Cisco Smart Licensing

A new licensing model, based on a single technology, has been designed for Cisco called Smart Licensing that is intended to provide Enterprise Level Agreement-like capabilities for all Cisco products. The Cisco Smart Licensing is based on the Trust but Verify model.

Your software release may not support all the features that are documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release. The Feature Information Table at the end of this document provides information about the documented features and lists the releases in which each feature is supported.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to http://tools.cisco.com/ITDIT/CFN/. An account on http://www.cisco.com/ is not required.

Contents

Hardware Compatibility Matrix for the Cisco cBR Series Routers

Note The hardware components that are introduced in a given Cisco IOS-XE Release are supported in all subsequent releases unless otherwise specified.

Table 1: Hardware Compatibility Matrix for the Cisco cBR Series Routers

Cisco CMTS Platform	Processor Engine	Interface Cards
Cisco cBR-8 Converged Broadband Router	**Cisco IOS-XE Release 16.5.1 and Later Releases** Cisco cBR-8 Supervisor: • PID—CBR-SUP-250G • PID—CBR-CCAP-SUP-160G	**Cisco IOS-XE Release 16.5.1 and Later Releases** Cisco cBR-8 CCAP Line Cards: • PID—CBR-LC-8D30-16U30 • PID—CBR-LC-8D31-16U30 • PID—CBR-RF-PIC • PID—CBR-RF-PROT-PIC • PID—CBR-CCAP-LC-40G • PID—CBR-CCAP-LC-40G-R • PID—CBR-CCAP-LC-G2-R • PID—CBR-SUP-8X10G-PIC • PID—CBR-2X100G-PIC Digital PICs: • PID—CBR-DPIC-8X10G • PID—CBR-DPIC-2X100G Cisco cBR-8 Downstream PHY Module: • PID—CBR-D31-DS-MOD Cisco cBR-8 Upstream PHY Modules: • PID—CBR-D31-US-MOD

Note Do not use DPICs (8X10G and 2x100G) to forward IP traffic, as it may cause buffer exhaustion, leading to line card reload.

The only allowed traffic on a DPIC interface is DEPI, UEPI, and GCP traffic from the Cisco cBR-8 router to Remote PHY devices. Other traffic such as DHCP, SSH, and UTSC should flow via another router, since DPICs cannot be used for normal routing.

Prerequisites for Cisco Smart Licensing

- You must configure the DNS server using the **ip name-server** global configuration command.

- You must configure the IP DNS-based hostname-to-address translation using the **ip domain-lookup** global configuration command.
- Cisco Smart Licensing is enabled by default on the Cisco cBR router. However, you must ensure that the CiscoTAC-1 call-home profile points to the Cisco Smart Software Manager at the following URL using the **show call-home profile CiscoTAC-1** command:

  https://tools.cisco.com/its/service/oddce/services/DDCEService

  The following is a sample output of the **show call-home profile CiscoTAC-1** command:

```
Router# show call-home profile CiscoTAC-1

Load for five secs: 10%/1%; one minute: 9%; five minutes: 8%
Time source is NTP, 16:49:35.525 PDT Thu Oct 29 2015

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

    Periodic configuration info message is scheduled every 19 day of the month at 11:41


    Periodic inventory info message is scheduled every 19 day of the month at 11:26

    Alert-group               Severity
    ------------------------  ------------
    crash                     debug
    diagnostic                minor
    environment               minor
    inventory                 normal

    Syslog-Pattern            Severity
    ------------------------  ------------
    .*                        major
```

- Ensure that you can ping the DNS server. If you are unable to ping the server, verify the connectivity to the NME port on the Cisco cBR router.

Note If you are using a Virtual Routing and Forwarding (VRF) instance, ensure that you can ping the VRF instance.

Information About Cisco Smart Licensing

Cisco Smart Licensing is software-based licensing that consists of tools and processes to authorize the customers for the usage and reporting of the Cisco products. The feature has the capability to capture the customer order and communicate with the Cisco Cloud License Service through Smart Call Home transport media or through Smart Transport to complete the product registration and authorization. If the Cisco products stop

communicating with the Cisco Cloud License Service for 90 days, the cable interfaces in the Cisco products will be locked, which means the customer can no longer enable/disable the cable interfaces.

The Cisco Smart Licensing feature is aimed at giving users an experience of a single, standardized licensing solution for all Cisco products.

In the Cisco Smart Licensing Model, you can activate licensed features (also known as entitlements) without the use of a special software key or upgrade license file. You can activate the new functionality using the appropriate product commands and configurations and the functionality is activated. A software reboot is not required for the Cisco cBR router.

The Cisco cBR router supports software activation using Cisco Smart Licensing. The Cisco Smart Licensing is enabled by default on the Cisco cBR router.

Note The **no http secure server-identity-check** option was default in versions 16.7.2 and earlier, and was not configurable. Ensure that you configure the **no http secure server-identity-check** option after upgrading to maintain parity with images earlier than 16.7.3. The default option is **http secure server-identity-check**.

A LCHA license is needed for each working linecard that is protected by the protect linecard.

Downstream License

The DOCSIS 3.1 license scheme provides support to identify the DOCSIS 3.1 channels and their width. The DOCSIS 3.1 entitlement is DOCSIS 3.1 Downstream Channel License.

Note Configuration of DOCSIS 3.1 Downstream OFDM channel consumes both DOCSIS 3.0 and DOCSIS 3.1 license in a 1:1 ratio with license units of 6 MHz.

Out of Compliance Enforcement

The following two events are responsible for triggering a DOCSIS configuration lock enforcement.

Eval-Expired (Evaluation Period Expired)

When a router is not registered with Smart License Manager for more than ninety days.

Auth-Expired (authorization Period Expired)

When a registered router fails to communicate with the Smart License Manager for more than ninety days.

When either of the above mentioned events occur, the Smart Agent sends a notification to the platform. The platform, upon receiving such notification, **locks** the following CLI commands:

- **[no] cable upstream shutdown** *upstream-port-number*
- **contoller upstream-cable** *slot/subslot/controller-port-number*
- **rf-chan***channel-number*

Any attempt to configure the above mentioned CLIs in this condition would fail and a warning message will be displayed. Under this condition all other CLIs are configurable, some of which may be required to configure Cisco License Call Home, connect to cisco and register the device to come out of either of the above two events and enter into authorized or Out of Compliance (OOC) state.

You can copy the modified configuration file to the startup configuration file and reload the device to make that configuration effective. However, when the device is in enforced state, you can only copy the running configuration file to the startup configuration file.

Note Any attempt to copy any other file fails and a warning message is displayed.

How to Configure Cisco Smart Licensing

This section contains the following:

Using Cisco Smart Licensing Agent on the Router

Step 1 Set up a Cisco Smart Account. See Setting Up a Cisco Smart Account, on page 5.

Step 2 Log in to the Cisco Smart Software Manager.

Step 3 (Optional) Create a virtual account. See Creating Virtual Accounts, on page 12.

Note A single default virtual account is always available.

Step 4 Create a product instance registration token. See Creating a Product Instance Registration Token, on page 13.

Step 5 Register the router with the Cisco Licensing Cloud using the product instance registration token. See Registering the Router with the Cisco Licensing Cloud Using the Registration Token, on page 15.

Step 6 Log in to the Cisco Smart Software Manager for managing licenses.

For more information, see the *Cisco Smart Software Manager User Guide*, which is accessible from the Cisco Smart Software Manager tool.

Setting Up a Cisco Smart Account

Cisco Smart Account enables you to fully utilize the license management features of the smart-enabled products.

Before you begin

- Ensure that you have a CCO ID.

Step 1 Log in to Cisco Software Workspace (CSW) with your CCO ID.

Step 2 Hover the cursor over the *Administration* tab and click **Create Smart Accounts**.

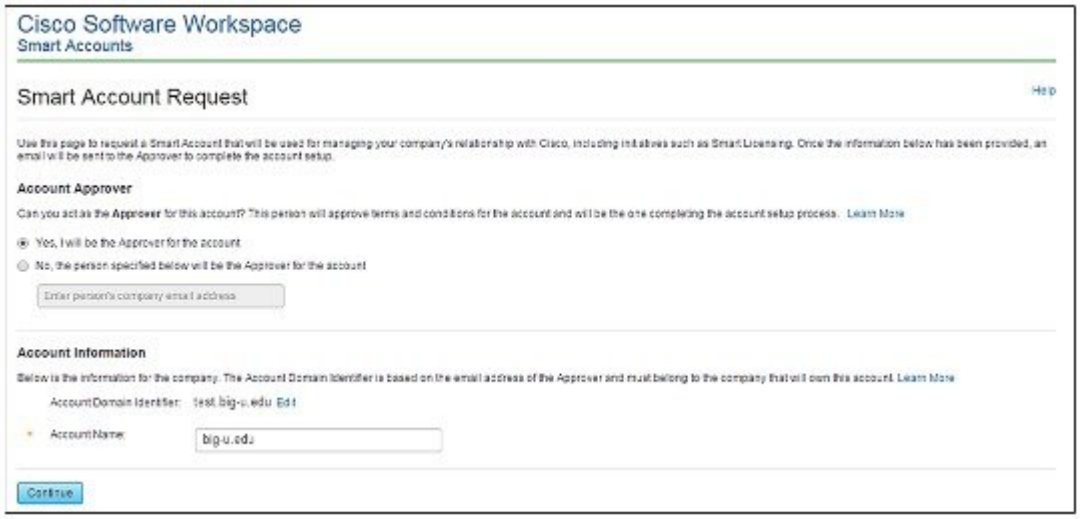
Figure 1: Creating Smart Account

Step 3 Perform one of the following to select the Account Approver:

- To select yourself as the Approver, click the **Yes, I will be the Approver for the account** radio button.
- To select other person as the Approver, click the **No, the person specified below will be the Approver for the account** radio button and specify the person's e-mail ID.

Note The specified Approver must have the authority to enter legal agreements. The Approver serves as the primary owner and nominates account administrators.

Figure 2: Selecting the Approver



Step 4 If you are the Approver, perform the following:

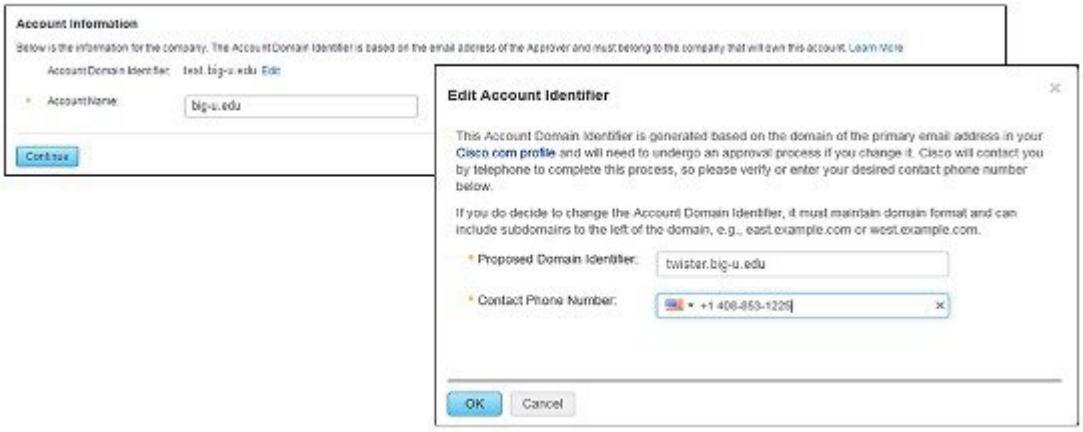
a) Enter the Account Name, Company/Organization Name, Country, and State/Province/Region information.

b) (Optional) Click **Edit**. In the *Edit Account Identifier* window, enter a valid Proposed Domain Identifier and Contact Phone Number. Click **OK**.

Note The default domain identifier is the Approver e-mail domain. If you edit the domain identifier, the change goes through a manual approval process.

c) Click **Continue** to select the legal address to be linked to your Cisco Smart Account.

Figure 3: Setting Up Account Information When You Are The Approver



Step 5 If you are not the Approver, perform the following:

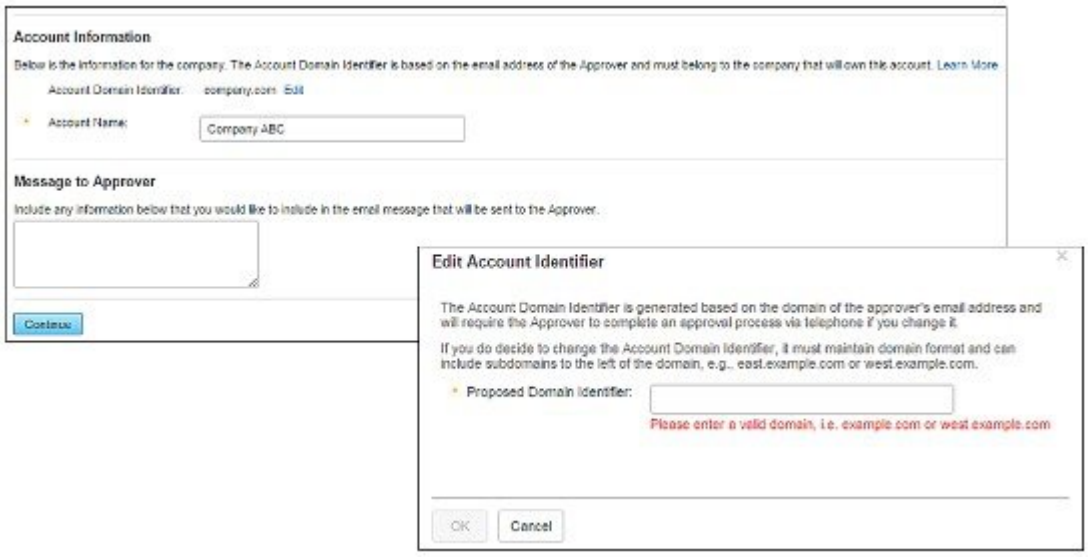
a) Enter the Account Name and an optional Message to Approver.

b) (Optional) Click **Edit**. In the *Edit Account Identifier* window, enter a valid Proposed Domain Identifier. Click **OK**.

Note The default domain identifier is the Approver e-mail domain. If you edit the domain identifier, the change goes through a manual approval process.

c) Click **Continue**.

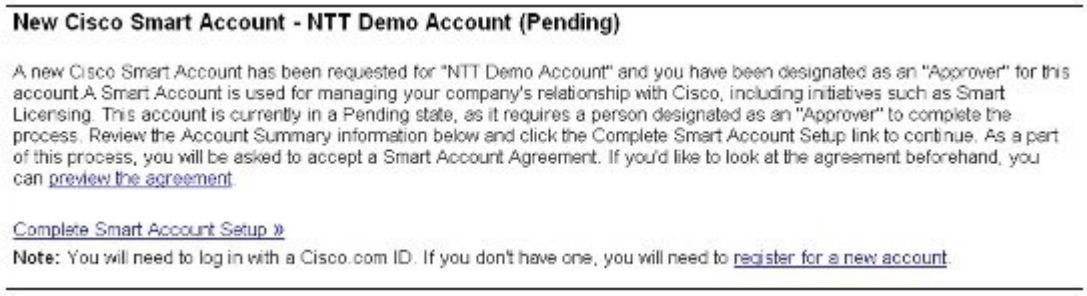
Figure 4: Setting Up Account Information When You Are Not The Approver



Step 6 If you are not the Approver, the Approver will receive an e-mail and must perform the following:

a) Click **Complete Smart Account Setup** in the received e-mail.

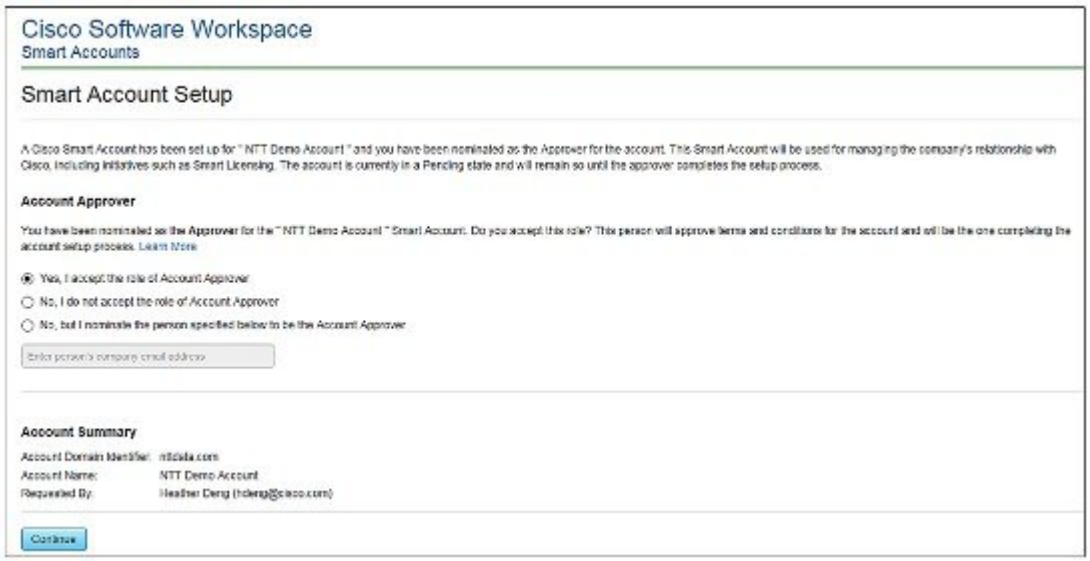
Figure 5: Complete Smart Account Setup Link in E-mail



b) Click the appropriate radio button to accept, decline, or nominate another Approver. To nominate another Approver, enter the person's e-mail address. Click **Continue**.

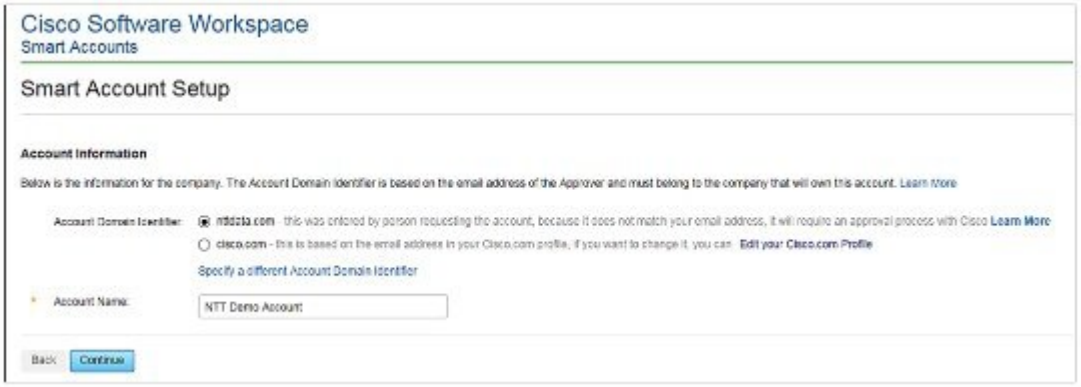
Note If the Approver declines, the Cisco Smart Account is deleted. If the Approver nominates another approver, the new Approver must accept the role.

Figure 6: Accepting the Account Approver Role



c) After accepting the Approver role, click the appropriate radio button to select the Account Domain Identifier or specify a different Account Domain Identifier.

Figure 7: Completing the Account Information



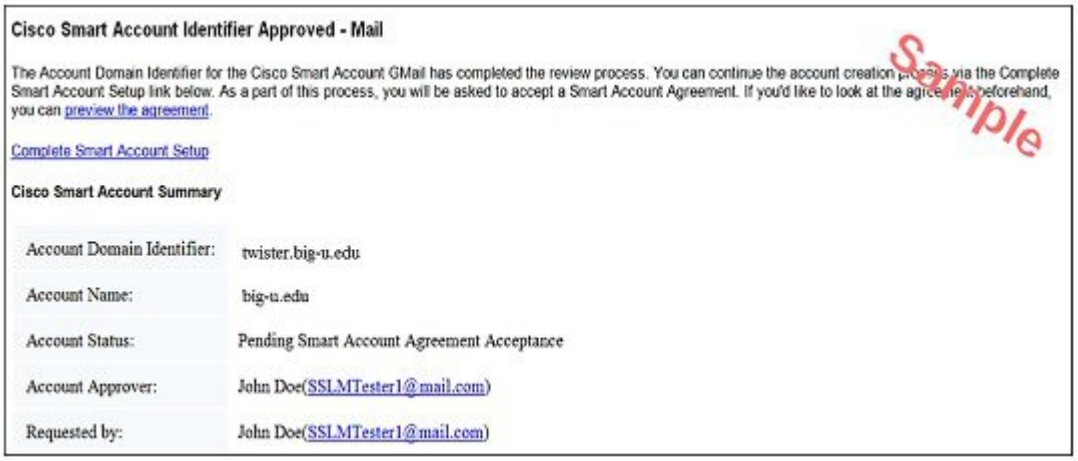
d) Enter the Account Name and click **Continue**.

The Approver role is accepted and Cisco Smart Account is pending Account Domain approval.

Step 7 After the Account Domain is approved, the Approver will receive an e-mail and must perform the following:

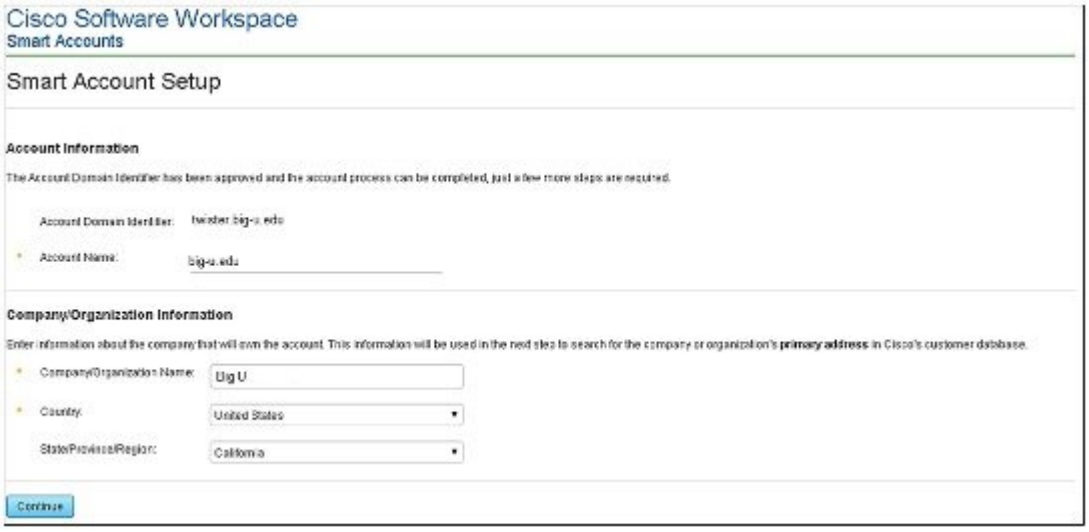
a) Click **Complete Smart Account Setup** in the received e-mail.

Figure 8: Cisco Smart Account Identifier Approved E-mail



b) Enter the Account Name, Company/Organization Name, Country, and State/Province/Region information.

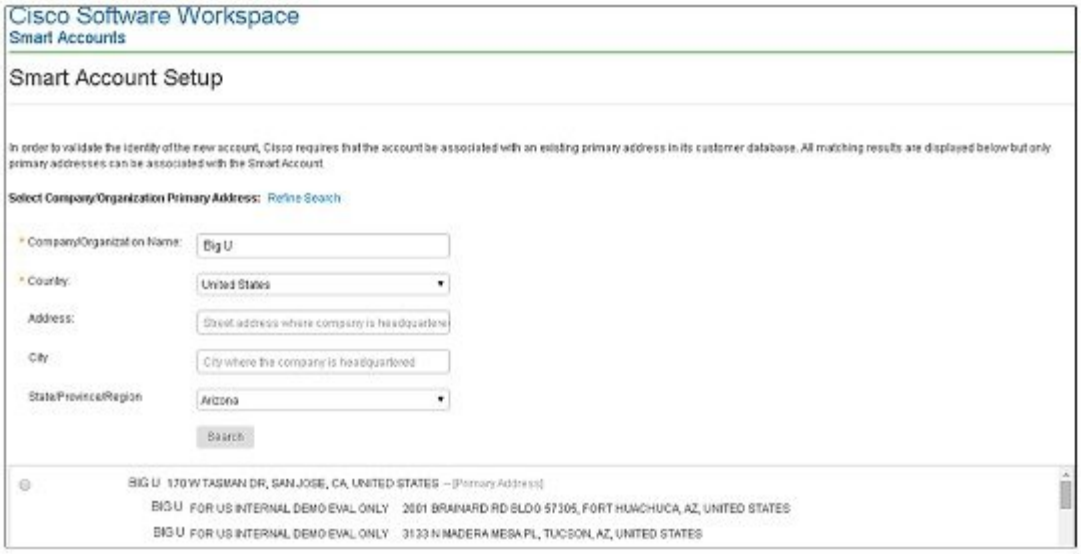
Figure 9: Completing the Account Information and Company/Organization Information



c) Click **Continue** to select the legal address to be linked to the Cisco Smart Account.

d) Select the Company/Organization Primary Address using the Refine Search option and click **Continue**.

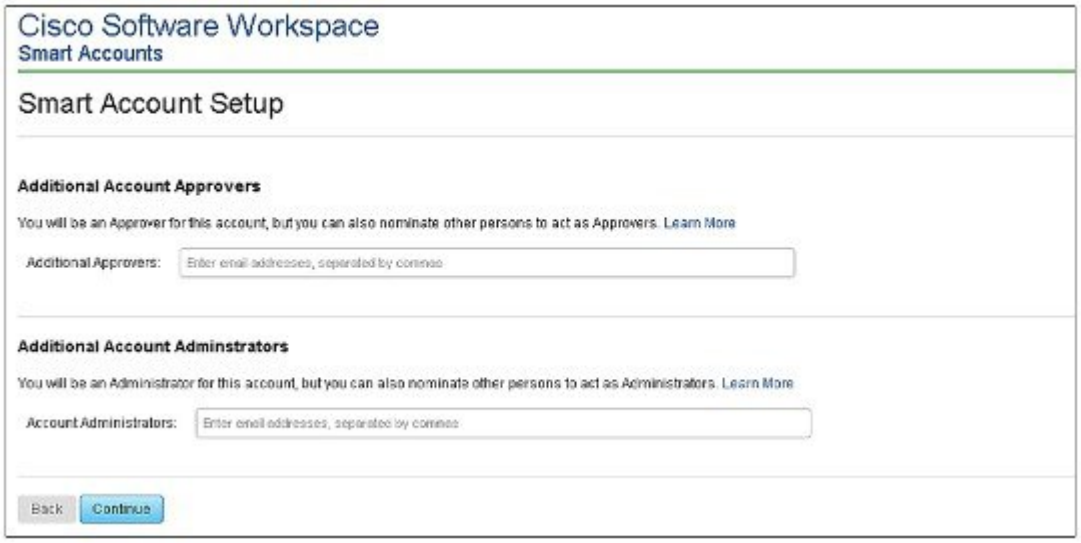
Figure 10: Selecting the Company/Organization Primary Address



e) (Optional) Enter the e-mail addresses of the Additional Account Approvers and Additional Account Administrators.

The initial Approver automatically becomes an Administrator. Additional Administrators can be created or assigned separately from the Approver creation process.

Figure 11: Nominating Additional Account Approvers and Administrators



f) Click **Continue**.
g) Review the agreement and check the **I agree to the terms above** check box to accept.
h) Click **Accept and Create Account** to create the Cisco Smart Account.

Figure 12: Accepting the Agreement and Creating the Cisco Smart Account

You will receive an e-mail confirming the creation of the Cisco Smart Account.

Creating Virtual Accounts

This procedure is optional. Virtual accounts are collections of licenses and product instances. You can create virtual accounts in Cisco Smart Software Manager to organize the licenses for your company into logical entities. A single virtual account is available by default.

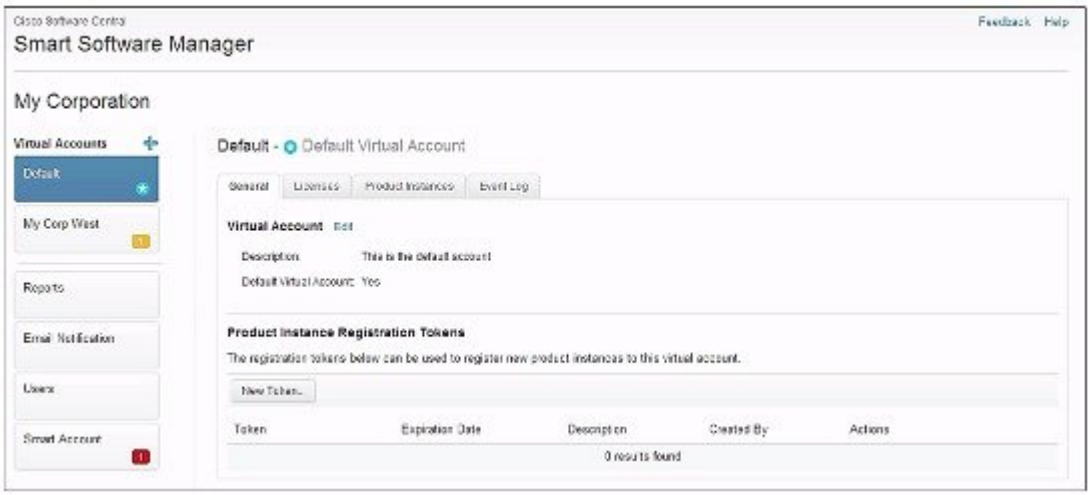
Before you begin

Set up a Cisco Smart Account. See Setting Up a Cisco Smart Account, on page 5.

Step 1 Log in to the Cisco Smart Software Manager.

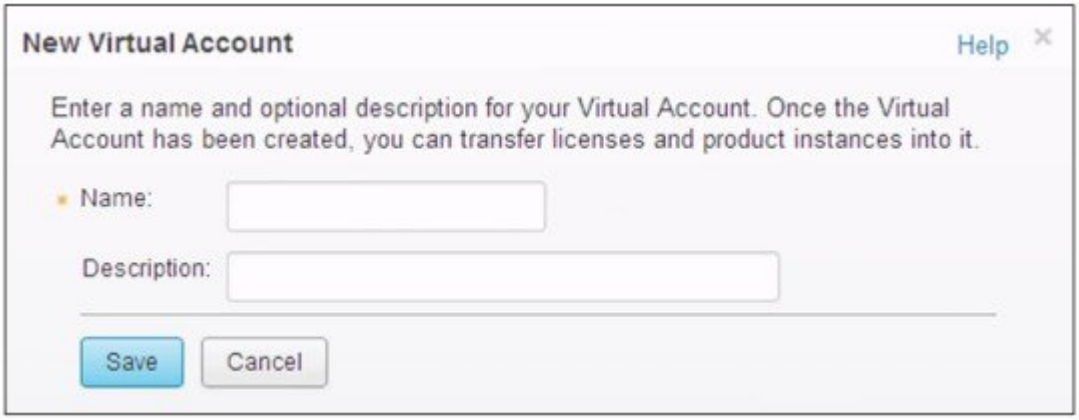
Step 2 Click the + (plus) symbol to create a virtual account.

Figure 13: Creating a Virtual Account



Step 3 In the **New Virtual Account** dialog box, enter the Name and Description.

Figure 14: New Virtual Account Dialog Box



Step 4 Click **Save**.

Creating a Product Instance Registration Token

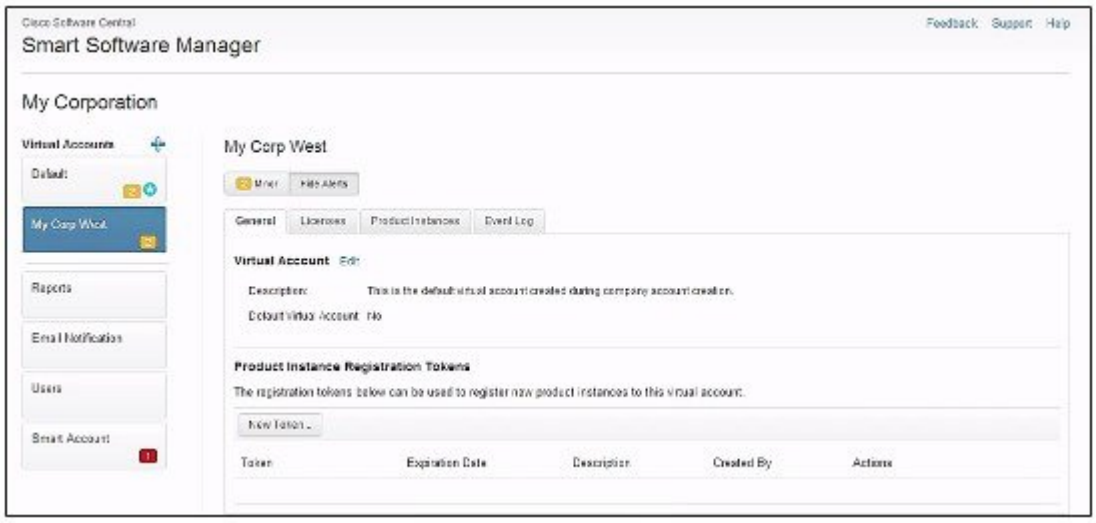
Product instance registration tokens are used to register and consume a product for Cisco Smart Licensing. You must generate a token to register the product and add the product instance to a specified virtual account. Registration tokens can be valid from 1 to 365 days.

Step 1 Log in to the Cisco Smart Software Manager.

Step 2 Click an existing virtual account.

Step 3 In the **General** tab, click **New Token**.

Figure 15: Creating a New Registration Token



Step 4 In the **Create Registration Token** dialog box, enter the Description and Expire After information and click **Create Token**.

Figure 16: Create Registration Token Dialog Box

What to do next

Register the router with the Cisco Licensing Cloud. For more details, see the Registering the Router with the Cisco Licensing Cloud Using the Registration Token, on page 15 section.

Communication with CSSM

Table 2: Feature History

Feature Name	Release Information	Feature Description
Support for Smart Transport	Cisco IOS XE Dublin 17.12.1	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. In this release, you can use Smart Transport as the new smart licensing transport, instead of Smart call-home (SCH).

You can configure a product instance to communicate with CSSM in the following ways:

- **Use Smart Call Home (SCH) to communicate with CSSM**: Call Home provides e-mail-based and web-based notification of critical system events. This method of connecting to CSSM is available in the earlier Smart Licensing environment, and remains available with Smart Licensing Using Policy. The following Call Home configuration options are available:
  - Direct cloud access: In this method, a product instance sends usage information directly over the internet to CSSM; no additional components are needed for the connection.

- Direct cloud access through an HTTPs proxy: In this method, a product instance sends usage information over the internet through a proxy server - either a Call Home Transport Gateway or an off-the-shelf proxy (such as Apache) to CSSM.

- **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. The following Smart transport configuration options are available:
  - Smart transport: In this method, a product instance uses a specific Smart transport licensing server URL. This must be configured exactly as shown in the workflow section.
  - Smart transport through an HTTPs proxy: In this method, a product instance uses a proxy server to communicate with the licensing server, and eventually, CSSM. The following example shows you how to configure Smart Transport through a HTTP proxy:

    ```
    Router(config)#
    Router(config)# license smart proxy address 192.168.0.1
    Router(config)# license smart proxy port 3128
    ```

  Ensure that the cBR-8 router can access `htttps://smartreceiver.cisco.com` to configure Smart Transport. The following example show hot to configure Smart Transport.

  ```
  Router# conf t
  license smart url https://smartreceiver.cisco.com/licservice/license
  license smart transport smart
  end
  ```

Note Use the `license smart url` command only if you want to point to a different CSSM. It is not required if you are using using the default cisco official CSSM.

Registering the Router with the Cisco Licensing Cloud Using the Registration Token

The router registration is performed only once for each product instance.

Note Ensure that you have the product instance registration token.

To register the router with the Cisco Licensing Cloud using a registration token, use the following commands:

```
enable
license smart register idtoken id-token
```

For example:

```
Router#license smart register idtoken
YjBkOWM5YTItMDFiOS00ZjBmLTllY2YtODEzMzg1YTMyZDVhLTEz
ODE0MjE0%0ANzc5NDF8U1BDUTAySWFRTmJqa1NnbmlzRUIyaGlYU
053L0pHZTNvUW9VTFpE%0AekxCOD0%3D%0A
```

The system contacts the Cisco Smart Licensing servers to obtain authorization for Smart Licensing.

The license agent registers the product with Cisco and receives an identity certificate. This certificate is saved and automatically used for all future communications with Cisco. The license agent automatically renews the registration information with Cisco every 30 days.

Note Smart licensing may fail if IPv6 is configured on any interface, and the router does not have IPv6 connectivity to the Internet or Cisco Smart Software Agent (at tools.cisco.com). Log file error messages similar to the following may appear.

(These messages may also appear as a result of other conditions being true.)

```
%SMART_LIC-3-AGENT_REG_FAILED: Smart Agent for Licensing Registration with Cisco licensing
 cloud failed: Fail to send out Call Home HTTP message.
%SMART_LIC-3-COMM_FAILED: Communications failure with Cisco licensing cloud: Fail to send
out Call Home HTTP message.
```

If connectivity fails due to this issue, see the Re-establishing Connectivity to Cisco Smart Call Home Server section.

After connectivity is established, register the router with the Cisco Licensing Cloud.

Reestablishing Connectivity to Cisco Smart Call Home Server

This section describes what to do when the router fails to connect to the Cisco Smart Call Home Server and IPv6 is configured.

The following scenarios are applicable:

- If the interface is configured using the **ip http client source-interface interface** CLI and has the IPv6 address, the router establishes a session with the remote server with IPv6 connectivity.
- If the interface is configured using the **ip http client source-interface interface** command and has the IPv4 address, the router establishes a session with the remote server with IPv4 connectivity.
- If the interface is configured using **ip http client source-interface interface** command, and has an IPv6 address and an IPv4 address, the router establishes a session with the remote server with IPv6 connectivity.
- If the interface isn't configured using the **ip http client source-interface interface**, the router establishes a session with the remote server with the IPv6 address.

For Cisco IOS XE Everest 16.5.1 or later, if an IPv6 address is available for an interface and the device can't connect to the Internet or Cisco Smart Software Agent, configure the interface to only use IPv4 for smart licensing, by running the following configuration mode command.

```
ip http client source-interface interface
```

How to Configure Cisco Smart Licensing using Transport Gateway Solution

The steps below describe how to configure Cisco smart licensing using transport gateway solution.

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**crypto pki trustpoint** **Example:** `Router(config)# crypto pki trustpoint cisco`	Declare the trustpoint that the router should use.
Step 4	**enrollment terminal** **Example:** `Router(ca-trustpoint)# enrollment terminal`	Specify manual cut-and-paste certificate enrollment.
Step 5	**revocation-check** *method* **Example:** `Router(ca-trustpoint)# revocation-check none`	Check the revocation status of a certificate. Method **none** means certificate checking is not required.
Step 6	**crypto pki authenticate** **Example:** `Router(config)# crypto pki authenticate cisco`	Authenticate the certification authority.

Step 7	**no reporting smart-licensing-data**
	Example:
	`Router(config)# call-home`
	`Router(cfg-call-home)# profile CiscoTAC-1`
	`Router(cfg-call-home-profile)# no reporting smart-licensing-data`
		Configure the default profile to not to communicate with tools.cisco.com.

Step 8	**destination address http** *address*
	Example:
	`Router(config)# call-home`
	`Router(cfg-call-home)# profile Custom-Profile-1`
	`Router(cfg-call-home-profile)# reporting smart-licensing-data`
	`Router(cfg-call-home-profile)# destination transport-method http`
	`Router(cfg-call-home-profile)# no destination transport-method email`
	`Router(cfg-call-home-profile)# destination address http`
	`https://TDS.IP.HERE:8443/Transportgateway/services/DeviceRequestHandler`
		Configure the custom profile to communicate with the transport server, here we use Custom Profile 1 as the name of the custom profile.

Configuring 100G Licenses for Supervisor 250G

The Cisco cBR Smart Account supports both 100G WAN licenses and 10G WAN licenses.

You need to configure the Cisco cBR to consume 100G WAN licenses for Supervisor 250G. This would accommodate existing 10G WAN licenses for 100G port, in addition to the 100G WAN license.

Starting from Cisco cBR release IOS-XE 16.8.1, there will be two types of WAN licenses in the Smart Account for WAN ports on the Cisco cBR Supervisor 250G module:

- 100G WAN license: By default, the Smart Account will consume the 100G WAN license for 100G WAN port.
- 10G WAN license: Can be applied to 10G and 100G WAN ports.

Overview of 100G License for Supervisor 250G

With the 100G WAN licenses, you can facilitate the ordering and management of WAN license for Supervisor 250G. This would help avoid the overhead of maintaining multiple 10G WAN licenses, and you can manage a single 100G WAN license for one 100G port of Supervisor 250G, instead of ten individual 10G WAN licenses.

However, there is no auto-conversion between 10G WAN licenses and 100G WAN licenses. They must be ordered and managed separately. If you are an existing customer using 10G WAN license for Supervisor 250G and have not purchased any 100G WAN licenses, the Cisco Smart Licensing will report out of compliance when attempting to upgrade to Cisco cBR release IOS-XE 16.8.1.

For information on configuring the Cisco cBR to consume 10G WAN licenses on 100G port for Supervisor 250G, see Applying 10G WAN License to the 100G WAN Ports, on page 18.

Note

- In Supervisor 160, there is no 100G WAN interface and WAN 100G License. The display is same as the previous release.
- The 100G license feature does not support an ISSU downgrade. This might cause a standby SUP crash.

Applying 10G WAN License to the 100G WAN Ports

Ensure that you go through Overview of 100G License for Supervisor 250G, on page 18 for an understanding of the feature and the restrictions.

The Smart Account will consume the 100G WAN license for 100G WAN port by default. To apply the 10G WAN licenses for the 100G WAN port, complete the following step.

SUMMARY STEPS

1. You can apply the 10G WAN license to the 100G WAN ports using the following command:

DETAILED STEPS

	Command or Action	Purpose

Step 1	You can apply the 10G WAN license to the 100G WAN ports using the following command:
	Example:
	`Router(config)# cable license 100G-conversion`
	To disable the 10G WAN license for 100G WAN ports, run the command with the *no* option. This would enable the 100G WAN ports to consume 100G WAN license.
	`Router(config)# no cable license 100G-conversion`	

Displaying the License Information

You can use the following command options to display the license information, based on wether the license has been configured or not:

SUMMARY STEPS

1. Run either of the following command options to display license information.
   - By default, or with the *no* option, the ports will consume a 100G WAN license for a 100G WAN port.

     For example if the **no cable license 100G-conversion** command has been issued, the responses to the **show cable license wan** and **show license summary** commands would be in the following format:

```
Router(config)# show cable license wan
-------------------------------------------
Entitlement:  WAN License
Consumed count: 0
Consumed count reported to SmartAgent: 0
Enforced state: No Enforcement

-------------------------------------------
Entitlement:  WAN 100G License
Consumed count: 2
Consumed count reported to SmartAgent: 2
Enforced state: No Enforcement

Router(config)# show license summary
Smart Licensing is ENABLED

Registration:
  Status: REGISTERED
  Smart Account: CBR8_DEV_1
  Virtual Account: cbr8-dev-test
  Export-Controlled Functionality: Allowed
  Last Renewal Attempt: None
  Next Renewal Attempt: Jun 13 00:47:13 2018 CST

License Authorization:
  Status: AUTHORIZED
```

```
  Last Communication Attempt: SUCCEEDED
  Next Communication Attempt: Jan 14 11:34:13 2018 CST

License Usage:
  License                 Entitlement tag               Count Status
  -----------------------------------------------------------------------------
  regid.2017-09.com.ci... (WAN_100G_License)                2 AUTHORIZED
```

- With the **cable license 100G-conversion** command, it will consume 10G WAN license for 100G WAN port.

  For example if the **cable license 100G-conversion** command has been issued, the responses to the **show cable license wan** and **show license summary** commands would be in the following format:

```
Router(config)# show cable licenses wan
-----------------------------------------
Entitlement:  WAN License
Consumed count: 20
Consumed count reported to SmartAgent: 20
Enforced state: No Enforcement


-----------------------------------------
Entitlement:  WAN 100G License
Consumed count: 0
Consumed count reported to SmartAgent: 0
Enforced state: No Enforcement

Router(config)# show license summary
Smart Licensing is ENABLED

Registration:
  Status: REGISTERED
  Smart Account: CBR8_DEV_1
  Virtual Account: cbr8-dev-test
  Export-Controlled Functionality: Allowed
  Last Renewal Attempt: None
  Next Renewal Attempt: Jun 13 00:47:13 2018 CST

License Authorization:
  Status: AUTHORIZED
  Last Communication Attempt: SUCCEEDED
  Next Communication Attempt: Jan 14 11:25:01 2018 CST

License Usage:
  License                 Entitlement tag               Count Status
  -----------------------------------------------------------------------------
  regid.2014-11.com.ci... (WAN_License)                    20 AUTHORIZED
```

DETAILED STEPS

	Command or Action	Purpose
Step 1	Run either of the following command options to display license information. • By default, or with the *no* option, the ports will consume a 100G WAN license for a 100G WAN port.	

	Command or Action	Purpose

	For example if the **no cable license 100G-conversion** command has been issued, the responses to the **show cable license wan** and **show license summary** commands would be in the following format:
	
	`Router(config)# show cable license wan`
	`----------`
	`Entitlement:  WAN License`
	`Consumed count: 0`
	`Consumed count reported to SmartAgent: 0`
	`Enforced state: No Enforcement`
	
	`----------`
	`Entitlement:  WAN 100G License`
	`Consumed count: 2`
	`Consumed count reported to SmartAgent: 2`
	`Enforced state: No Enforcement`
	
	`Router(config)# show license summary`
	
	`Smart Licensing is ENABLED`
	
	`Registration:`
	`  Status: REGISTERED`
	`  Smart Account: CBR8_DEV_1`
	`  Virtual Account: cbr8-dev-test`
	`  Export-Controlled Functionality: Allowed`
	`  Last Renewal Attempt: None`
	`  Next Renewal Attempt: Jun 13 00:47:13 2018 CST`
	
	`License Authorization:`
	`  Status: AUTHORIZED`
	`  Last Communication Attempt: SUCCEEDED`
	`  Next Communication Attempt: Jan 14 11:34:13 2018 CST`
	
	`License Usage:`
	`  License  Entitlement tag  Count Status`
	
	`---`
	
	`  regid.2017-09.com.ci... (WAN_100G_License)  2 AUTHORIZED`
	
	• With the **cable license 100G-conversion** command, it will consume 10G WAN license for 100G WAN port.
	
	For example if the **cable license 100G-conversion** command has been issued, the responses to the **show cable license wan** and **show license summary** commands would be in the following format:
	
	`Router(config)# show cable licenses wan`
	`----------`
	`Entitlement:  WAN License`	

	Command or Action	Purpose
	Consumed count: 20 Consumed count reported to SmartAgent: 20 Enforced state: No Enforcement ---------- Entitlement: WAN 100G License Consumed count: 0 Consumed count reported to SmartAgent: 0 Enforced state: No Enforcement Router(config)# show license summary Smart Licensing is ENABLED Registration: Status: REGISTERED Smart Account: CBR8_DEV_1 Virtual Account: cbr8-dev-test Export-Controlled Functionality: Allowed Last Renewal Attempt: None Next Renewal Attempt: Jun 13 00:47:13 2018 CST License Authorization: Status: AUTHORIZED Last Communication Attempt: SUCCEEDED Next Communication Attempt: Jan 14 11:25:01 2018 CST License Usage: License Entitlement tag Count Status ---------- regid.2014-11.com.ci... (WAN_License) 20 AUTHORIZED	

Feature Information for 100G License for Supervisor 250G

Use Cisco Feature Navigator to find information about the platform support and software image support. Cisco Feature Navigator enables you to determine which software images support a specific software release, feature set, or platform. To access Cisco Feature Navigator, go to the https://cfnng.cisco.com/ link. An account on the Cisco.com page is not required.

Note The following table lists the software release in which a given feature is introduced. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Table 3: Feature Information for 100G License for Supervisor 250G

Feature Name	Releases	Feature Information
100G License for Supervisor 250G	Cisco IOS-XE Release 16.8.1	This feature was integrated into Cisco IOS-XE Release 16.8.1 on theCisco cBR Series Converged Broadband Routers.

Verifying Cisco Smart Licensing Configuration

Use the following commands to verify the Cisco Smart Licensing Configuration on the Cisco cBR router:

- **show license all**—Displays all the license information.

  The following is a sample output of this command:

```
Router# show license all

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

Smart Licensing is ENABLED

Registration:
  Status: REGISTERED
  Virtual Account: auto-test-1
  Initial Registration: SUCCEEDED on Mar  5 02:01:03 2015 UTC
  Last Renewal Attempt: None
  Next Renewal Attempt: Sep  1 02:03:51 2015 UTC
  Registration Expires: Never

License Authorization:
  Status: OUT OF COMPLIANCE on Mar  5 03:34:54 2015 UTC
  Last Communication Attempt: SUCCEEDED on Mar  5 03:35:57 2015 UTC
  Next Communication Attempt: Mar  5 15:35:57 2015 UTC
  Communication Deadline: Jun  3 03:32:51 2015 UTC

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

(US_License):
  Description:
  Count: 64
  Version: 1.0
  Status: AUTHORIZED

(DS_License):
  Description:
  Count: 768
  Version: 1.0
  Status: AUTHORIZED

(WAN_License):
  Description:
  Count: 8
  Version: 1.0
  Status: OUT OF COMPLIANCE

Product Information
===================
```

```
UDI: PID:CBR-8-CCAP-CHASS,SN:FXS1739Q0NT

HA UDI List:
    Active:PID:CBR-8-CCAP-CHASS,SN:FXS1739Q0NT
    Standby:PID:CBR-8-CCAP-CHASS,SN:FXS1739Q0NT

Agent Version
=============
Smart Agent for Licensing: 1.2.1_throttle/5
Component Versions: SA:(1_2_1_throttle)1.1.0, SI:(rel20)1.0.1, CH:(rel4)1.0.15,
PK:(rel16)1.0.7
```

- **show license status**—Displays the license status information.

  The following is a sample output of this command:

```
Router# show license status

Smart Licensing is ENABLED

Registration:
  Status: REGISTERED
  Virtual Account: auto-test-1
  Initial Registration: SUCCEEDED on Mar  5 02:01:03 2015 UTC
  Last Renewal Attempt: None
  Next Renewal Attempt: Sep  1 02:03:51 2015 UTC
  Registration Expires: Never

License Authorization:
  Status: OUT OF COMPLIANCE on Mar  5 03:34:54 2015 UTC
  Last Communication Attempt: SUCCEEDED on Mar  5 03:35:57 2015 UTC
  Next Communication Attempt: Mar  5 15:35:56 2015 UTC
  Communication Deadline: Jun  3 03:32:50 2015 UTC
```

- **show license summary**—Displays the license summary information.

  The following is a sample output of this command:

```
Router# show license summary

Smart Licensing is ENABLED

Registration:
  Status: REGISTERED
  Virtual Account: auto-test-1
  Last Renewal Attempt: None
  Next Renewal Attempt: Sep  1 02:03:51 2015 UTC

License Authorization:
  Status: OUT OF COMPLIANCE
  Last Communication Attempt: SUCCEEDED
  Next Communication Attempt: Mar  5 15:35:56 2015 UTC

License Usage:
               License       Entitlement tag    Count Status
  -----------------------------------------------------------------
                               (US_License) 64       AUTHORIZED
                               (DS_License) 768      AUTHORIZED
                              (WAN_License) 8        OUT OF COMPLIANCE
```

- **show license tech support**—Displays the license technical support information.

The following is a sample output of this command:

```
Router# show license tech support

Smart Licensing Tech Support info

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

Smart Licensing is ENABLED

Registration:
  Status: REGISTERED
  Virtual Account: auto-test-1
  Initial Registration: SUCCEEDED on Mar  5 02:01:03 2015 UTC
  Last Renewal Attempt: None
  Next Renewal Attempt: Sep  1 02:03:51 2015 UTC
  Registration Expires: Never

License Authorization:
  Status: OUT OF COMPLIANCE on Mar  5 03:34:54 2015 UTC
  Last Communication Attempt: SUCCEEDED on Mar  5 03:35:57 2015 UTC
  Next Communication Attempt: Mar  5 15:35:57 2015 UTC
  Communication Deadline: Jun  3 03:32:51 2015 UTC

Evaluation Period:
  Evaluation Mode: Not In Use
  Evaluation Period Remaining: 89 days, 23 hours, 25 minutes, 40 seconds

License Usage
=============
Handle: 1
    License: 'nullPtr'
    Entitlement Tag:
regid.2014-11.com.cisco.US_License,1.0_a3f32909-2c71-426c-b3e0-eeefc946f9b3
    Description: <empty>
    Count: 64
    Version: 1.0
    Status: AUTHORIZED(3)
    Status time: Mar  5 03:34:54 2015 UTC
    Request Time: Mar  5 03:34:17 2015 UTC

Handle: 2
    License: 'nullPtr'
    Entitlement Tag:
regid.2014-11.com.cisco.DS_License,1.0_71ad0ae1-5e5e-4f02-b380-d2e1b8dcfa03
    Description: <empty>
    Count: 768
    Version: 1.0
    Status: AUTHORIZED(3)
    Status time: Mar  5 03:34:54 2015 UTC
    Request Time: Mar  5 03:34:17 2015 UTC

Handle: 3
    License: 'nullPtr'
    Entitlement Tag:
regid.2014-11.com.cisco.WAN_License,1.0_3d8bb7ba-1a92-4f01-a4aa-a4479f1d7612
    Description: <empty>
    Count: 8
    Version: 1.0
    Status: OUT OF COMPLIANCE(4)
    Status time: Mar  5 03:34:54 2015 UTC
    Request Time: Mar  5 03:34:17 2015 UTC
```

```
Product Information
====================
UDI: PID:CBR-8-CCAP-CHASS,SN:FXS1739Q0NT

HA UDI List:
    Active:PID:CBR-8-CCAP-CHASS,SN:FXS1739Q0NT
    Standby:PID:CBR-8-CCAP-CHASS,SN:FXS1739Q0NT

Agent Version
=============
Smart Agent for Licensing: 1.2.1_throttle/5
Component Versions: SA:(1_2_1_throttle)1.1.0, SI:(rel20)1.0.1, CH:(rel4)1.0.15,
PK:(rel16)1.0.7

Upcoming Scheduled Jobs
=======================
Current time: Mar  5 03:37:46 2015 UTC
IdCert Expiration Warning: Jan  4 02:00:41 2016 UTC (304 days, 22 hours, 22 minutes,
55 seconds remaining)
Daily: Mar  6 03:21:11 2015 UTC (23 hours, 43 minutes, 25 seconds remaining)
Certificate Renewal: Sep  1 02:03:51 2015 UTC (179 days, 22 hours, 26 minutes, 5 seconds
 remaining)
Certificate Expiration Check: Mar  4 02:00:41 2016 UTC (364 days, 22 hours, 22 minutes,
 55 seconds remaining)
Authorization Renewal: Mar  5 15:35:57 2015 UTC (11 hours, 58 minutes, 11 seconds
remaining)
Authorization Expiration Check: Jun  3 03:32:51 2015 UTC (89 days, 23 hours, 55 minutes,
 5 seconds remaining)
Init Flag Check: Not Available

License Certificates
====================
Production Cert: True
PIID: 36bf91ae-0577-4213-9e62-1b6ee0add02f
Licensing Certificated:
    Id certificate Info:
        Start Date: Mar  5 01:57:54 2015 UTC
        Expiry Date: Mar  4 01:57:54 2016 UTC
        Version Number: 3
        Serial Number: 134418
        Common Name: 05FB26B1A58A106DEA6878C346432186D08BC1C5::1,2

    Signing certificate Info:
        Start Date: Jun 14 20:18:52 2013 UTC
        Expiry Date: Apr 24 21:55:42 2033 UTC
        Version Number: 3
        Serial Number: 3
        Common Name: MMI Signer

    Sub CA Info:
        Start Date: Apr 24 22:19:15 2013 UTC
        Expiry Date: Apr 24 21:55:42 2033 UTC
        Version Number: 3
        Serial Number: 2
        Common Name: Smart Licensing CA - DEV


HA Info
==========
RP Role: Active
Chassis Role: Active
Behavior Role: Active
RMF: True
CF: True
```

```
CF State: Stateless

Other Info
==========
Software ID: regid.2014-12.com.cisco.CBR8V1,1.0_95948658-0b8b-4e8f-838d-b17020364ca9
Agent State: OOC
TS enable: True
Transport: Callhome
Locale: en_US.UTF-8
Debug flags: 0x7
Privacy Send Hostname: True
Privacy Send IP: True
Build type:: Production
sizeof(char)  : 1
sizeof(int)   : 4
sizeof(long)  : 4
sizeof(char *): 8
sizeof(time_t): 4
sizeof(size_t): 8
Endian: Big
enableOnInit: True
routingReadyByEvent: True
systemInitByEvent: True
WaitForHaRole: False
standbyIsHot: True
chkPtType: 2
delayCommInit: False
roleByEvent: True
maxTraceLength: 150
traceAlwaysOn: False
debugFlags: 7
```

- **show license udi**—Displays the license Unique Device Identifier (UDI) information.

  The following is a sample output of this command:

```
Router# show license udi

UDI: PID:CBR-8-CCAP-CHASS,SN:FXS1739Q0NT

HA UDI List:
    Active:PID:CBR-8-CCAP-CHASS,SN:FXS1739Q0NT
    Standby:PID:CBR-8-CCAP-CHASS,SN:FXS1739Q0NT
```

- **show license usage**—Displays the license usage information.

  The following is a sample output of this command:

```
Router# show license usage

License Authorization:
  Status: OUT OF COMPLIANCE on Mar  5 03:34:54 2015 UTC

(US_License):
  Description:
  Count: 64
  Version: 1.0
  Status: AUTHORIZED

(DS_License):
  Description:
  Count: 768
  Version: 1.0
  Status: AUTHORIZED
```

```
(WAN_License):
  Description:
  Count: 8
  Version: 1.0
  Status: OUT OF COMPLIANCE
```

- **show call-home profile all**—Displays the call home profile information for all configured profiles.

  The following is a sample output of this command:

```
Router# show call-home profile all

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
    Email address(es): callhome@cisco.com
    HTTP  address(es): https://tools.cisco.com/its/service/oddce/services/DDCEService

    Periodic configuration info message is scheduled every 25 day of the month at 10:03


    Periodic inventory info message is scheduled every 25 day of the month at 09:48

    Alert-group               Severity
    ------------------------  ------------
    crash                     debug
    diagnostic                minor
    environment               minor
    inventory                 normal

    Syslog-Pattern            Severity
    ------------------------  ------------
    .*                        major
```

- **show call-home smart-licensing statistics**—Displays the call home smart licensing statistics information.

  The following is a sample output of this command:

```
Router# show call-home smart-licensing statistics

Success: Successfully sent and response received.
Failed : Failed to send or response indicated error occurred.
Inqueue: In queue waiting to be sent.
Dropped: Dropped due to incorrect call-home configuration.

Msg Subtype      Success Failed  Inqueue Dropped Last-sent (GMT-06:00)
-------------------------------------------------------------------------
REGISTRATION     1       0       0       0       2015-03-13 13:12:13
ACKNOWLEDGEMENT  1       0       0       0       2015-03-13 13:12:20
ENTITLEMENT      5       0       0       0       2015-03-13 13:22:18
```

Use the following commands to verify the DOCSIS 3.1 Downstream License on the Cisco cBR router:

- **show cable license all | begin D3.1**—Displays all the DOCSIS 3.1 downstream license information.

  The following is a sample output of this command:

```
Router# show cable license all | begin D3.1

Load for five secs: 21%/1%; one minute: 52%; five minutes: 52%
Time source is NTP, 10:41:11.175 PST Mon May 9 2016
-----------------------------------------
Entitlement:  DOCSIS 3.1 Downstream Channel License
Consumed count: 31
Consumed count reported to SmartAgent: 0
Enforced state: No Enforcement
```

Use the following commands to verify the DOCSIS 3.1 Upstream Exclusive License on the Cisco cBR router:

- • **show cable licenses us_d31_exclusive**—Displays the DOCSIS 3.1 upstream exclusive license information.

  The following is a sample output of this command:

```
Router# show cable licenses us_d31_exclusive
Load for five secs: 99%/2%; one minute: 21%; five minutes: 6%
Time source is NTP, *10:14:30.935 CST Tue Jun 6 2017

-----------------------------------------
Entitlement:  DOCSIS 3.1 Upstream Channel Exclusive License
Total Licensed Spectrum: 188000000Hz
Consumed count: 188
Consumed count reported to SmartAgent: 188
Enforced state: No Enforcement
```

Troubleshooting Cisco Smart Licensing

Before taking the steps below to troubleshoot the Cisco Smart Licensing, the customers should first make sure the configuration is correct and see if they are able to ping the HTTP address they have configured for the smart license. The output of the **show call-home smart-licensing statistics** command should have REGISTERED and ACKNOWLEDGE information. And check the output of **show logging | include SMART | CALL**.

Manually Renewing the Smart License Registration

The license agent automatically renews the registration information with Cisco every 30 days. You may need to manually renew the registration if the license is out of compliance and it needs to be registered immediately.

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**license smart renew** **Example:** `Router# license smart renew`	Manually renews the license registration of the device instance with Cisco.

Unregistering the Router from Cisco Smart Licensing

You can unregister the router from Cisco Smart Licensing. You may need to unregister the router for the Return Material Authorization (RMA) of the router.

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**license smart deregister** **Example:** `Router# license smart deregister`	Removes the Cisco Smart Licensing registration for the device instance. All Cisco Smart Licensing certificates and entitlements are removed.

Flexible Consumption Model (FCM) Licenses

Smart Licensing supports the Flexible Consumption (FCM) licensing model. This model of licensing is available at low initial investment, provides easy scalability, and allows you to increase consumption of licenses as they expand. Flexible Consumption model licenses are checked for usage on a monthly basis. The monthly license usage is reported to the Smart Licensing Manager at Cisco.com.

In order to provide the simplification and flexibility to purchase software capacity as needed, FCM is metering the number of Subscribers(Modems) it has for each tier (Essential, Advantage, or Premier) which is based on the number of channels that are configured per Service Group:

- Essential (ES) tier is for 0–48 channels per Service Group.
- Advantage(AD) tier is for 49–80 channels per Service Group.
- Premier(PR) tier is for 81 and above channels per Service Group.

Benefits of FCM

- *Pay-as-you-grow*: Enables you to lower initial costs and add more capacity over time using Software Innovation Access (SIA)
- *Great Value*: Select the right tier, based on your needs (Essential, Advantage, Premier).
- *Simple*: Few pricing and service options.
- *Consistency*: Right-to-Use (RTU) model based on per subscriber (end user) basis aligned with other Cisco Service Provider products.

Pricing for Cisco cBR-8 routers consists of a perpetual license, **software innovation access (SIA) subscription, and Cisco Solution Support Services**.

- Perpetual licenses are charged as a one-time payment per end customer who is serviced by the platform and entitle permanent right-to-use of the cBR8 software.

- SIA is charged as a three, four, or five year subscription per end customer who is serviced by the platform, and entitles major software version upgrades during the subscription period. At the end of the initial subscription, you can renew the SIA subscriptions on an annual basis.
- Support Services (either SWSS-Basic or Solution Support) is required on the perpetual licenses for access to Technical Support and SW maintenance releases. Term of Support Services must align to the duration of the SIA subscription (i.e. three, four, or five years).

The following table shows the FCM PID list:

Table 4: Flexible Consumption Model License PID List

PID	Option Class	Sub-Option Class	Maximum Supported Channels Per Service Group	Rules
CBR8-SW	Nested Model			
	CBR-8 Essential RTU SW License			CBR-8 Per subscriber perpetual SW l applications
		CBR8-ES-RTU	48 channels	Per subscriber perpetual SW license f applications.
		CBR8-ES-SIA-3		Annual subscription 3-year SIA stand
		CBR8-ES-SIA-5		Annual subscription 5-year SIA stand
		CBR8-ES-SIA-7		Annual subscription 7-year SIA stand
		CBR8-ES-SIA-ST		Renewal PID for Transactional Esser
	CBR-8 Advantage RTU SW License			CBR-8 Per subscriber perpetual SW l applications.
		CBR8-AD-RTU	80 Channels	Per subscriber perpetual SW license f
		CBR8-AD-SIA-3		Annual subscription 3 year SIA stand
		CBR8-AD-SIA-5		Annual subscription 5 year SIA stand
		CBR8-AD-SIA-7		Annual subscription 7 year SIA stand
		CBR8-AD-SIA-ST		Renewal PID for Transactional Adva
	CBR-8 Premier RTU SW License			CBR-8 Premier Tier per subscriber P
		CBR8-PR-RTU	Unlimited Channels	Per subscriber perpetual SW license f applications
		CBR8-PR-SIA-3		Annual subscription 3-year SIA stand
		CBR8-PR-SIA-5		Annual subscription 5-year SIA stand
		CBR8-PR-SIA-7		Annual subscription 7-year SIA stand

PID	Option Class	Sub-Option Class	Maximum Supported Channels Per Service Group	Rules
		CBR8-PR-SIA-ST		Renewal PID for Transactional Premier S

Cisco cBR-8 routers either supports Traditional Mode License or FCM License, it does not allow combining FCM and Traditional Mode License. The Traditional Mode License is enabled by default. Use the `cable license enable-FCM` command to enable FCM. Use `no cable license enable-FCM` to disable FCM.

Table 5: Differences Between Traditional Smart License

Traditional Smart License	FCM
Bandwidth based model	Subscriber based model
Enabled by default	Use the `cable license enable-FCM` command to enable FCM. Use `no cable license enable-FCM` to disable FCM.
Enforced license types: • LCHA_License • DS_License • US_License • DS_D31_License • US_D31_License • WAN_License • NC_License • RPHY_BC_Video	Enforced license types: • LCHA_License • CBR8_ESS_RTU/ CR8_ADV_RTU/ CBR8_PRE_RTU • CBR8_ESS_SIA/ CR8_ADV_SIA/ CBR8_PRE_SIA
All Cisco IOS XE releases are supported.	Supported on Cisco IOS XE Cupertino 17.9.1w releases or later.

The following example shows the Traditional Mode License Summary:

Traditional Mode License Summary

```
router#show license summary
Load for five secs: 71%/4%; one minute: 62%; five minutes: 59%
Time source is NTP, 00:05:01.752 CST Mon Oct 17 2022

Smart Licensing is ENABLED

Registration:
  Status: REGISTERED
  Smart Account: BU Production Test 1
```

```
  Virtual Account: CBR8-STG2
  Export-Controlled Functionality: ALLOWED
  Last Renewal Attempt: None
  Next Renewal Attempt: Apr 14 22:51:18 2023 CST

License Authorization:
  Status: AUTHORIZED
  Last Communication Attempt: PENDNG
  Next Communication Attempt: Oct 17 23:07:06 2022 CST
License Usage:
  License                 Entitlement Tag               Count Status
  -----------------------------------------------------------------------------
  CBR8 DOCSIS 3.0 Upst... (US_License)                   1279 AUTHORIZED
  CBR8 VOD/SDV Downstr... (NC_License)                    744 AUTHORIZED
  CBR8 DOWNSTREAM RPHY... (RPHY_BC_Video)                   5 AUTHORIZED
  CBR8 Supervisor 10G ... (WAN_License)                    12 AUTHORIZED
  CBR8 DOCSIS 3.0 Down... (DS_License)                   3005 AUTHORIZED
  CBR8 D3.1 Downstream... (DS_D31_License)               1324 AUTHORIZED
  cBR8 DOCSIS 3.0 Line-...(DLCHA_License)                   1  AUTHORIZED
```

Determining Service Group(SG) Size

Service Group size only considers DOCSIS channels. Service Group only considers DS channel and does not consider US channel.

- For I-CMTS, one SG is a DS port. The DS port is DS controller port from CMTS.
- For RPHY, one SG is an RPD DS port.

Service Group considers max channels that are configured in the group, regardless if channel is up or down. The OFDM channels are calculated as the sums total of all licensed spectrum, which is divided by 6, and then rounded up. For example:

- In a Service Group –24 SC QAMs for DOCSIS 3.0 + 96 MHz (equivalent to 16- 6-Mhz channels) of OFDM for D3.1 = 40 total channels (24 + 16). This is an Essential Tier.
- In a Service Group –32 SC QAMs for DOCSIS 3.0 + 192 MHz (equivalent to 32- 6-Mhz channels) of OFDM for D3.1 = 64 total channels (32 + 32). This is an Advantage Tier.

Determining Service Tier

A Cisco cBR-8 router can only have one service tier i.e Essential, Advantage, or Premier, but can’t have a mixture of them. Here is the chassis level service tier Algorithm with 5% Allowance:

- Essential SG count >= total SG count * (1–5%), Cisco cBR-8 router service tier is **Essential**.
- Premier SG count > total SG count * 5%, Cisco cBR-8 router service tier is **Premier**.
- If the previous two conditions are not met, then Cisco cBR-8 router service tier is **Advantage**.

For example, on a Cisco cBR-8 router, there are 19 Essential SGs (48 DS channels) and 1 Advantage SG (64 DS channels), then this chassis level service tier is **Essential** Tier (19/(19+1) = 95%).

Cisco cBR-8 Router Reporting to CSSM

Cisco cBR-8 routers report the number of subscribers that it has for each tier (Essential, Advantage, or Premier). Every license has two entitlements. The entitlement types are the right-to-use (RTU) and Software Innovation Access (SIA). Cisco cBR-8 routers report same number of licenses in both RTU and SIA to server. Cisco

cBR-8 routers report subscribers to Cisco Smart Software Manager (CSSM) in one hour after bootup or SUP switchover, post that it reports Monthly. Cisco cBR-8 routers keeps track of the number of channels per SG and total modems count over the whole month. For example, if Cisco cBR-8 routers did 30 samples in one month, and the highest modems count and tier of the 30 samples are used for reporting. Cisco cBR-8 routers store the highest subscriber(modem) count during the reporting period, regardless if the modem is online or offline. DSG STB devices are excluded from subscriber statistics.(Use the `show cable modem docsis device-class` command.). Traditional licenses types are not reported in FCM model except LCHA license.

CSSM Response to Cisco cBR-8 Router

The Hierarchy license structure is as follows: Premier>Advanced>Essential. If there are sufficient RTU/SIA licenses in reported tier, then server response is **Compliance**. If the server does not have insufficient RTU/SIA licenses in the reported or higher tier, then server response is **Out of Compliance (OOC)**. If there are insufficient RTU/SIA licenses in reported tier, then the server automatically tries to use licenses of a higher level than what is reported.

The following is an example where the server response is **Compliance**:

CSSM has licenses: 1000 Essential-RTU License, 100 Advantage-RTU, 10 Premier-RTU. cBR-8 reports 1050 Essential-RTU to CSSM, CSSM uses 1000 Essential-RTU License + 50 Advantage-RTU. 1000 + 100 > 1050.

The following is an example where the server response is **Out of Compliance (OOC)**:

CSSM has licenses: 100 Essential -RTU License, 1000 Advantage-RTU, 10 Premier-RTU. cBR-8 reports 1050 Advantage-RTU to CSSM, CSSM uses 1000 Advantage -RTU License + 10 Premier-RTU, 1000 + 10 < 1050.

Order the required amount of RTU & SIA subscriptions licenses, based on the service tier and number of subscribers that you plan to deploy.

FCM License Summary

The following example shows how to deploy an FCS License.

```
router(config)#cable license enable-FCM

router#show license summary
Load for five secs: 26%/2%; one minute: 31%; five minutes: 31%
Time source is NTP, 00:07:14.392 CST Mon Oct 17 2022

Smart Licensing is ENABLED
Registration:
  Status: REGISTERED
  Smart Account: BU Production Test 1
  Virtual Account: CBR8-STG2
  Export-Controlled Functionality: ALLOWED
  Last Renewal Attempt: None
  Next Renewal Attempt: Apr 12 10:32:34 2023 CST

License Authorization:
  Status: AUTHORIZED
  Last Communication Attempt: SUCCEEDED
  Next Communication Attempt: Nov 16 00:07:12 2022 CST

License Usage:
  License                 Entitlement Tag               Count Status
  -----------------------------------------------------------------------------
  cBR DOCSIS 3.0 Line-... (LCHA_License)                    5 AUTHORIZED
```

```
CBR8 - Advantage - RTU  (CBR8_ADV_RTU)                264 AUTHORIZED
CBR8 - Advantage Sub... (CBR8_ADV_SIA)                164 AUTHORIZED
```

Additional References

Related Documents

Related Topic	Document Title
Cisco Smart Licensing	Cisco Smart Software Licensing

Technical Assistance

Description	Link
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.	http://www.cisco.com/support

Feature Information for Cisco Smart Licensing

Use Cisco Feature Navigator to find information about the platform support and software image support. Cisco Feature Navigator enables you to determine which software images support a specific software release, feature set, or platform. To access Cisco Feature Navigator, go to the https://cfnng.cisco.com/ link. An account on the Cisco.com page is not required.

Note The following table lists the software release in which a given feature is introduced. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Table 6: Feature Information for Cisco Smart Licensing

Feature Name	Releases	Feature Information
Cisco Smart Licensing	Cisco IOS XE Fuji 16.7.1	This feature was integrated on theCisco cBR Series Converged Broadband Routers.
DOCSIS 3.1 US Channel Licensing	Cisco IOS XE Fuji 16.7.1	This feature was integrated on theCisco cBR Series Converged Broadband Routers.