Smart Licensing Using Policy on Cisco IOS XR Routers

Smart Licensing Using Policy

Smart Licensing is a cloud-based, flexible software licensing model that enables you to activate and manage Cisco software licenses across your network. Smart Licensing solution allows you to track the status of your license and software usage trends.

You can establish a pool of software licenses or entitlements to use across the entire deployment in a flexible and automated manner. Pooling is helpful with RMAs as it eliminates the need to rehost licenses. You can self-manage license deployment easily and quickly in the Cisco Smart Software Manager (CSSM). See CSSM.

Smart Licensing Using Policy (SLP) is an enhanced version of Smart Licensing. You can use your devices right of the box in the network. You must establish trust within 90 days to report license usage. Using the RUM report capabilities of SLP, you gain the ability to track your license usage and expiration dates. See Benefits of Smart Licensing Using Policy.

Table 1: Feature History Table

Feature Name	Release Information	Feature Description
Smart Licensing Using Policy	Release 24.1.1	Cisco Smart Licensing Using Policy (SLP) is an enhancement to the existing Cisco Smart Licensing model. It streamlines the licensing process for Cisco IOS XR products by introducing a more flexible and automated approach. With SLP, you no longer need to register your device during installation, and there is no evaluation license state or period. This simplifies the licensing process and reduces complexity. To use SLP, your devices must establish trust and send the initial license usage report within 90 days.
		Starting with this release, **cslu** is the default communication transport mode.
		The feature introduces these changes:
		YANG Data Models:
		• `Cisco-IOS-XR-smart-license-cfg.yang` (see GitHub, YANG Data Models Navigator)

This document provides conceptual, configuration, and troubleshooting information for Smart Licensing Using Policy on the Cisco IOS XR Routers.

For information on Licensing models, smart accounts, see Cisco Licensing, go to cisco.com/go/licensingguide.

What is Smart Licensing Using Policy?

Smart Licensing Using Policy (SLP) simplifies day-zero operations and ongoing maintenance for you. You no longer need to register your devices on installation.

With SLP, there is no evaluation license status or evaluation period. You can directly boot up and start configuring features, using your preferred deployment topology.The devices must establish trust and send the initial license usage report within 90 days.

SLP offers the following deployments:

- On-Premises—enables you to administer devices and licenses on your premises. You can configure devices on premises using:

  - (Recommended) Smart Software Manager (SSM) On-Prem

  - Cisco Smart Licensing Utility (CSLU) utility

- Direct communication—enables you to connect your devices directly to CSSM.

- Offline communication—enables you to deploy devices in high-security environments where a device can't communicate online with anything outside its network.

The Cisco Default policy is enabled by default as a reporting policy. See What is a Policy?

You can use RUM reports (license usage) for recording the license usage, and store it at a trusted store on the device. Depending on your deployment, you can either sync the reports automatically or manually upload them for compliance. For more information, see Resource Utilization Measurement Report.

Supported Platforms

Starting with Cisco IOS XR Release 24.1.1, Smart Licensing Using Policy is enabled by default on the following platforms.

Table 2: Supported Platforms

Platform	Introductory Release
Cisco ASR 9000 Series Aggregation Services Routers	Cisco IOS XR Release 24.1.1
Cisco 8000 Series Routers	Cisco IOS XR Release 24.1.1
Cisco Network Convergence System 5500 Series	Cisco IOS XR Release 24.1.1
Cisco Network Convergence System 5700 Series	Cisco IOS XR Release 24.1.1
Cisco Network Convergence System 540 Series Routers	Cisco IOS XR Release 24.1.1
Cisco Network Convergence System 560 Series Routers	Cisco IOS XR Release 24.1.1
Cisco Network Convergence System 4000 Series	Cisco IOS XR Release 24.1.1
Cisco Network Convergence System 1000 Series	Cisco IOS XR Release 24.1.1

You can migrate your devices to the Smart Licensing Using Policy, see Migrating from Smart Licensing to Smart Licensing Using Policy, on page 23.

For documentation on Smart Licensing (IOS XR Release 7.11.1 and earlier), see Smart Licensing on Cisco IOS XR Routers, on page 37.

Benefits of Smart Licensing Using Policy

Key benefits of Smart Licensing Using Policy are:

- Seamless day-zero operations—Connect the devices to the network on installation. You need to establish trust within 90 days to report license consumption.

- Visibility—View of devices purchased and deployed

- Reporting—Use multiple reporting options to stay compliant

Smart Licensing versus Smart Licensing Using Policy

Here are some of the important differences between Smart licensing and Smart licensing Using Policy:

Table 3: Key Differences between Smart Licensing and Smart Licensing Using Policy

Smart Licensing (SL)	Smart Licensing Using Policy (SLP)
The default license communication transport mode is **callhome**. The device initiates a call home and requests the licenses.	The default license communication transport mode is **cslu**.
Register devices with SSM On-Prem or CSSM (on install) in the network to meet software compliance.	Devices must establish trust with SSM On-Prem, CSLU, or CSSM within 90 days to meet software compliance.
License states available are Evaluation, Evaluation Expired Registered, Authorized, Out of Compliance, Authorization Expired.	License states available are Pending, Out-of-Compliance, and Authorized.
License reporting is every 30 days.	License reporting (Cisco default policy) is 90 days. See Resource Utilization Measurement Report.
SIA licenses offer a grace period of 90 days to meet software compliance.	
Supports license reservation (SLR) in secure environments.	

Table 4: Supported Deployments in Smart Licensing and Smart Licensing Using Policy

Deployments	Smart Licensing	Smart Licensing Using Policy
On-Premises	Communication with SSM On-Prem	• (Recommended) Communication with SSM On-Prem, see Smart Software Manager (SSM) On-Prem • Communication with Cisco Smart Licensing Utility (CSLU), see Cisco Smart Licensing Utility (CSLU)
Direct Communication	Communication directly with CSSM (using Call Home)	Communication directly with CSSM
Offline Communication	• Communication with SSM On-Prem • Specific License Reservation (SLR)	• Communication with SSM On-Prem, see Smart Software Manager (SSM) On-Prem • Communication with Cisco Smart Licensing Utility (CSLU), see Cisco Smart Licensing Utility (CSLU) • Specific License Reservation (SLR)

Understanding Licensing

The following are some of the basic terms of Licensing at Cisco and used in this document.

- FCM—Flexible Consumption Model
- SIA—Software Innovation Access
- CSSM—Cisco Smart Software Manager
- SL—Smart Licensing
- SLP—Smart Licensing Using Policy
- SSM On-Prem—Smart Software Manager On-Prem; a Smart Licensing solution you can install on-premises, see SSM On-Prem, Version 8-202401
- CSLU—Cisco Smart License Utility; a Windows-based application you can install on-premises, see Smart Licensing Utility
- cslu—License transport mode is cslu
- Smart Transport—License transport mode is smart transport
- Call Home—License transport mode is callhome
- SLR—Specific License Reservation
- HTTP Proxy server—Communication using the HTTP Proxy server
- RUM—Resource Utilization Report

What is Cisco Smart Software Manager?

Cisco Smart Software Manager (CSSM) 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
- Generate tokens to establish trust with your devices
- 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, license count, license usage and so on.

For more information, see CSSM.

You can access the Cisco Smart Software Manager at https://software.cisco.com. Navigate to **License>Smart Software Licensing**.

Establishing Trust

With SLP, devices must establish trust and send the first license report within 90 days.

In direct communication deployments (using smart transport), trust is established using a token ID. Generate the token ID from the Smart account and Virtual account in CSSM to establish trust with your devices.

In SSM On-Prem deployments, sync the local accounts with CSSM. In SSM On-Prem disconnected, manually upload the license report and receive the ACK from CSSM to establish trust

For more information, see Trust Code.

Use the **license smart trust idtoken** *idtoken* **all** command to establish trust.

You can view the trust establishment on your device using the **license smart save trust-request** *filepath_filename* command.

Trust is established automatically when CSLU utility is configured.

> **Note** Trust is not required for offline transport.

Flexible Consumption Model (FCM)

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 that simplify license management—Essentials and Advantage.
- Use capital efficiently—License pooling enables an efficient way to share licenses across the network.

The IOS XR Flexible Consumption Model is available on the following platforms:

- Cisco 8000 Series
- Cisco ASR 9000 Series third-, fourth, and fifth-generation line cards
- NCS 5500 core and aggregation platforms
- NCS 5700 Series
- NCS 540 Series
- NCS 560 Series

> **Note** Starting with Cisco IOS XR Release 7.3.1, FCM is enabled by default on the Cisco 8000 Series, NCS 540 Series, and NCS 560 Series routers.

Use the **license smart flexible-consumption enable** command to enable Flexible Consumption model licensing on ASR 9000 Series and NCS 5500 Series routers.

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

To verify the Flexible Consumption Model configuration:

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

Alternatively, you can use the YANG data model `Cisco-IOS-XR-smart-license-cfg` to enable FCM:

```
<rpc xmlns="urn:ietf:params:xml:ns:netconf:base:1.0" message-id="101">
  <get-config>
    <source>
      <running/>
    </source>
    <filter>
      <licensing xmlns="http://cisco.com/ns/yang/Cisco-IOS-XR-smart-license-cfg">
        <flex-consumption/>
      </licensing>
    </filter>
  </get-config>
</rpc>
```

Which License to Use?

Cisco IOS XR provides the following licenses.

- Essential Licenses are the base licenses that are required by every active port for its operation. An example of an Essential License is ESS-ED-100G-RTU1.

- 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-ED-100G-RTU1.

- Advantage with Essential combination licenses are the licenses that are packaged together as a combined entitlement. An example of an advantage license with essentials is ADN-ED-100G-SIA3.

- SIA Licenses—Enables software upgrades on the router.

> **Note** SIA licenses expiry date is tracked on CSSM. You get a 90-day grace period to get compliant with SLP.

For more information on FCM, see *Cisco IOS XR Software Flexible Consumption Model Data Sheet*

Software Innovation Access (SIA)

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

When your device is in a SIA Out-of-Compliance state, support for major software version upgrades in your network devices are restricted.

When your device is Out-Of-Compliance on SIA licenses, you can continue to perform minor updates, SMU installations, RPM installations, and continue to use the RTU licenses without support for porting.

Smart Licensing (SL) and Smart Licensing using Policy (SLP) offer a grace period of 90 days.

In SLP, the devices must establish trust and get the first license usage report within 90 days.

When is a Network Compliant?

The concept of compliance is an important element of the SLP solution. Compliance is achieved by using less than or equal to the amount of perpetual (RTU) licenses and subscription (SIA) licenses, and reporting license usage regularly. The benefits of maintaining network compliance include license pooling, RTU portability, and access to software upgrades. When a compliant state isn't maintained (Out-of-Compliance (OOC)), the referenced benefits are restricted.

Network compliance is measured at the virtual account level and enforced based on the product family. For example, consider a virtual account that contains ASR 9000 devices and NCS 540 devices. In this example, the NCS 540 devices are compliant, but one of the ASR 9000 devices uses more SIAs than that are available in the Smart account. Once all granted grace periods are exhausted, the enforcement conditions are instituted (no license pooling, no RTU portability, and software upgrade restriction) for all ASR 9000 devices within that virtual account. In this example, the NCS 540 devices in the same virtual account aren't impacted by the OOC condition, nor are the other ASR 9000 devices that reside in different virtual accounts.

A product family in a virtual account is considered in compliance when four factors are valid:

1. The devices are registered with the smart licensing server (On-Prem or CSSM).

2. The number of current SIA licenses in use is less than or equal to the number of available SIA licenses in your virtual account.

3. The number of current RTU licenses in use is less than or equal to the number of available RTU licenses in your virtual account.

4. The devices are reporting license usage within 90 days.

Thus, network compliance for a product family in a given virtual account is present when all devices are using no more RTUs & SIAs that have been purchased, and those devices are reporting usage at least every 90 days.

Note Software upgrades are blocked for all devices in the product family in the virtual account when the devices are out of compliance.

Software upgrades are blocked when the device doesn't report within 90 days.

License States

- Pending—Licenses are in a Pending state on bootup until a trust is established.

- Out-Of-Compliance—Licenses are in an Out-of-Compliance state when you don't have sufficient licenses. Upgrades aren't allowed.

- Authorized—Licenses are in an authorized state when you have sufficient licenses.

Note The devices must establish trust and get the first license usage report within 90 days.

YANG Data Models for Smart Licensing Using Policy

YANG is a data modeling language that helps you 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 Using Policy.

Table 5: YANG Data Models for Smart Licensing Using Policy

Data	Data Model
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
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 Cisco-IOS-XR-infra--smartlicense-oper.yar
Actions: a set of NETCONF actions that support robust network-wide configuration transactions.	**Native data model:** Cisco-IOS-XR-smart-license-act.yang

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 Guide*.

Understanding Smart Licensing with Policy

Smart Licensing Using Policy Deployments

Smart Licensing Using Policy offers the following deployments: On-Premises, Direct Communication, and Offline Communication.
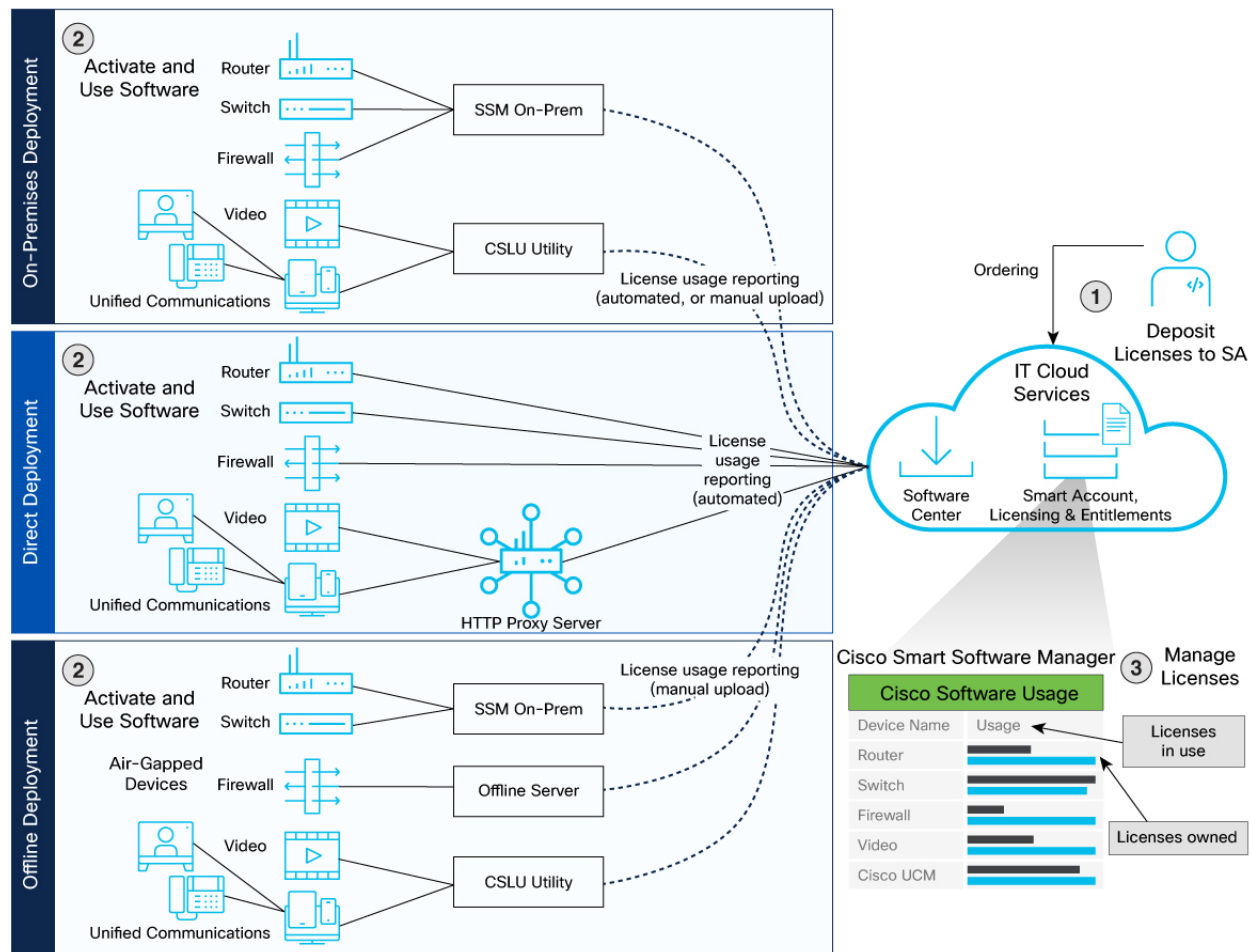

Table 6: Deployments in Smart Licensing Using Policy

Deployments	Smart Licensing Using Policy
On-Premises	• (Recommended) Communication with SSM On-Prem, see Connecting to SSM On-Premise • Communication with Cisco Smart Licensing Utility (CSLU), see Communication with CSLU Utility
Direct Communication	Communication directly with CSSM, see Configuring a Direct Cloud Connection Using Smart Transport Communication directly with CSSM using HTTP Proxy, see Configuring Smart Transport Through an HTTP Proxy

Deployments	Smart Licensing Using Policy
Offline Communication	• Communication with SSM On-Prem, see Connecting to SSM On-Premise • Communication with Cisco Smart Licensing Utility (CSLU), see Connecting to CSLU Utility (Offline) • Air-Gapped, see Offline Communication

Smart License Communication Transport Modes

You can deploy Smart Licensing Using Policy using the license transport modes:

- **cslu** transport

- **smart** transport

- Transport **off**

> **Note** SLP supports **callhome** transport mode. However, we recommend you upgrade to **smart** transport mode deployments—Configuring a Direct Cloud Connection Using Smart Transport or Configuring Smart Transport Through an HTTP Proxy.

On Premises

Smart Software Manager (SSM) On-Prem

SSM On-Prem enables you to administer Cisco devices and licenses on your premises. It's an On-Premise version of the Cisco Smart Software Manager (CSSM) and provides a similar set of features.

SSM On-Prem offers workspaces to perform actions such as:

- **Administration workspace**—request a new account, request access to an existing account, and manage an existing account.

- **License workspace**—track and manage licenses using Smart licensing.

SSM On-Prem offers:

- Support for multiple local Accounts

- Provides online or offline connectivity to Cisco

For more information on SSM On-Prem, see SSM On-Prem Quick Start Guide and the SSM On-Prem User Guide.

SSM On-Premise Communication

You can set up On-Premises communication SSM On-Prem in both Connected and Disconnected modes.

- **Connected**- Manage your devices on the premises. Devices register to SSM On-Prem and report license consumption to CSSM.

- **Disconnected** - Manually trigger usage collection from the device in the following scenarios:

  - You have policies that prevent devices from reporting to Cisco directly.

• You're in air-gapped deployments and reporting to CSSM directly isn't possible.

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> **Note**   Starting with Cisco IOS XR Release 24.1.1, we recommend you use the CSLU Transport URL. Configure the **license smart url cslu** command on the device to use the CSLU Transport URL.

When you connect a device to SSM On-Prem, SSM On-Prem becomes the single point of interface with CSSM. Once the SSM On-Prem is operational, devices register to SSM On-Prem and report license consumption.

See

Usage Synchronization

Synchronize the local accounts with CSSM by using the **Synchronization** widget in SSM On-Prem.

You can perform usage synchronization between SSM On-Prem and CSSM in the *push* and *pull* mode:

- **Product instance-initiated communication (push)**: The device initiates communication with SSM On-Prem, by connecting to a REST endpoint in SSM On-Prem. You can set up RUM reports from the device to SSM On-Prem.

- **SSM On-Prem-initiated communication (pull)**: You can retrieve information from your device using NETCONF, RESTCONF, and native REST API options. You can collect usage information from one or more devices as and when required (on-demand).

You can use the **license smart sync all** command to synchronize device information with SSM On-Prem. You can synchronize license usage with CSSM using the following:

- Set up on-demand synchronization with CSSM (Synchronize now with Cisco)

- Schedule synchronization with CSSM at a specified time

- Synchronize the license usage with CSSM, either by connecting to CSSM or by downloading and uploading files.

Cisco Smart Licensing Utility (CSLU)

Cisco Smart License Utility (CSLU) is an application-based utility that provides administration of licenses. You can connect to CSSM both in online mode or in a disconnected mode.

You can collect usage reports from the device, and upload them to the corresponding Smart Account or Virtual Account – online or offline. You can download an ACK file manually and upload it to the device in offline mode.

CSLU supports Windows 10 and Linux operating systems. We recommend that you always use the latest version of CSLU, see Software Download.

You can set up your device to push the required information to CSLU. Alternatively, you can also set up the CSLU to pull the required information from a device at a configurable frequency.

Device-initiated communication (push)—A device initiates communication with CSLU, by connecting to a REST endpoint in CSLU. You can set up the device to send the following to the CSLU:

- Configure the device to send RUM reports to CSLU at required intervals.

- Requests for UDI-tied trust codes

- Requests for policies

CSLU-initiated communication (pull)—The CSLU uses NETCONF, RESTCONF, or gRPC with YANG models, or native REST APIs, to connect to the device. You can set up the CSLU to obtain the following:

- Retrieve the RUM report from the device and send it to CSSM.

- Install UDI-tied trust code.

- Apply policies.

For information on installing and using CSLU, see Cisco Smart License Utility

Communication Using Cisco Smart Licensing Utility (CSLU)

- Install the CSLU application on your Windows or Linux server, see Cisco Smart Licensing Utility Quick Start Setup Guide.

- Configure the CSLU preference settings, see Cisco Smart Licensing Utility User Guide

On-Premise Communication Using CSLU Utility

You can set up On-Premises communication using the CSLU utility. The CSLU Utility can be configured both in Online and Offline modes.

- **CSLU Online**—The device initiates communication and automatically sends out the RUM report as per the default policy. CSLU forwards the RUM report to CSSM and retrieves the acknowledgment (ACK).

- **CSLU Offline**—If the CSLU utility is not connected to Cisco, you can work locally and log in to Cisco when you need to be connected to Cisco, see Cisco Smart Licensing Utility User Guide

You can sync the reports from CSLU with Cisco using the **CSLU> Data Menu** workspace.

You can collect usage reports from the device, and upload them to the corresponding Smart Account or Virtual Account. You can download an ACK file manually and upload it to the device in offline mode.

See Communication with CSLU Utility, on page 18.

Directly Communicating with CSSM

- Direct Cloud Access—Devices send usage information directly over the internet to CSSM on http://www.cisco.com; no additional components are needed for deployment.

  Direct cloud access through an HTTPs proxy—In direct cloud access through an HTTPs proxy deployment method, the devices send usage information over the internet through a proxy server (Smart transport) to CSSM on http://www.cisco.com.

Smart Transport

The Smart Transport method is a transport method where a Smart Licensing (JSON) message is contained within an HTTP message and exchanged between a product instance and CSSM to communicate. The following Smart transport configuration options are available.

- Smart transport through an HTTP proxy: In this method, a product instance uses a proxy server to communicate with the licensing server, and eventually, CSSM.

  See Configuring Smart Transport Through an HTTP Proxy, on page 20.

Offline

Offline Communication

Offline communication is vital in high-security deployments where a device can't communicate online with anything outside its network.

Offline communication deployments are:

- SSM On-Prem (Disconnected)
- CSLU (Offline)
- Specific License Reservation

SSM On-Prem (Disconnected) and CSLU (Offline)

All communication with the CSSM is manual, and the first offline communication establishes trust with the device.

Specific License Reservation (SLR)

Specific License Reservation (SLR) is available for classified environments, enabling entitlements usage without communication with Cisco. To use the Specific License Reservation feature, you must have approval and authorization from Cisco. For assistance, go to www.cisco.com/go/scm or contact your account representative.

See Offline Communication.

What is a Policy?

A policy file is associated with the Smart account. The policy file is uploaded on the device for reporting. You can request for custom policies that are available for specific deployments such as military or government devices.

Note The Cisco Default policy is automatically installed on new Cisco devices.

You can use a policy to determine the reporting frequency of devices. You can download the policy from the SSM On-Prem, CSLU, or CSSM, and load the policy on the device to reflect changes in reporting behavior. The policy is included as part of the ACK sent from SSM On-Prem, CSLU, or CSSM to the devices.

Understanding Policy Selection

CSSM determines the policy that is applied to a device. Cisco default is the default policy available on the device.

You can view the policy using the **show license all** command in privileged EXEC mode.

Table 7: Policy: Cisco default

Policy: Cisco default	Default Policy Values
License (Subscription)	First report requirement: 90 days
	Subsequent reporting frequency (days): 90 days
	On license change: Within 90 days

A license change occurs in the following scenarios:

• Changing licenses that are used (includes changing features on a product resulting in a different license being used)

• Going from consuming zero licenses to consuming one or more licenses

• Going from consuming one or more licenses to consuming zero licenses

✎

Note   Any change in license information is displayed in the **show license** command after one day.

Resource Utilization Measurement Report

A Resource Utilization Measurement report (RUM report) is a license usage report, which fulfills the reporting requirements as specified by the policy.

RUM reports are generated by the device and consumed by CSSM. The device records license usage information, and all license usage changes in an open RUM report.

The license usage report is also known as a RUM Report and the acknowledgment is referred to as an ACK.

You can retrieve the license usage information for your deployments:

• **SSM On-Prem**

SSM On-Prem server connects to the selected device and collects the usage reports. These usage reports are stored in On-Prem's local library.

You can sync the reports from SSM On-Prem with Cisco using the **SSM On-Prem > Smart Licensing** workspace. For more information, see SSM On-Prem User Guide.

Connected to Cisco

  • Log into **SSM On-Prem > Smart Licensing** workspace.

  • Navigate to **Reports > Usage Schedules > Synchronize now with Cisco**.

    Generate a license usage report in the Smart Licensing workspace.

  • Navigate to **Inventory > SL Using Policy**.

  • Select one or more devices by enabling the corresponding check box, and **Click Actions for Selected... > Collect Usage**

Not connected to Cisco

  • Manually trigger usage collection from the device.

  • Log into **SSM On-Prem > Smart Licensing** workspace.

  • Navigate to **Inventory > SL Using Policy> Export/Import All > Export Usage to Cisco**.

    Upload the report to CSSM and receive the ACK file.

  • Navigate to **Inventory > SL Using Policy> Export/Import All... > Import From Cisco**.

    Upload the .tar ACK file on the device.

You can schedule periodic retrieval of information from the device by configuring a frequency. In the SSM On-Prem UI, Smart Licensing workspace, navigate to **Reports > Usage Schedules > Synchronization pull schedule with the devices**.

• **CSLU Utility**

Cisco Smart License Utility Manager (CSLU) is a Windows-based application you can use for license reporting.

CSLU Online—You can sync the reports from CSLU with Cisco using the **CSLU> Data Menu** workspace. For more information, see Cisco Smart Licensing Utility User Guide.

The device initiates communication and automatically sends out the RUM reports as per the default policy. CSLU forwards the RUM report to CSSM and retrieves the acknowledgment (ACK).

CSLU Offline—You can collect usage reports from the device, and upload them to the corresponding Smart Account or Virtual Account. You can download an ACK file manually and upload it to the device in offline mode.

- **Direct Communication with Cisco**

  Establish trust with CSSM for the devices. The device initiates communication and automatically sends out the license usage report as per the default policy. CSSM automatically sends the ACK reports in the first 5 minutes.

- **Offline Communication**

  Manually upload the report to CSSM. You can download the ACK from SSM On-Prem or CSSM and upload it to the devices.

  You can generate the RUM report on the router and upload it to CSSM. You can download the ACK (acknowledgment) file, and import it on the device using the license smart import command.

  The first offline communication establishes trust with the device after the import. Use the **show license summary** command to view the trust establishment. You can also view the usage and compliance status on the device.

Trust Code

A trust code is a *UDI-tied public key*, which the device uses to:

- Sign a RUM report to prevent tampering and ensure data authenticity.

- Enable secure communication with CSSM.

✎

Note   A trust code is factory-installed for all new devices. A factory-installed trust code can't be used for communication with SSM On-Prem or CSSM.

You need a trust code in the following scenarios:

Table 8: Device Association and Trust Codes

Deployment	Trust Code	Action
Device connected with SSM On-Prem	Yes	Sync the local accounts with the Smart account and Virtual account.

Deployment	Trust Code	Action
Device connected using the CSLU utility	Yes	Select the Smart account or virtual account when setting up CSLU. If a trust code isn't available, the device automatically detects and requests one in the RUM report. A corresponding ACK from CSSM includes the trust code. Existing factory-installed trust code is automatically overwritten. Use this **license smart sync** command to establish trust with CSLU.
Device is Connected Directly to CSSM	Yes	Generate an ID token from the corresponding Smart Account and Virtual Account in CSSM to install the device. **Note** Overwrite the factory-installed trust code if there's one.
Device disconnected with SSM On-Prem (SSM On-Prem Disconnected)	Yes	Manually trigger license usage collection from the device Use the **SL Using Policy>Actions for Selected > Collect UsageCollect Usage**.
Device disconnected using the CSLU utility (CSLU Offline)	Yes	Select the Smart account or virtual account while manually uploading the license usage report on CSSM. If a trust code isn't available, the device automatically detects, and requests one, in the RUM report. The ACK you download from CSSM includes the trust code. Existing factory-installed trust codes are automatically overwritten. Use the trust code to establish trust with CSSM.
Offline Communication	Yes	Select the Smart account or virtual account while manually uploading the license usage report on CSSM. The ACK you download from CSSM includes the trust code. Existing factory-installed trust codes are automatically overwritten. Use the trust code to establish trust with CSSM.
SLR	Yes	Generate authorization code from CSSM to authorize license consumption.

Deploying Smart Licensing Using Policy

Smart Licensing Using Policy (in a nutshell)

- You can any use of the following deployment methods to communicate with SSM On-Prem, CSLU, or CSSM.

  - SSM On-Prem or CSLU utility (transport mode **cslu**)

  - Direct Communication to CSSM or HTTP Proxy Communication to CSSM (using transport mode **smart transport**)

  - Offline Communication (using transport mode **off**)

- Generate a token ID from the Smart account and Virtual account in CSSM, or local account in SSM On-Prem to establish trust with your devices. See Trust Code, on page 15.

- Manage the license consumption on your devices. View the license status and summary using the **show license summary** or **show license usage** commands.

```
Router# show license summary
Router# show license usage
```

- Set up reporting policies to communicate license usage consumption with SSM On-Prem, CSLU, or CSSM.

  Set the time interval for automatic synchronizing of the RUM reports using the **license smart usage interval** command.

```
Router# license smart usage interval
```

  In offline communication, manually upload the RUM reports with SSM On-Prem, CSLU, or CSSM for synchronization.

> ✎
>
> **Note**   You can choose to report every 1-90 days as the reporting frequency. See What is a Policy?

On-Premises

Connecting to SSM On-Premise

Configure SSM On-Prem with transport mode as **cslu**.

Before you begin

- Download the file from Smart Software Manager > Smart Software Manager On-Prem. See SSM On-Prem, Version 8-202401.

- Install Smart Software Manager On-Prem. For information, see SSM On-Prem Quick Start Guide and SSM On-Prem Release Notes.

- Configure SSM On-Prem and create a local account. For information, see SSM On-Prem User Guide.

- In the Smart Licensing Workspace go to **Inventory >General>Product Usage Registration Tokens**, select **CSLU Transport URL**.

Step 1   Enter the global configuration mode using the **configure** command.

Example:

```
Router# configure
```

Step 2   Configure the smart license communication mode using the **license smart transport cslu** command.

Example:

```
Router(config)# license smart transport cslu
```

Step 3   Configure the transport url using the **license smart url cslu** command.

The SSM On-Prem URL is *http://<ip>/cslu/v1/pi/<tenant ID>*. Enter the hostname or the IP address of the server where you have installed SSM On-Prem. The <tenantID> is the default local virtual account ID.

When using HTTPS to communicate (directly or through HTTP proxy) with CSLU utility or SSM On-Prem or CSSM, it is necessary to configure a name server. If the Common Name (CN) in the X.509 server certificate cannot be validated as a Fully Qualified Domain Name (FQDN), communication results in an "Error during SSL communication".

It's possible to configure **crypto ca fqdn-check ip-address allow** to bypass the name-server configuration. Additionally, you need to configure **crypto ca trustpoint Trustpool vrf** *vrf-name* with **http client vrf** *vrf-name* for communication in VRF.

Example:

```
Router(config)# license smart url cslu http://192.168.1.1:8182/cslu/v1/pi/SATELLITE9-1
```

Step 4   Commit the configuration using the **commit** command.

Example:

```
Router(config)# commit
```

Step 5   Exits the configuration mode using the **exit** command.

Example:

```
Router(config)# exi
```

Communication with CSLU Utility

Configure the CSLU utility on your premises.

Before you begin

- Download the file from Smart Software Manager > Smart Licensing Utility. See Smart Licensing Utility.

- Install the CSLU application on your Windows or Linux server, see Cisco Smart Licensing Utility Quick Start Setup Guide and Cisco Smart Licensing Utility User Guide.

- Set up CSLU preference settings, see Cisco Smart Licensing Utility User Guide.

- Associate the Smart account and virtual account details, see Cisco Smart Licensing Utility User Guide.

Step 1   Enter the global configuration mode using the **configure** command.

Example:

```
Router# configure
```

Step 2   Configure the smart license communication mode using the **license smart transport cslu** command.

Example:

```
Router(config)# license smart transport cslu
```

Step 3   Configure the transport url using the **license smart url cslu** command.

The default CSLU URL is *http://cslu-local:8182/cslu/v1/pi*. 8182 is the port number on the CSLU.

When using HTTPS to communicate (directly or through HTTP proxy) with CSLU utility or SSM On-Prem or CSSM, it is necessary to configure a name server. If the Common Name (CN) in the X.509 server certificate cannot be validated as a Fully Qualified Domain Name (FQDN), communication results in an "Error during SSL communication".

It's possible to configure **crypto ca fqdn-check ip-address allow** to bypass the name-server configuration. Additionally, you need to configure **crypto ca trustpoint Trustpool vrf** *vrf-name* with **http client vrf** *vrf-name* for communication in VRF.

Example:

```
Router(config)# license smart url cslu http://192.168.1.1:8182/cslu/v1/pi
```

If you're configuring an IPv6 URL, define a hostname-to address (domain mapping) using the **domain ipv6 host** command.

Example:

```
Router(config)# domain ipv6 host cslu-local 2001:420:54ff:a4::110:16
```

Step 4   Commit the configuration using the **commit** command.

Example:

```
Router(config)# commit
```

Step 5   Exits the configuration mode using the **exit** command.

Example:

```
Router(config)# exit
```

Direct Communication

Configuring a Direct Cloud Connection Using Smart Transport

You can configure a direct connection by using Smart Transport.

> **Note**   Starting with Cisco IOS XR Release 24.1.1, execute the **license smart transport smart** command to enable Smart transport.

Step 1   Enter the global configuration mode using the **configure** command.

Example:

```
Router# configure
```

Step 2   Configure the smart license transport mode to **smart** using the **license smart transport smart** command.

Example:

```
Router(config)# license smart transport smart
```

Step 3   Configure the transport URL using the **license smart url smart** *transport-url* command.

The router automatically configures the Smart URL *https://smartreceiver.cisco.com/licservice/license*. Enter the URL if it doesn't exist.

When using HTTPS to communicate (directly or through HTTP proxy) with CSLU utility or SSM On-Prem or CSSM, it is necessary to configure a name server. If the Common Name (CN) in the X.509 server certificate cannot be validated as a Fully Qualified Domain Name (FQDN), communication results in an "Error during SSL communication".

It's possible to configure **crypto ca fqdn-check ip-address allow** to bypass the name-server configuration. Additionally, you need to configure **crypto ca trustpoint Trustpool vrf** *vrf-name* with **http client vrf** *vrf-name* for communication in VRF.

Example:

```
Router(config)# license smart url smart https://smartreceiver.cisco.com/licservice/license
```

Step 4   Commit the configuration using the **commit** command.

Example:

```
Router(config)# commit
```

Step 5   Exits the configuration mode using the **exit** command.

Example:

```
Router(config)# exit
```

Configuring Smart Transport Through an HTTP Proxy

You can use a proxy server to communicate with CSSM using the Smart transport.

> **Note**   Starting with Cisco IOS XR Release 24.1.1, execute the **license smart transport smart** command to enable Smart transport.

Step 1   Enter the global configuration mode using the **configure terminal** command.

Example:

```
Router# configure
```

Step 2   Enable the smart transport communication using the **license smart transport smart** command.

Example:

```
Router(config)# license smart transport smart
```

Step 3   Configure the transport URL for transporting messages using the **license smart url smart** *transport-url* command.

The router automatically configures the Smart URL (https://smartreceiver.cisco.com/licservice/license).

Example:

```
Router(config)# license smart url smart https://smartreceiver.cisco.com/licservice/license
```

When using HTTPS to communicate (directly or through HTTP proxy) with CSLU utility or SSM On-Prem or CSSM, it is necessary to configure a name server. If the Common Name (CN) in the X.509 server certificate cannot be validated as a Fully Qualified Domain Name (FQDN), communication results in an "Error during SSL communication".

It's possible to configure **crypto ca fqdn-check ip-address allow** to bypass the name-server configuration. Additionally, you need to configure **crypto ca trustpoint Trustpool vrf** *vrf-name* with **http client vrf** *vrf-name* for communication in VRF.

Step 4   Configure a proxy for the Smart transport mode using the **license smart proxy** *hostname* **port** *port-number* command.

When you configure a proxy server, licensing messages are sent to the proxy along with the final destination URL (CSSM). The proxy sends the message to CSSM. Provide the address and port information:

- *hostname*—Enter the IP Address or hostname of the proxy server.

- *port*—Specify the proxy port number.

Example:

```
Router(config)# license smart proxy hostname proxy.esl.cisco.com port 80
```

Step 5   Commit the configuration using the **commit** command.

Example:

```
Router(config)# commit
```

Offline Communication

Connecting to CSLU Utility (Offline)

This task performs a product instance-initiated communication using the CSLU utility in Offline mode. You can manually upload reports to CSSM.

Before you begin

- Set up Smart Account and Virtual accounts, see https://software.cisco.com/.

- Install the CSLU application on your Windows or Linux server. For information on installing and setting CSLU, see Cisco Smart License Utility Quick Start Setup Guide and Cisco Smart Licensing Utility User Guide.

- Download the file from Smart Software Manager > Smart Licensing Utility.

- Set up CSLU utility preference settings and configure your device, see Cisco Smart Licensing Utility User Guide.

  Associate the Smart account and virtual account details, see Cisco Smart Licensing Utility User Guide.

Step 1   Enter global configuration mode using the **configure terminal** command.

Example:

```
Router# configure terminal
```

Step 2   Configure the communication transport mode using the **license smart transport cslu** command.

Example:

```
Router(config)# license smart transport cslu
```

Step 3 Configure the transport URL using the **license smart url cslu**.

The default CSLU URL is *http://cslu-local:8182/cslu/v1/pi*. 8182 is the port number on the CSLU utility.

You can also set a specific url by entering the FQDN hostname or the IP address of the Windows host where you have installed the CSLU utility.

When using HTTPS to communicate (directly or through HTTP proxy) with CSLU utility or SSM On-Prem or CSSM, it is necessary to configure a name server. If the Common Name (CN) in the X.509 server certificate cannot be validated as a Fully Qualified Domain Name (FQDN), communication results in an "Error during SSL communication".

It's possible to configure **crypto ca fqdn-check ip-address allow** to bypass the name-server configuration. Additionally, you need to configure **crypto ca trustpoint Trustpool vrf** *vrf-name* with **http client vrf** *vrf-name* for communication in VRF.

Example:

```
Router(config)# license smart url cslu http://cslu-local:8182/cslu/v1/pi
```

Example:

```
Router(config)# license smart url cslu http://192.168.1.1:8182/cslu/v1/pi
```

Step 4 Commit the configuration using the **commit** command.

Example:

```
Router(config)# commit
```

Step 5 Exits the configuration mode using the **exit** command.

Example:

```
Router(config)# exit
```

Step 6 In the CSLU utility, navigate to **CSLU Preference >Cisco Connectivity** and set the option to **off**. This confirms that Cisco isn't available.

Step 7 Navigate to **Menu >Product Instances > Download All for Cisco** and download the `tar.gz` file.

Step 8 Upload the report on CSSM at **Manage Licenses > Reports > Usage Data Files>Upload Usage Data**.

Upload the tar.gz file.

Step 9 Download the acknowledgment (ACK) file from CSSM.

Step 10 Import the acknowledgment (ACK) file on the device using the **license smart import***file-path* command.

Specify a file path on the device to import the file.

Example:

```
Router# license smart import example.txt.
```

Offline Communication

Step 1 Enter global configuration mode using the **configure** command.

Example:

```
Router# configure
```

Step 2   Set the license transport mode to offline using the **license smart transport off** command.

Example:

```
Router# license smart transport off
```

Step 3   (Optional) View the trust establishment of the device using the **license smart save trust-request** *filepath_filename* command.

Example:

```
Router# license smart save trust-request file_file1
```

Step 4   Generate a license usage (RUM) report using the **license smart save usage** command.

Specify the filename (usage.txt) for the report.

Example:

```
Router# license smart save usage all usage.txt
```

Step 5   Upload the report on CSSM at **Manage Licenses > Reports > Usage Data Files**.

Click **Upload Usage Data** to upload the report. The reporting status changes to No errors.

Step 6   Download the acknowledgment (ACK) file from CSSM.

Step 7   Import the acknowledgment (ACK) file on the device using the **license smart import***file-path* command.

Specify a file path on the device to import the file.

Note	The first offline communication establishes trust on the device after the import. You can view the updates using the **show license summary** command.
	Subsequent communications update the usage and compliance status of the device.

Example:

```
Router# license smart import example.txt.
```

Step 8   View the usage and compliance status on the device using the **show license summary** command.

Example:

```
Router# show license summary
```

Migrating from Smart Licensing to Smart Licensing Using Policy

The table describes the license states before and post migrating from Smart Licensing to Smart Licensing Using Policy.

Table 9: Changes in License Status

License State in SL Before Migration	License State Post Migration to SLP
Evaluation	Pending
Evaluation Expired	

License State in SL Before Migration	License State Post Migration to SLP
Authorized (Registered)	Authorized
Authorized (SLR enabled)	
Out-of-Compliance	Out-of-Compliance
Authorization Expired	
Not In Use ((SLR enabled)	Not In Use ((SLR enabled)

On-Premises

Migrating to SLP with SSM On-Prem

You're migrating from an earlier version of SL to SLP with SSM On-Prem deployment. In SL, the license transport mode is **call home** or **smart** transport. The task details the procedure to migrate to SLP.

1. Upgrade to the latest SSM On-Prem, Version 8-202401. For more information, see Cisco Smart Software Manager On-Prem Migration Guide.

2. Upgrade to the latest Cisco IOS XR release supporting SLP, see *Cisco IOS XR Setup and Upgrade Guide.*

3. Re-register your local account with CSSM, see Cisco Smart Software Manager On-Prem Migration Guide.

    • SSM On-Prem assigns a new temporary transport URL that points to the tenant in SSM On-Prem.

    • The transport mode configuration on the device changes from **call-home** or **smart**, to **cslu**.

4. Synchronize the device using the **license smart sync {all | local}** command to send and receive any pending data.

    ```
    Device# license smart sync local
    ```

    > ✎ **Note** If you don't execute the **license smart sync {all | local}** command, the license synchronization takes one day.

    Verify synchronization in the SSM On-Prem UI. Navigate to **Inventory > SL Using Policy>Alerts.** The following message displays "Usage report from product instance".

    The License usage is the same before and after the upgrade.

5. Synchronize license usage information between SSM On-Prem and CSSM.

    • **Connected to CSSM**: In the SSM On-Prem UI, Smart Licensing workspace, navigate to **Reports > Usage Schedules > Synchronize now with Cisco**.

    • **Not connected to CSSM**: Manually upload the files and receive the ACK from CSSM.

6. After you synchronize usage with CSSM, wait for a few minutes for the device to receive the ACK from SSM On-Prem.

For subsequent reporting, you have the following options:

    • Synchronize data between the device and SSM On-Prem:

        • Schedule periodic synchronization between the device and SSM On-Prem using the **license smart sync** command.

- Synchronize usage information with CSSM:

  - Schedule periodic synchronization with CSSM. In the SSM On-Prem UI, navigate to **Reports > Usage Schedules > Synchronization schedule with Cisco**.

  - Upload and download the required files for reporting.

Use the **show license all** command to view the license policy, license usage and license usage report details.

The example displays the license information on an ASR 9000 Series router.

```
RP/0/RSP0/CPU0:Router# show license all
Wed Feb 28 19:18:52.337 UTC

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

Smart Licensing is ENABLED
License Conversion:
  Automatic Conversion Enabled: True

Export Authorization Key:
  Features Authorized:
    <none>

Utility:
  Status: DISABLED

Smart Licensing Using Policy:
  Status: ENABLED

Account Information:
  Smart Account: <none>
  Virtual Account: <none>

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

Transport:
  Type: cslu
  Cslu address: https://10.76.81.71/cslu/v1/pi/SATELLITE9-1
  Proxy:
    Not Configured
  VRF:
    Not Supported

Miscellaneous:
  Custom Id: <empty>

Policy:
  Policy in use: Merged from multiple sources.
  Reporting ACK required: yes (CISCO default)
  Unenforced/Non-Export Perpetual Attributes:
    First report requirement (days): 365 (CISCO default)
    Reporting frequency (days): 0 (CISCO default)
    Report on change (days): 90 (CISCO default)
  Unenforced/Non-Export Subscription Attributes:
    First report requirement (days): 90 (CISCO default)
```

```
      Reporting frequency (days): 90 (CISCO default)
      Report on change (days): 90 (CISCO default)
    Enforced (Perpetual/Subscription) License Attributes:
      First report requirement (days): 0 (CISCO default)
      Reporting frequency (days): 0 (CISCO default)
      Report on change (days): 0 (CISCO default)
    Export (Perpetual/Subscription) License Attributes:
      First report requirement (days): 0 (CISCO default)
      Reporting frequency (days): 0 (CISCO default)
      Report on change (days): 0 (CISCO default)

Usage Reporting:
  Last ACK received: <none>
  Next ACK deadline: <none>
  Reporting push interval: 0 (no reporting)
  Next ACK push check: <none>
  Next report push: <none>
  Last report push: <none>
  Last report file write: <none>

Trust Code Installed: <none>
Secondary Signing Cert: 0

License Usage
=============

A9K_400GE_TRK (A9K-400GE-LAN-TRK):
  Description: Total A9K-400GE LCs in the system
  Count: 1
  Version: 1.0
  Status: AUTHORIZED
  Export status: NOT RESTRICTED
  Feature Name: A9K_400GE_TRK
  Feature Description: Total A9K-400GE LCs in the system
  Enforcement type: NOT ENFORCED
  License type: Perpetual

A9K_MOD400_TRK (A9K-MOD400-TRK):
  Description: Total A9K-MOD400 in the system
  Count: 1
  Version: 1.0
  Status: AUTHORIZED
  Export status: NOT RESTRICTED
  Feature Name: A9K_MOD400_TRK
  Feature Description: Total A9K-MOD400 in the system
  Enforcement type: NOT ENFORCED
  License type: Perpetual

ESS_100G_RTU_1 (ESS-SE-100G-RTU-1):
  Description: Essentials Software RTU License (per 100G) for Edge
  Count: 2
  Version: 1.0
  Status: AUTHORIZED
  Export status: NOT RESTRICTED
  Feature Name: ESS_100G_RTU_1
  Feature Description: Essentials Software RTU License (per 100G) for Edge
  Enforcement type: NOT ENFORCED
  License type: Perpetual

ESS_ED_100G_SIA_3 (ESS-ED-100G-SIA3):
  Description: Essentials Edge Subscription SIA
  Count: 2
  Version: 1.0
  Status: AUTHORIZED
```

```
  Export status: NOT RESTRICTED
  Feature Name: ESS_ED_100G_SIA_3
  Feature Description: Essentials Edge Subscription SIA
  Enforcement type: NOT ENFORCED
  License type: Subscription

Product Information
===================
UDI: PID:ASR-9006-AC,SN:FOX1605GNAH

HA UDI List:
    0/RSP0/CPU0: Active:PID:ASR-9006-AC,SN:FOX1605GNAH
    0/RSP1/CPU0: Standby:PID:ASR-9006-AC,SN:FOX1605GNAH

Agent Version
=============
Smart Agent for Licensing: 5.9.25_rel/115

License Authorizations
======================
Overall status:
  Active: PID:ASR-9006-AC,SN:FOX1605GNAH
      Status: NOT INSTALLED
  Standby: PID:ASR-9006-AC,SN:FOX1605GNAH
      Status: NOT INSTALLED

Purchased Licenses:
  No Purchase Information Available


Enforcement Status:
  No Enforcement Status Information Available

Usage Report Summary:
=====================
Total: 0,  Purged: 0
Total Acknowledged Received: 0,  Waiting for Ack: 0
Available to Report: 0  Collecting Data: 0

Device Telemetry Report Summary:
================================
Data Channel: NOT AVAILABLE
Reports on disk: 0
```

Migrating to SLP with CSLU Utility

You're migrating from an earlier version of SL to SLP with CSLU utility. In SL, the license transport mode is **call home** or **smart** transport. The task details the procedure to migrate to SLP.

Step 1   Upgrade to the latest Cisco IOS XR release supporting SLP, see *Cisco IOS XR Setup and Upgrade Guide.*

Step 2   Install the CSLU application on your Windows or Linux server, see Cisco Smart License Utility Quick, see Cisco Smart Licensing Utility User Guide.

Step 3   Re-Register your account with CSSM, see CSSM User Guide.

Step 4   Verify the license status using the **show license status** command.

   Example:

```
Router# show license status
```

The transcript mode configuration on the device changes from **callhome** or **smart**, to **cslu**.

Step 5   Configure the CSLU url using the **license smart url cslu** command.

Example:

```
Router(config)# license smart url cslu http://192.168.1.1:8182/cslu/v1/pi
```

When using HTTPS to communicate (directly or through HTTP proxy) with CSLU utility or SSM On-Prem or CSSM, it is necessary to configure a name server. If the Common Name (CN) in the X.509 server certificate cannot be validated as a Fully Qualified Domain Name (FQDN), communication results in an "Error during SSL communication".

It's possible to configure **crypto ca fqdn-check ip-address allow** to bypass the name-server configuration. Additionally, you need to configure **crypto ca trustpoint Trustpool vrf** *vrf-name* with **http client vrf** *vrf-name* for communication in VRF.

Step 6   Commit the configuration using the commit command.

Example:

```
Router(config)# commit
```

Step 7   Synchronize the device using the **license smart sync {all | local}** command to send and receive any pending data.

Example:

```
Device# license smart sync local
```

Note   If you don't execute the **license smart sync {all | local}** command, the license synchronization takes one day.

The license usage is the same before and after the upgrade.

Example

Use the **show license all** command to view the license policy, license usage and license usage report details.

The example displays the license information on an ASR 9000 Series router

```
RP/0/RSP0/CPU0:Router# show license  all
Wed Feb 28 19:17:44.652 UTC

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

Smart Licensing is ENABLED

License Conversion:
  Automatic Conversion Enabled: True

Export Authorization Key:
  Features Authorized:
    <none>

Utility:
  Status: DISABLED

Smart Licensing Using Policy:
  Status: ENABLED

Account Information:
```

```
   Smart Account: BU A9000 As of Feb 28 2024 14:34:05 UTC
   Virtual Account: A9000

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

Transport:
```
  Type: cslu
  Cslu address: http://10.106.210.171:8182/cslu/v1/pi
  Proxy:
    Not Configured
  VRF:
    Not Supported

Miscellaneous:
  Custom Id: <empty>

Policy:
  Policy in use: Merged from multiple sources.
  Reporting ACK required: yes (CISCO default)
  Unenforced/Non-Export Perpetual Attributes:
    First report requirement (days): 365 (CISCO default)
    Reporting frequency (days): 0 (CISCO default)
    Report on change (days): 90 (CISCO default)
  Unenforced/Non-Export Subscription Attributes:
    First report requirement (days): 90 (CISCO default)
    Reporting frequency (days): 90 (CISCO default)
    Report on change (days): 90 (CISCO default)
  Enforced (Perpetual/Subscription) License Attributes:
    First report requirement (days): 0 (CISCO default)
    Reporting frequency (days): 0 (CISCO default)
    Report on change (days): 0 (CISCO default)
  Export (Perpetual/Subscription) License Attributes:
    First report requirement (days): 0 (CISCO default)
    Reporting frequency (days): 0 (CISCO default)
    Report on change (days): 0 (CISCO default)

Usage Reporting:
  Last ACK received: Feb 28 2024 19:08:58 UTC
  Next ACK deadline: May 28 2024 19:08:58 UTC
  Reporting push interval: 30  days
  Next ACK push check: Feb 28 2024 19:20:44 UTC
  Next report push: Mar 29 2024 19:03:32 UTC
  Last report push: Feb 28 2024 19:03:32 UTC
  Last report file write: <none>

Trust Code Installed: <none>
Secondary Signing Cert: 0

License Usage
=============

A9K_400GE_TRK (A9K-400GE-LAN-TRK):
  Description: Total A9K-400GE LCs in the system
  Count: 1
  Version: 1.0
  Status: AUTHORIZED
  Export status: NOT RESTRICTED
  Feature Name: A9K_400GE_TRK
  Feature Description: Total A9K-400GE LCs in the system
  Enforcement type: NOT ENFORCED
```

```
  License type: Perpetual


A9K_MOD400_TRK (A9K-MOD400-TRK):
  Description: Total A9K-MOD400 in the system
  Count: 1
  Version: 1.0
  Status: AUTHORIZED
  Export status: NOT RESTRICTED
  Feature Name: A9K_MOD400_TRK
  Feature Description: Total A9K-MOD400 in the system
  Enforcement type: NOT ENFORCED
  License type: Perpetual


ESS_100G_RTU_1 (ESS-SE-100G-RTU-1):
  Description: Essentials Software RTU License (per 100G) for Edge
  Count: 2
  Version: 1.0
  Status: AUTHORIZED
  Export status: NOT RESTRICTED
  Feature Name: ESS_100G_RTU_1
  Feature Description: Essentials Software RTU License (per 100G) for Edge
  Enforcement type: NOT ENFORCED
  License type: Perpetual


ESS_ED_100G_SIA_3 (ESS-ED-100G-SIA3):
  Description: Essentials Edge Subscription SIA
  Count: 2
  Version: 1.0
  Status: AUTHORIZED
  Export status: NOT RESTRICTED
  Feature Name: ESS_ED_100G_SIA_3
  Feature Description: Essentials Edge Subscription SIA
  Enforcement type: NOT ENFORCED
  License type: Subscription


Product Information
===================
UDI: PID:ASR-9006-AC,SN:FOX1605GNAH

HA UDI List:
    0/RSP0/CPU0: Active:PID:ASR-9006-AC,SN:FOX1605GNAH
    0/RSP1/CPU0: Standby:PID:ASR-9006-AC,SN:FOX1605GNAH

Agent Version
=============
Smart Agent for Licensing: 5.9.25_rel/115

License Authorizations
======================
Overall status:
  Active: PID:ASR-9006-AC,SN:FOX1605GNAH
      Status: NOT INSTALLED
  Standby: PID:ASR-9006-AC,SN:FOX1605GNAH
      Status: NOT INSTALLED

Purchased Licenses:
  No Purchase Information Available


Enforcement Status:
  Date: Generated on 2024-02-28T14:34:05

  A9K_400GE_TRK (A9K-400GE-LAN-TRK):
  Status: AUTHORIZED
```

```
  ESS_ED_100G_SIA_3 (ESS-ED-100G-SIA3):
  Status: AUTHORIZED

  ESS_100G_RTU_1 (ESS-SE-100G-RTU-1):
  Status: AUTHORIZED

  A9K_MOD400_TRK (A9K-MOD400-TRK):
  Status: AUTHORIZED

Usage Report Summary:
=====================
Total: 28,  Purged: 0
Total Acknowledged Received: 24,  Waiting for Ack: 0
Available to Report: 4  Collecting Data: 4

Device Telemetry Report Summary:
================================
Data Channel: NOT AVAILABLE
Reports on disk: 0
```

Direct Communication

Migrating to SLP in Direct Communication with CSSM

You're migrating from an earlier version of SL to SLP in Direct Communication to CSSM deployment. In SL, the license transport mode is **call home** or **smart transport**. The task details the procedure to migrate to SLP.

Step 1   Upgrade to the latest Cisco IOS XR release supporting SLP, see *Cisco IOS XR Setup and Upgrade Guide.*

Step 2   Verify the license status using the **show license status** command.

   Example:

```
Router# show license status
```

   The transport mode is **callhome** or **smart**.

Step 3   Synchronize the device using the **license smart sync {all | local}** command to send and receive any pending data.

   Note   If you don't execute the **license smart sync {all | local}** command, the license synchronization takes one day.

Example

Use the **show license summary** command to view the license usage details.

```
P/0/RSP0/CPU0:Router# show lic summary
Tue Mar 19 16:48:28.589 UTC

Account Information:
  Smart Account: BU A9000 As of Mar 19 2024 09:53:21 UTC
  Virtual Account: A9000

License Usage:
```

```
   License                   Entitlement Tag                        Count Status
   -----------------------------------------------------------------------
   ESS_100G_RTU_1            (ESS-SE-100G-RTU-1)                     2 AUTHORIZED
   ESS_ED_100G_SIA_3         (ESS-ED-100G-SIA3)                      2 AUTHORIZED
   A9K_400GE_TRK             (A9K-400GE-LAN-TRK)                     1 AUTHORIZED
   A9K_MOD400_TRK            (A9K-MOD400-TRK)                        1 AUTHORIZED
```

Use the **show license status** command to verify the license status.

In this example, the transport mode is **callhome** is after upgrade to SLP.

```
Tue Mar 19 16:48:33.085 UTC


Utility:
  Status: DISABLED

Smart Licensing Using Policy:
  Status: ENABLED

Account Information:
  Smart Account: BU A9000 As of Mar 19 2024 09:53:21 UTC
  Virtual Account: A9000

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

Transport:
  Type: Callhome

Policy:
  Policy in use: Merged from multiple sources.
  Reporting ACK required: yes (CISCO default)
  Unenforced/Non-Export Perpetual Attributes:
    First report requirement (days): 365 (CISCO default)
    Reporting frequency (days): 0 (CISCO default)
    Report on change (days): 90 (CISCO default)
  Unenforced/Non-Export Subscription Attributes:
    First report requirement (days): 90 (CISCO default)
    Reporting frequency (days): 90 (CISCO default)
    Report on change (days): 90 (CISCO default)
  Enforced (Perpetual/Subscription) License Attributes:
    First report requirement (days): 0 (CISCO default)
    Reporting frequency (days): 0 (CISCO default)
    Report on change (days): 0 (CISCO default)
  Export (Perpetual/Subscription) License Attributes:
    First report requirement (days): 0 (CISCO default)
    Reporting frequency (days): 0 (CISCO default)
    Report on change (days): 0 (CISCO default)

Miscellaneous:
  Custom Id: <empty>

Usage Reporting:
  Last ACK received: Mar 19 2024 14:27:51 UTC
  Next ACK deadline: Jun 17 2024 14:27:51 UTC
  Reporting push interval: 30  days
  Next ACK push check: <none>
  Next report push: Apr 18 2024 14:22:55 UTC
  Last report push: Mar 19 2024 14:22:55 UTC
  Last report file write: <none>

Trust Code Installed:
```

```
  Active: PID:ASR-9006-AC,SN:FOX1605GNAH
    INSTALLED on Mar 19 2024 14:20:59 UTC
  Standby: PID:ASR-9006-AC,SN:FOX1605GNAH
    INSTALLED on Mar 19 2024 14:20:59 UTC
Secondary Signing Cert: 0
Device Telemetry Report Summary:
================================
Data Channel: NOT AVAILABLE
Reports on disk: 0
```

Migrating to SLP (Direct Communication) Through HTTP Proxy

You're migrating from an earlier version of SL to SLP in Direct Communication deployment through HTTP proxy. In SL, the license transport mode is **call home** or **smart transport**. The task details the procedure to migrate to SLP.

Step 1   Upgrade to the latest Cisco IOS XR release supporting SLP, see *Cisco IOS XR Setup and Upgrade Guide.*

Step 2   Verify the license status using the **show license status** command.

Example:

```
Router# show license status
```

The transport mode is **callhome** or **smart**.

Step 3   Commit the configuration using the commit command.

Example:

```
Router(config)# commit
```

Step 4   Configure a proxy for the Smart transport mode (if it doesn't exist) using the **license smart proxy** *hostname* **port***port-number* command.

When you configure a proxy server, licensing messages are sent to the proxy along with the final destination URL (CSSM). The proxy sends the message to CSSM. Provide the address and port information:

- *hostname*—Enter the IP Address or hostname of the proxy server.

- *port*—Specify the proxy port number.

Example:

```
Router(config)# license smart proxy hostname proxy.esl.cisco.com port 80
```

Step 5   Synchronize the device using the **license smart sync {all | local}** command to send and receive any pending data.

Example:

```
Device# license smart sync local
```

Note   If you don't execute the **license smart sync {all | local}** command, the license synchronization takes one day.

The license usage is the same before and after the upgrade.

Offline Communication

Migrating to SLP (On-Prem) to Offline Deployment

You're migrating from an earlier version of SL (SSM On-Prem) to Offline deployment (SLP). In SL, the license transport mode is **call home** or **smart transport**. The task details the procedure to migrate to SLP.

Step 1   Upgrade to the latest Cisco IOS XR release supporting SLP, see *Cisco IOS XR Setup and Upgrade Guide.*

Check the software image version.

Step 2   Verify the transport mode configuration post-migrating to SLP using the **show license status** command.

Example:

```
Router# show license status
```

The transport mode is **cslu**.

Step 3   Set the license transport mode to offline using the **license smart transport off** command.

Example:

```
Router# license smart transport off
```

Step 4   (Optional) View the trust establishment of the device using the **license smart save trust-request** *filepath_filename* command.

Example:

```
Router# license smart save trust-request file_file1
```

Step 5   Generate a license usage (RUM) report using the **license smart save usage** command.

Specify the filename (usage.txt) for the report.

Example:

```
Router# license smart save usage all usage.txt
```

Step 6   Upload the report on CSSM at **Manage Licenses > Reports > Usage Data Files**.

Step 7   Download the acknowledgment (ACK) file from CSSM and import it to the device.

Migrating to SLP (Direct) to Offline Deployment

You're migrating from an earlier version of SL (direct communication with CSSM) to Offline deployment (SLP). In SL, the license transport mode is **call home** or **smart transport**. The task details the procedure to migrate to SLP.

Step 1   Upgrade to the latest Cisco IOS XR release supporting SLP, see *Cisco IOS XR Setup and Upgrade Guide.*

Check the software image version.

Step 2   Verify the transport mode configuration post-migrating to SLP using the **show license status** command.

Example:

```
Router# show license status
```

The transport mode is **callhome** or **smart**.

Step 3   Set the license transport mode to offline using the **license smart transport off** command.

Example:
```
Router# license smart transport off
```

Step 4   (Optional) View the trust establishment of the device using the **license smart save trust-request** *filepath_filename* command.

Example:
```
Router# license smart save trust-request file_file1
```

Step 5   Generate a license usage (RUM) report using the **license smart save usage** command.

Specify the filename (usage.txt) for the report.

Example:
```
Router# license smart save usage all usage.txt
```

Step 6   Upload the report on CSSM at **Manage Licenses > Reports > Usage Data Files**.

Step 7   Download the acknowledgment (ACK) file from CSSM and import it to the device.

Downgrading from Smart Licensing Using Policy to Smart Licensing

Downgrading from SLP to SL in On-Prem Deployments

Guidelines while downgrading from SLP to SL in On-Prem deployments:

- **Downgrade from SLP (transport mode cslu) to SL in On-Prem**

  1. Downgrade to a version that supports SL, see *Cisco IOS XR Setup and Upgrade Guide.*

     You might see a config inconsistency issue. Clear the config inconsistency using the **clear configuration consistency** command.

  2. The transport mode changes to **call home**.

  3. Re-register your local account with CSSM, see Cisco Smart Software Manager On-Prem Migration Guide.

- **Downgrade from SLP (transport mode smart) to SL in On-Prem**

  1. Downgrade to a version that supports SL, see *Cisco IOS XR Setup and Upgrade Guide.*

  2. The transport mode changes to **smart**.

  3. Re-register your local account with CSSM, see Cisco Smart Software Manager On-Prem Migration Guide.

- **Downgrade from SLP (transport mode call home) to SL in On-Prem**

  1. Downgrade to a version that supports SL, see *Cisco IOS XR Setup and Upgrade Guide.*

  2. The transport mode changes to **call home**.

  3. Re-register your local account with CSSM, see Cisco Smart Software Manager On-Prem Migration Guide.

Downgrading from SLP to SL in Direct Communication Deployment

Guidelines while downgrading from SLP to SL in Direct Communication deployments:

- **Downgrade from SLP (transport mode cslu) to SL in Direct Communication**

  1. Downgrade to a version that supports SL, see *Cisco IOS XR Setup and Upgrade Guide.*

     You might see a config inconsistency issue. Clear the config inconsistency using the **clear configuration consistency** command.

  2. The transport mode changes to **call home**.

  3. Re-register with CSSM, see Cisco Smart Software Manager.

- **Downgrade from SLP (transport mode smart) to SL in Direct Communication**

  1. Downgrade to a version that supports SL, see *Cisco IOS XR Setup and Upgrade Guide.*

  2. The transport mode changes to **smart**.

  3. Re-register with CSSM, see Cisco Smart Software Manager.

- **Downgrade from SLP (transport mode call home) to SL in Direct Communication**

  1. Downgrade to a version that supports SL, see *Cisco IOS XR Setup and Upgrade Guide.*

  2. The transport mode changes to **call home**.

  3. Re-register with CSSM, see Cisco Smart Software Manager.

Additional References

Related Topic	Document Title
Cisco Commerce Workspace	Cisco Commerce Workspace
CSSM	Cisco Smart Software Manager
SSM On-Prem	SSM On-Prem, Version 8-202401
	SSM On-Prem Quick Start Guide
	SSM On-Prem User Guide
	SSM On-Prem Release Notes
Cisco Smart Licensing Utility	Smart Licensing Utility
	Cisco Smart Licensing Utility Quick Start Setup Guide
	Cisco Smart Licensing Utility User Guide
	Cisco Smart License Utility Release Notes

Related Topic	Document Title
Cisco Software Licensing	Cisco Software Licensing Guide Cisco Licensing Support Cisco Software Central Cisco Licensing Webpage Smart Accounts & Licensing APIs
Cisco IOS XR Smart Licensing Command References	ASR 9000 Command Reference Cisco 8000 Command Reference
Licensing Technotes	Smart Licensing on the ASR9000 Platform
Cisco IOS XR Software Flexible Consumption Model	Cisco IOS XR Software Flexible Consumption Model Data Sheet

Smart Licensing on Cisco IOS XR Routers

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

Smart Licensing is supported on the following platforms in releases prior to Cisco IOS XR Release 24.1.1.

Table 10: Smart Licensing Documentation

Supported Platforms	Documentation (Cisco IOS XR 7.11.1 and earlier)
ASR 9000 Series Aggregation Services Routers	Smart Licensing Configuration Guide Smart Licensing Command Reference
Cisco 8000 Series Routers	Smart Licensing Configuration Guide Smart Licensing Command Reference
Cisco Network Convergence System 5500 Series	Smart Licensing Configuration Guide
Cisco Network Convergence System 5700 Series	Smart Licensing Configuration Guide
Cisco Network Convergence System 540 Series	Smart Licensing Configuration Guide
Cisco Network Convergence System 560 Series	Smart Licensing Configuration Guide
Cisco Network Convergence System 4000 Series	Smart Licensing Configuration Guide Smart Licensing Command Reference
Cisco Network Convergence System 1000 Series	Smart Licensing Configuration Guide Smart Licensing Command Reference