Software Activation Configuration Guide (Cisco IOS XE ASR 900 Series)

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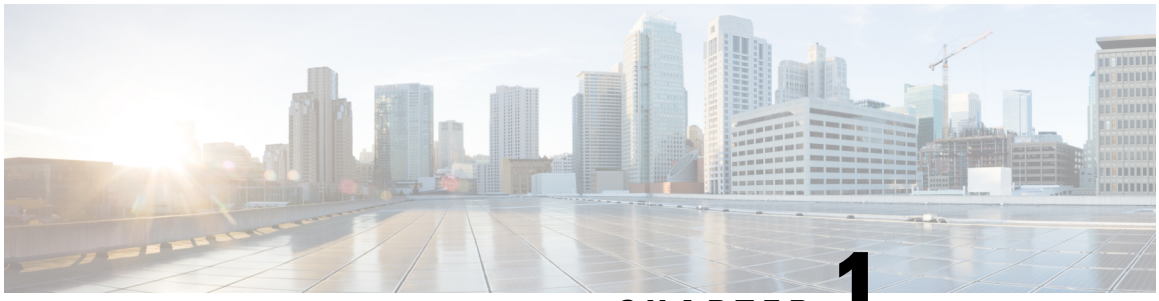
CONTENTS



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* at this URL: http://www.cisco.com/en/US/products/ps7138/products_user_guide_list.html .

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

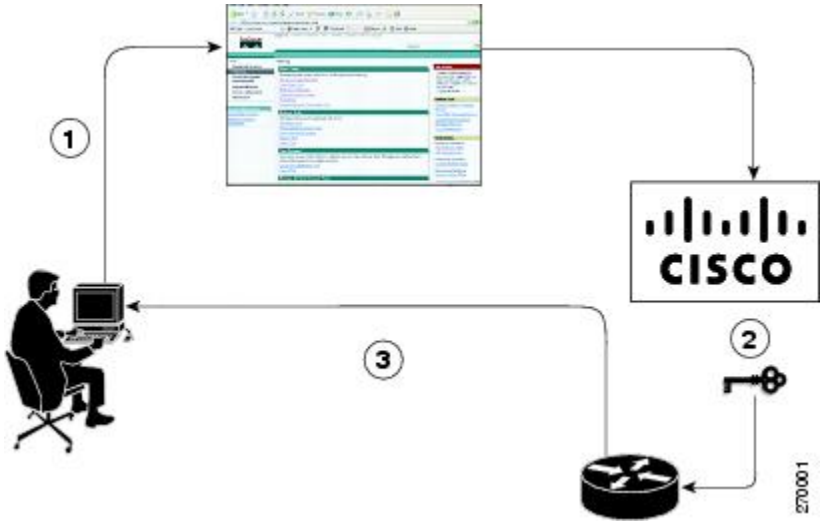
Software activation enables the various feature sets on a device by using license keys.

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.

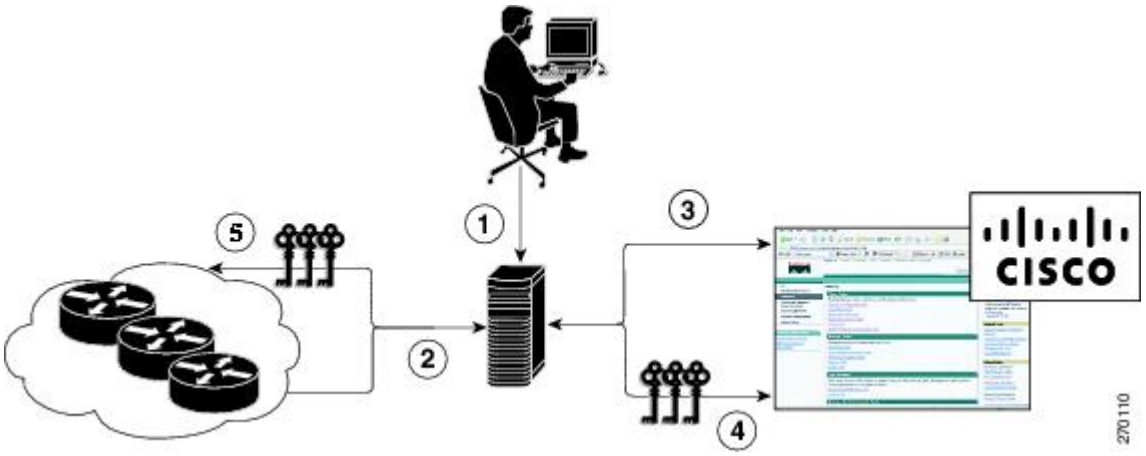
Automated Software Activation by Using Cisco License Manager

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.

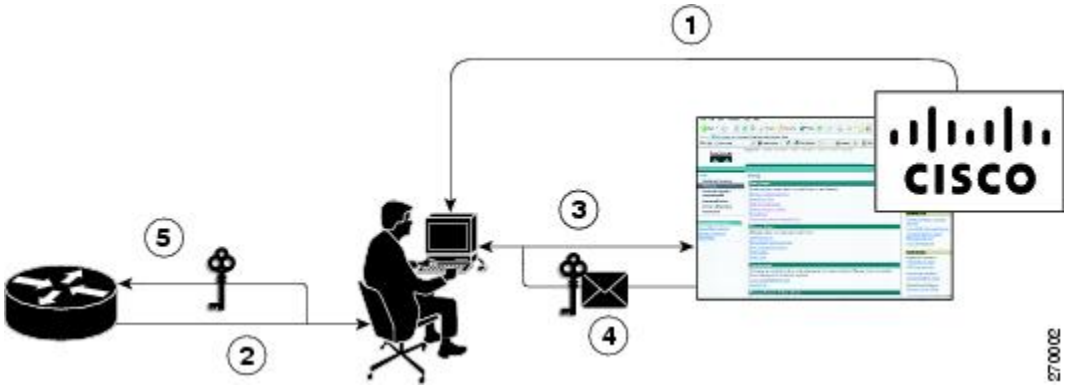
For more information, see the *User Guide for Cisco License Manager* at http://www.cisco.com/en/US/products/ps7138/products_user_guide_list.html.

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

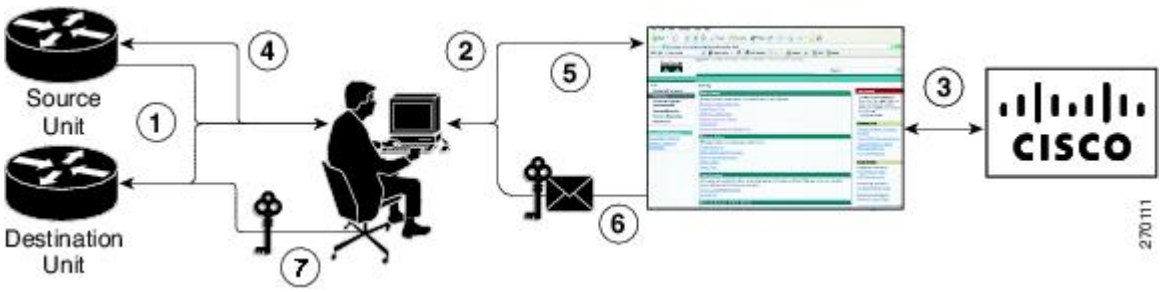
process transfers a license from one UDI to another by revoking the license from the source device and installing it on a new device.

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.

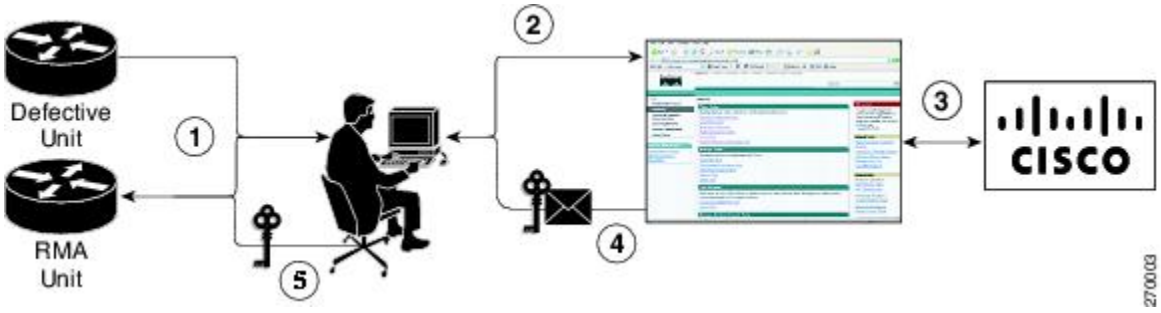
RMA License Transfer Between a Failed and a Working Device

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.

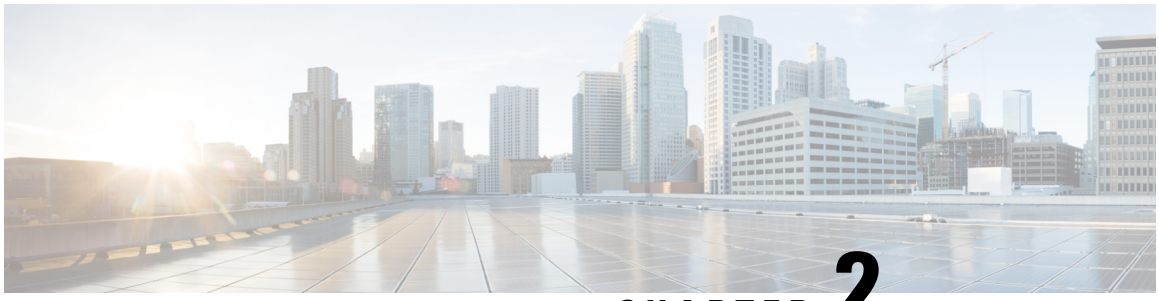
stack —A switch stack is a set of up to nine Catalyst 3750 switches connected through their StackWise ports.

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.

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 at the end of this module.

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.

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

Install and Upgrade Licenses Using Software Activation Commands

Before you begin

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

	Command or Action	Purpose
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.

	Command or Action	Purpose
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 on the devices.

Managing Licenses by Using Software Activation Commands

Adding a Comment to a License File

Procedure

	Command or Action	Purpose
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

	Command or Action	Purpose
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

	Command or Action	Purpose
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:**	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

	Command or Action	Purpose
	`Device# license save credential flash:cred.lic`	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

	Command or Action	Purpose
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

	Command or Action	Purpose
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

	Command or Action	Purpose
Step 1	**enable**	Enables privileged EXEC mode.

	Command or Action	Purpose
	Example: `Device> enable`	• 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

	Command or Action	Purpose
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.

	Command or Action	Purpose
		• 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

	Command or Action	Purpose
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

	Command or Action	Purpose
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]
```

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*

Related Topic	Document Title
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

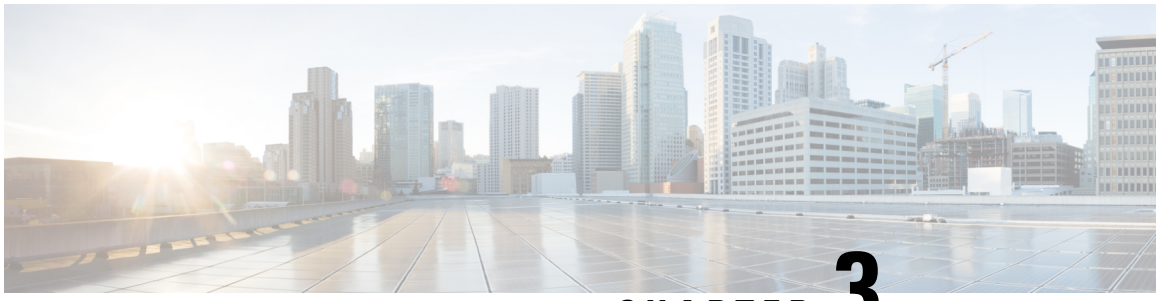
Technical Assistance

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.



CHAPTER 3

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 37 and Registering Device using the id Token, on page 38 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.

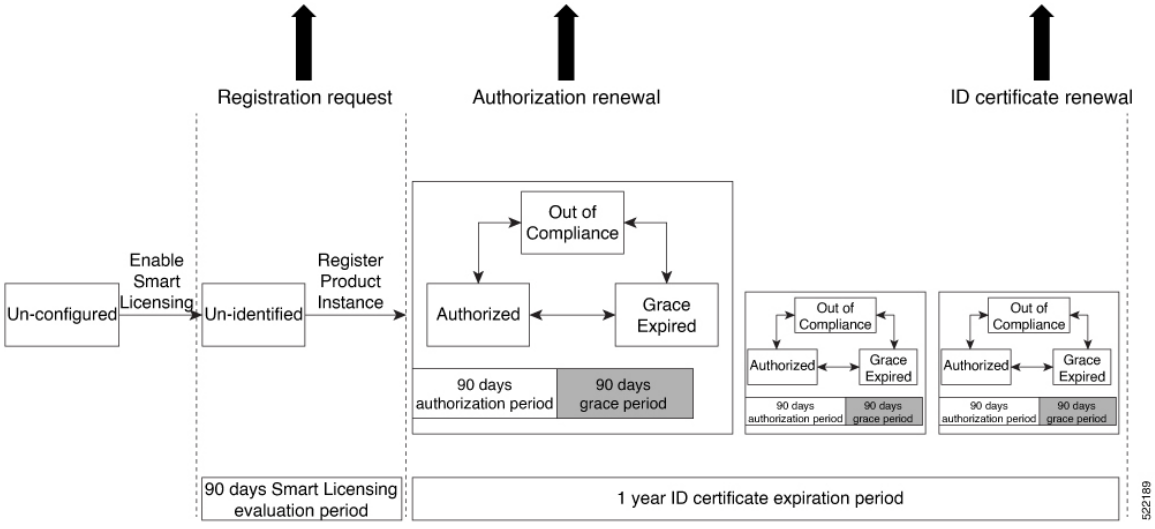
```
Router# set platform software trace ios R1 uea-sl ?
  debug      Debug messages
  emergency  Emergency possible message
  error      Error messages
  info       Informational messages
  noise      Maximum possible message
  notice     Notice messages
  verbose    Verbose debug messages
  warning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

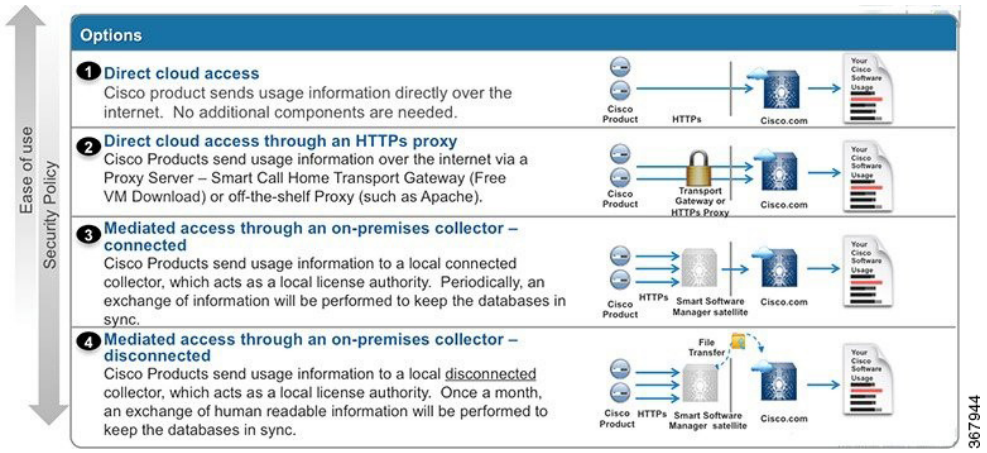
The Smart Licensing workflow is depicted in this flowchart.



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 32 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 37.

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 41
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 37 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 38 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.

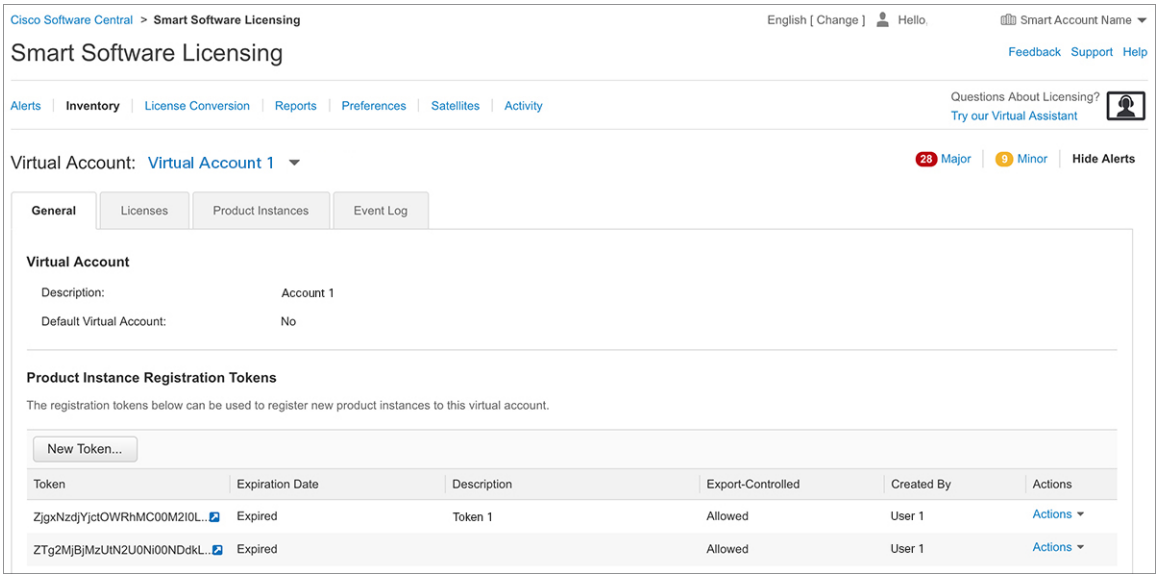
Procedure

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 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 the OC-3 and OC-12 Interface Modules and Licensing on 1-Port OC-192 or 8-Port Low Rate CEM Interface Module

Step 4 **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 49

  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 50.

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 51

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 51

Switching between license modes is possible on the router. For more information see, Switching License Modes, on page 48

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 1: 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 2: 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 3: 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 4

Introduction to License Reservation

Table 4: 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

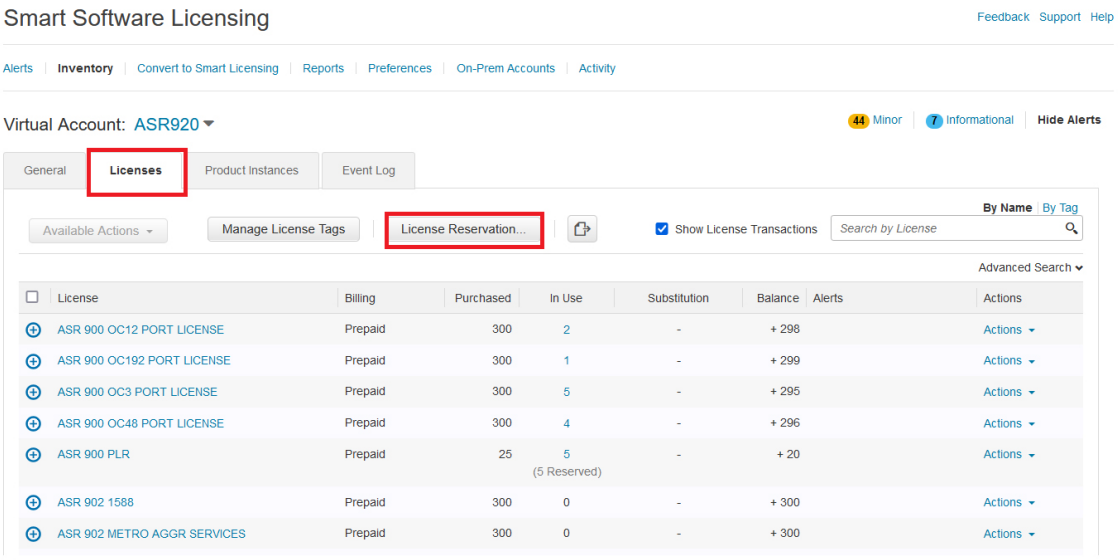
Procedure

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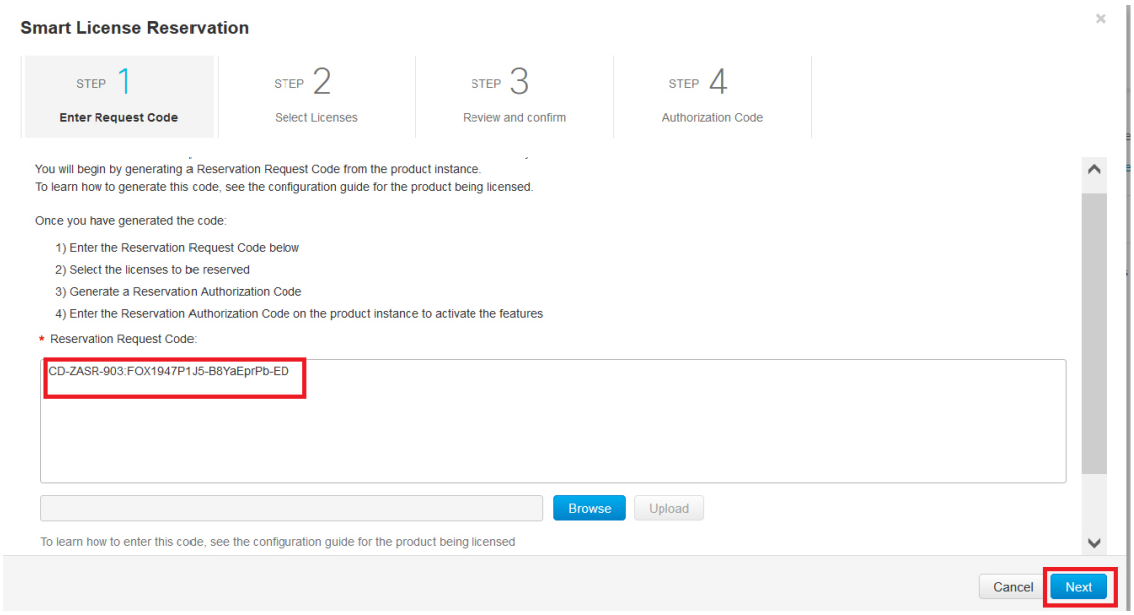
Step 4 Click License Reservation. Enter or attach the reservation request code that is generated from the router at **Enter Request Code**, and click **Next**.



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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 62

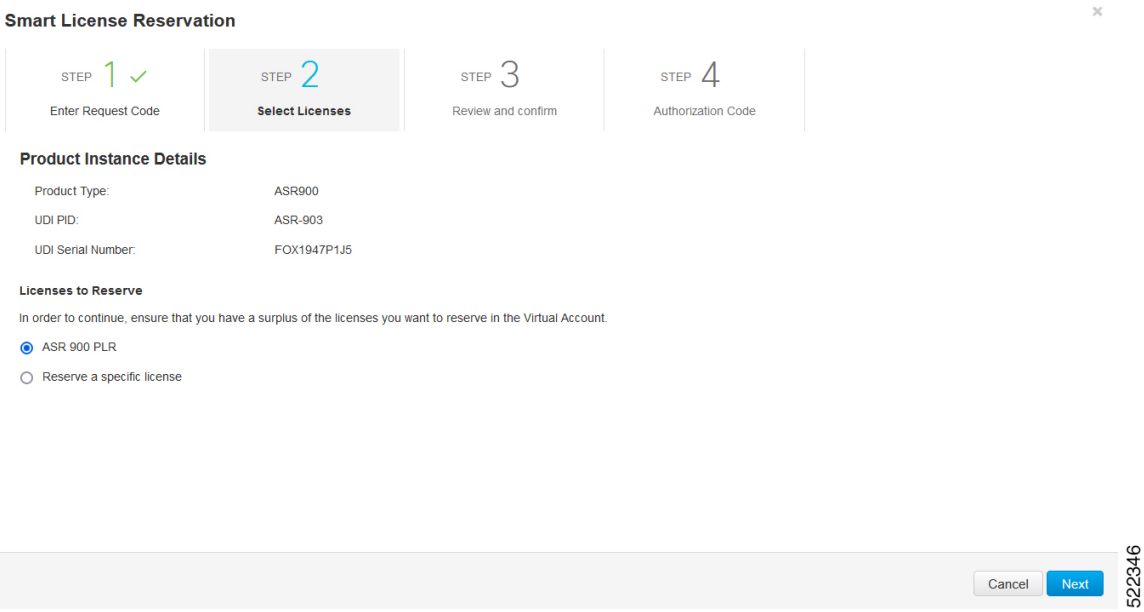
- SLR—Reserves specific licenses for Specific License Reservation. See Reserving Licenses with Specific License Reservation, on page 64

Reserving Licenses with Permanent License Reservation

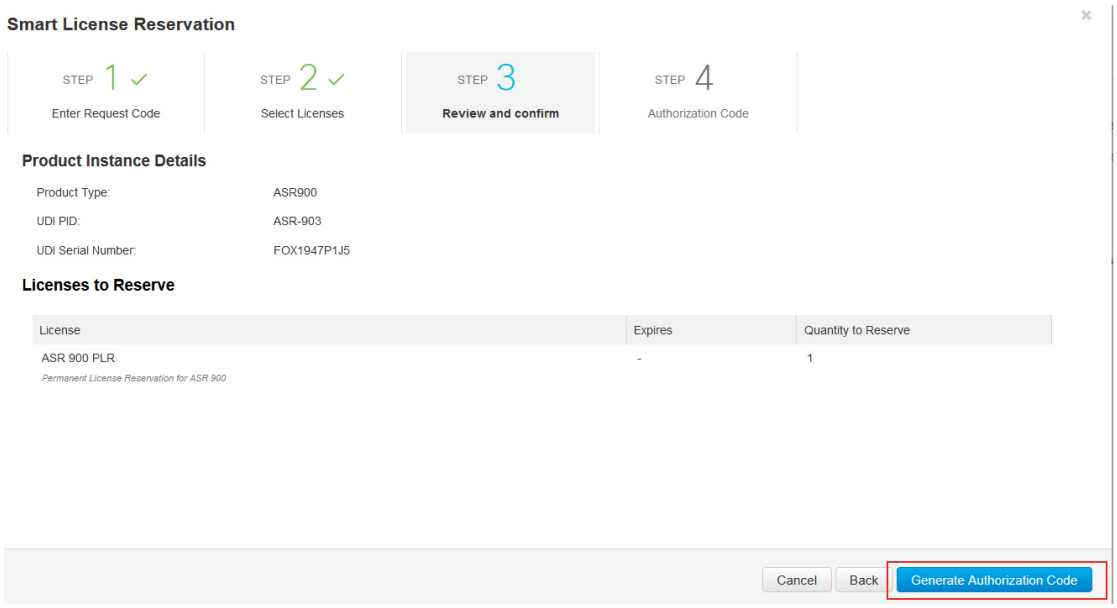
Procedure

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**.



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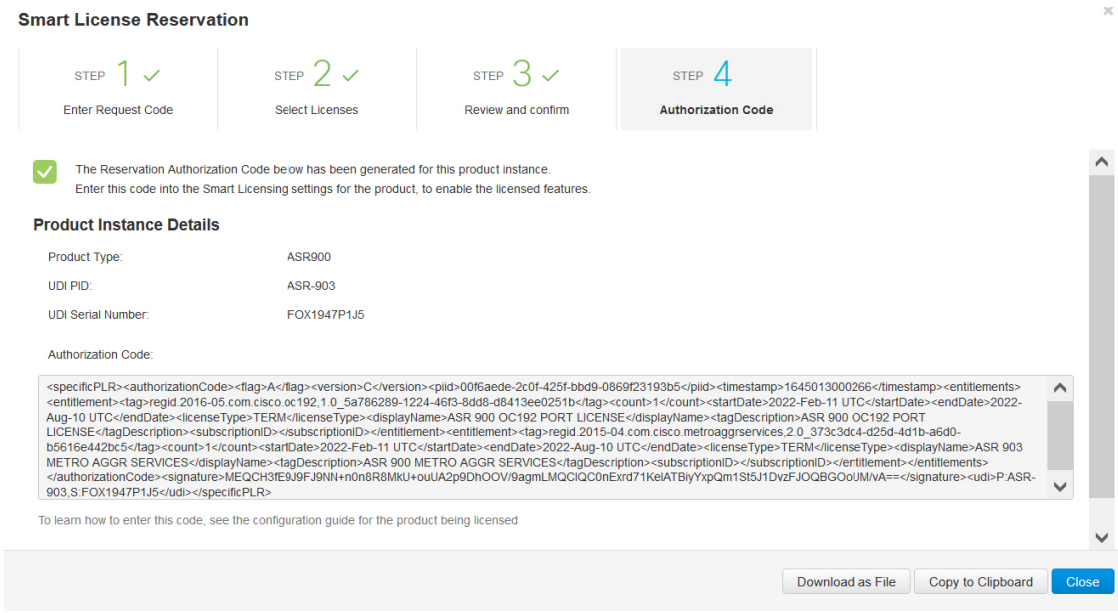
The system displays the Authorization Code.



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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.

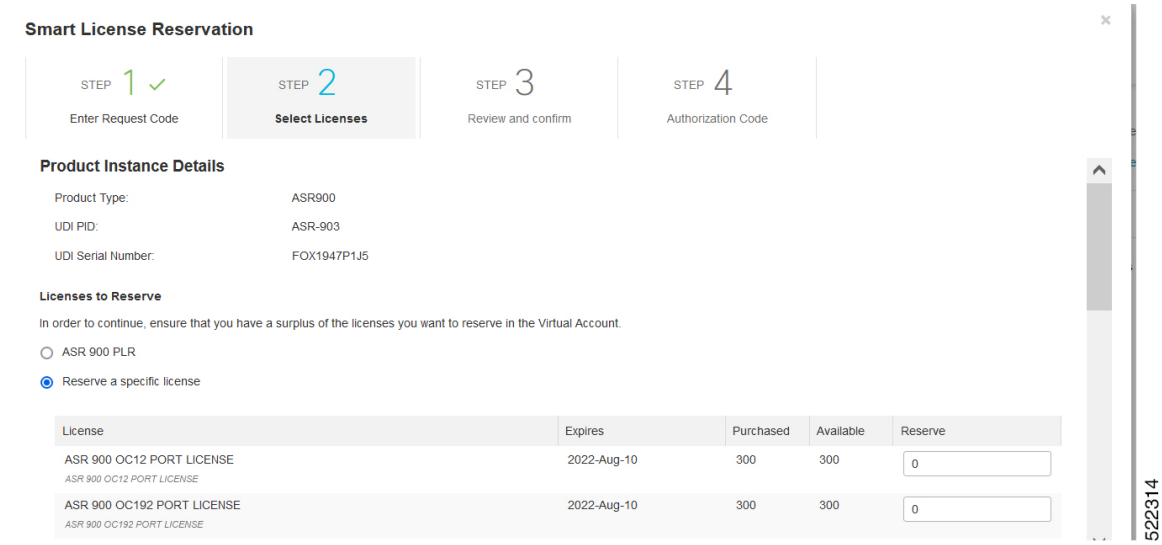
Step 4 Install the authorization file on the router by registering the device. See Register the Device Using the Authorization Code, on page 66

Reserving Licenses with Specific License Reservation

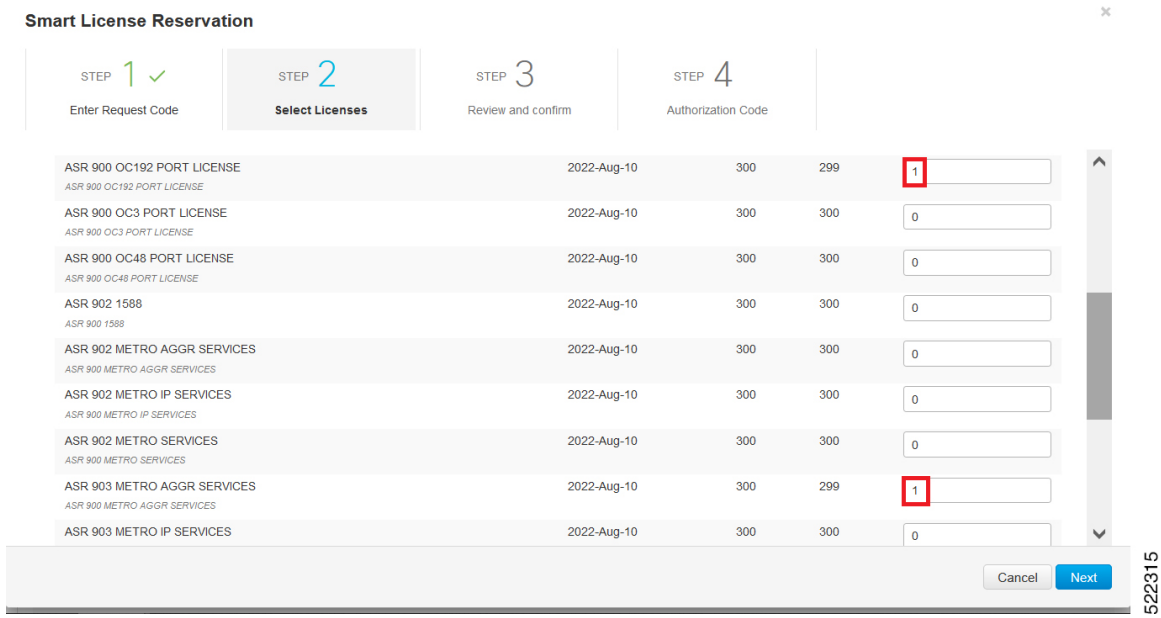
Procedure

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

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

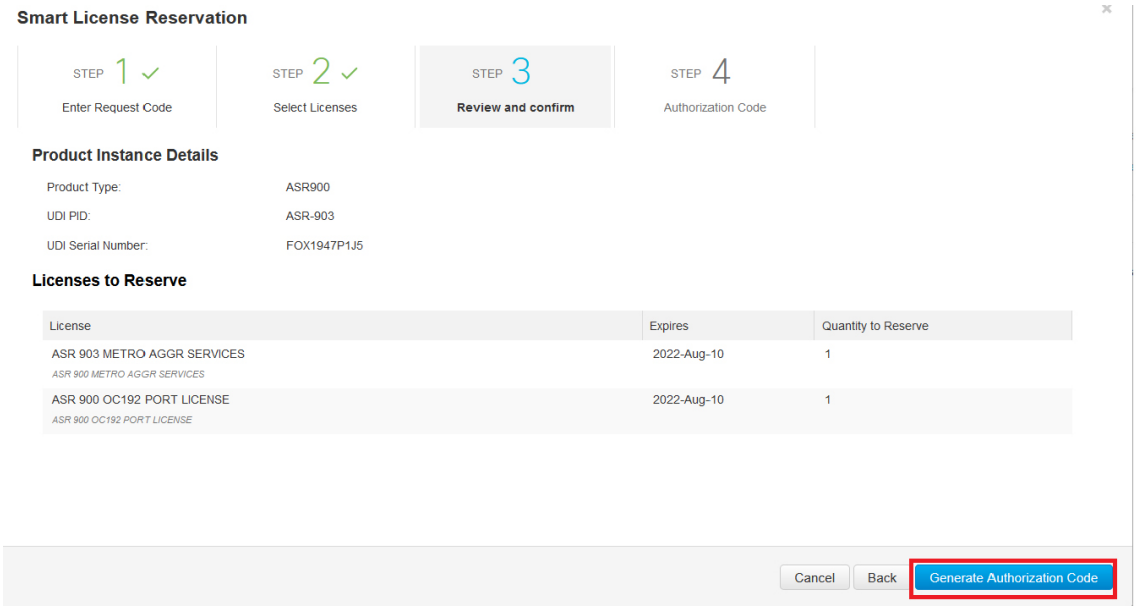


Step 2 Enter the number of licenses to reserve, in the **Reserve** field. Click **Next**.



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

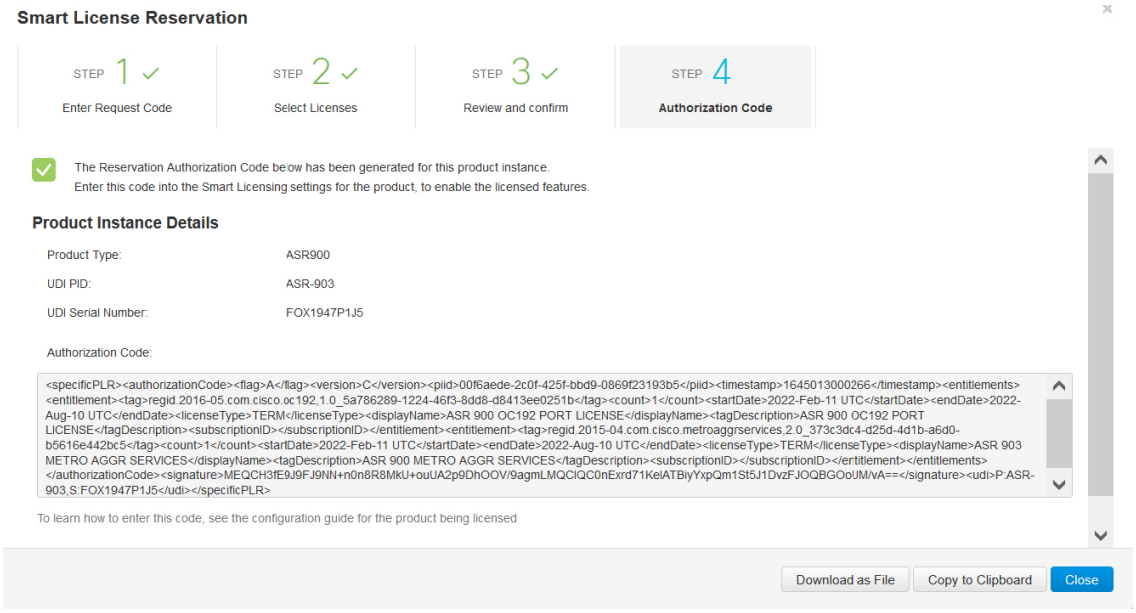
The system displays the Authorization Code.



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.



Step 5 Install the authorization code file on the router by registering the device. See Register the Device Using the Authorization Code, on page 66

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_FOX1947P1J5
.txt
Reservation install file successful
Last Confirmation code UDI: PID:ASR-903,SN:FOX1947P1J5
    Confirmation code: 24cbda5f
```

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-903,SN:FOX1947P1J5
      Reservation status: SPECIFIC INSTALLED on Feb 17 06:05:40 2022 UTC
      Last Confirmation code: 24cbda5f

Specified license reservations:
  ASR 903 METRO AGGR SERVICES(metroaggrservices):
    Description: ASR 900 METRO AGGR SERVICES
    Total reserved count: 1
    Enforcement type: NOT ENFORCED
    Term information:
      Active: PID:ASR-903,SN:FOX1947P1J5
        Authorization type: SPECIFIC INSTALLED on Feb 17 06:05:40 2022 UTC
        License type: TERM
          Start Date: 2022-FEB-17 UTC
          End Date: 2022-AUG-20 UTC
          Term Count: 1
```

```
  ASR 900 OC192 PORT LICENSE (OC192portlicense):
    Description: ASR 900 OC192 PORT LICENSE
    Total reserved count: 1
    Enforcement type: ENFORCED
    Term information:
      Active: PID:ASR-903-IM,SN:FOX1947P1J5
        Authorization type: SPECIFIC INSTALLED on Feb 17 06:05:40 2022 UTC
        License type: TERM
          Start Date: 2022-FEB-17 UTC
          End Date: 2022-AUG-20 UTC
          Term Count: 1
```

This example shows the license status on the router.

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

ASR 903 METRO AGGR SERVICES (metroaggrservices):
  Description: ASR 903 METRO AGGR SERVICES
  Count: 1
  Version: 1.0
  Status: AUTHORIZED
  Export status: NOT RESTRICTED
  Feature Name: metroaggrservices
  Feature Description: metroaggrservices
  Reservation:
    Reservation status: SPECIFIC INSTALLED
    Total reserved count: 1

ASR 900 OC192 PORT LICENSE (OC192portlicense):
  Description: ASR 900 OC192 PORT LICENSE
  Count: 0
  Status: AUTHORIZED
  Export status: NOT RESTRICTED
  Feature Name: ASR 900 OC192 PORT LICENSE
  Feature Description: ASR 900 OC192 PORT LICENSE
  Reservation:
    Reservation status: SPECIFIC INSTALLED
    Total reserved count: 1
```

Upgrading Licenses with Specific License Reservation

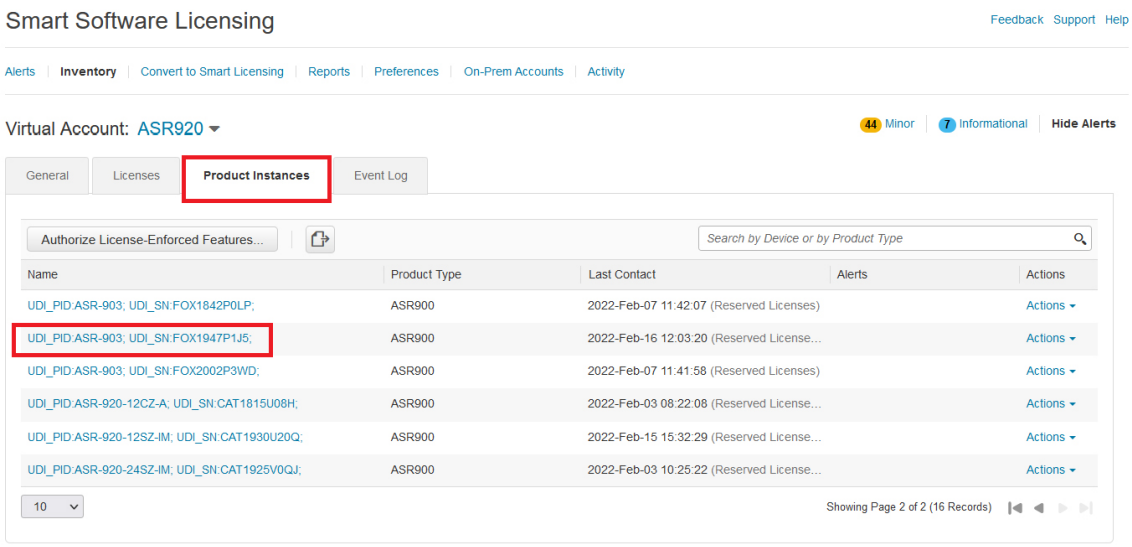
Registered devices can be upgraded new features licenses or licenses.

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**.



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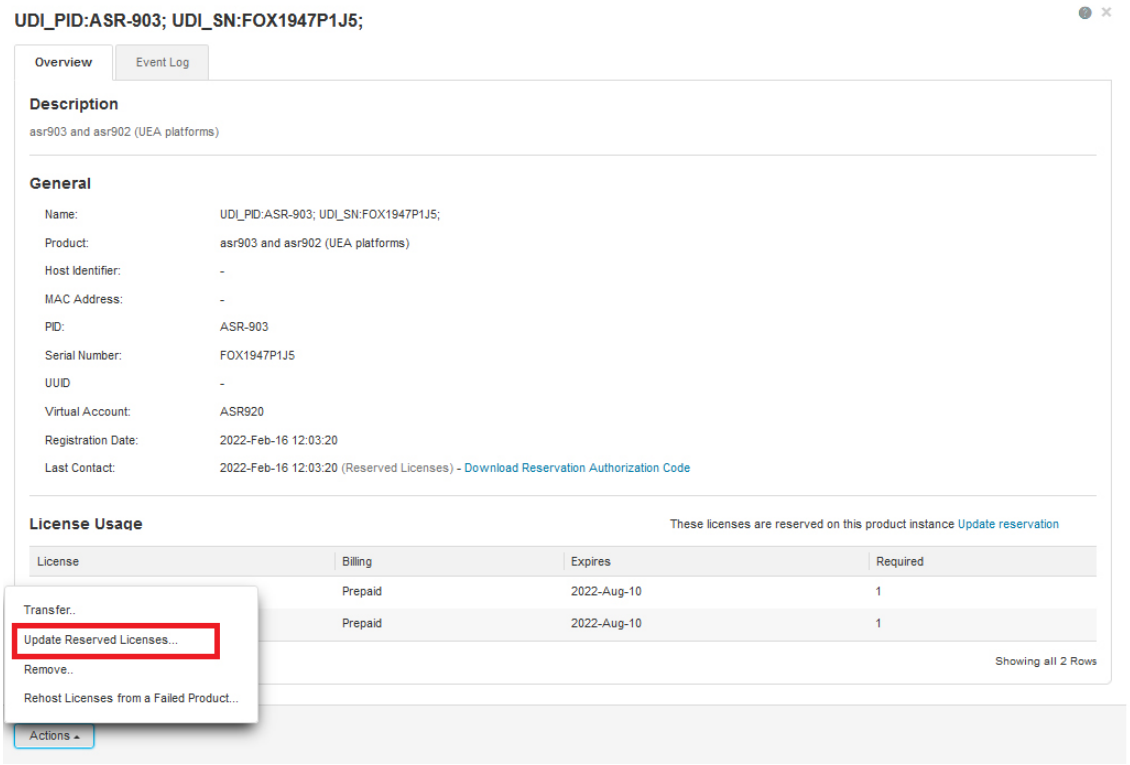
Step 4 Click **Update Reserved Licenses**.



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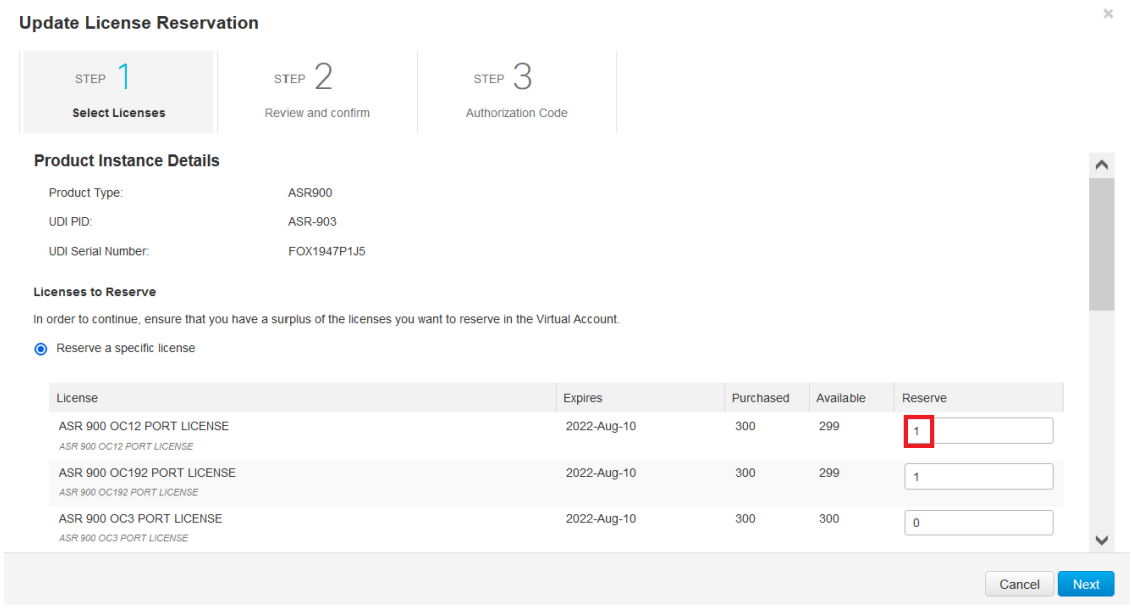
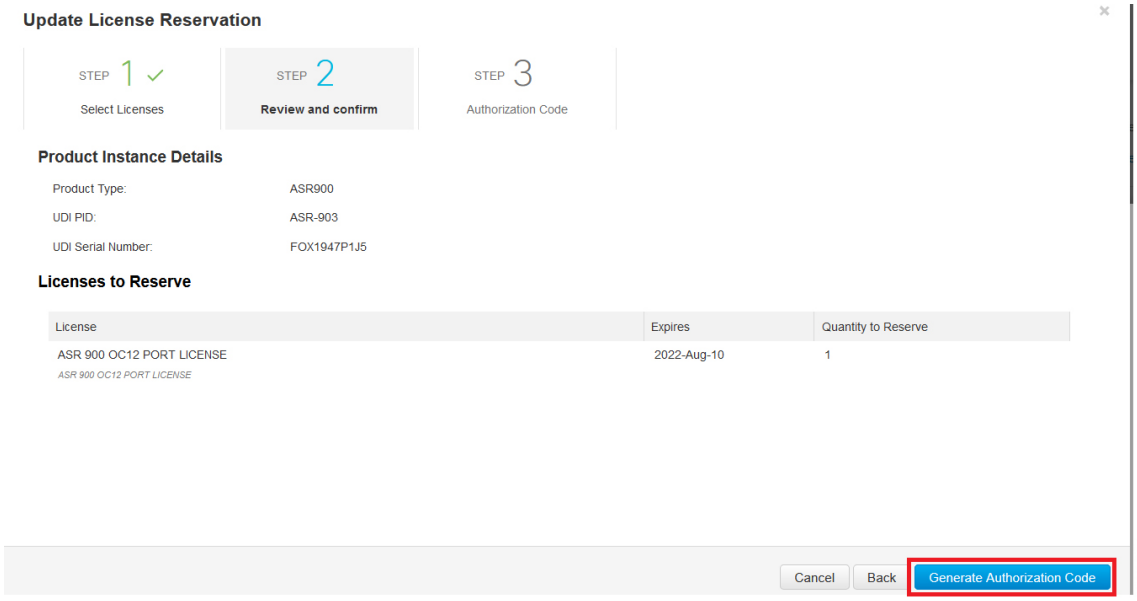
Step 5 Select the license that you want to update.

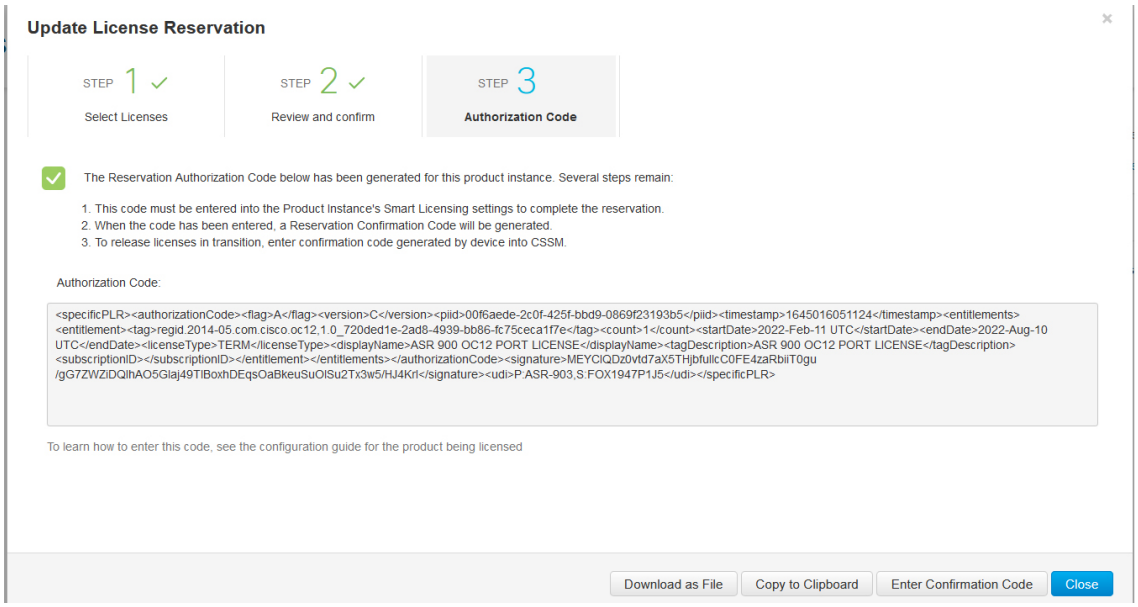


Step 6 Click **Next**.

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.

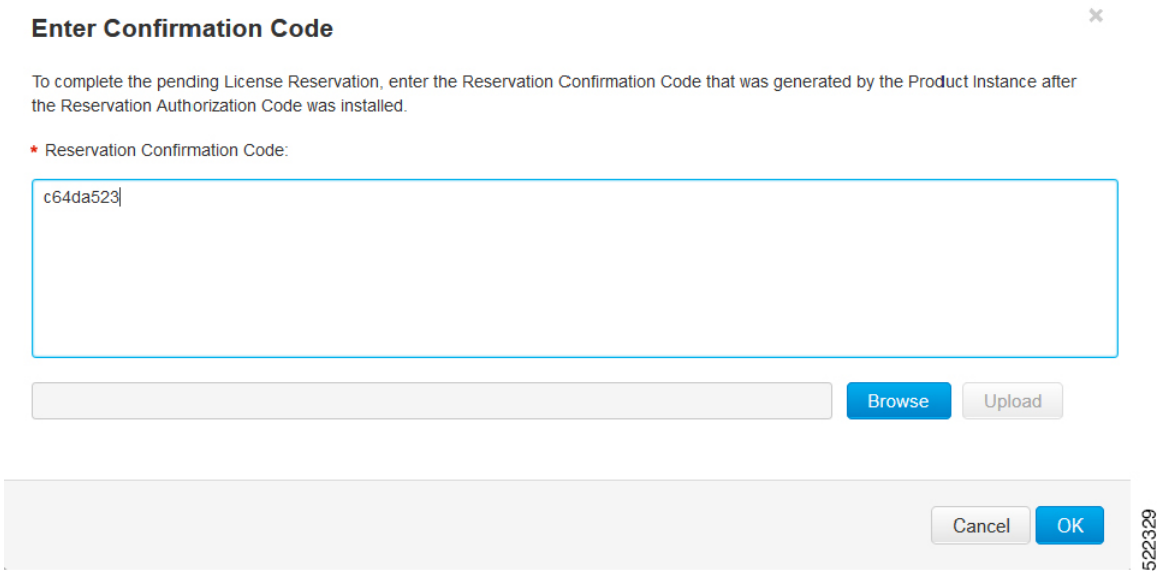
Example:

```
Router# license smart reservation install file
bootflash:AuthorizationCode_SN_FOX1947P1J5.txt
Reservation install file successful
Last Confirmation code UDI:PID:ASR-903,SN:FOX1947P1J5
c64da523
```

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.

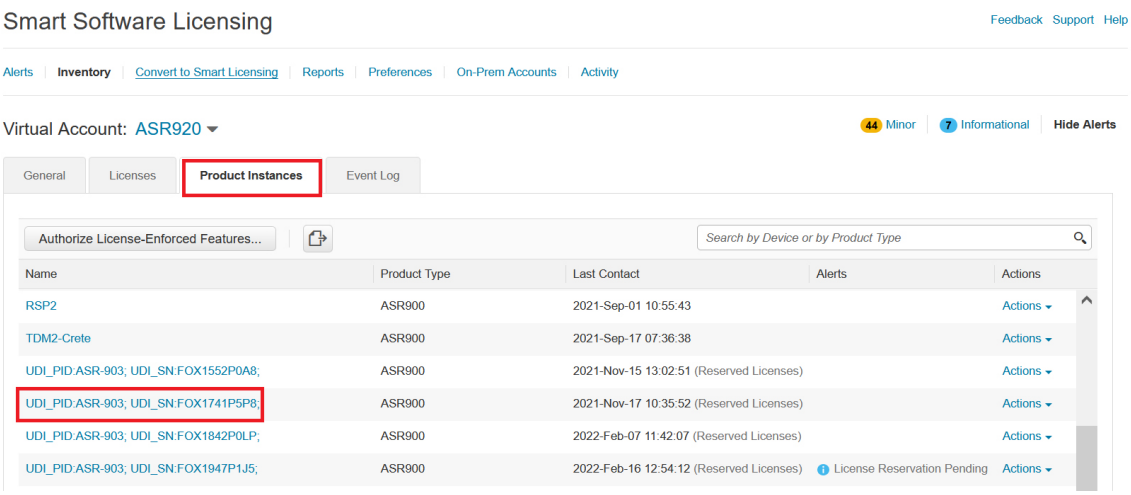
```
Router# license smart reservation return local
This command will remove the license reservation authorization code and the device will
transition back to the unregistered state. Some features may not function properly.
Do you want to continue? [yes/no]: yes
Enter this return code in Cisco Smart Software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

UDI: PID:ASR-903,SN:FOX1741P5P8

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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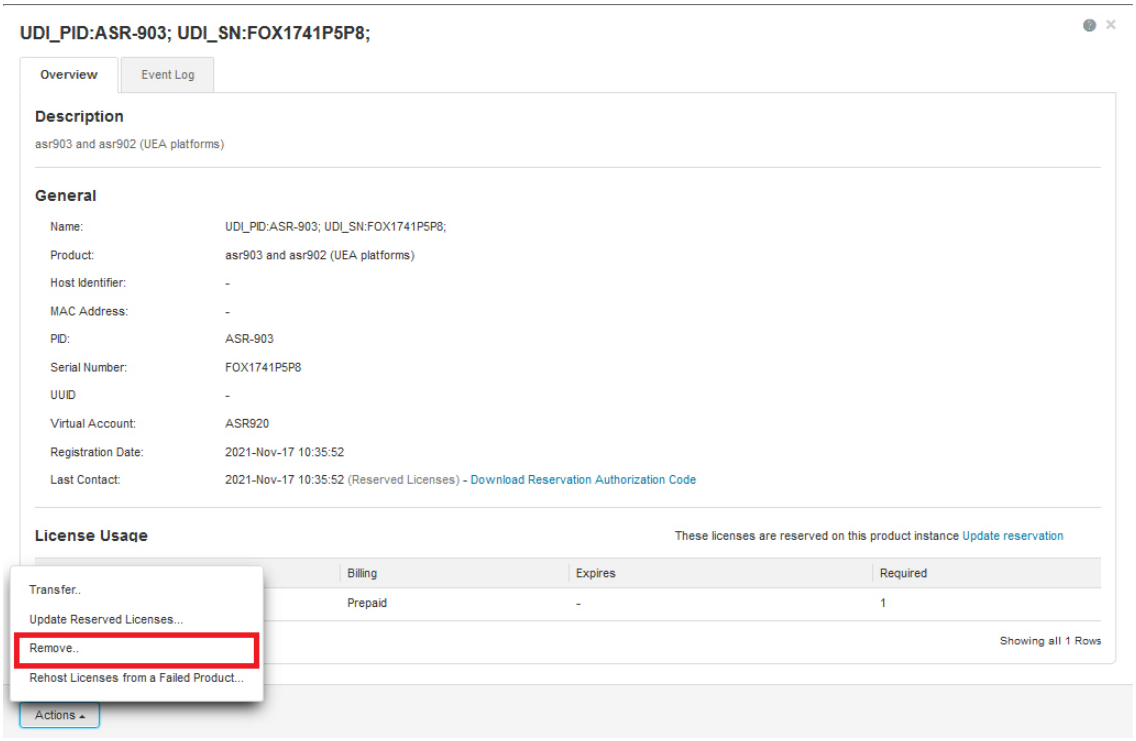
Step 6 Select **Remove**.



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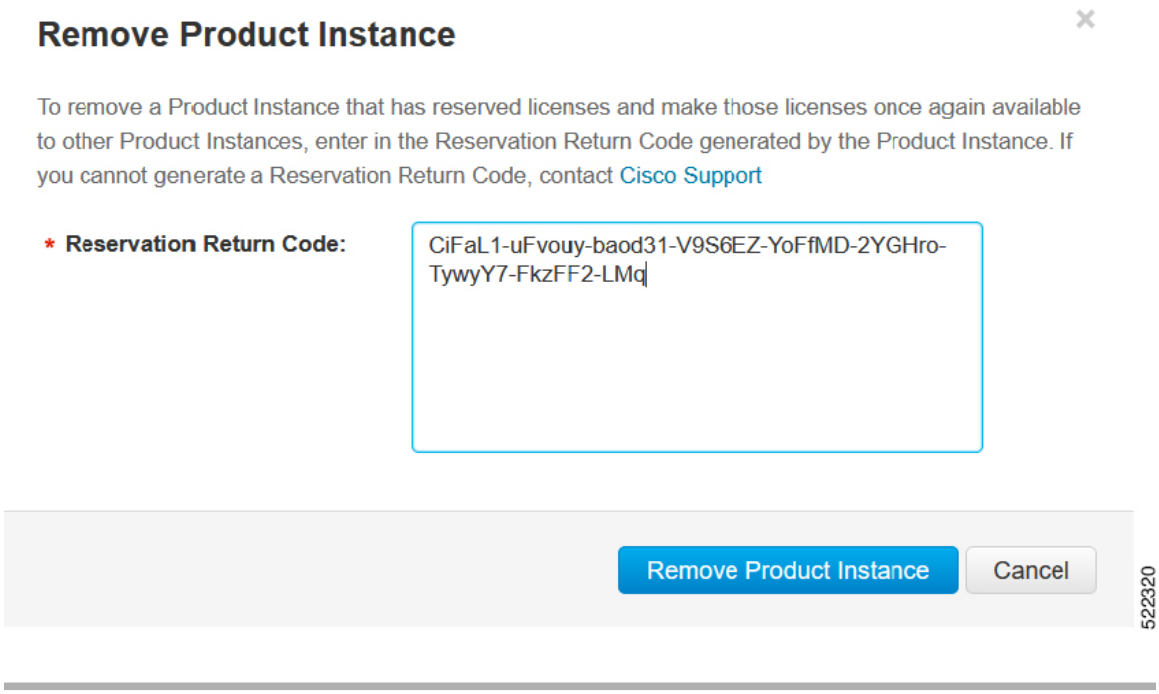
Step 7 Enter the return code, and click **Remove Product Instance**.



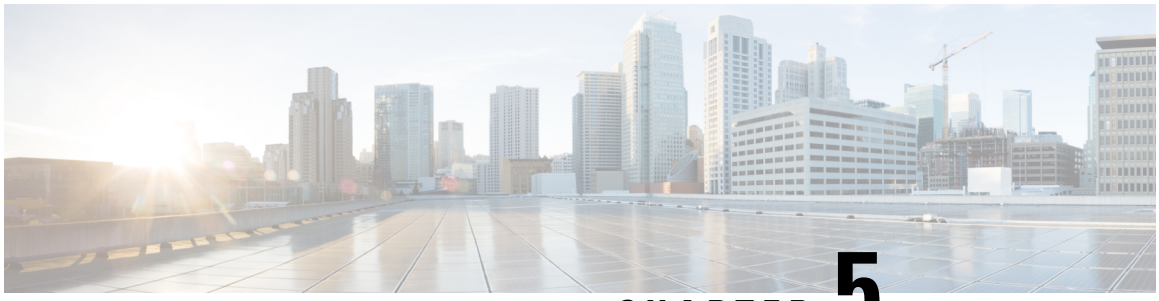
Removing the Authorization Code Post Factory Reset

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 71.
- Contact Cisco Support to remove the router instance from CSSM.



CHAPTER 5

Right To Use Licensing

The Cisco Software License Activation feature is a set of processes and components to activate Cisco IOS 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.

For information on obtaining and installing licenses, see Configuring the Cisco IOS Software Activation Feature.

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release.

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

Restrictions for using RTU Licenses

- 1588 feature license is *not* supported with RTU.
- OC-3 and OC-12 port licenses are *not* supported with RTU. We recommend that you go with Pay As You Grow model and purchase the license to use the feature.

Information About Licensing the Cisco ASR 900 Series Routers

For information on software activation and license procedures, see Software Activation Configuration Guide, Cisco IOS XE Release 3S (Cisco ASR 903).

Right to Use License Support for Cisco ASR 900 Series Routers

The RTU license starts as an evaluation license with a 60-day trial period and changes into a perpetual “Right-To-Use” license after the expiry of the trial period.

The RTU license is shipped with the IOS software image, as a built-in evaluation license (60 days). Once the trial usage period expires and license automatically is converted, you are required to accept the EULA (End User License Agreement) while activating the license. You can verify the license change by executing the **show license** command.

Syslog messages are generated on the 50th, 55th and 60th day of usage as a warning at the end of the evaluation period and conversion to an RTU license

Note Permanent licenses have precedence over RTU licenses and node-locked licenses have precedence over RTU licenses.

In a HA setup, to move licenses to the Standby RSP from the active, enable the **standby console enable** command.

```
Router(config)# configure terminal
Router(config)# redundancy
Router(config-red)# main-cpu
Router(config-r-mc)# standby console enable
Router(config-r-mc)# end
```

Advantages of RTU Licenses

- Offers simplified licensing approach.
- Licenses are converted to permanent licenses after the trial period.

Right To Use Licenses for Cisco ASR 900 Series

License Type	RTU
Base License	
Metro Services	Yes
Metro IP Services	Yes
Metro Aggregation Services	Yes
Feature Licenses	
ATM	Yes
1588	No
OC-3 and OC-12 Port License	No

Migration of Existing Licenses to RTU Licenses

When you upgrade to RTU licenses, EULA acceptance prompts for fresh license activation. After the trial period, the license is converted to a permanent license.

License Type	Migration to RTU License
Permanent license is installed	NA
Built-in evaluation license	New image boots with default license.
Temporary license generated by SWIFT	No issues during migration. After license expiry period (temporary license and RTU trial period), license is converted to permanent.

Configuring the Right to Use License

Procedure

	Command or Action	Purpose
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 right-to-use move** {**metroaggrservices** | **metroipservices** | **metroservices**} **Example:** `Router# license right-to-use move metroipservices`	Installs the RTU license. Accept the end-user license agreement if prompted.
Step 4	**end** **Example:** `Router# end`	Returns to privileged EXEC mode.

Configuration Example

```
Router# license right-to-use move metroipservices

% End User License Agreement is not accepted
PLEASE READ THE FOLLOWING TERMS CAREFULLY. INSTALLING THE LICENSE OR
LICENSE  KEY  PROVIDED FOR  ANY CISCO  PRODUCT  FEATURE  OR  USING SUCH
PRODUCT  FEATURE  CONSTITUTES  YOUR  FULL ACCEPTANCE  OF  THE FOLLOWING
TERMS. YOU MUST NOT PROCEED FURTHER IF YOU ARE NOT WILLING TO  BE BOUND
BY ALL THE TERMS SET FORTH HEREIN.

Use of this product feature requires  an additional license from Cisco,
```

```
together with an additional  payment.  You may use this product feature
on an evaluation basis, without payment to Cisco, for 60 days. Your use
of the  product,  including  during the 60 day  evaluation  period,  is
subject to the Cisco end user license agreement
http://www.cisco.com/en/US/docs/general/warranty/English/EU1KEN_.html
If you use the product feature beyond the 60 day evaluation period, you
must submit the appropriate payment to Cisco for the license. After the
60 day  evaluation  period,  your  use of the  product  feature will be
governed  solely by the Cisco  end user license agreement (link above),
together  with any supplements  relating to such product  feature.  The
above  applies  even if the evaluation  license  is  not  automatically
terminated  and you do  not receive any notice of the expiration of the
evaluation  period.  It is your  responsibility  to  determine when the
evaluation  period is complete and you are required to make  payment to
Cisco for your use of the product feature beyond the evaluation period.

Your  acceptance  of  this agreement  for the software  features on one
product  shall be deemed  your  acceptance  with  respect  to all  such
software  on all Cisco  products  you purchase  which includes the same
software.  (The foregoing  notwithstanding, you must purchase a license
for each software.
```

Activating the Right to Use License

Procedure

	Command or Action	Purpose
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 boot level** {**metroaggrservices** | **metroipservices** | **metroservices**} **Example:** `Router# license boot level move metroipservices`	Enables the RTU license.
Step 4	**end** **Example:** `Router# end`	Returns to privileged EXEC mode.

Verifying the RTU Licenses

- **show license right-to-use**

Use the **show license right-to-use** command to view the RTU licenses.

```
Router# show license right-to-use
Index 1 Feature: metroaggrservices
        Period left: Life time
        License Type: RightToUse
        License State: Active, In Use
        License Count: Non-Counted
        License Priority: Low
Index 2 Feature: metroipservices
        Period left: Life time
        License Type: RightToUse
        License State: Active, Not in Use, EULA accepted
        License Count: Non-Counted
        License Priority: Low
Index 3 Feature: metroservices
        Period left: Life time
        License Type: RightToUse
        License State: Active, Not in Use, EULA accepted
        License Count: Non-Counted
        License Priority: Low
Index 4 Feature: atm
        Period left: Life time
        License Type: RightToUse
        License State: Active, Not in Use, EULA accepted
        License Count: Non-Counted
        License Priority: Lowe
```

- **show license detail metroaggrservices**

  Use the **show license detail metroaggrservices** command for a detailed view of the licenses.

```
Router# show license detail metroaggrservice
Index: 1        Feature: metroaggrservices                Version: 1.0
        License Type: RightToUse
        License State: Active, In Use
        Lock type: Non Node locked
        Vendor info: <UDI><PID>NOTLOCKED</PID><SN>NOTLOCKED</SN></UDI><T>RTU</T>
        License Addition: Additive
        License Generation version: 0x8200000
        License Count: Non-Counted
        License Priority: Low
        Store Index: 0
        Store Name: Built-In License Storage
```

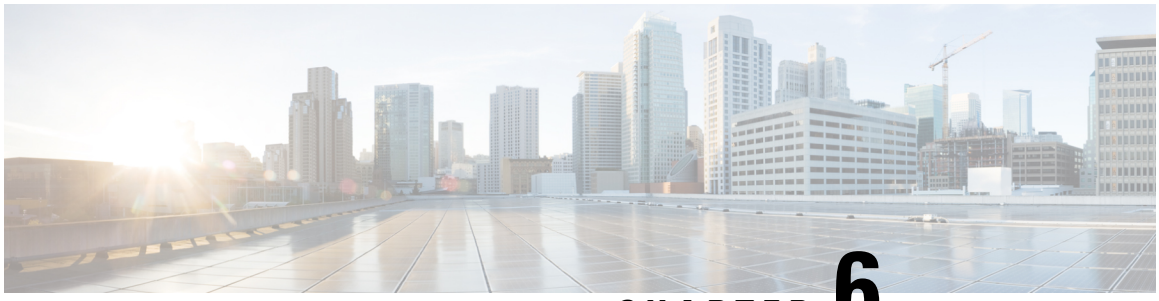
- **show license detail standby**

  Use the **show license detail standby** command to view the licenses on the Standby RSP.

Note If the license accept end user agreement exists, then the EULA agreement is *not* displayed.

```
Router# show license detail standby
Index: 1        Feature: atm                              Version: 1.0
        License Type: EvalRightToUse
        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
        Lock type: Non Node locked
        Vendor info: <UDI><PID>NOTLOCKED</PID><SN>NOTLOCKED</SN></UDI><T>RTU</T>
        License Addition: Additive
```

```
        License Generation version: 0x8200000
        License Count: Non-Counted
        License Priority: None
        Store Index: 3
        Store Name: Built-In License Storage
Index: 2        Feature: metroaggrservices                Version: 1.0
        License Type: EvalRightToUse
        License State: Active, In Use
            Evaluation total period: 8  weeks 4  days
            Evaluation period left: 8  weeks 2  days
            Period used: 1  day  18 hours
            Transition date: Jun 22 2014 18:28:54
        Lock type: Non Node locked
        Vendor info: <UDI><PID>NOTLOCKED</PID><SN>NOTLOCKED</SN></UDI><T>RTU</T>
        License Addition: Additive
        License Generation version: 0x8200000
        License Count: Non-Counted
        License Priority: Low
Store Index: 0
        Store Name: Built-In License Storage
Index: 3        Feature: metroipservices                  Version: 1.0
        License Type: EvalRightToUse
        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
        Lock type: Non Node locked
```



CHAPTER 6

Licensing the OC-3 and OC-12 Interface Modules

The Cisco Software License Activation feature is a set of processes and components to activate Cisco IOS 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.

For information on obtaining and installing licenses, see Configuring the Cisco IOS Software Activation Feature.

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release.

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

Restrictions for Licensing the Ports on the OC-3 and OC-12 Interface Module

- The 1 OC12 port license can only be enabled on port 0 of the OC-3 or OC-12 interface module.
- Evaluation licences cannot be used along with permanent licences to enable ports on OC-3 or OC-12 interface module.

Information About Licensing the Cisco ASR 900 Series Routers

For information on software activation and license procedures, see Software Activation Configuration Guide, Cisco IOS XE Release 3S (Cisco ASR 903).

Licensing the OC-3 and OC-12 Interface Modules

The optical modules 4-Port OC3/STM-1 or 1-Port OC12/STM-4 delivers four active ports of OC-3 interface module (IM) or Synchronous Transport Module level 1 (STM-1) connectivity, or one active port of OC-12 IM or STM-4 connectivity, on the Cisco ASR 903 Router. Licensing is applicable to these ports on the interface modules.

The benefits of licensing these ports are:

- Pay-as-you-grow model to enhance the ports by purchasing licenses as required.
- Ability to shift license from one port to another.
- Ability to release a license when the interface module is removed from a slot and reinstall the license when inserted again.
- Support for high availability and OIR of interface modules.

Note For more information on installing the OC-3 and OC-12 interface modules, see the Cisco ASR 903 Series Aggregation Services Router Hardware Installation Guide.

These

are guidelines for licensing the ports:

- Two types of licenses are available for the OC-3 and OC-12 IMs.
- Each port can have only one license at a given point of time.
- Each port needs one license and each license can be used for any of the ports.
- If the card type is changed from OC-3 to OC-12 or vice versa

  , the license installed on the card is automatically released and the new card type uses the license.

Note The OC-12 port license works only on the first port of the IM. U

nless there is a license enabled on the port, no configuration can be performed on the port.

Table 5: OC-3 and OC-12 Port Licenses

License Type	Description	Usability
1 OC3 port license	Single OC3/STM-1 port	STM-1 on OC-3 port
1 OC12 port license	Single OC12/STM-4 port	STM-1 on OC-3 port

Note Licenses are not mapped to any port. All the licenses are in a pool. Licenses can be used to enable any port as long as there are sufficient number of licenses.

Moving Licenses Across Ports

The licenses are not tied to a port and can moved across the ports and interface modules.

For example, if there are four licenses, and we have two interface modules (IM) and four ports, the licenses are distributed to the first IM on slot 0 and second IM on slot 1.

```
Platform enable controller sonet 0/0/0
Platform enable controller sonet 0/0/1

Platform enable controller sonet 0/1/0
Platform enable controller sonet 0/1/1
```

OC-3 and OC-12 Interface Module Online Insertion and Removal (OIR)

If an OIR is performed on the enabled port or controller of the interface module, the license used by the interface module is released. When the interface module is inserted again, the license which was valid before the OIR is re-enabled (assuming that there are non-zero usable ports).

OC-3 and OC-12 Interface Module Stateful Switchover (SSO)

If the license is installed on an active port and enabled on the active RSP module, the license information is synchronized with the standby RSP module. On SSO, the license ports enabled on the active RSP are activated on the standby RSP module.

An port license ISSU upgrade from an unsupported release to a supported release may impact the traffic flow on the router. If the controllers before the ISSU are in UP state, after an upgrade the controllers might remain in DOWN state, until the license in installed and enabled on the ports

Reload of Cisco ASR 903

A router reload may not be required after the license in installed on the ports. However, if the router is reloaded, the ports that are enabled prior to the reload will retain the license and configuration.

Installing and Upgrading Licenses on the OC-3 and OC-12 Interface Modules

Before you begin

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

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**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 3	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 4	**license install** *stored-location-url* **Example:** `Router# license install bootflash:*.lic`	Installs the license. Accept the end-user license agreement if prompted.
Step 5	**show license detail** **Example:** `Router# show license detail`	Displays the license information and verifies the number of licenses obtained.
Step 6	**end** **Example:**	Returns to privileged EXEC mode.

	Command or Action	Purpose
	`Router# end`	

What to do next

You need to enable the ports on the interface module slot for the license to take effect.

Enabling Ports on the Slot

After installing and verifying the licenses on the router, enable the ports on the router.

Note The **no platform enable controller** disables the ports on the interface module.

Procedure

	Command or Action	Purpose
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	**platform enable controller** *controller-type slot/subslot/port* **Example:** `Router(config)# platform enable controller sonet 0/1/2`	Enables the ports on slot where the interface is present. **Note** The slot number for the **controller sonet** is always zero on the Cisco ASR 903 Router. • **controller**—Configures a specific controller • *controller-type*—Type of controller.
Step 4	**controller sonet controller** *controller-type slot/subslot/port* **Example:** `Router(config)# controller sonet 0/1/2`	Selects the controller to configure and enters controller configuration mode.
Step 5	**no shutdown** **Example:** `Router(config-controller)# no shutdown`	Enables the controller.

	Command or Action	Purpose
Step 6	**end** **Example:** `Router# end`	Returns to privileged EXEC mode.

Uninstalling the License on OC-3 and OC-12 Interface Modules

Procedure

	Command or Action	Purpose
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	**no platform enable controller** *controller-type slot/subslot/port* **Example:** `Router# no platform enable controller sonet 0/1/2`	Uninstalls the licenses on the controllers for the feature.
Step 4	**license clear** *feature-name* **Example:** `Router# license clear oc3`	Removes a license entry from license storage once it has been verified that the license line is valid and was explicitly installed.
Step 5	**end** **Example:** `Router# end`	Returns to privileged EXEC mode.

Verifying the Licenses

- **show license detail**

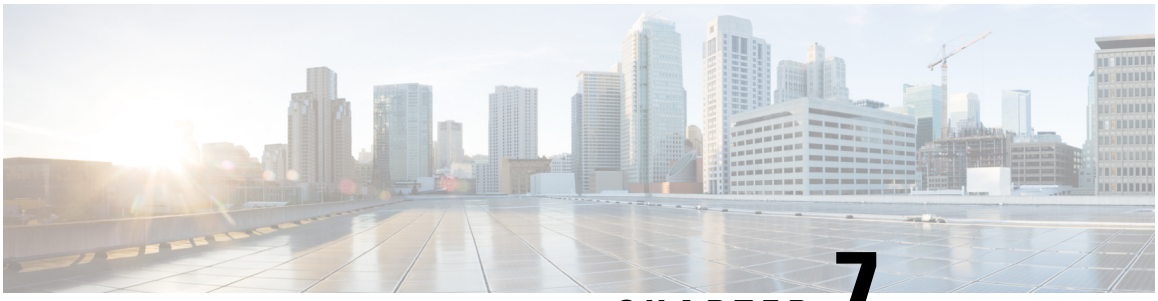
  Use the **show license detail** command to view the license on the ports.

```
Router# show license detail
Index: 4        Feature: oc3                              Version: 1.0
        License Type: Permanent
        License State: Active, Not in Use
        License Count: 13/0/0 (Active/In-use/Violation)
        License Priority: Medium
        Store Index: 2
        Store Name: Primary License Storage
```

- **show license udi**

  Use the **show license udi** command to view the UDI details of the license.

```
Router# show license udi
SlotID   PID                   SN                    UDI
-------------------------------------------------------------------------------
*6       ASR-903               FOX1637P0UB     ASR-903:FOX1637P0UB
```



CHAPTER 7

Licensing on 1-Port OC-192 or 8-Port Low Rate CEM Interface Module

The Cisco Software License Activation feature is a set of processes and components to activate Cisco IOS 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.

For information on obtaining and installing licenses, see Configuring the Cisco IOS Software Activation Feature.

About the 1-Port OC-192 or 8-Port Low Rate CEM Interface Module

By default, no license is enabled on any port of the IM. To *enable* the license on a port, you must first *install* the license on the router. Licenses can be enabled on a per-port basis. 1-Port OC-192 or 8-Port Low Rate CEM Interface Module can be enabled with any of the following license types:

- OC-3
- OC-12
- OC-48
- OC-192

The lower rates (OC-3, OC-12, and OC-48) can be enabled on any slot from port 0 to port 7. OC-192 can be enabled only on port 8.

One port can be enabled with more than one type of license; however, each license can be associated with only one port. A license once assigned to a port cannot be assigned to any other port unless it is freed from the previous port.

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release.

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

Prerequisites for Licensing on the 1-Port OC-192 or 8-Port Low Rate CEM Interface Module

- To enable a license on a port, you must first install it on the router.

Restrictions for Licensing on the 1-Port OC-192 or 8-Port Low Rate CEM Interface Module

- An OC-192 license cannot be enabled on port 0 to port 7. Port 8 cannot be enabled for any of the lower rates (OC3, OC-12, and OC-48) .
- Licenses cannot be used interchangeably. That is, four OC-3 licenses cannot be used in place of one OC-12 license. To configure a spcific rate, you must enable the same rate license on that port.
- Evaluation licences cannot be used along with permanent licences to enable ports on OC-3, OC-12, OC-48 and OC-192 interface module.
- One port can be enabled with more than one type of license. However, one license can be associated only with one port. Once assigned to a port, the same license cannot be assigned to any other port unless it is disassociated from the previous port.

Information About Licensing the Cisco ASR 900 Series Routers

For information on software activation and license procedures, see Software Activation Configuration Guide, Cisco IOS XE Release 3S (Cisco ASR 903).

Licensing the 1-port OC-192 or 8-port Low Rate CEM Interface Module

The benefits of licensing the ports are:

- Pay-as-you-grow model to enhance the ports by purchasing licenses as required.

- Ability to shift license from one port to another.
- Ability to release a license when the interface module is removed from a slot and reinstall the license when inserted again.

Note If an IM is removed, it is possible that the licenses on that IM are utilized by other IMs.

- Support for high availability and OIR of interface modules.

The following guidelines apply while licensing the ports:

- You must provide a license type to enable the license on the 1-port OC-192 or 8-port Low Rate CEM Interface Module.
- The validity of the license is checked only when you configure the controller rate. The configuration is allowed only if the same rate is enabled on the port. For example, if OC-3 license is enabled on a port, only OC-3 rate is can be configured on the same port; OC-12, OC-48, and OC-192 rates cannot be onfigured on that port.

Moving Licenses Across Ports

The licenses are not tied to a port and can moved across the ports and interface modules.

For example, if there are four licenses, and we have two interface modules (IM) and four ports, the licenses are distributed as follows.

```
platform enable controller mediatype 0/0/0 oc3 <<IM in slot 0
platform enable controller mediatype 0/0/1 oc12 <<IM in slot 0

platform enable controller mediatype 0/1/0 oc48 <<IM in slot 1
platform enable controller mediatype 0/1/2 oc3 <<IM in slot 1
```

Let's assume we no longer require the OC-12 license in 0/0/1. To remove this license from slot 0:

```
Router# no platform enable controller mediatype 0/0/1 oc12
```

The above command, allows the OC-12 license to be added to the free pool. To enable this license on another port, for example 0/1/3:

```
Router# platform enable controller mediatype 0/1/3 oc12
```

Interface Module Online Insertion and Removal (OIR)

If an OIR is performed on the enabled controller port of the interface module, the license used by the interface module is released. All the port licenses are given to free pool and can now be given to any other port.

If the interface module is inserted again, and if there are licenses in the free pool, the license that was valid before the OIR is re-enabled (assuming that there are non-zero usable ports). However, if before re-insertion the free license is aquired by another IM and the license is not available in the free pool, the IM port is moved into *shut* state and an error is displayed.

To *unshut* this port:

- Either remove all configuration at rate level
- Or enable the license on the port that has the same rate

OC-3 and OC-12 Interface Module Stateful Switchover (SSO)

If the license is installed on an active port and enabled on the active RSP module, the license information is synchronized with the standby RSP module. On SSO, the license ports enabled on the active RSP are activated on the standby RSP module.

An port license ISSU upgrade from an unsupported release to a supported release may impact the traffic flow on the router. If the controllers before the ISSU are in UP state, after an upgrade the controllers might remain in DOWN state, until the license in installed and enabled on the ports

Reload of Cisco ASR 903

A router reload may not be required after the license in installed on the ports. However, if the router is reloaded, the ports that are enabled prior to the reload will retain the license and configuration.

Installing and Upgrading Licenses on the 1-Port OC-192 or 8-Port Low Rate CEM Interface Module

Before you begin

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

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.

	Command or Action	Purpose
Step 2	**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 3	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 4	**license install** *stored-location-url* **Example:** `Router# license install bootflash:*.lic`	Installs the license. Accept the end-user license agreement if prompted.
Step 5	**show license detail** **Example:** `Router# show license detail`	Displays the license information and verifies the number of licenses obtained.
Step 6	**end** **Example:** `Router# end`	Returns to privileged EXEC mode.

What to do next

You need to enable the ports on the interface module slot for the license to take effect.

Enabling Licenses on the Port

After installing and verifying the licenses on the router, enable the ports on the router.

Note The **no platform enable controller** disables the ports on the interface module.

Procedure

	Command or Action	Purpose
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	**platform enable controller Mediatype** *slot/subslot/port license-type* **Example:** `Router(config)# platform enable controller Mediatype 0/4/0 oc3`	Enables the ports on slot where the 1-port OC-192 or 8-port Low Rate CEM Interface Module is present. **Note** Do not use **controller sonet** to enable the 1-port OC-192 or 8-port Low Rate CEM Interface Module. • **controller Mediatype**—Configures a specific controller. • *license-type*—Type of license. Valid values are oc3, oc12, oc48, and oc192.
Step 4	**end** **Example:** `Router# end`	Returns to privileged EXEC mode.

Enabling Rate Configuration for a License

While configuring rate license ensure that it is the same rate as that of controller license.

The following is a sample configuration that depicts this scenario.

```
Router# configure terminal
Router(config)# platform enable controller MediaType 0/4/4 oc3 >>license is enabled for oc3
license received successfully on MediaType 0/4/4 for oc3
Router(config)# controller MEdiaType 0/4/4
Router(config-controller)# mode SONET
Router(config-controller)# exit
Router(config)# controller SONET 0/4/4
Router(config-controller)# rate oc12  >>rate is configured for oc12 whereas license is
enabled for OC3
license is not enabled for this rate.
% Unable to configure this rate.
Router(config-controller)# rate oc3  >>rate is configured for oc3
Router(config-controller)#
```

Disabling the License

Note Ensure that you have disabled the rate configuration before disabling the license.

This section describes disabling the rate configuration as well disabling the license configuration.

To display the enabled licenses, run the following command:

```
Router# show running-config | sec 0/4/4
platform enable controller MediaType 0/4/4 oc3
platform enable controller MediaType 0/4/4 oc12
```

The above output indicates that port 0/4/4 has two licensesOC3 and OC12. The port is configured with *rate* = OC3.

```
Router(config)# no platform enable controller MediaType 0/4/4 oc12
>>License successfully disabled as it is not in use
Router(config)# no platform enable controller MediaType 0/4/4 oc3
  Controller rate configured needs this license
  unconfigure rate before disabling this license  >>license failed to disable.
Router(config)# controller SONET 0/4/4
Router(config-controller)# STS-1 1
Router(config-ctrlr-sts1)# no vtg 1 t1 1 cem-group 23 unfr  >>Removes all the configuration
 after rate configuration
Router(config-ctrlr-sts1)# no mode vt-15
Router(config)# controller MEdiaType 0/4/4
Router(config-controller)# no mode SONET     >>Disables rate configuration
Router(config-controller)#exit
Router(config)# no platform enable controller MEdiaType 0/4/4 oc3
 License disabling successful.
```

Online Insertion and Removal of the Interface Module

The 1-port OC-192 or 8-port Low Rate CEM Interface Module can be removed and inserted from the chassis slot while the system is online.

When removing the interface module:

- All licenses enabled on the module's ports are also removed and released to free pool.
- These free licenses can now be enabled on the same or a different module's ports on a first-come-first-served basis.

When insertting an interface module, if free licenses exist, they are acquired and the previous configuration works.

If there are no free licenses available, the IM port is moved into *shut* state and an error is displayed.

ExampleOIR of Interface Module

ScenarioThere is one license installed on the router for OC3. The interface module is inserted in slot 0/4. The OC3 license is installed on port 0/4/0 by using the command **platform enable controller controller Mediatype 0/4/0 oc3**. The following output displays this license.

```
Router# show license detail
Index: 15       Feature: oc3                                Version: 1.0
        License Type: Permanent
        License State: Active, Not in Use
       License Count: 1/1/0  (Active/In-use/Violation) >>license is "in-use" by port 0/4/0

        License Priority: Medium
        Store Index: 4
        Store Name: Primary License Storage.
```

The interface module is now removed from slot 0/4. The display the new state, run the following command:

```
Router# show license detail
Index: 15       Feature: oc3                                Version: 1.0
        License Type: Permanent
        License State: Active, Not in Use
        License Count: 1/0/0  (Active/In-use/Violation)  >>license is freed.
        License Priority: Medium
        Store Index: 4
        Store Name: Primary License Storage.
```

Now, insert a different OC-192 Interface Module or 8-port Low Rate CEM Interface Module in a different slot, say 0/3 by using the command **platform enable controller controller Mediatype 0/3/0 oc3**.

Run the **show license detail** command to view the details:

```
Index: 15       Feature: oc3                                Version: 1.0
        License Type: Permanent
        License State: Active, Not in Use
       License Count: 1/1/0  (Active/In-use/Violation)  >>license is now used by port 0/3/0

        License Priority: Medium
        Store Index: 4
        Store Name: Primary License Storage.
```

Re-insert the first interface module in slot 0/4

Verifying the Licenses

- **show license detail**

  Use the **show license detail** command to view the license on the ports. The following are sample ouput for in-use an not-in-use licenses.

  ```
  Router# show license detail
  Index: 4        Feature: oc3                                Version: 1.0
          License Type: Permanent
          License State: Active, Not in Use
          License Count: 13/0/0 (Active/In-use/Violation)
          License Priority: Medium
          Store Index: 2
          Store Name: Primary License Storage
  ```

```
Router# show license detail
Index: 15       Feature: oc3                                  Version: 1.0
        License Type: Permanent
        License State: Active, In Use
        License Count: 1/1/0  (Active/In-use/Violation0
        License Priority: Medium
        Store Index: 4
        Store Name: Primary License Storage
```

- **show license udi**

  Use the **show license udi** command to view the UDI details of the license.

```
Router# show license udi
SlotID   PID                   SN                      UDI
-------------------------------------------------------------------------------
*6       ASR-903               FOX1637P0UB     ASR-903:FOX1637P0UB
```

- **show platform hardware license-port license detail**

  To verify the association between controller ports and licenses, use the **show platform hardware license-port license detail**

```
Router# show platform hardware license-port license detail
OC3 IM output
==============
The following are the port license details for IM in slot 3
###############################################

The port 0/3/0 is A licensed port

The port 0/3/1 is NOT A licensed port
This port is OIR'd, and is NOT A licensed port before OIR
```