



# Smart Licensing

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## Overview

Cisco Smart Licensing using Policy is a software licensing model that provides visibility of ownership and usage through the Cisco Smart Software Manager (CSSM) portal. CSSM is a central license repository that manages licenses across all Cisco products that you own, including CUBE. Devices send license usage to CSSM either directly or use an on-premises application. Your Smart Account Administrator controls your access to CSSM. Use your Cisco credentials to access the CSSM portal through <http://software.cisco.com>.

Smart Licensing applies to all platform technology (UCK9, Security, DNA) and CUBE feature licenses that the platform uses.

CSSM shows license usage across all devices that are registered to a virtual account. A Virtual Account License Inventory displays the quantity of licenses that are purchased, those licenses in use, and a balance. An **Insufficient Licenses** alert is displayed if the license balance is below 0.

For example, consider a smart account in CSSM with 50 CUBE trunk session licenses. If you have a single registered CUBE router using 20 trunk sessions, the CSSM licenses page shows **Purchased** as 50, **In Use** as 20, and **Balance** as 30.

For more information on Smart Software Manager, see the [Cisco Smart Software Manager User Guide](#).

## Smart License Operation

Smart Licensing using Policy introduces a new paradigm for tracking license usage across your business. In earlier releases, license authorization was forward looking, binding licenses to a device until the next authorization request. Actual license use during the proceeding reporting period is now sent to CSSM, allowing you to plan ongoing license requirements based on historical usage data.

Each time a change in license usage is detected, the account policy defines how soon this should be reported to CSSM. Typically, this means that CUBE must send a report at least every 90 days, although it is

recommended that reports are sent more frequently. CSSM acknowledges each submitted Resource Utilization Monitoring (RUM) report to ensure that the use is recorded reliably. If the router does not receive an acknowledgment within the minimum reporting period, call processing may be disabled. Call processing is resumed when a valid acknowledgment is received.

Submit the reports to CSSM directly or through a Smart Software Manager On-Prem server. The Cisco Smart Licensing Utility (CSLU) application can also collect usage reports, providing more flexibility in managing your license usage. When a device is not able to communicate directly with a licensing server, a signed usage report can be generated and manually uploaded to CSSM. The acknowledgment that is generated by CSSM must be uploaded to the device within the license reporting policy period to ensure continued use.




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**Note** CUBE\_T\_VGW records TDM license count when there is a TDM-SIP call. The **show license all** command displays the number of licenses that are used and is an expected behaviour. The CUBE\_T\_VGW is not displayed when there is no TDM-SIP call, and the CUBE does not act as a gateway. The TDM-SIP call service continues uninterrupted even if the device is not registered to CSSM or RUM acknowledgement is not received from the CSSM server.

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**Note** Cisco Smart Software Manager On-Prem Version 8 Release 202102 or later is required for any device using SLP. Refer to the SLP feature documentation for further information ([Smart Licensing Using Policy for Cisco Enterprise Routing Platforms](#)).

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**Warning** When using any of the following Smart Licensing using Policy releases, CUBE shuts down if the router does not receive a report acknowledgment from CSSM before the acknowledgment deadline set by the account policy: 17.3.2, 17.3.3, 17.3.4a, 17.6.1a, or any 17.4 or 17.5 release. CUBE does not shut down in this way with later releases.

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License usage is calculated dynamically in the same way as earlier releases, with measurements recorded periodically based on the periodicity timer. Measurements are stored locally until they are submitted to CSSM. This historical usage reporting allows for more accurate aggregation of use across multiple devices over time. The minimum value for the periodicity timer is increased to 8 hours.

The system records the changes every eight hours. It reports these changes to CSSM as soon as it detects any variations from the previous value. However, note that this report is limited to a maximum frequency of once per 24 hours.

If the peak license usage for the current period is different by more or less than 25% of the previously reported value, it is reported and periodicity interval is reset. Use of CUBE Standard Trunk and CUBE Enhanced Trunk licenses are monitored separately.




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**Note** Smart License Reservation (SLR) for CUBE licenses is not compatible with SLP. Even if a reservation is in place when upgrading, license use reporting will still be required in accordance with the device policy. Reservations should therefore be returned immediately before or after upgrading to a release that uses SLP.

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**Note** From Cisco IOS XE Bengaluru 17.6.1a onwards, calls that are forked using WebSockets are marked as consuming an Enhanced session license.

## Smart Software Licensing Task Flow

IOS XE license use reports may either be pushed to or pulled by a licensing server. Refer to the workflows in [Smart Licensing Using Policy for Cisco Enterprise routing Platforms](#) for more details.

### Obtain the Registration ID Token

#### Detailed Steps

1. Log in to your Smart Account in either CSSM or satellite.
2. Navigate to the Virtual Account to register the CUBE.
3. Generate a registration ID token.

### Configure Smart Licensing Transport Settings

**Step 1** `hostname` *hostname*

**Example:**

```
Device(config)# hostname cube
cube(config)#
```

Ensure that hostname and the PID of the platform are not the same. For example, if the hostname of an ASR1006 router is configured as "ASR1006," registration is unsuccessful.

**Step 2** `ip name-server` *IP Address*

**Example:**

```
cube(config)# ip name-server 10.0.0.1 10.0.0.10
```

Configures valid DNS servers to ensure the correct resolution of the CSSM hostname.

**Step 3** `ip http client source-interface` *interface name*

**Example:**

```
cube(config)# ip http client source-interface GigabitEthernet0/0/0
```

Binds the platform HTTP client to the interface used to access the CSSM.

**Step 4** `license smart transport smart`

**Example:**

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

Smart transport is the preferred method for sending usage reports.

**Step 5** `license smart proxy address` *host-name***Example:**

```
cube(config)# license smart proxy address proxy.cisco.com
```

If necessary, configure a proxy-server for the platform when a direct HTTP connection to CSSM is not permitted.

**Step 6** `license smart proxy port` *port-number***Example:**

```
cube(config)# license smart proxy port 80
```

If using an internet proxy, configure a proxy-server port number.

**Step 7** `license smart url default`**Example:**

```
cube(config)# license smart url default
```

Use the default URL for sending reports to CSSM.

## Associate the Host Platform with CSSM

From Cisco IOS XE Everest 16.11.1a to Cisco IOS XE Amsterdam 17.3.1a, you must register the host platform to either CSSM or SSM On-Prem to report license usage. From Cisco IOS XE Amsterdam 17.3.2 onwards, license use must be reported to CSSM or SSM On-Prem in accordance with the Smart Account reporting policy.

**Before you begin**

1. Obtain the registration ID token from your Smart Account.
2. Configure Smart Licensing transport settings.

Use the following command to register the CUBE platform with CSSM.

```
license smart trust id_token id_token...local [force]
```

**Example:**

```
Router# license smart trust id_token ZDEwZDFiODktNWF.....
```

## Configure CUBE Licensed Features

**Step 1** `voice service voip`**Example:**

```
Device(config)# voice service voip
```

Enters global VoIP configuration mode.

**Step 2** `mode border-element [ license periodicity {hours <8-23> | days <1-30> } ]`

The periodicity keyword configures the CUBE measurement interval for license usage. If you do not configure the periodicity keyword, license usage is measured once every 7 days.

## Verify Smart License Operation

This section shows CUBE license usage status and license usage history.

Use the following commands to verify the platform license usage:

- **show cube status**—Displays CUBE license status.

```
cube#show cube status
CUBE-Version : 14.4
SW-Version : 17.6.1a, Platform ISR4321/K9
HA-Type : none
```

- **show license status**—Displays the license policy and reporting status.



**Note** The acknowledgment deadline is presented in this output. Ensure that an acknowledgment is received before this time to ensure continued operation of the SIP service.

```
cube#show license status
Utility:
  Status: DISABLED

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

Transport:
  Type: Callhome

Policy:
  Policy in use: Merged from multiple sources.
  Installed Time: Jan 01 05:30:00 1970 IST
  Reporting ACK required: yes
  Perpetual Attributes:
    First report requirement (days): 365 (CISCO default)
    Reporting frequency (days): 90 (CISCO default)
    Report on change (days): 90 (Product default)
  Subscription Attributes:
    First report requirement (days): 90 (CISCO default)
    Reporting frequency (days): 90 (CISCO default)
    Report on change (days): 80 (Product default)
  Enforced License Attributes:
    First report requirement (days): 90 (Customer Policy)
    Reporting frequency (days): 90 (Customer Policy)
    Report on change (days): 80 (Customer Policy)
  Export License Attributes:
    First report requirement (days): 90 (Customer Policy)
    Reporting frequency (days): 90 (Customer Policy)
```

```

Report on change (days): 90 (Customer Policy)

Miscellaneous:
  Custom Id: <empty>

Usage Reporting:
  Last ACK received: <none>
  Next ACK deadline: May 26 08:24:45 2020 IST
  Reporting Interval: 30
  Next ACK push check: <none>
  Next report push: Jun 15 08:24:45 2020 IST
  Last report push: <none>
  Last report file write: <none>
  Last report pull: <none>

Trust Code Installed: <none>

```

- **show voice sip license stats**—Displays CUBE trunk license usage history.

License usage is recorded in tabular and graphical format for all the three types of trunk call count (Enhanced, Standard, and Aggregate). Usage is recorded based on the peak value of concurrent calls for a defined interval of time:

- **Seconds Table**—This table stores concurrent calls at every second for the last 60 seconds.
- **Minutes Table**—This table stores regularized peak value of concurrent calls at every minute for the last 60 minutes. Regularized peak for a minute is the average of top 3 peak values that occurs in a minute.
- **Hours Table**—This table stores peak value for each hour for the last 72 hours.
- **Days Table**—This table stores peak value for each day for the last 72 days.

The following example outputs are truncated to display 60-second and 60-minute tables only.

```
cube#show voice sip license stats table
```

```
02:50:16 PM Wednesday Nov 13 2019 UTC
```

```

CUBE Trunk License Usage (last 60 seconds)
Period      Average      Max
-----
 1-5         0             0
 6-10        0             0
11-15        0             0
16-20        0             0
21-25        0             0
26-30        0             0
31-35        0             0
36-40        0             0
41-45        0             0
46-50        0             0
51-55        0             0
56-60        0             0

```

```

CUBE Trunk License Usage (last 60 minutes)
Period      Average      Max
-----
 1-5         0             0
 6-10        0             0

```

```

11-15      0      0
16-20      0      0
21-25      0      0
26-30      0      0
31-35      0      0
36-40      0      0
41-45      0      0
46-50     324     900
51-55     343     899
56-60     292     600
    
```

cube#show voice sip license stats

11:01:01 AM Thursday Aug 29 2019 IST

```

10
 9
 8
 7
 6
 5
 4
 3
 2
 1
0....5....1....1....2....2....3....3....4....4....5....5....6
   0   5   0   5   0   5   0   5   0   5   0   5   0
CUBE Trunk License Usage (last 60 seconds)
    
```

```

910
820
730
640
550
460
370
280
190
100
 10
0....5....1....1....2....2....3....3....4....4....5....5....6
   0   5   0   5   0   5   0   5   0   5   0   5   0
CUBE Trunk License Usage (last 60 minutes)
* = maximum      # = average
369863146641
8880900440044
3330922440011
**
#*
##
***  **
####  ##
##### *###*
*##### *###*
#####* #####
##### #####
*#####*#####*
#####*#####*
    
```

- **show voice sip license status**—Displays the license status.

```

Router#show voice sip license status
Host Name: Router
    
```

```

Current Time: Mar 30 2021 00:32:35 UTC
SIP service: Up
License use recorded every: 8 Hour(s)
Next record at: Mar 30 2021 07:00:00 UTC
Recent use of license(s) for CUBE Standard Trunk
Verify Smart License Operation
-----

```

Timestamp Count

```

-----
Mar 29 2021 23:00:00 UTC 0
Mar 29 2021 22:00:00 UTC 9
Mar 29 2021 21:00:00 UTC 24
Mar 29 2021 20:00:00 UTC 13
Mar 29 2021 11:00:00 UTC 0
Mar 29 2021 09:00:00 UTC 2
Recent use of license(s) for CUBE Enhanced Trunk
-----

```

Timestamp Count

```

-----
Mar 29 2021 21:00:00 UTC 0
Mar 29 2021 20:00:00 UTC 2
Mar 29 2021 11:00:00 UTC 0
Mar 29 2021 09:00:00 UTC 8

```

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

```

cube#show license usage
Utility:
  Status: DISABLED

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

Transport:
  Type: Callhome

Policy:
  Policy in use: Merged from multiple sources.
  Installed Time: Jan 01 05:30:00 1970 IST
  Reporting ACK required: yes
  Perpetual Attributes:
    First report requirement (days): 365 (CISCO default)
    Reporting frequency (days): 90 (CISCO default)
    Report on change (days): 90 (Product default)
  Subscription Attributes:
    First report requirement (days): 90 (CISCO default)
    Reporting frequency (days): 90 (CISCO default)
    Report on change (days): 80 (Product default)
  Enforced License Attributes:
    First report requirement (days): 90 (Customer Policy)
    Reporting frequency (days): 90 (Customer Policy)
    Report on change (days): 80 (Customer Policy)
  Export License Attributes:
    First report requirement (days): 90 (Customer Policy)
    Reporting frequency (days): 90 (Customer Policy)
    Report on change (days): 90 (Customer Policy)

Miscellaneous:
  Custom Id: <empty>

Usage Reporting:
  Last ACK received: <none>

```



```

Next ACK deadline: May 26 08:24:45 2020 IST
Reporting Interval: 30
Next ACK push check: <none>
Next report push: Jun 15 08:24:45 2020 IST
Last report push: <none>
Last report file write: <none>
Last report pull: <none>

```

```
Trust Code Installed: <none>
```

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

```
Device#show license summary
```

```
License Usage:
```

| License    | Entitlement tag             | Count | Status |
|------------|-----------------------------|-------|--------|
| CUBE_T_STD | (CUBE_T_STD)                | 5     | IN USE |
| uck9       | (ISR_4351_UnifiedCommun...) | 1     | IN USE |
| CUBE_T_VGW | (CUBE_T_VGW)                | 4     | IN USE |

### Commands Related to Smart License

- **show license all**—Displays all the information that is related to licensing.
- **show license tech support**—Displays the license technical support information.
- **show call-home smart-licensing**—Displays the destination URL that is configured.

Use the following commands to debug any issues that are related to your Smart License:

- **debug license feature cube all**

- Request successful for license\_type:<license\_type\_int> and count <usage\_count>.

Example:

```
*May 18 10:12:45.178: //CUBE-SL/Info/cube_sl_send_entitlement_request: Request
successful for license_type: 0 and count 9.
```

```
Request successful for license <license_type_string>
```

Example:

```
*May 18 10:15:45.181: //CUBE-SL/Info/cube_license_request: Request successful
for license CUBE_T_STD
```

# High Availability Configurations

## Smart Licensing with Box-to-Box High Availability

Box-to-Box redundancy uses the Redundancy Group (RG) Infrastructure to form High Availability (high availability) pair of platforms.

For Smart License configurations on the High Availability pair of platforms, see [Smart Software Licensing Task Flow, on page 3](#). When reporting license usage, the Smart Agent includes details of its high availability group and, if it is in the active or standby state. Thus allowing the CSSM to group license requirements for the high availability pair.

Box-to-Box High Availability requires CUBE Trunk Redundant Session licenses. From Cisco IOS XE Amsterdam 17.2.1r onwards, license usage is based on dynamic call counting.

### Before Failover

- Establish a trust relationship for both platforms in the high availability configuration with the same CSSM Smart Virtual Account.
- CSSM sets the reporting policy for each platform.
- Only the active platform submits license usage reports to CSSM.

### After Failover

- The platform that switches to the active mode reports license usage to the CSSM.
- The new active platform starts a new license measurement interval timer. For example, if a periodicity of five days is configured and failover occurs after three days, the next measurement will be recorded five days later.

## Verify Smart License Operation for Box-to-Box High Availability

You can use all the commands that are given in the section [Verify Smart License Operation, on page 5](#) to verify the licensing status in High Availability mode. The following commands reflect Smart License information that is related to Box-to-Box high availability for IOS XE releases 16.11.1a:

The following commands reflect Box-to-Box high availability licensing information.

- **show cube status**—Displays CUBE license capacity and the high availability mode.

```
CSR#sh cube status
CUBE-Version : 14.4
SW-Version : 17.6.1a, Platform ISR4321/K9
HA-Type : hot-standby-chassis-to-chassis
```

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

```
CSR#sh license usage
License Authorization:
  Status: Not Applicable

CUBE_T_RED (CUBE_T_RED):
  Description: CUBE_T_RED
  Count: 100
  Version: 1.0
  Status: IN USE
  Export status: NOT RESTRICTED
  Feature Name: CUBE_T_RED
  Feature Description: CUBE_T_RED
  Enforcement type: NOT ENFORCED
  License type: Perpetual
```

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

Following is the sample output from the active instance of CUBE.

```
CSR#sh license summary
License Usage:
  License                               Entitlement tag           Count Status
-----
  CUBE_T_RED                            (CUBE_T_RED)              1 IN USE
```

- **show license all**—Displays Active and Standby modes.

```
c8kv#sh license all
Smart Licensing Status
=====

Smart Licensing is ENABLED

Export Authorization Key:
  Features Authorized:
    <none>

Utility:
  Status: DISABLED

Smart Licensing Using Policy:
  Status: ENABLED

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

Transport:
  Type: Smart
  URL: https://smartreceiver-stage.cisco.com/licservice/license
  Proxy:
    Not Configured

Miscellaneous:
  Custom Id: <empty>

Policy:
  Policy in use: Installed On Apr 20 13:26:18 2021 UTC
  Policy name: SLE Policy
  Reporting ACK required: yes (Customer Policy)
  Unenforced/Non-Export Perpetual Attributes:
    First report requirement (days): 30 (Customer Policy)
    Reporting frequency (days): 60 (Customer Policy)
    Report on change (days): 60 (Customer Policy)
  Unenforced/Non-Export Subscription Attributes:
    First report requirement (days): 120 (Customer Policy)
    Reporting frequency (days): 150 (Customer Policy)
    Report on change (days): 120 (Customer Policy)
  Enforced (Perpetual/Subscription) License Attributes:
    First report requirement (days): 0 (CISCO default)
    Reporting frequency (days): 90 (Customer Policy)
    Report on change (days): 60 (Customer Policy)
  Export (Perpetual/Subscription) License Attributes:
    First report requirement (days): 0 (CISCO default)
    Reporting frequency (days): 30 (Customer Policy)
    Report on change (days): 30 (Customer Policy)

Usage Reporting:
  Last ACK received: Oct 08 13:56:07 2021 UTC
  Next ACK deadline: Dec 07 13:56:07 2021 UTC
```

```

Reporting push interval: 1 days
Next ACK push check: Oct 22 20:44:57 2021 UTC
Next report push: Oct 23 16:24:52 2021 UTC
Last report push: Oct 22 16:24:52 2021 UTC
Last report file write: <none>

```

Trust Code Installed: Apr 20 13:26:18 2021 UTC

#### License Usage

=====

```

network-advantage_1G (ESR_P_1G_A):
  Description: network-advantage_1G
  Count: 1
  Version: 1.0
  Status: IN USE
  Export status: NOT RESTRICTED
  Feature Name: network-advantage_1G
  Feature Description: network-advantage_1G
  Enforcement type: NOT ENFORCED
  License type: Perpetual

```

```

dna-advantage_1G (DNA_P_1G_A):
  Description: dna-advantage_1G
  Count: 1
  Version: 1.0
  Status: IN USE
  Export status: NOT RESTRICTED
  Feature Name: dna-advantage_1G
  Feature Description: dna-advantage_1G
  Enforcement type: NOT ENFORCED
  License type: Subscription

```

```

CUBE_T_STD (CUBE_T_STD):
  Description: CUBE_T_STD
  Count: 121
  Version: 1.0
  Status: IN USE
  Export status: NOT RESTRICTED
  Feature Name: CUBE_T_STD
  Feature Description: CUBE_T_STD
  Enforcement type: NOT ENFORCED
  License type: Perpetual

```

#### Product Information

=====

UDI: PID:C8000V,SN:93POM8FF9IZ

#### Agent Version

=====

Smart Agent for Licensing: 5.1.21\_rel/96

#### License Authorizations

=====

##### Overall status:

```

Active: PID:C8000V,SN:93POM8FF9IZ
Status: SMART AUTHORIZATION INSTALLED on Sep 21 13:48:56 2021 UTC
Last Confirmation code: 1fc54c75

```

##### Purchased Licenses:

No Purchase Information Available#

## Smart Licensing with Inbox High Availability

You can configure a Cisco ASR 1000 Series Router platform with two Route Processors for Inbox High Availability using Stateful Switchover (SSO). In this configuration, one Route Processor is active while the other is in standby mode.

For Smart License configuration, see [Smart Software Licensing Task Flow](#). Only the active Route Processor in the SSO configuration reports license usage, so CSSM reserves one set of licenses for the platform.

Inbox High Availability requires CUBE Trunk Standard Session licenses.

### Before Failover

- Smart License configuration is synchronized between the two Route Processors. Only the active Route Processor registers with CSSM or satellite.
- The CSSM or satellite authorizes license usage requests for the active Route Processor.




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**Note** For Smart License using Policy, the CSSM or satellite license usage requests for the active Route Processor.

---

### After Failover

- The Route Processor that switches to active mode, reports license usage to the CSSM or satellite.
- As the new report appears to come from the same device, the CSSM or satellite retains the original reservation for the platform.

## Verify Smart License Operation for Inbox High Availability

You can use all the commands that are given in the section [Verify Smart License Operation, on page 5](#) to verify the licensing status in the High Availability mode.

The following commands reflect Inbox High Availability (HA) licensing information:

- **show cube status**—Displays CUBE license capacity and the high availability mode.

```
cube-1#sh cube status
CUBE-Version : 14.4
SW-Version : 17.6.1a, Platform ASR1006-X
HA-Type : hot-standby-card-to-card
cube-2#sh cube status
CUBE-Version : 14.4
SW-Version : 17.6.1a, Platform ASR1006-X
HA-Type : hot-standby-card-to-card
```

- **show redundancy states**—Displays the redundancy state of the Route Processors.

```
cube-1#sh redundancy states
my state = 13 -ACTIVE
peer state = 8 -STANDBY HOT
Mode = Duplex
Unit = Primary
Unit ID = 48

Redundancy Mode (Operational) = sso
```

```

Redundancy Mode (Configured) = sso
Redundancy State              = sso
  Maintenance Mode = Disabled
  Manual Swact = enabled
  Communications = Up

  client count = 135
  client_notification_TMR = 30000 milliseconds
    RF debug mask = 0x0
Gateway monitoring interval = 0 secs
cube-1#
cube-2#sh redundancy states
  my state = 8  -STANDBY HOT
  peer state = 13 -ACTIVE
    Mode = Duplex
    Unit = Secondary
    Unit ID = 49

Redundancy Mode (Operational) = sso
Redundancy Mode (Configured) = sso
Redundancy State              = sso
  Maintenance Mode = Disabled
  Manual Swact = cannot be initiated from this the standby unit
  Communications = Up

  client count = 135
  client_notification_TMR = 30000 milliseconds
    RF debug mask = 0x0
Gateway monitoring interval = 0 secs
cube-2#

```

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

```

cube-1#sh license summary (active)
License Usage:
  License                Entitlement tag                Count Status
  -----
  adventerprise          (ASR_1000_AdvEnterprise)          1 IN USE
  ipbase                  (ASR_1000_Ipbase)                 1 IN USE
  CUBE_Standard_Session  (CUBE_T_STD)                       10 IN USE

cube-1#

cube-2#sh license summary (standby)
License Usage:
  License                Entitlement tag                Count Status
  -----
  adventerprise          (ASR_1000_AdvEnterprise)          1 IN USE
  ipbase                  (ASR_1000_Ipbase)                 1 IN USE
cube-2#

```

## Syslog Messages

- In B2BHA mode, syslog messages are generated by the active CUBE router and not the standby router. The following is a syslog output for an active CUBE router in B2BHA mode:

```
%CUBE-5-LICENSE_INFO: Requesting for 3 CUBE Enhanced trunk licenses
```