09:07:03.174: DEBUG
```

```
 - *Jul  9 09:07:03.174: %SMART_LIC-3-EVAL_EXPIRED_WARNING: Evaluation period expired on
Jan  1 00:00:00 1970 UTC where Jan  1 00:00:00 1970 UTC is the UTC date that it expired.
*Jul  9 09:07:03.174: DEBUG - Found job name 12, to be triggered in 3600 secs, changing to
 3600 seconds *Jul  9 09:07:03.174: DEBUG - *Jul  9 09:10:32.325: SMART-LICENSE-TRACE:
call_home_smart_license_status_get[446], Get smart license status 1 *Jul  9 09:11:14.883:
%SYS-5-CONFIG_I: Configured from console by console *Jul  9 09:12:23.087: %SYS-5-CONFIG_I:
 Configured from console by console *Jul  9 09:12:58.243: %SYS-5-CONFIG_I: Configured from
 console by console *Jul  9 09:13:29.983: %LINK-5-CHANGED: Interface GigabitEthernet0/0/11,
 changed state to administratively down *Jul  9 09:13:30.682: %LINEPROTO-5-UPDOWN: Line
protocol on Interface GigabitEthernet0/0/11, changed state to down *Jul  9 09:13:43.831:
%SYS-5-CONFIG_I: Configured from console by console *Jul  9 09:16:42.319: %SYS-5-CONFIG_I:
 Configured from console by console *Jul  9 09:16:58.459: %LINK-3-UPDOWN: Interface
GigabitEthernet0/0/11, changed state to down Router# Command Output Name : show inventory
Attachment Type : command output MIME Type : text/plain Command Output Text : show inventory
NAME: "Chassis", DESCR: "Cisco ASR920 Series - 12GE and 2-10GE - AC model"
PID: ASR-920           , VID: V01, SN: CAT1740U01D

NAME: "IM subslot 0/0", DESCR: "12-port Gig & 2-port Ten Gig Dual Ethernet Interface Module"
PID: 12xGE-2x10GE-FIXED, VID: V00, SN: N/A

NAME: "subslot 0/0 transceiver 1", DESCR: "GE SX"
PID: GLC-SX-MMD          , VID: A   , SN: FNS17481N4J

NAME: "subslot 0/0 transceiver 2", DESCR: "GE SX"
PID: FTLF8519P2BCL-CS  , VID: 0000, SN: FNS11270EAW

NAME: "subslot 0/0 transceiver 3", DESCR: "GE ZX"
PID: GLC-ZX-SMD          , VID: M1  , SN: OPL14450280

NAME: "subslot 0/0 transceiver 4", DESCR: "GE SX"
PID: GLC-SX-MMD          , VID: A   , SN: FNS17220A5R

NAME: "subslot 0/0 transceiver 5", DESCR: "GE SX"
PID: QFBR-5766LP       , VID:     , SN: AGS09498EPL

NAME: "subslot 0/0 transceiver 6", DESCR: "GE SX"
PID: GLC-SX-MMD          , VID: A   , SN: FNS17472EX1

NAME: "subslot 0/0 transceiver 7", DESCR: "GE SX"
PID: GLC-SX-MMD          , VID: A   , SN: FNS17372HFX

NAME: "subslot 0/0 transceiver 9", DESCR: "GE SX"
PID: GLC-SX-MMD          , VID: A   , SN: FNS17481M3M

NAME: "subslot 0/0 transceiver 13", DESCR: "SFP+ 10GBASE-SR"
PID: SFP-10G-SR          , VID: G4.1, SN: AVD1744A0UW

NAME: "module R0", DESCR: "ASR 920 Route Switch Processor , Base Scale, 64Gbps "
PID: ASR-920-12CZ-A    , VID: V00, SN: CAT1740U01D
```

Sample Syslog Alert Notification in XML Format

The following example shows a Syslog alert notification in XML format:

```
<?xml version="1.0" encoding="UTF-8"?>
<soap-env:Envelope xmlns:soap-env="http://www.w3.org/2003/05/soap-envelope">
<soap-env:Header>
<aml-session:Session xmlns:aml-session="http://www.cisco.com/2004/01/aml-session"
soap-env:mustUnderstand="true"
soap-env:role="http://www.w3.org/2003/05/soap-envelope/role/next">
<aml-session:To>http://tools.cisco.com/neddce/services/DDCEService</aml-session:To>
<aml-session:Path>
<aml-session:Via>http://www.cisco.com/appliance/uri</aml-session:Via>
```

```
</aml-session:Path>
<aml-session:From>http://www.cisco.com/appliance/uri</aml-session:From>
<aml-session:MessageId>M2:CAT1740U01D:53BD07BB</aml-session:MessageId>
</aml-session:Session>
</soap-env:Header>
<soap-env:Body>
<aml-block:Block xmlns:aml-block="http://www.cisco.com/2004/01/aml-block">
<aml-block:Header>
<aml-block:Type>http://www.cisco.com/2005/05/callhome/syslog</aml-block:Type>
<aml-block:CreationDate>2014-07-09 09:13:31 GMT+00:00</aml-block:CreationDate>
<aml-block:Builder>
<aml-block:Name>ASR920</aml-block:Name>
<aml-block:Version>2.0</aml-block:Version>
</aml-block:Builder>
<aml-block:BlockGroup>
<aml-block:GroupId>G3:CAT1740U01D:53BD07BB</aml-block:GroupId>
<aml-block:Number>0</aml-block:Number>
<aml-block:IsLast>true</aml-block:IsLast>
<aml-block:IsPrimary>true</aml-block:IsPrimary>
<aml-block:WaitForPrimary>false</aml-block:WaitForPrimary>
</aml-block:BlockGroup>
<aml-block:Severity>2</aml-block:Severity>
</aml-block:Header>
<aml-block:Content>
<ch:CallHome xmlns:ch="http://www.cisco.com/2005/05/callhome" version="1.0">
<ch:EventTime>2014-07-09 09:13:29 GMT+00:00</ch:EventTime> <ch:MessageDescription>*Jul  9
09:13:29.983: %LINK-5-CHANGED: Interface GigabitEthernet0/0/11, changed state to
administratively down</ch:MessageDescription> <ch:Event> <ch:Type>syslog</ch:Type>
<ch:SubType></ch:SubType> <ch:Brand>Cisco Systems</ch:Brand>
<ch:Series>ASR920 Series Router</ch:Series> </ch:Event> <ch:CustomerData> <ch:UserData>
<ch:Email>vmalshet@cisco.com</ch:Email>
</ch:UserData>
<ch:ContractData>
<ch:CustomerId></ch:CustomerId>
<ch:SiteId></ch:SiteId>
<ch:ContractId></ch:ContractId>
<ch:DeviceId>ASR-920@C@CAT1740U01D</ch:DeviceId>
</ch:ContractData>
<ch:SystemInfo>
<ch:Name>Router</ch:Name>
<ch:Contact></ch:Contact>
<ch:ContactEmail>vmalshet@cisco.com</ch:ContactEmail>
<ch:ContactPhoneNumber></ch:ContactPhoneNumber>
<ch:StreetAddress></ch:StreetAddress>
</ch:SystemInfo>
<ch:CCOID></ch:CCOID>
</ch:CustomerData>
<ch:Device>
<rme:Chassis xmlns:rme="http://www.cisco.com/rme/4.0">
<rme:Model>ASR-920</rme:Model>
<rme:HardwareVersion>1.0</rme:HardwareVersion>
<rme:SerialNumber>CAT1740U01D</rme:SerialNumber>
<rme:AdditionalInformation>
<rme:AD name="PartNumber" value="68-3992-01" /> <rme:AD name="SoftwareVersion"
value="15.5(20140708:133902)" /> <rme:AD name="SystemObjectId" value="1.3.6.1.4.1.9.1.2062"
 /> <rme:AD name="SystemDescription" value="Cisco IOS Software, ASR920 Software
(PPC_LINUX_IOSD-UNIVERSALK9_NPE-M), Experimental Version 15.5(20140708:133902)
[mcp_dev-mrameshj-july4 114] Copyright (c) 1986-2014 by Cisco Systems, Inc.
Compiled Tue 08-Jul-14 23:52 by mrameshj" /> <rme:AD name="ServiceNumber" value="" /> <rme:AD
 name="ForwardAddress" value="" /> </rme:AdditionalInformation> </rme:Chassis> </ch:Device>
 </ch:CallHome> </aml-block:Content> <aml-block:Attachments> <aml-block:Attachment
type="inline"> <aml-block:Name>show logging</aml-block:Name> <aml-block:Data encoding="plain">
 <![CDATA[show logging Syslog logging: enabled (0 messages dropped, 1 messages rate-limited,
 0 flushes, 0 overruns, xml disabled, filtering disabled)
```

```
No Active Message Discriminator.

No Inactive Message Discriminator.


    Console logging: level debugging, 178 messages logged, xml disabled,
                     filtering disabled
    Monitor logging: level debugging, 0 messages logged, xml disabled,
                     filtering disabled
    Buffer logging:  level debugging, 43 messages logged, xml disabled,
                    filtering disabled
    Exception Logging: size (4096 bytes)
    Count and timestamp logging messages: disabled
    Persistent logging: disabled
    Trap logging: level informational, 109 message lines logged
        Logging Source-Interface:       VRF Name:

Log Buffer (1000000 bytes):

*Jul  9 08:25:11.492: %SYS-5-LOG_CONFIG_CHANGE: Buffer logging: level debugging, xml disabled,
 filtering disabled, size (1000000) *Jul  9 08:25:17.639: %SYS-5-CONFIG_I: Configured from
 console by console *Jul  9 08:27:13.757: DEBUG - Found job name 9, to be triggered in 1049
 secs, changing to 1 seconds *Jul  9 08:27:13.757: DEBUG - *Jul  9 08:27:14.758: DEBUG -
Invoking callback 0x3B9887B0 for job 9 *Jul  9 08:27:14.758: DEBUG - *Jul  9 08:27:14.957:
 %SSH-5-DISABLED: SSH 1.99 has been disabled *Jul  9 08:27:21.719: %SSH-5-ENABLED: SSH 1.99
 has been enabled *Jul  9 08:27:21.910: %PKI-4-NOCONFIGAUTOSAVE: Configuration was modified.
  Issue "write memory" to save new IOS PKI configuration *Jul  9 08:27:21.910: DEBUG - Found
 job name 9, to be triggered in 1 secs, changing to 1189 seconds *Jul  9 08:27:21.910: DEBUG
 - *Jul  9 08:30:36.996: DEBUG - Found job name 9, to be triggered in 1189 secs, changing
to 1 seconds *Jul  9 08:30:36.997: DEBUG - *Jul  9 08:30:37.995: DEBUG - Invoking callback
 0x3B9887B0 for job 9 *Jul  9 08:30:37.996: DEBUG - *Jul  9 08:30:38.198: %SSH-5-DISABLED:
 SSH 1.99 has been disabled *Jul  9 08:30:41.734: %SSH-5-ENABLED: SSH 1.99 has been enabled
 *Jul  9 08:30:41.935: %PKI-4-NOCONFIGAUTOSAVE: Configuration was modified.  Issue "write
memory" to save new IOS PKI configuration *Jul  9 08:30:41.935: DEBUG - Found job name 9,
to be triggered in 1 secs, changing to 928 seconds *Jul  9 08:30:41.935: DEBUG - *Jul  9
08:46:09.936: DEBUG - Invoking callback 0x3B9887B0 for job 9 *Jul  9 08:46:09.936: DEBUG -
 *Jul  9 08:46:10.136: %SSH-5-DISABLED: SSH 1.99 has been disabled *Jul  9 08:46:14.301:
%SSH-5-ENABLED: SSH 1.99 has been enabled *Jul  9 08:46:14.483: %PKI-4-NOCONFIGAUTOSAVE:
Configuration was modified.  Issue "write memory" to save new IOS PKI configuration *Jul
9 08:46:14.483: DEBUG - Found job name 9, to be triggered in 928 secs, changing to 1033
seconds *Jul  9 08:46:14.483: DEBUG - *Jul  9 09:03:27.484: DEBUG - Invoking callback
0x3B9887B0 for job 9 *Jul  9 09:03:27.484: DEBUG - *Jul  9 09:03:27.688: %SSH-5-DISABLED:
SSH 1.99 has been disabled *Jul  9 09:03:33.000: %SSH-5-ENABLED: SSH 1.99 has been enabled
 *Jul  9 09:03:33.190: %PKI-4-NOCONFIGAUTOSAVE: Configuration was modified.  Issue "write
memory" to save new IOS PKI configuration *Jul  9 09:03:33.191: DEBUG - Found job name 9,
to be triggered in 1033 secs, changing to 1144 seconds *Jul  9 09:03:33.191: DEBUG - *Jul
 9 09:07:03.174: DEBUG - Invoking callback 0x3B988508 for job 12 *Jul  9 09:07:03.174: DEBUG
 - *Jul  9 09:07:03.174: %SMART_LIC-3-EVAL_EXPIRED_WARNING: Evaluation period expired on
Jan  1 00:00:00 1970 UTC where Jan  1 00:00:00 1970 UTC is the UTC date that it expired.
*Jul  9 09:07:03.174: DEBUG - Found job name 12, to be triggered in 3600 secs, changing to
 3600 seconds *Jul  9 09:07:03.174: DEBUG - *Jul  9 09:10:32.325: SMART-LICENSE-TRACE:
call_home_smart_license_status_get[446], Get smart license status 1 *Jul  9 09:11:14.883:
%SYS-5-CONFIG_I: Configured from console by console *Jul  9 09:12:23.087: %SYS-5-CONFIG_I:
 Configured from console by console *Jul  9 09:12:58.243: %SYS-5-CONFIG_I: Configured from
 console by console Router#]]></aml-block:Data> </aml-block:Attachment> <aml-block:Attachment
 type="inline"> <aml-block:Name>show inventory</aml-block:Name> <aml-block:Data
encoding="plain"> <![CDATA[show inventory
NAME: "Chassis", DESCR: "Cisco ASR920 Series - 12GE and 2-10GE - AC model"
PID: ASR-920           , VID: V01, SN: CAT1740U01D

NAME: "IM subslot 0/0", DESCR: "12-port Gig & 2-port Ten Gig Dual Ethernet Interface Module"
PID: 12xGE-2x10GE-FIXED, VID: V00, SN: N/A
```

```
NAME: "subslot 0/0 transceiver 1", DESCR: "GE SX"
PID: GLC-SX-MMD          , VID: A   , SN: FNS17481N4J

NAME: "subslot 0/0 transceiver 2", DESCR: "GE SX"
PID: FTLF8519P2BCL-CS  , VID: 0000, SN: FNS11270EAW

NAME: "subslot 0/0 transceiver 3", DESCR: "GE ZX"
PID: GLC-ZX-SMD          , VID: M1  , SN: OPL14450280

NAME: "subslot 0/0 transceiver 4", DESCR: "GE SX"
PID: GLC-SX-MMD          , VID: A   , SN: FNS17220A5R

NAME: "subslot 0/0 transceiver 5", DESCR: "GE SX"
PID: QFBR-5766LP       , VID:     , SN: AGS09498EPL

NAME: "subslot 0/0 transceiver 6", DESCR: "GE SX"
PID: GLC-SX-MMD          , VID: A   , SN: FNS17472EX1

NAME: "subslot 0/0 transceiver 7", DESCR: "GE SX"
PID: GLC-SX-MMD          , VID: A   , SN: FNS17372HFX

NAME: "subslot 0/0 transceiver 9", DESCR: "GE SX"
PID: GLC-SX-MMD          , VID: A   , SN: FNS17481M3M

NAME: "subslot 0/0 transceiver 13", DESCR: "SFP+ 10GBASE-SR"
PID: SFP-10G-SR          , VID: G4.1, SN: AVD1744A0UW

NAME: "module R0", DESCR: "ASR 920 Route Switch Processor , Base Scale, 64Gbps "
PID: ASR-920-12CZ-A    , VID: V00, SN: CAT1740U01D


Router#]]></aml-block:Data>
</aml-block:Attachment>
</aml-block:Attachments>
</aml-block:Block>
</soap-env:Body>
</soap-env:Envelope>
```

Additional References

The following sections provide references related to the Call Home feature.

Related Documents

Related Topic	Title
Cisco IOS XE commands	Cisco IOS Master Commands List, All Releases
Explains how the Smart Call Home service offers web-based access to important information on select Cisco devices and offers higher network availability, and increased operational efficiency by providing real-time alerts.	Smart Call Home User Guide
Smart Call Home site page on Cisco.com for access to all related product information.	Cisco Smart Call Home site

Related Topic	Title
Public Key Infrastructure (PKI) and Certificate Authority configuration in Cisco IOS XE software	Cisco IOS XE Security Configuration Guide: Secure Connectivity

Standards

Standard	Title
No new or modified standards are supported by this feature, and support for existing standards has not been modified by this feature.	—

MIBs

MIB	MIBs Link
CISCO-CALLHOME-MIB	To locate and download MIBs for selected platforms, Cisco IOS XE software releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFC	Title
No new or modified RFCs are supported by this feature, and support for existing RFCs has not been modified by this feature.	—

Technical Assistance

Description	Link
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

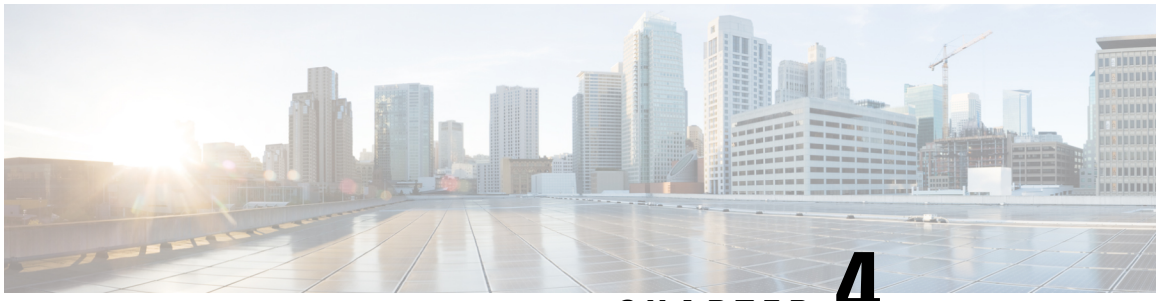
Feature Information for Call Home

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Table 8: Feature Information for Call Home

Feature Name	Releases	Feature Information
Call Home	Cisco IOS XE Release 3.13.0S	This feature was introduced on the Cisco ASR 920 Series Aggregation Services Router (ASR-920-12CZ-A, ASR-920-12CZ-D, ASR-920-4SZ-A, ASR-920-4SZ-D).



CHAPTER 4

What Is Smart Licensing?

Cisco Smart Licensing is a flexible licensing model that provides you with an easier, faster, and more consistent way to purchase and manage software across the Cisco portfolio and across your organization. And it's secure – you control what users can access. With Smart Licensing you get:

- Easy Activation: Smart Licensing establishes a pool of software licenses that can be used across the entire organization—no more PAKs (Product Activation Keys).
- Unified Management: My Cisco Entitlements (MCE) provides a complete view into all of your Cisco products and services in an easy-to-use portal, so you always know what you have and what you are using.
- License Flexibility: Your software is not node-locked to your hardware, so you can easily use and transfer licenses as needed.

To use Smart Licensing, you must first set up a Smart Account on Cisco Software Central (http://software.cisco.com/).

For a more detailed overview on Cisco Licensing, go to https://cisco.com/go/licensingguide.

Benefits of Smart Licensing

- Visibility into devices and software that you have purchased and deployed

- Product simplicity with standard software offers, licensing platform, and policies
- Better and educated purchase decisions that could lead to lower operational costs
- Easier deployment with automatic license activation that negates the use of product activation keys

Create a Cisco Smart Account

Cisco Smart Account is an account where all products enabled for Smart Licensing are deposited. Cisco Smart Account allows you to manage and activate your licenses to devices, monitor license use, and track Cisco license purchases. Through transparent access, you have a real-time view into your Smart Licensing products. IT administrators can manage licenses and account users within your organization's Smart Account through the Smart Software Manager.

You can create your Cisco Smart Account, see Smart Accounts.

Prerequisites

Before you enable or migrate to Smart Licensing, ensure that:

- You have a smart account, and access to the Cisco Smart Software Manager portal. To create and access a smart account, go to Smart Accounts. Click **Get a Smart Account**, to get started.
- You have registered your device in CSSM. To register your device, see the Generating a New Token from Cisco Smart Software Manager, on page 85 and Registering Device using the id Token, on page 86 section.
- You have configured the Layer 3 connectivity to the CSSM Smart Software Manager satellite.

Cisco Smart Software Manager

Cisco Smart Software Manager enables you to manage all of your Cisco Smart software licenses from one centralized website. With Cisco Smart Software Manager, you organize and view your licenses in groups called virtual accounts (collections of licenses and product instances). Use the Cisco Smart Software Manager to do the following tasks:

- Create, manage, or view virtual accounts.
- Create and manage Product Instance Registration Tokens.
- Transfer licenses between virtual accounts or view licenses
- Transfer, remove, or view product instances.
- Run reports against your virtual accounts.
- Modify your email notification settings.
- View overall account information

The Cisco Smart Software Manager **Help** describes the procedures for carrying out these tasks. You can access the Cisco Smart Software Manager on https://software.cisco.com/#.

Note Use Chrome 32.0, Firefox 25.0 or Safari 6.0.5 web browsers to access the Cisco Smart Software Manager. Also, ensure that Javascript 1.5 or a later version is enabled in your browser.

Note If there is a communication failure seen with the following error message:

```
Error Message %SMART_LIC-3-COMM_FAILED: Communications failure with the [chars] :
[chars]
```

Explanation: Smart Licensing communication either with CSSM failed. The first [chars] is the currently configured transport type, and the second [chars] is the error string with details of the failure. This message appears for every communication attempt that fails.

Possible reasons for failure include:

- A TLS or SSL handshake failure caused by a missing client certificate. The certificate is required for TLS authentication of the two communicating sides. A recent server upgrade may have cause the certificate to be removed. This reason applies only to a topology where the product instance is directly connected to CSSM.

Recommended Action:

- To resolve the error, configure the **ip http client secure-trustpoint *trustpoint-name*** command in global configuration mode. For *trustpoint-name*, enter only `SLA-TrustPoint`. This command specifies that the secure HTTP client should use the certificate associated with the trustpoint indicated by the trustpoint-name argument.

Licenses, Product Instances, and Registration Tokens

Licenses

Cisco offers two primary licensing models: perpetual and subscription.

- Perpetual license: Software with the right to use for an indefinite period of time. The license is typically locked to the device and additional annual fees are required to maintain support. Customers buy a new license when they buy a new device.
- Subscription license: Software with the right to use for the length of the subscription term. Subscription models generally provide faster access to our latest features and innovations and more predictable cost structures. Additionally, support services are included with your subscription.

In addition, there are demo licenses that expire after at most 60 days. As implied by the name, demo licenses are not intended for production use.

All product licenses reside in a virtual account.

Product Instances

A product instance is an individual device with a unique device identifier (UDI) that is registered using a product instance registration token (or registration token). You can register any number of instances of a product with a single registration token. Each product instance can have one or more licenses residing in the same virtual account. Product instances must periodically connect to the Cisco Smart Software Manager servers during a specific renewal period. If a product instance fails to connect, it is marked as having a license shortage, but continues to use the license. If you remove the product instance, its licenses are released and made available within the virtual account.

Product Instance Registration Tokens

A product requires a registration token until you have registered the product. Registration tokens are stored in the Product Instance Registration Token Table associated with your enterprise account. Once the product is registered the registration token is no longer necessary and can be revoked and removed from the table without effect. Registration tokens can be valid from 1 to 365 days.

Virtual Accounts

Smart Licencing allows you to create multiple license pools or virtual accounts within the Smart Software Manager portal. Using the **Virtual Accounts** option you can aggregate licenses into discrete bundles associated with a cost center so that one section of an organization cannot use the licenses of another section of the organization. For example, if you segregate your company into different geographic regions, you can create a virtual account for each region to hold the licenses and product instances for that region.

All new licenses and product instances are placed in the default virtual account in the Smart Software Manager, unless you specify a different one during the order process. Once in the default account, you may choose to transfer them to any other account as desired, provided you have the required access permissions.

Use the Smart Software Manager portal at https://www.cisco.com/c/en/us/products/software/smart-accounts/software-licensing.html to create license pools or transfer licenses.

Compliance reporting

On a periodic basis, as described by the terms of the Smart Licensing contract, reports are automatically sent to you containing inventory and license compliance data. These reports will take one of three forms:

- **Periodic Record:** This record is generated on a periodic (configurable) basis with relevant inventory data saved at a given point of time. This report is saved within the Cisco cloud for archival.
- **Manual Record:** You can manually generate this record with relevant inventory data saved at any given point of time. This report will be saved within the Cisco cloud for archival.
- **Compliance Warning Report:** This report is automatically or manually generated when a license compliance event occurs. This report does not contain a full inventory data, but only any shortfalls in entitlements for a given software license.

  You can view these reports from the Smart Software Manager portal at https://www.cisco.com/c/en/us/products/software/smart-accounts/software-licensing.html.

Restrictions for Smart Licensing

- Specific License Reservation (SLR) is not supported on the router in releases prior to Cisco IOS XE Cupertino 17.8.1 Release.

- Starting with Cisco IOS XE Amsterdam 17.3.1, bulk port license is not requested explicitly from the Smart Licensing server by IOS XE software. Instead, equivalent Port Upgrade Licenses are consumed.
- The **debug smart license** command is not supported. Use the **license smart log verbose** command to collect smart agent logs.
- Starting with Cisco IOS XE Cupertino 17.10.1, debug license command is not supported. Use the **set platform software trace** command to collect the logs.

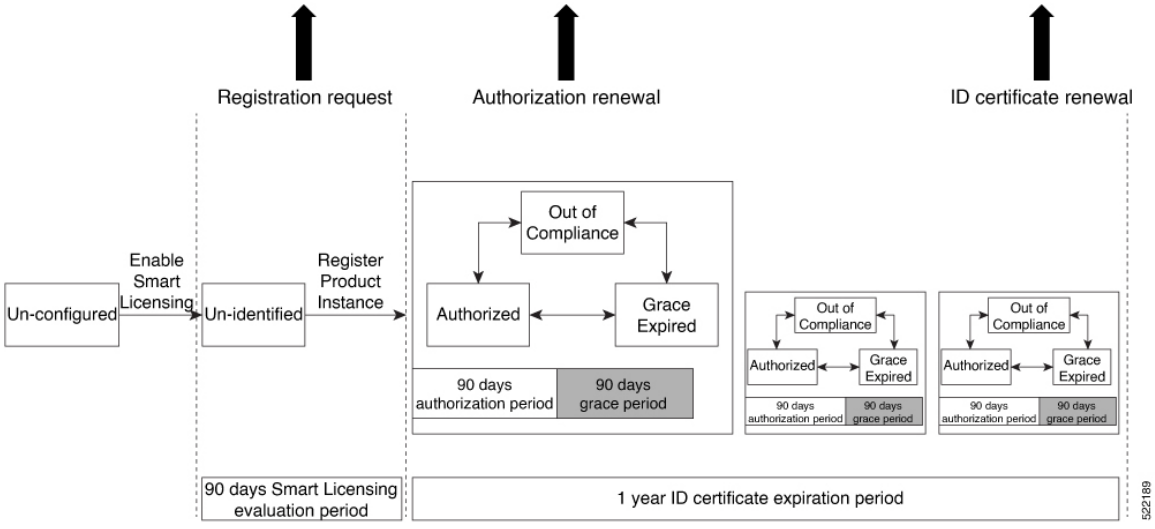
```
Router# set platform software trace ios R1 uea-sl ?
  debug      Debug messages
  emergency  Emergency possible message
  error      Error messages
  info       Informational messages
  noise      Maximum possible message
  notice     Notice messages
  verbose    Verbose debug messages
  warning    Warning messages

2022/04/16 14:29:26.257693428 {iosrp_R0-0}{255}: [btrace] [52428800:8195]: (note):
module init: (uea-sl), huffman code len=32, code:
0xa5.4b.b0.b8.00.00.00.00.00.00.00.00.00.00.00.00
2022/04/16 14:29:26.259058254 {iosrp_R0-0}{255}: [uea-sl] [8195]: (note):  UEA registered
 for btrace
```

- The license boot level command must be configured before upgrading to Smart Licensing for releases prior to Cisco IOS XE Cupertino 17.8.1.
- In Cisco IOS XE Cupertino 17.8.1, the router in Smart Licensing mode may go into an Unregistered-Registration state post reload. This issue occurs when you try to reregister Smart Licensing on the router with the same token. We recommend you remove the router from the CSSM server in Product Instances, and reregister the Smart License with the same token.

Smart Licensing Workflow

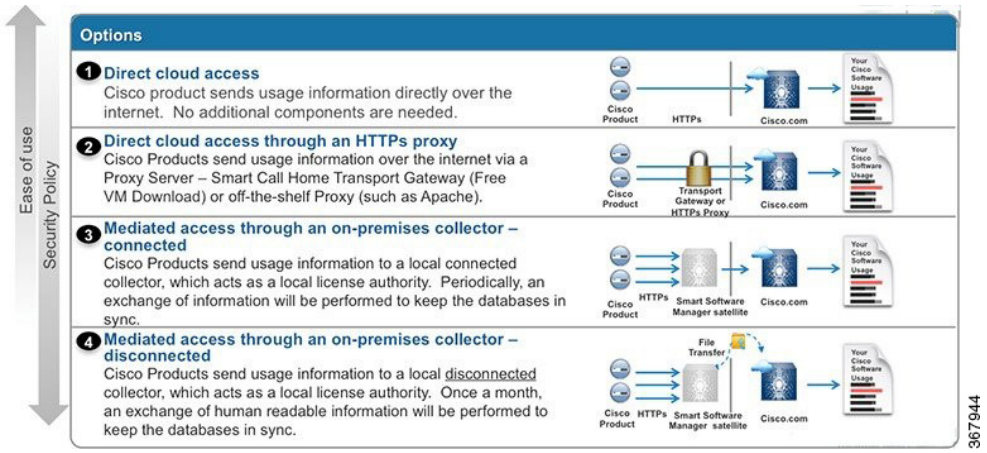
The Smart Licensing workflow is depicted in this flowchart.



Deployment Options for Smart Licensing

The following illustration shows the various options available for deploying Smart Licensing. Since security is one of the most important aspects for any user, the image lists the deployment options from the easiest option to the most secure one:

Figure 6: Smart Licensing Deployment Options



1. Direct Cloud Access: This deployment option allows you to transfer usage over the Internet to the Cloud server directly from the devices to the cloud via HTTPs.
2. Direct cloud access through a HTTPs proxy: The deployment option allows you to transfer files directly over the Internet to the Cloud server through an HTTPs proxy. That is, either using Smart Call Home Transport Gateway or using HTTPs proxy such as Apache.
3. Mediated access through an on-premises collector-connected: The third deployment option uses an internal collection device called as the “Cisco Smart Software Satellite.” The Satellite, which is available at your end, periodically transmits the information into the cloud using periodic network synchronization. In this deployment option, the only system or database transferring information to the cloud is the Satellite. You can thus control what is included in the collector database, which provides greater security.
4. Mediated access through an on-premises collector-disconnected: The fourth deployment option is where you use the Satellite, but only to transfer the collected files using manual synchronization (at least once a month). In this option, the system is not directly connected to the Cloud and an air gap exists between your network and the Cisco Cloud.

Smart Licensing for New Depolyments

When you purchase the Default Smart License—Cisco IOS XE Cupertino 17.7.1 or later images, Smart Licensing is enabled by default. However, you must perform the following steps to use the Smart Licensing feature:

1. Ensure that the Prerequisites, on page 80 are met.
2. Power on your device.

3. Configure Smart Call Home. To view the detailed steps for configuring Call Home, see Configure Smart Call Home, on page 85.

Note While specifying the Smart Licensing registration URL for the CSSM portal, prefix the URL with HTTPS; HTTP is no longer supported

Note In case of Satellite deployments under call-home profile, remove the default destination CSSM production URL and configure the satellite destination URL.

4. Enable Smart Licensing. See Enable and Register Smart Licensing, on page 89
5. Generate a token ID from the CSSM portal. To know how to perform this step, see the Generating a New Token from Cisco Smart Software Manager, on page 85 section.
6. Register the device on the portal using the token. To know how to perform this step, see the Registering Device using the id Token, on page 86 section.

Configure Smart Call Home

Smart Call Home options that are required for the Smart Licensing are automatically enabled when the Smart Licensing is enabled.

If Smart Call Home is disabled, enable the following:

1. Configure terminal
2. Service call-home

In the smart licensing configuration, by default a Cisco TAC-1 profile is configured. For direct cloud access, you must additionally update the following:

- Configure terminal
- Service call-home
- Call-home > Contact-email-address

When you change from the Call Home to the Smart transport method, you do not have to disable the CiscoTAC-1 call-home profile for Smart Licensing to work as expected.

Generating a New Token from Cisco Smart Software Manager

Tokens are generated to register new product instances to the virtual account.

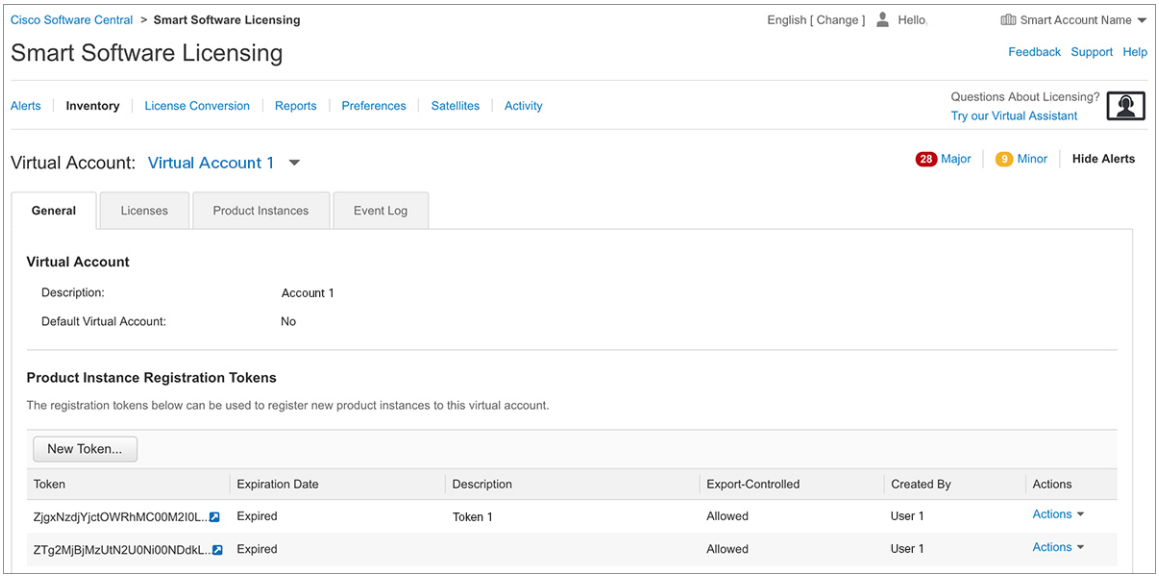
Procedure

Step 1 Login to Cisco Smart Software Manager at https://software.cisco.com/#.

You must log into the portal using an username and password provided by Cisco.

Step 2 Select the **Inventory** tab, and select your virtual account from the **Virtual Account** drop-down list.

Step 3 Select the **General** tab, and click **New Token**.



The system displays the Create Registration Token page.

Step 4 Enter the token description. Specify the number of days the token must be active.

Step 5 Enable the **Allow export-controlled functionality on the products registered with this token** check box.

Step 6 Click **Create Token**. After the token is created, click **Copy** to copy the newly created token.

Registering Device using the id Token

Procedure

Now that you have the token from the CSSM, using the token, execute the `<device>#license smart register idtoken < token from CSSM portal >` command to complete the smart license configuration.

On successful registration, the device displays the “Registered” status and receives an identity certificate. This certificate is saved on your device and is automatically used for all future communication with Cisco. However, if the registration fails, the system generates an error log.

Example:

Note For an ASR device with redundancy enabled, you must execute `write memory` after successful registration. This ensures that the registration is valid even if you perform switchover or reload operations.

What to do next

- Enable the required technology package licenses by executing the **license boot level** <*technologypackage*> command from the global config mode.

Registering Smart Licensing on the Mangement Interface

- Obtain the IP address for configuration which can access the Cisco Licensing Cloud servers.
- Configure the Smart Call Home receiver http address for Call-home message delivery.
- Obtain the e-mail, phone, and street address information for the Call Home contact for configuration, so that the receiver determines the origin of received messages.
- Configure the IP route and verify the IP connectivity from the router to e-mail servers or destination Smart Call Home receiver.

Procedure

Step 1 Configure the IP address on Mgmt-interface which access the backend servers.

Example:

```
Configure terminal
Router (config)# interface gi0
IP address 10.78.101.228 255.255.255.0
```

Step 2 Configure the IP routes on management interface.

Example:

```
Router(config)# ip route vrf Mgmt-intf 0.0.0.0 0.0.0.0 10.78.100.1
Router(config)#ip route vrf Mgmt-intf 10.105.33.0 255.255.255.0 10.78.100.1
```

Step 3 Configure DNS server IP address and name server.

Example:

```
Router (config)#ip domain lookup source-interface GigabitEthernet0
Router (config)# ip http client source-interface GigabitEthernet0
Router (config)#ip name-server vrf Mgmt-intf 171.70.168.183
Router (config)#ip name-server vrf Mgmt-intf 72.163.128.140
```

Step 4 Configure the e-mail server and destination Smart Call Home receiver http address.

Example:

```
Router(config)# license smart enable
Router(config)#service call-home
Router(config)# call-home
Router(config)#vrf Mgmt-intf
Router(cfg-call-home)# contact-email-addr <addr>
Router(cfg-call-home)# no http secure server-identity-check
Router(cfg-call-home)#mail-server 72.163.197.20 priority 1
Router(cfg-call-home)# mail-server 173.36.12.72 priority 2
Router(cfg-call-home)# profile ciscoTAC-1
Router (cfg-call-home-profile)# destination transport-method http
Router (cfg-call-home-profile)# destination address http
```

```
http://elo-elm5.cisco.com:8080/ddce/services/DDCEService
Router(cfg-call-home-profile)# end
```

What to do next

Enable and Register Smart Licensing

Registering Smart Licensing Using Network Port

Before you begin

- If the interface is configured using **ip http client source-interface interface** command with IPv6 address, it establishes a session with a remote server with IPv6 connectivity.
- If the interface is configured using **ip http client source-interface interface** command with IPv6 address and IPv4 address, it establishes a session with a remote server with IPv6 connectivity.

Procedure

Step 1 Configure the IP address on network port which access the backend servers.

Example:

```
Configure terminal
Router (config)# interface gi0
IP address 10.78.101.228 255.255.255.0
```

Step 2 Configure the IP routes on network.

Example:

```
Router(config)# ip route 0.0.0.0 0.0.0.0 10.78.101.1
Router(config)#ip route 10.105.33.0 255.255.255.0 10.78.101.1
```

Step 3 Configure DNS server IP address and name server.

Example:

```
Router (config)#ip domain lookup source-interface GigabitEthernet0/0/3
Router (config)# ip http client source-interface GigabitEthernet0/0/3
Router (config)#ip name-server 72.163.128.140
Router (config)#ip name-server 171.70.168.183
```

Step 4 Configure the e-mail server and destination Smart Call Home receiver http address.

Example:

```
Router(config)# license smart enable
Router(config)#service call-home
Router(config)#call-home
Router(cfg-call-home)# contact-email-addr <addr>
Router(cfg-call-home)# no http secure server-identity-check
Router(cfg-call-home)# profile ciscoTAC-1
Router (cfg-call-home-profile)# destination transport-method http
Router (cfg-call-home-profile)# destination address http
```

```
http://elo-elm5.cisco.com:8080/ddce/services/DDCEService
Router(cfg-call-home-profile)#end
```

What to do next

Enable and Register Smart Licensing

Enable and Register Smart Licensing

When you purchase the Cisco IOS XE Cupertino 17.7.1 or later images, Smart Licensing is enabled by default. Smart Licensing is the only mode that is available for licensing, and you do not have to perform any additional steps to enable this feature.

If you are using Cisco IOS XE Bengaluru 17.6.1 or a previous version, Smart Licensing is not enabled by default. To enable the same, execute the following:

Note Once Smart Licensing mode is enabled, all CLIs related to the traditional licensing mode are disabled.

Before you begin

You must have purchased the product for which you are adding the license. When you purchase the product, you are provided with a user name and password to the Cisco Smart Software Manager portal, from where you can generate the product instance registration tokens.

Procedure

Step 1 Login to Cisco Smart Software Manager at https://www.cisco.com/c/en/us/buy/licensing.html.

Get a token from the Cisco portal using the link. You must log in to the portal using a Cisco provided username and password. Once you have generated the token, select **Copy** hyperlink to copy the token or download the token to a text file. The token is used to register and activate a device, and assign the device to a virtual account.

Note This token is valid for 30 days.

Step 2 **license smart enable**

Example:

```
Device(config)#license smart enable
```

Enables basic Smart Licensing. Use the **no** form of this command to disable Smart Licensing and revert to the traditional or strict mode of licensing.

Note All ports go to admin down state on executing the **no smart license enable** command. We recommend you do perform the following to bring up the ports:

- Default (license free) ports—Reload the router.
- Licensed ports—Perform no shutdown of router followed by reload.

Warning **Disabling the smart licensing can deactivate all the licenses and the target device can be inaccessible. Ensure the backup access method is available for console or management port.**

Step 3 **license boot level** { *advancedmetroipaccess* | *metroaccess* | *metroipaccess* }

Example:

```
Device(config)#license boot level metroipaccess
```

Enables technological license, these licenses need router reboot after configuring.

Step 4 **license feature** { *atm* | *gnss* | *ipsec* | *port* | *ptp* | *upoe* }

Example:

```
Device(config)#license feature atm
```

Enables different feature level licences available.

Note Feature level license supported depends on the router variant.

For more information see, Licensing 1G and 10G Ports on the Cisco ASR 920 Series Routers

Step 5 **license smart register idtoken** *token_ID*

Example:

```
Device# license smart register idtoken
NmE1Yzg0OWMtYmJ4

license smart register: Registration process is
in progress.Please check the syslog for the
registration status and result
```

Enables to register your device.

What to do next

On successful registration, the device will receive an identity certificate. This certificate is saved on your device and automatically used for all future communications with Cisco. Every 30 days, Smart Licensing will automatically renew the registration information with Cisco. If registration fails, an error will be logged. Additionally, license usage data is collected and a report is sent to you every month. If required, you can configure your Smart Call Home settings such that sensitive information (like hostname, username and password) are filtered out from the usage report.

Verify Smart Licensing Configuration

After enabling Smart Licensing, you can use the **show** commands to verify the default Smart Licensing configuration. If any issue is detected, take corrective action before making further configurations.

Note Starting with Cisco IOS XE Amsterdam 17.3.1, bulk port license is not displayed in any of the **show license** commands.

Procedure

Step 1 **show license status**

Example:

```
Device#show license status
```

Displays the compliance status of Smart Licensing. Following are the possible status:

- **Enabled**: Indicates that Smart Licensing is enabled.
- **Waiting**: Indicates the initial state after your device has made a license entitlement request. The device establishes communication with Cisco and successfully registers itself with the Cisco license manager.
- **Authorized**: Indicates that your device is able to communicate with the Cisco license manager, and is authorised to initiate requests for license entitlements.
- **Out-Of-Compliance**: Indicates that one or more of your licenses are out-of-compliance. You must buy additional licenses.
- **Eval Period**: Indicates that Smart Licencing is consuming the evaluation period. You must register the device with the Cisco Licensing manager, else your license expires.
- **Grace Period**: Indicates that connectivity to the Cisco license manager is lost. You must try restore connectivity to renew the authorization period.
- **Disabled**: Indicates that Smart Licensing is disabled.
- **Invalid**: Indicates that Cisco does not recognize the entitlement tag as it is not in the database.

Example:

```
Smart Licensing is ENABLED

Registration:
  Status: REGISTERED
  Smart Account: BU Production Test
  Virtual Account:Device
  Export-Controlled Functionality: Allowed
  Initial Registration: SUCCEEDED on Dec 17 02:31:11 2015 UTC
  Last Renewal Attempt: None
  Next Renewal Attempt: Jun 14 02:31:10 2016 UTC
  Registration Expires: Dec 16 02:25:58 2016 UTC

License Authorization:
  Status: AUTHORIZED on Feb 01 05:08:29 2016 UTC
  Last Communication Attempt: FAILED on Feb 01 05:08:29 2016 UTC
    Failure reason: Fail to send out Call Home HTTP message.
  Next Communication Attempt: Feb 02 04:09:56 2016 UTC
  Communication Deadline: Mar 16 03:00:33 2016 UTC
```

Step 2 **show license all**

Example:

```
Device#show license all
```

Displays all entitlements in use. It can also be used to check if Smart Licensing is enabled. Additionally, it shows associated licensing certificates, compliance status, UDI, and other details.

Step 3 **show license tech support**

Displays the output of the license commands.

Example:

```
Smart Licensing Status
======================

Smart Licensing is ENABLED

Registration:
  Status: REGISTERED
  Smart Account: BU Production Test
  Virtual Account:Device
  Export-Controlled Functionality: Allowed
  Initial Registration: SUCCEEDED on Dec 17 02:31:11 2015 UTC
  Last Renewal Attempt: None
  Next Renewal Attempt: Jun 14 02:31:11 2016 UTC
  Registration Expires: Dec 16 02:25:59 2016 UTC

License Authorization:
  Status: AUTHORIZED on Feb 01 05:08:29 2016 UTC
  Last Communication Attempt: FAILED on Feb 01 05:08:29 2016 UTC
    Failure reason: Fail to send out Call Home HTTP message.
  Next Communication Attempt: Feb 02 04:09:57 2016 UTC
  Communication Deadline: Mar 16 03:00:34 2016 UTC

Evaluation Period:
  Evaluation Mode: Not In Use
  Evaluation Period Remaining: 89 days, 23 hours, 20 minutes, 20 seconds
```

Step 4 **show license usage**

Displays the license usage information.

Example:

```
Device#show license usage
License Authorization:
  Status: AUTHORIZED on Feb 01 05:08:29 2016 UTC

Device METRO IP ACCESS (metroipaccess):
  Description: Device METRO IP ACCESS
  Count: 1
  Version: 1.0
  Status: AUTHORIZED

Device 1588 (1588):
  Description: Device 1588
  Count: 1
  Version: 1.0
  Status: AUTHORIZED

Device ATM (atm):
  Description: Device ATM
  Count: 1
  Version: 1.0
  Status: AUTHORIZED

Device UPOE (upoe):
  Description: Device UPOE
  Count: 1
  Version: 1.0
  Status: AUTHORIZED

Device GNSS (gnss):
  Description: Device GNSS
```

```
  Count: 1
  Version: 1.0
  Status: AUTHORIZED

Device 6-1GE PORT LICENSE (1GEupgradelicense):
  Description: Device 6-1GE PORT LICENSE
  Count: 2
  Version: 1.0
  Status: AUTHORIZED

Device 2-10G PORT LICENSE (10GEupgradelicense):
  Description: Device 2-10G PORT LICENSE
  Count: 2
  Version: 1.0
  Status: AUTHORIZED
```

Step 5 **show license summary**

Displays the summary of all active licenses.

Example:

```
Smart Licensing is ENABLED

Registration:
  Status: REGISTERED
  Smart Account: BU Production Test
  Virtual Account: Device
  Export-Controlled Functionality: Allowed
  Last Renewal Attempt: None
  Next Renewal Attempt: Jun 14 02:31:11 2016 UTC

License Authorization:
  Status: AUTHORIZED
  Last Communication Attempt: FAILED
  Next Communication Attempt: Feb 02 04:09:57 2016 UTC

License Usage:
  License                 Entitlement tag               Count Status
  -----------------------------------------------------------------------------
  Device METRO IP ACCESS (metroipaccess)                   1 AUTHORIZED
  Device 1588             (1588)                           1 AUTHORIZED
  Device ATM             (atm)                             1 AUTHORIZED
  Device UPOE             (upoe)                           1 AUTHORIZED
  Device GNSS             (gnss)                           1 AUTHORIZED
  Device 6-1GE PORT L... (1GEupgradelicense)               2 AUTHORIZED
  Device 2-10G PORT L... (10GEupgradelicense)              2 AUTHORIZED
```

Renew Smart Licensing Registration

In general, your registration is automatically renewed every 30 days. Use this option to make an on-demand manual update of your registration. Thus, instead of waiting 30 days for the next registration renewal cycle, you can issue this command to instantly find out the status of your license.

Before you begin

You must ensure that the following conditions are met to renew your smart license:

- Smart licensing is enabled.

- The device is registered.

Procedure

license smart renew {**auth** | **id**}

Example:

```
Device# license smart renew auth
Tue  Apr 22 09:12:37.086 PST

license smart renew auth: Authorization process is in progress.
Please check the syslog for the authorization status and result.
```

Renew your ID or authorization with Cisco smart licensing. If ID certification renewal fails, then the product instance goes to an unidentified state and starts consuming the evaluation period.

Note Authorization periods are renewed by the Smart Licensing system every 30 days. As long as the license is in an 'Authorized' or 'Out-of-compliance' (OOC), the authorization period is renewed. Grace period starts when an authorization period expires. During the grace period or when the grace period is in the 'Expired' state, the system continues to try renew the authorization period. If a retry is successful, a new authorization period starts.

De-register Smart Licensing

When your device is taken off the inventory, shipped elsewhere for redeployment or returned to Cisco for replacement using the return merchandise authorization (RMA) process, you can use the de-register option to cancel the registration on your device. Use the following steps to cancel device registration:

Procedure

license smart deregister

Example:

```
Device# license smart deregister

license smart deregister: Success

License command "license smart deregister " completed successfully.
```

Cancels the device registration, and sends it into a 30-day evaluation mode. All Smart Licensing entitlements and certificates on the platform are removed.

Note Though the product instance has been de-registered from the Cisco license cloud service, Smart Licencing is still enabled.

Note License description for a license after deregistering a device may appear slightly different. This is because of disconnecting with the CSSM server. The example shows the license ASR 920 2-10G Port License description before after de-registration.

```
After SL registration:
=============
  ASR 920 2-10G PORT L... (10GEupgradelicense)              2 AUTHORIZED
  ASR 920 6-1GE PORT L... (1GEupgradelicense)               2 AUTHORIZED

After SL de-register:
=============
  10GEupgradelicense      (10GEupgradelicense)              2 EVAL MODE
  1GEupgradelicense       (1GEupgradelicense)               2 EVAL MODE
```

Upgrading to Default Smart Licensing

Feature Name	Release Information	Feature Description
Default Smart Licensing	Cisco IOS XE Cupertino 17.7.1	Smart Licensing mode is the default mode enabled on the routers. As PAK licenses are no longer available, you can upgrade to Smart Licensing mode (recommended) or operate in the No-License mode. Traditional licenses upgrades automatically to No-license mode after upgrading to this release.

Starting with Cisco IOS XE Cupertino 17.7.1, PAK licenses are no longer available. We recommend that you move to Smart Licensing before upgrading to Cisco IOS XE Cupertino 17.7.1 or a later releases, for a seamless experience.

Note Smart Licensing requires that you enable the **boot level license** command, before upgrading to Cisco IOS XE Cupertino 17.7.1 release and earlier. If you upgrade the router to Smart Licensing, before enabling the **boot level license** command, the router boots with the default boot license.

If you choose not to move to Smart Licensing before upgrading to Cisco IOS XE Cupertino 17.7.1 or a higher release, your license automatically upgrades to No-License Mode post upgrade.

Cisco IOS XE Cupertino 17.7.1 or later releases offers two modes:

- Smart Licensing Mode—If the router is already operating in Smart Licensing mode, there's no difference with respect to license operations after a release upgrade. Licenses are used as the corresponding configurations are applied. If you're using Smart licensing, and opt to upgrade to the latest release with Smart Licensing see.Upgrading the Router Operating in Smart Licensing mode, on page 97

  Similarly, there's no difference with respect to licenses operations when downgrading the release on a router with Smart Licensing. See Downgrading the Router operating in Default Smart Licensing mode to Smart Licensing, on page 98.

Note Upgrading or downgrading the release doesn't modify the Smart License behavior on a router. The License Registration, License Authorization status, and License usage status depend on CSSM portal connectivity and licenses available in the account.

- No-License Mode—If you're operating with a traditional license, on upgrading to Cisco IOS XE Cupertino 17.7.1 release or later, your license automatically converts to No-License mode. See Upgrading the Router with Traditional License to No-License, on page 99

Note No-license mode is available to you in the following release:

- Cisco IOS XE Cupertino 17.7.1

In No-License mode, after you upgrade the Cisco IOS XE Cupertino 17.7.1 or later release on the router, all license operations (Register, Request & Release) are skipped unlike the traditional Cisco Software License (CSL). All features are available with appropriate configurations. No-License mode lets you use all licensed features regardless of acquiring the license.

Note The **show license detail** command displays all installed licenses, although in "Not in Use" state.

However, if you choose to downgrade from No-License mode to Traditional License mode, the router retains only features with available licenses. If you are in No-License Mode, and want to move to traditional license see, Downgrading the Router from No-license mode to Traditional Licensing , on page 99

Switching between license modes is possible on the router. For more information see, Switching License Modes, on page 96

Switching License Modes

If the router is operating in Smart Licensing mode, you can switch to the "No-License Mode" by configuring **no license smart enable** command followed by reload of the router. See List item.

If the router is operating in "No-License Mode", you can switch to Smart Licensing mode by configuring **license smart enable** command followed by reload of the router. See List item.

- **Switching from Smart Licensing mode to No-License mode**

  Configure **no license smart enable** command.

```
Router# configure terminal
 Router(config)#no license smart enable
 Router(config)#
```

  Reload the router and verify using **show version** command.

```
Router# show ver | in Lic
Cisco IOS XE Software, Version 17.07.01prd9

License Level: metroaggrservices
License Type: No License Mode
Next reload license Level: metroaggrservices
```

The router operates in No License Mode.

- **Switching from No-License mode to Smart Licensing mode**

  Configure **license smart enable** command.

```
Router# configure terminal
Router(config)#license smart enable
Router(config)#end
Router#
```

  Reload the router and verify using **show license summary** command

```
Router# show version | in Lic
 Cisco IOS XE Software, Version 17.07.01prd9

License Level: metroaggrservices
License Type: Smart License
Next reload license Level: metroaggrservices

Router#sh license summary
Smart Licensing is ENABLED

Registration:
  Status: UNREGISTERED
  Export-Controlled Functionality: NOT ALLOWED

License Authorization:
  Status: EVAL MODE
  Evaluation Period Remaining: 70 days, 7 hours, 23 minutes, 19 seconds

License Usage:
  License                 Entitlement Tag               Count Status
  -----------------------------------------------------------------------------
  metroaggrservices       (metroaggrservices)               1 EVAL MODE
```

  The router operates in Smart Licensing mode.

Upgrading the Router Operating in Smart Licensing mode

This procedure upgrades the router operating in Smart Licensing in Cisco XE Amsterdam 17.3.3 or earlier, to a later release with Smart Licensing mode.

1. Verify if the router is running an earlier release with Smart Licensing mode.

```
Router# show version
Cisco IOS XE Software, Version 17.03.04
!
License Level: metroaggrservices
License Type: Smart License
Next reload license Level: metroaggrservices
!
Smart Licensing Status: UNREGISTERED/EVAL MODE
!
```

2. Upgrade the router with the latest image. Reload the router or perform ISSU.

```
Router# show version
Cisco IOS XE Software, Version 17.07.01prd15
```

The router continues to operate in Smart License mode.

3. Verify the feature license using the **show license summary** command.

```
Router# show license summary
 Smart Licensing is ENABLED

Registration:
  Status: UNREGISTERED
  Export-Controlled Functionality: NOT ALLOWED

License Authorization:
  Status: EVAL MODE
  Evaluation Period Remaining: 70 days, 7 hours, 13 minutes, 9 seconds

License Usage:
  License                 Entitlement Tag               Count Status
  -----------------------------------------------------------------------------
  metroaggrservices       (metroaggrservices)               1 EVAL MODE
```

Downgrading the Router operating in Default Smart Licensing mode to Smart Licensing

This procedure explains downgrade of image of router with Smart Licensing.

1. Ensure the router is operating in Smart Licensing mode. Verify by issuing **show version** command.

```
Router# show version

Cisco IOS XE Software, Version 17.07.01prd15
licensed under the GNU General Public License ("GPL") Version 2.0.  The
documentation or "License Notice" file accompanying the IOS-XE software,
License Level: metroaggrservices
License Type: Smart License
Smart Licensing Status: UNREGISTERED/EVAL MODE
Router#
```

2. Perform image downgrade to an earlier release. Reload the router or perform ISSU.

```
Router# show version
Cisco IOS XE Software, Version 17.03.04
```

The router operates in Smart Licensing mode. The licenses are used when corresponding configurations are applied.

3. Verify the licenses using the **show license summary** command.

```
Router# show license summary

Smart Licensing is ENABLED

Registration:
  Status: UNREGISTERED
  Export-Controlled Functionality: NOT ALLOWED

License Authorization:
  Status: EVAL MODE
```

```
  Evaluation Period Remaining: 70 days, 7 hours, 23 minutes, 19 seconds

License Usage:
  License                Entitlement Tag               Count Status
  -----------------------------------------------------------------------------
  metroaggrservices      (metroaggrservices)               1 EVAL MODE
```

Upgrading the Router with Traditional License to No-License

This procedure upgrades the router operating traditional CSL license to No-License mode.

1. Verify the router is operating with CSL Licensing mode.

```
Router# show version
Cisco IOS XE Software, Version 16.06.10
!
License Level: metroaggrservices
License Type: EvalRightToUse
Next reload license Level: metroaggrservices

Router#sh license
Index 1 Feature: metroaggrservices
 Period left: 8  weeks 3  days
 Period Used: 2  minutes 19 seconds
 License Type: EvalRightToUse
 License State: Active, In Use
 License Count: Non-Counted
 License Priority: Low
```

2. Upgrade the router with the latest image. Reload the router or perform ISSU.

```
Router# show version
Cisco IOS XE Software, Version 17.07.01prd15
```

   The License operation such as register, request and release are skipped. All features are available.

3. Verify license mode using **show version** command.

```
Router# show version
Cisco IOS XE Software, Version 17.07.01prd15
!
License Level: metroaggrservices
License Type: No License Mode
Next reload license Level: metroaggrservices
!
Smart Licensing Status: Smart Licensing is DISABLED
```

Downgrading the Router from No-license mode to Traditional Licensing

This procedure explains downgrade of image of router with No-License.

1. Ensure the router operating in No-License mode. Verify by issuing **show version** command.

```
Router# show version
Cisco IOS XE Software, Version 17.07.01prd15
!
License Level: metroaggrservices
License Type: No License Mode
Next reload license Level: metroaggrservices
```

```
!
Smart Licensing Status: Smart Licensing is DISABLED
```

2. Perform image downgrade to an earlier release. Reload the router or perform ISSU.

   The router operates in traditional mode. Licenses are used if feature configurations exist on router.

Note If feature license is not available, then corresponding configuration is removed.

3. Verify the license using **show version** command after the downgrade.

```
Router# show version
Cisco IOS XE Software, Version 16.06.10
!
License Level: metroaggrservices
License Type: EvalRightToUse
Next reload license Level: metroaggrservices

Router#sh license
Index 1 Feature: metroaggrservices
 Period left: 8  weeks 3  days
 Period Used: 2  minutes 19 seconds
 License Type: EvalRightToUse
 License State: Active, In Use
 License Count: Non-Counted
 License Priority: Low
```

Recording Snapshot of Licenses

Product Authorization Key (PAK) is provided when you order and purchase the right to use a feature set for a particular platform. The PAK serves as a receipt and is an important component in the process to obtain the license for the device.

There are three types of license boot levels available:

- Metro Access License
- Metro IP Access License
- Advanced Metro IP Access License

Starting with release Cisco IOS XE Cupertino 17.7.1, PAK licenses aren’t available, and the router boots in the Smart Licensing or No-License mode. A router with permanent boot License boots with the default boot level license (metro access) instead of the installed license. For example, if the PAK license "advancedmetroipaccess" is the installed license available on the router. After upgrade, the router boots with the default boot license (metro access) instead of "advancedmetroipaccess" license.

Table 9: Feature History

Feature Name	Release Information	Feature Description
License Snapshot Support is Introduced	Cisco IOS XE Cupertino 17.8.1	License snapshot captures the license information in the router before an upgrade. Post upgrade, the router generates a snapshot of the available installed licenses from an earlier release. The router boots with licenses matching the PAK licenses.

Starting with release Cisco IOS XE Cupertino 17.8.1, the router generates a license snapshot of the available licenses from an earlier release. Snapshot of license contains the details of the licenses available on the router. Post upgrading to Smart Licensing or No-License modes, the router boots with licenses matching the permanent license.

For example, if the PAK license Advanced Metro IP Access is the installed license available on the router. Then, after upgrade the router boots with the default boot license (Metro Access) instead of Advanced Metro IP Access license. If you want to change the license, then deposit the PAK license, factory reset the router, and use the smart-licensing mode to configure the new license.

The **show platform software sl-infra pak-info** displays the license information after generating a snapshot of the licenses.

1. Verify the PAK license for Permanent Licenses on the router. This example shows the router displaying Permanent License configuration.

```
Router#show license
Index 1 Feature: advancedmetroipaccess
 Period left: Life time
 License Type: Permanent
 License State: Active, In Use
 License Count: Non-Counted
 License Priority: Medium
Router#sh run | i boot
boot-start-marker
boot-end-marker
diagnostic bootup level minimal
```

2. Upgrade the router to Cisco IOS XE Cupertino 17.8.1 release or later. The router generates a snapshot of the available licenses from an earlier release. Verify the license information.

   This example shows the snapshot information.

```
Router# show platform software sl-infra pak-info
Pak License Snapshot Information
================================
Platform Supports PAK License snapshot
PAK License Snapshot integrity check pass
PAK License Snapshot available
License Name                : advancedmetroipaccess
  Index                     : 0
  In Use Count              : 0
  In Use Count Valid        : 0
  License Precedence        : 0
  License Type              : 0 - Permanent
  License Get Type          : 0 - Permanent
  Number of License         : 65535 - Non-Counted
```

```
Current State             : 2 - Active, Not in Use
License State             : 1 - Active, In Use
Timestamp lower 32bits    : 1635281126 - Tue Oct 26 20:45:26 2021
Timestamp upper 32bits    : 0
Trial Elapsed Period Left : 0
```

After upgrading to the Smart Licensing or No-License mode, the router boots with the license level matching the permanent license.

- Example: Router in No-license mode:

```
Router#show version
License Level: advancedmetroipaccess
License Type: No License Mode
Next reload license Level: advancedmetroipaccess
```

- Example: Router in Smart Licensing mode:

```
Router# show license summary
Smart Licensing is ENABLED

Registration:
  Status: UNREGISTERED
```

```
Router# show version
License Level: advancedmetroipaccess
License Type: Smart License
Next reload license Level: advancedmetroipaccess
```

In HA setup, a router which stays unchanged for releases, all preexisting PAK licenses upgrade to Smart licensing seamlessly. However, if you have added, removed or downgraded your PAK licenses, you might face issues with the standby router reloading continuously. This issue occurs when the PAK licenses stored in the active and standby routers are different.

We recommend that you do a factory reset of all routers in a HA setup, and manually configure the licenses.

Table 10: Feature History

Feature Name	Release Information	Feature Description
License Snapshot Support is Discontinued	Cisco IOS XE Dublin 17.11.1	Starting from this release the license snapshot option is discontinued. We recommend that you migrate to Cisco Smart Licensing, which provides unified management, easy to activate, and supports license flexibility.

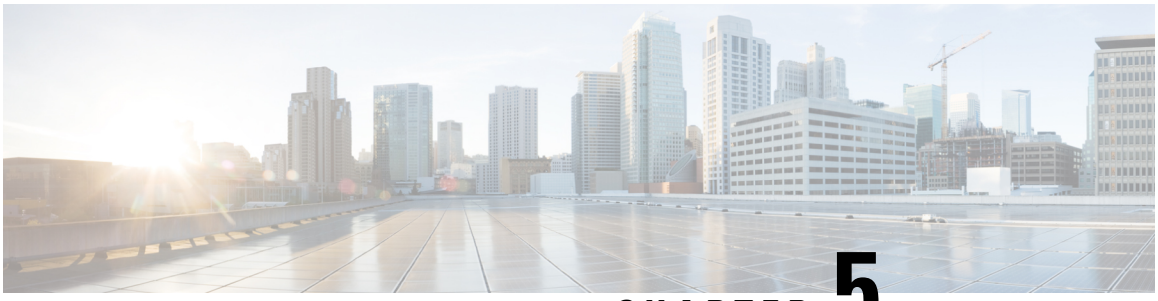
Starting with release Cisco IOS XE Dublin 17.11.1, the PAK managing library is discontinued and the ability to capture PAK information in a snapshot is no longer supported.

Router takes snapshot only on releases starting from release 17.8.1 to 17.10.x releases. If the router gets directly upgraded to release 17.11.1 or later, then no PAK license information is available.

If you want to take a snapshot, then we recommend you to choose a release where the router can take a snapshot of any PAK license to have the previous reference of the PAK license usage.

Table 11: License Support Matrix

XE Release	PAK License	Snapshot	Smart License
17.1.1	Yes	No	No
17.2.1	Yes	No	No
17.3.1	Yes	No	Yes
17.4.1	Yes	No	Yes
17.5.1	Yes	No	Yes
17.6.1	Yes	No	Yes
17.7.1	No	No	Yes
17.8.1	No	Yes	Yes
17.9.1	No	Yes	Yes
17.10.1	No	Yes	Yes
17.11.1	No	No	Yes



CHAPTER 5

Introduction to License Reservation

Table 12: Feature History

Feature Name	Release Information	Feature Description
License Reservation for Smart Licensing	Cisco IOS XE Cupertino 17.8.1	Routers using Smart Licensing share information at regular intervals with Cisco Smart Software Manager (CSSM). License reservation allows you to use Smart Licensing without the need to share license information. By reserving node-locked licenses, you can deploy smart licensed routers in highly secure and air-gapped networks. Two kinds of License Reservation are available: • Permanent License Reservation—Perpetual (Golden key) reserved license. • Specified License Reservation—Specific reserved licenses and term licenses.

License reservation offers two kinds of licensing:

- Permanent License Reservation
  - Provides an unlimited quantity of licenses.
  - Activates all the functionalities of the router with single universal license.
  - Does not require periodic access to the License Authority.
- Specific License Reservation

- Allows selection of licenses.
- Requires one-time authorization and configuration with CSSM.

For more information see, Cisco Licensing cisco.com/go/licensingguide.

Prerequisites for License Reservation

Before you start, ensure that you have the following:

- Active Cisco.com account
- User or admin access to a Smart account (To request access to a Smart account, refer to How to Request Access to an Existing Smart Account.)
- Understanding of products supporting Specific License Reservation. See How to Identify Products That Support SLR

Permanent License Reservation

Permanent License Reservation offers a single “Universal” license that authorizes all possible product functionalities. It also includes an unlimited quantity of counted licenses.

Permanent licenses do not require periodic access to the License Authority. You can purchase the license, and install the license key for Prime Access Registrar.

Permanent license reservation (PLR) enables you to deploy permanent software license on a router without communicating license information to CSSM.

Specific License Reservation

Specific License Reservation (SLR) is a functionality that enables you to deploy a software license on a device without communicating usage information to Cisco. This functionality is especially used in highly secure networks, and it is supported on platforms that have Smart Licensing enabled.

SLR lets you reserve a license for your product instance from the CSSM. These reserved licenses need not be renewed or reauthorized unless there is a license usage change on the device.

License enforcement is a mechanism that prevents a feature from being used without first obtaining a license.The following enforcement mechanisms are available:

- Hard enforcement: Hard enforcement is applicable only for enforced licenses . If you do not authorize the required licenses by installing the authorization code, the license cannot be used, and the feature is disabled.
- Soft enforcement: When you do not authorize the required licenses by installing the authorization code, you can continue to use the license. The system displays an appropriate syslog message and the license status is “Not Authorized”.

Note SLR is not enabled by default, and you must specifically request for this functionality. See How to Reserve Licenses

Obtaining License Reservation Code

To obtain the license reservation code to the Smart Account in Cisco Smart Software Manager (CSSM).

1. Go to Support Case Manager.
2. Click OPEN NEW CASE
3. Select Software Licensing

For more information see, How to Reserve Licenses (SLR)

Enabling License Reservation

Procedure

Step 1 **enable**

Example:

```
Router# enable
```

Enables privileged EXEC mode.

Step 2 **configure terminal**

Enters global configuration mode.

Example:

```
Router# configure terminal
```

Step 3 **license smart reservation**

Enables License Reservation. Use the no form of this command to disable License Reservation.

Example:

```
Router(config)# license smart reservation
```

Step 4 **exit**

Exits configuration mode, and returns the device to the global configuration mode.

Step 5 **license smart enable**

Enables basic Smart Licensing.

Example:

```
Router(config)# license smart enable
```

Step 6 **license smart reservation request local**

Generates a request code for the device to be entered in the Cisco Smart Software Manager.

Note To cancel the License Reservation request, execute the **license smart reservation cancel** command.

Example:

```
Router# license smart reservation request local
```

Reserving Licenses using CSSM

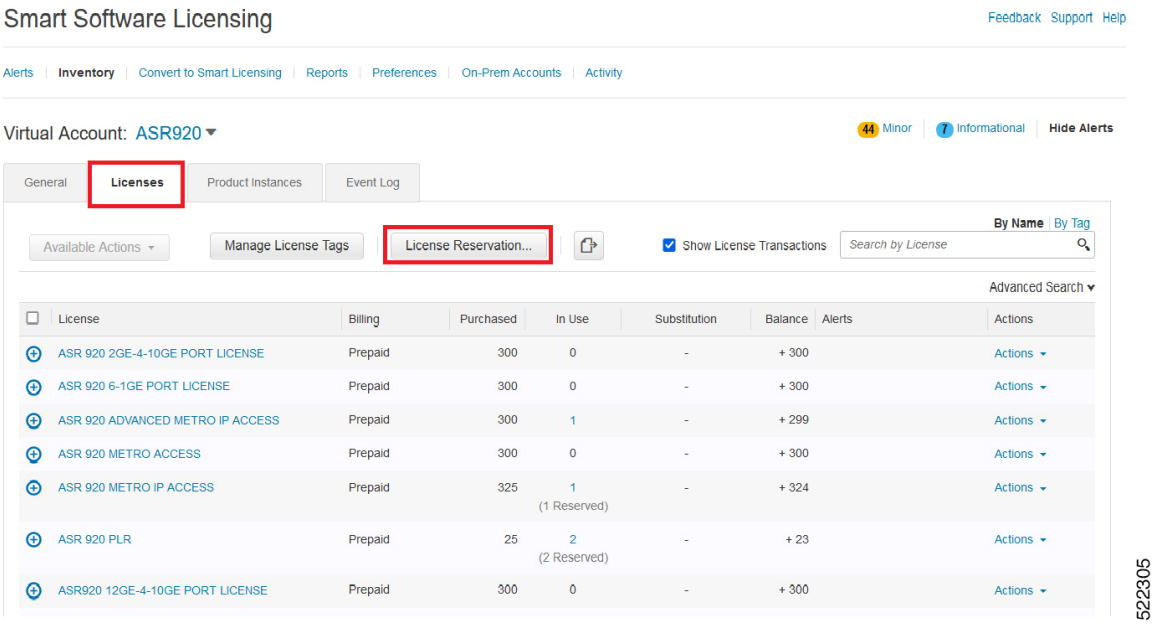
Procedure

Step 1 Log in to Cisco Smart Software Manager at https://software.cisco.com/# using the Cisco provided username and password..

Step 2 Click the **Inventory** tab. From the **Virtual Account** drop-down list, select the smart account.

Step 3 From the **Licenses** tab, click **License Reservation**.

The system displays the Smart License Reservation wizard.



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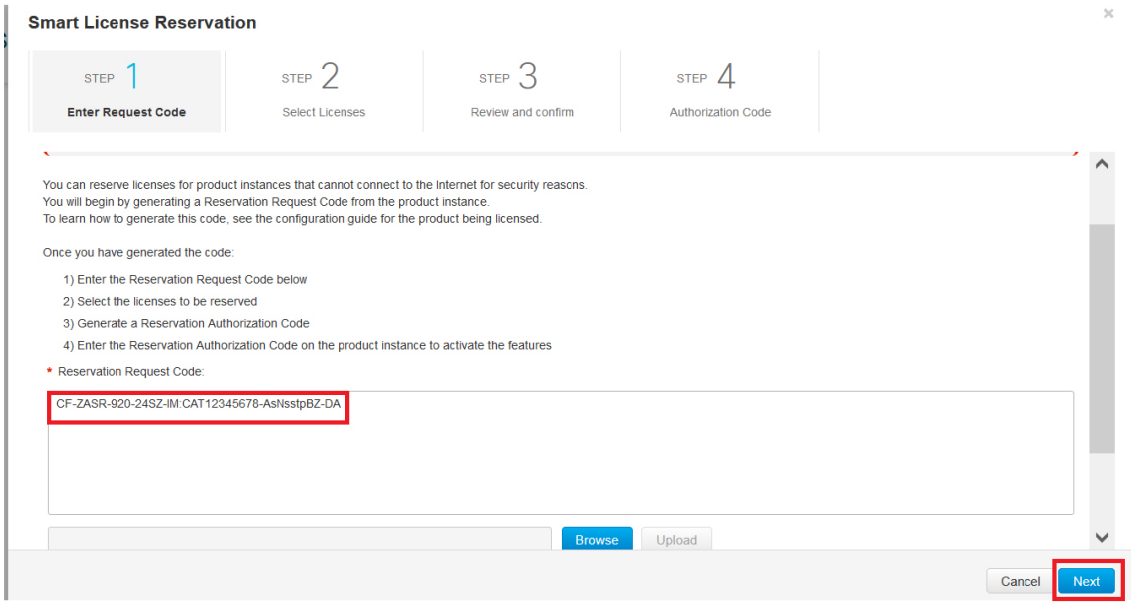
Step 4 Click License Reservation. Enter or attach the reservation request code that is generated from the router at **Enter Request Code**, and click **Next**.



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The Smart License Reservation displays.

Step 5 Select the type of license to reserve.

- PLR—Reserves single license for Permanent License Reservation. See Reserving Licenses with Permanent License Reservation, on page 110

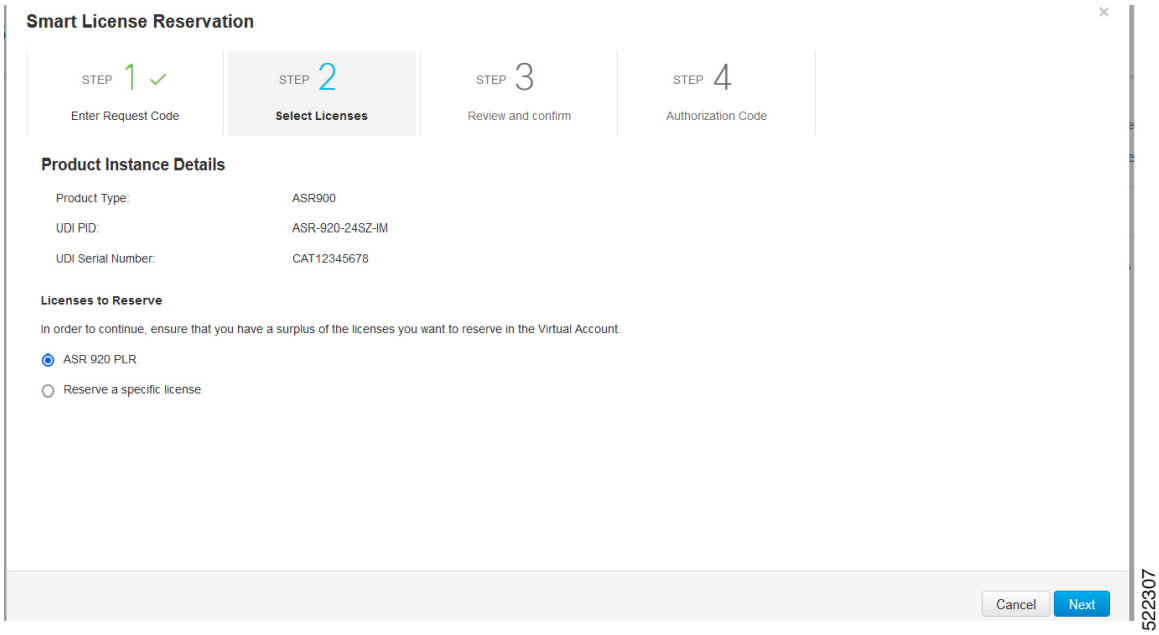
- SLR—Reserves specific licenses for Specific License Reservation. See Reserving Licenses with Specific License Reservation, on page 112

Reserving Licenses with Permanent License Reservation

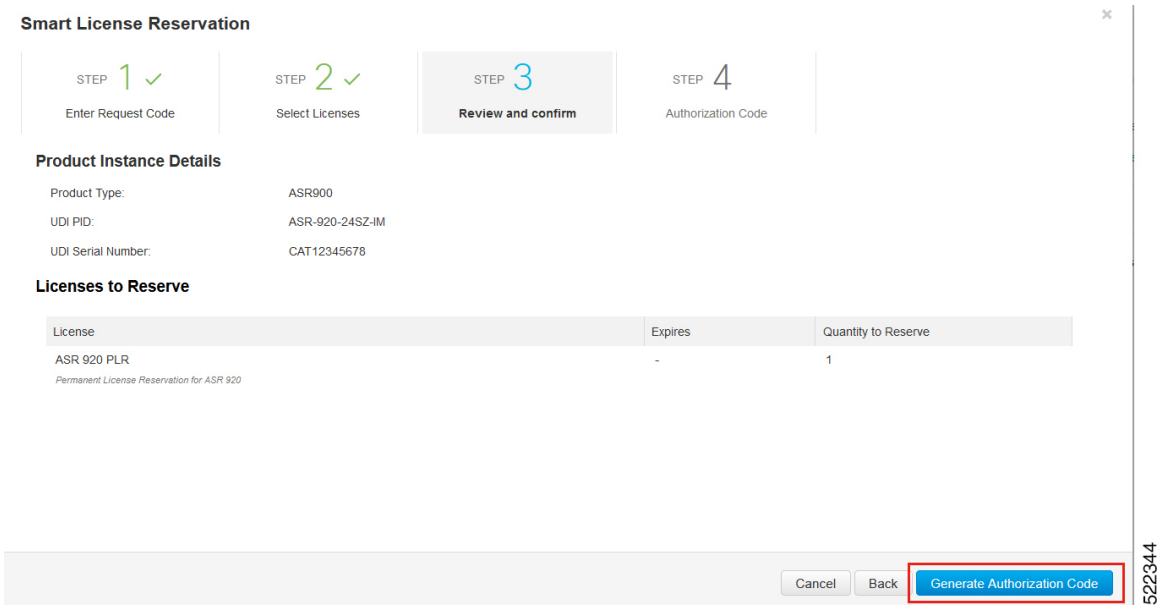
Procedure

Step 1 Select **PLR**.

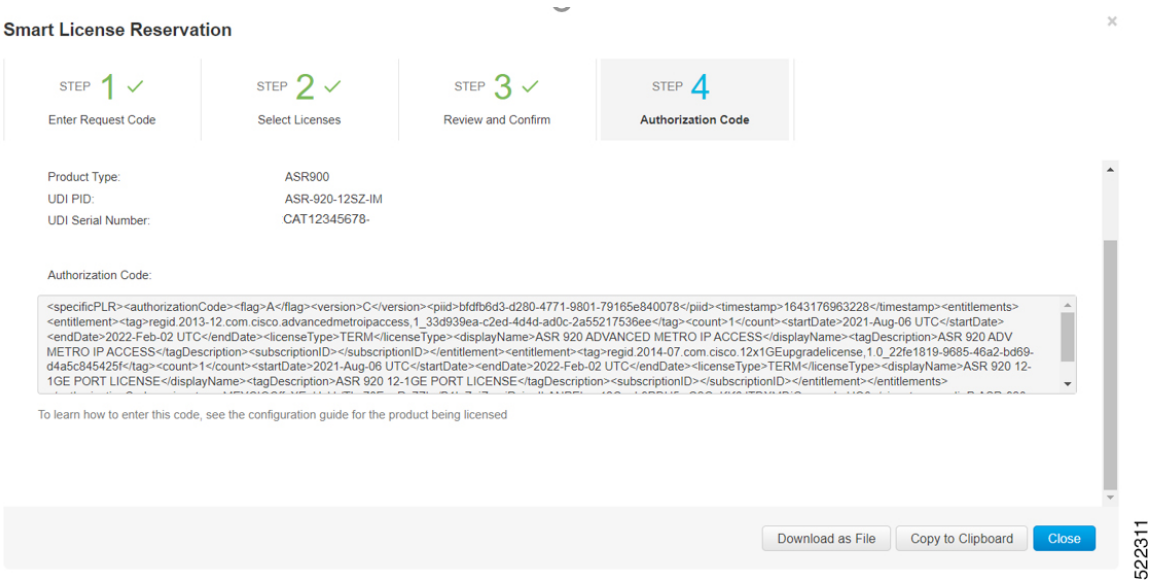
The system reserves the permanent licenses for the router.



Step 2 From the **Review and Confirm** tab, click **Generate Authorization Code**.



The system displays the Authorization Code.



Note After generating the code, the authorization code file is valid till you install the code.

For installation failure issues, contact Cisco Global Licensing Operations (GLO) to generate a new authorization code.

Step 3 Click the **Copy to Clipboard** option to copy the code, or **Download as File** to download the code as a file.

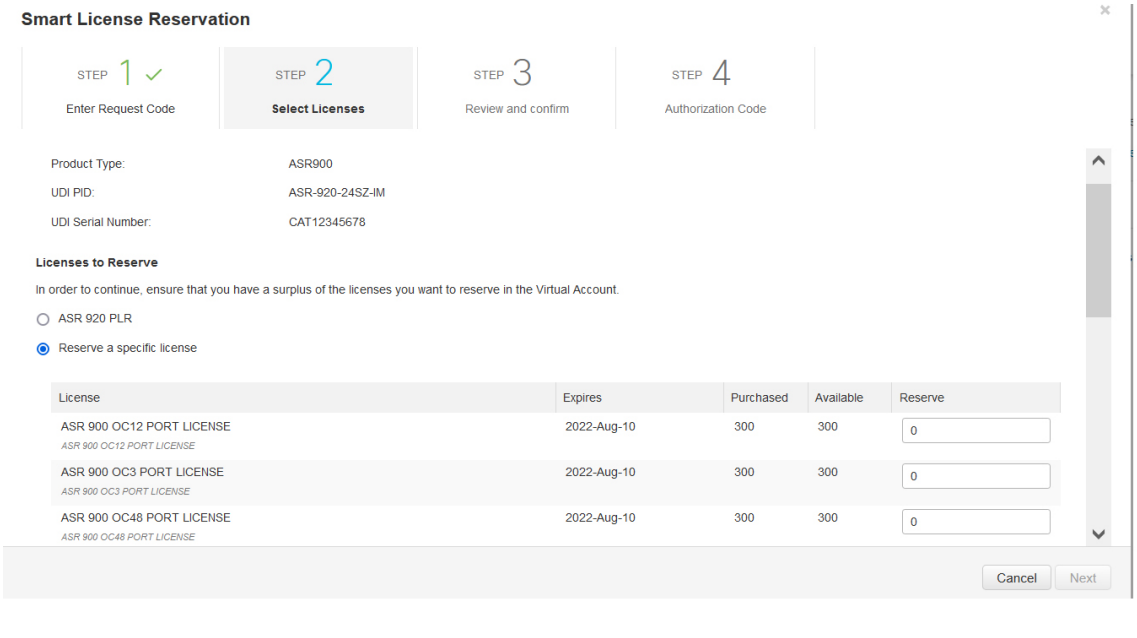
Step 4 Install the authorization file on the router by registering the device. See Register the Device Using the Authorization Code, on page 114

Reserving Licenses with Specific License Reservation

Procedure

Step 1 Check **Reserve a specific License**.

The system displays the list of surplus licenses available in your Virtual Account.



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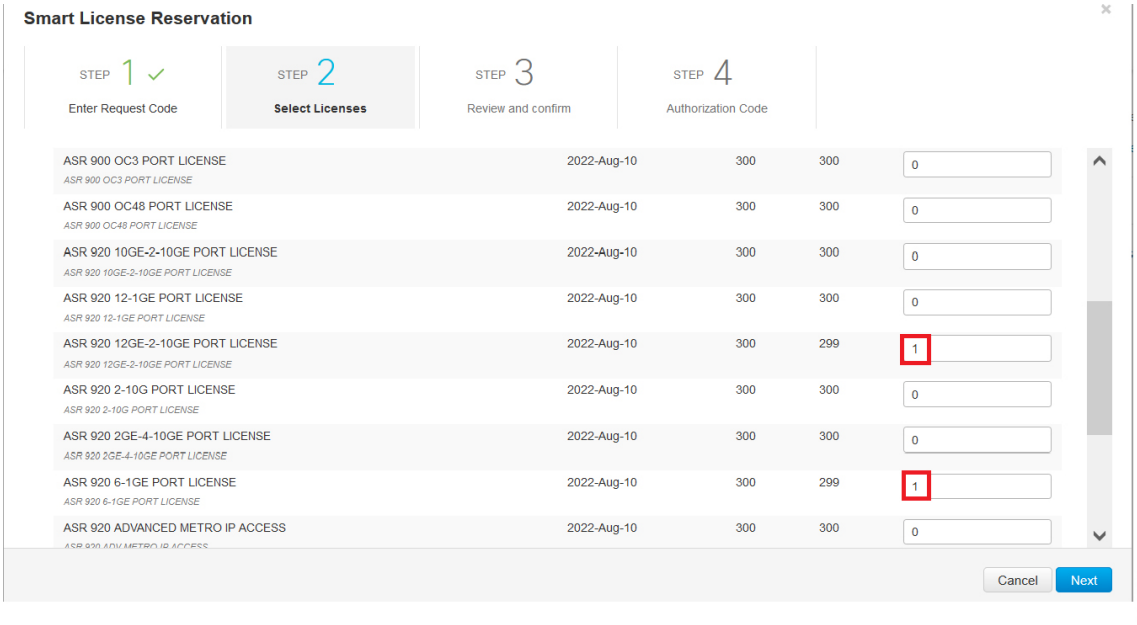
Step 2 Enter the number of licenses to reserve, in the **Reserve** field. Click **Next**.



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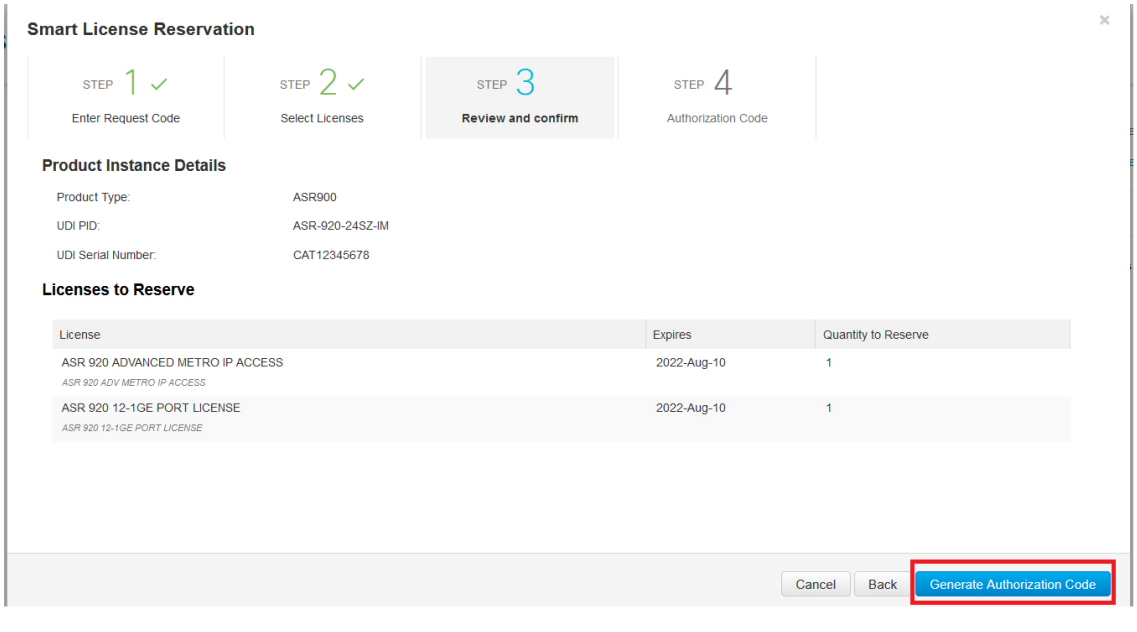
Step 3 At the **Review and Confirm** tab, click **Generate Authorization Code**

The system displays the Authorization Code.



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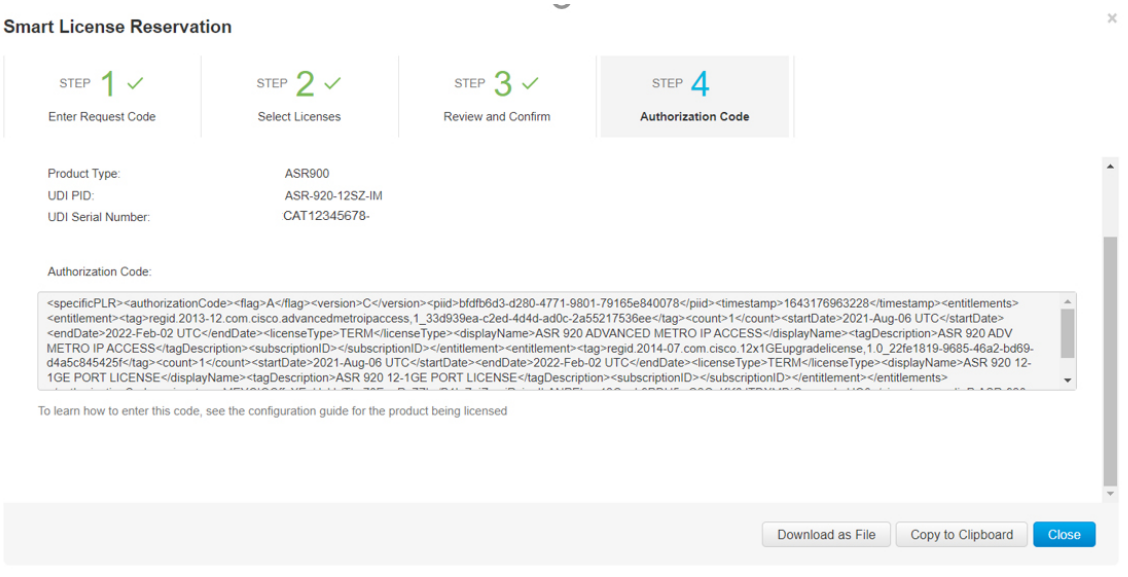
Note After you generating the code for a specific device, the authorization code file is valid till you install the code the router.

For installation failure issues, contact GLO to generate a new authorization code.

Step 4 Click the **Copy to Clipboard** option to copy the code or **Download as File** to download the code as a file.



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Step 5 Install the authorization code file on the router by registering the device. See Register the Device Using the Authorization Code, on page 114

Register the Device Using the Authorization Code

After you get the authorization code from CSSM, execute the following commands to complete the license reservation procedure:

Procedure

Step 1 **enable**

Enables privileged EXEC mode.

Enter your password, if prompted.

Step 2 **license smart reservation install file bootflash:**<*authfile.txt*>

This command registers the device. The authorization code you copied as a file is used to activate smart licensing reservation for your device.When you run the `show license tech support` command, the system displays the details of the reserved licenses.

Example: Installing the Authorization Code

This example shows how to install the authorization code on the router.

```
Router# license smart reservation install file bootflash:AuthorizationCode_SN_CAT1930U20Q.txt
Reservation install file successful
Last Confirmation code UDI: PID:ASR-920-12SZ-IM,SN:CAT1930U20Q
    Confirmation code: 92bd4d9f
```

Verifyig License Registration Status with Authorization Code

Verify the license status after registration, using the **show license reservation** command:

```
Router# show license reservation
License reservation: ENABLED
Overall status:
  Active: PID:ASR-920-12SZ-IM,SN:CAT1930U20Q
      Reservation status: SPECIFIC INSTALLED on Jan 26 06:05:40 2022 UTC
      Last Confirmation code: 92bd4d9f
Specified license reservations:
  ASR 920 ADVANCED METRO IP ACCESS (advancedmetroipaccess):
    Description: ASR 920 ADV METRO IP ACCESS
    Total reserved count: 1
    Enforcement type: NOT ENFORCED
    Term information:
      Active: PID:ASR-920-12SZ-IM,SN:CAT1930U20Q
        Authorization type: SPECIFIC INSTALLED on Jan 26 06:05:40 2022 UTC
        License type: TERM
          Start Date: 2021-AUG-06 UTC
          End Date: 2022-FEB-02 UTC
          Term Count: 1
  ASR 920 12-1GE PORT LICENSE (12x1GEupgradelicense):
    Description: ASR 920 12-1GE PORT LICENSE
```

```
    Total reserved count: 1
    Enforcement type: ENFORCED
    Term information:
      Active: PID:ASR-920-12SZ-IM,SN:CAT1930U20Q
        Authorization type: SPECIFIC INSTALLED on Jan 26 06:05:40 2022 UTC
        License type: TERM
          Start Date: 2021-AUG-06 UTC
          End Date: 2022-FEB-02 UTC
          Term Count: 1
```

This example shows the license status on the router.

```
Router# show license usage
License Authorization:
  Status: AUTHORIZED

ASR 920 ADVANCED METRO IP ACCESS (advancedmetroipaccess):
  Description: ASR 920 ADV METRO IP ACCESS
  Count: 1
  Version: 1.0
  Status: AUTHORIZED
  Export status: NOT RESTRICTED
  Feature Name: advancedmetroipaccess
  Feature Description: advancedmetroipaccess
  Reservation:
    Reservation status: SPECIFIC INSTALLED
    Total reserved count: 1

ASR 920 12-1GE PORT LICENSE (12x1GEupgradelicense):
  Description: ASR 920 12-1GE PORT LICENSE
  Count: 0
  Status: AUTHORIZED
  Export status: NOT RESTRICTED
  Feature Name: ASR 920 12-1GE PORT LICENSE
  Feature Description: ASR 920 12-1GE PORT LICENSE
  Reservation:
    Reservation status: SPECIFIC INSTALLED
    Total reserved count: 1
```

Upgrading Licenses with Specific License Reservation

Registered devices can be upgraded new features licenses or licenses.

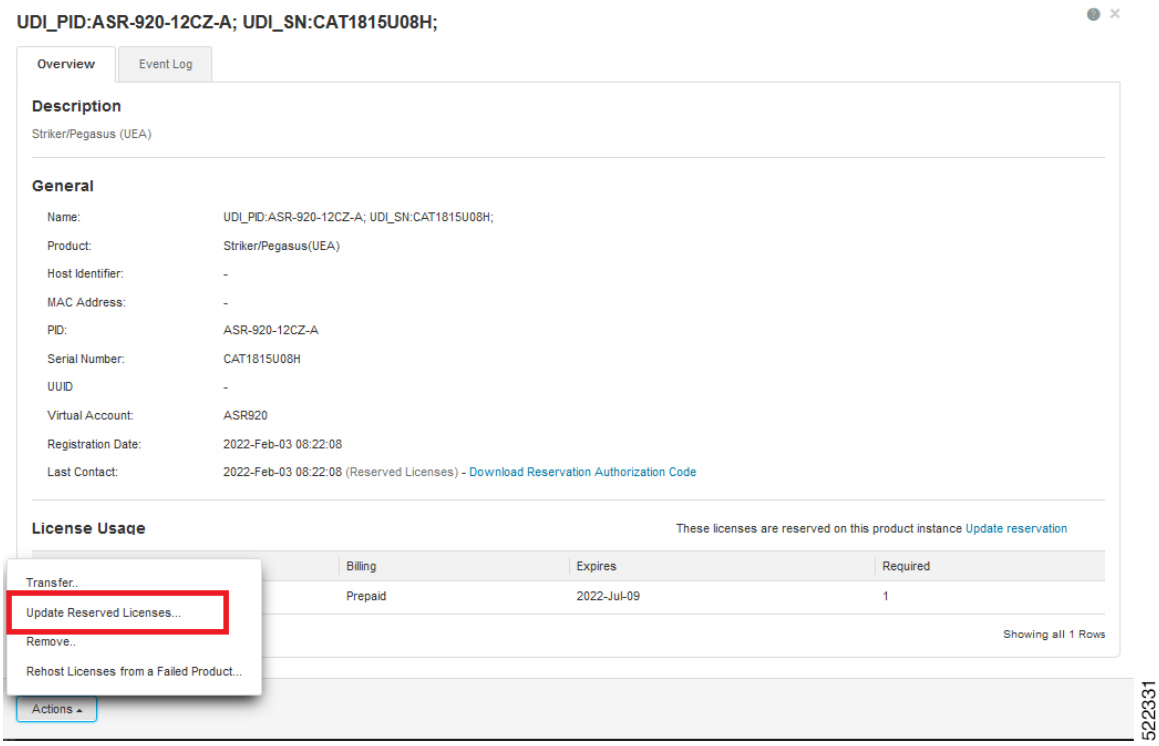
Procedure

Step 1 Log in to Cisco Smart Software Manager at https://software.cisco.com/# using the Cisco provided username and password.

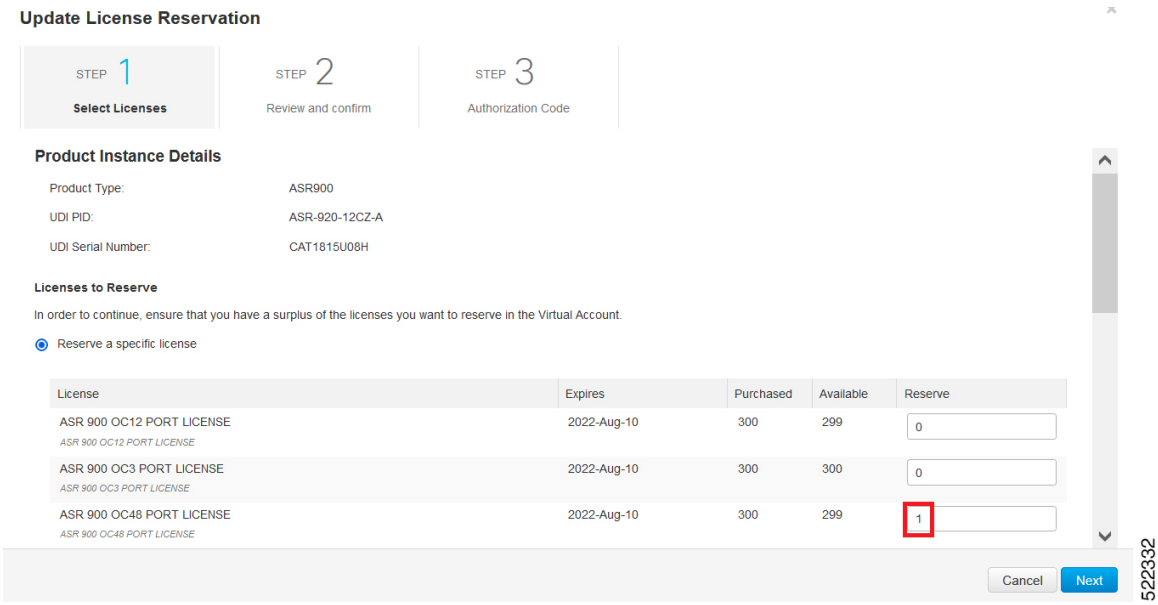
Step 2 Click the **Inventory** tab. From the **Virtual Account** drop-down list, select your smart account.

Step 3 From the **Product Instances** tab, for the device that you want to update, click **Actions**.

Step 4 Click **Update Reserved Licenses**.

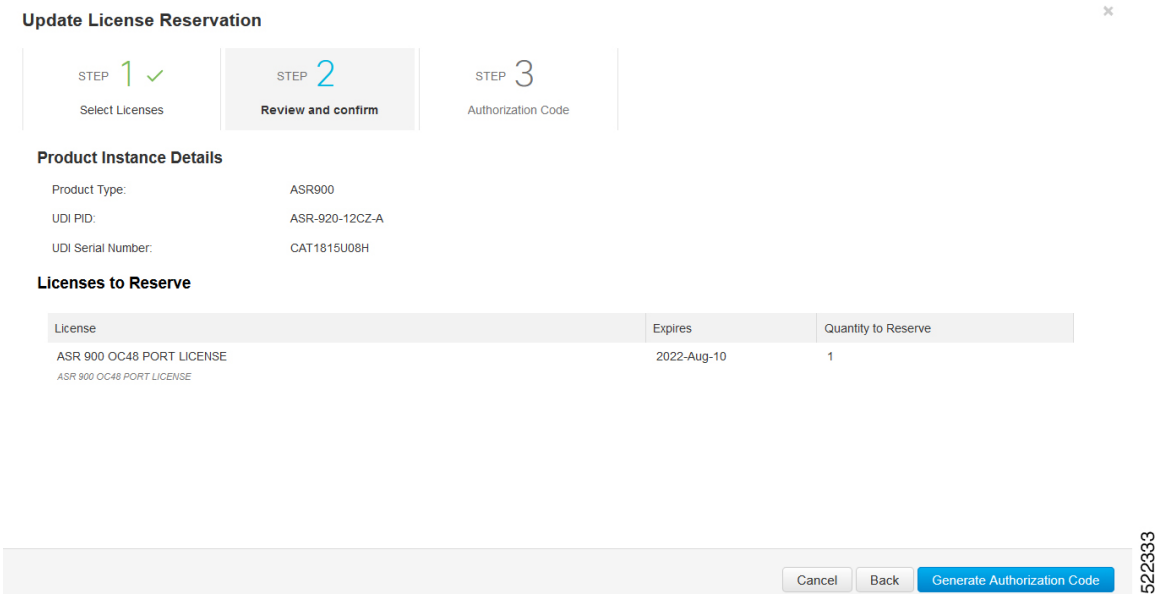


Step 5 Select the license that you want to update.

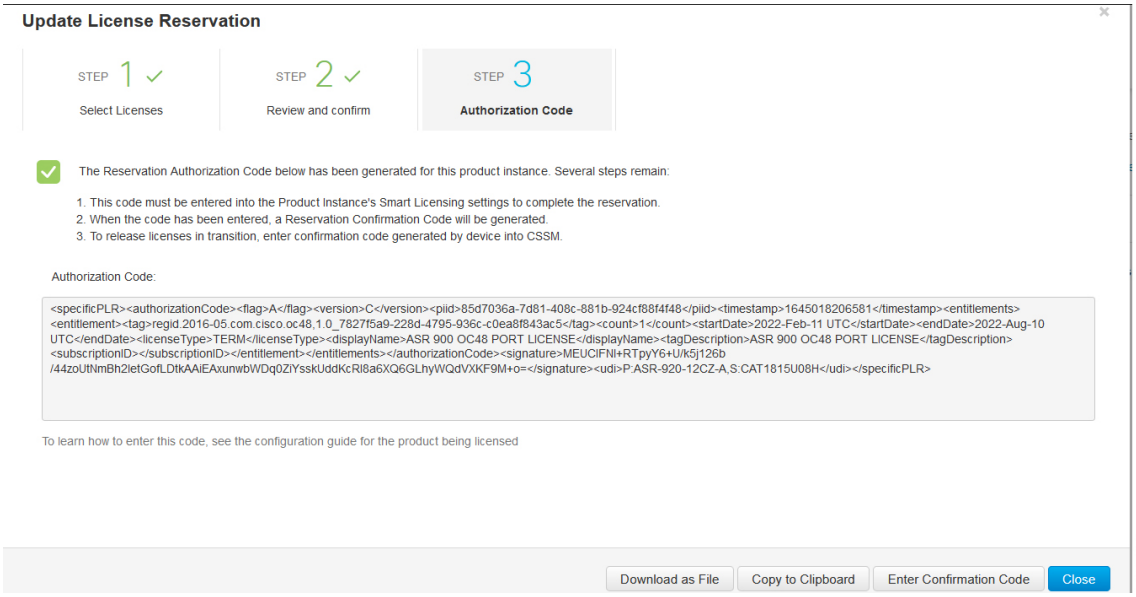


Step 6 Click **Next**.

Step 7 From the **Review and Confirm** tab, click **Generate Authorization Code**.



Step 8 Click the **Copy to Clipboard** option to copy the code, or **Download as File** to dowload the file.



Step 9 To Install the downloaded file on the router, run the **license smart reservation install file** command.

`license smart reservation install file bootflash:`*`<authfile.txt>`*

This command registers the device with the new authorization code.

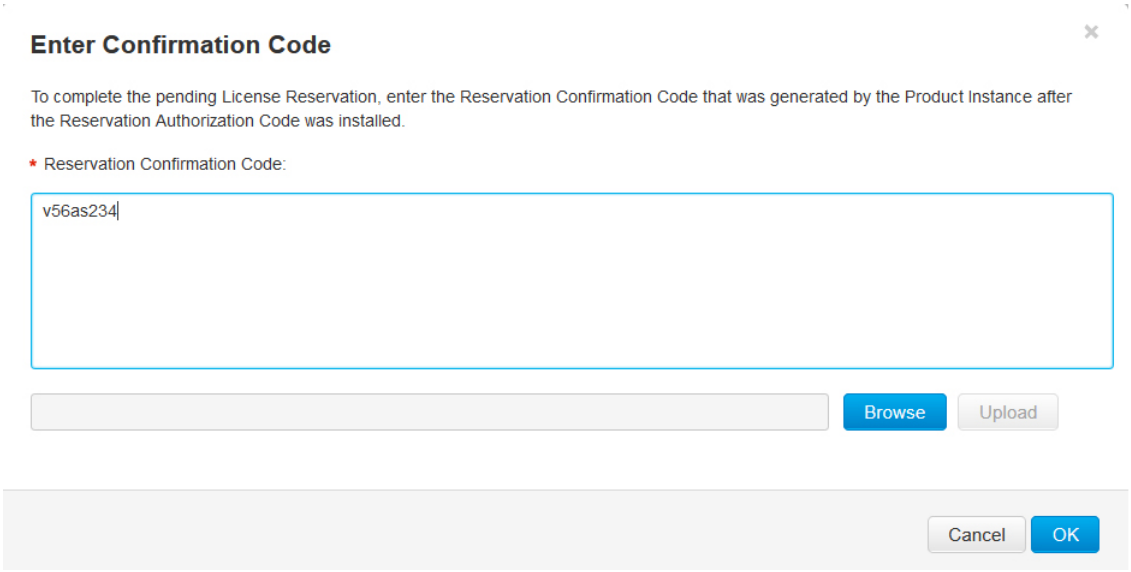
Example:

```
Router# license smart reservation install file
bootflash:AuthorizationCode_SN_CAT1815U08H.txt
Reservation install file successful
Last Confirmation code UDI:PID:ASR-920-12CZ-A,SN:CAT1815U08H
v56as234
```

Note the confirmation code that is displayed in the output.

Step 10 In CSSM, from the **Authorization Code** tab, click the **Enter Confirmation Code** button.

Enter the confirmation code that is displayed on the router.



Step 11 Click **OK** to complete the license reservation.

Removing License Authorization Code

Deregistering devices requires the removal of the authorization code. Installed Authorization codes must be returned to CSSM. The router moves into Eval mode on returning the code.

Procedure

Step 1 Log in to the router to generate a return code for the instance.

Step 2 Run the **license smart reservation return local** command to generate the code.

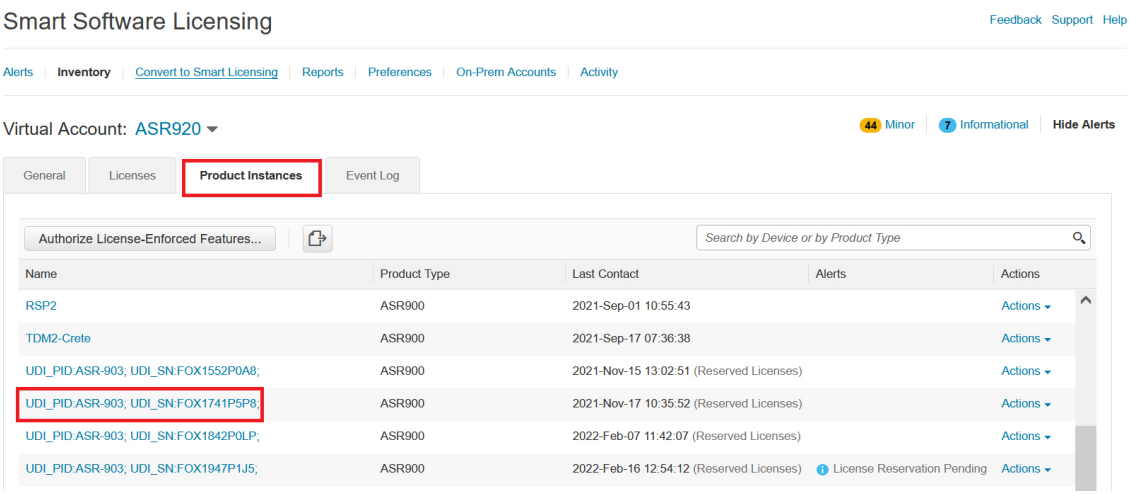
```
Router# license smart reservation return local
This command will remove the license reservation authorization code and the device will
transition back to the unregistered state. Some features may not function properly.
Do you want to continue? [yes/no]: yes
Enter this return code in Cisco Smart Software Manager portal:
UDI: PID:ASR-920-12SZ-IM,SN:CAT1930U20Q


CiFaL1-uFvouy-baod31-V9S6EZ-YoFfMD-2YFHro-Tywy77-FkzFF2-LMq
```

Step 3 Log in to Cisco Smart Software Manager at https://software.cisco.com/#.

You must log in to the portal using the Cisco provided username and password.

Step 4 Click the **Inventory** tab. From the **Virtual Account** drop-down list, select your smart account.

Step 5 From the **Product Instances** tab, select the device to remove license reservation, click **Actions**.



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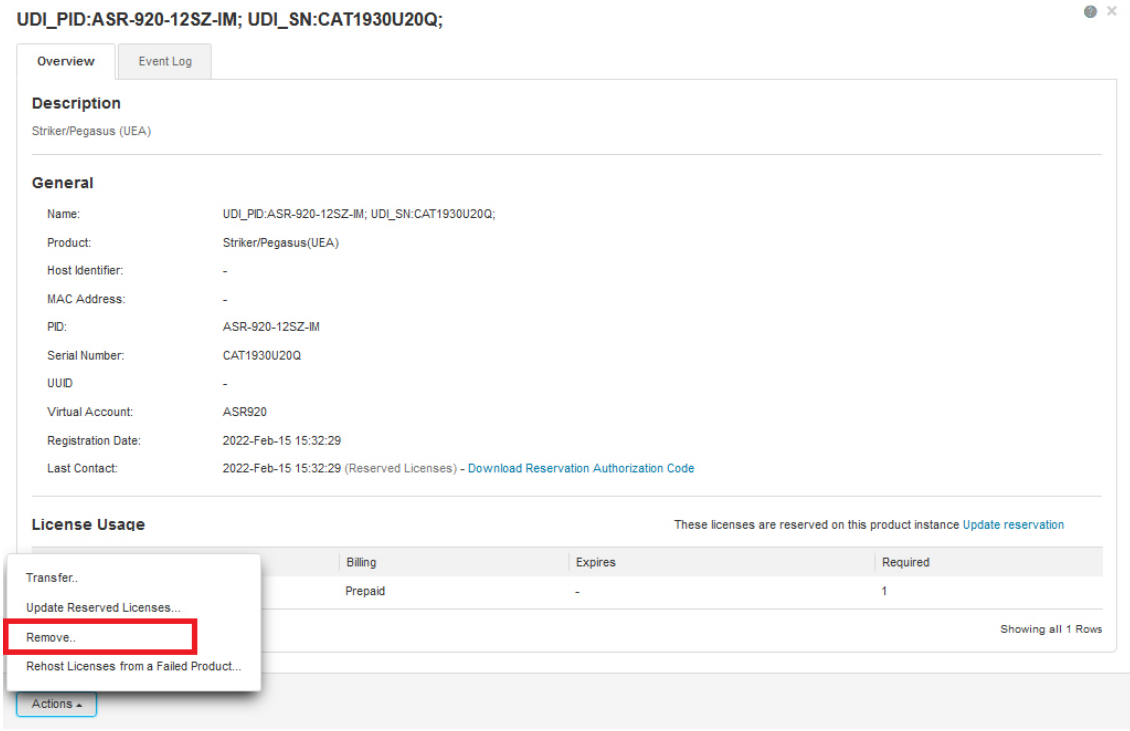
Step 6 Select **Remove**.



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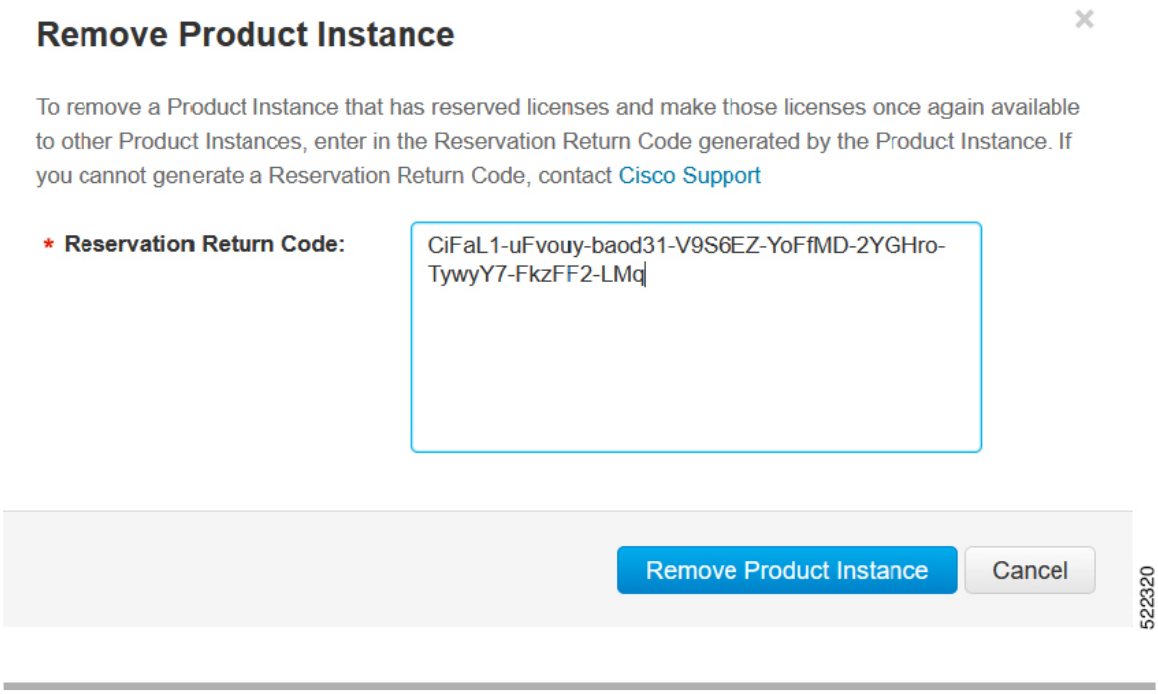
Step 7 Enter the return code, and click **Remove Product Instance**.



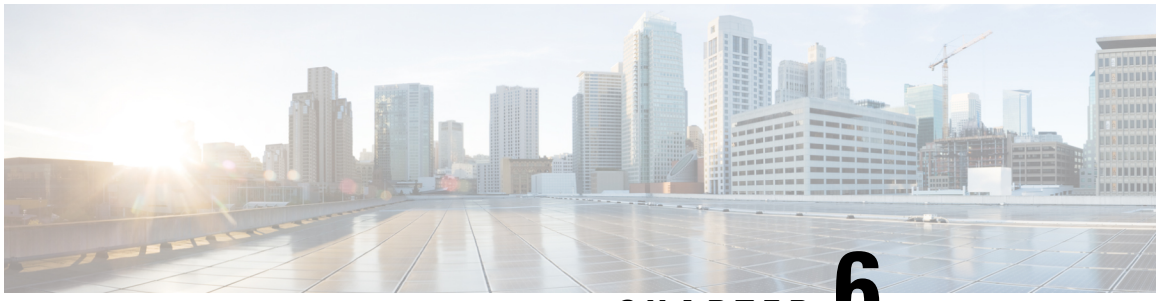
Removing the Authorization Code Post Factory Reset

Before performing a factory reset, you must generate the reservation return code to the Cisco Global Licensing Operations (GLO).

Note The router may go into Unregistered state if you fail to return the code, and CSSM displays the product instance.

To remove the router instance from CSSM, do one of the following:

- Check if authorization code is available post factory reset. Use the **license smart reservation return authorization file** *autho_code_file* command to generate return code for the router. Use this return code to remove the instance from the CSSM. See Removing License Authorization Code, on page 118.
- Contact Cisco Support to remove the router instance from CSSM.



CHAPTER 6

Flexi License

Flexi license allows you to select the port of your choice . When you buy a chassis few ports are enabled for free of charge (4*1G ports are enbaled by default). With this license in place, you can choose the ports of your choice to activate additional 4*10G ports on the chassis.

By deactivating the enabled port, you can activate other ports of your choice.

Note Flexi Licensing is applicable for 10G ports only.

Note This license upgrade will not disturb the existing port state.

This document describes about flexi license on Cisco ASR 920 Series Routers beginning with Cisco IOS XE 3.18.0S

Prerequisites for Flexi Licensing

Before activating this license, you must obtain and install the license. For information on obtaining and installing licenses, see Configuring the Cisco IOS Software Activation Feature.

Flexi license restrictions for dual rate ports

- If 10G license is installed for a dual rate port and SFP is inserted in that port, the interface will come up in 1G mode.
- If 10G license is installed for a dual rate port and SFP+ is inserted in that port, the interface will come up in 10G mode.
- If 10G license is **not** installed for particular port and SFP is inserted, the interface will come up in 1G mode.

- If there is a 10G license and SFP+ is inserted in the chassis(for the ports Te0/0/12-Te0/0/15), Te0/0/12–Te0/0/15 will come up in 10G mode.
- If sufficient 10G licenses or Bulk Licenses are not available for a port and an SFP+ is inserted, the 10G mode is not enabled. The interface will be in 'link down state' and the following system warning message will be generated. `Warning: SFP+ inserted at port X tengig license not in use`

Information About Flexi Licensing

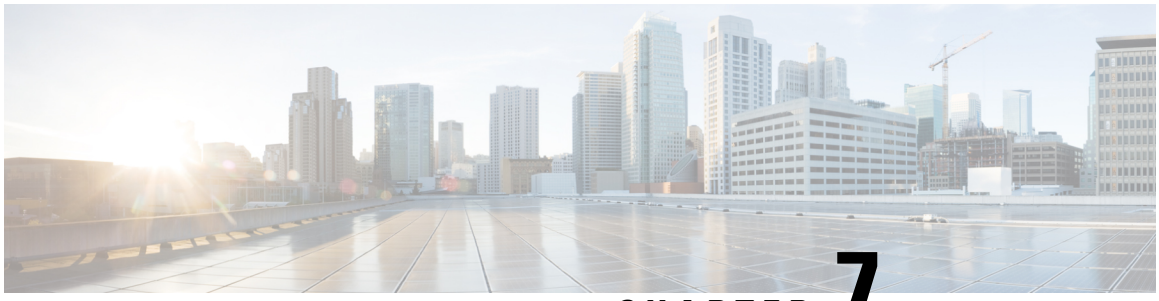
With this license, you can now choose the ports of your choice to activate 6, 12, or 4 ports on the chassis.

The following table displays the details of the licensed and nonlicensed ports on different models of Cisco ASR 920 series.

Cisco Cisco ASR 920 Series models	1G ports	10G ports
ASR-920-4SZ-A ASR-920-4SZ-D	All 6 ports operate in 1G mode by default and no license is required to activate these ports.	4 SFP + operates in 10G mode depending on the license count. License count 1: Any 2 SFP+ operates in 10G mode. License count 2: All 4 SFP+ (ports 2–5) operates in 10G mode.
ASR-920-12CZ-A ASR-920-12CZ-D	Any 6 ports and remaining 6 port s are enabled after purchasing license. By default Te0/0/12 & Te0/0/13 operates as 1G mode if 10 G license is not in use	2 SFP+ operates in 10G mode.
ASR-920-10SZ-PD	Any 6 ports. (By default Te0/0/10 & Te0/0/11 operates as 1G mode if 10 G license is not in use) and the remaining 4 ports can be activated in 1G mode.	2 SFP+ operates in 10 G mode.
ASR-920-24SZ-IM	Any 12 ports 0–15 and the remaining ports are enabled in 1G mode.	SFP+ Ports (24–27) are enabled based on license count available: License count 1: Any two ports are enabled. License count 2: All ports are enabled.

Cisco Cisco ASR 920 Series models	1G ports	10G ports
ASR-920-24TZ-M	Any 12 ports and the remaining ports are enabled in 1G mode.	SFP+ Ports (24–27) are enabled based on license count available: License count 1: Any two ports are enabled. License count 2: All ports are enabled.
ASR-920-24SZ-M	Any 12 ports and the remaining ports are enabled in 1G mode.	SFP+ Ports (24–27) are enabled based on license count available: License count 1: Any two ports are enabled. License count 2: All ports are enabled.
ASR-920-12SZ-IM	Any of the four ports 0–15 is enabled as 1G port. Ports are enabled depending on license count available: License count 1: 6 ports out of 12 remaining in 1G mode is enabled. License count 2: All the ports are enabled in 1G mode.	SFP+ Ports any two is enabled based on license count available: License count 1: Any two ports are enabled. License count 2: Remaining 2-10G is enabled.
ASR-920-8S4Z-PD	Any four ports are enabled as 1G port. Remaining four ports are enabled in 1G mode after purchasing license (By default Te0/0/8 to Te0/0/11 operates as 1G mode if 10G license is not in use)	Without any 10G license: Any two SFP+ ports are enabled. License count 1: Remaining two SFP+ ports are enabled.
ASR-920-20SZ-M	Any 12 ports and the remaining 12 ports are enabled in 1G mode after license installation.	SFP+ Ports (24–27) are enabled based on license count available: License count 1: Any two ports are enabled. License count 2: All ports are enabled.

Cisco Cisco ASR 920 Series models	1G ports	10G ports
ASR-920-12SZ-A ASR-920-12SZ-D	Any port can be used in 1G mode. No license is required.	Six ports are enabled by default. The remaining six ports are 10G licensed ports. To activate the 10G ports, you can install any of the following licenses. **1.** When you install and activate the first 10-Gigabit Ethernet Upgrade License, any eight ports can be enabled as 10G and the other four ports can be enabled as 1G ports – allowing an overall capacity of (8x10G+4x1G). **2.** When you install and activate the second 10-Gigabit Ethernet Upgrade License, any ten ports can be enabled as 10G and the other two ports can be enabled as 1G ports – allowing an overall capacity of (10x10G+2x1G). **3.** When you install and activate the third 10-Gigabit Ethernet Upgrade License, all 12 ports can be enabled as 10G - allowing an overall capacity of (12x10G).



CHAPTER 7

Licensing 1G and 10G Ports on the Cisco ASR 920 Series Routers

The Cisco Software License Activation feature is a set of processes and components to activate Cisco IOS-XE software feature sets by obtaining and validating fee-based Cisco software licenses.

For information on software license activation and concepts, see the Cisco IOS Software Activation Conceptual Overview.

Refer the following link for the License Registration Portal: https://slexui.cloudapps.cisco.com/SWIFT/LicensingUI/Quickstart

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see Bug Search Tool and the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the feature information table.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to https://cfnng.cisco.com/. An account on Cisco.com is not required.

Prerequisites for Port Upgrade Licensing and Bulk Port Licensing

Before activating the Port Upgrade and Bulk Port license, you must obtain and install the license. For information on obtaining and installing licenses, see Configuring the Cisco IOS Software Activation Feature.

Ports must be enabled to Admin Up mode after installing the license on the Cisco router to activate the license in Use state.

Effective from the Cisco IOS XE 3.18 release, the **License Feature Port** command is not supported.

Restrictions for Port Upgrade Licensing and Bulk Port Licensing

Note Port Upgrade Licensing is applicable for both 1G and 10G ports.

- If 10G license is installed and activated for a dual rate port and an SFP is inserted in that port, the interface will come up in 1G mode.
- If 10G license is installed and activated for a dual rate port and an SFP+ is inserted in that port, the interface will come up in 10G mode.
- If 10G license is **not** installed for particular port and SFP is inserted, the interface will come up in 1G mode.
- If sufficient 10G licenses or Bulk Licenses are not available or not activated for a port and an SFP+ is inserted, the 10G mode is not enabled. The interface will be in 'link down state' and the following system warning message will be generated. `Warning: SFP+ inserted at port X tengig license not in use`
- If an activated 10G license is uninstalled or deactivated for a particular port with SFP+, the interface is initialized to 1G mode and 10G interfaces will be in administratively down state.
- If optics is swapped from 1G to 10G or vice versa in dual-rate ports, execute the **write mem** command before installing Bulk or Port upgrade licenses.
- Starting with Cisco IOS XE Amsterdam 17.3.1, if Smart Licensing is enabled, bulk port license is not requested explicitly from the Smart Licensing server by IOS XE software. Instead, equivalent Port Upgrade Licenses are consumed.

Information about Port Upgrade and Bulk Port Licensing

Note Before clearing the license, all corresponding ports must be in admin down (disabled) mode.

Bulk licenses have the highest priority in all Cisco ASR 920 router models, followed by the 12x1G licenses (applicable only on the Cisco ASR-920-24SZ-*xx* models), and then the 1G licenses.

When a 6x1G license is enabled, activating the 12x1G releases the 6x1G license. However, if the 12x1G license is activated, enabling 6x1G license causes no change, that is, the 6x1G license is rejected.

Similarly, when any type of license is in use and a bulk license is activated, all licenses are released and only the bulk license is activated. On the other hand, if a bulk license is in use, all other license configurations are rejected.

Port Upgrade License

Port upgrade license is available in pay-as-you-grow model. Few ports in the router are enabled by default. However, you must purchase the licenses to enable other ports.

- 1 GigabitEthernet Upgrade License (**L-ASR920-1G-6**)—1G ports are bundled as a group of six ports. You must purchase one license bundle to enable six 1G ports.
- 10 GigabitEthernet Upgrade License (**L-ASR920-10G-2**)—10G ports are bundled as a group of two ports. You must purchase one license bundle to enable two 10G ports.

The Cisco ASR 920 Series routers support dual rate 10G ports. Initially all the 10G ports operate in 1G mode. You must purchase 10G Upgrade license to operate in 10G mode.

Table 13: Licensed and Non-Licensed Ports on the Cisco ASR 920 Series

Cisco ASR 920 Router Models	1G ports	10G ports
ASR-920-12CZ-A ASR-920-12CZ-D	There are 12X1G ports. The 12X1G ports are grouped as (4 SFP + 8 AMS port) The first six ports (4 SFP + 2 AMS Port) are non-licensed ports that are enabled by default. The last 6 ports (6 AMS Ports) are licensed ports. • Ports enabled by default: **Gi0/0/0 - Gi0/0/5** • Licensed ports: **Gi0/0/6 - Gi0/0/11**	There are 2X10G ports that operate in 1G mode by default. To operate in 10G mode, you have to activate 10 Gigabit Ethernet Upgrade license with single bundle. • Ports enabled by default: **Te0/0/12 - Te0/0/13** (operating in 1G mode) • Licensed ports: **Te0/0/12 - Te0/0/13** (license needed for 10G mode)

Cisco ASR 920 Router Models	1G ports	10G ports
ASR-920-4SZ-A ASR-920-4SZ-D	The two ports operate in 1G mode by default and no license is required to activate these ports. • Ports enabled by default: **Gi0/0/0 - Gi0/0/1** • Licensed ports: **None**	There are 4X10G ports that operate in 1G mode by default. To operate in 10G mode, you have to activate 10 GigabitEthernet Upgrade license with single bundle or two bundles. When you install and activate with the single bundle (bundle count 1), then the first two ports are enabled in 10G mode (Interfaces Te0/0/2 and Te0/0/3 only). If you install the second bundle (bundle count 2), all the 10G ports (Te0/0/2 - Te0/0/5) are enabled in 10G mode. • Ports enabled by default: **Te0/0/2 - Te0/0/5** (operating in 1G mode) • Licensed ports: **Te0/0/2 - Te0/0/5** (license needed for 10G mode available in bundles of 2 ports)
ASR-920-10SZ-PD	There are 10X1G ports. These 10X1G ports are grouped as: • Two copper ports • Eight SFP ports The first four ports (Gi0/0/0 -Gi0/0/3) are non-licensed ports, that is, these ports are enabled by default. The last six ports (Gi0/0/4 - Gi0/0/9) are licensed ports, that is, you need a license to enable them.	There are 2X10G ports that operate in 1G mode by default. For the ports to operate in 10G mode, you must to activate the 10 Gigabit Ethernet Upgrade License with a single bundle. • Ports enabled by default—Te0/0/10 – Te0/0/11 (operate in 1G mode) • Licensed ports—Te0/0/10 – Te0/0/11 (license needed to operate in 10G mode)

Cisco ASR 920 Router Models	1G ports	10G ports
ASR-920-24SZ-IM ASR-920-24SZ-M ASR-920-24TZ-M ASR-920-20SZ-M	There are 24X1G ports. The first 12 ports (Gi0/0/0 – Gi 0/0/11) are active by default and no license is required for these ports. The last 12 ports (Gi 0/0/12 – Gi 0/0/23) are licensed ports, that is, you need a license to enable them. You can use a 12X1G bundle license to activate all the licensed 1G ports at once. **Note** License will remain activated for these ports; however, you must explicitly deactivate/release the port license by executing the (no) license feature port onegig bundle_count command. In case of the ASR-920-24SZ-IM model, if the pluggable IM (8X1G Copper) is activated, ports 16-23 are disabled and removed from the interface list. Even when all the license bundles are activated before the IM activation, once IM is activated, the ports16-23 will be disabled. In case of the ASR-920-24SZ-IM model, when activating the 8T1/E1 IM, ports Gi 0/0/20 – Gi 0/0/23 are disabled and the interfaces are removed from the list.	There are 4X10G ports and they are disabled by default. Since dual rate ports are not supported, these ports cannot be used in 1G mode. To activate the 10G ports, upgrade license with single or two bundles is required. When you install and activate a single bundle (bundle count=1), the first two TenGigabitEthernet ports are enabled —Te0/0/24 – Te0/0/25. If you install the second bundle (bundle count=2), all 10G ports (Te0/0/23 – Te0/0/27) are activated.

Cisco ASR 920 Router Models	1G ports	10G ports
ASR-920-12SZ-IM	There are 12X1G ports (Gi0/0/0 - Gi0/0/11). Ports 12–15 are dual rate ports. • Ports enabled by default: Any of the four ports 0-15 can be enabled as 1G port. • Licensed ports: Remaining eight ports from 0-15 require 1G license to be enabled.	There are 4X10G ports (Te0/0/12 - Te0/0/15). To operate in 10G mode, you must activate 10 Gigabit Ethernet Upgrade license with bundle count 2, or bulk license. • Licensed ports: **Te0/0/12 - Te0/0/15** (10G/Bulk license and SFP+ needed to operate in 10G mode)
ASR-920-12SZ-A ASR-920-12SZ-D	• Any port can be used in 1G mode. No license is required. • Licensed ports: None	Six ports are enabled by default. The remaining six ports are 10G licensed ports. To activate the 10G ports, you can install any of the following licenses: • When you install and activate the first *10 GigabitEthernet Upgrade License*, any eight ports can be enabled as 10G and the other four ports can be enabled as 1G ports – allowing an overall capacity of (8x10G+4x1G). • When you install and activate the second *10 GigabitEthernet Upgrade License*, any ten ports can be enabled as 10G and the other two ports can be enabled as 1G ports – allowing an overall capacity of (10x10G+2x1G). • When you install and activate the third *10 GigabitEthernet Upgrade License*, all twelve ports can be enabled as 10G - allowing an overall capacity of (12x10G).

Cisco ASR 920 Router Models	1G ports	10G ports
ASR-920-8S4Z-PD	There are 8X1G ports. These 8X1G ports are grouped as: • Two copper ports • Six SFP ports Out of these, four ports are non-licensed ports, that is, these ports are enabled by default. The remaining four ports are licensed ports, that is, you need a license to enable them.	There are 4X10G ports that operate in 1G mode by default. 2X10G ports can operate in 10G mode without a license. For the remaining two ports to operate in 10G mode, you must activate the 10 Gigabit Ethernet Upgrade License with a single bundle. • Ports enabled by default—Te0/0/8 – Te0/0/11 (operate in 1G mode) • Ports enabled by default in 10G mode – any 2 (Te0/0/8 – Te0/0/11) • Licensed ports—Remaining two ports (Te0/0/8 – Te0/0/11) need a license to operate in 10G mode

Table 14: Port Behavior

Cisco ASR 920 Router Models	1G ports	10G ports
ASR-920-12CZ-A ASR-920-12CZ-D	Without license: You will have all the non-licensed ports Gi0/0/0 - Gi0/0/5. The licensed ports Gi0/0/6 - Gi0/0/11 are "admin-down", that is the licensed ports are in Shutdown state. You cannot activate the interface using the **no shutdown** command on the licensed ports unless you have the valid 1 GigabitEthernet Upgrade license installed and activated. With License: After you install and activate the license, then the licensed ports Gi0/0/6 - Gi0/0/11 come out of "admin-down" state, and will be **Up** or **Down** state based on the connection.	Without License: The licensed ports Te0/0/12 - Te0/0/13 operate in 1G mode. With License: After you install and activate the license, the licensed ports Te0/0/12-Te0/0/13 operate in 1G or 10G mode.

Cisco ASR 920 Router Models	1G ports	10G ports
ASR-920-4SZ-A ASR-920-4SZ-D	Without License: The ports Gi0/0/0 - Gi0/0/1 operate in 1G mode.	Without License: The licensed ports Te0/0/2-Te0/0/5 operate in 1G mode. With License: If you install and activate the license with single bundle (bundle count 1), then the ports Te0/0/2 - Te0/0/3 will be activated in 10G mode and the remaining ports will be in 1G mode. If you install and activate the license with second bundle (bundle count 2), then all the licensed ports Te0/0/2 - Te0/0/5 will operate in 1G or 10G mode.
ASR-920-10SZ-PD	Without license: The ports Gi0/0/0 – Gi0/0/3 are non-licensed. The licensed ports Gi0/0/4 - Gi0/0/9 are in "admin-down" state, that is, licensed ports are in shutdown state. You cannot activate the interface using the **no shutdown** command on the licensed ports unless you have a valid 1 Gigabit Ethernet upgrade license installed and activated. With License: After you install and activate the license, the licensed ports Gi0/0/4 – Gi0/0/9 are no longer in "admin-down" state. These ports are in **UP** or **DOWN** state based on the connection.	Without License: The ports Te0/0/10 – Te0/0/11 operate in 1G mode. With License: After you install and activate the license, the ports Te0/0/10 – Te0/0/11 operate in 1G or 10G mode.
ASR-920-24SZ-IM ASR-920-24SZ-M ASR-920-24TZ-M ASR-920-20SZ-M	Without License: The ports Gi0/0/0 – Gi0/0/11 are non-licensed. The licensed ports Gi0/0/12 – Gi0/0/23 are in "admin-down" state, that is, the ports are in shutdown state. You cannot activate the interface using the **no shutdown** command. With License: After you install and activate the license with single bundle of six 1G ports, the ports Gi0/0/12 – Gi0/0/17 are activated. If you install the license with second bundle of six 1G ports, all ports Gi0/0/12 – Gi0/0/23 are activated. L-ASR920-1G-6 license is not supported on the router. Only L-ASR920-1G-12 license is supported.	Without license: With no 10G licensed installed, the ports Te0/0/24 – Te0/0/27 cannot be used. They remain in "admin-down" state and cannot be activated using the **no shutdown** command. With license: After you install and activate the license with single bundle count, ports Te0/0/24 – Te0/0/25 are activated. The remaining ports will be in "admin-down" state. When you install the second bundle license (bundle count=2), all TenGig ports (Te0/0/24 – Te0/0/27) are activated. L-ASR920-1G-6 license is not supported on the router. Only L-ASR920-1G-12 license is supported.

Cisco ASR 920 Router Models	1G ports	10G ports
ASR-920-12SZ-IM	Without license: The licensed ports Gi0/0/0 - Gi0/0/11 are "admin-down", that is, licensed ports are in Shutdown state. You cannot activate the interface using the **no shutdown** command on the licensed ports unless you have the valid 1 GigabitEthernet Upgrade license/Bulk license installed and activated. With License: After you install and activate the license, then the licensed ports Gi0/0/0 - Gi0/0/11 come out of "admin-down" state, and will be **Up** or **Down** state based on the connection.	Without License: The licensed ports Te0/0/12 - Te0/0/15 cannot operate in 10G mode. With License: After you install and activate the 10G license with single bundle count, any two TenGig ports are activated and will work in 10G mode if SFP+ is inserted. The remaining ports will operate in 1G mode if you have a valid 1G license. When you install the second bundle license (bundle count=2), all TenGiabitEthernet ports (Te0/0/12 – Te0/0/15) are activated and work in 10G mode if SFP+ is inserted.
ASR-920-12SZ-A ASR-920-12SZ-D	By default, you can operate in 1G mode on all 12 ports or use the default (6x10G + 6x1G) license. **Note** Port upgrade license is not required for using the ports in 1G mode.	Without license: By default, the (6x10G + 6x1G) license is available. **Note** If no pluggable is present in the router at bootup, then any six ports can be used as default licenses (6x10G + 6x1G = 66G). However, if 10G pluggables are present in all the ports of router at bootup, then the first six port are marked for default licenses. The remaining ports can be used as licensed ports. With License: As part of the pay-as-you-grow: • When you install and activate the first *10 GigabitEthernet Upgrade License*, any eight ports can be enabled as 10G and the other four ports can be enabled as 1G ports – allowing an overall capacity of (8x10G+4x1G). • When you install and activate the second *10 GigabitEthernet Upgrade License*, any ten ports can be enabled as 10G and the other two ports can be enabled as 1G ports – allowing an overall capacity of (10x10G+2x1G). • When you install and activate the third *10 GigabitEthernet Upgrade License*, all twelve ports can be enabled as 10G - allowing an overall capacity of (12x10G).

Cisco ASR 920 Router Models	1G ports	10G ports
ASR-920-8S4Z-PD	Without license: Any four ports are non-licensed. The remaining four licensed ports are in "admin-down" state, that is, licensed ports are in shutdown state. You cannot activate the interface using the **no shutdown** command on the licensed ports unless you have a valid 1 Gigabit Ethernet upgrade license installed and activated. With License: After you install and activate the license, the licensed ports are no longer in **admin-down** state. These ports are in **UP** or **DOWN** state based on the connection.	Without License: The ports Te0/0/8 – Te0/0/11 operate in 1G mode. Any two SFP+ ports operate in 10G mode. With License: After you install and activate the license, the remaining two SFP+ ports operate in 10G mode.

Bulk Port License

Bulk port licensing allows you to enable all the ports with a single license. When Bulk port license is activated, even while the 1 GigabitEthernet or 10 GigabitEthernet Upgrade Licenses are in use, there is no impact on the corresponding interfaces. The existing 1 GigabitEthernet or 10 GigabitEthernet Upgrade Licenses are released.

Note Bulk port licensing is not supported on the Cisco ASR-920-12SZ-A/D routers.

Note Starting with Cisco IOS XE Amsterdam 17.3.1, if Smart Licensing is enabled, bulk port license is not requested explicitly from the Smart Licensing server by IOS XE software. Instead, equivalent Port Upgrade Licenses are consumed.

- Bulk port license for enabling all licensed ports on ASR-920-12CZ models
  - **ASR920-12G-2-10G**—Enables six 1G combo ports and upgrades two 10G SFP+ ports to operate in 10G mode.
- Bulk port license for enabling all licensed ports on ASR-920-4SZ models
  - **ASR920-2G-4-10G**—Enables all four SFP+ ports to operate in 10G mode.
- Bulk port license for enabling all licensed ports on ASR-920-10SZ-PD models
  - **ASR920-10G-2-10G**—Enables six 1G ports and upgrades the two 10G SFP+ ports to operate in 10Gmode.

- Bulk port license for enabling all licensed ports on ASR-920-24SZ-IM, ASR-920-24SZ-M, ASR-920-24TZ-M, and ASR-920-20SZ-M models
  - **ASR920-24G-4-10G**—Enables all SFP (12-23) and SFP+ (24-27) ports

Note In case of the ASR-920-24SZ-IM model, if the pluggable IM (8x1G Copper) is activated, ports 16-23 are disabled and removed from the interface list.

- Bulk port license for enabling all licensed ports on ASR-920-12SZ-IM models
  - **ASR920-12G-4-10G**—Enables twelve 1G ports and upgrades four 10G SFP+ ports to operate in 10G mode.

Note If there is no license and a 1G SFP is inserted in the chassis ports Gi0/0/12–Gi0/0/15 will be administratively down

If there is a license and 1G SFP is inserted in the chassis, ports Gi0/0/12–Gi0/0/15 will work in 10G mode only.

- Bulk port license for enabling all licensed ports on ASR-920-8S4Z-PD models
  - **ASR920-8G-4-10G**—Enables four 1G ports and upgrades the two 10G SFP+ ports to operate in 10G mode.

Note Before clearing the license, all corresponding ports must be in admin down (disabled) mode.

Configuring Ports Using Port Upgrade License

Procedure

Step 1 **enable**

Example:

```
Router> enable
```

Enables privileged EXEC mode.

- Enter your password if prompted.

Step 2 **configure terminal**

Example:

```
Router# configure terminal
```

Enters global configuration mode.

Step 3 **license feature port** {**onegig** | **6xonegig** | **tengig**} *bundle_count* | **12xonegig**

Example:

```
Router(config)# license feature port 6xonegig 2
ASR-920-24SZ(config)# license feature port 12xonegig
```

Note For all Cisco ASR 920 router models except Cisco ASR-920-24SZ-*xx*, use **license feature port** {**onegig** | **tengig**} *bundle_count* command.

For the Cisco ASR-920-24SZ-*xx*, use **license feature port** {**6xonegig** *bundle_count* | **tengig** *bundle_count* | **12xonengig**} command.

Activates the Port Upgrade license and enables the associated ports.

- **onegig**—Specifies 1G port.
- **12xonegig**—Specifies 1G port for all twelve ports.

  Note This option is applicable only to the Cisco ASR-920-24SZ-*xx* models.

- **tengig**—Specifies 10G port.
- *bundle_count*—Specifies the bundle count 1 or 2.

  Note The *bundle_count* option is not applicable when used with **12xonegig**.

Note In case of Cisco ASR-920-24SZ-*xx* models, when for onegig upgrade license and bundle count 1 is specified, the lower ports (12-17) are enabled. If bundle count 2 is specified, all ports (12-23) are enabled.

Note In case of ASR-920-24SZ-*xx* models, when for tengig upgrade license and bundle count 1 is specified, the lower ports (24-25) are enabled. If bundle count 2 is specified, all ports (24-27) are enabled.

To deactivate the license and disable the associated ports, use the **no license feature port** command.

- Use bundle count 1 to disable the ports Te0/0/4 and Te0/0/5.
- Use bundle count 2 to directly disable all the four 10G ports.

For ASR-920-12SZ-IM, to disable ports Gi0/0/0 to Gi0/0/11:

- For 1G ports: bundle count 2 will disable/enable all ports (Gi0/0/0–Gi0/0/11)
- For 10G ports:
  - bundle count=1, disables Gi0/0/12–Gi0/0/13
  - bundle count =2, disables Gi0/0/12–Gi0/0/15

Configuring Ports Using Bulk Port License

Procedure

Step 1 **enable**

Example:

```
Router> enable
```

Enables privileged EXEC mode.

- Enter your password if prompted.

Step 2 **configure terminal**

Example:

```
Router# configure terminal
```

Enters global configuration mode.

Step 3 **license feature port bulk**

Example:

```
Router(config)# license feature port bulk
```

Activates the Bulk Port license and enables all the associated ports.

To deactivate the license and disable all the associated ports, use the **no license feature port bulk** command.

Verifying Port Upgrade and Bulk Port Licensing

Verifying the installed license

This example shows only license installed but not activated.

```
Router# show license all

License Store: Primary License Storage
StoreIndex: 0   Feature: 1GEupgradelicense                Version: 1.0
        License Type: Permanent
        License State: Active, Not in Use
        License Count: 1/0/0  (Active/In-use/Violation)
        License Priority: Medium
```

Activating the 1GigabitEthernet Port Upgrade License

```
Router(config)# license feature port onegig 1

*Apr  2 11:03:58.894 IST:  1G Upgrade License with bundle count 1 for ports 6 to 11 Enabled
```

Note For all Cisco ASR 920 router models, use **license feature port** {**onegig** | **tengig**} *bundle_count* command.

For the Cisco ASR-920-24SZ-*xx*, you can also use the **license feature port** {**6xonegig** *bundle_count* | **12xonengig**} command.

Activating the 10GigabitEthernet Port Upgrade License for ASR-920-12CZ-A/ ASR-920-12CZ-D model

```
Router(config)# license feature port tengig 1
Router# show interface description

Interface                      Status         Protocol Description
Gi0/0/0                        up             up
Gi0/0/1                        up             up
Gi0/0/2                        up             up
Gi0/0/3                        up             up
Gi0/0/4                        up             up
Gi0/0/5                        down           down
Gi0/0/6                        up             up
Gi0/0/7                        up             up
Gi0/0/8                        up             up
Gi0/0/9                        up             up
Gi0/0/10                       up             up
Gi0/0/11                       up             up
Te0/0/12                       up             up
Te0/0/13                       up             up
Gi0                            up             up
```

Activating the 10GigabitEthernet Port Upgrade License for ASR-920-4SZ-A/ ASR-920-4SZ-D model with bundle count 1

```
Router(config)# license feature port tengig 1
Router# show interface description

Gi0/0/0                        up             up
Gi0/0/1                        up             up
Te0/0/2                        up             up
Te0/0/3                        up             up
Te0/0/4                        down           down
Te0/0/5                        down           down
Gi0                            up             up
```

Activating the 10GigabitEthernet Port Upgrade License for ASR-920-4SZ-A/ ASR-920-4SZ-D model with bundle count 2

```
Router(config)# license feature port tengig 2
Router# show interface description

Interface                      Status         Protocol Description
Gi0/0/0                        up             up
Gi0/0/1                        up             up
Te0/0/2                        up             up
Te0/0/3                        up             up
Te0/0/4                        up             up
Te0/0/5                        up             up
Gi0                            up             up
```

Verifying the Port Upgrade Licenses Installed and Activated (bundle count 2)

```
Router# show license all

License Store: Primary License Storage
StoreIndex: 0   Feature: 1GEupgradelicense                Version: 1.0
        License Type: Permanent
        License State: Active, In Use
        License Count: 1/2/0  (Active/In-use/Violation)
        License Priority: Medium

StoreIndex: 2   Feature: 10GEupgradelicense               Version: 1.0
        License Type: Permanent
        License State: Active, In Use
        License Count: 1/2/0  (Active/In-use/Violation)
        License Priority: Medium
License Store: Built-In License Storage
```

Deactivating the 1GigabitEthernet Port Upgrade License

```
Router(config)# no license feature port onegig 1
Router# show interface description

Interface                      Status         Protocol Description
Gi0/0/0                        up             up
Gi0/0/1                        up             up
Gi0/0/2                        up             up
Gi0/0/3                        up             up
Gi0/0/4                        up             up
Gi0/0/5                        down           down
Gi0/0/6                        admin down     down
Gi0/0/7                        admin down     down
Gi0/0/8                        admin down     down
Gi0/0/9                        admin down     down
Gi0/0/10                       admin down     down
Gi0/0/11                       admin down     down
Te0/0/12                       up             up
Te0/0/13                       up             up
Gi0                            up             up
```

Uninstalling the 1GigabitEthernet Port Upgrade License

```
Router# license clear 1GEupgradelicense

Feature: 1GEupgradelicense
    1   License Type: Permanent
        License State: Active, Not in Use
        License Addition: Exclusive
        License Count: 3
        Comment:
        Store Index: 0
        Store Name: Primary License Storage
Are you sure you want to clear? (yes/[no]): yes
Router#
*Apr  2 11:00:16.097 IST: %LICENSE-6-REMOVE: Feature 1GEupgradelicense 1.0 was removed from
 this device.
UDI=ASR-920:CAT1748U1B6; StoreIndex=0:Primary License Storage
```

Deactivating the 10GigabitEthernet Port Upgrade License on ASR-920-12CZ-A/ ASR-920-12CZ-D model

```
Router(config)# no license feature port tengig 1
Router# show interface description

Interface                      Status         Protocol Description
Gi0/0/0                        up             up
Gi0/0/1                        up             up
Gi0/0/2                        up             up
Gi0/0/3                        up             up
Gi0/0/4                        up             up
Gi0/0/5                        down           down
Gi0/0/6                        up             up
Gi0/0/7                        up             up
Gi0/0/8                        up             up
Gi0/0/9                        up             up
Gi0/0/10                       up             up
Gi0/0/11                       up             up
Te0/0/12                       down           down
Te0/0/13                       down           down
Gi0                            up             up
```

Uninstalling the 10GigabitEthernet Port Upgrade License on ASR-920-12CZ-A/ ASR-920-12CZ-D model

```
Router# license clear 10GEupgradelicense

Feature: 10GEupgradelicense
    1   License Type: Permanent
        License State: Active, Not in Use
        License Addition: Exclusive
        License Count: 1
        Comment:
        Store Index: 0
        Store Name: Primary License Storage


Are you sure you want to clear? (yes/[no]): yes
Router#
*Apr  2 11:00:16.097 IST: %LICENSE-6-REMOVE: Feature 10GEupgradelicense 1.0 was removed
from this device.
UDI=ASR-920:CAT1748U1B6; StoreIndex=0:Primary License Storage
```

Deactivating the 10GigabitEthernet Port Upgrade License on ASR-920-4SZ-A/ ASR-920-4SZ-D model with bundle count 1

```
Router(config)# no license feature port tengig 1
Router# show interface description

Interface                      Status         Protocol Description
Gi0/0/0                        up             up
Gi0/0/1                        up             up
Te0/0/2                        up             up
Te0/0/3                        up             up
Te0/0/4                        down           down
Te0/0/5                        down           down
Gi0                            up             up
```

Deactivating the 10GigabitEthernet Port Upgrade License on ASR-920-4SZ-A/ ASR-920-4SZ-D model with bundle count 2

```
Router(config)# no license feature port tengig 2
Router# show interface description

Interface                      Status         Protocol Description
Gi0/0/0                        up             up
Gi0/0/1                        up             up
Te0/0/2                        down           down
Te0/0/3                        down           down
Te0/0/4                        down           down
Te0/0/5                        down           down
Gi0                            up             up
```

Uninstalling the 10GigabitEthernet Port Upgrade License on ASR-920-4SZ-A/ ASR-920-4SZ-D model

```
Router# license clear 10GEupgradelicense

Feature: 10GEupgradelicense
    1   License Type: Permanent
        License State: Active, Not in Use
        License Addition: Exclusive
        License Count: 1
        Comment:
        Store Index: 0
        Store Name: Primary License Storage


Are you sure you want to clear? (yes/[no]): yes
Router#
*Apr  2 11:00:16.097 IST: %LICENSE-6-REMOVE: Feature 10GEupgradelicense 1.0 was removed
from this device.
UDI=ASR-920:CAT36821784; StoreIndex=0:Primary License Storage
```

Additional References

Related Documents

Related Topic	Document Title
Cisco IOS commands	https://www.cisco.com/c/en/us/td/docs/ios-xml/ios/mcl/allreleasemcl/all-book.html

Standards and RFCs

Standard/RFC	Title
No specific Standards and RFCs are supported by the features in this document.	—

MIBs

MIB	MIBs Link
—	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

Technical Assistance

Description	Link
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

Feature Information for Port Upgrade and Bulk Port Licensing

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Table 15: Feature Information for Port Upgrade and Bulk Port Licensing

Feature Name	Releases	Feature Information
Port Upgrade and Bulk Port Licensing	Cisco IOS XE Release 3.13.0S	This feature was introduced on the Cisco ASR 920 Series Aggregation Services Router (ASR-920-12CZ-A, ASR-920-12CZ-D, ASR-920-4SZ-A, ASR-920-4SZ-D).
Port Upgrade and Bulk Port Licensing	Cisco IOS XE Release 3.14.0S	This feature was introduced on the Cisco ASR 920 Series Aggregation Services Router (ASR-920-10SZ-PD, ASR-920-24SZ-IM, ASR-920-24SZ-M, and ASR-920-24TZ-M).
Port Upgrade and Bulk Port Licensing	Cisco IOS XE Release 16.09.04	This feature was introduced on the Cisco ASR 920 Series Aggregation Services Router (ASR-920-8S4Z-PD).