

What Is Smart Licensing?

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

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

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

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

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Benefits of Smart Licensing

- Visibility into devices and software that you have purchased and deployed
- Product simplicity with standard software offers, licensing platform, and policies

- Better and educated purchase decisions that could lead to lower operational costs
- Easier deployment with automatic license activation that negates the use of product activation keys

Create a Cisco Smart Account

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

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

Prerequisites

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

- You have a smart account, and access to the Cisco Smart Software Manager portal. To create and access a smart account, go to Smart Accounts. Click **Get a Smart Account**, to get started.
- You have registered your device in CSSM. To register your device, see the Generating a New Token from Cisco Smart Software Manager, on page 7 and Registering Device using the id Token, on page 8 section.
- You have configured the Layer 3 connectivity to the CSSM Smart Software Manager satellite.

Cisco Smart Software Manager

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

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

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

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

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

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

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

Possible reasons for failure include:

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

Recommended Action:

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

Licenses, Product Instances, and Registration Tokens

Licenses

Cisco offers two primary licensing models: perpetual and subscription.

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

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

All product licenses reside in a virtual account.

Product Instances

A product instance is an individual device with a unique device identifier (UDI) that is registered using a product instance registration token (or registration token). You can register any number of instances of a product with a single registration token. Each product instance can have one or more licenses residing in the same virtual account. Product instances must periodically connect to the Cisco Smart Software Manager

servers during a specific renewal period. If a product instance fails to connect, it is marked as having a license shortage, but continues to use the license. If you remove the product instance, its licenses are released and made available within the virtual account.

Product Instance Registration Tokens

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

Virtual Accounts

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

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

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

Compliance reporting

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

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

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

Restrictions for Smart Licensing

- Specific License Reservation (SLR) is not supported on the router in releases prior to Cisco IOS XE Cupertino 17.8.1 Release.
- Starting with Cisco IOS XE Amsterdam 17.3.1, bulk port license is not requested explicitly from the Smart Licensing server by IOS XE software. Instead, equivalent Port Upgrade Licenses are consumed.

- The **debug smart license** command is not supported. Use the **license smart log verbose** command to collect smart agent logs.
- Starting with Cisco IOS XE Cupertino 17.10.1, debug license command is not supported. Use the **set platform software trace** command to collect the logs.

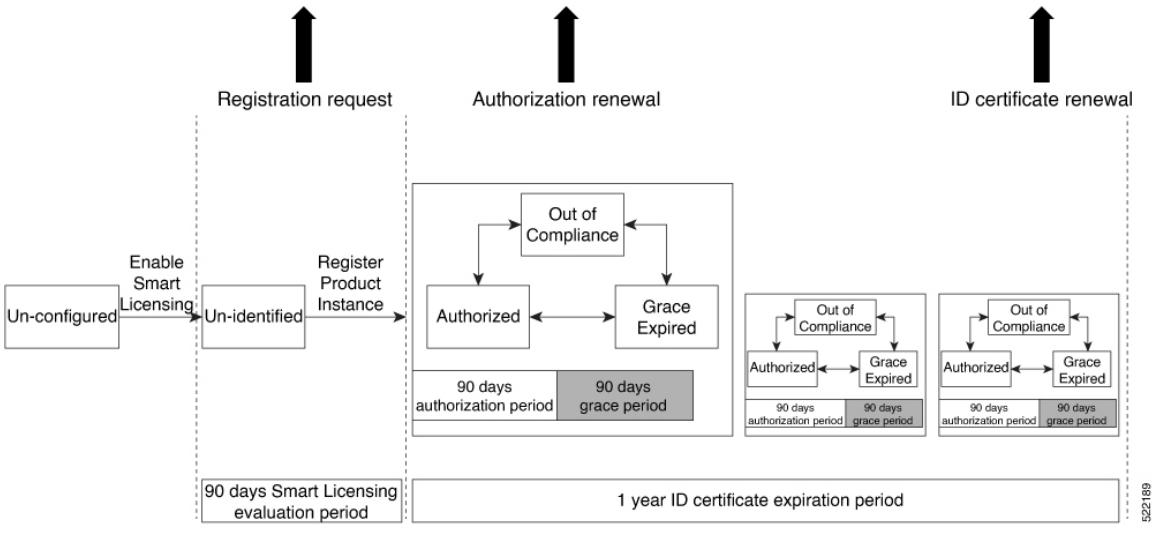
```
Router# set platform software trace ios R1 uea-sl ?
  debug      Debug messages
  emergency  Emergency possible message
  error      Error messages
  info       Informational messages
  noise      Maximum possible message
  notice     Notice messages
  verbose    Verbose debug messages
  warning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

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

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

Smart Licensing Workflow

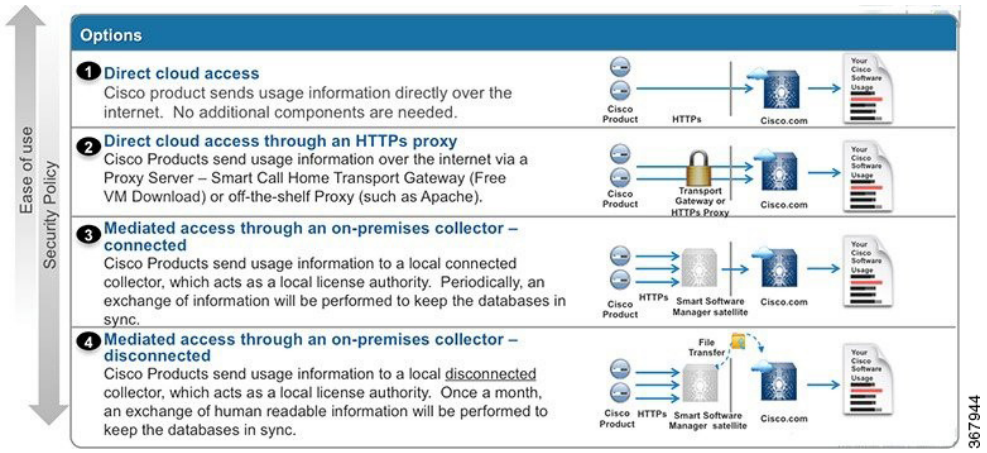
The Smart Licensing workflow is depicted in this flowchart.



Deployment Options for Smart Licensing

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

Figure 1: Smart Licensing Deployment Options



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

Smart Licensing for New Depolyments

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

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

3. Configure Smart Call Home. To view the detailed steps for configuring Call Home, see Configure Smart Call Home, on page 7.

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

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

4. Enable Smart Licensing. See Enable and Register Smart Licensing, on page 11
5. Generate a token ID from the CSSM portal. To know how to perform this step, see the Generating a New Token from Cisco Smart Software Manager, on page 7 section.
6. Register the device on the portal using the token. To know how to perform this step, see the Registering Device using the id Token, on page 8 section.

Configure Smart Call Home

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

If Smart Call Home is disabled, enable the following:

1. Configure terminal
2. Service call-home

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

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

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

Generating a New Token from Cisco Smart Software Manager

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

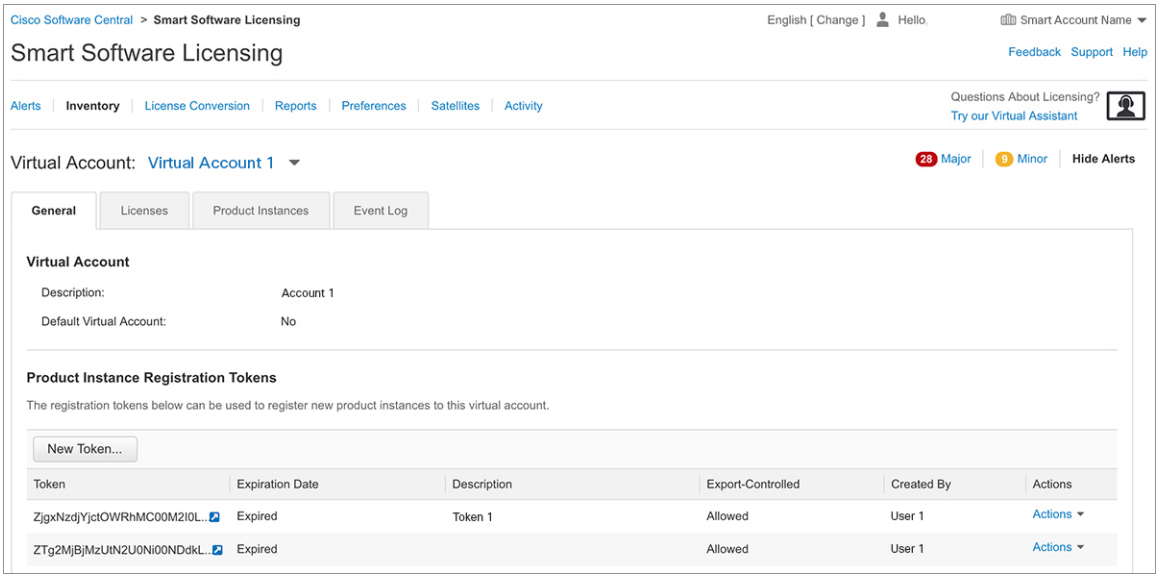
Procedure

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

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

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

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



The system displays the Create Registration Token page.

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

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

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

Registering Device using the id Token

Procedure

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

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

Example:

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

What to do next

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

Registering Smart Licensing on the Mangement Interface

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

Procedure

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

Example:

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

Step 2 Configure the IP routes on management interface.

Example:

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

Step 3 Configure DNS server IP address and name server.

Example:

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

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

Example:

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

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

What to do next

Enable Smart Licensing

Registering Smart Licensing Using Network Port

Before you begin

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

Procedure

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

Example:

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

Step 2 Configure the IP routes on network.

Example:

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

Step 3 Configure DNS server IP address and name server.

Example:

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

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

Example:

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

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

What to do next

Enable Smart Licensing

Enable and Register Smart Licensing

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

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

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

Before you begin

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

Procedure

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

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

Note
This token is valid for 30 days.

Step 2 **license smart enable**

Example:

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

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

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

- Default (license free) ports—Reload the router.

- Licensed ports—Perform no shutdown of router followed by reload.

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

Step 3 **license feature** { *atm* | *gnss* | *ipsec* | *port* | *ptp* | *upoe* }

Example:

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

Enables different feature level licences available.

Note
Feature level license supported depends on the router variant.

For more information see, Licensing the OC-3 and OC-12 Interface Modules and Licensing on 1-Port OC-192 or 8-Port Low Rate CEM Interface Module

Step 4 **license smart register idtoken** *token_ID*

Example:

```
Device# license smart register idtoken
NmE1Yzg0OWMtYmJ4

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

Enables to register your device.

What to do next

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

Verify Smart Licensing Configuration

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

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

Procedure

Step 1 **show license status**

Example:

```
Device#show license status
```

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

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

Example:

```
Smart Licensing is ENABLED

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

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

Step 2 **show license all**

Example:

```
Device#show license all
```

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

Step 3 **show license tech support**

Displays the output of the license commands.

Example:

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

Smart Licensing is ENABLED

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

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

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

Step 4 **show license usage**

Displays the license usage information.

Example:

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

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

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

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

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

```
Device GNSS (gnss):
  Description: Device GNSS
  Count: 1
  Version: 1.0
  Status: AUTHORIZED

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

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

Step 5 **show license summary**

Displays the summary of all active licenses.

Example:

```
Smart Licensing is ENABLED

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

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

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

Renew Smart Licensing Registration

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

Before you begin

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

- Smart licensing is enabled.
- The device is registered.

Procedure

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

Example:

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

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

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

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

De-register Smart Licensing

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

Procedure

license smart deregister

Example:

```
Device# license smart deregister

license smart deregister: Success

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

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

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

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

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

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

Upgrading to Default Smart Licensing

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

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

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

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

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

- Smart Licensing Mode—If the router is already operating in Smart Licensing mode, there's no difference with respect to license operations after a release upgrade. Licenses are used as the corresponding configurations are applied. If you're using Smart licensing, and opt to upgrade to the latest release with Smart Licensing see.Upgrading the Router Operating in Smart Licensing mode, on page 19

Similarly, there's no difference with respect to licenses operations when downgrading the release on a router with Smart Licensing. See Downgrading the Router operating in Default Smart Licensing mode to Smart Licensing, on page 20.

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

- No-License Mode—If you're operating with a traditional license, on upgrading to Cisco IOS XE Cupertino 17.7.1 release or later, your license automatically converts to No-License mode. See Upgrading the Router with Traditional License to No-License, on page 21

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

- Cisco IOS XE Cupertino 17.7.1

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

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

However, if you choose to downgrade from No-License mode to Traditional License mode, the router retains only features with available licenses. If you are in No-License Mode, and want to move to traditional license see, Downgrading the Router from No-license mode to Traditional Licensing , on page 21

Switching between license modes is possible on the router. For more information see, Switching License Modes, on page 18

Switching License Modes

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

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

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

  Configure **no license smart enable** command.

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

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

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

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

The router operates in No License Mode.

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

  Configure **license smart enable** command.

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

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

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

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

Router#sh license summary
Smart Licensing is ENABLED

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

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

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

The router operates in Smart Licensing mode.

Upgrading the Router Operating in Smart Licensing mode

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

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

```
Router# show version
Cisco IOS XE Software, Version 17.03.04
!
License Level: metroaggrservices
```

```
License Type: Smart License
Next reload license Level: metroaggrservices
!
Smart Licensing Status: UNREGISTERED/EVAL MODE
!
```

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

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

The router continues to operate in Smart License mode.

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

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

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

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

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

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

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

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

```
Router# show version

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

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

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

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

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

```
Router# show license summary

Smart Licensing is ENABLED
```

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

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

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

Upgrading the Router with Traditional License to No-License

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

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

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

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

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

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

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

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

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

Downgrading the Router from No-license mode to Traditional Licensing

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

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

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

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

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



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

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

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

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

Recording Snapshot of Licenses

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

There are three types of license boot levels available:

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

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

Table 1: Feature History

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

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

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

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

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

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

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

   This example shows the snapshot information.

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

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

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

- Example: Router in No-license mode:

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

- Example: Router in Smart Licensing mode:

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

Registration:
  Status: UNREGISTERED
```

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

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

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

Table 2: Feature History

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

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

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

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

Table 3: License Support Matrix

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