Software Activation Configuration Guide, Cisco IOS XE Release 3S (ASR 903)

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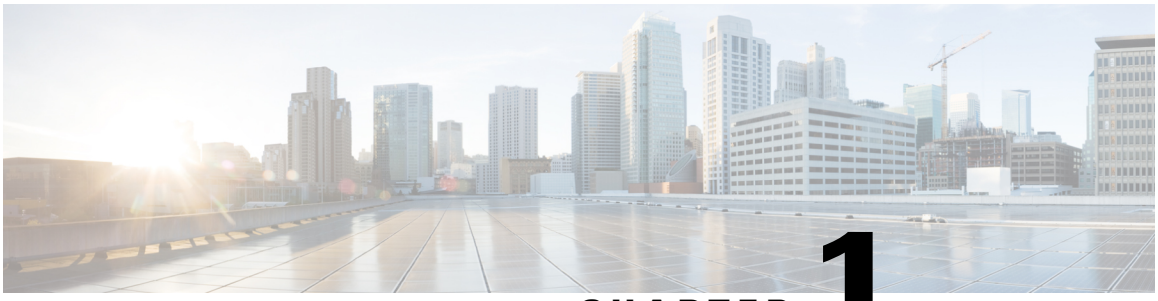


CHAPTER 1

Cisco IOS Software Activation Conceptual Overview

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

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

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

Finding Feature Information

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

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

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 .

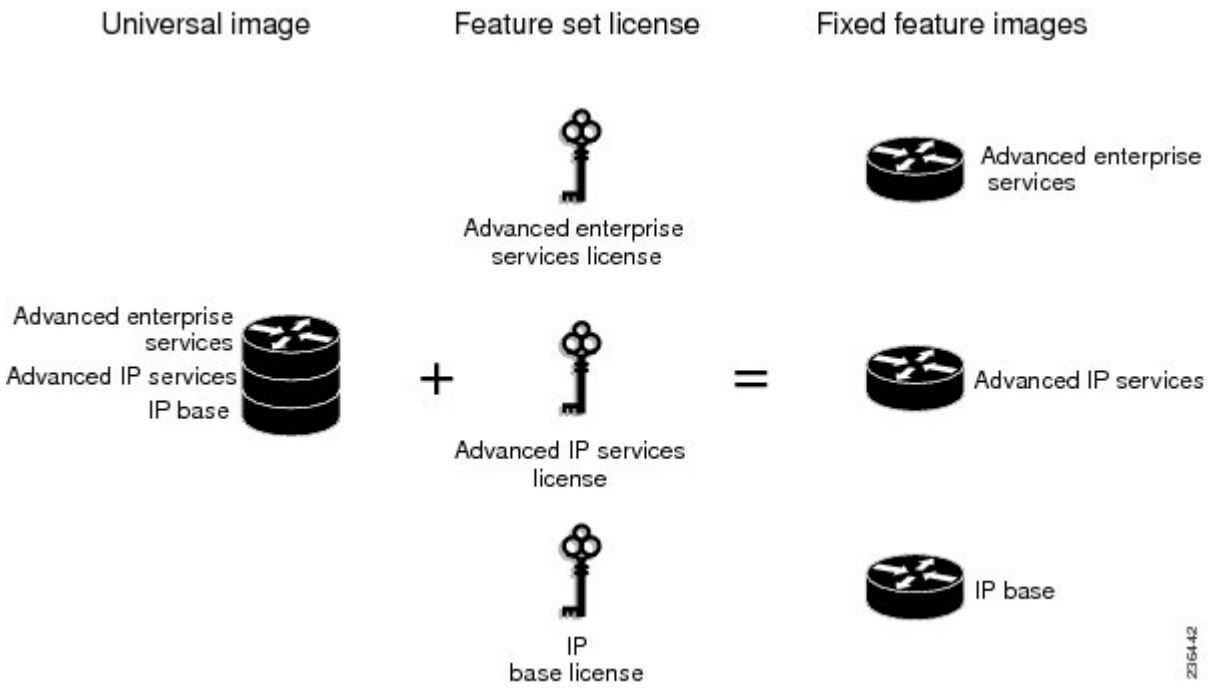
License Models for Images and Features

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.

Figure 1: Example of Universal Image Components



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

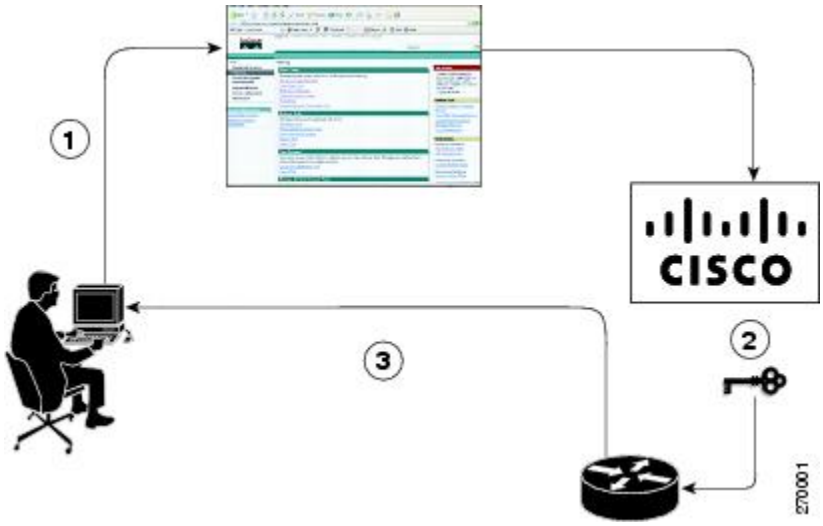
Software activation enables the various feature sets on a device by using license keys.

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 2: 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.

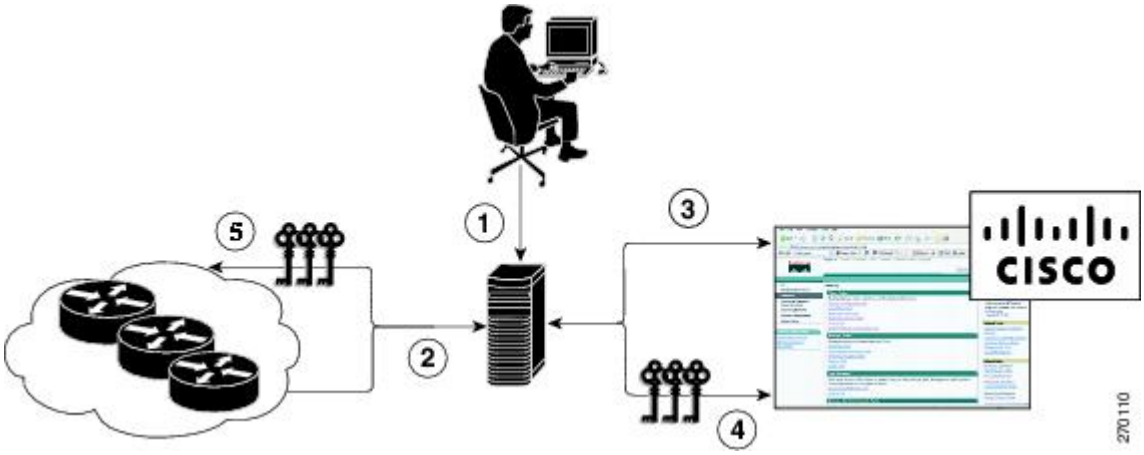
Automated Software Activation by Using Cisco License Manager

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 3: 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.

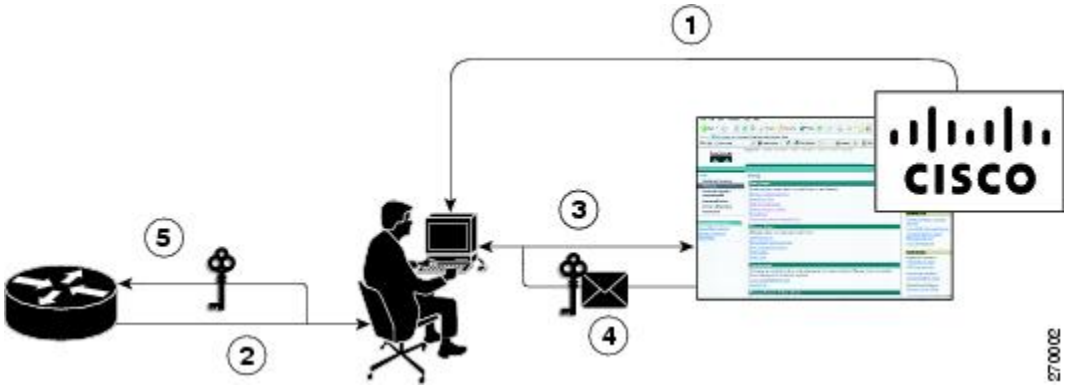
For more information, see the *User Guide for Cisco License Manager* at http://www.cisco.com/en/US/products/ps7138/products_user_guide_list.html.

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 4: 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

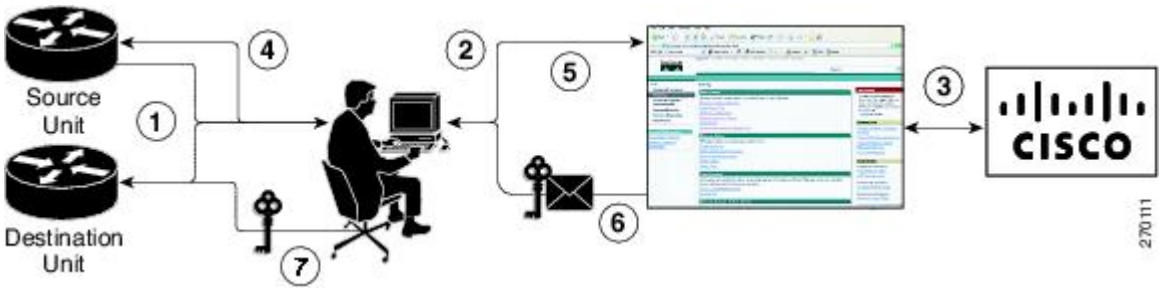
Cisco supports fully automated, customer-initiated, no-questions-asked transfer of licenses. Transferring a license between two working devices is accomplished by using a process known as *rehosting*. The rehosting process transfers a license from one UDI to another by revoking the license from the source 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 5: 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.

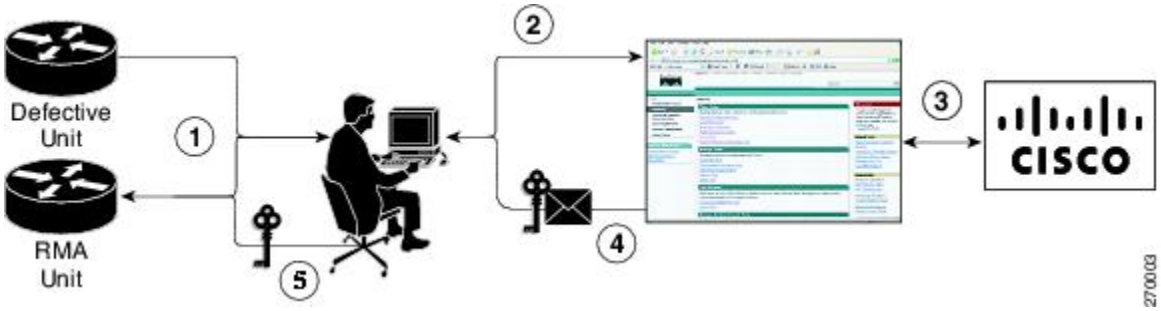
RMA License Transfer Between a Failed and a Working Device

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 6: 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.

Table 1: Feature Information for Cisco IOS Software Activation

Feature Name	Releases	Feature Information
Cisco IOS Software Activation	12.4(15)XZ 12.4(20)T 15.0(1)M	The Cisco IOS Software Activation feature supports basic licensing processes. This feature is platform-independent. This feature module provides information about Cisco Software Activation: • "Configuring the Cisco IOS Software Activation Feature" module

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.

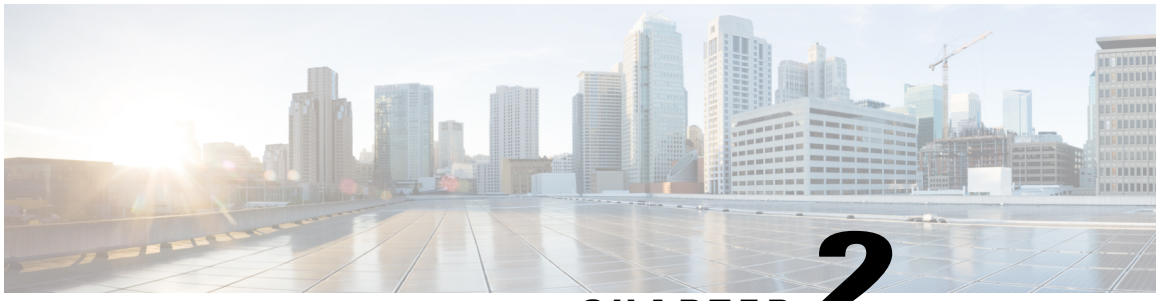
stack —A switch stack is a set of up to nine Catalyst 3750 switches connected through their StackWise ports.

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.

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.

Restrictions for Cisco IOS Software Activation

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

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

Information About the Cisco IOS Software Activation

License Activation MIB Support

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

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

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

How to Activate Software from a Cisco IOS Device

Installing and Upgrading Licenses by Using Software Activation Commands

Before You Begin

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

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

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

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

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

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

SUMMARY STEPS

1. Obtain the PAK.
2. **enable**
3. **show license udi**
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.
5. **license install** *stored-location-url*
6. **configure terminal**
7. **license boot level** {**metroaggrservices**}
8. **write memory**
9. **reload**

DETAILED STEPS

	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*	Installs the license.

	Command or Action	Purpose
	Example: `Device# license install tftp://infra-sun/<user>/license/5400/38a.lic`	• Accept the end-user license agreement if prompted.
Step 6	**configure terminal** **Example:** `Device# configure terminal`	Enters the global configuration mode.
Step 7	**license boot level** {**metroaggrservices**} **Example:** `Device(config)# license boot level metroaggrservices`	Activates the metroaggrservices license on the device upon the next reload.
Step 8	**write memory** **Example:** `Device# write memory`	Saves the running configuration to NVRAM.
Step 9	**reload** **Example:** `Device# reload`	(Optional) Restarts the device to enable the new feature set. **Note** A reload is not required when moving from an evaluation license to a permanent license of the same license level on ASR 903 routers.

Managing Licenses by Using Software Activation Commands

Adding a Comment to a License File

SUMMARY STEPS

1. **enable**
2. **license comment add** *feature-name comment* [**switch** *switch-num*]
3. **show license file** [**switch** *switch-num*]

DETAILED STEPS

	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

SUMMARY STEPS

1. **enable**
2. **license save** *file-sys://lic-location* [**switch** *switch-num*]

DETAILED STEPS

	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	**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.

SUMMARY STEPS

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

DETAILED STEPS

	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:** `Device# license save credential flash:cred.lic`	Saves credential information associated with a device to a specified URL. • *lic-location* : The license storage location can be a directory or a URL that points to a file system. Use the **?** command to see the storage locations supported by your device. • (Optional)**switch** *switch-num*: sends this request to a specific switch in a switch stack.

	Command or Action	Purpose

Displaying All Licenses in a Device

SUMMARY STEPS

1. **enable**
2. **show license all**

DETAILED STEPS

	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

SUMMARY STEPS

1. **enable**
2. **show license detail** [*feature-name*]

DETAILED STEPS

	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 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

SUMMARY STEPS

1. **enable**
2. **show license feature**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**show license feature** **Example:** `Device# show license feature`	Displays a list of licensed features available in an image.

Removing Licenses by Using Software Activation Commands

Removing a License Entry from a Permanent License File

Note

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

SUMMARY STEPS

1. **enable**
2. **license clear** *feature-name* [**switch** *switch-num*]
3. **show license detail**

DETAILED STEPS

	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. • You must select the index number of the license to clear. Enter the number at the Select Index to Clear prompt.

	Command or Action	Purpose
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.

SUMMARY STEPS

1. **enable**
2. **license revoke revoke** *permission-file-url output-rehost-ticket-url*

DETAILED STEPS

	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

SUMMARY STEPS

1. **enable**
2. **show license file** [**switch** *switch-num*]
3. **show license statistics**
4. **show license status** [**switch** *switch-num*]
5. **debug license** {**all** | **core** | **errors** | **events**}
6. **no debug license** {**all** | **core** | **errors** | **events**}

DETAILED STEPS

	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 : 4772 bytes
!
version 12.4
no service pad
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
service internal
!
hostname csl-xfr-enhance-2951
!
...
...
license udi pid CISCO2951 sn FHH1211P037
license boot module c2951 technology-package securityk9 disable
license boot module c2951 technology-package uc
license boot module c2951 technology-package data
license call-home url https://tools-stage.cisco.com/SWIFT/Licensing
```

```
license agent listener http plaintext /lic-agent authenticate none
!
!
archive
 log config
  hidekeys
!
.
.
.
```

show tech-support

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

```
Device# show tech-support
------------------ show license udi ------------------
Device#   PID                 SN              UDI
-------------------------------------------------------------------------------
*0        CISCO2951           FHH1211P037     CISCO2951:FHH1211P037
------------------ show license feature ------------------
Feature name             Enforcement  Evaluation  Subscription   Enabled
ipbasek9                 no           no          no             no
securityk9               yes          yes         no             no
uc                       yes          yes         no             yes
data                     yes          yes         no             no
gatekeeper               yes          yes         no             no
LI                       yes          no          no             no
SSL_VPN                  yes          yes         no             no
ios-ips-update           yes          yes         yes            no
SNASw                    yes          yes         no             no
------------------ show license file ------------------
License Store: Primary License Storage
License Store: Evaluation License Storage
  Store Index: 0
    License: 11 securityk9 1.0 LONG TRIAL DISABLED 1440 DISABLED STANDALONE AD
             D INFINITE_KEYS INFINITE_KEYS NEVER NEVER NiL SLM_CODE DEMO NiL N
             iL Ni NiL NiL 5_MINS NiL GT5YVbrMAdt0NY50UcKGfvLTjQ17P2o3g84hE8Tq
             sOfu3Xph0N:2AmMdpMNxxKXSVG$<WLC>AQEBIQAB//+FugzZgqFJn/XhIxoyelg63
             YJD++i6Qx6vVp0MVqrX2EinbufbTfGzc7/GHNZaDZqRqwInXo3s+nsLU7rOtdOxoI
             xYZAo3LYmUJ+MFzsqlhKoJVlPyEvQ8H21MNUjVbhoN0gyIWsyiJaM8AQIkVBQFzhr
             10GYolVzdzfJfEPQIx6tZ++/Vtc/q3SF/5Ko8XCY=</WLC>
    Comment:
       Hash: CLWUVZgY84BMRTO3JIlYmIqwAQA=
------------------ show license detail ------------------
Index: 1        Feature: SNASw                           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
        Lock type: Non Node locked
        Vendor info:
        License Addition: Additive
        License Generation version: 0x8100000
        License Count: Non-Counted
        License Priority: None
        Store Index: 5
        Store Name: Evaluation License Storage
------------------ show license status ------------------
                License Type Supported
        permanent               Non-expiring node locked license
        extension               Expiring node locked license
        evaluation              Expiring non node locked license
        paid subscription       Expiring node locked subscription license
                                with valid end date
        extension subscription  Expiring node locked subscription license
        evaluation subscription Expiring node locked subscription license
...
```

```
...
------------------ 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:         1
                Client statistics
        Request success count:   1
        Request failure count:   3
        Release count:           0
        Global Notify count:     4
```

show version

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

```
Device> show version
Cisco IOS Software, C2951 Software (C2951-UNIVERSALK9-M), Experimental Version
12.4(20090326:052343)
 [rifu-xformers_3_25 130]
Copyright (c) 1986-2009 by Cisco Systems, Inc.
Compiled Thu 26-Mar-09 21:49 by rifu
ROM: System Bootstrap, Version 12.4(20090303:092436)
[BLD-xformers_dev.XFR_20090303-20090303_0101-53
 107], DEVELOPMENT SOFTWARE
csl-xfr-enhance-2951 uptime is 3 days, 4 hours, 28 minutes
System returned to ROM by reload at 18:48:45 PST Mon Nov 26 1956
System image file is "flash0:c2951-universalk9-mz.SSA"
Last reload reason: Reload Command
...
...
Cisco C2951 (revision 1.0) with 1005568K/43008K bytes of memory.
Processor board ID FHH1211P037
3 Gigabit Ethernet interfaces
1 terminal line
1 cisco Special Services Engine(s)
DRAM configuration is 72 bits wide with parity enabled.
255K bytes of non-volatile configuration memory.
250880K bytes of ATA System CompactFlash 0 (Read/Write)
License Info:
License UDI:
-------------------------------------------------
Device#   PID                 SN
-------------------------------------------------
*0        CISCO2951           FHH1211P037
Technology Package License Information for Module:'c2951'
-----------------------------------------------------------------
Technology    Technology-package          Technology-package
              Current       Type          Next reboot
-----------------------------------------------------------------
ipbase        ipbasek9      None          ipbasek9
security      disable       None          disable
uc            uc            Evaluation    uc
data          None          None          None
Configuration register is 0x0
```

Additional References

Related Documents

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

MIBs

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

Technical Assistance

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

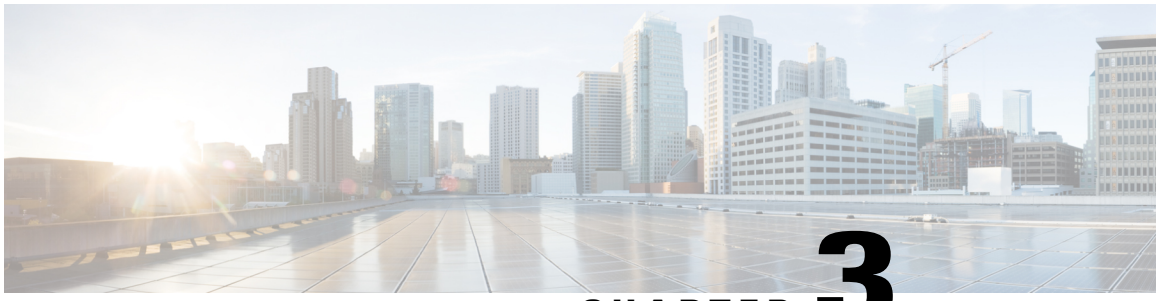
Feature Information for Cisco IOS Software Activation

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

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

Table 2: Feature Information for Cisco IOS Software Activation

Feature Name	Releases	Feature Information
Cisco IOS Software Activation	12.4(15)XZ 12.4(20)T 15.0(1)M 15.4(1)S	Cisco IOS Software Activation EXEC commands support basic licensing processes. This feature is platform-independent. These commands were introduced or modified by this feature: **debug license**, **license clear**, **license comment**, **license install**, **license revoke**, **license save**, **license save credential**, **show license all**, **show license detail**, **show license feature**, **show license file**, **show license statistics**, **show license status**, **show license udi** In Cisco IOS Release 15.4(1)S, support was added for the Cisco ASR 901S series router.
CISL-SNMP support (MIB)	12.4(20)T 15.0(1)M	SNMP support for the CISCO-LICENSE-MGMT-MIB was added. These commands were introduced or modified by this feature: **snmp-server enable traps**, **snmp-server host**



CHAPTER 3

What Is Smart Licensing ?

Smart Licensing is a system that consists of a license manager on a Cisco IOS XE device that manages licenses for various software and hardware features. The license manager parses and authenticates a license before accepting it. The software features on the router use the license manager APIs to check out and release licenses. Licenses are stored in persistent storage on the router.

Information About Smart Licensing

Smart Licensing is a cloud-based, software license management solution that enables you to automate time-consuming, manual licensing tasks. The solution allows you to easily track the status of your license and software usage trends.

Smart Licensing helps simplify three core functions:

- **Purchasing:** The software that you have installed in your network can automatically self-register themselves, without Product Activation Keys (PAKs).

- **Management:** You can automatically track activations against your license entitlements. Additionally, there is no need to install the license file on every node. You can create license pools (logical grouping of licenses) to reflect your organization structure. Smart Licensing offers you Cisco Smart Software Manager, a centralized portal that enables you to manage all your Cisco software licenses from one centralized website.
- **Reporting:** Through the portal, Smart Licensing offers an integrated view of the licenses you have purchased and what has been actually deployed in your network. You can use this data to make better purchase decisions, based on your consumption.

Smart Versus Traditional Licensing

Traditional (node locked) licencing	Smart (dynamic) licencing
You must procure the license and manually install it on the device.	Your device initiates a call home and requests the licenses it needs.
Node-locked licences - license is associated with a specific device.	Pooled licences - licences are company account-specific, and can be used with any compatible device in your company. You can activate or deactivate different types of licenses on the device without actually installing a license file on the device.
No common install base location to view licenses purchased or software usage trends	Licenses are stored securely on Cisco servers accessible 24x7x365.
No easy means to transfer licenses from one device to another.	Licenses can be moved between product instances without a license transfer. This greatly simplifies the reassignment of a software license as part of the Return Material Authorization (RMA) process.
Limited visibility into all software licenses being used in the network. Licenses are tracked only on per node basis.	Complete view of all Smart Software Licenses used in the network using a consolidated usage report of software licenses and devices in one easy-to-use portal.

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.

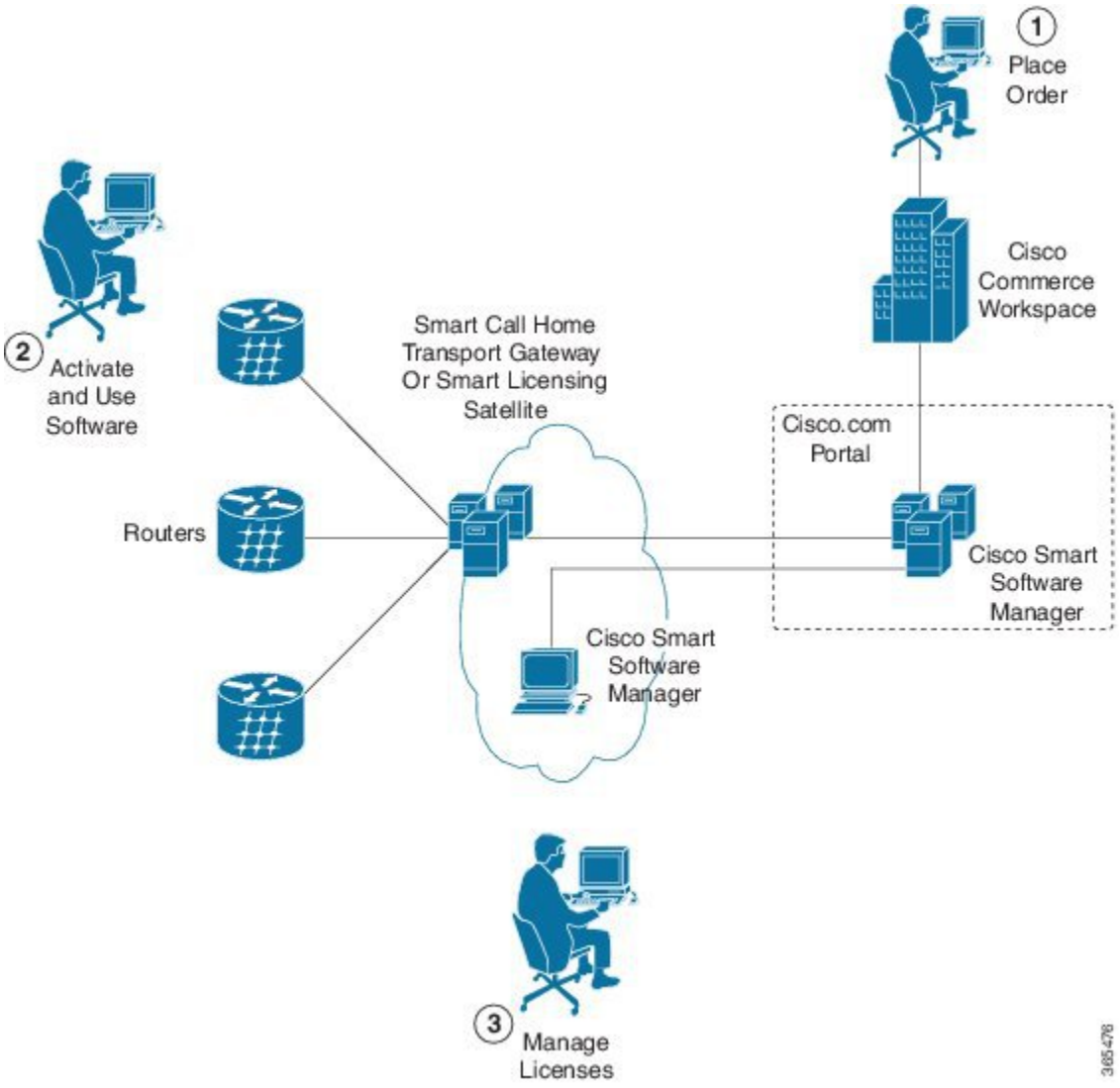
You can create your Cisco Smart Account at this webpage: https://webapps.cisco.com/software/company/smartaccounts/home#accountcreation-account/request.

For information on how to create a Cisco Smart Account, see: http://www.cisco.com/c/en/us/products/collateral/software/one-software/solution-overview-c22-733273.html.

Smart Licensing Working

Smart Licensing involves the three steps shown in the illustration below, that depicts the working model of the Smart Licensing.

Figure 7: Smart Licensing - Example



- **Setting up Smart Licensing:** You can place the order for Smart Licensing, to manage licenses on Cisco.com portal. You agree to the terms and conditions governing the use and access of Smart Licensing in the Smart Software Manager portal.
- **Enabling and Use Smart Licensing:** Enable Smart Licensing, *on page 38* describes the steps you must follow to enable Smart Licensing. *Smart Licencing Workflow* provides an illustration.
  After you enable Smart Licensing, you can use either of the following options to communicate:

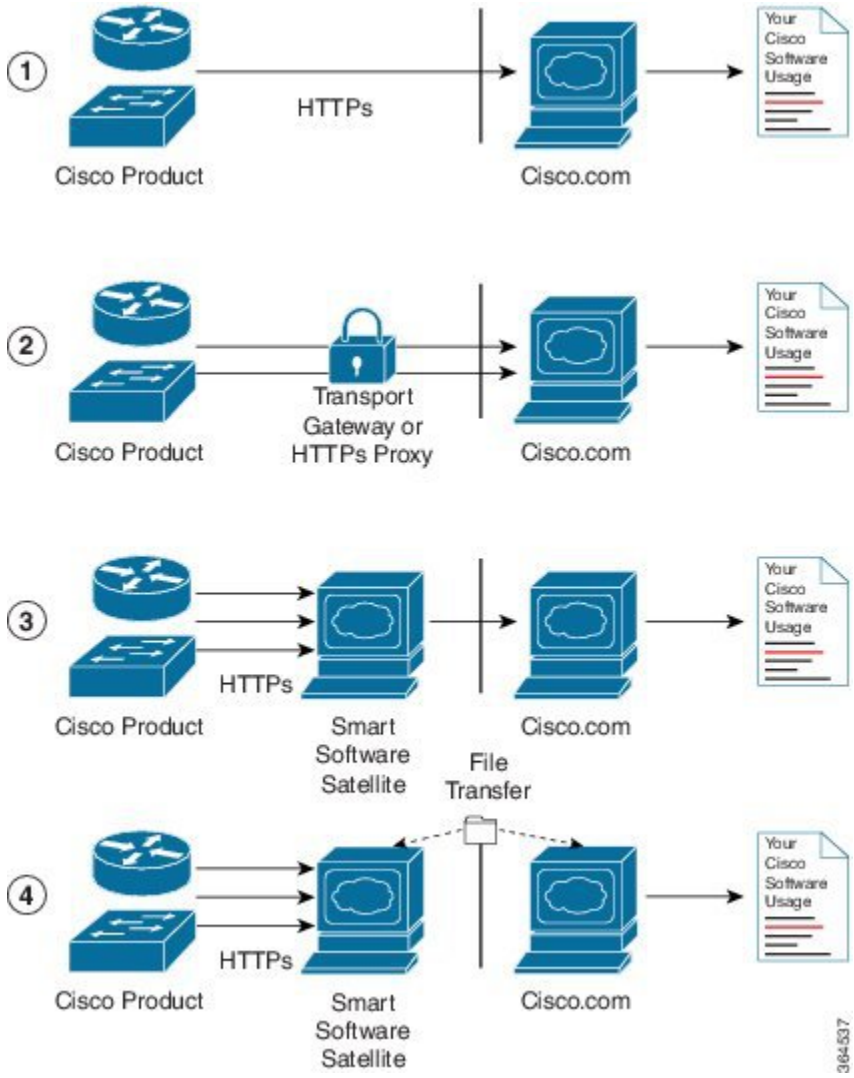
- **Smart Call Home:** The Smart Call Home feature is automatically configured after the Smart Licensing is enabled. Smart Call Home is used by Smart Licensing as a medium for communication with the Cisco license service. Call Home feature allows Cisco products to periodically call-home and perform an audit and reconciliation of your software usage information. This information helps Cisco efficiently track your install base, keep them up and running, and more effectively pursue service and support contract renewals, without much intervention from your end.
- **Smart Licensing Satellite:** The Smart licensing satellite option provides an on-premises collector that can be used to consolidate and manage Smart license usage, as well facilitate communications back to Cisco License Service at http://www.cisco.com.

- **Manage and Report Licenses:** You can manage and view reports about your overall software usage in the Smart Software Manager portal.

Deployment Options for Smart Licensing

The following illustration shows the various options available for deploying Smart Licensing:

Figure 8: Smart Licensing Deployment Options



1 **Direct cloud access:** In direct cloud access deployment method, Cisco products send usage information directly over the internet to Cisco.com (Cisco license service); no additional components are needed for deployment.

2 **Direct cloud access through an HTTPs proxy:** In direct cloud access through an HTTPs proxy deployment method, Cisco products send usage information over the internet through a proxy server - either a Smart Call Home Transport Gateway or off-the-shelf Proxy (such as Apache) to Cisco License Service.

3 **Mediated access through an on-premises collector-connected:** In mediated access through an on-premises collector-connected deployment method, Cisco products send usage information to a locally-connected

collector, which acts as a local license authority. Periodically, the information is exchanged to keep the databases in synchronization.

4 **Mediated access through an on-premises collector-disconnected:** In the mediated access through an on-premises collector-disconnected deployment method, Cisco products send usage information to a local disconnected collector, which acts as a local license authority. Exchange of human-readable information is performed occasionally (maybe once a month) to keep the databases in synchronization.

Options **1** and **2** provide an easy deployment option, and options **3** and **4** provide a secure environment deployment option. Smart Software Satellite provides support for options **3** and **4**.

Enable Smart Licensing

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.

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.

SUMMARY STEPS

1. Login to Cisco Smart Software Manager at https://tools.cisco.com/rhodui/index.
2. **license smart enable**
3. **license boot level** { *advancedmetroipaccess* | *metroaccess* | *metroipaccess* }
4. **license feature** { *atm* | *gnss* | *ipsec* | *port* | *ptp* | *upoe* }
5. **license smart register idtoken** *token_ID*

DETAILED STEPS

	Command or Action	Purpose
Step 1	Login to Cisco Smart Software Manager at https://tools.cisco.com/rhodui/index.	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.

	Command or Action	Purpose
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** If you revert smart licencing to CSL, router need to be rebooted.
Step 3	**license boot level** { *advancedmetroipaccess* | *metroaccess* | *metroipaccess* } **Example:** `Device(config)#license boot level advancedmetroipaccess`	Enables technological license, these licenses need router reboot after configuring.
Step 4	**license feature** { *atm* | *gnss* | *ipsec* | *port* | *ptp* | *upoe* } **Example:** `Device(config)#license feature atm`	Enables different feature level licences available. **Note** Feature level license supported depends on the ASR 903 variant. For more information see, http://www.cisco.com/c/en/us/td/docs/routers/asr920/configuration/guide/csa/b_port_licensing_asr920.html

Step 5	**license smart register idtoken** *token_ID*
	
	Example:
	`Device# license smart register idtoken NmE1Yzg0OWMtYmJ4`
	
	`license smart register: Registration process is`
	`in progress.Please check the syslog for the`
	
	`registration status and result`
		Enables to register your device.

What to Do Next

You can use the Cisco Smart Software Manager to:

- Create virtual accounts
- Assign a registered device to a virtual account
- View licenses in a virtual account
- Manage product instance registration tokens
- Transfer a license
- View, transfer or remove product instances in a virtual account

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.

SUMMARY STEPS

1. **show license status**
2. **show license all**
3. exit
4. **show license tech support**
5. **show license usage**
6. **show license summary**

DETAILED STEPS

	Command or Action	Purpose

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`

	Command or Action	Purpose
		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	exit	

Step 4	**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 5	**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`

	Command or Action	Purpose
		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 6	**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

	Command or Action	Purpose
		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.

SUMMARY STEPS

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

DETAILED STEPS

	Command or Action	Purpose

Step 1	**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:

SUMMARY STEPS

1. **license smart deregister**

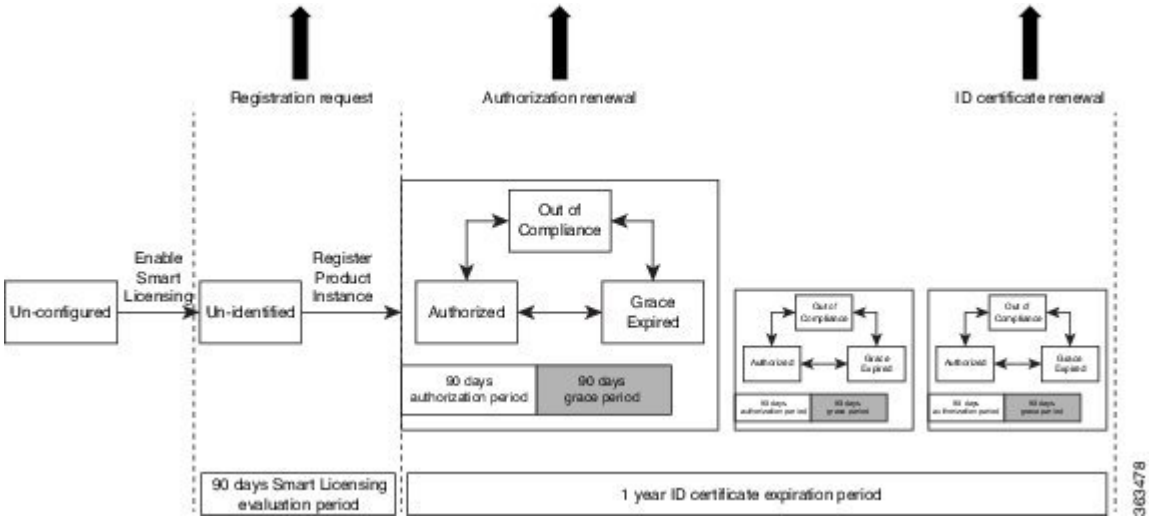
DETAILED STEPS

	Command or Action	Purpose

Step 1	**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.

Smart Licensing Workflow

The Smart Licensing workflow is depicted in this flowchart.



Cisco Smart Software Manager Overview

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://webapps.cisco.com/software/csws/ws/platform/home, by clicking **Licensing**, and then selecting **Smart Software Manager**; and then login using the username and password provided by Cisco.

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.

Licenses, Product Instances, and Registration Tokens

Licenses

Licenses are required for all Cisco products. All Cisco product licenses are one of two types which vary depending on the product:

- Perpetual licenses—Licenses that do not expire.
- Term licenses—Licenses that automatically expire after a set amount of time: one year, three years, or whatever term was purchased.

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://tools.cisco.com/rhodui/index 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.

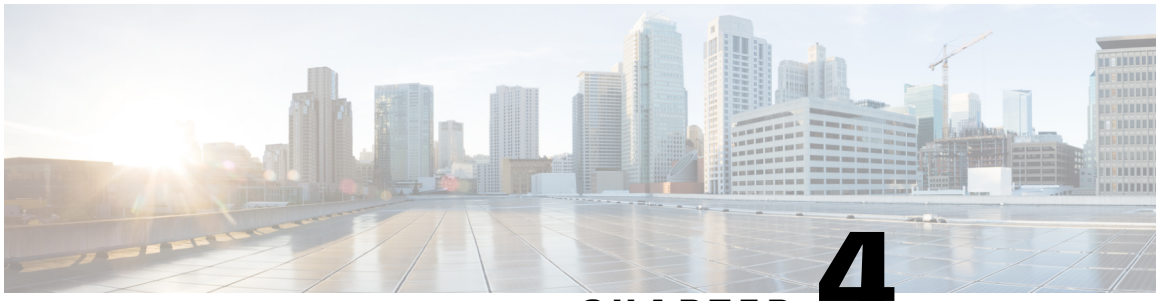
  You can view these reports from the Smart Software Manager portal at https://tools.cisco.com/rhodui/index.

Traditional Licensing Consideration in Smart Licensing

Traditional licensing, and the associated commands, currently co-exist with Smart Licensing. By default, the software image is loaded with the traditional, strictly-enforced mode of licensing. You may want to retain the traditional licensing model in the following scenarios:

- when there are multiple users, and you do not know the actual end user of your software.

- when the software is deployed in a location with limited access to the license and inventory management solution.
- when the user has opted not to establish a Smart Call Home relationship with Cisco.
- when a Smart Call Home relationship cannot be maintained with the user owing to logistics and a fallback is required.



CHAPTER 4

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 3: 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

License Type	Description	Usability
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

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

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

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

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

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

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

SUMMARY STEPS

1. **enable**
2. **show license udi**
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.
4. **license install** *stored-location-url*
5. **show license detail**
6. **end**

DETAILED STEPS

	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:

	Command or Action	Purpose
		• 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 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.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **platform enable controller** *controller-type slot/subslot/port*
4. **controller sonet controller** *controller-type slot/subslot/port*
5. **no shutdown**
6. **end**

DETAILED STEPS

	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.
Step 6	**end** **Example:** `Router# end`	Returns to privileged EXEC mode.

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

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **no platform enable controller** *controller-type slot/subslot/port*
4. **license clear** *feature-name*
5. **end**

DETAILED STEPS

	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.

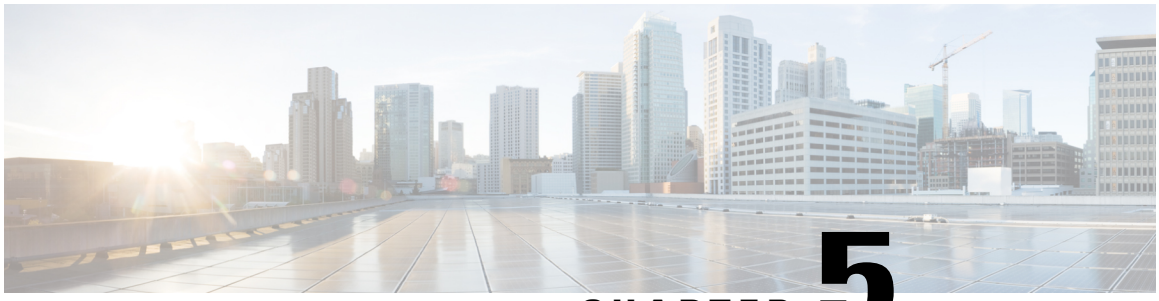
Verifying the Licenses

- **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 5

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

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

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

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

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

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

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

SUMMARY STEPS

1. **enable**
2. **show license udi**
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.
4. **license install** *stored-location-url*
5. **show license detail**
6. **end**

DETAILED STEPS

	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:** `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.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **platform enable controller Mediatype** *slot/subslot/port license-type*
4. **end**

DETAILED STEPS

	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 licenses□OC3 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.

Example OIR of Interface Module

Scenario There 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
```