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Cisco IOS XR Smart Licensing

Smart Licensing for Cisco IOS XR Routers

This article provides information about Smart Licensing (SL) solutions and their deployment on Cisco IOS XR Routers.

Smart Software Licensing is a solution for managing software across the Cisco portfolio and your organization. It provides complete visibility into your software usage and gives you full control over your licensing status.

Efficient Cloud-Based Software Licensing with Smart Licensing

Smart Licensing (SL) is a cloud-based, flexible software licensing model that allows you to activate and manage Cisco software licenses across your organization. This solution enables you to easily track the status of your licenses and software usage trends. Smart Licensing allows pooling of licenses or entitlements that you can use across the entire organization in a flexible and automated manner.

Benefits of Smart Licensing

These are the key benefits of Smart Licensing.

- **Easy activation**—Establishes a pool of software licenses that can be used across your company—no more entering Product Activation Keys.

- **Unified management**—Provides a complete view into all of your products and services in an user-friendly portal.

- **License flexibility**—Allows you to easily use and move licenses as needed since the software is not node-locked to your hardware.

Key Features of Smart Licensing

- **Direct and Proxy Registration**: Registers your device directly with the Cisco Smart Software Manager (CSSM) portal or through a proxy for restricted internet access environments.

- **Centralized Management**: Manage your license inventory using CSSM, simplifying software asset tracking and management.

- **License Portability**: Move or transfer your licenses easily between devices, offering flexibility in deploying software assets within the organization.

- **Simplified Activation**: Simplifies this process by using a pool of licenses that aren't tied to a specific device as against Traditional licensing.

- **Automatic License Renewal**: Renews licenses automatically, reducing the administrative burden of tracking license expiration dates and manual renewals.

- **Usage Reporting**: Generates detailed reports on license usage to understand device software consumption, optimizing your license investments.

- **Compliance Assurance**: Provides visibility into license entitlements versus actual usage, helping that you stay compliant.

- **Support for Hybrid Environments**: Supports both on-premises and cloud-based environments, allowing for consistent license management across different deployment models.

- **Real-time Updates**: Receives real-time updates from Cisco, ensuring that you have access to the latest features and compliance information.

Deployment Models for Smart Licensing

These are the deployment models of Smart Licensing:

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

- Direct Deployment
  - Direct Cloud Access
  - Direct Cloud Access through an HTTPS proxy

- Offline Deployment
  - SSM On-Prem Disconnected
  - Specific License Reservation

Smart Licensing versus Traditional Licensing

This table contrasts traditional licensing with smart licensing.

| License Attributes	Traditional Licensing	Smart Licensing
License Activation	Manually install licenses on the device for activation.	Activate licenses by registering at the Cisco Smart Software Manager (CSSM). Call home is the default transport mode.
License Pooling	Licenses are node-locked to devices. One license associates to a specific device.	Pooling of licenses in a virtual account of the network. You can activate or deactivate different types of licenses on the device without installing a license file.
License Inventory	No common install base location to view licenses purchased or software usage trends.	CSSM maintains your license inventory. It provides a statistical view of license usage and consumption.
Licnese Transfer	No easy means to transfer licenses from one device to another.	Easy movement of licenses between devices without license transfer, simplifying license reassignment in a Return Material Authorization (RMA) process.

Deploying Smart Licenses

Smart Licensing 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 is your locally installed on-premises user portal that work with CSSM.

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

Hover and click each deployment in the image to navigate to the topic.
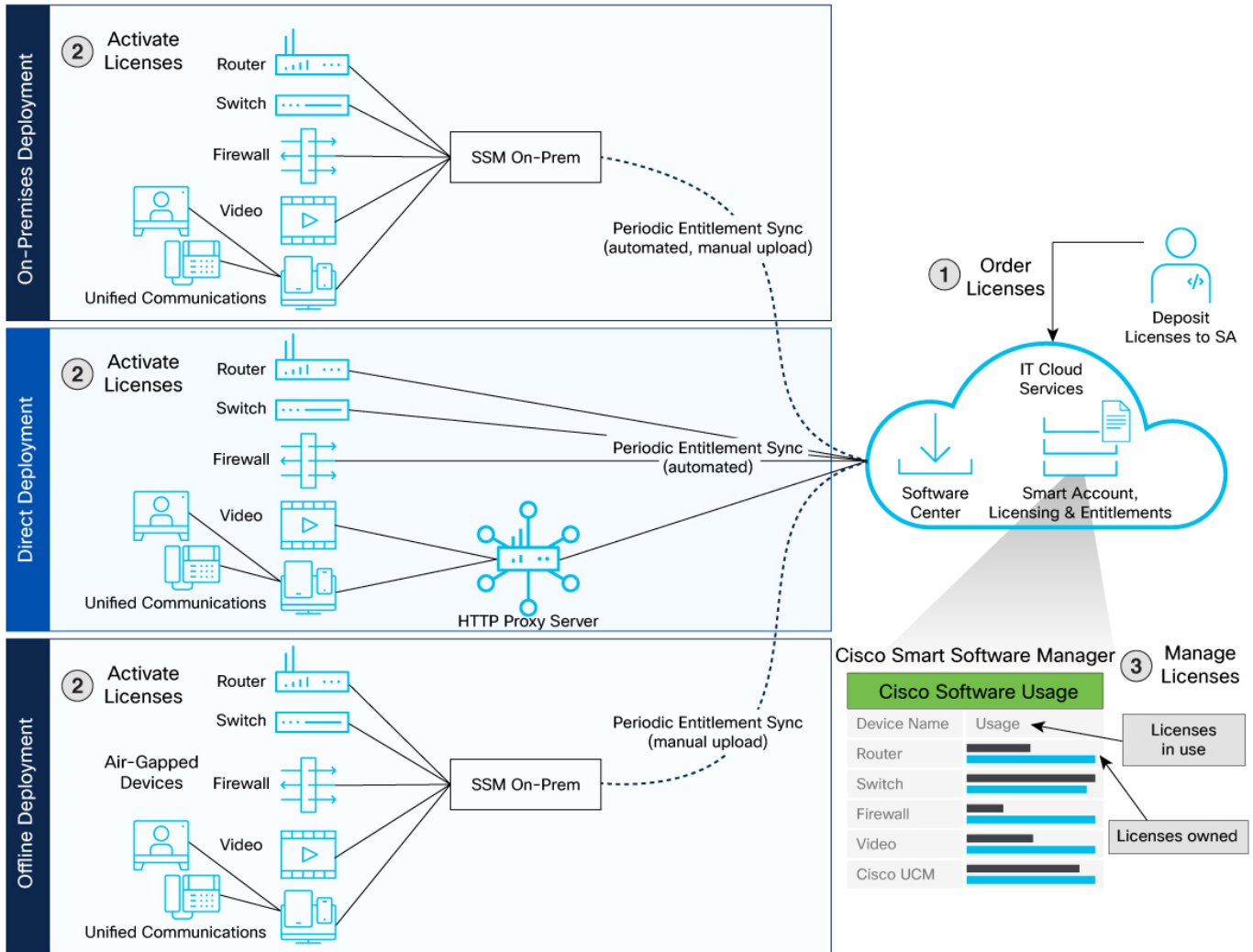
Smart Licensing Workflow In a Nutshell

These are the stages for deploying Smart Licenses:

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 register the device with CSSM.

3. Manage licenses.

   a. Generate your 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 to Deploy Smart Licensing

Before deploying Smart Licensing, read the guidelines for a smooth deployment.

Starting Cisco IOS XR Release 7.10.1, 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.

On-Premises Deployment

On-Premises deployment is an option for organizations that prefer not to have their products communicate directly with Cisco Smart Software Manager (CSSM) over the internet. This type of deployment involves the use of a license server, such as Smart Software Manager (SSM) on the premises to administer and manage devices and licenses.

Smart Software Manager On-Premises

Smart Software Manager (SSM) is an On-Premise version of Cisco Smart Software Manager (CSSM) and provides a similar set of features. 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.

SSM On-Prem offers

- support for multiple local accounts, and
- provides online or offline connectivity to Cisco.

SSM On-Prem Modes

SSM On-Prem connects with CSSM in the cloud to synchronize license consumption and usage at the desired frequency such as daily, weekly, or monthly.

These are the ways that you can connect SSM On-Prem with CSSM:

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

To report license usage, synchronize local accounts on SSM On-Prem with CSSM by using the **Synchronization** widget in the SSM On-Prem UI. 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.

Steps to Deploy SSM On-Prem

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

1. Activate Licenses on SSM On-Prem
2. Manage licenses on SSM On-Prem

Activate Licenses on SSM On-Prem

Smart Licensing on SSM On-Prem uses call home as the transport mode. You must create a Call Home profile to report to CSSM.

Follow these steps to activate licenses on SSM On-Prem deployment.

Step 1   Download the file from Smart Software Manager On-Prem and install Smart Software Manager On-Prem.

Step 2   Refer to the SSM On-Prem User Guide to configure SSM On-Prem and create a local account.

Step 3   On the SSM On-Prem, navigate to the **Licensing workspace > Inventory > General** , select **Smart Call Home Registration URL**.

Step 4   Register the device by generating a token from the smart account and virtual account in CSSM and copy the token on the devices using the **license smart register token id** command.

Example:

```
Router# license smart register idtoken $Tl4UytrNXBzbEs1ck8veUtWaG5abnZJOFdDa1FwbVRa%0AblRMbz0%3D%0A
```

Step 5   Create a Call Home destination profile on your device. See Create a Call Home Destination Profile, on page 7.

Step 6   Configure a source interface for the HTTP client using the **http client source-interface** command.

Example:

```
Router(config)# http client source-interface ipv4 Vlan100
```

This command is mandatory for a VRF interface.

Step 7   (Optional) Declare the trustpoint using the **crypto ca trustpoint** command.

Example:

```
Router(config)# crypto ca trustpoint SLA-TrustPoint
Router(config-trustp)#
Router(config-trustp)# commit
Router(config-trustp)# end
```

Step 8   View On-Prem Call Home profile, using the **show call-home profile all** command.

Example:

```
Router# show call-home profile all
Tue Aug 18 23:52:16.590 UTC

Profile Name: CiscoTAC-1
    Profile status: ACTIVE
    Profile mode: Full Reporting
```

```
        Reporting Data: Smart Call Home, Smart Licensing
        Preferred Message Format: xml
        Message Size Limit: 3145728 Bytes
        Transport Method: http
        HTTP  address(es): https://209.165.201.15/Transportgateway/services/DeviceRequestHandler

        Other address(es): default

        Periodic configuration info message is scheduled every 17 day of the month at 13:15

        Periodic inventory info message is scheduled every 17 day of the month at 13:0

        Alert-group              Severity
        ----------------------   ------------
        inventory                    normal

        Syslog-Pattern           Severity
        ----------------------   ------------
        .*                              critical
```

Step 9   Verify the license status using the **show license status** command.

Example:

```
Router# show license status

Smart Licensing is ENABLED

Registration:
  Status: REGISTERED
  Smart Account: Forty-Two uLtd.
  Virtual Account: IOSXR
  Export-Controlled Functionality: ALLOWED
  Initial Registration: SUCCEEDED on Aug 18 2020 23:51:46 UTC
  Last Renewal Attempt: None
  Next Renewal Attempt: Feb 14 2021 23:51:46 UTC
  Registration Expires: Aug 18 2021 23:46:43 UTC

License Authorization:
  Status: OUT OF COMPLIANCE on Aug 18 2020 23:51:57 UTC
  Last Communication Attempt: SUCCEEDED on Aug 18 2020 23:51:57 UTC
  Next Communication Attempt: Aug 19 2020 11:51:57 UTC
  Communication Deadline: Nov 16 2020 23:46:56 UTC

Export Authorization Key:
  Features Authorized:
    <none>

Utility:
  Status: DISABLED

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

Transport:
  Type: Callhome

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

Core and Aggregation Essentials SW Right-to-Use v1.0 per 100G (ESS-100G-RTU-1):
  Description: Core and Aggregation Essentials SW Right-to-Use v1.0 per 100G
```

```
Count: 1
Version: 1.0
Status: OUT OF COMPLIANCE
Export status: NOT RESTRICTED

5501 Base Hardware Tracking PID (NCS-5501-TRK):
  Description: 5501 Base Hardware Tracking PID
  Count: 1
  Version: 1.0
  Status: OUT OF COMPLIANCE
  Export status: NOT RESTRICTED

Product Information
===================
UDI: PID:NCS-5501,SN:FOC2137R1SL

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

Reservation Info
================
License reservation: DISABLED
```

Create a Call Home Destination Profile

Step 1   Configure the Call Home profile in the call-home configuration using the **profile** command.

Example:

```
Router# configure
Router(config)# call-home
Router(config-call-home)# profile test1
Router(config-call-home-profile)# reporting smart-licensing-data
```

Step 2   Enable data sharing with the Call Home service through HTTP using the **destination transport-method http** command.

Example:
```
Router(config-call-home-profile)# destination transport-method http
```

Step 3   Configure the On-Prem destination URL to send Call Home messages using the **destination address http** command.

If the default destination address exists, then remove using the **no destination address http** command.

Example:
```
Router(config-call-home-profile)# destination address http
http://209.165.201.15/Transportgateway/services/DeviceRequestHandler

Or
Router(config-call-home-profile)# destination address http
https://209.165.201.15/Transportgateway/services/DeviceRequestHandler
```

Verify that the IP address or the Fully Qualified Domain Name (FQDN) in the destination URL matches the IP address or the FQDN of the **Host Name** on the SSM On-Prem.

Starting Cisco IOS XR Release 7.10.1, 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 **cryptoca fqdn-check ip-address allow** command to bypass the name-server configuration. Additionally, you must configure **crypto ca trustpoint Trustpool vrf** *vrf-name* with **http client vrf** *vrf-name* for communication in VRF.

Step 4   Set a preferred message format using the **destination preferred-msg-format** command. The default message format is XML.

Example:

```
Router(config-call-home-profile)# destination preferred-msg-format xml
```

Step 5   Enable the destination profile using the **active** command.

Example:

```
Router(config-call-home-profile)# active
```

Step 6   Exit the Call Home configuration using the **exit** command.

Example:

```
Router(config-call-home-profile)# exit
Router(config-call-home)# exit
```

Manage Licenses on SSM On-Prem

Generate an authorization code from the CSSM portal:

Step 1   Log into **SSM On-Prem > Smart Licensing** workspace.

Step 2   Synchronize the reports from SSM On-Prem with Cisco using the **SSM On-Prem > Smart Licensing** workspace.

If you're in	Then
Connected Mode	a. Navigate to **Reports** and select the desired report. b. Enter a name and description at **Run License Report** to generate a report.
Disconnected Mode	a. Navigate to **Reports** and select the desired report. b. Enter a name and description at **Run License Report** to generate a **Run report**. c. Select **Export to Excel** or **Export to CSV** reports to open a **File Save** dialog. Save the report on the device after downloading the report.

Step 3   Manage the license consumption on your devices. View the license status and summary using the **show license summary** or **show license usage** commands.

Example:

```
Router# show license summary

Smart Licensing is ENABLED

Registration:
  Status: REGISTERED
  Smart Account: Forty-Two uLtd.
  Virtual Account: IOSXR
  Export-Controlled Functionality: ALLOWED
  Last Renewal Attempt: None
  Next Renewal Attempt: Feb 14 2021 23:51:46 UTC

License Authorization:
  Status: OUT OF COMPLIANCE
  Last Communication Attempt: SUCCEEDED
  Next Communication Attempt: Aug 19 2020 11:51:56 UTC

License Usage:
  License                              Entitlement tag              Count Status
  ------------------------------------------------------------------------------------------

  Core and Aggregation...        (ESS-100G-RTU-1)         1 OUT OF COMPLIANCE
  5501 Base Hardware T...        (NCS-5501-TRK)            1 OUT OF COMPLIANCE

Router# show license usage

License Authorization:
  Status: OUT OF COMPLIANCE on Aug 18 2020 23:51:57 UTC

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

5501 Base Hardware Tracking PID (NCS-5501-TRK):
  Description: 5501 Base Hardware Tracking PID
  Count: 1
  Version: 1.0
  Status: OUT OF COMPLIANCE
  Export status: NOT RESTRICTED
```

Direct Deployment

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.

The two ways to set up direct deployments are:

- Smart Transport

- Smart Call Home

Smart Transport

The Smart Transport 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 the following 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's registered with the CSSM.

Steps to Deploy Smart Licensing using Direct Deployment Mode

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

Activate Licenses on Direct Deployment

Follow these steps to activate licenses in direct deployment.

Step 1   Enable smart transport mode on the device using the **license smart transport smart** command.

Example:

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

Step 2   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*).

Starting Cisco IOS XR Release 7.10.1, 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 **cryptoca fqdn-check ip-address allow** command to bypass the name-server configuration. Additionally, you must 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 If you are deploying 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.

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

Step 4 Register the device by generating a token from the smart account and virtual account in CSSM and copy the token on the devices using the **license smart register token id** command.

Example:

```
Router# license smart register idtoken $Tl4UytrNXBzbEs1ck8veUtWaG5abnZJOFdDa1FwbVRa%0AblRMbz0%3D%0A
```

Step 5 Verify the license status using the **show license status** command.

Example:

```
Router# show license status

Smart Licensing is ENABLED

Utility:
  Status: DISABLED

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

Transport:
  Type: Smart
 URL: https://smartreceiver.cisco.com/licservice/license
 Proxy:
   Not Configure
Registration:
  Status: UNREGISTERED
  Export-Controlled Functionality: NOT ALLOWED

License Authorization:
  Status: EVAL MODE
  Evaluation Period Remaining: 83 days, 23 hours, 32 minutes, 57 seconds

Export Authorization Key:
  Features Authorized
```

Manage Licenses on Direct Deployment

Step 1 In CSSM UI, navigate to **Smart Software Licensing > Reports**.

Step 2   Generate the report at **Run License Report**.

You can save the report to the device using **Export to Excel** or **Export to CSV**.

Step 3   Manage the license consumption on your devices. View the license status and summary using the **show license summary** or **show license usage** commands.

Example:

```
Router# show license summary

 Router# show license summary
Smart Licensing is ENABLED

Registration:
  Status: REGISTERED
  Smart Account: Forty-Two uLtd.
  Virtual Account: IOSXR
  Export-Controlled Functionality: ALLOWED
  Last Renewal Attempt: None
  Next Renewal Attempt: Feb 14 2021 23:51:46 UTC

License Authorization:
  Status: OUT OF COMPLIANCE
  Last Communication Attempt: SUCCEEDED
  Next Communication Attempt: Aug 19 2020 11:51:56 UTC

License Usage:
  License                                Entitlement tag              Count Status
  -----------------------------------------------------------------------------------------

  Core and Aggregation...        (ESS-100G-RTU-1)        1 OUT OF COMPLIANCE
  5501 Base Hardware T...        (NCS-5501-TRK)            1 OUT OF COMPLIANCE

Router# show license usage
Router# show license usage
License Authorization:
  Status: OUT OF COMPLIANCE on Aug 18 2020 23:51:57 UTC

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

5501 Base Hardware Tracking PID (NCS-5501-TRK):
  Description: 5501 Base Hardware Tracking PID
  Count: 1
  Version: 1.0
  Status: OUT OF COMPLIANCE
  Export status: NOT RESTRICTED
```

Smart Call Home

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

You can also configure Call Home to collect syslog and diagnostic data, collect core dump data, or send email notifications for events. You can view your Call Home collected information with your Smart Licensing username and password at https://tools.cisco.com/sch/reports/deviceReport.do.

For more information on the Smart Call Home feature, see the Smart Call Home Deployment Guide.

Direct Deployment Methods

Direct deployment offers the following 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 the Call Home profile to CSSM.

Report License Usage

In direct deployments, the device automatically generates reports once it's registered with the CSSM.

Steps to Deploy Smart Licensing in Direct Deployment Mode

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

1.

2.

Activate Licenses on Direct Deployment

Follow these steps to activate licenses in direct deployment.

| **Step 1** | Configure the Call Home profile using the **call-home** command. |

Enter a default email address using the **contact-email-address** *email-address* command. You can enter up to 200 characters in email address format. Avoid using spaces in the email address.

Example:

```
Router(config)# call-home
Router(config-call-home)# service active
Router(config-call-home)# contact-email-addr sch-smart-licensing@cisco.com
```

Step 2 If you are deploying Direct Cloud access through an HTTPS proxy method, configure a proxy server to the Call Home service using the **http-proxy** *proxy-address* port *port-number* command. Skip this step for Direct Cloud Access deployment.

Example:

```
Router(config-call-home)# http-proxy 198.51.100.10 port 3128
```

Step 3 Disable the email option for the Call Home service using the **no destination transport-method email** command in the CiscoTAC-1 profile for the Call Home service.

Example:

```
Router(config-call-home)# profile CiscoTAC-1
Router(config-call-home-profile)# no destination transport-method email
Router(config-call-home-profile)# exit
```

Step 4 Create a Call Home destination profile using the **profile** *profile-name* command.

Example:

```
Router(config-call-home)# profile test1
```

a) Enable data sharing with the Call Home service for HTTP using the **reporting smart-licensing-data** command.

Example:
```
Router(config-call-home-profile)# reporting smart-licensing-data
```

b) Set the HTTP message transport method using the **destination transport-method http** command.

Example:
```
Router(config-call-home-profile)# destination transport-method http
```

c) Specify the destination address using the **destination address http** *url* command to connect to CSSM.

Starting Cisco IOS XR Release 7.10.1, 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 **cryptoca fqdn-check ip-address allow** command to bypass the name-server configuration. Additionally, you must configure **crypto ca trustpoint Trustpool vrf** *vrf-name* with **http client vrf** *vrf-name* for communication in VRF.

Example:
```
Router(config-call-home-profile)# destination address http
https://tools.cisco.com/its/service/oddce/services/DDCEService
```

d) Activate the profile using the **active** command and exit the configuration.

Example:

```
Router(config-call-home-profile)# active
Router(config-call-home-profile)# exit
Router(config-call-home)# exit
```

Step 5   View the Call Home profile using the **show call-home profile all** command.

Example:
```
Router# show call-home profile all
Tue Aug 18 23:52:16.590 UTC

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

    Periodic configuration info message is scheduled every 17 day of the month at 13:15

    Periodic inventory info message is scheduled every 17 day of the month at 13:0

    Alert-group               Severity
    ----------------------   ------------
    inventory                   normal

    Syslog-Pattern           Severity
```

```
                                ----------------------- ------------
                                .*                                critical
```

Step 6   Register the device by generating a token from the smart account and virtual account in CSSM and copy the token on the devices using the **license smart register token id** command.

Example:

```
Router# license smart register idtoken $Tl4UytrNXBzbEs1ck8veUtWaG5abnZJOFdDa1FwbVRa%0AblRMbz0%3D%0A
```

Step 7   Verify the license status using the **show license status** command.

Example:

```
Router# show license status

Smart Licensing is ENABLED

Utility:
  Status: DISABLED

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

Transport:
  Transport:
  Type: Callhome
Registration:
  Status: UNREGISTERED
  Export-Controlled Functionality: NOT ALLOWED

License Authorization:
  Status: EVAL MODE
  Evaluation Period Remaining: 83 days, 23 hours, 32 minutes, 57 seconds

Export Authorization Key:
  Features Authorized
```

Manage Licenses on Direct Deployment

Step 1   In CSSM UI, navigate to **Smart Software Licensing > Reports**.

Step 2   Generate the report at **Run License Report**.

You can save the report to the device using **Export to Excel** or **Export to CSV**.

Step 3   Manage the license consumption on your devices. View the license status and summary using the **show license summary** or **show license usage** commands.

Example:

```
Router# show license summary

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

```
    Registration:
      Status: REGISTERED
      Smart Account: Forty-Two uLtd.
      Virtual Account: IOSXR
      Export-Controlled Functionality: ALLOWED
      Last Renewal Attempt: None
      Next Renewal Attempt: Feb 14 2021 23:51:46 UTC

    License Authorization:
      Status: OUT OF COMPLIANCE
      Last Communication Attempt: SUCCEEDED
      Next Communication Attempt: Aug 19 2020 11:51:56 UTC

    License Usage:
      License                              Entitlement tag            Count Status
      ---------------------------------------------------------------------------------------

      Core and Aggregation...        (ESS-100G-RTU-1)        1 OUT OF COMPLIANCE
      5501 Base Hardware T...       (NCS-5501-TRK)           1 OUT OF COMPLIANCE
Router# show license usage
Router# show license usage
License Authorization:
  Status: OUT OF COMPLIANCE on Aug 18 2020 23:51:57 UTC

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

5501 Base Hardware Tracking PID (NCS-5501-TRK):
  Description: 5501 Base Hardware Tracking PID
  Count: 1
  Version: 1.0
  Status: OUT OF COMPLIANCE
  Export status: NOT RESTRICTED
```

Offline Deployment

Offline deployment is when a device is not communicating with Cisco. Offline deployments are mostly used in highly secure environments that have no internet access.

Offline Deployments Based on your Network

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

- **Remote deployments** - Your On-Premises server offer disconnected mode. Use disconnected licensing mode by turning off communication with Cisco on the SSM On-Prem server. See Activate Licenses on SSM On-Prem, on page 5.

- **Air-gapped deployments** - Use license reservation by going fully offline which requires no ongoing communication or additional infrastructure. License reservation solution is designed for classified environments that don't allow electronic communication in or out of the environment. All licenses are manually checked in and out by copying and pasting license authorization code information between products and Cisco.com.

The two types of license reservation are:

- **Specific License Reservation (SLR)** - SLR is reservation of specific licenses from the smart account as per the license usage on the router.
- **Permanent License Reservation (PLR)** - PLR is reservation of permanent licenses from the smart account, allowing unlimited license usage on the router. PLR is offered to select users who don't want tracking of license usage.

To use the Specific License Reservation or Permanent 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.

Report License Usage

Report license usage for remote environments: By turning off device communication to Cisco in your On-Premises servers your devices do not report to CSSM. You have to manually report to CSSM.

Report license usage for air-gapped environments: In fully offline deployment, there is no reporting of devices to Cisco.

Activate 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.

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

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

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

Example:

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

Step 3 Generate a request code using **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** at CSSM, and select the virtual account. 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) Select licenses at **Select License > Reserve a Specific License**.

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

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

Step 5 Install the authorization code on the device using 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 using 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
```

YANG Data Models for Smart Licensing

YANG is a data modeling language that helps create configurations, retrieve operational data, and execute actions. The router acts on the data definitions using NETCONF RPCs. You can access the data models from the Github repository. To learn more about the data models and put them to use, see the *Programmability Configuration Guide*.

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]

Data	Data Model	CLI Commands
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 1: Feature History Table

Feature Name	Release Information	Feature Description
YANG Data Models for Smart Licensing	Release 7.4.1	With this feature, you can use data models for all the smart licensing operations such as registering your device with a token, renewing token ID, deregistering device to remove the software entitlements and so on using NETCONF remote procedure calls (RPCs). The following data models are introduced: Cisco-IOS-XR-smart-license-cfg.yang cisco-smart-license.yang Cisco-IOS-XR-smartlicense-platform-oper.yang Cisco-IOS-XR-infra-smartlicense-oper.yang Cisco-IOS-XR-smart-license-act.yang You can access these data models from the Github repository.

Feature Name	Release Information	Feature Description
Smart Transport	Release 7.4.1	You can now use Smart transport to communicate with CSSM. Smart transport is a transport method where a Smart Licensing (JSON) message is contained within an HTTPs message, and exchanged between a product instance and CSSM, to communicate.
Offline Deployment	Release 7.3.1	Specific License Reservation (SLR) allows customers in highly secure networks to utilize smart licenses without communicating the license information to the Cisco Smart Software manager (CSSM).