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Cisco ACI Smart Licensing Using Policy

About Cisco ACI Smart Licensing Using Policy

Cisco Application Centric Infrastructure (ACI) Smart Licensing using Policy (SLP) is a software management platform that manages all Cisco ACI product licenses. SLP simplifies license management compared to the original Cisco Smart Licensing feature. SLP provides a licensing solution that does not interrupt the operations of your network and enables a compliance relationship that considers the hardware and software licenses you purchase and use.

You can use one of the following options to report license usage to the Cisco Smart Software Manager (CSSM):

- Online mode
- Offline mode

In online mode, you configure network settings and connect the Cisco Application Policy Infrastructure Controller (APIC) to the CSSM either directly or indirectly using middleware. The Cisco APIC automatically sends a Resource Utilization Measurement (RUM) report, which details license usage, to the CSSM and gets acknowledgment from the CSSM. The online network settings are as follows:

- **Direct Connect to CSSM**: This is the most commonly used network setting. Cisco APIC must have Internet connectivity so that Cisco APIC can send RUM reports to CSSM directly. The DNS must be configured and the CSSM hostname must be pingable. In Cisco ACI 6.1(1) or later releases, the CSSM hostname is changed to: **smartreceiver.cisco.com**, which must be pingable from the Cisco APIC controller.
- **Cisco Transport Gateway**: With this setting, the Cisco APIC does not have Internet connectivity. Cisco APIC sends RUM reports to CSSM using a transport gateway. The Cisco transport gateway middleware must be already installed in the data center.
- **HTTP Proxy**: With this setting, the Cisco APIC does not have Internet connectivity. The Cisco APIC sends RUM reports to the CSSM using your web server. Make sure the web server is properly configured to allow the smart licensing messages to pass through the firewall and to reach the destination (ptesdc.cloudapps.cisco.com/its/service/oddce/). In Cisco ACI 6.1 (1) or later releases, the CSSM URL is changed to, https://smartreceiver.cisco.com/licservice/license. Make sure that the web server can reach this destination

  Note

  From ACI release 6.1(1) onward, the Smart Agent HTTP client does not support IPv6 proxy addresses. To establish successful communication with CSSM, the proxy hostname needs to be configured in place of the IPv6 address under the APIC Smart Licensing configuration. Also, the APIC should be configured with the DNS IP

- **Cisco Smart Software Manager On-Prem** (On-Prem): With this setting, Cisco APIC does not have Internet connectivity, whereas On-Prem must have Internet connectivity. Cisco APIC sends RUM reports to CSSM through the On-Prem. The On-Prem middleware must be already installed in the data center. This setting was known as **Cisco Smart Software Manager Satellite** (Manager Satellite) in Cisco ACI Smart Licensing (SL).
- **Cisco Smart Licensing Utility (CSLU)**: With this setting, the Cisco APIC does not have Internet connectivity. The Cisco APIC sends RUM reports to CSSM using the CSLU. The CSLU Microsoft Windows version of the middleware must be already installed in the data center.

In offline mode, the Cisco APIC is isolated without any network connection with the CSSM either directly or indirectly. Because the Cisco APIC cannot reach the CSSM through a network connection, every 12 months you must download a RUM report from the

Cisco APIC and import the report into the CSSM. Afterward, you must download an acknowledgment from the CSSM and import the acknowledgment into the Cisco APIC.

SLP defines a Cisco ACI product as unenforced and uses a generic policy type. Unlike the original Cisco Smart Licensing, SLP does not have a 90-day evaluation period, product registration, nor product unregistration. In addition, SLP does not have the license authorization status in the client view.

In the client view, a license entitlement has one of two statuses: in use or not in use. Because the Cisco APIC only manages those licenses that are currently enabled (in use), in the Cisco APIC GUI or CLI, you can only see licenses that have an entitlement status of **In Use**, and you cannot see licenses that have an entitlement status of **Not In Use**.

SLP monitors license usage similar to the way that you use a syslog server to monitor faults and events. The CSSM is similar to a syslog server and a RUM report is similar to a fault or event. The CSSM receives a RUM report from each Cisco APIC, stores license usage for each Cisco ACI product instance, and knows if a license entitlement is authorized or out of compliance. The Cisco APIC is only responsible for periodically sending a RUM report to the CSSM and does not know if a license entitlement is authorized or out of compliance. However, you can use the Cisco APIC CLI to show if the Cisco APIC has received the acknowledgment of the last RUM report or not.

SLP incorporates all issues and errors, such as an initial network setting configuration issue or network connectivity issue, into faults. If you do not see any faults in the Cisco APICSmart Licensing GUI, then there are no licensing issues.

SLP is supported starting with the Cisco APIC 5.2(4) release. If you have deployed the 5.2(3) release or earlier, see the *Cisco ACI Smart Licensing* document instead of this document:

https://www.cisco.com/c/en/us/td/docs/switches/datacenter/aci/apic/sw/all/smart-licensing/b_Smart_Licensing.html

Starting with Cisco ACI 6.1(1), the ACI product now provides switch licenses for Spine switches. The license usage that is consumed by the Spine switches are reported to CSSM. The Cisco ACI switch licenses consist of the BASE/ESS/ADV/PREM license tiers. Within an APIC controller or a fabric, if a leaf switch consumes the ADV license, all the Spine switches consume the ADV licenses. Otherwise, all the Spine switches consume the ESS licenses.

Premier License Enforcement Policy

Starting with Cisco ACI 6.2(1), Cisco ACI introduces the premier license enforcement policy. This policy determines which license entitlements are applied based on the types of licenses you have purchased.

Note

A switch with a more recent manufacturing date will consume a license before a switch with an older manufacturing date.

When you configure the premier (PREM) license policy in Cisco ACI, switches consume licenses in the following order:

- ACI switches first consume PREM licenses until the number consumed reaches the PREM license count specified in the PREM license policy. Cisco APIC reports PREM license usage to CSSM and displays usage details in the APIC UI.
- After PREM licenses are exhausted, ACI switches consume the advanced licenses until the number consumed equals the advanced license count specified in the policy.
- Once both PREM and advanced licenses are fully consumed, switches use BASE, ESS, or ADV license tiers.. The assigned license depends on the features enabled or disabled, which ensures that every switch has a license. License usage is reported to CSSM, and details appear in the APIC UI.
- If you reset the license counts in the PREM license policy to zero (the default), Cisco APIC reverts to the default, feature-based approach for reporting license usage to CSSM.

To override the default feature-based license usage reporting and enforce the APIC controller to report PREM or ADV license usage to CSSM, use the following ACI REST APIs:

- To query Prem license:

```
Operation: GET

        URL: https://<APIC node-1 hostname or IP>/api/class/licensePremEnforcePol.xml

                https://<APIC node-1 hostname or IP>/api/mo/uni/fabric/premenforcepol.xml
```

- To modify Prem license:

```
Operation: POST

         URL: https://<APIC node-1 hostname or IP>/api/mo/uni/fabric/premenforcepol.xml

         URL Body: <licensePremEnforcePol dn="uni/fabric/premenforcepol" premLicenseCount="50"
advLicenseCount="30"/>
```

Guidelines to Use the Premier License Enforcement Policy

Follow these best practices when configuring Premier (PREM) and Advanced (ADV) license reporting in Cisco ACI environments:

- If you did not purchase any PREM licenses, do not use the PREM license policy. Instead, rely on the default feature-based approach to ensure correct license usage reporting to Cisco Smart Software Manager (CSSM).
- If you purchased PREM licenses for all switches at a site, configure the **premLicenseCount** equal to the total number of PREM licenses purchased. This enables the APIC controller and APIC UI to report PREM license usage accurately to CSSM.
- If you purchased only ADV licenses for all switches and have not enabled the multi-site feature, configure the **advLicenseCount** equal to the total number of ADV licenses purchased. If you enable the multi-site feature later, reset **advLicenseCount** to **zero** to revert to the default feature-based approach for accurate reporting.
- If your environment includes a combination of license types, such as perpetual and subscription, or entitlements like PREM, ADV, or ESS, do not use the PREM license policy approach. Using the PREM license policy approach in this situation can result in incorrect PREM license entitlement reports and may cause Out-of-Compliance issues.

  Instead, rely on the default feature-based approach to ensure accurate reporting and prevent problems. Purchased PREM licenses will still be used from your license pool on CSSM, even if the APIC UI does not display PREM license usage. This usage does not trigger an Out-of-Compliance state.

About the Cisco ACI Smart Licensing Policies

Cisco Application Centric Infrastructure (ACI) Smart Licensing using Policy (SLP) uses the following smart licensing policies:

- `License Type`: Cisco ACI license entitlements are of the generic type, including both perpetual and subscription-based licenses.
- `Enforcement`: Cisco ACI license entitlements are unenforced. You can use or enable any licensed feature without authorization.
- `Export Control`: Cisco ACI license entitlements do not support export control or non-export control.
- `First Report Requirement`: After the system is rebooted, first report of license usage is required within 90 days. This is the Cisco default value and you cannot change it.
- `Report on Change`: When license usage is changed, the license usage must be reported within 90 days. This is the Cisco default value and you cannot change it.

- `Report Interval`: When you configure the network setting as an online mode, the Cisco Application Policy Infrastructure Controller (APIC) reports license usage every number of days specified by this policy. The default report interval is 30 days. You can set the report interval to a value between 1 and 90 days.

About the Cisco ACI Smart Licensing Using Policy Transport Servers

If the Cisco Application Policy Infrastructure Controller (APIC) does not have Internet access, you must configure a transport server to enable the Cisco APIC to send the RUM reports to the Cisco Smart Software Manager (CSSM) indirectly. The required server depends on the network setting that you configured.

- **Cisco Transport Gateway**: When using the gateway as a proxy server to forward smart licensing messages to the CSSM, configure the following parameters in the Cisco Transport Gateway settings:

Parameter	Value
`destination`	`tools.cisco.com`
`protocol`	`https`
`port`	`443`

  For information about installing and configuring the transport gateway, see the following document:

  https://www.cisco.com/c/dam/en/us/td/docs/switches/lan/smart_call_home/user_guides/SCH_Ch4.pdf

- **HTTP Proxy**: This is your web server, served as a proxy server. You must configure the proxy server to allow the destination URL (tools.cisco.com) to pass through the firewall so that smart licensing messages can be forwarded to the CSSM. In Cisco ACI 6.1(1) or the later releases, the destination URL is changed to: https://smartreceiver.cisco.com/licservice/license. Make sure that the proxy server can reach this destination.

  Note

  From ACI release 6.1(1) onward, the Smart Agent HTTP client does not support IPv6 proxy addresses. To establish successful communication with CSSM, the proxy hostname needs to be configured in place of the IPv6 address under the APIC Smart Licensing configuration. Also, the APIC should be configured with the DNS IP

- **Cisco Smart Software Manager On-Prem**: In Cisco Application Centric Infrastructure (ACI) Smart Licensing using Policy (SLP), the Cisco Smart Software Manager Satellite is replaced by Ciscom Smart Software Manager On-Prem (On-Prem). On-Prem is a light-weight version of the CSSM and deployed on-premises (or inside your data center). On-Prem can aggregate RUM reports from different Cisco products deployed in the same data center and send the RUM reports to the CSSM. On-Prem supports both "poll" and "push" approaches to get RUM reports from a product instance. For a Cisco ACI product, you must use the "push" approach. That is, in the Cisco APIC GUI, configure the On-Prem URL. The Cisco APIC will push the RUM report to On-Prem.

  For information about installing and configuring On-Prem, see the following document:

  https://www.cisco.com/web/software/286285517/147683/Smart_Software_Manager_On-Prem_7_Installation_Guide.pdf

- **Cisco Smart Licensing Utility (CSLU)**: The CSLU is a Windows-based application that enables you to administer licenses and your associated product instances from your premises instead of having to directly connect your Smart Licensed-enabled product instances to the CSSM.

  The CSLU can aggregate RUM reports from the different Cisco products deployed in the same data center and send the RUM reports to the CSSM. The CSLU is similar to On-Prem in that both support scheduled and on-demand synchronization with the

CSSM. The difference is that the CSLU does not have a license database and does not bind to a specific virtual account. The CSLU can be connected to any virtual account. The CSLU only supports the Microsoft Windows operating system.

For information about installing and configuring the CSLU for Microsoft Windows, see the following document:

https://www.cisco.com/web/software/286327971/154599/CSLU_User_Guide.pdf

About the Cisco ACI Smart Licensing using Policy License Catalog

Cisco Application Centric Infrastructure (ACI) Smart Licensing using Policy (SLP) has a license catalog that specifies each license entitlement for the Cisco Cisco ACI fabric. Each license entitlement is considered as a type of license. The Product and Entitlement definition is available as a managed object in XML format. The **show license catalog** command displays the license catalog in a format similar to the managed object XML format.

About Cisco ACI Smart Licensing using Policy and Cisco ACI Licenses From Older Releases

The Device Led Conversion (DLC) tool converts Cisco ACI licenses purchased from before the 3.1(1) release into the purchased license pool in the CSSM. The conversion must be performed only once during the lifecycle of a Cisco APIC product. SLP does not support the DLC tool. Therefore, if you have not converted pre-3.1(1) release licenses with the DLC tool, you must convert the licenses before you upgrade to the Cisco APIC 5.2(4) release or later. Cisco APIC releases 3.2(1) through 5.2(3) support the DLC tool.

Cisco ACI Smart Licensing using Policy Upgrade Considerations

Before you upgrade to the Cisco Application Policy Infrastructure Controller (APIC) 5.2(4) release or later, if the Cisco APIC is already registered and the network setting or transport mode is **Direct Connect to CSSM**, **Transport Gateway**, or **HTTP Proxy**, you can directly upgrade the Cisco APIC from Cisco Application Centric Infrastructure (ACI) Smart Licensing (SL) to Cisco ACI Smart Licensing using Policy (SLP). You do not need to perform any special procedure. After the upgrade, the Cisco APIC will still be connected with the CSSM and can send RUM reports to the CSSM.

If instead the Cisco APIC is already registered and the network setting or transport mode is **Manager Satellite**, you cannot directly upgrade the Cisco APIC from SL to SLP. This is because both the transport type and URL are changed for the **Cisco Smart Software Manager On-Prem** (On-Prem) network setting that replaces **Manager Satellite**. You must perform the following actions:

1. Upgrade the **Manager Satellite** to the latest version of **Cisco Smart Software Manager On-Prem** that supports SLP. After the upgrade, make sure On-Prem has network connectivity with the CSSM and synchronization is still working between On-Prem and the CSSM.
2. Upgrade the Cisco APIC to the 5.2(4) release or later. After the upgrade, the Cisco APIC GUI will display that the network setting is **Transport Gateway** rather than **Manager Satellite**. You must reconfigure the network setting to **Cisco Smart Software Manager On-Prem**.

Supported Software Releases With Cisco ACI Smart Licensing using Policy

Cisco Application Centric Infrastructure (ACI) Smart Licensing using Policy (SLP) supports the following software releases:

Table 1: Supported Software Releases

Software	Supported Releases
Smart Agent	5.4.7_rel/35 is used by Cisco ACI version 5.2(4) to 6.0(6) 5.5.30_rel/125 is used by ACI version Cisco ACI 6.1(1) and later
Cisco Smart Licensing Utility middleware	1.5.0 or later
Cisco Smart Software Manager On-Prem middleware	8-202201 or later
Cisco Smart Software Manager Satellite-to-Cisco Smart Software Manager On-Prem migration script	1.5 or later

You can download Cisco Smart Software Manager On-Prem middleware and Cisco Smart Software Manager Satellite-to-Cisco Smart Software Manager On-Prem migration script from the following site:

https://software.cisco.com/

Navigate to **Downloads Home** > **Cloud and Systems Management** > **Network Automation and Management** > **Smart Software Manager**.

Cisco ACI Smart Licensing using Policy Guidelines and Limitations

The following limitations and guidelines apply to Cisco Application Centric Infrastructure (ACI) Smart Licensing using Policy (SLP):

- The **Cisco Smart Licensing Utility (CSLU)** mode does not support the HTTPS protocol.
- The **show license all** CLI command displays Smart Agent syslog information. In the "Usage Reporting" section of the output, the Smart Agent does not update the "Last report push" and "Next report push" timestamp. The workaround is to look at the "Last ACK received" timestamp. The "Last ACK received" is the timestamp of the last acknowledgement successfully received by the Smart Agent.
- The Smart Agent performs minimal content validation for the RUM report files and acknowledgment files. A report or acknowledgment file with an invalid ID or invalid content does not trigger a fault.
- The **Direct Connect to CSSM** and **HTTP Proxy** network modes send smart licensing messages to the CSSM using the Cisco Smart-Transport cloud service. **Cisco Transport Gateway** uses the legacy Cisco Callhome to send messages to the CSSM.

  Sometimes, the Cisco Callhome server is too busy and the HTTPS response can return the following errors in the Callhome logs:

  - `Bad response from license server (HTTP response code : 500) : Service group plan has been violated`
  - `Rate Limit Exceeded`

  The workaround is to wait for some time. Then, log into the Cisco Application Policy Infrastructure Controller (APIC) GUI and click **Synchronize CSSM** to force the Cisco APIC to resend the RUM report to the CSSM.
- You can collect the RUM report from and import the acknowledgement file into the APIC leader for the licensemgr service, which by default is APIC 1. If APIC 1 is unavailable, then you can perform these actions with the new APIC leader.
- In the **Offline** network mode, the first time that you import a RUM report into the CSSM, sometimes after a RUM report import succeeds, the CSSM GUI does not display the product instance. The workaround is to download the acknowledgement and import it into the Cisco APIC to finish the first round of reporting. Then, download the RUM report and import it into the CSSM again. The product instance will show up in the CSSM GUI.

- In the **Offline** network mode, one acknowledgement is associated with one specific RUM report uniquely. When a user imports an acknowledgement file into the Cisco APIC, the Smart Agent does not validate the acknowledgement thoroughly. Such as, if the acknowledgement file is not the one created for the RUM report that you just imported or the file is not an acknowledgement file at all, the Smart Agent does not return an error. As a result, the relevant fault (F4310) is not raised. The workaround is that you should always remember to import the correct acknowledgement file. That is, import the acknowledgement file that was created for the specific RUM report that you just imported into the CSSM.
- Smart licensing with Policy does not support IPv6.
- A new **acidiag** command, **acidiag clean smartagentdb**, has been introduced to clean up the License Manager db files when you chose to switch from one mode to another.

Configuring Cisco ACI Smart Licensing using Policy Using the GUI

Configuring the Network Settings for Cisco ACI Smart Licensing using Policy Using the GUI

This procedure configures the network settings for Cisco Application Centric Infrastructure (ACI) Smart Licensing using Policy (SLP). In most cases, you will not change the settings after you initially configuring them. However, under some circumstances, you might want to change to the network settings. If you change network settings from **Direct connect to CSSM**, **Cisco Transport Gateway**, **HTTP Proxy**, or **Cisco Smart Licensing Utility (CSLU)**, do not delete the connected product instance from the CSSM virtual account, unless you want the Cisco Application Policy Infrastructure Controller (APIC) to connect to different virtual account.

- Your CSSM Smart Software Licensing account must be created.
- The following transport modes require you to install middleware in your data center: Cisco Transport Gateway, Cisco Smart Software Manager On-Prem, Cisco Smart Licensing Utility, and HTTP Proxy.

Step 1 Log in to the Cisco APIC GUI.

Step 2 On the menu bar, choose **System** > **Smart Licensing**.

Step 3 In the Work pane, this is your first time configuring the network settings, click the **Configure Network Settings** button in the message box at the top of the pane. If you are reconfiguring the existing network settings, choose **Actions** > **Configure Network Settings**. In either case, next choose one of the Smart License modes and fill out the fields.

- **Direct connect to CSSM**: You must provide the product instance ID token, which you can obtain from your CSSM virtual account. You cannot change the URL nor the port.
- **Cisco Smart Software Manager On-Prem**: You must provide the URL to the Cisco Smart Software Manager On-Prem. To get the URL, log in to the Cisco Smart Software Manager On-Prem GUI. Navigate to **Inventory** > **General** and click the **CSLU Transport URL** link. Copy the CSLU URL and paste it in the **URL** field in the Cisco APIC GUI.

  You do not need to specify your product instance ID token. The Cisco APIC uses a build-in certificate to communicate with the Cisco Smart Software Manager On-Prem.
- **HTTP Proxy**: You must specify the IP address to your web server, the HTTP port number that will be used by the server to listen, the HTTPS port that is not supported, Enter the product instance ID token. You can obtain the ID token can from your CSSM virtual account.

  Starting with Cisco ACI 6.1 (1), proxy authentication is supported as an optional feature. To use this feature, you need to configure and enable proxy authentication on the proxy server configuration file, enter the proxy user/password, and your product instance ID token in the APIC UI. You can obtain the token can from your CSSM virtual account.

Note From ACI release 6.1(1) onward, the Smart Agent HTTP client does not support IPv6 proxy addresses. To establish successful communication with CSSM, the proxy hostname needs to be configured in place of the IPv6 address under the APIC Smart Licensing configuration. Also, the APIC should be configured with the DNS IP

- **Cisco Transport Gateway**: You must provide the URL to the CSSM and your product instance ID token. You can obtain the token can from your CSSM virtual account. The URL format is as follows:

  `http[s]://ip_or_hostname:port/Transportgateway/services/DeviceRequestHandler`

  ip_or_hostname is the transport gateway's IP address or hostname. You must specify the port if it is not the default HTTP port 80 or HTTPS port 443.

- **Cisco Smart Licensing Utility (CSLU)**: You must provide the URL to the CSLU in the following format:

  `http:ip_or_hostname:port/cslu/v1/pi`

  ip_or_hostname is the CSLU's IP address or hostname. HTTPS is not supported.

  You do not need to specify your product instance ID token. The Cisco APIC uses a build-in certificate to communicate with the CSLU.

- **Offline**: Specifies that Cisco APIC does not have any network connectivity with CSSM, either directly or indirectly. To configure network settings in offline mode, choose Offline mode on the Cisco APIC UI. You do not need to enter any other information. With this mode, you must download a RUM report every 12 months from Cisco APIC and import the report into the CSSM. Later, you must download an acknowledgment from CSSM and import the acknowledgment into Cisco APIC.

Step 4 Click **OK**.

Step 5 If you chose the **Direct connect to CSSM**, **Cisco Transport Gateway**, **HTTP Proxy**, or **Cisco Smart Licensing Utility (CSLU)** transport mode, perform this step.

If after approximately 20 seconds the smart account and virtual account names display in the Cisco APIC GUI, you are done; do not perform the substep. This indicates that the network settings configuration was successful and the Cisco APIC has connected to the CSSM.

If after approximately 2 minutes the smart account and virtual account names do not display in the Cisco APIC GUI, continue with the substep.

a) Choose **Actions** > **Synchronize CSSM**, which forces the Cisco APIC to synchronize with the CSSM.

Step 6 If you chose the **Cisco Smart Software Manager On-Prem** transport mode, perform this step.

The synchronization from the Cisco Smart Software Manager On-Prem to the CSSM is scheduled by default. Therefore, Cisco APIC cannot get the smart account and virtual account names from the CSSM immediately. To get these names, perform the following substeps:

a) Log in to Cisco Smart Software Manager On-Prem and perform a manual synchronization with the CSSM.

   If after approximately 4 to 5 minutes the smart account and virtual account names display in the Cisco APIC GUI, you are done; do not perform the remaining substeps. This indicates that the network settings configuration was successful and the Cisco APIC has connected to the CSSM.

   If the smart account and virtual account names are still not displayed in the Cisco APIC GUI, continue with the remaining substeps.

b) In the Cisco APIC GUI, and navigate to **System** > **Smart Licensing**.
c) Choose **Actions** > **Synchronize CSSM**, which forces the Cisco APIC to send a RUM report.
d) Log in to Cisco Smart Software Manager On-Prem to perform a manual synchronization with the CSSM again.

After approximately 4 to 5 minutes, the smart account and virtual account names will be displayed in the Cisco APIC GUI, which indicates the network setting configuration for Cisco Smart Software Manager On-Prem has succeeded.

Step 7 If you chose the **Offline** Smart License mode, the **Smart Account Name** field will have no value and the **Virtual Account Name** field will have no value until you import the acknowledgement of a RUM report.

Configuring the RUM Report Send Interval for Cisco ACI Smart Licensing using Policy Using the GUI

This procedure changes the RUM report send interval. When the interval times out, the Cisco Application Policy Infrastructure Controller (APIC) sends a RUM report to the Cisco Smart Software Manager (CSSM). A RUM report contains license usage data. This action is available only for the online modes.

Step 1 Log in to the Cisco APIC GUI.

Step 2 On the menu bar, choose **System** > **Smart Licensing**.

Step 3 In the Work pane, choose **Actions** > **Change Report Interval**.

Step 4 In the **License Usage Reporting Interval (in day)** field, enter the desired report interval.

The range is from 1 to 90 days. The default is 30 days.

Step 5 Click **OK**.

A RUM report will get sent to the CSSM automatically every number of days that you specified.

Downloading a RUM Report for Cisco ACI Smart Licensing using Policy Using the GUI

This procedure downloads a RUM report from the Cisco Application Policy Infrastructure Controller (APIC) and saves the report to your local system. The report is in XML format and always has a filename of `LicenseUsageRumReport.xml`. This action is primarily used in offline mode.

In one of the online modes, you would use this action if you need to report license usage manually to the CSSM in a few specific situations. For example, if your network connection is temporarily down, the Cisco APIC will raise a fault to indicate that Cisco APIC did not receive the acknowledgement of RUM report. You can download the RUM report and import it into the CSSM. Then, you can download the acknowledgement from the CSSM and import it into the Cisco APIC to clear the fault.

Step 1 Log in to the Cisco APIC GUI.

Step 2 On the menu bar, choose **System** > **Smart Licensing**.

Step 3 In the Work pane, choose **Actions** > **Download Rum Report**.

The RUM report file gets downloaded automatically to your browser's default download folder.

Importing an Acknowledgement File for Cisco ACI Smart Licensing using Policy Using the GUI

This action is primarily used in offline mode because you are responsible for manually reporting license usage. After you import a RUM report into the CSSM, the CSSM generates an acknowledgement. You can import the acknowledgement into the Cisco Application Policy Infrastructure Controller (APIC). The acknowledgement file is in XML format and has a filename of `ACK_LicensedUsageRumReport.xml`.

Normally, this action is not needed in online mode, except under some special circumstances. See the example of clearing a fault described in Downloading a RUM Report for Cisco ACI Smart Licensing using Policy Using the GUI, on page 9.

You must have downloaded an acknowledgement file from the Cisco Smart Software Manager (CSSM).

Step 1 Log in to the Cisco APIC GUI.

Step 2 On the menu bar, choose **System** > **Smart Licensing**.

Step 3 In the Work pane, choose **Actions** > **Import Acknowledgement**.

Step 4 Click **Choose File**, navigate to where you downloaded the acknowledgement file, choose the file, and click **Open**.

Step 5 Click **OK**.

The acknowledgement file gets imported into the Cisco APIC.

Manually Synchronizing with the CSSM for Cisco ACI Smart Licensing using Policy Using the GUI

This procedure manually sends a RUM report to the Cisco Smart Software Manager (CSSM). Use this procedure if you do not want to wait for the configured report interval to pass before the Cisco Application Policy Infrastructure Controller (APIC) sends a RUM report. After the Cisco APIC sends the RUM report to the CSSM, the Cisco APIC will poll for acknowledgement of the RUM report from the CSSM within 4 minutes. This action is available only for the online modes.

You must have configured the network settings with any mode except **Offline**.

Step 1 Log in to the Cisco APIC GUI.

Step 2 On the menu bar, choose **System** > **Smart Licensing**.

Step 3 In the Work pane, choose **Actions** > **Synchronize CSSM**.

Step 4 Click **OK**.

The Cisco APIC immediately sends a RUM report to the CSSM.

Viewing Cisco ACI Smart Licensing using Policy Information Using the GUI

After you configure the network settings, you can view smart licensing information in the following Cisco Application Policy Infrastructure Controller (APIC) GUI areas:

- Smart Licensing **General** tab
- License Entitlement Detail dialog
- Smart Licensing **Faults** tab

Smart Licensing General tab

To view this tab, navigate to **System** > **Smart Licensing**, then click the **General** tab in the Work pane. The top part of the screen displays the user-configured network setting, the names of the smart account and virtual account with which the Cisco APIC is connected, and the hostname of the Cisco APIC (the **Product Instance Name** field).

The bottom part the screen has a table that displays the license usage for each license entitlement, including the license name, status, entitlement tag, description, and instance count (the total number of licenses consumed). The license usage table only displays the license entitlements that have a status of **In Use**. The table does not display license entitlements that have a status of **Not In Use**.

License Entitlement Detail Dialog

To view this dialog, navigate to **System** > **Smart Licensing**, click the **General** tab in the Work pane, then click a number in the **Instance Count** column. This dialog displays which switch nodes consume this license entitlement, including the switch node ID and type, and a list of license features that are currently enabled.

Smart Licensing Faults tab

To view this tab, navigate to **System** > **Smart Licensing**, then click the **Faults** tab in the Work pane. This tab contains a table that displays all of the smart licensing-related faults. These faults are used for troubleshooting smart licensing related issues.

Configuring Cisco ACI Smart Licensing using Policy Using the CLI

About the Cisco ACI Smart Licensing using Policy CLI Commands

The standard CLI **config** and **show** commands for Cisco Application Centric Infrastructure (ACI) Smart Licensing using Policy (SLP) are supported in the Cisco ACI fabric with the following exceptions:

- In the CLI, there is no difference between the **config** and the **exec** command. Therefore, both **config** and the **exec** commands are implemented as a **config** command.
- By default, Smart Licensing is enabled and cannot be disabled by the user. Therefore, the **[no] license smart enable** CLI configuration command is not supported in the Cisco Application Policy Infrastructure Controller (APIC).
- The operational **test** CLI commands are not supported.
- A few CLI commands specific to the Cisco ACI fabric product line are implemented.

The CLI commands are organized as follows:

- All the **show** commands start with **show license**.
- All the configuration commands start with **license smart**.
- All the keywords are lower case, and a keyword can be auto filled.
- All the values (user-input value) are indicated by italics. For example, *authorization_code* indicates this is not a keyword, but this is the authorization code a user must type in.
- The keywords and values have help text that explains the purpose of the keywords and values.

Configuring the Cisco ACI Smart Licensing using Policy Network Settings Using the CLI

This procedure configures the network settings for Cisco Application Centric Infrastructure (ACI) Smart Licensing using Policy (SLP). In most cases, you will not change the settings after you initially configuring them. However, under some circumstances, you might want to change to the network settings. If you change network settings from `smart-licensing`, `transport-gateway`, `proxy`, or `cslu`, do not delete the connected product instance from the CSSM virtual account, unless you want the Cisco Application Policy Infrastructure Controller (APIC) to connect to different virtual account.

- Your CSSM Smart Software Licensing account must be created.
- The following transport modes require you to install middleware in your data center: `transport-gateway`, `on-prem`, `cslu`, and `proxy`.

Step 1 Enter the configuration mode.

Example:

```
apic1# configure terminal
```

Step 2 Configure your desired Smart License mode.

- **cslu**: You must provide the URL to the Cisco Smart Licensing Utility (CSLU) in the following format:

  `http://ip_or_hostname:port/cslu/v1/pi`

  ip_or_hostname is the CSLU's IP address or hostname. HTTPS is not supported.

  The command syntax is as follows:

  ```
  apic1(config)# license smart transport-mode cslu url url
  ```

- **offline**: Specifies that Cisco APIC does not have any network connectivity with the CSSM, either directly or indirectly. With this mode, you must manually generate RUM reports and manually send the reports to the CSSM. You do not need to enter any information.

  The command syntax is as follows:

  ```
  apic1(config)# license smart transport-mode offline
  ```

- **on-prem**: You must provide the URL to the Cisco Smart Software Manager On-Prem (On-Prem). To get the URL, log in to the On-Prem GUI. Navigate to **Inventory** > **General** and click the **CSLU Transport URL** link.

  The command syntax is as follows:

  ```
  apic1(config)# license smart transport-mode on-prem url url
  ```

- **proxy**: You must specify the IP address to your web server and the port number that will be used by the server to listen.

  The command syntax is as follows:

  ```
  apic1(config)# license smart transport-mode proxy ip-address ip_address port port
  ```

  Starting with Cisco ACI 6.1(1), proxy authentication is supported as an optional feature. To use this feature, you need to configure and enable proxy authentication in the proxy server configuration file and type the proxy user/password in the CLI. The command syntax is as follows:

  ```
  apic1(config)# license smart transport-mode proxy ip-addressip_addressportportusername username
  password password
  ```

- **smart-licensing**: You do not need to specify any additional parameters. This is the same as the **Direct connect to CSSM** mode in the GUI.

  The command syntax is as follows:

  ```
  apic1(config)# license smart transport-mode smart-licensing
  ```

- **transport-gateway**: You must provide the URL to the Cisco Transport Gateway. The URL format is as follows:

  `http[s]://ip_or_hostname:port/Transportgateway/services/DeviceRequestHandler`

  ip_or_hostname is the transport gateway's IP address or hostname. You must specify the port if it is not the default HTTP port 80 or HTTPS port 443.

  The command syntax is as follows:

  ```
  apic1(config)# license smart transport-mode transport-gateway url url
  ```

Step 3 For the **proxy**, **smart-licensing**, or **transport-gateway** mode, create a product instance ID token.

a) Log in to the CSSM.
b) Create a registration token from a virtual account.
c) Copy the token, which you will use for the token ID in the next step.

Step 4 Establish trust between the device and the CSSM, and enable the transport mode.

Example:

For the **proxy**, **smart-licensing**, or **transport-gateway** mode:

```
apic1(config)# license smart establish trust idtoken token
```

token is the token ID that you copied from the previous step.

For the **cslu**, **offline**, or **on-prem** mode:

```
apic1(config)# license smart establish trust
```

Configuring the Cisco ACI Smart Licensing using Policy RUM Report Send Interval Using the CLI

Step 1 Enter the configuration mode.

Example:

```
apic1# configure terminal
```

Step 2 Configure the Smart Licensing policy report interval.

In online mode, the report interval decides how often a RUM report is sent to the CSSM. The default value is 30 days. You can configure a report interval in the range of 1 to 90 days.

Example:

```
apic1(config)# license smart interval number_of_days
```

In online mode, a RUM report will get sent to the CSSM automatically every number of days that you specified.

Configuring the Cisco ACI Smart Licensing using Policy Hostname Privacy Using the CLI

If hostname privacy is disabled, the Cisco Application Policy Infrastructure Controller (APIC) will include its hostname in the RUM reports that get sent to the CSSM. This is the default behavior. If you do not want the Cisco APIC's hostname to be included in the RUM reports, you can enable hostname privacy.

Step 1 Enter the configuration mode.

Example:

```
apic1# configure terminal
```

Step 2 Configure the hostname privacy.

Example:

```
apic1(config)# license smart hostname privacy {enable | disable}
```

Creating and Copying a Cisco ACI Smart Licensing using Policy RUM Report Using the CLI

You can manually create a RUM report, which gets saved to the Cisco Application Policy Infrastructure Controller's (APIC's) file system. The report is in XML format and always has a filename of `LicenseUsageRumReport.xml`. This action is primarily used in offline mode.

In one of the online modes, you would use this action if you need to report license usage manually to the CSSM in a few specific situations. For example, if your network connection is temporarily down, the Cisco APIC will raise a fault to indicate that Cisco APIC did not receive the acknowledgement of RUM report. You can download the RUM report and import it into the CSSM. Then, you can download the acknowledgement from the CSSM and import it into the Cisco APIC to clear the fault.

Unlike with the GUI, the CLI command cannot automatically copy the report to your local system. You must copy the file manually after creating the RUM report.

Step 1 Enter the configuration mode.

Example:

```
apic1# configure terminal
```

Step 2 Create a RUM report.

Example:

```
apic1(config)# license smart create rum-report
```

The report gets saved to the Cisco APIC node 1 the cluster with a filename of `LicenseUsageRumReport.xml` to the `/data/license` directory.

Step 3 Copy the report to your local system using the **scp** command.

Importing an Acknowledgement File for Cisco ACI Smart Licensing using Policy Using the CLI

This action is primarily used in offline mode because you are responsible for manually reporting license usage. After you import a RUM report into the CSSM, the CSSM generates an acknowledgement. You can import the acknowledgement into the Cisco Application Policy Infrastructure Controller (APIC). The acknowledgement file is in XML format and has a filename of `ACK_LicensedUsageRumReport.xml`.

Normally, this action is not needed in online mode, except under some special circumstances. See the example of clearing a fault described in Creating and Copying a Cisco ACI Smart Licensing using Policy RUM Report Using the CLI, on page 13.

You must have downloaded an acknowledgement file from the Cisco Smart Software Manager (CSSM), and then copied the file to the `/home/admin` directory in the Cisco APIC using the **scp** command.

Step 1 Enter the configuration mode.

Example:

```
apic1# configure terminal
```

Step 2 Import the acknowledgement file.

The Cisco APIC looks for the file in the `/home/admin` directory.

Example:

```
apic1(config)# license smart import rum-report acknowledgement filename
```

The acknowledgement file gets imported into the Cisco APIC.

Manually Synchronizing with the CSSM for Cisco ACI Smart Licensing using Policy Using the CLI

This procedure manually sends a RUM report to the Cisco Smart Software Manager (CSSM). Use this procedure if you do not want to wait for the configured report interval to pass before the Cisco Application Policy Infrastructure Controller (APIC) sends a RUM

report. After the Cisco APIC sends the RUM report to the CSSM, the Cisco APIC will poll for acknowledgement of the RUM report from the CSSM within 4 minutes. This action is available only for the online modes.

You must have configured the network settings with any mode except **Offline**.

Step 1 Enter the configuration mode.

Example:

```
apic1# configure terminal
```

Step 2 Send the RUM report.

Example:

```
apic1(config)# license smart renew auth
```

The Cisco APIC immediately sends a RUM report to the CSSM.

Viewing Cisco ACI Smart Licensing using Policy Information Using the CLI

After you configure the network settings, you can view Cisco Application Centric Infrastructure (ACI) SLP licensing using Policy (SLP) information in the following Cisco Application Policy Infrastructure Controller (APIC) CLI commands:

Command	Description
# **show license catalog**	Shows the SLP license definitions of the Cisco ACI products and license entitlements.
# **show license transport-mode**	Shows the SLP transport mode that you configured as part of the network settings.
# **show license interval**	Shows the SLP RUM report send interval configuration. The value is in days.
# **show license hostname privacy**	Shows the SLP hostname privacy configuration.
# **show license all**	Shows all SLP license information.
# **show license status**	Shows all SLP license statuses.
# **show license summary**	Shows a summary of all SLP license statuses.
# **show license tech support**	Collects the SLP tech support data and shows a partial output of the data. The console cannot display the complete file because of the file size. The full contents get saved to the `/tmp/SA_Show_Tech_Support.txt` file.
# **show license udi**	Shows the Unique Device Identifier (UDI) of the licensed Cisco ACI products.
# **show license usage**	Shows SLP license usage data.

Troubleshooting Cisco ACI Smart Licensing using Policy

Troubleshooting Cisco ACI Smart Licensing using Policy Using the Faults

Cisco Application Centric Infrastructure (ACI) Smart Licensing using Policy (SLP) incorporates all configuration issues and run-time errors into faults. The following table lists the smart licensing faults:

Table 2: SLP Faults

Fault ID	Description
F3057	This is a warning fault, indicating that you have not configured a network setting yet. Even if you want to choose the offline mode, configure the **Offline** network setting. Configuring a network setting clears this fault.
F4290	This fault indicates that the product instance ID token that you entered is either an invalid or expired token. Log in to the CSSM and create a new product instance registration token. Log in to the Cisco Application Policy Infrastructure Controller (APIC) GUI to enter the new ID token and reconfigure the network setting. This action clears the fault.
F4291	This fault indicates that network connectivity between the Cisco APIC and the CSSM or between the Cisco APIC and the transport server (Gateway, Proxy, On-Prem, or CSLU) has an issue. The Cisco APIC cannot communicate with the CSSM or transport server. After you resolve the network connectivity issue, log in to the Cisco APIC GUI, navigate to **System** > **Smart Licensing**, and choose **Actions** > **Synchronize CSSM**. This action clears the fault shortly afterward.
F4222	This fault indicates that the Cisco APIC has not received acknowledgement of a RUM report for a long time and the acknowledgement has expired. In offline mode, manually download a RUM report and import the acknowledgement. Importing the acknowledgement file into the Cisco APIC clears the fault. In the online modes, this fault indicates that, due to a networking issue, the Cisco APIC has been out synchronization with the CSSM for a long time. Troubleshoot the network connectivity issue between the Cisco APIC and CSSM or between the Cisco APIC and transport server, as well as between the transport server and CSSM. After you resolve the network connectivity issue, log in to the Cisco APIC GUI, navigate to **System** > **Smart Licensing**, and choose **Actions** > **Synchronize CSSM**. This action forces the Cisco APIC to send the RUM report again. If the network setting is **On-Prem**, log in to the **On-Prem** GUI to do a manual synchronization from On-Prem or CSLU to the CSSM. After the synchronization is completed, the fault will be cleared within 10 to 15 minutes.
F4310	This fault indicates that you imported the wrong acknowledgement of a RUM report. An acknowledgement is uniquely associated with one RUM report. The imported acknowledgement must match the RUM report that you downloaded. Manually download the RUM report again and import the correct acknowledgement into the Cisco APIC, which clears the fault.

Troubleshooting Cisco ACI Smart Licensing using Policy Using the CLI

There are two CLI **show** commands that are useful for troubleshooting. To use these commands, log in to the Cisco Application Policy Infrastructure Controller (APIC) node 1 in the cluster as the admin user.

```
# show license all
```

This show command displays smart licensing information from the Smart Agent (SA) trust store. The "Usage Reporting" section displays the timestamp of last sent RUM report and the last received acknowledgement, as well as when to send the next RUM report and when to poll the next acknowledgement. If the timestamp of the last received acknowledgement is newer than the timestamp of the last sent RUM report, this indicates that the Cisco APIC successfully sent the RUM report and received the acknowledgement.

```
# show license tech support
```

This show command displays much more detailed information than **`show license all`**. The console cannot display the entire result because of its length, but you can open the file `/tmp/SA_Show_Tech_Support.txt` to view all of the output.

Common Issues With Cisco ACI Smart Licensing using Policy

The following list describes some common issues with Cisco Application Centric Infrastructure (ACI) Smart Licensing using Policy (SLP):

- In **Offline** mode, you forgot to download a RUM report and import the acknowledgement for a long time.
- In the **Direct Connect to CSSM** mode, you forgot to configure DNS on the Cisco Application Policy Infrastructure Controller (APIC) or the Cisco APIC has no Internet connection.
- In the **Cisco Smart Software Manager On-Prem** (On-Prem) mode, On-Prem polls the acknowledgement from the CSSM and the Cisco APIC polls the acknowledgement from On-Prem. The default synchronization between On-Prem and the CSSM is schedule-based, which could delay the synchronization for one or more days. You can log in to On-Prem to do a manual synchronization from On-Prem to the CSSM, which resolves the synchronization issue.