Information About Smart Licensing

The Smart Licensing Client feature is a standardized licensing platform that simplifies the Cisco software experience and helps you understand how Cisco software is used across your network. Smart Licensing is the next generation licensing platform for all Cisco software products.

This document provides an overview of the Cisco Smart Licensing Client feature and describes the several tools and processes required to complete the products' registration and authorization. See the following topics to know more about Smart Licensing:

- Overview of Smart Licensing, on page 1
- New Features by Release, on page 2
- Benefits of Smart Licensing, on page 3
- Prerequisites, on page 3
- Restrictions for Smart Licensing, on page 3
- License Evaluation in Smart Licensing, on page 4
- Deployment Options for Smart Licensing, on page 4

Overview of Smart Licensing

Cisco Smart Software Licensing is a new, flexible way of licensing to buy, deploy, track, and renew Cisco software. By using Smart Licensing, you can remove the entitlement barriers that are present in Traditional or Classic Licensing. Smart Licensing is also a major step towards Cisco's e-strategy because this functionality enables you to move away from a Product Authorization Keys (PAK)-based licensing model.

With Smart Licensing, you can configure, activate, and register your device. This feature thus removes the need to access a website and register each product with PAKs. Instead of using PAKs or license files, Smart Software Licensing establishes a pool of software licenses or entitlements that is used across your entire company in a flexible and automated manner. License pooling is particularly helpful with Return Material Authorizations (RMAs) because pooling eliminates the need to re-host licenses.

When you buy or upgrade to a Cisco Smart Software Licensed product, you first create a Smart Account. To create an account, you must obtain access to the Cisco Smart Software Manager (CSSM) portal. Use CSSM to organize and view your licenses in groups called Virtual Accounts. Virtual Accounts are collections of licenses and product instances. Using a Virtual Account, you can manage license deployment throughout your company easily and quickly.

Further, you, your chosen partners, and Cisco personnel can view your hardware, software entitlements, and eventually services by using the Cisco Smart Software Manager interface.
The following lists certain key operations that you can perform using the CSSM portal:

- 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.

Smart Licensing thus offers standard product offers, a standard license platform, and flexible contracts with a simplified, and better user experience.

**Platforms Supported**

Smart Licensing was first supported on Cisco IOS XE 16.10.1a by all routing platforms. The following are the list of platforms that support Smart Licensing:

- All ASR1000 series fixed and modular platforms
- All ISR 4000 series routers and ISR 1100 series routers
- CSR1000v and ISRv routers

**Licensing Options**

The following are the licensing options that are supported by Smart Licensing:

- **Standard Smart Licensing**: Deploy a software license on a device that directly communicates the usage information to the Cisco Cloud.

- **Specific License Reservation (only Release 16.11.1a)**: Deploy a software license on a device that is not directly connected to the Cisco Cloud. In this option, an air gap exists between the network and the Cloud. For more information about Specific License Reservation, see Configure Specific License Reservation, on page 31.

**New Features by Release**

The following are the new features in each release of Smart Licensing:
### Benefits of Smart Licensing

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

### Prerequisites

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

- You have a smart account, and access to the Cisco Smart Software Manager portal. To create and access a smart account, go to Smart Accounts. Click Get a Smart Account, to get started.

- You have registered your device in CSSM. To register your device, see the Generating a New Token from Cisco Smart Software Manager, on page 8 and Registering Device using the id Token, on page 9 section.

- You have configured the Layer 3 connectivity to the CSSM Smart Software Manager satellite.

### Restrictions for Smart Licensing

- In IOS XE Release 16.10.1a, the Smart Licensing feature is applicable only for users whose routers directly connect to the CSSM portal, or whose routers connect to a satellite server. In IOS XE Release 16.11.1a, if you want to use your routers without directly connecting to the Cisco Cloud, you can use Smart Licensing Reservation, as described in Configure Specific License Reservation, on page 31.
• To access the CSSM portal, use Chrome 32.0, Firefox 25.0, Safari 6.0, or later releases. Ensure that Javascript 1.5 or later is enabled in your browser.

• For IOS XE, DLC is not supported on ASR 1000 Series RP2 Platforms running non-universal K9 images. As a workaround, migrate to an intermediate release, such as IOS XE 16.3, 16.6, or 16.9, before you migrate to IOS XE 16.10.1a.

• If you want to Migrate from Traditional Licensing to Smart Licensing, on page 15, the following releases of Smart Software Manager satellite are not supported:
  • Releases earlier than 4.1.0
  • Releases 6.0.x
  • Releases 6.1

License Evaluation in Smart Licensing

When you boot the SL-only image, Smart Licensing is automatically enabled, and the licenses for your device go into the Evaluation or EVAL mode. You have 90 days of device usage to register your device in CSSM. During this period, the existing features work as expected for ISR and ASR routers. As long as the device is used, the evaluation timer counts down. The evaluation period applies to the whole device rather than to individual features or entitlements. When the evaluation period expires for a device, it cannot be reset. After the 90 days time period, these licenses move to the Expired or EVAL EXPIRED state. For CSR and ISRv, after the 90 days time period, the throughput drops to a default of 1Mbps.

In IOS XE Release 16.11.1a, you have 365 days to register your device with CSSM without being restricted or receiving evaluation expiration messages. For more information, see Suppression of Evaluation Expiration Messages in IOS XE Release 16.11.1a, on page 29

Deployment Options for Smart Licensing

The following illustration shows the various options available for deploying Smart Licensing. Since security is one of the most important aspects for any user, the image lists the deployment options from the easiest option to the most secure one:
1. Direct Cloud Access: This deployment option allows you to transfer usage over the Internet to the Cloud server directly from the devices to the cloud via HTTPS.

2. Direct cloud access through a HTTPs proxy: The deployment option allows you to transfer files directly over the Internet to the Cloud server through an HTTPs proxy. That is, either using Smart Call Home Transport Gateway or using HTTPs proxy such as Apache.

3. Mediated access through an on-premises collector-connected: The third deployment option uses an internal collection device called as the “Cisco Smart Software Satellite.” The Satellite, which is available at your end, periodically transmits the information into the cloud using periodic network synchronization. In this deployment option, the only system or database transferring information to the cloud is the Satellite. You can thus control what is included in the collector database, which provides greater security.

4. Mediated access through an on-premises collector-disconnected: The fourth deployment option is where you use the Satellite, but only to transfer the collected files using manual synchronization (at least once a month). In this option, the system is not directly connected to the Cloud and an air gap exists between your network and the Cisco Cloud.

To know more about Smart Software Manager Satellite, see About Cisco Smart Software Manager Satellite, and Smart Software Manager Satellite Overview.
Smart Licensing for New Deployments

When you purchase the SL-only 16.10.1a or later images, Smart Licensing is enabled by default. However, you must perform the following steps to use the Smart Licensing feature:

1. Ensure that the Prerequisites, on page 3 are met.
2. Power on your device.
3. Configure Smart Call Home. To view the detailed steps for configuring Call Home, see Configuring Call Home Service.
4. Generate a token ID from the CSSM portal. To know how to perform this step, see the Generating a New Token from Cisco Smart Software Manager, on page 8 section.
5. Register the device on the portal using the token. To know how to perform this step, see the Registering Device using the id Token, on page 9 section.
6. In case of Satellite deployments under call-home profile, remove the default destination CSSM production URL and configure the satellite destination URL.

The following image describes the high level steps involved in configuring Smart Licensing for a new deployment:

Figure 2: Smart Licensing workflow for new deployments

Note

You must enable some specific licenses for some enforced features such as HSEC and Boost. These licenses are called enforced licenses. To enable enforced licensing, purchase the required enforced licenses. After you purchase an enforced license, Cisco deposits these licenses in your smart account. When you register your device, the licenses undergo an automatic check after which they are enabled.
See the following topics to know how to configure Smart Licensing:

- Enable Smart Licensing, on page 8
- Generating a New Token from Cisco Smart Software Manager, on page 8
- Registering Device using the id Token, on page 9

Enable Smart Licensing

When you purchase the Cisco IOS XE 16.10.1a or later images, Smart Licensing is enabled by default. Smart Licensing is the only mode that is available for licensing, and you do not have to perform any additional steps to enable this feature.

As the next step, proceed to Configuring Call Home Service.

Generating a New Token from Cisco Smart Software Manager

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

Step 1
Login to Cisco Smart Software Manager at https://software.cisco.com/#
You must log into the portal using a username and password provided by Cisco.

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

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

The system displays the Create Registration Token page.

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

Step 5
Enable the Allow export-controlled functionality on the products registered with this token check box.
Step 6  Click Create Token. After the token is created, click Copy to copy the newly created token.

Registering Device using the id Token

SUMMARY STEPS

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

DETAILED STEPS

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

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

Example:

```
Device#sh license summary
Smart Licensing is ENABLED
Registration:
  Status: REGISTERED
  Smart Account: BU Production Test
  Virtual Account: ASR-SJC-DT
  Export-Controlled Functionality: Allowed
  Last Renewal Attempt: None
  Next Renewal Attempt: Apr 28 03:39:36 2019 UTC
License Authorization:
  Status: AUTHORIZED
  Last Communication Attempt: SUCCEEDED
  Next Communication Attempt: Nov 29 03:39:42 2018 UTC
License Usage:
  Licence: Entitlement tag   Count Status
  --------------------------------------------------------------------------------
  Upgrade from 2.5 Gbps... (ASR_1001X_Throughput_2...) 1 AUTHORIZED
  ASR_1000_AdvEnterprise (ASR_1000_AdvEnterprise) 1 AUTHORIZED
```

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

What to do next

- If you have purchased enforced licenses, execute the `license feature hsec9` command for HSEC, and the `platform hardware throughput level boost` command for Boost.
- If you are migrating from traditional license to Smart Licensing, proceed to Device Led Conversion.
Registering Device using the id Token
CHAPTER 3

Configure Smart Licensing (Satellite)

Cisco Smart Software Manager satellite is a component of Cisco Smart Licensing. CSSM Satellite works in conjunction with CSSM to manage product licenses, providing near-realtime visibility and reporting of Cisco licenses in use. For security reasons, if you do not want to manage the installed base with Smart Software Manager residing on Cisco.com, you can choose to install the Smart Software Manager satellite on premises.

The following are the high level steps to register a device in CSSM Satellite:

- Ensure that you meet all the prerequisites.
- Configure the Call Home settings if you want to enable email notifications.
- Register the device by executing the `license smart register id token <token>` command.
- In the Call-Home profile, remove the default destination CSSM production URL and configure the satellite destination URL.

- Generate a New Token from the Satellite Server, on page 11
- Register a Device in Satellite, on page 12

Generate a New Token from the Satellite Server

If you have chosen to deploy the Smart Software Manager Satellite On Premises, you must follow this procedure to generate a token to register your product instance to your Virtual Account.

Step 1 Log in to the Smart Software Manager Satellite server.
Step 2  Select the **General** tab, and click **New Token**. Once the token is generated, the system displays the token on the Virtual Account page. The event log also captures the token ID creation.

The product instance is created in your Virtual Account.

**What to do next**

Register the device using the token that you generated.

**Register a Device in Satellite**

On the device, execute the `<device>\license smart register idtoken <token from Satellite>` command to complete the registration. Use the token ID that you generated from Satellite.

On successful registration, the device displays the “Registered” status and receives an identity certificate. This certificate is saved on the device and is automatically used for all future communications with the Satellite. However, if the registration fails, an error is logged.

**Example:**

```
Device#sh license summary
```
Smart Licensing is ENABLED
Registration:
Status: REGISTERED
Smart Account: BU Production Test
Virtual Account: ASR-SJC-DTRxport-Controlled
Functionality: Allowed
Renewal Attempt: None
Next Renewal Attempt: Apr 28 03:39:36 2019 UTC
License Authorization:
Status: AUTHORIZED
Last Communication Attempt: SUCCEEDED
Next Communication Attempt: Nov 29 03:39:42 2018 UTC
License Usage:
<table>
<thead>
<tr>
<th>Status</th>
<th>License Entitlement tag</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upgrade from 2.5 Gbp...</td>
<td>(ASR_1001X_Throughput_2...)</td>
<td>1 AUTHORIZED</td>
</tr>
<tr>
<td>ASR_1000_AdvEnterprise</td>
<td>(ASR_1000_AdvEnterprise)</td>
<td>1 AUTHORIZED</td>
</tr>
</tbody>
</table>
Register a Device in Satellite
CHAPTER 4

Migrate from Traditional Licensing to Smart Licensing

Cisco employs two types of license models - Traditional or Classic Licensing and Smart Software Licensing. If you are an existing user who is using a device earlier than Cisco IOS XE Release 16.10.1a, you are most likely using Traditional Licensing such as an RTU license, paper license, or a PAK license. If you want to upgrade to the Cisco IOS XE Release 16.10.1a or later SL-only image, you must migrate to Smart Licensing. The following image specifies the high-level steps to migrate to Smart Licensing:

**Figure 3: Migrate to Smart Licensing**

When you upgrade to IOS XE Release 16.10.1a or later, your existing licenses change to the evaluation (EVAL) state till the device registration is complete. However, existing features continue to function without interruption. After registration, the licenses change to the AUTHORIZED state.

1. Ensure that all the prerequisites are met before you migrate to Smart Licensing. See the Prerequisites, on page 3 section.
2. Load the 16.10.1a or later image. See the Load the 16.10.1a or Later Image, on page 16 section.
3. Generate a token ID using the CSSM Portal. See the Generating a New Token from Cisco Smart Software Manager, on page 8 section.
4. Register your device using the token that you generated. See the Registering Device using the id Token, on page 9 section.
5. Initiate DLC conversion. See the Initiate DLC, on page 17 section.
For IOS XE, DLC is not supported on ASR 1000 Series RP2 platforms running non-universal K9 images. As a workaround, you can migrate to intermediate releases such as IOS XE 16.3, 16.6, or 16.9, before migrating to IOS XE 16.10.1a or later. Or, contact the Cisco TAC team by telephone to migrate from traditional licenses to smart licenses.

The following sections describe the migration workflow in detail:
- Load the 16.10.1a or Later Image, on page 16
- Device Led Conversion, on page 16
- Initiate DLC, on page 17
- Verify the Migration Status in CSSM Portal, on page 17
- Verify DLC Status on Satellite, on page 18

Load the 16.10.1a or Later Image

As the first step of migrating to Smart Licensing, you must load the Cisco IOS XE 16.10.1a or later image. When you upgrade to this image, Smart Licensing is automatically enabled.

You cannot execute the `license smart enable` command on the device.

After you load the SL-only image, proceed to Generating a New Token from Cisco Smart Software Manager, on page 8.

Device Led Conversion

Device Led Conversion (DLC) is the process where a new device or a product instance is upgraded from Traditional to Smart Licensing when registered in Cisco Smart Software Manager (CSSM). All licenses on the device automatically convert from Classic or Perpetual Right-to-Use (RTU) License to Smart License without the need for any manual conversion.

You can perform the DLC operation only once during the life of the device.

Important

CSR does not support DLC in the Cisco IOS XE 16.10.1a release. You can either deposit licenses directly or you can convert licenses in CSSM and License Registration Portal (LRP).

Important

ASR does not support OTV, LISP, VPLS, and FPI licenses for DLC.
Initiate DLC

To initiate the DLC operation, execute the `license smart conversion start` command. If the DLC operation is complete, the device displays a "Completed" status.

The following is an example of DLC completion. Note the Completed output in the DLC Status field.

```
Device#show platform software license dlc
Index 1 Feature: adventerprise
Permanent License: 0
EVAL RTU License: 1
RTU License: 0
Paper License: 0
DLC Status: Completed
Index 2 Feature: adventerprise
Permanent License: 0
EVAL RTU License: 1
RTU License: 0
Paper License: 0
DLC Status: Completed
Index 3 Feature: adventerprise
Permanent License: 0
EVAL RTU License: 1
RTU License: 0
Paper License: 0
DLC Status: Completed
```

To verify whether the operation was successful, run the `show license all` command. The system displays a "Success" status if the DLC operation is successful. The following example shows a successful DLC operation:

```
Device#show license all | sec License Conversion:
License Conversion:
Automatic Conversion Enabled: False
Status: Successful on Nov 08 18:54:40 2018 IST
```

To convert broadband licenses using DLC for an ASR1000 device, execute the `subscriber license dlc <sessions>` command. This command sets the total number of broadband sessions that can be converted using DLC including paper licenses and PAK licenses.

To consume the broadband licenses in the 16.10.1a or later image, use the `subscriber license session` command. If this command is not configured, the broadband module also supports the automatic procuring of licenses for every 2K session brought up in the device.

Any broadband licenses from traditional licensing are consumed as 2k sessions in SL-only mode in 16.10.1a or later. For example, if a customer has 10 licenses as broadband and 4k in traditional licensing, after migrating to SL-only image, these licenses are visible as 20 Licenses in feature broadband during the DLC conversion. Use the `show platform software license dlc` command to view the 20 licenses.

Verify the Migration Status in CSSM Portal

After the DLC conversion is successful, the smart licenses for your virtual account are authorized. You can verify the status of the migration by checking the message in the CSSM portal.

**SUMMARY STEPS**

1. Log in to the CSSM portal. Click **Inventory > Product Instances**.
2. Verify whether the DLC operation is successful by clicking the **Convert to Smart Licensing** tab, and clicking **Conversion History**. You see the following in the portal:

### DETAILED STEPS

#### Step 1
Log in to the CSSM portal. Click **Inventory > Product Instances**. If the migration is successful, the converted licenses are added in CSSM.

#### Step 2
Verify whether the DLC operation is successful by clicking the **Convert to Smart Licensing** tab, and clicking **Conversion History**. You see the following in the portal:

It takes about an hour or more for the Conversion Status of the DLC to display as "Converted" on CSSM. This status means that the DLC is complete and that successful logs have been detected on the device.

### Verify DLC Status on Satellite

This verification topic is applicable only if you have configured Smart Licensing for Satellite.

#### Step 1
Log in to the Satellite Server, and click the **Licenses** tab. If your device is registered successfully, the Licenses are in the **In Use** state.

After you initiate DLC, the Licenses move to the **Pending** state.
Step 2  After the DLC conversion is successful, click the Conversion History tab to verify whether the conversion status is updated to "Converted".

After the migration is complete, in the Licenses tab, the Purchased count is updated to 1 from 0. Also, the conversion status is displayed as "CONVERT_SUCCESS".
Verify DLC Status on Satellite

Smart Software Manager satellite

Cisco Smart Software Manager

Satellite-DLC-Prod-5.0.1

Virtual Accounts
ISR-DLC-Prod-5.0.1

Synchronization
Reports
Administration

Last Synchronization: 2018-Nov-16 20:06:32 UTC
Synchronize Now

Version Compatibility Note: Temporarily, this satellite will only be able to register Product Instances that are using the multi-level certificate hierarchy feature (use “show license” on the Product Instance to ensure that the agent version is 1.5+) To enable registration of Product Instances using older versions of the agent, wait two business days after the satellite’s initial registration and then synchronize.

ISR-DLC-Prod-5.0

License Billing Purchased In Use Balance Alerts
Boost Performance for ISR4331 Prepaid 1 1 0
ISR_4331_Application Prepaid 1 1 0
ISR_4331_Have Prepaid 1 1 0
ISR_4331_Security Prepaid 1 1 0
ISR_4331_UnifiedCommunication Prepaid 1 1 0
Unified Survivable Remote Site Telephony (SRST) Endpoint License Prepaid 0 5 -5

Insufficient Licenses
CHAPTER 5

Convert CSR1000v PAK Licenses to Smart Licenses

**Step 1** Log in to the CSSM portal using the username and password that you obtained from Cisco.

**Step 2** Click Convert to Smart Licensing > Convert Licenses > License Conversion Wizard.

**Step 3** From the Product Family drop-down list, select the product family.

**Step 4** Specify the Device Identifier, and click Search.

**Step 5** Select the device that has been added, and select Convert Licenses to Smart Licensing.
Step 6  Assign the licenses to a Virtual Account by choosing the corresponding option from the Virtual Account drop-down list.

Step 7  Specify the number of licenses that you want to convert in the Quantity to Convert field.

Step 8  On the Convert to Smart Entitlements page, click Submit.
Convert PAK Licenses in License Registration Portal

Step 1
Log into the License Registration Portal using the credentials that you obtained from Cisco.

Step 2
Click the Devices tab, and click Add Devices.

Step 3
On the Add Device pop-up screen, select the appropriate Product Family, and UDI.

Step 4
Click OK.
Convert PAK Licenses in License Registration Portal
Roll back to Traditional Licensing Model

You might want to roll back to a release earlier than Cisco IOS XE 16.10.1a and therefore to the earlier/traditional licensing model in the following scenarios:

- There are multiple users, and you do not know the actual end user of your software.
- The software is deployed in a location with limited access to the license and inventory management solution.
- You have not opted to establish a Smart Call Home relationship with Cisco.
- A Smart Call Home relationship cannot be maintained with the user owing to logistics.

When you have upgraded from Cisco IOS XE Everest 16.6 release to Cisco IOS XE Gibraltar 16.10.1a or later, and want to rollback, you must **reload** the router twice to move the licenses to the "Active, In-Use" state.

**Figure 4: Roll back to an earlier release**

To roll back to the earlier release, perform these steps:

- **Step 1** De-register the device from CSSM by executing the `license smart deregister` command.
- **Step 2** Reload the device with an earlier release.
- **Step 3** Perform a write action (write memory), if required. To do so, execute the `write memory` command.
- **Step 4** Reboot the device.
**Attention**  When you rollback from the Cisco IOS XE Release 16.0.1a to a previous release, you must reboot the router twice with a write memory in between.

Downgrading a device from Cisco IOS XE Release 16.10.1a or later to any prior release will migrate the smart license to traditional license. All smart license information on the device is removed. In case the device needs to be upgraded back to Cisco IOS XE Release 16.10.1a or later, the license status remains in the evaluation mode until the device is registered again in CSSM. Your RTU licenses will be in evaluation mode, and these licenses cannot be enforced along with the controlled features. You must contact Cisco TAC by telephone to resolve this issue.
Renew Smart Licensing Registration

Your registration is automatically renewed every six months for a one year registration period. However, to make an on-demand manual update of your registration, perform this procedure.

**Step 1**
In the router command prompt, execute the `enable` command.
Enables privileged EXEC mode. Enter your password if prompted.

**Step 2**
Execute the `license smart renew {auth | id}` command.

**Note** The Smart Licensing system renews the registration automatically every 30 days.
Suppression of Evaluation Expiration Messages in IOS XE Release 16.11.1a

Overview of the Evaluation Period

When you boot the SL-only image, Smart Licensing is automatically enabled, and the licenses for your device go into the Evaluation or EVAL mode. You have 90 days of device usage to register your device in CSSM. During this period, the existing features work as expected for ISR and ASR routers. As long as the device is used, the evaluation timer counts down. The evaluation period applies to the whole device rather than to individual features or entitlements. When the evaluation period expires for a device, it cannot be reset. After the 90 days time period, these licenses move to the Expired or EVAL EXPIRED state. For CSR and ISRv, after the 90 days time period, the throughput drops to a default of 1Mbps.

In release 16.11.1a, the behavior of the evaluation expiration messages has been changed.

Evaluation Period in 16.10.1.a

In release 16.10.1.a, to notify the user about the evaluation period, the following syslog messages are displayed when the device has not been registered in CSSM:

• %SMART_LIC-3-EVAL_EXPIRED: Displayed when the evaluation period expires.

• %SMART_LIC-4-EVAL_WILL_EXPIRE_WARNING: Displayed when the evaluation period is about to expire on the following schedule:
  • 60 days before expiration.
  • 30 days before expiration.
  • Every week in the last month.
  • Every day in the last week.
  • Every hour on the last day.

• %SMART_LIC-4-EVAL_EXPIRED_WARNING: Displayed when the evaluation period has already expired. It is displayed once a week after the expiration and also displays the timestamp of expiry.

Changes to the Evaluation Period in 16.11.1a

In release 16.11.1a, the evaluation period of 90 days is the same as 16.10.1a. However, the syslog messages are not displayed until after you use the device for 365 days. This period of 365 days includes the 90 days of
the evaluation period. Due to the suppression of these messages, you can use your device without restrictions for 365 days from when you first start the device.
Configure Specific License Reservation

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

Specific License Reservation is only supported in IOS XE Release release 16.11.1a.

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

SLR is not enabled by default and you must specifically request for this functionality.

To enable and use the SLR feature, you must generate a reservation request code from the router device. Use this code in CSSM and generate an authorization code. When you enter this authorization code on the router, the license reservation becomes effective. After you enable license reservation, the system displays the License Reservation section, which is used to reserve licenses for your product.

The following enforcement mechanisms are available:

• Hard enforcement: This applies to boot-level licenses. If you do not register the device using Specific License Reservation, you cannot use the license.

• Soft enforcement: If you do not register the device using Specific License Reservation, you can use the license, but syslog and error messages are displayed.

• Cisco Smart Software Manager (CSSM) Managed: The licenses are managed by CSSM.

Read on to know how to configure SLR, in detail:

• Restrictions for Specific License Reservation, on page 32
• Register a Device Using Specific License Reservation, on page 32
• Update a Specific License Reservation, on page 35
• Deregister a Specific License Reservation, on page 35
Restrictions for Specific License Reservation

For ASR 1000 Series Routers with two Route Processors (RPs), do not change the state of the licenses on switching over to a new active RP.

Register a Device Using Specific License Reservation

To register a device using Specific License Reservation, you must do the following:

Enable Specific License Reservation

To enable Specific License Reservation for your device, you must execute the following commands:

Step 1    Enable
          Enables privileged EXEC mode.
          Enter your password if prompted.

Step 2    configure terminal
          Enters global configuration mode.

Step 3    license smart reservation
          Enables Specific License Reservation. Use the no form of this command to disable Specific License Reservation.

Step 4    exit
          Exits configuration mode, and returns the device to the global configuration mode.

Step 5    license smart reservation request local
          Generates a request code for the device to be entered in the Cisco Smart Software Manager.

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

Example

SR-I# Enable
SR-I# configure terminal
SR-I(config)# license smart reservation
SR-I(config)# exit
SR-I# license smart reservation request local
Reserve Licenses using Cisco Smart Software Manager

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

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

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

The system displays the Smart License Reservation wizard.

Step 4
On the **Enter Request Code** page, enter or attach the reservation request code you generated from the router, and click **Next**.

Step 5
Check the **Reserve a specific License** check box.

The system displays the list of surplus licenses available in your Virtual Account. Enter the number of licenses that you want to reserve for the required license, in the **Quantity to Reserve** field. Click **Next**.

Step 6
From the **Review and Confirm** tab, click **Generate Authorization Code**.

The system displays the Authorization Code that is generated.

Step 7
Click the **Copy to Clipboard** option to copy the code, or download it as a file. You need to copy the code or file to your device.
Register the Device Using the Authorization Code

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

---

Step 1  
**enable**

Enables privileged EXEC mode.

Enter your password, if prompted.

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

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

Step 3  
(Optional) **license smart reservation return local**

This command will remove the authorization code and the device transitions back to the unregistered state. A return code is generated and must be entered in Cisco Smart Software Manager to remove product instance.

---

Example: Enable Specific License Reservation

```
SR-I> enable
SR-I# configure terminal
SR-I(config)# license smart reservation
cancel Cancel a Smart License reservation request before the authorization code is installed
install Install a Smart License reservation authorization code
request Request a license reservation
return Return a Smart License reservation authorization code that was installed

SR-I#license smart reservation req
SR-I#license smart reservation request loc
SR-I#license smart reservation request local
ce577e57-9aa9-403e-8e7c-e9532a810075
SR-I#license smart reservation install file bootflash:slr_sl
Reservation install file successful
Last Confirmation code UDI: PID:ASR1001-HX,SN:JAE200602WHff518c84
SR-I#show license tech support | section Reservation Info
Reservation Info
================
License reservation: ENABLED
Overall status:
Active: PID:C1117-4PWA,SN:FGL214790X2
Reservation status: SPECIFIC INSTALLED on Mar 29 11:23:06 2019 PDT
Export-Controlled Functionality: ALLOWED
Request code: <none>
Last return code: <none>
Last Confirmation code: b6556195
Reservation authorization code: <authcode>
```
Update a Specific License Reservation

After you register a device successfully, if required, you can update the reservation with a new feature or license as follows:

**Step 1**
Log in to Cisco Smart Software Manager at https://software.cisco.com/.
You must log in to the portal using the Cisco provided username and password.

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

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

**Step 4**
Click **Update Reserved Licenses**.

**Step 5**
Select the license that you want to update.

**Step 6**
Click **Next**.

**Step 7**
From the **Review and Confirm** tab, click **Generate Authorization Code**. The **Authorization Code** tab is displayed.
The system displays the Authorization Code that is generated.

**Step 8**
Click the **Copy to Clipboard** option to copy the code, or download it as a file. You need to copy the code or file to your device.

**Step 9**
Log in to the device that you want to update.

**Step 10**
Run the **license smart reservation install file** command.

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

This command registers the device with the new authorization code. The authorization code you copied as a file is used to activate smart licensing reservation for your device.

Example:

```
device# license smart reservation install file bootflash:auth.txt
Reservation install file successful
Last Confirmation code UDI: PID:ISR4351/K9,SN:FDQ210305DQ
2029eee4
```

**Step 11**
Note the confirmation code from the output of the previous command.

**Step 12**
In CSSM, from the **Authorization Code** tab, click the **Enter Confirmation Code** button.

**Step 13**
Enter the confirmation code that you noted in the previous step.

**Step 14**
Click **OK**.

---

Deregister a Specific License Reservation

To deregister a Specific License Reservation for a device, you must return the license reservation in the CLI and remove the instance from CSSM.

**Step 1**
Log in to the device that you want to deregister.


**Step 2**  
To remove the license reservation authorization code, run the `license smart reservation return` command

```
license smart reservation return local
```

Device# license smart reservation return local  
This command will remove the license reservation authorization code and the device will transition back to the unregistered state. Some features may not function properly.

Do you want to continue? [yes/no]: yes

Enter this return code in Cisco Smart Software Manager portal:

UDI: PID:ISR4351/K9,SN:FDO210305DQ
   CBURR4-cTgMun-arvYM-e-gta6ir-yqgXQm-yMKxWM-2ajywD-5kADgZ-a33

**Step 3**  
Log in to Cisco Smart Software Manager at [https://software.cisco.com/#](https://software.cisco.com/#).

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

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

**Step 5**  
From the **Product Instances** tab, for the device that you want to deregister, click **Actions**.

**Step 6**  
Click **Remove**.

**Step 7**  
When prompted, enter the return code.
Troubleshoot Smart Licensing Issues

The following chapter describes some common Smart Licensing issues that you might encounter and possible solutions. This chapter contains the following sections:

- Troubleshoot Smart Licensing, on page 37
- Troubleshoot Specific License Reservation, on page 41

Troubleshoot Smart Licensing

This section describes some common smart licensing issues you may encounter with IOS XE Release 16.10.1a and their possible solutions.

Note

The issues described in this section apply to release 16.10.1a only.

CSSM Registration Failure

Causes

HTTP Communication Failures

Sample Syslogs

Nov 15 14:18:48.373 PDT: %SMART_LIC-3-AGENT_REG_FAILED: Smart Agent for Licensing Registration with the Cisco Smart Software Manager or satellite failed: Fail to send out Call Home HTTP message.

Nov 15 14:18:48.373 PDT: %SMART_LIC-3-COMM_FAILED: Communications failure with the Cisco Smart Software Manager or satellite: Fail to send out Call Home HTTP message.

Verification Steps

Execute the `show license all` command and locate the failure reason in the output. See the following sample output:

Registration:
Status: REGISTERING - REGISTRATION IN PROGRESS
Export-Controlled Functionality: NOT ALLOWED
Initial Registration: FAILED on Nov 15 14:18:48 2018 PDT
CSSM Registration Failure reason: Invalid tokenID

Sample Syslogs
Nov 15 19:03:07.272: %SMART_LIC-3-AGENT_REG_FAILED: Smart Agent for Licensing Registration with the Cisco Smart Software Manager or satellite failed: Error received from Smart Software Manager: {"token": ["The token '"tokenID'" is not valid."]}

Verification Steps
Execute the `show license all` command and look for failure reason in the output. See the following example output:

Registration:
Status: REGISTERING - REGISTRATION IN PROGRESS
Export-Controlled Functionality: NOT ALLOWED
Initial Registration: FAILED on Nov 15 14:32:24 2018 PDT

Recommended Solution
The Token ID that you entered is incorrect. Try registering the device again with the correct tokenID.

DLC syslog message with "DLC Already Completed"

Sample Syslogs
Nov 11 00:41:22.395: %SMART_LIC-6-CONVERT_LIC_SUCCESS: PID:ISR4451-X/K9,SN:FOC17221WLK License regid.2014-12.com.cisco.ISR_4400_Security,1.0_02ea4d4a-2469-46c1-aaf-d6c7f1980aa has been converted to ISR_4400_Security with a count of 1
Nov 11 00:41:22.395: %SMART_LIC-6-CONVERT_ALREADY: PID:ISR4451-X/K9,SN:FOC17221WLK Smart License Conversion successful
Nov 11 00:41:24.637: %SMART_LIC-6-AUTH_RENEW_SUCCESS: Authorization renewal with the Cisco Smart Software Manager or satellite. State=OOC for udi PID:ISR4451-X/K9,SN:FOC17221WLK

Recommended Solution
You can perform the DLC operation only once during the lifecycle of a device. If you want to add new licenses after DLC conversion, you have to deposit those licenses in your Virtual Account.

CSSM Registration with Out of Compliance: Existing customers upgrading to 16.10.1a and later. Virtual Account with no tags

CSSM Registration displays out of compliance error message for existing users who are upgrading to the 16.10.1a release.
Sample Syslogs

Nov 15 15:15:34.444 PDT: %SMART_LIC-6-AGENT_REG_SUCCESS: Smart Agent for Licensing Registration with the Cisco Smart Software Manager or satellite for udi PID:ISR4461/K9,SN:FDO2213A0GL

Nov 15 15:15:36.509 PDT: %SMART_LIC-4-CONFIG_NOT_SAVED: Smart Licensing configuration has not been saved

Nov 15 15:15:39.357 PDT: %SMART_LIC-3-OUT_OF_COMPLIANCE: One or more entitlements are out of compliance

Nov 15 15:15:39.358 PDT: %SMART_LIC-6-AUTH_RENEW_SUCCESS: Authorization renewal with the Cisco Smart Software Manager or satellite. State=OOC for udi PID:ISR4461/K9,SN:FDO2213A0GL

Verification Steps

Execute the `show license all` command and look for failure reason in the output. For example, see the following output:

Registration:
License Authorization:
Status: OUT OF COMPLIANCE
Last Communication Attempt: SUCCEEDED
    Next Communication Attempt: Nov 16 03:15:39 2018 PDT

Recommended Solution

Your Virtual Account has no licenses deposited. Perform the DLC operation to deposit licenses and get them authorized.

CSSM Registration with EVAL Expired: Existing customers upgrading to 16.10.1a. Licenses state after 90 days without registration

Existing customers upgrading to IOS XE Release 16.10.1a might see an "evaluation period expired" error message. This implies that the licenses are in the evaluation state after 90 days, and the device is yet to be registered.

Sample Syslogs

Nov 14 17:10:23.585 PDT: %SMART_LIC-4-EVAL_WILL_EXPIRE_WARNING: Evaluation period will expire in 1 hours. *

Nov 14 17:10:33.585 PDT: %SMART_LIC-3-EVAL_EXPIRED: Evaluation period expired

Nov 14 17:10:33.586 PDT: *** Evaluation period has expired ***

Verification Steps

Execute the `show license all` command and look for failure reason in the output. For example, see the following output:

Smart Licensing is ENABLED
Registration:
Status: UNREGISTERED
    Export-Controlled Functionality: Not Allowed
License Authorization:
Status: EVAL EXPIRED
License Usage:

<table>
<thead>
<tr>
<th>License</th>
<th>Entitlement tag</th>
<th>Count Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ISR_4400_Application)</td>
<td>1 EVAL EXPIRED</td>
<td></td>
</tr>
</tbody>
</table>

**Recommended Solution**

Register the device and perform the DLC process if your Virtual Account has no license deposited.

**DLC successful but license missing in Virtual Account**

The DLC operation is successful but licenses are missing in the Virtual Account.

**Possible Cause**

The license could be in an "Out of Compliance" mode wherein you cannot use the corresponding features due to license unavailability.

Only those licenses seen when you execute the `show platform software license dlc` command are eligible for conversion. If a particular license is missing in the DLC path, that license cannot be converted. The license continues to be in the OOC or Out of Compliance mode.

**Recommended Solution**

You must manually deposit the licenses in your Virtual Account.

**Invalid PAK file error during DLC**

During DLC operation, you see an invalid PAK file error.

**Sample Syslogs**

Oct 23 00:06:24.234: CSL: pid = ISR4451-X/K9, sn = FOC17221WLK^M

Oct 23 00:06:24.238: CSL: pid = ISR4451-X/K9, sn = FOC17221WLK^M

Oct 23 00:06:25.827: %SMART_LIC-3-CONVERT_FAILED: PID:ISR4451-X/K9,SN:FOC17221WLK
License conversion failed: Invalid License File^M

**Recommended Solution**

You must manually deposit the licenses in your Virtual Account.

**HTTP Communication Failures**

If you see HTTP Communication failure errors, verify whether:

- The HTTP server configuration on the switch is correct. To verify this, execute the `show run | s http` command.
- The Call Home address or URL is correct. To verify this, execute the `show call-home profile all` command.
- The HTTP using ping tools.cisco.com or the nnslookup translated IP.
• The HTTP client source interface is correct.
• The DNS/IP in the Call Home profile is correct.
• The ip route is pointing to the right route.
• The TCP443 is not blocked anywhere in the path.

Troubleshoot Specific License Reservation

This section describes the steps to troubleshoot issues when configuring Specific License Reservation.

Reservation install file failed: Bad input parameter

When you register the device using the `license smart reservation install` command, a bad input parameter error is displayed.

Sample Syslogs

c#license smart reservation install file bootflash:auth1.txt
%Error opening bootflash:auth1.txt (Permission denied)Reservation install file failed: Bad input parameter

Recommended Solution

Verify that the file containing the authorization code is loaded on the device flash.

Invalid Return Code

When entering the Reservation Return Code on the CSSM portal, the following error is displayed:

The Reservation Return Code you entered is not valid. Ensure that you have entered the entire code.

Recommended Solution

Verify that you have entered the correct Reservation Return Code and that there is no extra character or space in the code. After you have verified the code, try again.
Invalid Return Code
### Known Caveats

**Table 2: Known Caveats in Smart Licensing (Release 16.11.1a)**

<table>
<thead>
<tr>
<th>Bug ID</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSCvo48002</td>
<td>Licenses in Eval Expired state coming up in Eval state after reload without doing a write mem.</td>
</tr>
<tr>
<td>CSCvo48377</td>
<td>16.11: HSEC license shown 'NOT IN USE' after upgrade from 16.9</td>
</tr>
<tr>
<td>CSCvo74870</td>
<td>Need to revert the soft enforcement for MACSEC licenses in SLR mode</td>
</tr>
<tr>
<td>CSCvm90638</td>
<td>SLR 1001-X licenses offered also provide 1002-X and non-supported throughput.</td>
</tr>
<tr>
<td>CSCvn87329</td>
<td>MACSEC License counts incorrect after SSO in SLR mode</td>
</tr>
<tr>
<td>CSCvo64618</td>
<td>Syslog appear when UUT is in registered in CSSM Portal</td>
</tr>
</tbody>
</table>

**Table 3: Known Caveats in Smart Licensing (Release 16.10.1a)**

<table>
<thead>
<tr>
<th>Bug ID</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSCvn15214</td>
<td>Device registered to CSSM losing the registration on upgrade from 16.06.04 CCO SL-mode to 16.10.01a SL-only.</td>
</tr>
<tr>
<td>CSCvm63242</td>
<td>IOS_LICENSE_IMAGE_APPLICATION-3-FAILED: license request failed logs on upgrading to 16.10.1a image.</td>
</tr>
<tr>
<td>CSCvm81231</td>
<td>DLC status seen as Complete in show plat sw lic dle inspite of DLC conversion failure on the device.</td>
</tr>
<tr>
<td>CSCvn22505</td>
<td>Device registration to Satellite 5.0.1 failing with reason “failure to send HTTP msgs”.</td>
</tr>
<tr>
<td>Bug ID</td>
<td>Summary</td>
</tr>
<tr>
<td>-----------</td>
<td>-------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>CSCvn17114</td>
<td>ASR1K: Unable to retrieve the information error on standby RP with ISSU downgrade.</td>
</tr>
<tr>
<td>CSCvm77949</td>
<td>Port Licenses are always shown as EVAL RTU though installed from PAK on ASR1001-HX</td>
</tr>
<tr>
<td>CSCvm88430</td>
<td>HSECk9 license which was in Authstate is available to use even after the device is deregistered</td>
</tr>
<tr>
<td>CSCvn21716</td>
<td>ASR : SW Redundancy and Firewall coming in DLC Path in SL Only mode</td>
</tr>
<tr>
<td>CSCvm65937</td>
<td>Licenses go to OOC and then later gets authorized even when tags are available in VA</td>
</tr>
<tr>
<td>CSCvn33180</td>
<td>Port Licenses are shown as PaperLicense undershow platform software license dlc output in 16.10.1a image</td>
</tr>
<tr>
<td>CSCvn01251</td>
<td>SL to SL-only path: Router hangs when downgrading from 16.10 to 16.6.4 CCO image</td>
</tr>
</tbody>
</table>
Additional References

The following are certain useful references related to Smart Licensing:

- Overview of Smart Accounts - Introduction
- Overview of Smart Software Manager Satellite
- The Cisco Software Download page from which you can download router software
- Cisco Smart Software Manager portal
- Installing Cisco 1000v and ISRv Licenses