



What is Smart Licensing?

Smart Licensing is a cloud-based, flexible software licensing model that enables you to activate and manage Cisco software licenses across their organization. Smart Licensing solution allows you to easily track the status of your license and software usage trends. Cisco Smart Licensing establishes a pool of licenses or entitlements that can be used across the entire organization in a flexible and automated manner. Smart Licensing helps simplify four core functions:

- **Purchase**—Creates a Smart Account (and optionally, your Virtual Account). Licenses are added to your Smart Account and are immediately available for use.
 - **Install**—Register your product with your Smart Account using an account-based Registration Token. Thereafter, the entire process is automatic. Product Activation Keys (PAKs) and license files are no longer needed.
 - **Management**—Make changes to license consumption by updating your configuration; any license change is automatically reflected in your Smart Account. You can share licenses in your Virtual Account through the license pooling option. License pools (logical grouping of licenses) can reflect your organization structure. Smart Licensing solution also offers Cisco Smart Software Manager, a centralized portal that enables you to manage all your Cisco software licenses from one centralized website.
 - **Visibility and Asset Management**—Cisco Smart Software Manager (CSSM) portal offers an integrated view of the licenses you own and have deployed. You can use this data to make better purchase decisions, based on your consumption.
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What is Flexible Consumption Model?

Table 1: Feature History Table

Feature Name	Release Information	Feature Description
Support for Flexible Consumption Model on A900-IMA-8Z-L-CC	Release 7.9.1	Support for Flexible Consumption Model (FCM) is now extended to the following Interface Module: <ul style="list-style-type: none"> • A900-IMA-8Z-L-CC-ASR 900 8 X 10GE Interface Module, Lite, Conformal Coated
Support for Flexible Consumption Model on <ul style="list-style-type: none"> • N560-IMA8Q • N560-IMA2C-DD • A900-IMA8Z 	Release 7.4.1	Support for Flexible Consumption Model (FCM) is now extended to the following interface modules supported on the Cisco routers: <ul style="list-style-type: none"> • N560-IMA8Q • N560-IMA2C-DD • A900-IMA8Z
Essential and Advantage smart licenses in a combined entitlement	Release 7.4.1	With this release, the Advanced licenses are now referred to as the Advantage licenses, without essential entitlement. Also, a new license model – Advantage with Essentials, has been introduced that contains both Essential and Advantage licenses as a combined entitlement in a single PID. This simplifies the license procurement and management effort by eliminating the need to procure separate PIDs for Essential and Advantage licenses.

The Flexible Consumption Model (FCM) provides the capability and flexibility to purchase software capacity as needed. FCM delivers the following:

- Pay-as-you-grow—Enables you to lower initial costs and add more capacity over time.
- Simplify operations—FCM delivers the carrier-class IOS-XR software feature set with two software suites, Essentials and Advantage, that simplifies license management.
- Utilize capital efficiently—License pooling enables an efficient way to share licenses across the network.



Note FCM is enabled by default for Cisco IOS XR Release 7.1.2 and later.

The types of licenses in this model are:

- Essential Licenses are the base licenses that are required by every active port for its operation. An example of Essential License is ESS-AC-10G-RTU-1.
- Advantage (earlier known as Advanced licenses) without essential licenses, are the licenses that are required on top of Essential Licenses for ports that use advanced features like L3VPN. An example of an advantage license is ADV-AC-10G-RTU-1.
- Advantage with Essential combination licenses are the licenses that are packaged together as a combined entitlement. Example of an advantage license with essentials is ADN-AC-100G-RTU-1.
- Tracking licenses, for example .

To enable Flexible Consumption model licensing on routers running Cisco IOS XR Releases 7.1.1 and earlier:

```
Router(config)# license smart flexible-consumption enable
Router(config)# commit
```

To verify the Flexible Consumption Model configuration:

```
Device# show running-config license smart flexible-consumption enable
```

The following table provides information about FCM licenses for Cisco NCS 560 routers:

Table 2: Flexible Consumption Licensing Model Usage Pattern

Flexible Consumption Model Licenses	Consumption Pattern
Essential Licenses: <ul style="list-style-type: none"> • ESS-AC-100G-RTU-1 Advantage Licenses: <ul style="list-style-type: none"> • ADV-AC-100G-RTU-1 	If the router has a modular chassis, the license consumption checks are performed on the chassis.
Hardware Tracking Licenses that support the chassis: <ul style="list-style-type: none"> • N560-4-SYS-TRK • N560-4-SYS-E-TRK • N560-4-SYS-CC-TRK • N560-4-SYSE-CC-TRK 	Licensing consumption is checked on every chassis.

Flexible Consumption Model Licenses	Consumption Pattern
Hardware Tracking Licenses that support components in the chassis. <ul style="list-style-type: none"> • N560-IMA2C-TRK • A900-IMA8Z-TRK • A900-IMA8CS1ZM-TRK 	Licensing consumption is checked on every chassis. For example, the N560-IMA2C-TRK license is tracked on the chassis that has this line card.

Table 3: Advantage with Essential Licenses

License Product ID	License Entitlement	License Description
ADN-AC-100G-RTU-1	1 ESS RTU Tag + 1 ADV RTU Tag	Access Advantage with Essentials SW RTU v1.0 100G
ESS-ADN-AC-100G-RT	1 ADV RTU Tag	Access Essentials to Advantage Upgrade RTU per 100G
ESS-ADN-AC100G-SST	1 ADV SIA 3 Tag	Access Essentials to Advantage Upgrade SIA 100G 1-35 month term
ESS-ADN-AC100G-S3	1 ADV SIA 3 Tag	Access Essentials to Advantage Upgrade SIA 100G 3-5 yrs
ESS-ADN-AC100G-S5	1 ADV SIA 3 Tag	Access Essentials to Advantage Upgrade SIA 100G 5-10 yrs
ADN-AC-100G-SIA-3	1 ESS SIA 3 Tag + 1 ADV SIA 3 Tag	Access Advantage with Essentials SIA 100G 3-5 year term
ADN-AC-100G-SIA-5	1 ESS SIA 3 Tag + 1 ADV SIA 3 Tag	Access Advantage with Essentials SIA 100G 5-10 year term
ADN-AC-100G-SIA-ST	1 ESS SIA 3 Tag + 1 ADV SIA 3 Tag	Access Advantage with Essentials SIA 100G 1-35 month term

Software Innovation Access

Table 4: Feature History Table

	Release Information	Feature Description
Software Innovation Access (SIA) Entitlement	Release 7.3.1	SIA license grants you access to the latest software upgrades which contain new features, bug fixes, and security enhancements for devices on your network. Also, it enables the consumption of Advantage and Essential Right-to-Use (RTU) licenses on your device, and allows portability of these RTU licenses from one device to another.

Overview

Software Innovation Access (SIA) subscription, a type of FCM licensing, provides access to the latest software upgrades and features for your network. SIA licenses enable the consumption of Right-to-Use (RTU) licenses for your devices to access software innovation and avail support for your devices throughout the term of subscription.

The benefits of SIA subscription are:

- **Access to software innovation:** SIA subscription provides access to continuous software upgrades which contain latest features, security enhancements, and bug fixes for all your devices at a network level.
- **Pooling of licenses:** SIA subscription enables Right-to-Use (RTU) licenses to be shared across your FCM network from a common license pool through the virtual account.
- **Protects your investment:** SIA subscription enables the portability of perpetual RTU licenses purchased for your current device to a next-generation router when you expand or upgrade your network.

The initial term of a SIA subscription is for a term of three years. You can renew the subscription by contacting your Cisco account representative. An equal number of SIA licenses and corresponding RTU licenses are required to enjoy the benefits, and ensure that your network is in compliance. There are two types of SIA licenses available:

- To utilize Advantage RTU licenses, you need Advantage SIA licenses.
- Essential SIA licenses are required to utilise Essential RTU on your device.

If your device is in a state of SIA Out-of-Compliance (OOC) the benefits cease.

SIA Out-of-compliance (OOC) state

When your device is in a SIA Out-of-compliance state, support for major software version upgrades in your network devices are restricted. However, you can continue to perform minor updates, SMU installations, and RPM installations, and continue to utilize the RTU licenses without support for porting.

A device can get into a SIA Out-of-compliance (OOC) state in the following instances:

- The SIA License *EVAL* period of 90 days has expired.
- The number of SIA licenses consumed has exceeded the number of SIA licenses purchased. This can also occur when the RTU licenses consumed is higher than the number of SIA licenses purchased.
- The term of the SIA license has expired and you haven't renewed the subscription.
- The license authorization status is:
 - Not Authorized: The license authorization code installed doesn't contain sufficient counts for the request. This can occur when you attempt to use more licenses than the licenses available in your Virtual Account.
 - Authorization expired: The device hasn't been able to connect to CSSM for an extended period, due to which the authorization status couldn't be verified.



Note The CSSM smart license hierarchy applies to the Right-to-Use (RTU) license only. Therefore, if there is an insufficient RTU 100G license, CSSM can convert the RTU 400G license into four RTU 100G licenses. This is not applicable for SIA license.

In order to bring your device to In-Compliance state, perform one of the following steps:

- Register your device with CSSM if the SIA license *EVAL* period has expired.
- If the SIA license has expired or the number of SIA licenses consumed is more than the number of SIA licenses purchased, contact your Cisco Account Representative to purchase or renew the required licenses.
- If the authorization code has insufficient counts for the request, generate the code with sufficient counts.
- If the authorization has expired, connect the device with CSSM.

When the device enters an OOC state, a grace period of 90 days (cumulative of all the previous occurrences) begins. During this period, SIA license benefits can still be availed. The system attempts to renew the authorization period by connecting with the CSSM during the grace period, or even after the grace period has expired. If an attempt isn't successful, it remains in an OOC state. If the attempt is successful, a new authorization period begins and the device is In-Compliance.

Verification

To verify the device compliance status, use the **show license platform summary** command:

Examples

Status: In-Compliance

```
Router# show license platform summary
Mon Jan 25 20:52:35.954 UTC
Collection: LAST: Mon Jan 25 2021 21:30:42 UTC
            NEXT: Mon Jan 25 2021 21:31:42 UTC
Reporting:  LAST: Mon Jan 25 2021 21:30:42 UTC
            NEXT: Mon Jan 25 2021 21:31:42 UTC
SIA Status: In Compliance
```

Feature/Area	Entitlement	Count
		Last Next

```

=====
FCM          Total A900-IMA8CS1Z-M LCs in the system          1    0
FCM          Total A900-IMA8Z LCs in the system              2    0
FCM          NCS560-4 Base Hardware Tracking PID             1    0
    
```

Status: Out-of-Compliance (Grace Period Remaining)

```

Router# show license platform summary
Mon Jan 25 20:52:35.954 UTC
Collection: LAST: Mon Jan 25 2021 20:51:51 UTC
            NEXT: Mon Jan 25 2021 20:52:51 UTC
Reporting:  LAST: Mon Jan 25 2021 20:51:51 UTC
            NEXT: Mon Jan 25 2021 20:52:51 UTC
*****IMPORTANT*****
SIA Status: Out of Compliance(Remaining Grace Period: 90 days, 0 hours)
            SIA license(s) status is Not Authorized.
            SW Upgrade will still be allowed as SIA Grace Period is remaining
*****
    
```

Feature/Area	Entitlement	Count	
		Last	Next
FCM	Total A900-IMA8CS1Z-M LCs in the system	1	0
FCM	Total A900-IMA8Z LCs in the system	2	0

Status: Out-of-Compliance (Grace Period expired and upgrades are blocked)

```

Router# show license platform summary
Mon Jan 25 20:52:35.954 UTC
Collection: LAST: Mon Jan 25 2021 21:51:51 UTC
            NEXT: Mon Jan 25 2021 21:52:51 UTC
Reporting:  LAST: Mon Jan 25 2021 21:51:51 UTC
            NEXT: Mon Jan 25 2021 21:52:51 UTC
*****IMPORTANT*****
SIA Status: Out of Compliance(Grace Period Expired)
            SW Upgrades are blocked as SIA license(s) are in "Not Authorized" state
*****
    
```

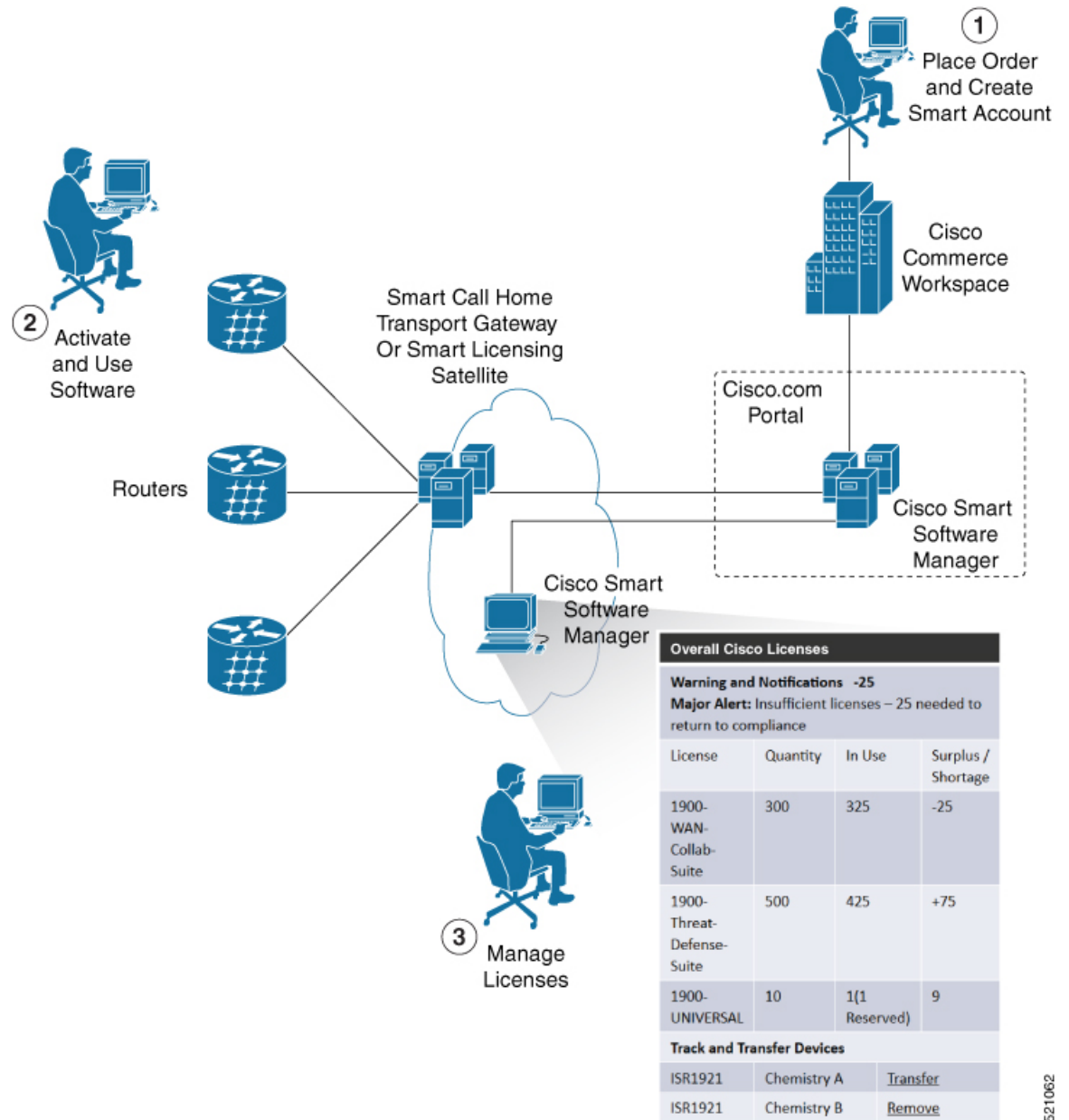
Feature/Area	Entitlement	Count	
		Last	Next
FCM	Total A900-IMA8CS1Z-M LCs in the system	1	0
FCM	Total A900-IMA8Z LCs in the system	2	0

How Does Smart Licensing Work?

Table 5: Feature History Table

Feature Name	Release Information	Feature Description
Smart Transport Support	Release 7.4.1	<p>You can now use Smart transport to communicate with CSSM. Smart transport is a transport method where a Smart Licensing (JSON) message is contained within an HTTPs message, and exchanged between a product instance and CSSM, to communicate. The following Smart transport configuration options are available:</p> <ul style="list-style-type: none"> • Smart transport: In this method, a product instance uses a specific Smart transport licensing server URL. This must be configured exactly as shown in the workflow section. • Smart transport through an HTTPs proxy: In this method, a product instance uses a proxy server to communicate with the licensing server, and eventually, CSSM.

Figure 1: Smart Licensing - Workflow



1. Place Order and Create Smart Account—You must have a Smart Account to set up Smart Licensing.
 - a. Go to <https://software.cisco.com/>.
 - b. Under the **Administration** section, click **Get a Smart Account or Request Access to an Existing Smart Account**.
 - c. Verify or enter your Cisco.com profile details to complete creating a Smart Account.
2. Activate and Use Software—Register your product. For more information, see the *Registering your Router* section. You can use either of the following options to communicate with the CSSM:

- Smart Transport—The Smart Transport method is a transport method where a Smart Licensing (JSON) message is contained within a HTTPs message, and exchanged between a product instance and CSSM to communicate. The following Smart transport configuration options are available.
 - Smart Transport: In this method, a product instance uses a specific Smart transport licensing server URL. This must be configured exactly as shown in the workflow section.
 - Smart transport through an HTTPs proxy: In this method, a product instance uses a proxy server to communicate with the licensing server, and eventually, CSSM.
- Smart Call Home—The Smart Call Home feature is automatically configured. Smart Call Home is used by Smart Licensing as a medium for communication with the CSSM. You can use this feature to page a network support engineer, email a Network Operations Center, or use Cisco Smart Call Home services to generate a case with the Technical Assistance Center. The Call Home feature can deliver alert messages containing information about diagnostics and environmental faults and events. For more information on Smart Call Home feature, see the [Smart Call Home Deployment Guide](#).
- Smart Licensing CSSM On-Prem—The Smart licensing on-premise option provides an on-premises collector that can be used to consolidate and manage Smart license usage, as well as facilitate communications back to the CSSM at Cisco.com.



Note Starting Cisco IOS XR Software Release 7.10.1, name server is required to validate CN in X.509 certificate is FQDN. TLS connection to CSSM is not be established if there is no name server configured. However, you can configure **crypto ca fqdn-check ip-address allow** to bypass the name-server configuration

You need to configure **crypto ca trustpoint Trustpool vrf vrf-name** with **http client vrf vrf-name** for CSSM communication in VRF.

3. Manage Licenses—You can manage and view reports about your overall license usage in the Smart Software Manager portal.

What is 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). The Cisco Smart Software Manager allows you to:

- 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

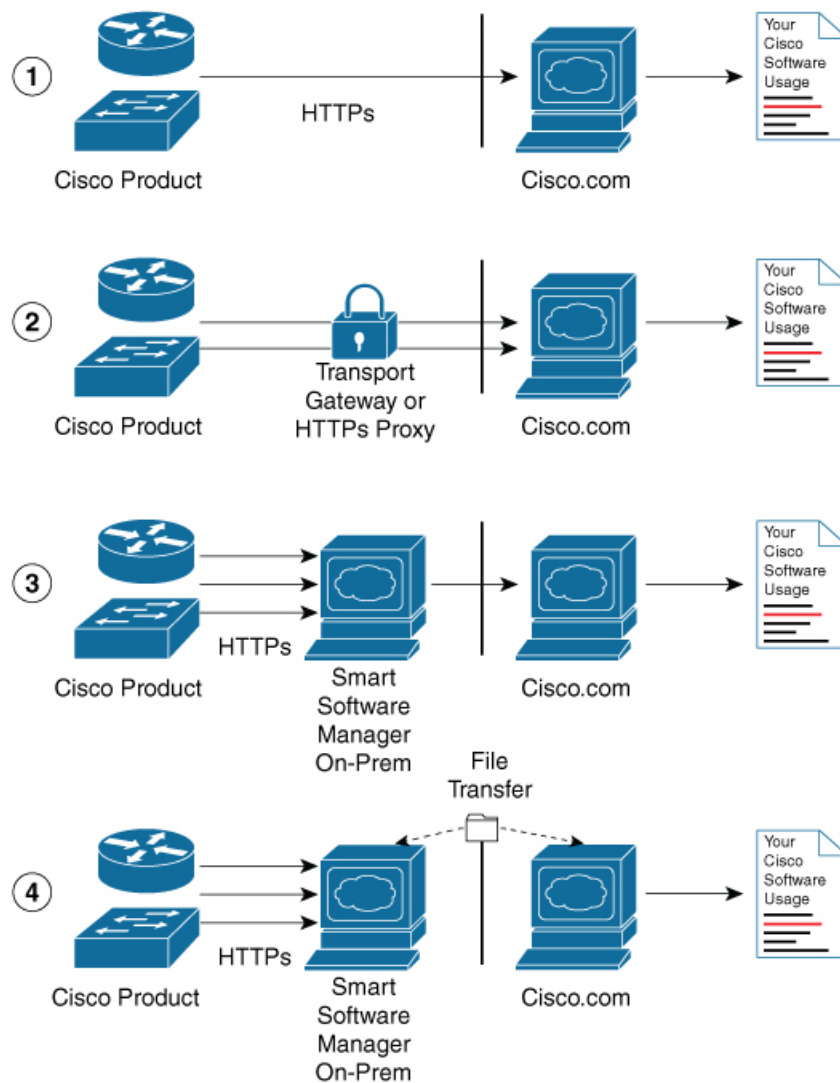
To access the Cisco Smart Software Manager:

- Go to <https://software.cisco.com>.
- Under the **License** section, click **Smart Software Licensing**.

Smart Licensing Deployment Options

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

Figure 2: Smart Licensing Deployment Options



1. Direct cloud access—In this method, Cisco products send usage information directly over the internet to CSSM on <http://www.cisco.com>; no additional components are needed for deployment.

2. Direct cloud access through an HTTPs proxy—In direct cloud access through an HTTPs proxy deployment method, Cisco products send usage information over the internet through a proxy server—either a Smart Call Home Transport Gateway or off-the-shelf Proxy (such as Apache) to CSSM on <http://www.cisco.com>.
3. Mediated access through an on-premises collector-connected—In mediated access through an on-premises collector-connected deployment method, Cisco products send usage information to a locally connected collector, which acts as a local license authority. Periodically, the information is exchanged to keep the databases in synchronization.
4. Mediated access through an on-premises collector-disconnected—In the mediated access through an on-premises collector-disconnected deployment method, Cisco products send usage information to a local disconnected collector, which acts as a local license authority. Exchange of human-readable information is performed occasionally (once a month) to keep the databases in synchronization.

Options 1 and 2 provide easy deployment options, whereas options 3 and 4 provide secure environment deployment options.



Note Smart Software On-Premise provides support for options 3 and 4.

The communication between Cisco devices and CSSM is facilitated by the Smart Call Home software.

YANG Data Models for Smart Licensing

YANG is a data modeling language that helps to create configurations, retrieve operational data and execute actions. The router acts on the data definition when these operations are requested using NETCONF RPCs. The data model handles the following types of requirements on the routers for smart licensing functionality:

Data	Data Model	CLI Commands
Configuration data: a set of writable data that is required to configure smart licensing on the router.	Native data model: Cisco-IOS-XR-smart-license-cfg.yang	<ul style="list-style-type: none"> • license smart reservation • [no] license smart reservation • license smart flexible-consumption enable • [no] license smart flexible-consumption enable
Operational state data: a set of data that the system obtains at run time.	Common data model: cisco-smart-license.yang Native data model: Cisco-IOS-XR-smart-license-platform-oper.yang Cisco-IOS-XR-infra-smartlicense-oper.yang	<ul style="list-style-type: none"> • show license platform summary • show license platform detail • show license [all summary usage udi]

Data	Data Model	CLI Commands
<p>Actions: a set of NETCONF actions that support robust networkwide configuration transactions.</p>	<p>Native data model: Cisco-IOS-XR-smart-license-act.yang</p>	<ul style="list-style-type: none"> • license smart register id token • license smart deregister • license smart renew id • license smart renew auth • license smart reservation request local • license smart reservation cancel local • license smart reservation install file <file path> • license smart reservation return local • license smart reservation return authorization file <file path> • license smart transport smart • license smart url <url> • license smart software-upgrade enable • license smart proxy hostname <hostname/ip> • license smart proxy port <port>

You can access the data models from the [Github](#) repository. To learn more about the data models and put them to use, see the *Programmability Configuration Guide*.

Configuring Smart Licensing

Prerequisites for Configuring Smart Licensing

Ensure that you have completed the following activities on Cisco Smart Software Manager:

- Set up a Cisco Smart Account. For more information, see the *How Smart Licensing Works* section in this document.
- Set up Virtual Account or accounts. For more information, see the *Virtual Accounts* section in the [Smart Software Manager Help](#).
- Create user roles in the **Users** tab in the **Manage Smart Account** page. Provide the appropriate user access rights.
- Accept the Smart Software Licensing Agreement on Cisco Smart Software Manager to register your router.
- Have a layer 3 connection set up on your router.

- Configure a valid DNS and proper time on the router to connect CSSM or CSSM On-Prem.

Setting up the Router for Smart Licensing

Table 6: Three-step Roadmap to Set up the Router for Smart Licensing

Activity	Communication Connection Options		
Step 1—Configure Communications	See the <i>Configuring a Direct Cloud Connection</i> section.	See the <i>Configuring a Connection through a HTTP Proxy</i> section.	See the <i>Connecting to CSSM On-Premise</i> section.
Step 2—Register and Activate	See the <i>Registering and Activating your Router</i> section.		
Step 3—Verify the Configuration	See the <i>Verifying your Smart Licensing Configuration</i> section.		

Configuring a Communications Connection Between the Router and Cisco Smart Software Manager

Configuring a Direct Cloud Connection

In this deployment option, the **configure call-home profile** is configured by default. Use the **show call-home profile all** command to check the profile status.

Call Home service provides email-based and web-based notification of critical system events to Cisco Smart Software Manager.

To configure and enable Call Home service:

Procedure

	Command or Action	Purpose
Step 1	configure terminal Example: Router# configure terminal	Enters global configuration mode.
Step 2	call-home Example: Router(config)# call-home	Enters Call Home configuration mode.
Step 3	service active Example: Router(config-call-home)# service active	Activates Call Home service.

	Command or Action	Purpose
Step 4	contact-email-addr <i>email-address</i> Example: <pre>Router(config-call-home)# contact-email-addr username@example.com</pre>	Assigns the provided email address. You can enter up to 200 characters in email address format. Note Spaces are not allowed in the email address.
Step 5	profile CiscoTAC-1 Example: <pre>Router(config-call-home)# profile CiscoTAC-1</pre>	Enables the CiscoTAC-1 profile to be used with the Call Home service. By default, the CiscoTAC-1 profile is disabled.
Step 6	destination transport-method http Example: <pre>Router(config-call-home-profile)# destination transport-method http</pre>	Enables the Call Home service through an HTTP connection. Note Starting Cisco IOS XR Software Release 7.10.1, name server is required to validate CN in X.509 certificate is FQDN. TLS connection to CSSM is not be established if there is no name server configured. However, you can configure crypto ca fqdn-check ip-address allow to bypass the name-server configuration You need to configure crypto ca trustpoint Trustpool vrf vrf-name with http client vrf vrf-name for CSSM communication in VRF.
Step 7	destination address http url Example: <pre>Router(config-call-home-profile)# destination address http https://tools.cisco.com/its/service/odbe/services/IDCEService</pre>	Connects the router to the Cisco Smart Software Manager.
Step 8	active Example: <pre>Router(config-call-home-profile)# active</pre>	Enables the destination profile.
Step 9	no destination transport-method email Example: <pre>Router(config-call-home-profile)# no destination transport-method email</pre>	Disables the email option for the Call Home service.
Step 10	commit Example: <pre>Router(config-call-home-profile)# commit</pre>	Commits the configuration.

	Command or Action	Purpose
Step 11	exit Example: Router(config-call-home-profile)# exit	Exits the Call Home destination profile configuration mode and returns to the Call Home configuration mode.
Step 12	exit Example: Router(config-call-home)# exit Router(config)#	Exits the Call Home configuration mode and returns to the global configuration mode.

Configuring a Connection Through an HTTP Proxy

The Call Home service can be configured through an HTTPs proxy server.

Procedure

	Command or Action	Purpose
Step 1	configure terminal Example: Router# configure terminal	Enters global configuration mode.
Step 2	call-home Example: Router(config)# call-home	Enters Call Home configuration mode.
Step 3	service active Example: Router(config-call-home)# service active	Enables the Call Home feature.
Step 4	contact-email-address <i>email-address</i> Example: Router(config-call-home)# contact-email-addr sch-smart-licensing@cisco.com	Configures the default email address.
Step 5	http-proxy <i>proxy-address</i> port <i>port-number</i> Example: Router(config-call-home)# http-proxy 198.51.100.10 port 3128	Provides the proxy server information to the Call Home service.
Step 6	profile CiscoTAC-1 Example: Router(config-call-home)# profile CiscoTAC-1	Enables the CiscoTAC-1 profile to be used with the Call Home service. By default, the CiscoTAC-1 profile is disabled.

	Command or Action	Purpose
Step 7	no destination transport-method email Example: <pre>Router(config-call-home-profile)# no destination transport-method email</pre>	Disables the email option for the Call Home service.
Step 8	exit Example: <pre>Router(config-call-home-profile)# exit Router(config-call-home)#</pre>	Exits the Call Home destination profile configuration mode and returns to the Call Home configuration mode.
Step 9	profile <i>profile-name</i> Example: <pre>Router(config-call-home)# profile test1</pre>	Enters the Call Home destination profile configuration mode for the specified destination profile name. If the specified destination profile does not exist, it is created.
Step 10	reporting smart-licensing-data Example: <pre>Router(config-call-home-profile)# reporting smart-licensing-data</pre>	Enables data sharing with the Call Home service through the configured transport method, in this case, HTTP.
Step 11	destination transport-method http Example: <pre>Router(config-call-home-profile)# destination transport-method http</pre>	Enables the HTTP message transport method.
Step 12	destination address http <i>url</i> Example: <pre>Router(config-call-home-profile)# destination address http https://tools.cisco.com/its/service/atte/services/DCEService</pre>	<p>Connects the router to the Cisco Smart Software Manager.</p> <p>Note Starting Cisco IOS XR Software Release 7.10.1, name server is required to validate CN in X.509 certificate is FQDN. TLS connection to CSSM is not be established if there is no name server configured. However, you can configure crypto ca fqdn-check ip-address allow to bypass the name-server configuration</p> <p>You need to configure crypto ca trustpoint Trustpool vrf <i>vrf-name</i> with http client vrf <i>vrf-name</i> for CSSM communication in VRF.</p>
Step 13	active Example: <pre>Router(config-call-home-profile)# active</pre>	Enables the destination profile.

	Command or Action	Purpose
Step 14	exit Example: Router(config-call-home-profile)# exit	Exits the Call Home destination profile configuration mode and returns to the Call Home configuration mode.
Step 15	exit Example: Router(config-call-home)# exit Router(config)#	Exits the Call Home configuration mode and returns to the global configuration mode.
Step 16	commit Example: Router(config)# commit	Commits the configuration.

Connecting to CSSM On-Premise

This section describes how to configure the Call Home service for on-premise smart software through connected or disconnected mode.

Procedure

	Command or Action	Purpose
Step 1	configure terminal Example: Router# configure terminal	Enters global configuration mode.
Step 2	call-home Example: Router(config)# call-home	Enters Call Home configuration mode.
Step 3	profile <i>profile-name</i> Example: Router(config-call-home)# profile test1	Enters the Call Home destination profile configuration mode for the specified destination profile name. If the specified destination profile does not exist, it is created.
Step 4	reporting smart-licensing-data Example: Router(config-call-home-profile)# reporting smart-licensing-data	Enables data sharing with the Call Home service through the configured transport method, in this case, HTTP.
Step 5	destination transport-method http Example: Router(config-call-home-profile)# destination transport-method http	Enables the HTTP message transport method.
Step 6	destination address http <i>url</i> Example:	Configures the destination URL (CSSM) to which Call Home messages are sent. Ensure

	Command or Action	Purpose
	<pre>Router(config-call-home-profile) # destination address http http://209.165.201.15/Transportgateway/services/DeviceRequestHandler Or Router(config-call-home-profile) # destination address http https://209.165.201.15/Transportgateway/services/DeviceRequestHandler</pre>	<p>the IP address or the fully qualified domain name (FQDN) in the destination URL matches the IP address or the FQDN as configured for the Host Name on the CSSM On-Prem.</p> <p>Note Starting Cisco IOS XR Software Release 7.10.1, name server is required to validate CN in X.509 certificate is FQDN. TLS connection to CSSM is not be established if there is no name server configured. However, you can configure crypto ca fqdn-check ip-address allow to bypass the name-server configuration</p> <p>You need to configure crypto ca trustpoint Trustpool vrf vrf-name with http client vrf vrf-name for CSSM communication in VRF.</p>
Step 7	<p>no destination address http url</p> <p>Example:</p> <pre>Router(config-call-home-profile) # no destination address http https://tools.cisco.com/its/service/aita/services/IDEService</pre>	Removes the default destination address.
Step 8	<p>destination preferred-msg-format {long-text short-text xml}</p> <p>Example:</p> <pre>Router(config-call-home-profile) # destination preferred-msg-format xml</pre>	(Optional) Configures a preferred message format. The default message format is XML.
Step 9	<p>active</p> <p>Example:</p> <pre>Router(config-call-home-profile) # active</pre>	Enables the destination profile.
Step 10	<p>exit</p> <p>Example:</p> <pre>Router(config-call-home-profile) # exit</pre>	Exits the Call Home destination profile configuration mode and returns to the Call Home configuration mode.
Step 11	<p>exit</p> <p>Example:</p> <pre>Router(config-call-home) # exit Router(config) #</pre>	Exits the Call Home configuration mode and returns to the global configuration mode.
Step 12	<p>http client source-interface ip-version interface-type interface-number</p>	Configures a source interface for the HTTP client.

	Command or Action	Purpose
	Example: <pre>Router(config)# http client source-interface ipv4 Vlan100</pre>	Note This command is mandatory for a VRF interface.
Step 13	crypto ca trustpool policy crl optional Example: <pre>Router(config)# crypto ca trustpool policy crl optional</pre>	(Optional) Bypasses the Certificate Revocation Lists (CRLs) check and establishes the connection. By default, the CRLs check is mandatory while establishing a TLS connection. We recommend this step when the smart licensing-enabled router is within a network and can rely on the License server to check the certificate status without retrieving and caching each CRL for every peer.
Step 14	commit Example: <pre>Router(config)# commit</pre>	Commits the configuration.
Step 15	end Example: <pre>Router(config)# end</pre>	Returns to the global configuration mode.

Installing CSSM On-Premise

For information on installation instructions, see the [Smart Software Manager On-Prem Installation Guide](#).

Registering and Activating Your Router

Product registration securely associates a device with the Smart Account and the Virtual Account of your choice. It also establishes trust between the end product and the CSSM. Tokens are used to register a product with the appropriate Virtual Account on CSSM Cloud (on Cisco.com) or CSSM On-Premise.



Note When the router is in an unregistered state, the licenses are in EVAL (evaluation) mode. Evaluation period will last for 90 days.

A Registration Token:

- Can be either used once or reused multiple times. You can set a limit to the number of times a token can be reused when you create the token.
- Can be created and revoked at any time.
- Expires after a period of time (default is 30 days; minimum is one day; maximum is 365 days)

A Registration Token is not:

- Product specific: The same Registration Token can be used on different product types.

- A license, key, or PAK.
- Stored on the Cisco device and they are not persistent.
- Required after the product is registered. Token expiration has no effect on previously registered products; it simply means that that token can no longer be used to register a new product.

Generating a New Token from CSSM

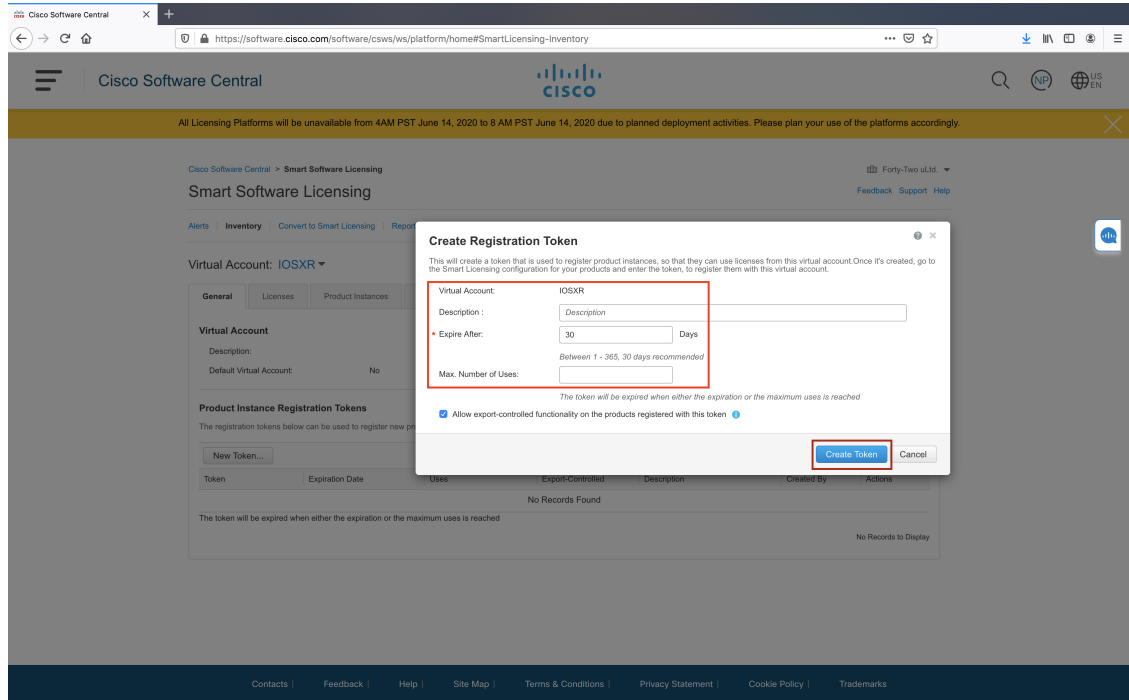
Procedure

- Step 1** If you choose the direct cloud access deployment option, log in to CSSM from <https://software.cisco.com/#>. If you chose the mediated access deployment option, log in to CSSM On-Prem from <https://<on-prem-ip-address>:8443>.
- Step 2** Select the **Inventory** tab.
- Step 3** From the Virtual Account drop-down list, choose the virtual account to which you want to register your product.
- Step 4** Select the **General** tab.
- Step 5** Click **New Token**.

The **Create Registration Token** window is displayed.

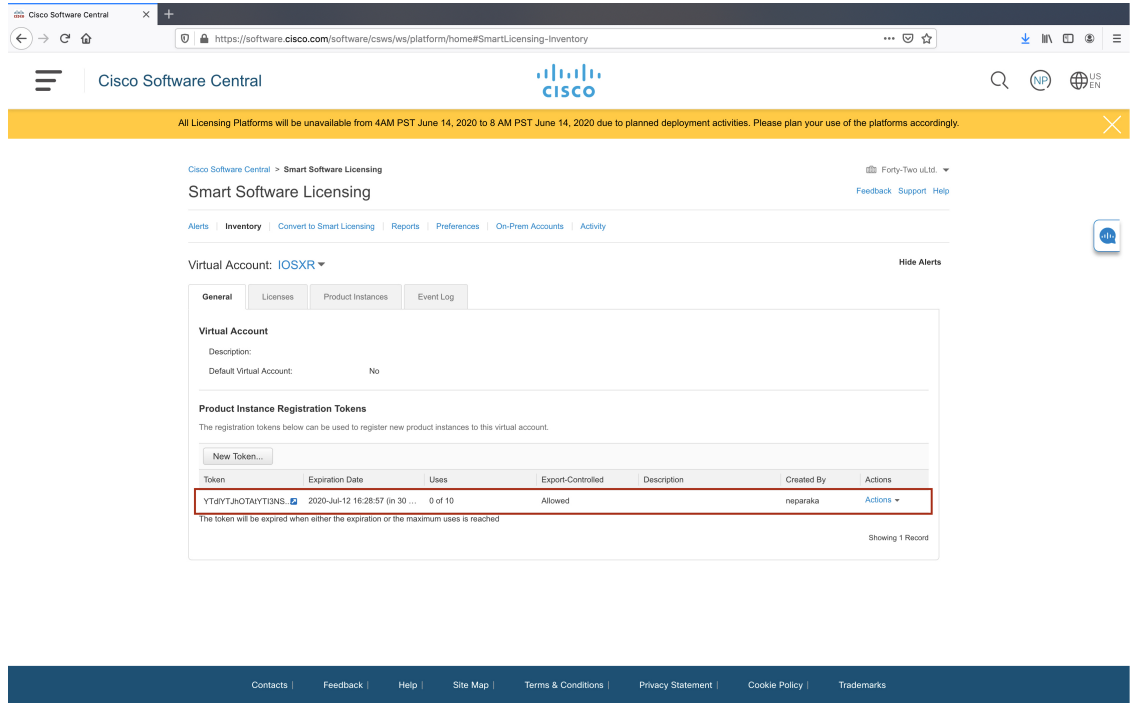
- Step 6** In the **Description** field, enter the token description.
In the **Expire After** field, enter the number of days the token must be active. The default value is 30 days.

In the **Max. Number of Uses** field, enter the maximum number of uses allowed after which the token expires. Select the **Allow export-controlled functionality on the products registered with this token** checkbox to ensure Cisco compliance with US and country-specific export policies and guidelines. For more information, see <https://www.cisco.com/c/en/us/about/legal/global-export-trade.html>.

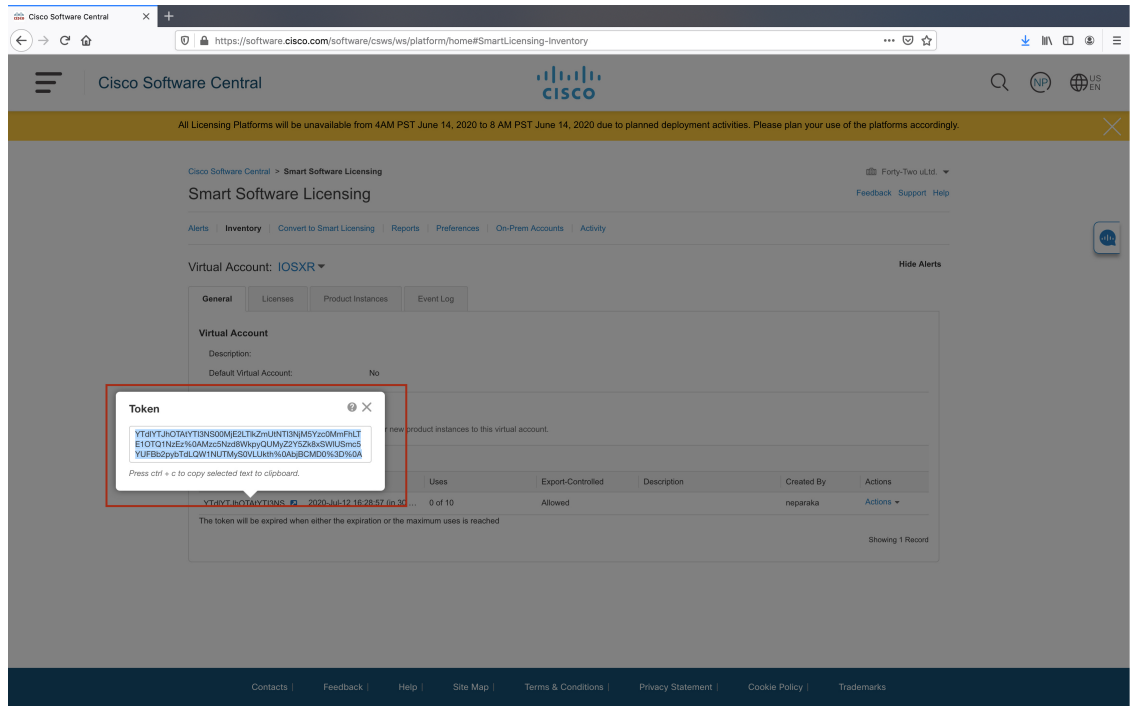


Click **Create Token**.

Step 7 After the token is created, select and copy the token to a text file.



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You need this token to register your router.

What to do next

See the *Registering Your Device With the Token* section.

Registering Your Device With the Token

Procedure

	Command or Action	Purpose
Step 1	license smart register idtoken <i>token-ID</i> Example: <pre>license smart register idtoken \$Tl4UytrNXBzbEslck8veUtWag5abnZJOfdDa1FwbVRa%0Ab1RMbz0%3D%0A</pre>	Registers Smart Licensing on the router using the registration token created in the CSSM. On successful registration, the product instance is created in the CSSM virtual account and its license usage is displayed on the CSSM.

Example**Register Device Using YANG Data Model**

As an alternative to the CLI command, the `Cisco-IOS-XR-smart-license-act` YANG data model can also be used to register your device with CSSM On-prem server. The following example shows the NETCONF RPC request:

```
<rpc xmlns="urn:iETF:params:xml:ns:netconf:base:1.0" message-id="101">
  <register-id-token xmlns="http://cisco.com/ns/yang/Cisco-IOS-XR-smart-license-act">
    <id-token>$Tl4UytrNXBzbEslck8veUtWag5abnZJOfdDa1FwbVRa%0Ab1RMbz0%3D%0A</id-token>
  </register-id-token>
</rpc>
```

Renewing Your Smart Licensing Registration

Your registration is automatically renewed every six months. To find the status of the license, use the **license smart renew auth** command.

As long as the license is in an 'Authorized' or 'Out-of-compliance' (OOC) state, 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 to renew the authorization period. If a retry is successful, a new authorization period starts.



Note If the smart license renewal fails, then the product instance goes to an unidentified state and starts consuming the evaluation period.

Before you begin

Ensure that the following conditions are met to renew your smart license:

- Smart licensing is enabled.

- The router is registered.

Procedure

	Command or Action	Purpose
Step 1	license smart renew {auth id} Example: Router# license smart renew auth	Renews your token ID or authorization with Cisco smart licensing.

Deregistering Your Router from CSSM

When a router is taken off the inventory, shipped elsewhere for redeployment, or returned to Cisco for replacement, you can deregister that router.

Before you begin

Ensure that a Layer 3 connection to CSSM is available to successfully deregister the device.

Procedure

	Command or Action	Purpose
Step 1	license smart deregister Example: Router# license smart deregister	Cancels the registration of the router and sends the router into evaluation mode. All smart licensing entitlements and certificates on the corresponding platform are removed. The product instance of the router stored on CSSM is also removed.

Verifying the Smart Licensing Configuration

Use the following **show** commands to verify the default Smart Licensing configuration. If any issue is detected, take corrective action before making further configurations.

Procedure

	Command or Action	Purpose
Step 1	show license status Example: Router# show license status	Displays the compliance status of Smart Licensing. Following are the possible status: <ul style="list-style-type: none"> • Waiting—Indicates that 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.

	Command or Action	Purpose
		<ul style="list-style-type: none"> • Authorized—Indicates that your device is able to communicate with the Cisco license manager, and is authorized to initiate requests for license entitlements. • Out-Of-Compliance—Indicates that one or more of your licenses are out-of-compliance. Buy more licenses, or renew the existing licenses. • Eval Period—Indicates that Smart Licensing is consuming the evaluation period. Register the device with the Cisco Licensing manager, else your license expires. <p>Note Repetitive 'Smart Licensing evaluation expired' warning messages are displayed on the console every hour, but there is no functionality impact on the device. To stop these repetitive messages, register the device again with new a registration token.</p> <ul style="list-style-type: none"> • Disabled—Indicates that Smart Licensing is disabled. • Invalid—Indicates that Cisco does not recognize the entitlement tag as the tag is not in the database.
Step 2	show license all Example: Router# show license all	Displays all entitlements in use. The output also displays the associated licensing certificates, compliance status, Unique Device Identifier (UDI), and other details.
Step 3	show license status Example: Router# show license status	Displays the status of all entitlements in use.
Step 4	show license udi Example: Router# show license udi	Displays the Unique Device Identifier (UDI) information.
Step 5	show license summary Example: Router# show license summary	Displays a summary of all entitlements in use.

	Command or Action	Purpose
Step 6	show license platform summary Example: Router# show license platform summary	Displays the registration status and provides detailed information about the essential, advantage without essentials, advantage with essentials, and tracking license consumption in generic or vortex license model.
Step 7	show license platform detail Example: Router# show license platform detail	Displays detailed information about: <ul style="list-style-type: none"> • Licenses that can be consumed on a platform in both, generic and vortex models • The active model, whether generic or vortex model • The current count and the next consumption count of a license
Step 8	show call-home smart-licensing statistics Example: Router# show call-home smart-licensing statistics	Displays statistics of the communication between the Smart Licensing manager and the Cisco back-end using Smart Call Home. Note If the communication fails or drops, check your call home configuration for any errors.

Smart Licensing Configuration Examples

Example: Viewing the Call Home Profile

To display the **http Call Home profile** or the **On-Prem Call Home profile**, use the **show call-home profile all** command.

```
Router# show call-home profile all
```

```
Mon Jul 6 07:12:03.728 UTC
```

```
Profile Name: CiscoTAC-1
Profile status: ACTIVE
Profile mode: Full Reporting
Reporting Data: Smart Call Home, Smart Licensing
Preferred Message Format: xml
Message Size Limit: 3145728 Bytes
Transport Method: http
HTTP address(es): https://tools.cisco.com/its/service/oddce/services/DDCEService
Other address(es): default

Periodic configuration info message is scheduled every 5 day of the month at 9 :51

Periodic inventory info message is scheduled every 5 day of the month at 9 :36

Alert-group          Severity
-----
```

Example: Viewing License Information Before Registration

```

inventory                normal
Syslog-Pattern           Severity
-----
.*                       critical

Router# show call-home profile all
Tue Jul  7 18:48:47.325 UTC

Profile Name: CiscoTAC-1
Profile status: ACTIVE
Profile mode: Full Reporting
Reporting Data: Smart Call Home, Smart Licensing
Preferred Message Format: xml
Message Size Limit: 3145728 Bytes
Transport Method: http
HTTP address(es): http://10.30.110.38/Transportgateway/services/RouterRequestHandler

Other address(es): default

Periodic configuration info message is scheduled every 5 day of the month at 9 :51

Periodic inventory info message is scheduled every 5 day of the month at 9 :36

Alert-group             Severity
-----
inventory              normal
Syslog-Pattern           Severity
-----
.*                       critical

```

Example: Viewing License Information Before Registration

To display the license entitlements, use the **show license all** command:

```

Router# show license all
Mon Jul  6 07:25:24.369 UTC

Smart Licensing Status
=====

Smart Licensing is ENABLED

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

License Authorization:
  Status: EVAL EXPIRED on Jul 31 2019 10:11:28 UTC

Export Authorization Key:
  Features Authorized:
  <none>

Utility:
  Status: DISABLED

Data Privacy:
  Sending Hostname: yes
  Callhome hostname privacy: DISABLED
  Smart Licensing hostname privacy: DISABLED
  Version privacy: DISABLED

```

```

Transport:
  Type: Callhome

License Usage
=====

(ESS-AC-100G-RTU-1):
  Description:
  Count: 1
  Version: 1.0
  Status: EVAL EXPIRED
  Export status: NOT RESTRICTED

(N560-4-SYS-E-TRK):
  Description:
  Count: 1
  Version: 1.0
  Status: EVAL EXPIRED
  Export status: NOT RESTRICTED

(A900-IMA8Z-TRK):
  Description:
  Count: 2
  Version: 1.0
  Status: EVAL EXPIRED
  Export status: NOT RESTRICTED

(A900-IMA8CS1ZM-TRK):
  Description:
  Count: 1
  Version: 1.0
  Status: EVAL EXPIRED
  Export status: NOT RESTRICTED
Product Information
=====
UDI: PID:NCS560-4,SN:FOX2305P81D

Agent Version
=====
Smart Agent for Licensing: 4.9.6_rel/41

Reservation Info
=====
License reservation: DISABLED

```

To display the license usage information, use the **show license usage** command:

```

Router# show license usage
Mon Jul  6 07:26:07.579 UTC

License Authorization:
  Status: EVAL EXPIRED on Jul 31 2019 10:11:28 UTC

(ESS-AC-100G-RTU-1):
  Description:
  Count: 1
  Version: 1.0
  Status: EVAL EXPIRED
  Export status: NOT RESTRICTED

(N560-4-SYS-E-TRK):
  Description:
  Count: 1
  Version: 1.0

```

Example: Viewing License Information Before Registration

```
Status: EVAL EXPIRED
Export status: NOT RESTRICTED
```

```
(A900-IMA8Z-TRK):
Description:
Count: 2
Version: 1.0
Status: EVAL EXPIRED
Export status: NOT RESTRICTED
```

```
(A900-IMA8CS1ZM-TRK):
Description:
Count: 1
Version: 1.0
Status: EVAL EXPIRED
Export status: NOT RESTRICTED
```

To display all the license summaries, use the **show license summary** command:

```
Router# show license summary
Mon Jul  6 07:27:23.696 UTC

Smart Licensing is ENABLED

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

License Authorization:
  Status: EVAL EXPIRED

License Usage:
  License                               Entitlement tag                               Count Status
  -----
                                     (ESS-AC-100G-RTU-1)                           1 EVAL EXPIRED
                                     (N560-4-SYS-E-TRK)                             1 EVAL EXPIRED
                                     (A900-IMA8Z-TRK)                               2 EVAL EXPIRED
                                     (A900-IMA8CS1ZM-TRK)                          1 EVAL EXPIRED
```

To display the license status information, use the **show license status** command:

```
Router# show license status
Mon Jul  6 07:28:23.414 UTC

Smart Licensing is ENABLED

Utility:
  Status: DISABLED

Data Privacy:
  Sending Hostname: yes
  Callhome hostname privacy: DISABLED
  Smart Licensing hostname privacy: DISABLED
  Version privacy: DISABLED

Transport:
  Type: Callhome

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

License Authorization:
  Status: EVAL EXPIRED on Jul 31 2019 10:11:28 UTC
```

```
Export Authorization Key:
Features Authorized:
<none>
```

Example: Registering the Router

To register a device, use the **license smart register idtoken** command:

```
Router# license smart register idtoken
Tl4UytrNXBzbEs1ck8veUtWaG5abnZJOFdDalFwbVRa%0Ab1RMbz0%3D%0A
```

Example: Viewing License Information After Registration

To display the license entitlements, use the **show license all** command

```
Router# show license all
Mon Jul  6 07:13:23.823 UTC

Smart Licensing Status
=====

Smart Licensing is ENABLED

Registration:
  Status: REGISTERED
  Smart Account: Forty-Two uLtd.
  Virtual Account: IOSXR
  Export-Controlled Functionality: ALLOWED
  Initial Registration: SUCCEEDED on Jul 01 2020 07:14:24 UTC
  Last Renewal Attempt: None
  Next Renewal Attempt: Dec 28 2020 07:14:23 UTC
  Registration Expires: Jul 01 2021 07:01:42 UTC

License Authorization:
  Status: OUT OF COMPLIANCE on Jul 01 2020 07:14:38 UTC
  Last Communication Attempt: SUCCEEDED on Jul 05 2020 19:15:51 UTC
  Next Communication Attempt: Jul 06 2020 07:15:50 UTC
  Communication Deadline: Oct 03 2020 19:10:49 UTC

Export Authorization Key:
Features Authorized:
<none>

Utility:
  Status: DISABLED

Data Privacy:
  Sending Hostname: yes
  Callhome hostname privacy: DISABLED
  Smart Licensing hostname privacy: DISABLED
  Version privacy: DISABLED

Transport:
  Type: Callhome

License Usage
=====

Access Essentials SW Right-to-Use v1.0 per 100G (ESS-AC-100G-RTU-1):
  Description: Access Essentials SW Right-to-Use v1.0 per 100G
  Count: 1
  Version: 1.0
  Status: OUT OF COMPLIANCE
```

Example: Viewing License Information After Registration

```

Export status: NOT RESTRICTED

Tracking PID for N560-4-SYS-E Vortex ATO (N560-4-SYS-E-TRK):
  Description: Tracking PID for N560-4-SYS-E Vortex ATO
  Count: 1
  Version: 1.0
  Status: AUTHORIZED
  Export status: NOT RESTRICTED

Tracking PID for ASR 900 8-port 10GE Interface Module (A900-IMA8Z-TRK):
  Description: Tracking PID for ASR 900 8-port 10GE Interface Module
  Count: 2
  Version: 1.0
  Status: AUTHORIZED
  Export status: NOT RESTRICTED

Tracking PID for ASR 900 8/16-port 1GE + 1-port 10GE Interface Module (A900-IMA8CS1ZM-TRK):
  Description: Tracking PID for ASR 900 8/16-port 1GE 1-port 10GE Interface
  Module
  Count: 1
  Version: 1.0
  Status: AUTHORIZED
  Export status: NOT RESTRICTED

Product Information
=====
UDI: PID:NCS560-4,SN:FOX2305P81D

Agent Version
=====
Smart Agent for Licensing: 4.9.6_rel/41

Reservation Info
=====
License reservation: DISABLED

To display the license usage information, use the show license usage command:

Router# show license usage
Mon Jul  6 07:14:55.554 UTC

License Authorization:
  Status: OUT OF COMPLIANCE on Jul 01 2020 07:14:38 UTC

Access Essentials SW Right-to-Use v1.0 per 100G (ESS-AC-100G-RTU-1):
  Description: Access Essentials SW Right-to-Use v1.0 per 100G
  Count: 1
  Version: 1.0
  Status: OUT OF COMPLIANCE
  Export status: NOT RESTRICTED

Tracking PID for N560-4-SYS-E Vortex ATO (N560-4-SYS-E-TRK):
  Description: Tracking PID for N560-4-SYS-E Vortex ATO
  Count: 1
  Version: 1.0
  Status: AUTHORIZED
  Export status: NOT RESTRICTED

Tracking PID for ASR 900 8-port 10GE Interface Module (A900-IMA8Z-TRK):
  Description: Tracking PID for ASR 900 8-port 10GE Interface Module
  Count: 2
  Version: 1.0
  Status: AUTHORIZED
  Export status: NOT RESTRICTED

```


Tracking PID for ASR 900 8/16-port 1GE + 1-port 10GE Interface Module (A900-IMA8CS1ZM-TRK):

```
Description: Tracking PID for ASR 900 8/16-port 1GE 1-port 10GE Interface
Module
Count: 1
Version: 1.0
Status: AUTHORIZED
Export status: NOT RESTRICTED
```

To display all the license summaries, use the **show license summary** command:

```
Router# show license summary
Mon Jul 6 07:16:30.036 UTC

Smart Licensing is ENABLED

Registration:
  Status: REGISTERED
  Smart Account: Forty-Two uLtd.
  Virtual Account: IOSXR
  Export-Controlled Functionality: ALLOWED
  Last Renewal Attempt: None
  Next Renewal Attempt: Dec 28 2020 07:14:24 UTC

License Authorization:
  Status: OUT OF COMPLIANCE
  Last Communication Attempt: SUCCEEDED
  Next Communication Attempt: Jul 06 2020 19:15:57 UTC

License Usage:
  License                               Entitlement tag                Count Status
  -----
  Access Essentials SW... (ESS-AC-100G-RTU-1)          1 OUT OF COMPLIANCE
  Tracking PID for N56... (N560-4-SYS-E-TRK)           1 AUTHORIZED
  Tracking PID for ASR... (A900-IMA8Z-TRK)             2 AUTHORIZED
  Tracking PID for ASR... (A900-IMA8CS1ZM-TRK)        1 AUTHORIZED
```

To display the license status information, use the **show license status** command:

```
Router# show license status
Mon Jul 6 07:17:27.729 UTC

Smart Licensing is ENABLED

Utility:
  Status: DISABLED

Data Privacy:
  Sending Hostname: yes
  Callhome hostname privacy: DISABLED
  Smart Licensing hostname privacy: DISABLED
  Version privacy: DISABLED

Transport:
  Type: Callhome

Registration:
  Status: REGISTERED
  Smart Account: Forty-Two uLtd.
  Virtual Account: IOSXR
  Export-Controlled Functionality: ALLOWED
  Initial Registration: SUCCEEDED on Jul 01 2020 07:14:24 UTC
  Last Renewal Attempt: None
  Next Renewal Attempt: Dec 28 2020 07:14:23 UTC
```

Example: Viewing License Information After Registration

Registration Expires: Jul 01 2021 07:01:42 UTC

License Authorization:

Status: OUT OF COMPLIANCE on Jul 01 2020 07:14:38 UTC

Last Communication Attempt: SUCCEEDED on Jul 06 2020 07:15:57 UTC

Next Communication Attempt: Jul 06 2020 19:15:57 UTC

Communication Deadline: Oct 04 2020 07:10:56 UTC

Export Authorization Key:

Features Authorized:

<none>