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Cisco IOS XR Smart Licensing Using Policy

Simplify Licensing with Smart Licensing Using Policy

In the fast-paced network operations environment, there's an increasing need to simplify and streamline the licensing process. Smart Licensing Using Policy, enabled by default on all IOS XR devices starting with IOS XR Release 24.1.1, enables you to ensure network compliance through effective license reporting.

This article provides information about Smart Licensing Using Policy solutions and their deployment on IOS XR Routers.

Smart Licensing Using Policy

Smart Licensing Using Policy is a policy-driven licensing model built on the existing Cisco Smart Licensing model that

- simplifies the licensing process for IOS XR products by offering a more adaptable and automated method
- allows network administrators to easily activate and manage licenses, and
- helps monitor usage patterns.

Policy-driven licensing is a licensing model based on a set of predefined policies associated with a smart account that is automatically installed on new Cisco devices.

These policies determine how often and under what conditions devices report their software license usage. The policy sets the initial reporting requirements for

- new licenses
- ongoing report acknowledgment protocols, and
- intervals at which usage reports must be submitted to maintain license compliance.

Policies Installed in Cisco Devices

New Cisco devices come pre-installed with the Cisco default policy.

Table 1: Cisco default policy

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

You can request for custom policies that are available for specific deployments such as military or government devices. For assistance, go to www.cisco.com/go/scm or contact your account representative.

Key Features

- Policy-Based Management: The Cisco default policy, enabled by default, automates license management, streamlining operations and ensuring compliance.

- Streamlined Activation: Smart Licensing Using Policy automates the device registration at the time of installation, which allows for immediate use of the network devices

- License Pooling: Licenses can be pooled across the entire network, allowing for more flexible and efficient use of software entitlements.

- Seamless Integration with CSSM: Smart Licensing Using Policy integrates with CSSM for easy license management and visibility, enabling self-service for license deployments and maintenance.

- No Evaluation License Period: Devices with Smart Licensing Using Policy can boot up and operate with full feature sets immediately.

- Trust Establishment: Devices must establish trust with CSSM or SSM using a trust code within 90 days to report license consumption. This ensures a secure and verified licensing environment.

- Automated Usage Reports: The Resource Utilization Measurement (RUM) reports automate the recording of license usage. Data can be securely stored on the device and synced automatically or manually for compliance.

Deployment Models

Smart Licensing Using Policy offers these deployment models:

- On-Premises Deployments
    - Smart Software Manager (SSM) On-Prem (Recommended)
    - Cisco Smart License Utility (CSLU)

- Direct Deployments
    - Direct Cloud Access
    - Direct Cloud Access through an HTTPs proxy

- Offline Deployments
    - SSM On-Prem Disconnected
    - CSLU Offline
    - Specific License Reservation

Smart Licensing versus Smart Licensing Using Policy

Table 2: Smart Licensing vs Smart Licensing Using Policy

License Attributes	Smart Licensing	Smart Licensing Using Policy
License communication transport mode	The default license communication transport mode is **callhome**. The device initiates a Call Home and requests the licenses. • On-Premises Deployments: callhome • Direct Deployments: callhome, smart transport • Offline Deployments: off	The license communication transport modes for Smart Licensing Using Policy are as follows: • On-Premises Deployments: cslu transport (default) • Direct Deployments: callhome, smart transport (recommended) • Offline Deployments: off
Software compliance requirements	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	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	License reporting is every 30 days.	License reporting (Cisco default policy) is 90 days.

Both Smart Licensing and Smart Licensing Using Policy support

• Software Innovation Access (SIA) licenses that offer a grace period of 90 days to meet software compliance, and

• Specific License Reservation (SLR) in secure environments.

License States

License states indicate the actual status of the license of a device. Both Smart Licensing and Smart Licensing Using Policy solutions use license states to indicate the status of a license.

When you upgrade or downgrade your devices between the solutions, the license states changes accordingly.The table describes the mapping of license states during migration.

Table 3: License States in Smart Licensing and Smart Licensing Using Policy

License States in Smart Licensing	License States in Smart Licensing Using Policy
Evaluation	Pending
Evaluation Expired	
Authorized (Registered)	Authorized
Authorized (SLR enabled)	

License States in Smart Licensing	License States in Smart Licensing Using Policy
Out-of-Compliance	Out-of-Compliance
Authorization Expired	
Not In Use (SLR enabled)	Not In Use (SLR enabled)

Use Cases

This table describes various Smart Licensing Using Policy use cases based on your device.

Table 4: Smart Licensing Using Policy Use Cases

If your device is...	And you want to deploy...	Then, go to...
new	Smart Licensing Using Policy	Deploying Smart Licensing Using Policy , on page 4
Smart Licensing-enabled	Smart Licensing Using Policy	Upgrade Devices to Smart Licensing Using Policy, on page 22
Smart Licensing Using Policy-enabled	Smart Licensing	Downgrade Devices to Smart Licensing, on page 30

Note

Your network can have a mix of both Smart Licensing and Smart Licensing Using Policy enabled devices.

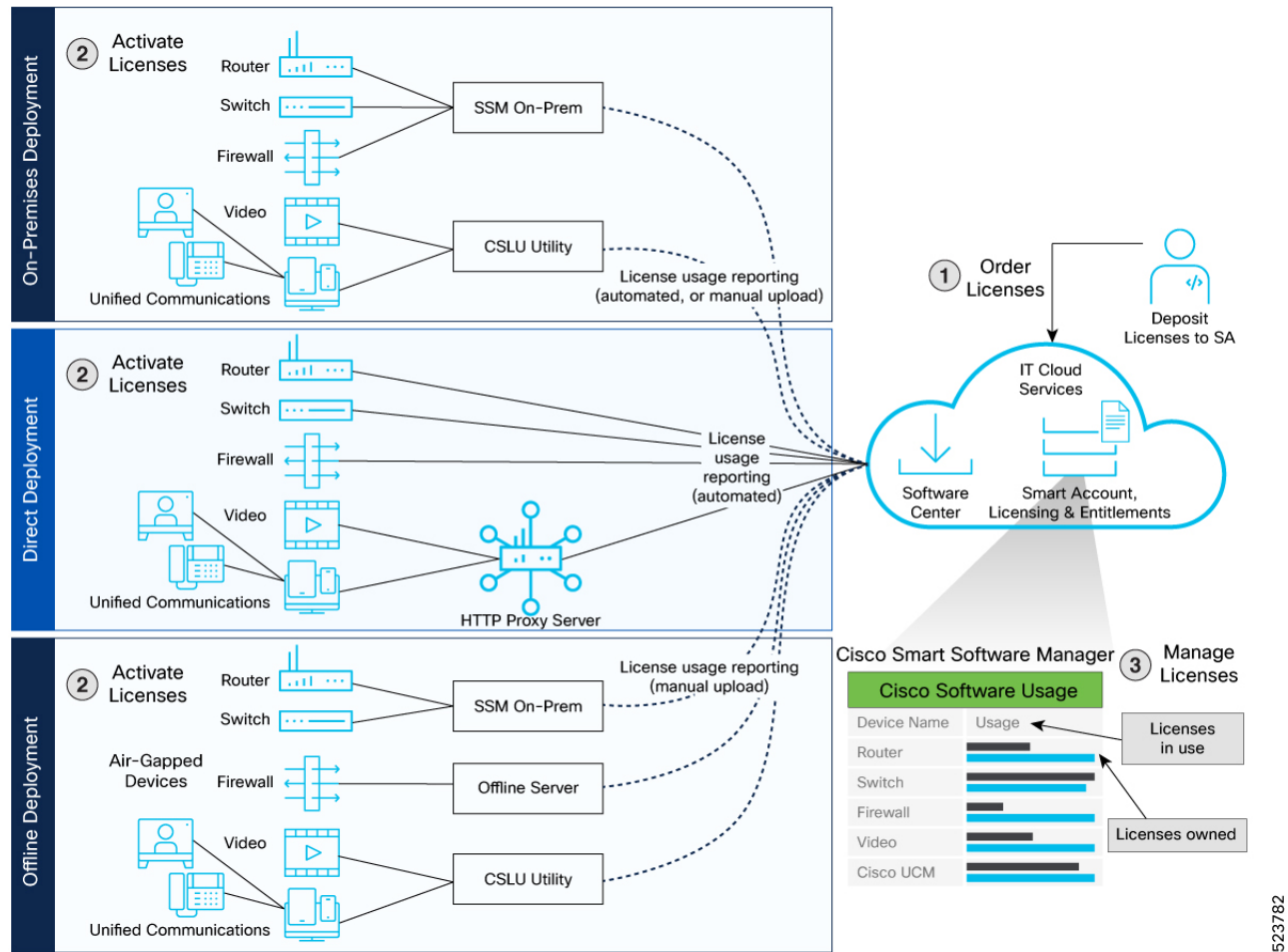# Deploying Smart Licensing Using Policy

Smart Licensing Using Policy solution makes it easier for you to procure, deploy, and manage your license. Cisco Smart Software Manager (CSSM) is your primary licensing server and portal where you can create your smart accounts and manage licenses.

Smart Software Manager On-Prem and Cisco Smart Licensing Utility are your locally installed on-premises user portals that work with CSSM.

After purchasing licenses, activate your licenses on your devices in your deployments. As the devices establish trust and report license usage, you can manage your licenses through continuous reporting.

Hover and click each deployment in the image to navigate to the topic.

Figure 1: Workflow to Deploy Smart Licensing Using Policy

1 On-Premises Deployments
2 Direct Deployments
3 Offline Deployments

Workflow In a Nutshell

These are the stages for deploying Smart Licensing Using Policy:

1. Order licenses

    a. Order your license from Cisco Commerce Workspace (CCW).

    b. Access CSSM and create the smart account and virtual accounts to organize your licenses.

2. Activate licenses.

    a. Select the deployment methods.

        • On-Premises Deployments: Locally installed servers on your premises

        • Direct Deployments: Direct Cloud Access (CSSM)

- Offline Deployments: No connectivity to CSSM

   b. Configure the smart license transport mode and establish trust with CSSM.

3. Manage licenses.

   a. Generate your Resource Utilization Measurement (RUM) report from the device. Synchronize the report with CSSM either automatically or manually.

   b. Monitor the license usage and compliance status through the CSSM portal.

Guidelines

The following are the guidelines you need to remember before deploying Smart Licensing Using Policy.

- Smart Licensing Using Policy is enabled by default on all new devices. To enable Smart Licensing Using Policy on existing Smart Licensing-enabled devices, upgrade to Cisco IOS-XR Release 24.1.1 or higher. See *Cisco IOS XR Setup and Upgrade Guide*, for instructions to upgrade your device.

- Smart Licensing Using Policy supports **smart transport** and **callhome** as a transport mode. We recommend you to use **smart transport** mode.

- Smart Licensing is available in Cisco IOS XR Release 7.11.1 and earlier. You can downgrade your Smart Licensing Using Policy-enabled devices to appropriate Smart Licensing deployments.

On-Premises Deployments

On-Premises deployment is a deployment option that enables you to manage your software licenses locally without direct communication with Cisco Smart Software Manager (CSSM) over the internet.

This type of deployment involves the use of either a license server, such as Smart Software Manager (SSM), or a Windows application, such as Cisco Smart License Utility (CSLU), on the premises to manage devices and licenses. These tools use a synchronization process to exchange license information with CSSM, which can be done automatically over the network or manually offline.

These are the on-Premises deployments:

- SSM On-Prem
- CSLU

Smart Software Manager On-Prem

Smart Software Manager (SSM) On-Prem is on-premise version of Cisco Smart Software Manager (CSSM) that enables you to administer Cisco products and licenses on your premises. SSM On-Prem offers similar features and functionalities as CSSM, such as:

- Centralized license management
- Real-Time license usage tracking
- Automated license activation and so on.

SSM On-Prem acts as the primary interface with CSSM when devices are connected. Once operational, devices register with SSM On-Prem and report their license consumption.

SSM On-Prem Modes

SSM On-Prem offers these two deployment modes:

- **Connected**: Connected mode allows you to manage your devices on premises with a license server connected to CSSM. Devices register to SSM On-Prem and report license consumption and usage to CSSM at the desired frequency.

- **Disconnected**: Disconnected mode allows you to manage your devices on premises without connecting to CSSM. SSM On-Prem synchronizes to CSSM via a manual file transfer process for reporting license consumption and usage.

Report License Usage

The devices connect to SSM On-Prem and provide their license usage data. The local accounts on SSM On-Prem synchronize with CSSM by using the **Synchronization** widget in the SSM On-Prem UI to report license usage.

Use the **license smart sync all** command to synchronize device information with SSM On-Prem.

You can synchronize license usage with CSSM using the one of these methods.

- Set up on-demand synchronization with CSSM.

- Schedule synchronization with CSSM at a specified time.

- Synchronize the license usage with CSSM, either by connecting to CSSM immediately or by downloading and uploading files for SSM On-Prem disconnected mode.

Steps to Deploy SSM On-Prem

After you order the license and set up your smart accounts in CSSM, perform these steps to deploy Smart Licensing Using Policy on your devices.

Step 1	Activate Licenses on SSM On-Prem
Step 2	Manage Licenses on SSM On-Prem

Activate Licenses on SSM On-Prem

To establish trust with the devices, you must activate the license.

Step 1	Download and install Smart Software Manager On-Prem release 9-202407 or higher so that SSM On-Prem is compatible with Smart Licensing Using Policy.
Step 2	Setup the SSM On-Prem on the device to create a local account. For more information, see SSM On-Prem User Guide.
Step 3	Navigate to **License workspace > Inventory > General > Product Usage Registration Tokens**, and select **CSLU Transport URL** in the SSM On-Prem UI to set the transport gateway and generate an ID token. You need the ID token to establish trust with devices in Step 6.
Step 4	If you are deploying SSM On-Prem disconnected mode, navigate to **Settings** to disable communication with Cisco in the SSM On-Prem UI. If you are deploying SSM On-Prem connected mode, skip this step.

Step 5   Configure the transport mode and SSM On-Prem URL on your device.

If you are deploying ...	Then configure transport mode...
SSM On-Prem connected mode	**cslu**.
SSM On-Prem disconnected mode	**off**

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 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# configure
Router(config)# license smart transport cslu
Router(config)# license smart url cslu http://192.0.2.1:8182/cslu/v1/pi/SATELLITE9-1
Router(config)# commit
```

Example:

```
Router# configure
Router(config)# license smart transport off
Router(config)# license smart url cslu http://192.0.2.1:8182/cslu/v1/pi/SATELLITE9-1
Router(config)# commit
```

Step 6   Use the **license smart trust idtoken** command to establish trust with the device.

The ID token is generated at SSM UI at Step 3.

Example:

```
Router# license smart trust idtoken SjczNAMwZWYtNTAzMS00NjKmLWJmMTQtMzM1YmRhZ all force
```

If you want to view the trust establishment status on the device, use the **license smart save trust-request** command.

Example:

```
Router# license smart save trust-request file1
```

Step 7   Use the **show license status** command to verify the status of the license.

Also, check the show outuput for the latest date in the **Trust Code Installed** field.

Example:

```
Router# show license status

Utility:
  Status: DISABLED

Smart Licensing Using Policy:

  Status: ENABLED

Account Information:
  Smart Account: A9000
  Virtual Account: ASR9000
```

```
Data Privacy:

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

Transport:

  Type: cslu

  Cslu address: https://192.0.2.1/cslu/v1/pi/SATELLITE9-1

  Proxy:
    Not Configured
  VRF:
    Not Supported
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)
..

Trust Code Installed: Mar 10 20:56:02 2021 UTC
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


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
..!
```

Manage Licenses on SSM On-Prem

To have visibility into license usage and stay compliant, you must manage the license.

Step 1   Log into **SSM On-Prem > Smart Licensing** workspace to synchronize the reports from SSM On-Prem with Cisco.

If you have deployed	Then perform these steps ...
SSM On-Prem connected mode	a. Navigate to **Reports > Usage Schedules > Synchronize now with Cisco** and generate a license usage RUM report in the Smart Licensing workspace. b. Navigate to **Inventory > SL Using Policy** and select one or more devices by enabling the corresponding check box, and **Click Actions for Selected... > Collect Usage**
SSM On-Prem disconnected mode	a. Navigate to **Inventory > SL Using Policy> Export/Import All** and select **Export Usage to Cisco** to manually trigger usage collection from the device. Upload the report to CSSM and receive the ACK file. b. Navigate to **Inventory > SL Using Policy> Export/Import All...** and select **Import From Cisco** to upload the .tar ACK file on the device.

Step 2   Use the **show license summary** or **show license usage** commands to view the license consumption on the device.

Example:

```
Router# show license 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


Router# show license usage
ESS_100G_CA_RTU_2 (ESS-CA-100G-RTU-2):
 ..
Description: Core and Aggr Essentials SW Right-to-Use per 100G for Cisco 8000
             series
  Count: 14
```

```
        Version: 1.0
        Status: PENDING
        Export status: NOT RESTRICTED
        Feature Name: ESS_100G_CA_RTU_2
        Feature Description: Core and Aggr Essentials SW Right-to-Use per 100G for Cisco 8000 series
        Enforcement type: NOT ENFORCED
        License type: Perpetual
.
.
..!
```

Step 3   (Optional) Set the time interval to automatically synchronize RUM reports with **license smart usage interval** command.

In Disconnected mode, manually upload the RUM reports to SSM On-Prem for synchronization.

Example:

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

Cisco Smart Licensing Utility

Cisco Smart License Utility Manager (CSLU) is a Windows-based application that enables you to administer licenses for your devices on premises instead of having to directly connect their devices to CSSM. When you connect a device to CSLU, CSLU becomes the single point of interface with CSSM.

Once the CSLU is operational, devices register to CSLU and report license consumption.

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

CSLU Modes

The CSLU Utility offers these two deployment modes.

- **CSLU Online**: CSLU Online mode allows you to manage your devices on premises. Devices initiate communication automatically with CSLU and sends the RUM report to CSLU as per the default policy. CSLU forwards the RUM report to CSSM and retrieves the acknowledgment (ACK).

- **CSLU Offline**: CLSU Offline mode allows you to manage your devices on premises withour connecting to CSSM. Devices initiate communication automatically and sends the RUM reports to CSLU. CSLU utility is not connected to CSSM, so you need to manually connect to CSSM and upload the RUM reports.

Report License Usage

By default, the CSLU utility application is scheduled to collect data information at 24 hours intervals. CSLU connects to the selected Product Instance(s) and collects the RUM reports. These RUM reports are then stored in CSLU's local library.

Steps to Deploy CSLU On-Prem

After you order the license and set up your smart accounts in CSSM:

Step 1   Activate Licenses on CSLU
Step 2   Manage Licenses on CSLU, on page 14

Activate Licenses on CSLU

To establish trust with the devices, you must activate the license.

Step 1   Download the latest version of CSLU from Smart Licensing Utility to install the CSLU application on your Windows or Linux server.

For more information, see Cisco Smart Licensing Utility Quick Start Setup Guide

Step 2   Set up CSLU preference settings to associate the Smart account and virtual account details.

For more information, see Cisco Smart Licensing Utility User Guide

Step 3   If you want to deploy CSLU Offline mode, navigate to **CSLU Preference > Cisco Connectivity** and set the option to **off** in the CSLU utility UI.

The field switches to **Cisco Is Not Available.**.

If you are deploying CSLU Online mode, skip this step.

Step 4   Configure the transport mode and CSLU URL on your device.

If you are deploying ...	Then configure transport mode...
CSLU Online mode	**cslu**
CSLU Offline mode	**off**

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

Example:

```
Router# configure
Router(config)# license smart transport cslu
Router(config)# license smart url cslu http://192.0.2.1:8182/cslu/v1/pi
```

Example:

```
Router# configure
Router(config)# license smart transport off
Router(config)# license smart url cslu http://192.0.2.1:8182/cslu/v1/pi
```

Step 5   Configure a VRF for the HTTP client to facilitate CSLU communication over a named VRF.

Example:

```
Router(config)# http client vrf cslu-vrf
Router(config)# commit
```

Step 6   If you are 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:DB8:54ff:a4::110:16
```

In CSLU Online mode, the devices establish automatic trust with CSLU configuration.

In CSLU Offline mode, manually import the RUM report to establish first offline communication trust with CSLU.

If a trust code isn't available, the device automatically detects and requests one in the RUM report. The corresponding ACK from CSSM includes the trust code and the existing factory-installed trust code is automatically overwritten.

Step 7   If you want to establish trust immediately with CSLU, use the **license smart sync all** command.

Example:

```
Router# license smart sync all
```

Step 8 Verify the license status using the **show license status** command. Verify the latest date in the **Trust Code Installed** field.

Example:

```
Router# show license status

Utility:
Status: DISABLED

Smart Licensing Using Policy:
Utility:
  Status: DISABLED

Smart Licensing Using Policy:
  Status: ENABLED

Account Information:
  Smart Account: A9000 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://192.0.2.1:8182/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: Jan 10 20:56:02 2021 UTC
Secondary Signing Cert: 0
```

Manage Licenses on CSLU

To have visibility into license usage and stay compliant, you must manage the license.

Step 1 Log into CSLU UI to synchronize the reports from CSLU with Cisco.

If you have deployed...	Then....
CSLU Online	perform these steps: Navigate to **CSLU > Data Menu > Send to CSSM** to immediately send RUM reports to Cisco. See Reporting License Usage.
CSLU Offline	perform these steps: a. Navigate to **Menu > Product Instances > Download All for Cisco** and download the **tar.gz** file. b. Retrieve the RUM report from the device using the **license smart save usage all** command. c. Access the CSSM UI and upload the report at **Manage Licenses > Reports > Usage Data Files > Upload Usage Data**. Download the acknowledgment (ACK) file from CSSM. d. Specify a file path on the device and import the acknowledgment (ACK) file using the **license smart import** command.

Step 2 Use the **show license summary** or **show license usage** commands to view the license consumption on the device.

Example:

```
Router# show license 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


Router# show license usage
ESS_100G_CA_RTU_2 (ESS-CA-100G-RTU-2):
 ..
```

```
Description: Core and Aggr Essentials SW Right-to-Use per 100G for Cisco 8000
              series
  Count: 14
  Version: 1.0
  Status: PENDING
  Export status: NOT RESTRICTED
  Feature Name: ESS_100G_CA_RTU_2
  Feature Description: Core and Aggr Essentials SW Right-to-Use per 100G for Cisco 8000 series
  Enforcement type: NOT ENFORCED
  License type: Perpetual
.
.
..!
```

Step 3 (Optional) Set the time interval to automatically synchronize RUM reports with **license smart usage interval** command.

In Offline mode, manually upload the RUM reports to CSLU for synchronization.

Example:

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

Direct Deployments

Direct deployment involves connecting devices to *tools.cisco.com* through the internet or an HTTP proxy server to report usage information using the Smart transport mode. Direct deployment works out of the box with no additional configuration.

Direct deployment is most suitable for small networks, especially in the enterprise world. It's when a user doesn't want to manage an on-premises server and communicates with Cisco directly or through a proxy.

Smart Transport Method

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.

Direct Deployment Methods

Direct deployment offers these methods:

- Direct Cloud Access: In this method, devices send usage information directly over the internet to CSSM.

- Direct Cloud access through an HTTPs proxy: In this method, devices send usage information over the internet through a proxy server using Smart transport to CSSM.

Report License Usage

In direct deployments, the device automatically generates reports once it establishes a trusted connection with the CSSM.

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. You can set up a subsequent reporting frequency as per the policy.

Steps to Deploy Licenses in Direct Deployment

After you order the licenses and set up your smart accounts in CSSM:

Step 1 [Activate Licenses on Direct Deployment](#)

Activate Licenses on Direct Deployment

To establish trust with the devices, you must activate the license.

Step 1   Configure the transport mode on your device with the **license smart transport smart** command.

Example:

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

Step 2   Configure the transport URL with the **license smart url smart** *transport-url* command.

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

When using HTTPS to communicate directly or through HTTP proxy with 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 3   Configure a proxy for the smart transport mode with the **license smart proxy** command to deploy Direct Cloud access through an HTTPS proxy method. Skip this step for Direct Cloud Access deployment.

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.

Example:

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

Step 4   Configure a VRF for the HTTP client to facilitate smart transport communication over a named VRF.

Example:

```
Router(config)# http client vrf st-vrf
Router(config)# commit
Router(config)# exit
```

Step 5   Generate a token from the smart account and virtual account in CSSM. Use the **license smart trust idtoken** command to establish trust with the device.

Example:

```
Router# license smart trust idtoken
MjczNDMwZWYtNDAzMS00NjNmLWUmMIQtMzM1YmRhZDAxZWNmLUE3MjA1OTE3%0ANzM4MIh8eit1NENmLzNYaHg3WVk3VzFYeDVxc0xSaEZqNjhtNERGMnc5UHZK%0AU1RMYz0%3D%0A
 all force
```

If you want to view the trust establishment status on the device, use the **license smart save trust-request** command.

Example:

```
Router# license smart save trust-request file1
```

Step 6   Use the **show license status** command to verify the status of the license.

Also, check the show outuput for the latest date in the **Trust Code Installed** field.

Example:

```
Router# show license status

Utility:
  Status: DISABLED
Smart Licensing Using Policy:
  Status: ENABLED
Account Information:
  Smart Account: BU A9000 UTC
  Virtual Account: A9000
Data Privacy:
  Sending Hostname: yes
    Callhome hostname privacy: DISABLED
    Smart Licensing hostname privacy: DISABLED
  Version privacy: DISABLED

Transport:
  Type: Smart

  URL: https://smartreceiver.cisco.com/licservice/license
 Proxy:
  Not Configure

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)

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
..!
```

Manage Licenses on Direct Deployment

To have visibility into license usage and stay compliant, you must manage the license.

Step 1 Navigate to **Smart Software Licensing > Reports** on the CSSM UI to download the acknowledgment and upload it to your device.

Step 2 Use the **show license summary** or **show license usage** commands to view the license consumption on your devices.

Example:

```
Router# show license summary


Account Information:
  Smart Account: BU A9000 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

Router# show 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
```

Step 3 (Optional) Set the time interval to automatically synchronize RUM reports with the **license smart usage interval** command.

You can generate and view RUM report on your device. See Reporting License Usage.

.

Example:

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

Offline Deployments

Offline deployment is a type of smart licensing deployment that

- allows devices to be set up without internet access

- does not require communication with Cisco, and

• is used in highly secure environments.

Offline Deployments Methods

Depending on your network environment, you can select the offline deployment methods.

- Remote deployments: Your On-Premises servers offer disconnected modes. Use disconnected licensing mode by turning off communication with Cisco on your On-Premises servers.

    - Activate Licenses on SSM On-Prem

    - Activate Licenses on CSLU

- Air-gapped deployments: Specific License Reservation (SLR) is a reservation of specific licenses from the smart account as per the license usage on the router.

    License reservation offers security for organizations that need a full air-gapped environment when on-premises licensing is not an option. The license reservation solution is for classified environments that don't allow electronic communication in or out of the environment. With a license reservation solution, you are fully offline without any ongoing communication or additional infrastructure.

    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.

    After you order the license and set up your smart accounts in CSSM, you can Activate Licenses in Air-Gapped Deployments.

Report License Usage

Report license usage for remote environments: In remote offline deployments, turn off device communication to CSSM on the On-Premises servers. Manually upload the license consumption using RUM reports to establish trust and reporting to CSSM.

Report license usage for air-gapped environments: In fully offline deployment, no action is required, as there is no trust establishment or reporting of devices to CSSM.

Activate Licenses in Air-Gapped Deployments

Follow these steps to activate SLR licenses in air-gapped deployments.

For enabling Specific License Reservation, you must have approval and authorization from Cisco. For assistance, go to www.cisco.com/go/scm or contact your account.

Step 1 Obtain the license reservation code from Cisco by contacting your account representative.

Step 2 Enable SLR on the device with the **license smart reservation** command.

Example:
```
Router# configure
Router(config)# license smart reservation
```

Step 3 Generate a request code with the **license smart reservation request local** command.

Copy the request code and enter it at CSSM.

Example:
```
Router# license smart reservation request local
```

```
Enter this request code in the Cisco Smart Software Manager portal:
CD-ZNCS-5501-SE:FOC2118R24P-AVYd1FABK-AC /* This is a sample code */
```

Step 4 Navigate to **Smart Software Licensing > Inventory** in the CSSM UI, and select the virtual account. Then, navigate to **Licenses > License Reservation**.

    a) Enter or attach the reservation request code that you generated from the router at **Enter Request Code**. click **Next**.

    b) Navigate to **Select License > Reserve a Specific License** and select licenses.

       Enter the number of licenses you require and click **Next**.

    c) Generate an authorization code and copy it to the device.

Step 5 Install the authorization code on the device with the **license smart reservation install** command.

Example:

```
Router# license smart reservation install file /disk2:/AuthorizationCode_SN_FOX24XXXXX.txt
/* This is a sample code */
The "/" before the directory (/disk2:/ or /harddisk:/) is needed because of the linux file path.
```

The authorization code activates smart license reservation for your device.

Step 6 Verify the license status with the **show license reservation** command.

```
Router# show license reservation

License reservation: ENABLED
Overall status:
  Active: PID:NCS-55A2-MOD-S,SN:FOC2245R05H
      Reservation status: RESERVATION IN PROGRESS on Feb 05 2021 16:33:08 UTC
      Request code: CC-ZNCS-55A2-MOD-S:FOC2245R05H-AVYd1FABK-45
```

Reporting License Usage

License reporting is important to manage license consumption. Devices generate the Resource Utilization Measurement (RUM) report and CSSM uses RUM reports to manage license consumption.

Resource Utilization Measurement Reports

A RUM report is a license usage report, which fulfills the reporting requirements as specified by the policy. It is an ISO 19770-4 report that is delivered in the JSON format and signed as per the trust model.

The RUM report contains information such as

- license usage filtered by ID

- license name, and

- summary of the license information.

The devices record license usage information and any modifications to license usage in an open RUM report. At specific intervals, open RUM reports are closed, and new RUM reports are opened to record license usage. The closed RUM reports are sent to CSSM.

Generate RUM Reports

You can generate the RUM report from the device using the **show license rum** command. You can sync or manually upload the RUM report to CSSM based on your deployment.

Table 5: Procure RUM Reports

If your deployment is...	Then...
SSM On-Prem using connected mode	perform these tasks: 1. Generate the RUM report from the device using the **show license rum** command. SSM On-Prem server connects to the selected device and collects the usage reports and stores the report in the local library. 2. Navigate to **SSM On-Prem > Smart Licensing workspace** on SSM On-Prem UI to synchronize the reports with Cisco.
SSM On-Prem using disconnected mode	perform these tasks: 1. Generate the RUM report on the router using the **show license rum** command and upload it to CSSM. 2. Download the ACK (acknowledgment) file, and import it on the device using the **license smart import** command.
CSLU Utility using online mode	the device automatically sends RUM reports to CSLU as per the default policy. If you want to synchronize the reports immediately, navigate to **CSLU> Data Menu** workspace, select **Send to CSSM**.
CSLU Utility using offline mode	perform these tasks: 1. Generate the RUM report on the router using the **show license rum** command and upload it to CSSM. 2. Download the ACK (acknowledgment) file, and import it on the device using the **license smart import** command.
Direct deployment	no action is required. The device automatically sends the RUM report as per the default policy.

Statistical View of RUM Reports

A statistical view of a RUM report includes

- total number of reports on the device
- number of reports that have a corresponding ACK
- number of reports waiting for an ACK, and so on.

To view the statistical RUM report information, use the **show license all** and **show license tech** commands.

Upgrade Devices to Smart Licensing Using Policy

Starting with Cisco IOS XRRelease 24.1.1 Smart Licensing Using Policy is the default licensing solution. If your existing devices are SL-enabled, you can upgrade to appropriate Smart Licensing Using Policy deployments.

Table 6: Upgrade Devices to Smart Licensing Using Policy

If your Smart Licensing deployment is...	Then upgrade Smart Licensing Using Policy deployment...
SSM On-Prem	(Recommended) Upgrade Devices with SSM On-Prem **OR** Upgrade Devices with CSLU.
Direct Cloud Access	Upgrade Devices in Direct Deployment.
Specific License Reservation	No action is required. The upgrade doesn't affect devices using SLR as the devices don't communicate to CSSM.

Upgrade Devices with SSM On-Prem

Follow these steps to upgrade devices to Smart Licensing Using Policy in SSM On-Prem deployment.

Step 1 Upgrade to the latest SSM On-Prem.

For more information, see Cisco Smart Software Manager On-Prem Migration Guide.

Step 2 Upgrade to the latest Cisco IOS XR release supporting Smart Licensing Using Policy.

See *Cisco IOS XR Setup and Upgrade Guide*.

Step 3 Reregister 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** to **cslu**

Step 4 Verify the license status using the **show license status** command. Verify if the latest date is appearing in the **Trust Code Installed** field.

Example:

```
Router# show license status
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:
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
..!

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
```

Step 5 If you are deploying SSM On-Prem disconnected mode, log off from CSSM.

a) Set the license transport mode on the device using the **license smart transport off** command.

Example:

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

b) Retrieve the RUM report using the **license smart save usage** command.

Example:

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

Navigate to **Manage Licenses > Reports > Usage Data Files** in the CSSM workspace to upload the report manually.

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

Step 6 Synchronize the device using the **license smart sync** command to send and receive any pending data.

> If you don't execute the **license smart sync** command, the license synchronization takes one day.

Note

Upgrade Devices with CSLU

Follow these steps to upgrade devices to Smart Licensing Using Policy with CSLU.

Step 1 Upgrade to the latest Cisco IOS XR release supporting Smart Licensing Using Policy.

See *Cisco IOS XR Setup and Upgrade Guide*.

Step 2 Upgrade to the latest version of CSLU. See Cisco Smart License Utility.

Step 3 Install the CSLU application on your Windows or Linux server. See Cisco Smart Licensing Utility User Guide.

Step 4   Set up CSLU preference settings and associate the Smart account and virtual account details. Refer Cisco Smart Licensing Utility User Guide.

Step 5   Configure the smart license transport mode and the CSLU URL on your device using the **license smart transport cslu** command.

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

Example:

```
Router# configure
Router(config)# license smart transport cslu
Router(config)# license smart url cslu http://192.0.2.1:8182/cslu/v1/pi
Router(config)# commit
```

Devices establish automatic trust with CSLU configuration.

Step 6   If you want to establish trust immediately with CSLU, use the **license smart sync all** command.

Step 7   Reregister your account with CSSM, see CSSM User Guide.

Step 8   Verify the license status on the device using the **show license status** command. Verify if the latest date is appearing in the **Trust Code Installed** field.

Example:

```
Router# show license status

Utility:
Status: DISABLED

Smart Licensing Using Policy:
Utility:
  Status: DISABLED

Smart Licensing Using Policy:
  Status: ENABLED

Account Information:
  Smart Account: A9000 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://192.0.2.1:8182/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: Jan 10 20:56:02 2024 UTC
```
Secondary Signing Cert: 0
```

Step 9   If you want to deploy CSLU Offline mode, navigate to the **CSLU Preference > Cisco Connectivity** and set the option to **off** in the CSLU utility UI.

The field switches to **Cisco Is Not Available**.

a) Set the license transport mode on the device using the **license smart transport off** command.

Example:

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

b) Verify the license status using the **show license status** command. Verify if the latest date is appearing in the **Trust Code Installed** field.

Example:

```
Router# show license status

Utility:
Status: DISABLED

Smart Licensing Using Policy:
Utility:
  Status: DISABLED

Smart Licensing Using Policy:
  Status: ENABLED

Account Information:
  Smart Account: A9000 UTC
  Virtual Account: A9000

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

Transport:
  Type: off
```

```
     Cslu address: http://192.0.2.1:8182/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: Jan 10 20:56:02 2024 UTC
   Secondary Signing Cert: 0
```

Upgrade Devices in Direct Deployment

Follow these steps to upgrade devices from an existing Smart Licensing Direct Cloud Access or Direct Cloud Access through an HTTP Proxy deployment model.

Step 1   Upgrade to the latest Cisco IOS XR release supporting Smart Licensing Using Policy.

   See *Cisco IOS XR Setup and Upgrade Guide*.

Step 2   If you're changing the transport mode from **callhome** to **smart transport**, use the **license smart transport smart** command to enable the smart transport mode.

   Example:

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

   a)   Configure the transport URL using the **license smart url smart transport-url** command. Ignore this step if the URL is configured.

Example:

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

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

b) If you want to deploy Direct Cloud access through an HTTPS proxy method, configure a proxy for the **smart transport** mode using the **license smart proxy hostname port port-number** command. Skip this step for Direct Cloud Access deployment.

Example:

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

Step 3 Verify the license status on your device using the **show license status** command. Verify if the latest date is appearing in the **Trust Code Installed** field.

Example:

```
Router# show license status

Utility:
  Status: DISABLED
Smart Licensing Using Policy:
  Status: ENABLED
Account Information:
  Smart Account: BU A9000 UTC
  Virtual Account: A9000
Data Privacy:
  Sending Hostname: yes
    Callhome hostname privacy: DISABLED
    Smart Licensing hostname privacy: DISABLED
  Version privacy: DISABLED

Transport:
  Type: Smart

  URL: https://smartreceiver.cisco.com/licservice/license
 Proxy:
  Not Configure

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)

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
..!
```

Step 4   Synchronize the device using the **license smart sync** command to send and receive any pending data.

> **Note**   If you don't execute the **license smart sync** command, the license synchronization takes one day.

Downgrade Devices to Smart Licensing

Table 7: Downgrade Devices to Smart Licensing

If your existing Smart Licensing Using Policy deployment is...	Then ...
Smart Software Manager On-Prem	downgrade devices in SSM On-Prem.
Cisco Smart Licensing Utility	no action is required. CSLU is not supported in Smart Licensing. We recommend you to deploy SSM On-Prem.
Direct Deployments	Downgrade Devices in Direct Deployment.
Offline Deployments	no action is required because you are not connected to CSSM.

Downgrade Devices in SSM On-Prem Deployment

Follow these steps to downgrade devices to Smart Licensing SSM On-Prem deployment.

Step 1   Downgrade to Cisco IOS XR Release 7.11.1 version or earlier that supports Smart Licensing.

See *Cisco IOS XR Setup and Upgrade Guide*.

a)   Copy the package on the hard disk of the router or on a network server.
b)   Use the **install add source** command to unpack the package software files from a PIE file and copy them to the boot device such as disk0:.

Step 2   Activate the package using the **install activate** command.

If there is a configuration inconsistency issue, use the **clear configuration consistency** command to clear the configuration.

Step 3   Reregister your device with SSM On-Prem using the **license smart register id token** command on the device.

Step 4   Sync your SSM On-Prem local account with CSSM, see Cisco Smart Software Manager On-Prem Migration Guide.

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

Downgrade Devices in Direct Deployment

Follow these steps to downgrade devices to Smart Licensing direct deployment.

Step 1 Downgrade to Cisco IOS XR Release 7.11.1 version or earlier that supports Smart Licensing.

See *Cisco IOS XR Setup and Upgrade Guide*.

a) Copy the package on the hard disk of the router or on a network server.
b) Use the **install add source** command to unpack the package software files from a PIE file and copy them to the boot device such as `disk0:`.

Step 2 Activate the package using the **install activate** command.

If there is a configuration inconsistency issue, use the **clear configuration consistency** command to clear the configuration.

Step 3 Register the device using the **license smart register idtoken** *idtoken* command.

An authorization error might occur during registration.

```
Failure reason: {"product_instance_identifier":["ProductInstance '0a17705c-cf31-4b4f-ad8a-9605fd867ddc'
 is not valid"]}
```

If you encounter this error, then use the **license smart register idtoken** *idtoken* **force** command to force the registration.

The transport mode changes to **smart**.

Step 4 Reregister with CSSM, see Cisco Smart Software Manager.

YANG Data Models

Cisco IOS XR supports a programmatic way of configuring and collecting operational data of a network device using YANG data models. Although configurations using CLIs are easier and human-readable, automating the configuration using model-driven programmability results in scalability.

The data models are available in the release image, and are also published in the Github repository. Navigate to the release folder of interest to view the list of supported data models and their definitions. Each data model defines a complete and cohesive model, or augments an existing data model with additional XPaths. To view a comprehensive list of the data models supported in a release, navigate to the **Available-Content.md** file in the repository.

You can also view the data model definitions using the YANG Data Models Navigator tool. This GUI-based and easy-to-use tool helps you explore the nuances of the data model and view the dependencies between various containers in the model. You can view the list of models supported across Cisco IOS XR releases and platforms, locate a specific model, view the containers and their respective lists, leaves, and leaf lists presented visually in a tree structure. This visual tree form helps you get insights into nodes that can help you automate your network.

To get started with using the data models, see the *Programmability Configuration Guide*.

The data model handles the types of requirements for smart licensing.

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	• license smart reservation • [no] license smart reservation • license smart flexible-consumption enables • [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	• show license platform summary • show license platform detail • show license [all | summary | usage | udi]
Actions: a set of NETCONF actions that support robust networkwide configuration transactions.	**Native data model:** Cisco-IOS-XR-smart-license-act.yang	• license smart register id token • license smart deregister • license smart renew id • license smart renew auth • license smart reservation request local • license smart reservation cancels 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>*

Revision History

Table 8: Feature History Table

Feature Name	Release Information	Feature Description
Smart Licensing Using Policy	Release 24.1.1	Cisco Smart Licensing Using Policy 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 Smart Licensing Using Policy, 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 Smart Licensing Using Policy, 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)