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Cisco MDS 9000 Series Licensing Guide, Release 9.x

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Americas Headquarters

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CHAPTER

Licensing Cisco MDS 9000 Series NX-OS Software Features

Licenses are available for all switches in the Cisco MDS 9000 Series. Licensing allows you to access specified premium features on the switch after you install the appropriate license for that feature.

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- Related Documentation, on page 20
- Communications, Services, and Additional Information, on page 22

Cisco MDS NX-OS Software Licenses

This section contains information related to licensing types, options, procedures, installation, and management for the Cisco MDS NX-OS software.

Licensing Terminology

The following terms are used in this document:

Licensed feature

Permission to use a particular feature through a license file, a hardware object, or a legal contract. This permission is limited to the number of users, number of instances, time span, and the implemented device.

Licensed application

A software feature that requires a license to be used.

License enforcement

A mechanism that prevents a feature from being used without first obtaining a license.

Node-locked license

A license that can only be used on a particular device using the device's unique host ID.

Host IDs

A unique chassis serial number that is specific to each device.

Software license claim certificate

A document entitling its rightful owner to use licensed features on one device as described in that document.

Product Authorization Key (PAK)

The PAK allows you to obtain a license key from one of the sites listed in the software license claim certificate document. After registering at the specified website, you will receive your license key file and installation instructions through e-mail.

License key file

A device-specific unique file that specifies the licensed features. Each file contains digital signatures to prevent tampering and modification. License keys are required to use a licensed feature. License keys are enforced within a specified time span.

Missing license

If the bootflash has been corrupted or a supervisor module replaced after you have installed a license, that license shows as missing. The feature still works. You should reinstall the license as soon as possible.

Evaluation license

A temporary license. Evaluation licenses are time bound (valid for a specified number of days) and are tied to a host ID (device serial number).

Permanent license

A license that is not time bound is called a permanent license.

Grace period

The amount of time the features in a license package can continue functioning without a license.

Support

If you purchased Cisco support through a Cisco reseller, contact the reseller directly. If you purchased support directly from Cisco, contact Cisco Technical Support at this URL: http://www.cisco.com/en/US/support/tsd_cisco_worldwide_contacts.html

Licensing Model

The licensing model defined for the Cisco MDS product line has two options:

Feature-based licenses allow features that are applicable to the entire switch.



Note

• A SAN extension license is included in the base license for the Cisco MDS 9000 24/10-Port SAN Extension Module (DS-X9334-K9).

This table describes feature-based licenses.

Table 1: Feature-Based Licenses

Feature License	Features		
Enterprise package	• FC Port security		
(ENTERPRISE_PKG)	VSAN-based access control		
	• Fibre Channel Security Protocol (FC-SP) authentication		
	Advanced	traffic engineering—quality of service (QoS)	
	• IPsec and I	IKE for IPv4	
	Note	From Cisco MDS NX-OS Release 9.2(2), the IPsec feature is included in the default feature set and does not require an ENTERPRISE_PKG license on the Cisco MDS 9220i Fabric Switch.	
	• IKE digital certificates		
	• Enhanced VSAN routing inter-VSAN routing (IVR) over Fibre Channel		
	• IVR Netwo	ork Address Translation (NAT) over Fibre Channel	
	Zone-base	d traffic prioritizing	
	• Zone-base	d FC QoS	
	• Extended I	BB_Credits	
	Fibre Char	nnel write acceleration	
	• FCIP encryption		
	 Fabric bind 	ding for Fibre Channel	
	SAN device virtualization		
	• Cisco Trus	tSec Fibre Channel Link Encryption	

Feature License	Features
SAN Telemetry package	
SAN_TELEMETRY_PKG	

Feature License	Features
	SAN Analytics
	The SAN Analytics feature is used to collect, store, and fetch the data of interest. This feature allows you to analyze data only on the switch.
	Note The SAN_TELEMETRY_PKG license is a switch based license only.
	The following provides information about the licenses that are supported on Cisco switches and the release from which it supports these licenses:
	• Cisco MDS 9700 Series Multilayer Directors: Supports the SAN_ANALYTICS_PKG and SAN_TELEMETRY_PKG licenses from Cisco MDS NX-OS Release 8.2(1).
	• Cisco MDS 9396T 32-Gbps 96-Port Fibre Channel Fabric Switch: Supports only the SAN_ANALYTICS_PKG license from Cisco MDS NX-OS Release 8.4(1).
	• Cisco MDS 9148T 32-Gbps 48-Port Fibre Channel Fabric Switch: Supports only the SAN_ANALYTICS_PKG license from Cisco MDS NX-OS Release 8.4(1).
	• Cisco MDS 9132T 32-Gbps 32-Port Fibre Channel Fabric Switch: Supports only the SAN_ANALYTICS_PKG license from Cisco MDS NX-OS Release 8.3(1).
	If you have purchased the SAN_TELEMETRY_PKG license, you can continue to use it only to analyze data on your switch in Cisco MDS NX-OS Release 8.3(1) or later releases. However, we recommend that you upgrade to the SAN_ANALYTICS_PKG license that is available from Cisco MDS NX-OS Release 8.3(1) to analyze data not only on the switch but also on the Cisco Data Center Network Manager (DCNM) or supported third party devices or apps.
	To upgrade from SAN_TELEMETRY_PKG used in Cisco MDS NX-OS Release 8.2(1) to SAN_ANALYTICS_PKG that is available in Cisco MDS NX-OS Release 8.3(1), perform these steps:
	1. Use the no feature analytics command to disable the SAN analytics feature.
	2. Use the clear license <i>filename</i> to uninstall the SAN_TELEMETRY_PKG license.
	Note You can uninstall a license before or after upgrading the software as long as the license package is not in use.
	3. Upgrade to Cisco MDS NX-OS Release 8.3(1).

Feature License	Fea	atures	
	4.	Use the inst SAN_ANA	all license <i>filename</i> to install the LYTICS_PKG license.
		Note	If you have already purchased the SAN_TELEMETRY_PKG license, you can upgrade to the SAN_ANALYTICS_PKG license for free.
	5.	Use the feat analytics feat	ture analytics command to enable the SAN ature.
	Th	is feature sup	ports the following license models:
		• Grace-peri- enable the command,	od license—If you do not have a license and analytic feature using the feature analytics the feature functions for 120 days.
		Note	After 120 days of using the analytics feature, this feature will be disabled.
		• Term-based Analytics a is valid for displayed 9 reminder to to display of the last 28 the license	d license—Term-based license for the SAN and Telemetry feature is a traditional license that a minimum of three years. A message will be 00 days before the license expiry date as a o renew the license. The message will continue on the 89th, 60th, 30th day, once every day for days, and once every hour for the last 7 days of expiry date.
		Note	After the license expiry, the SAN Analytics feature will be disabled after you reload the switch, using the reload command.

Feature License	Features		
SAN Analytics package	SAN Analytics and SAN Telemetry Streaming		
SAN_ANALYTICS_PKG	The SAN Analytics and SAN Telemetry Streaming provides insights into your fabric by allowing you to monitor, analyze, identify, and troubleshoot performance issues. This solution allows you to analyze data not only on the switch but also on the Cisco Data Center Network Manager (DCNM) or supported third party devices or apps.		
	Note • The SAN_ANALYTICS_PKG license is a switch based license only.		
	• For the SAN Analytics and SAN Telemetry Streaming feature to work on DCNM, you need to purchase the DCNM Advanced SAN Feature License and SAN Analytics license. For more information on the licensing information on DCNM, see the "Advanced SAN Feature Licenses" topic in the Cisco DCNM Licensing Guide.		
	This solution is supported from Cisco MDS Release 8.3(1) and later releases and supports the following license models:		
	• Grace-period license—If you do not have a license and enable the analytic feature using the feature analytics command, the feature functions for 120 days.		
	Note After 120 days of using the analytics feature, this feature will be disabled.		
	• Term-based license—Term-based license for the SAN Analytics and Telemetry feature is a traditional license that is valid for a minimum of three years. A message will be displayed 90 days before the license expiry date as a reminder to renew the license. The message will continue to display on the 89th, 60th, 30th day, once every day for the last 28 days, and once every hour for the last 7 days of the license expiry date.		
	Note After the license expiry, the SAN Analytics feature will be disabled after you reload the switch, using the reload command.		
Mainframe package	Switch cascading		
(MAINFRAME_PKG)	IBM TotalStorage Virtual Tape Server (VTS)		
	IBM TotalStorage XRC application		
	• Port swap, block, prohibit		

Feature License	Features		
DCNM-SAN License packages	For DCNM related licensing information, see the Cisco DCNM Licensing Guide.		
NDFC License packages	For NDFC related licensing information, see the License Management chapter in Cisco NDFC Fabric Controller Configuration Guide.		
On-demand Port Activation Licensing package (PORT_ACTIVATION_PKG)	 On the Cisco MDS 9220i Switch: Fibre Channel ports: Only the first 4 Fibre Channel ports out of the 12 ports are active by default. The 		
(M9220I-UPGK9=)	FC_PORT_ACTIV_9220I_PKG enables additional 8 Fibre Channel ports.		
(M9250IP20-16G=) (M9148T-PL8) (M9396T-PL16) (M9132T-PL8)	 IPS ports: Only the first 2 IPS ports operating in 1-Gbps speed mode are active by default (IP Storage 1/1 and IP Storage 1/2). The IPS_PORT_ACTIV_9220I_PKG enables other speed modes. Cisco MDS 9148V with 48 x 8/16/32/64-Gbps multispeed 		
(M9124V-PL8) (M9148V-PL8) Note The license manager does	ports and 1-rack unit (1RU) SAN fabric switch. 24 ports are enabled by default and the other ports are enabled in increments of 8.		
not prevent installing more port licenses than the available physical ports on the switch. The extra licenses if installed, will not affect the normal behavior of the licensed ports.	 Cisco MDS 9124Vx with 24 x 8/16/32/64-Gbps multispeed ports and 1-rack unit (1RU) SAN fabric switch. 8 ports are enabled by default and the other ports are enabled in increments of 8. Cisco MDS 9132T 32-Gbps 32-Port Fibre Channel Switches have 16 32-Gbps FC ports (FC1/1-16) in the base chassis and 16 32-Gbps FC ports on the LEM module (FC1/17-32). Port licenses are not movable between the base chassis and the LEM module. 		
Data Mobility Manager (DMM)	Online migration of heterogenous arrays		
(DMM_FOR_SSM_PKG)	Simultaneous migration of multiple LUNs		
(M9250IDMM16M)	• Unequal size LUN migration		
	• Rate adjusted migration		
	Verification of migrated data		
	Secure erasure of migrated data		
	Dual fabric support		



Note

License packages for Cisco DMM (Cisco Data Mobility Manager) and Cisco SME (Cisco Storage Media Encryption) are documented in the Cisco MDS 9000 Series Data Mobility Manager Configuration Guide.

Licensing High Availability

As with other Cisco NX-OS features, the licensing feature also maintains the following high-availability standards:

- Installing any license in the device is a nondisruptive process.
- Installing a license automatically saves a copy of permanent licenses to the chassis.
- If you have enabled the grace period feature, enabling a licensed feature that does not have a license key starts a counter on the grace period. You then have 120 days to install the appropriate license keys, disable the use of that feature, or disable the grace period feature. If at the end of the 120-day grace period the device does not have a valid license key for the feature, the Cisco NX-OS software automatically disables the feature and removes the configuration from the device.

Devices with dual supervisors have the following additional high-availability features:

- The license software runs on both supervisor modules and provides failover protection.
- The license key file is mirrored on both supervisor modules. Even if both supervisor modules fail, the license file continues to function from the version that is available on the chassis.

License Transfers Between Devices

A license is specific to the physical device for which it is issued and is not valid on any other physical device. The license cannot be transferred. Note

- Cisco ONE Software license can be transferred from one device to another as a replacement.
 - Return Material Authorization (RMA) certified devices need new license file and can be obtained from Technical Assistance Center (TAC) license team.
 - If you have a single supervisor module on your Cisco NX-OS device and you replace the supervisor module, you must reinstall the license key file.

If you are evaluating a license when you replace the supervisor module, the grace period of the license is usually set to 120 days. On a dual supervisor system, the grace period of the license will be overwritten from the existing active supervisor module to the new stand-by supervisor module.

- If you purchased Cisco support through a Cisco reseller, contact the reseller directly. If you purchased support directly from Cisco, contact Cisco Technical Support at this URL: http://www.cisco.com/en/US/ support/tsd_cisco_worldwide_contacts.html
- If the supervisor modules are interchanged between two different Cisco MDS chassis, license missing message is displayed under the **show license usage** command. Use the **clear license** *filename* command to uninstall the license package and re-install the license files. However, the licensed features will continue to work.

On-Demand Port Activation Licensing

This section describes how to use the on-demand port activation licensing feature on the Cisco MDS 9132T, Cisco MDS 9148T, Cisco MDS 9148V, Cisco MDS 9124V Cisco MDS 9148S, Cisco MDS 9250i, and Cisco MDS 9396S switches.

About On-Demand Port Activation Licensing

You can expand your SAN connectivity as needed by enabling users to purchase and install additional port licenses. By default, all ports are eligible for license activation.

Port-Naming Conventions

This table describes the port-naming conventions for the Cisco Fabric switches.

Cisco MDS 9124V Switch	fc1/1 through fc1/8
Cisco MDS 9132T Switch	Cisco MDS 9132T Switch
Cisco MDS 9148S Switch	fc1/1 through fc1/48
Cisco MDS 9148T Switch	fc1/1 through fc1/48
Cisco MDS 9148V Switch	fc1/1 through fc1/24
Cisco MDS 9220i Switch	fc1/1 through fc1/12 and IPS 1/1 through 1/6

Table 2: Port-Naming Conventions for Cisco Fabric Switches

Cisco MDS 9250i Switch	fc1/1 through fc1/40 and IPS 1/1-2 ETH 1/1-8
Cisco MDS 9396S Switch	fc1/1 through fc1/96
Cisco MDS 9396T Switch	fc1/1 through fc1/96

Port Licensing

Cisco MDS 9250i Switch

On Cisco MDS 9250i Switch, 20 16-Gbps Fibre Channel ports are active by default. To enable the other 20 16-Gbps Fibre Channel ports, you must obtain a license. The 8 10-Gbps FCoE ports are active by default. The two fixed 10-Gbps IP storage services ports do not require additional license.

Cisco MDS 9220i Switch

- Fibre Channel ports: Only the first 4 ports out of the 12 ports are active by default. However, you can move the default license from the first 4 ports to any of the other 8 ports. To enable the other 8 ports, you must obtain a license. The additional license will enable the extra 8 ports.
- IP Storage (IPS) ports: Only the first two ports that are operating in 1-Gbps speed mode are active by default (IPStorage 1/1 and IPStorage 1/2). You cannot move the default license from these ports to the other IPS ports such as IPStorage 1/3 through 1/6.

Default license for IPS ports is available only in the 1-Gbps speed mode. In any other speed mode (10 Gbps or 40 Gbps), ports need additional port activation license.

The port licenses for Fibre Channel and IPS ports are bundled into a single license. You need to install this license for enabling additional ports for both Fibre Channel and IPS ports.

The following example displays the license status on a Cisco MDS 9220i switch:

switch# show lic usage Feature	Ins	Lic Count	Status	Expiry	Date	Comments
FM_SERVER_PKG ENTERPRISE_PKG FC_PORT_ACTIV_9220I_PKG IPS_PORT_ACTIV_9220I_PKG IPS_1G_PORT_ACTIV_9220I_PKG	No No Yes Yes No	- - 3 12 3 4 2	Unused In use In use In use In use	never never never		- Grace 49D 13H - -
switch# show lic default Feature		Γ)efault I	License	Coun	t
FM_SERVER_PKG ENTERPRISE_PKG FC_PORT_ACTIV_9220I_PKG IPS_PORT_ACTIV_9220I_PKG IPS_IG_PORT_ACTIV_9220I_PKG		- - 4 C 2	- - - - - - - - - - - - - - - - - - -			
switch# show port-license Available FC port activation licenses are 0 Available IPS port activation licenses are 2						

I

Interface	Cookie	Port	Activation	License
 fc1/1	16777216		acquired	
fc1/2	16781312		acquired	
fc1/3	16785408		acquired	
fc1/4	16789504		acquired	
fc1/5	16793600		acquired	
fc1/6	16797696		acquired	
fc1/7	16801792		acquired	
fc1/8	16805888		acquired	
fc1/9	16809984		acquired	
fc1/10	16814080		acquired	
fc1/11	16818176		acquired	
fc1/12	16822272		acquired	
fcip1	167772160		eligible	
fcip3	167772162		eligible	
IPStorage1/1	33554432		acquired	
IPStorage1/2	33558528		acquired	
IPStorage1/3	33562624		acquired	
IPStorage1/4	33566720		acquired	
IPStorage1/5	33570816		eligible	
IPStorage1/6	33574912		ineligible	Э

Default Configuration

The following example shows the default port license configuration for the Cisco MDS 9132T Switch:

switch# show port-license Available port activation licenses are 8				
Interface	Cookie	Port Activation License		
fc1/1	16777216	acquired		
fc1/2	16781312	acquired		
fc1/3	16785408	acquired		
fc1/4	16789504	acquired		
fc1/5	16793600	acquired		
fc1/6	16797696	acquired		
fc1/7	16801792	acquired		
fc1/8	16805888	acquired		
fc1/9	16809984	eligible		
fc1/10	16814080	eligible		
fc1/11	16818176	eligible		
fc1/12	16822272	eligible		
fc1/13	16826368	eligible		
fc1/14	16830464	eligible		
fc1/15	16834560	eligible		
fc1/16	16838656	eligible		
fc1/17	16842752	acquired		
fc1/18	16846848	acquired		
fc1/19	16850944	acquired		
fc1/20	16855040	acquired		
fc1/21	16859136	acquired		
fc1/22	16863232	acquired		
fc1/23	16867328	acquired		
fc1/24	16871424	acquired		
fc1/25	16875520	acquired		
fc1/26	16879616	acquired		
tc1/27	16883712	acquired		
ic1/28	T 688, 808	acquired		
tc1/29	16891904	acquired		

L

fc1/30	16896000	acquired
fc1/31	16900096	acquired
fc1/32	16904192	acquired



The cookie is used to acquire a license. Use the **show license usage PORT_ACTIV_8132U_PKG** command to show the cookies for acquired licenses.

```
switch# show license usage poRT_ACTIV_9132U_PKG
Application
Port Manager (fc1/1)
Port Manager (fc1/2)
Port Manager (fc1/3)
Port Manager (fc1/4)
Port Manager (fc1/4)
Port Manager (fc1/6)
Port Manager (fc1/6)
Port Manager (fc1/7)
Port Manager (fc1/8)
```

The following example shows the default port license configuration for the Cisco MDS 9250i Switch:

```
switch# show port-license
Available port activation licenses are 20
   _____
 Interface Cookie Port Activation License
 _____
 fc1/1
         16777216
                         acquired
           16781312
 fc1/2
                         acquired
 fc1/3
           16785408
                         acquired
                          acquired
 fc1/4
            16789504
 fc1/5
            16793600
                          acquired
            16797696
 fc1/6
                          acquired
 fc1/7
            16801792
                          acquired
 fc1/8
            16805888
                          acquired
 fc1/9
           16809984
                          acquired
 fc1/10
           16814080
                          acquired
 fc1/11
           16818176
                          acquired
 fc1/12
            16822272
                          acquired
 fc1/13
            16826368
                          acquired
 fc1/14
            16830464
                          acquired
 fc1/15
            16834560
                          acquired
           16838656
 fc1/16
                          acquired
 fc1/17
           16842752
                          acquired
 fc1/18
           16846848
                          acquired
 fc1/19
           16850944
                          acquired
 fc1/20
            16855040
                          acquired
                          eligible
 fc1/21
            16859136
 fc1/22
            16863232
                          eligible
 fc1/23
            16867328
                          eligible
 fc1/24
            16871424
                          eligible
 fc1/25
           16875520
                         eligible
                         eligible
 fc1/26
            16879616
 fc1/27
            16883712
                          eligible
 fc1/28
            16887808
                          eligible
           16891904
 fc1/29
                         eligible
 fc1/30
          16896000
                         eligible
```

fc1/31	16900096	eligible
fc1/32	16904192	eligible
fc1/33	16908288	eligible
fc1/34	16912384	eligible
fc1/35	16916480	eligible
fc1/36	16920576	eligible
fc1/37	16924672	eligible
fc1/38	16928768	eligible
fc1/39	16932864	eligible
fc1/40	16936960	eligible

[~]

Note The cookie is used to acquire a license. Use the **show license usage PORT_ACTIV_20P** command to show the cookies for acquired licenses.

```
switch# show license usage PORT ACTIV 20P
Application
_____
Port Manager (fc1/1)
Port Manager (fc1/2)
Port Manager (fc1/3)
Port Manager (fc1/4)
Port Manager (fc1/5)
Port Manager (fc1/6)
Port Manager (fc1/7)
Port Manager (fc1/8)
Port Manager (fc1/9)
Port Manager (fc1/10)
Port Manager (fc1/11)
Port Manager (fc1/12)
Port Manager (fc1/13)
Port Manager (fc1/14)
Port Manager (fc1/15)
Port Manager (fc1/16)
Port Manager (fc1/17)
Port Manager (fc1/18)
Port Manager (fc1/19)
```

```
Port Manager (fc1/20)
```

The following example shows the default port license configuration for the Cisco MDS 9396S Switch:

```
switch# show port-license
Available port activation licenses are 0
  Interface Cookie Port Activation License
_____
         16777216
 fc1/1
                     acquired
 fc1/2
         16781312
                     acquired
 fc1/3
         16785408
                     acquired
 fc1/4
         16789504
                     acquired
         16793600
                     acquired
 fc1/5
                     acquired
 fc1/6
          16797696
 fc1/7
          16801792
                      acquired
 fc1/8
          16805888
                      acquired
         16809984
                     acquired
 fc1/9
                     acquired
 fc1/10
         16814080
 fc1/11
         16818176
                     acquired
 fc1/12
         16822272
                     acquired
         16826368
 fc1/13
                      acquired
 fc1/14
          16830464
                      acquired
```

fc1/15	16834560	acquired
fc1/16	16838656	acquired
fc1/17	16842752	acquired
fc1/18	16846848	acquired
fc1/19	16850944	acquired
fc1/20	16855040	acquired
fc1/21	16859136	acquired
fc1/22	16863232	acquired
fc1/23	16867328	acquired
fc1/24	16871424	acquired
fc1/25	16875520	acquired
fc1/26	16879616	acquired
fc1/27	16883712	acquired
$f_{c1}/28$	16887808	acquired
fc1/29	16891904	acquired
fc1/30	16896000	acquired
fc1/31	16900096	acquired
fa1/22	16004102	acquired
1C1/32 5~1/32	16904192	acquired
101/33	16908288	acquired
IC1/34	16912384	acquired
IC1/35	16916480	acquired
ic1/36	16920576	acquired
fc1/37	16924672	acquired
fc1/38	16928768	acquired
fc1/39	16932864	acquired
fc1/40	16936960	acquired
fc1/41	16941056	acquired
fc1/42	16945152	acquired
fc1/43	16949248	acquired
fc1/44	16953344	acquired
fc1/45	16957440	acquired
fc1/45 fc1/46	16957440 16961536	acquired acquired
fc1/45 fc1/46 fc1/47	16957440 16961536 16965632	acquired acquired acquired
fc1/45 fc1/46 fc1/47 fc1/48	16957440 16961536 16965632 16969728	acquired acquired acquired acquired
fc1/45 fc1/46 fc1/47 fc1/48 fc1/49	16957440 16961536 16965632 16969728 16973824	acquired acquired acquired acquired eligible
fc1/45 fc1/46 fc1/47 fc1/48 fc1/49 fc1/50	16957440 16961536 16965632 16969728 16977824 16977920	acquired acquired acquired acquired eligible eligible
fc1/45 fc1/46 fc1/47 fc1/48 fc1/49 fc1/50 fc1/51	16957440 16961536 16965632 16969728 16973824 16977920 16982016	acquired acquired acquired acquired eligible eligible
fc1/45 fc1/46 fc1/47 fc1/48 fc1/49 fc1/50 fc1/51 fc1/52	16957440 16961536 16965632 16969728 16973824 16977920 16982016 16986112	acquired acquired acquired eligible eligible eligible
fc1/45 fc1/46 fc1/47 fc1/48 fc1/49 fc1/50 fc1/51 fc1/52 fc1/53 fc1/53	16957440 16961536 16965632 16969728 16973824 16977920 16982016 16986112 16990208	acquired acquired acquired eligible eligible eligible eligible eligible
fc1/45 fc1/46 fc1/47 fc1/48 fc1/49 fc1/50 fc1/51 fc1/52 fc1/53 fc1/54 fc1/54	16957440 16961536 16965632 16969728 16973824 16977920 16982016 16986112 16990208 16994304	acquired acquired acquired eligible eligible eligible eligible eligible eligible
fc1/45 fc1/46 fc1/47 fc1/48 fc1/49 fc1/50 fc1/51 fc1/52 fc1/53 fc1/54 fc1/55 fc1/55	16957440 16961536 16965632 16969728 16973824 16977920 16982016 16986112 16990208 16994304 16998400	acquired acquired acquired eligible eligible eligible eligible eligible eligible eligible
fc1/45 fc1/46 fc1/47 fc1/48 fc1/49 fc1/50 fc1/51 fc1/52 fc1/53 fc1/54 fc1/55 fc1/56 fc1/56	16957440 16961536 16965632 16969728 16973824 16977920 16982016 16986112 16990208 16994304 16998400 17002496	acquired acquired acquired eligible eligible eligible eligible eligible eligible eligible eligible
fc1/45 fc1/46 fc1/47 fc1/48 fc1/49 fc1/50 fc1/51 fc1/52 fc1/53 fc1/54 fc1/55 fc1/56 fc1/57 fc1/59	16957440 16961536 16965632 16969728 16977920 16982016 16986112 16990208 16994304 16998400 17002496 17006592	acquired acquired acquired eligible eligible eligible eligible eligible eligible eligible eligible
fc1/45 fc1/46 fc1/47 fc1/48 fc1/49 fc1/50 fc1/51 fc1/52 fc1/53 fc1/54 fc1/55 fc1/56 fc1/57 fc1/58 fc1/58	16957440 16961536 16965632 16969728 16973824 16977920 16982016 16986112 16990208 16994304 16998400 17002496 17006592 17010688	acquired acquired acquired eligible eligible eligible eligible eligible eligible eligible eligible eligible
fc1/45 fc1/46 fc1/47 fc1/48 fc1/49 fc1/50 fc1/51 fc1/52 fc1/53 fc1/54 fc1/55 fc1/56 fc1/57 fc1/58 fc1/59 fc1/60	16957440 16961536 16965632 16969728 16973824 16977920 16982016 16986112 16990208 16994304 16998400 17002496 17006592 17010688 17014784 17014784	acquired acquired acquired eligible eligible eligible eligible eligible eligible eligible eligible eligible eligible
fc1/45 fc1/46 fc1/47 fc1/48 fc1/49 fc1/50 fc1/51 fc1/52 fc1/53 fc1/54 fc1/55 fc1/56 fc1/57 fc1/58 fc1/59 fc1/60 fc1/61	16957440 16961536 16965632 16969728 16973824 16977920 16982016 16986112 16990208 16994304 16998400 17002496 17006592 17010688 17014784 17018880 17022976	acquired acquired acquired eligible eligible eligible eligible eligible eligible eligible eligible eligible eligible eligible
fc1/45 fc1/46 fc1/47 fc1/48 fc1/49 fc1/50 fc1/51 fc1/52 fc1/53 fc1/54 fc1/55 fc1/56 fc1/57 fc1/58 fc1/59 fc1/60 fc1/61 fc1/62	16957440 16961536 16965632 16973824 16977920 16982016 16986112 16990208 16994304 16998400 17002496 17006592 17010688 17014784 17018880 17022976 17022976	acquired acquired acquired eligible eligible eligible eligible eligible eligible eligible eligible eligible eligible eligible eligible
fc1/45 fc1/46 fc1/47 fc1/48 fc1/49 fc1/50 fc1/51 fc1/52 fc1/53 fc1/54 fc1/55 fc1/56 fc1/57 fc1/58 fc1/59 fc1/60 fc1/61 fc1/62 fc1/63	16957440 16961536 16965632 16973824 16977920 16982016 16986112 16990208 16994304 16998400 17002496 17006592 17010688 17014784 17018880 17022976 17022772 17031168	acquired acquired acquired eligible eligible eligible eligible eligible eligible eligible eligible eligible eligible eligible eligible eligible
fc1/45 fc1/46 fc1/47 fc1/48 fc1/49 fc1/50 fc1/51 fc1/52 fc1/53 fc1/54 fc1/55 fc1/56 fc1/57 fc1/58 fc1/59 fc1/60 fc1/61 fc1/62 fc1/63 fc1/64	16957440 16961536 16965632 16973824 16977920 16982016 16986112 16990208 16994304 16998400 17002496 17006592 17010688 17014784 17018880 17022976 17022976 17027072 17031168 17035264	acquired acquired acquired eligible eligible eligible eligible eligible eligible eligible eligible eligible eligible eligible eligible eligible
fc1/45 fc1/46 fc1/47 fc1/48 fc1/49 fc1/50 fc1/51 fc1/52 fc1/53 fc1/54 fc1/55 fc1/56 fc1/57 fc1/58 fc1/59 fc1/60 fc1/61 fc1/62 fc1/63 fc1/64 fc1/65	16957440 16961536 16965632 16969728 16977920 16982016 16986112 16990208 16994304 16998400 17002496 17006592 17010688 17014784 17018880 17022976 17027072 17031168 17035264 17033564	acquired acquired acquired eligible eligible eligible eligible eligible eligible eligible eligible eligible eligible eligible eligible eligible eligible
fc1/45 fc1/46 fc1/47 fc1/48 fc1/49 fc1/50 fc1/51 fc1/52 fc1/53 fc1/54 fc1/55 fc1/56 fc1/57 fc1/58 fc1/59 fc1/60 fc1/61 fc1/62 fc1/64 fc1/65 fc1/66	16957440 16961536 16965632 16969728 16977920 16982016 16986112 16990208 16994304 16998400 17002496 17006592 17010688 17014784 17018880 17022976 17027072 17031168 17035264 17039360 17043456	acquired acquired acquired acquired eligible eligible eligible eligible eligible eligible eligible eligible eligible eligible eligible eligible eligible eligible eligible
fc1/45 fc1/46 fc1/47 fc1/48 fc1/49 fc1/50 fc1/51 fc1/52 fc1/53 fc1/54 fc1/55 fc1/56 fc1/57 fc1/58 fc1/59 fc1/60 fc1/61 fc1/62 fc1/63 fc1/64 fc1/65	16957440 16961536 16965632 16969728 16977920 16982016 16986112 16990208 16994304 16994304 16994304 17002496 17006592 17010688 17014784 17018880 17022976 17022976 17027072 17031168 17035264 17039360 17043456 17047552	acquired acquired acquired acquired eligible eligible eligible eligible eligible eligible eligible eligible eligible eligible eligible eligible eligible eligible eligible eligible
fc1/45 fc1/46 fc1/47 fc1/48 fc1/49 fc1/50 fc1/51 fc1/52 fc1/53 fc1/54 fc1/55 fc1/56 fc1/57 fc1/58 fc1/59 fc1/60 fc1/61 fc1/62 fc1/63 fc1/64 fc1/65 fc1/68	16957440 16961536 16965632 16969728 16977920 16982016 16986112 16990208 16994304 16994304 16994304 17002496 17006592 17010688 17014784 17018880 17022976 17022976 17027072 17031168 17035264 17039360 17043456 17047552 17051648	acquired acquired acquired acquired eligible eligible eligible eligible eligible eligible eligible eligible eligible eligible eligible eligible eligible eligible eligible eligible eligible
fc1/45 fc1/46 fc1/47 fc1/48 fc1/50 fc1/50 fc1/51 fc1/52 fc1/53 fc1/54 fc1/55 fc1/56 fc1/57 fc1/58 fc1/59 fc1/60 fc1/61 fc1/62 fc1/63 fc1/64 fc1/65 fc1/68 fc1/69	16957440 16961536 16965632 16969728 16977920 16982016 16986112 16990208 16994304 16994304 16994304 16998400 17006592 17010688 17014784 17018880 17022976 17027072 17031168 17035264 17039360 17043456 17047552 17051648 17055744	acquired acquired acquired acquired eligible
fc1/45 fc1/46 fc1/47 fc1/48 fc1/49 fc1/50 fc1/51 fc1/52 fc1/53 fc1/54 fc1/55 fc1/56 fc1/57 fc1/58 fc1/59 fc1/60 fc1/61 fc1/62 fc1/63 fc1/64 fc1/65 fc1/67 fc1/68 fc1/69 fc1/70	16957440 16961536 16965632 16969728 16977920 16982016 16986112 16990208 16994304 16994304 16994304 16994304 17006592 17010688 17014784 17018880 17022976 17022976 17022976 170229772 17031168 17035264 17039360 17043456 17047552 17051648 17055744 17059840	acquired acquired acquired acquired eligible
fc1/45 fc1/46 fc1/47 fc1/48 fc1/50 fc1/51 fc1/52 fc1/53 fc1/54 fc1/55 fc1/56 fc1/57 fc1/58 fc1/59 fc1/60 fc1/61 fc1/62 fc1/63 fc1/64 fc1/65 fc1/66 fc1/67 fc1/68 fc1/70 fc1/71	16957440 16961536 16969728 16977920 16982016 16986112 16990208 16994304 16994304 16998400 17002496 17006592 17010688 17014784 17018880 17022976 17027072 17031168 17035264 17039360 17043456 17047552 17051648 17055744 17059840 17063936	acquired acquired acquired acquired eligible
fc1/45 fc1/46 fc1/47 fc1/48 fc1/50 fc1/51 fc1/52 fc1/53 fc1/54 fc1/55 fc1/56 fc1/57 fc1/58 fc1/59 fc1/60 fc1/61 fc1/62 fc1/63 fc1/64 fc1/65 fc1/66 fc1/67 fc1/68 fc1/70 fc1/71 fc1/72	16957440 16961536 16969728 16977920 16982016 16986112 16990208 16994304 16994304 16998400 17002496 17006592 17010688 17014784 17018880 17022976 17027072 17031168 17035264 17039360 17043456 17047552 17051648 17055744 17059840 17063936 17063936 17063936	acquired acquired acquired acquired eligible
fc1/45 fc1/46 fc1/47 fc1/48 fc1/50 fc1/51 fc1/52 fc1/53 fc1/54 fc1/55 fc1/56 fc1/57 fc1/58 fc1/59 fc1/60 fc1/61 fc1/62 fc1/63 fc1/64 fc1/65 fc1/66 fc1/67 fc1/68 fc1/70 fc1/71 fc1/72 fc1/73	16957440 16961536 16969728 16977920 16982016 16982016 16986112 16990208 16994304 16994304 16998400 17002496 17006592 17010688 17014784 17018880 17022976 17022976 17027072 17031168 17035264 17039360 17043456 17047552 17051648 17055744 17059840 17063936 17068032 17072128	acquired acquired acquired acquired eligible
fc1/45 fc1/46 fc1/47 fc1/48 fc1/50 fc1/51 fc1/52 fc1/53 fc1/54 fc1/55 fc1/56 fc1/57 fc1/58 fc1/59 fc1/60 fc1/61 fc1/62 fc1/63 fc1/64 fc1/65 fc1/66 fc1/67 fc1/68 fc1/70 fc1/72 fc1/73 fc1/74	16957440 16961536 16969728 16977920 16982016 16986112 16990208 16994304 16994304 16998400 17002496 17006592 17010688 17014784 17018880 17022976 17022976 17027072 17031168 17035264 17039360 17043456 17047552 17051648 17055744 17059840 17063936 17068032 17072128 17076224	acquired acquired acquired acquired eligible
fc1/45 fc1/46 fc1/47 fc1/48 fc1/50 fc1/51 fc1/52 fc1/53 fc1/54 fc1/55 fc1/56 fc1/57 fc1/58 fc1/59 fc1/60 fc1/61 fc1/62 fc1/63 fc1/64 fc1/65 fc1/66 fc1/67 fc1/68 fc1/70 fc1/71 fc1/72 fc1/73 fc1/74 fc1/75	16957440 16961536 16965632 1697788 16977920 16982016 16986112 16990208 16994304 16994304 16998400 17002496 17006592 17010688 17014784 17018880 17022976 17022976 17027072 17031168 17035264 17039360 17043456 17043456 17047552 17051648 17055744 17059840 17068032 17076224 17076224 17080320	acquired acquired acquired acquired eligible
fc1/45 fc1/46 fc1/47 fc1/48 fc1/49 fc1/50 fc1/51 fc1/52 fc1/53 fc1/54 fc1/55 fc1/56 fc1/57 fc1/58 fc1/59 fc1/60 fc1/61 fc1/62 fc1/63 fc1/64 fc1/65 fc1/66 fc1/67 fc1/68 fc1/70 fc1/71 fc1/72 fc1/73 fc1/74 fc1/75 fc1/76	16957440 16961536 16969728 16977920 16982016 16986112 16990208 16994304 16994304 16994304 16998400 17002496 17006592 17010688 17014784 17018880 17022976 17027072 17031168 17035264 17035264 17043456 17047552 17051648 17055744 17059840 17063936 17068032 17072128 17076224 17080320 17084416	acquired acquired acquired acquired eligible

fc1/78	17092608	eligible
fc1/79	17096704	eligible
fc1/80	17100800	eligible
fc1/81	17104896	eligible
fc1/82	17108992	eligible
fc1/83	17113088	eligible
fc1/84	17117184	eligible
fc1/85	17121280	eligible
fc1/86	17125376	eligible
fc1/87	17129472	eligible
fc1/88	17133568	eligible
fc1/89	17137664	eligible
fc1/90	17141760	eligible
fc1/91	17145856	eligible
fc1/92	17149952	eligible
fc1/93	17154048	eligible
fc1/94	17158144	eligible
fc1/95	17162240	eligible
fc1/96	17166336	eligible



Note The cookie is used to acquire a license. Use the show license usage PORT_ACTIV_9396S_PKG command to show the cookies for acquired licenses.

```
switch# show license usage PORT_ACTIV_9396S_PKG
Application
_____
Port Manager (fc1/1)
Port Manager (fc1/2)
Port Manager (fc1/3)
Port Manager (fc1/4)
Port Manager (fc1/5)
Port Manager (fc1/6)
Port Manager (fc1/7)
Port Manager (fc1/8)
Port Manager (fc1/9)
Port Manager (fc1/10)
Port Manager (fc1/11)
Port Manager (fc1/12)
Port Manager (fc1/13)
Port Manager (fc1/14)
Port Manager (fc1/15)
Port Manager (fc1/16)
Port Manager (fc1/17)
Port Manager (fc1/18)
Port Manager (fc1/19)
Port Manager (fc1/20)
Port Manager (fc1/21)
Port Manager (fc1/22)
Port Manager (fc1/23)
Port Manager (fc1/24)
Port Manager (fc1/25)
Port Manager (fc1/26)
Port Manager (fc1/27)
Port Manager (fc1/28)
Port Manager (fc1/29)
Port Manager (fc1/30)
Port Manager (fc1/31)
Port Manager (fc1/32)
Port Manager (fc1/33)
```

Port Manager (fc1/34)

L

Port Manager (fc1/35) Port Manager (fc1/36) Port Manager (fc1/37) Port Manager (fc1/38) Port Manager (fc1/39) Port Manager (fc1/40) Port Manager (fc1/41) Port Manager (fc1/42) Port Manager (fc1/43) Port Manager (fc1/44) Port Manager (fc1/45) Port Manager (fc1/46) Port Manager (fc1/47) Port Manager (fc1/48)

License Status Definitions

This table defines the port activation license status terms.

Table 3: Port Activation License Status Definitions

Port Activation License Status	Definition
acquired	The port is licensed and active.
eligible	The port is eligible to receive a license but does not yet have one.
ineligible	The port is not allowed to receive a license.

By default, when you install additional port license activation packages, the activation status of ports changes from "eligible" to "acquired." If you prefer to accept the default behavior, no further action is required.

Note

e You can uninstall licenses for ports not in use; however, you cannot uninstall default licenses.

This table describes the port license assignments for the Cisco MDS 9148S Switch.

Table 4: Default Port License Assignments for Cisco MDS 9148S Switch

License Package (PORT_ACTIV_9148S_PKG)	Assigned to Ports on the Cisco MDS 9148S Switch
Default	1–12
PORT_ACTIV_9148S_PKG	13–48

You can use the **show license usage** command to view any licenses assigned to a switch. If a license is in use, the status displayed is In use. If a license is installed but features or ports have acquired the license, then the status displayed is Unused.

The default license package for the Cisco MDS 9148S Switch is as follows:

```
switch# show license usage
```

Feature	Ins I Co	Lic ount	Status	Expiry	Date	Comments
FM_SERVER_PKG ENTERPRISE_PKG PORT_ACTIV_9148S_PKG	Yes No No	- - 12	Unused Unused In use	never never		- Grace expired -

This example displays the output when you do not have port licenses and try to active a port license:

```
switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
switch(config) # interface fc1/50
switch(config-if)# shutdown
switch(config-if) # port-license acquire
fc1/50: (error) port activation license not available
switch(config-if)# no shutdown
switch(config-if)# end
switch# show interface fc1/50
fc1/50 is down (SFP not present)
   Hardware is Fibre Channel
    Port WWN is 20:32:8c:60:4f:0d:27:70
    Admin port mode is F, trunk mode is off
    snmp link state traps are enabled
   Port vsan is 1
   Receive data field Size is 2112
   Beacon is turned off
    Logical type is Unknown(0)
    5 minutes input rate 0 bits/sec,0 bytes/sec, 0 frames/sec
    5 minutes output rate 0 bits/sec,0 bytes/sec, 0 frames/sec
      0 frames input, 0 bytes
       0 discards,0 errors
        0 invalid CRC/FCS, 0 unknown class
        0 too long,0 too short
      0 frames output, 0 bytes
        0 discards,0 errors
      0 input OLS, 0 LRR, 0 NOS, 0 loop inits
      0 output OLS, 0 LRR, 0 NOS, 0 loop inits
    Last clearing of "show interface" counters : never
switch# show running-config interface fc1/50
!Command: show running-config interface fc1/50
!Time: Mon Apr 17 11:47:08 2017
version 8.1(1)
interface fc1/50
 switchport mode F
  no shutdown
```

```
switch# show port-license | i 1/50
fc1/50 16977920 eligible
```

This table describes the port license assignments for the Cisco MDS 9250i Switch.

Table 5: Default Port License Assignments for Cisco MDS 9250i Switch

License Package (PORT_ACTIV_20P)	Assigned to Ports on the Cisco MDS 9250i Switch					
Default	1–20					

License Package (PORT_ACTIV_20P)	Assigned to Ports on the Cisco MDS 9250i Switch					
PORT_ACTIV_20P	21–40					

You can use the **show license usage** command to view any licenses assigned to a switch. If a license is in use, the status displayed is In use. If a license is installed but no ports have acquired a license, then the status displayed is Unused.

The default license package for the Cisco MDS 9250i Switch is as follows:

switch# show license usage Feature	Ins (Lic Count	Status	Expiry	Date	Comments
DMM 9250	No	0	Unused			-
IOA 9250	No	0	Unused			-
XRC ACCL	No	-	Unused			-
FM SERVER PKG	Yes	-	Unused	never		-
MAINFRAME PKG	No	-	Unused			-
ENTERPRISE_PKG	No	-	Unused			-
PORT_ACTIV_20P	No	20	In use	never		-

This table describes the port license assignments for the Cisco MDS 9396S Switch.

Table 6: Default Port License Assignments for Cisco MDS 9396S Switch

License Package (PORT_ACTIV_9396S_PKG)	Assigned to Ports on the Cisco MDS 9396S Switch
Default	1-48
First PORT_ACTIV_9396S_PKG	49-60
Second PORT_ACTIV_9396S_PKG	61-72
Third PORT_ACTIV_9396S_PKG	73-84
Fourth PORT_ACTIV_9396S_PKG	85-96

You can use the **show license usage** command to view any licenses assigned to a switch. If a license is in use, the status displayed is In use. If a license is installed but features or ports have acquired the license, then the status displayed is Unused.

The default license package for the Cisco MDS 9396S Switch is as follows:

switch# show license usage

Feature	Ins	Lic Count	Status	Expiry	Date	Comments	
FM_SERVER_PKG ENTERPRISE PKG	No No	-	Unused In use			- Grace 24D	ОН
PORT_ACTIV_9396S_PKG	No	48	In use	never		-	

Related Documentation

The documentation set for the Cisco MDS 9000 Series includes the following documents. To find a document online, use the Cisco MDS NX-OS Documentation Locator at:

http://www.cisco.com/en/US/docs/storage/san_switches/mds9000/roadmaps/doclocater.htm

Cisco DCNM documentation is available at the following URL:

http://www.cisco.com/en/US/products/ps9369/tsd_products_support_series_home.html

Release Notes

- Cisco MDS 9000 Series Release Notes for Cisco MDS NX-OS Releases
- Cisco MDS 9000 Series Release Notes for MDS SAN-OS Releases
- Cisco MDS 9000 Series Release Notes for Storage Services Interface Images
- Cisco MDS 9000 Series Release Notes for Cisco MDS 9000 EPLD Images
- Cisco Data Center Network Manager Release Notes

Regulatory Compliance and Safety Information

Regulatory Compliance and Safety Information for the Cisco MDS 9000 Series

Compatibility Information

- Cisco Data Center Interoperability Support Matrix
- Cisco MDS 9000 NX-OS Hardware and Software Compatibility Information and Feature Lists
- Cisco MDS NX-OS Release Compatibility Matrix for Storage Service Interface Images
- Cisco MDS 9000 Series Switch-to-Switch Interoperability Configuration Guide
- Cisco MDS NX-OS Release Compatibility Matrix for IBM SAN Volume Controller Software for Cisco MDS 9000

Hardware Installation

- Cisco MDS 9700 Director Hardware Installation Guide
- Cisco MDS 9500 Series Hardware Installation Guide
- Cisco MDS 9250i Multiservice Switch Hardware Installation Guide
- Cisco MDS 9200 Series Hardware Installation Guide

Software Installation and Upgrade

- Cisco MDS 9000 Series Storage Services Interface Image Install and Upgrade Guide
- Cisco MDS 9000 Series Storage Services Module Software Installation and Upgrade Guide

• Cisco MDS 9000 NX-OS Release 4.1(x) and SAN-OS 3(x) Software Upgrade and Downgrade Guide

Cisco NX-OS

- Cisco MDS 9000 Series NX-OS Fundamentals Configuration Guide
- Cisco MDS 9000 Series NX-OS Licensing Guide
- Cisco MDS 9000 Series NX-OS System Management Configuration Guide
- Cisco MDS 9000 Series NX-OS Interfaces Configuration Guide
- Cisco MDS 9000 Series NX-OS Fabric Configuration Guide
- Cisco MDS 9000 Series NX-OS Quality of Service Configuration Guide
- Cisco MDS 9000 Series NX-OS Security Configuration Guide
- Cisco MDS 9000 Series NX-OS IP Services Configuration Guide
- Cisco MDS 9000 Series NX-OS Intelligent Storage Services Configuration Guide
- Cisco MDS 9000 Series NX-OS High Availability and Redundancy Configuration Guide
- Cisco MDS 9000 Series NX-OS Inter-VSAN Routing Configuration Guide

Command-Line Interface

Cisco MDS 9000 Series Command Reference

Intelligent Storage Networking Services Configuration Guides

- Cisco MDS 9000 I/O Acceleration Configuration Guide
- Cisco MDS 9000 Series SANTap Deployment Guide
- Cisco MDS 9000 Series Data Mobility Manager Configuration Guide
- Cisco MDS 9000 Series Storage Media Encryption Configuration Guide
- Cisco MDS 9000 Series Secure Erase Configuration Guide
- Cisco MDS 9000 Series Cookbook for Cisco MDS SAN-OS

Troubleshooting and Reference

- Cisco NX-OS System Messages Reference
- Cisco MDS 9000 Series NX-OS Troubleshooting Guide
- Cisco MDS 9000 Series NX-OS MIB Quick Reference
- Cisco MDS 9000 Series NX-OS SMI-S Programming Reference
- Cisco DCNM for SAN Database Schema Reference

Communications, Services, and Additional Information

- To receive timely, relevant information from Cisco, sign up at Cisco Profile Manager.
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- To discover and browse secure, validated enterprise-class apps, products, solutions and services, visit Cisco Marketplace.
- To obtain general networking, training, and certification titles, visit Cisco Press.
- To find warranty information for a specific product or product family, access Cisco Warranty Finder.

Cisco Bug Search Tool

Cisco Bug Search Tool (BST) is a web-based tool that acts as a gateway to the Cisco bug tracking system that maintains a comprehensive list of defects and vulnerabilities in Cisco products and software. BST provides you with detailed defect information about your products and software.



Smart Software Licensing

This chapter provides an overview of Smart Software Licensing and describes the tools and processes required to complete the registration and authorization for Cisco MDS 9000 Series Switches.

- Finding Feature Information, on page 23
- Information About Smart Software Licensing, on page 24
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Finding Feature Information

Your software release might not support all the features documented in this module. For the latest caveats and feature information, see the Bug Search Tool at https://tools.cisco.com/bugsearch/ and the release notes for your software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the Feature History for Smart Software Licensing table.

Information About Smart Software Licensing

Introduction to Smart Licensing

Cisco Smart Licensing is a flexible licensing model that provides you with an easier, faster, and more consistent way to purchase and manage software across the Cisco portfolio and across your organization. And it's secure – you control what users can access. With Smart Licensing you get:

- Easy Activation: Smart Licensing establishes a pool of software licenses that can be used across the entire organization—no more PAKs (Product Activation Keys).
- Unified Management: My Cisco Entitlements (MCE) provides a complete view into all of your Cisco products and services in an easy-to-use portal, so you always know what you have and what you are using.
- License Flexibility: Your software is not node-locked to your hardware, so you can easily use and transfer licenses as needed.

To use Smart Licensing, you must first set up a Smart Account on Cisco Software Central (https://software.cisco.com/software/csws/ws/platform/home).

For a more detailed overview on Cisco Licensing, go to https://www.cisco.com/c/en/us/buy/licensing/licensing-guide.html.

Smart Software Licensing Overview

Smart Software Licensing is a cloud-based licensing model that consists of tools and processes to authorize you the usage and reporting of your Cisco products. This feature captures your order and communicates with the Cisco Cloud License Service through the Smart Call Home transport media to complete product registration and authorization at the corresponding performance and technology levels.

In the Smart Software Licensing model, you can activate licensed products without the use of a special software key or upgrade license file. You can activate the new functionalities using the appropriate product commands or configurations. Note that a software reboot may or may not be required depending on the product capabilities and requirements.

Similarly, downgrading or removing an advanced feature, performance, or functionality requires the removal of configurations or commands. After either of these actions is taken, the change in license state is noted by the Smart Software Manager during the next synchronization and an appropriate action is taken.

Starting from Cisco NX-OS 8.4(2), subscription-based licensing is available on Cisco MDS 9000 Series switches. This enables the customer to purchase licenses for a period of time.

Smart Software Licensing provides a single, standardized licensing solution for your Cisco products.

Figure 1: Smart Licensing Workflow



Traditional Licensing Overview

Traditional licensing at Cisco is a legacy licensing model based on Product Activation Keys (PAK) and Unique Device Identifiers (UDI). On most devices, capacity needs are assessed prior to obtaining and installing a *.tar* file on switches to retrieve the UDI. Customers place an order for a PAK, and the PAK is emailed to the user. A combination of them. UDI and PAK is used to receive a license file that is installed in the boot directory of the switch to complete the installation of the Cisco NX-OS software.

The License Registration Portal (LRP) is available to help migrate traditional licenses to smart licenses. To access the LRP, obtain training, and manage licenses, go to http://tools.cisco.com/SWIFT/LicensingUI/Home.

You can convert the traditional license to a smart license in the following ways:

- Converting a Traditional License to a Smart License Through GUI, on page 32
- Converting a Traditional License to a Smart License Through CLI, on page 33

Comparing Licensing Models

Two types of licensing models are used for the Cisco MDS 9000 Series Switches—traditional licensing and Smart Software Licensing.

Description	Traditional Licensing	Smart Software Licensing
License instance node locked to the product instance	Yes	No
Product registration upon configuration	No	Yes
Offers tools to report, monitor, own, and consume	No	Yes
Requires Smart Call Home	No	Yes

Smart Software Licensing Model

The Smart Software licensing model that is defined for the Cisco MDS product line has the following options:

- Subscription-based licenses
 - Advantage (A)

License contains Cisco Nexus Dashboard Fabric Controller (formerly DCNM) and Enterprise license of Cisco MDS 9000 series.

• Premier (P)

License contains Cisco Nexus Dashboard Fabric Controller (formerly DCNM), SAN Analytics, and Enterprise license of Cisco MDS 9000 series.

• Enterprise Agreement (EA) licenses

The license naming convention is as follows: M91XK9-A-1Y

- M91XK9 Cisco MDS 9000 series
- A or P License type
- NY License Duration in years.

This table provides PIDs for subscription-based licenses.

Table 8: PIDs for Subscription-Based Licenses

PIDs	License Type	Duration (years)
M91XK9-DCNM-1Y	Subscription	1
M92XK9-DCNM-1Y	Subscription	1
M93XK9-DCNM-1Y	Subscription	1

PIDs	License Type	Duration (years)
M97XK9-DCNM-1Y	Subscription	1
M91XK9-DCNM-3Y	Subscription	3
M92XK9-DCNM-3Y	Subscription	3
M93XK9-DCNM-3Y	Subscription	3
M97XK9-DCNM-3Y	Subscription	3
M91XK9-DCNM-5Y	Subscription	5
M92XK9-DCNM-5Y	Subscription	5
M93XK9-DCNM-5Y	Subscription	5
M97XK9-DCNM-5Y	Subscription	5
M91XK9-ENT-1Y	Subscription	1
M92XK9-ENT-1Y	Subscription	1
M93XK9-ENT-1Y	Subscription	1
M97XK9-ENT-1Y	Subscription	1
M91XK9-ENT-3Y	Subscription	3
M92XK9-ENT-3Y	Subscription	3
M93XK9-ENT-3Y	Subscription	3
M97XK9-ENT-3Y	Subscription	3
M91XK9-ENT-5Y	Subscription	5
M92XK9-ENT-5Y	Subscription	5
M93XK9-ENT-5Y	Subscription	5
M97XK9-ENT-5Y	Subscription	5
L1-D-M91S-AXK9	Time Based	1
L-D-M91S-AXK9	Time Based	3
L5-D-M91S-AXK9	Time Based	5
L1-D-M93S-AXK9	Time Based	1
L-D-M93S-AXK9	Time Based	3
L5-D-M93S-AXK9	Time Based	5
L1-D-M97S-AXK9	Time Based	1
L-D-M97S-AXK9	Time Based	3
L5-D-M97S-AXK9	Time Based	5
M91XK9-A-1Y	Subscription	1
M91XK9-A-3Y	Subscription	3

PIDs	License Type	Duration (years)
M91XK9-A-5Y	Subscription	5
M93XK9-A-1Y	Subscription	1
M93XK9-A-3Y	Subscription	3
M93XK9-A-5Y	Subscription	5
M97XK9-A-1Y	Subscription	1
M97XK9-A-3Y	Subscription	3
M97XK9-A-5Y	Subscription	5
M91XK9-P-1Y	Subscription	1
M91XK9-P-3Y	Subscription	3
M91XK9-P-5Y	Subscription	5
M93XK9-P-1Y	Subscription	1
M93XK9-P-3Y	Subscription	3
M93XK9-P-5Y	Subscription	5
M97XK9-P-1Y	Subscription	1
M97XK9-P-3Y	Subscription	3
M97XK9-P-5Y	Subscription	5
M91XK9-SD-1Y	Subscription	1
M91XK9-SD-3Y	Subscription	3
M91XK9-SD-5Y	Subscription	5
M93XK9-SD-1Y	Subscription	1
M93XK9-SD-3Y	Subscription	3
M93XK9-SD-5Y	Subscription	5
M97XK9-SD-1Y	Subscription	1
M97XK9-SD-3Y	Subscription	3
M97XK9-SD-5Y	Subscription	5

This table provides PIDs for EA licenses.

Table 9: PIDs for EA Licenses

PIDs	Term
E2N-MDS9100-G-A	3 or 5 Year
E2N-MDS9100-B-A	3 or 5 Year
E2N-MDS9100-G-P	3 or 5 Year

PIDs	Term
E2N-MDS9100-B-P	3 or 5 Year
E2N-MDS9300-G-A	3 or 5 Year
E2N-MDS9300-B-A	3 or 5 Year
E2N-MDS9300-G-P	3 or 5 Year
E2N-MDS9300-B-P	3 or 5 Year
E2N-MDS9700-G-A	3 or 5 Year
E2N-MDS9700-B-A	3 or 5 Year
E2N-MDS9700-G-P	3 or 5 Year
E2N-MDS9700-B-P	3 or 5 Year

Guidelines and Limitations for Smart Software Licensing

- You cannot use both traditional licensing and Smart Software Licensing at the same time on the Cisco MDS 9000 Series Switches.
- From Cisco MDS NX-OS Release 9.2(2), Smart Software Licensing is supported on Cisco N-Port Virtualizer (Cisco NPV) devices. Smart Software Licensing is not supported on Cisco NPV devices in Cisco MDS NX-OS Release 9.2(1) or earlier.

Smart Accounts and Virtual Accounts

• A Smart account provides you with a single location for all smart-account enabled products and licenses. It assists you in speedy procurement, deployment, and maintenance of your Cisco software.

If you are requesting a Smart account on behalf of an organization, you must have the authority to represent the requesting organization when creating a Smart account. After submitting the request, the request goes through an approval process before you are provided with access to your Smart account.

Go to http://software.cisco.com to learn about, set up, and manage a Smart account.

• A virtual account is a subaccount within a Smart account. You can define the virtual account's structure based on organizational layout, business function, geography, or any defined hierarchy. Virtual accounts can be created and maintained only by Smart account administrators.

Smart Software Manager Overview

Smart Software Manager enables the management of software licenses and Smart accounts from a single portal. The interface allows you to activate your product, manage entitlements, renew, and upgrade software.

An active Smart account is required to complete the registration process. To access the Smart Software Manager, go to http://www.cisco.com/web/ordering/smart-software-manager/index.html.

You must add the following information in the Smart Software Manager:

- Trusted Unique Identifier—This is the device ID (Secure Unique Device Identifier (SUDI)).
- Organizational Identifier—This is a numerical format to associate a product with a Smart account or Virtual account.
- Licenses consumed—Allows the Smart Software Manager to understand the license type and the level
 of consumption.

Smart Call Home Overview

Use the Smart Call Home feature to communicate with the Smart Software Manager. Smart Call Home is enabled automatically when you configure Smart Software Licensing. On Cisco MDS 9000 Series Switches, Smart Software Licensing is not enabled by default.

The Smart Call Home (SCH) server runs on the Cisco Smart Software Manager (CSSM) satellite by default. You can access this service using the following URL:

https://<CSSM satllite IP:443>/Transportgateway/services/DeviceRequestHandler

Provide this URL as part of Smart Call Home configuration so that the device registration works with the CSSM satellite. For a sample configuration, see Configuration Examples for Smart Software Licensing.

The associated Smart Call Home messages are sent to the Smart Software Manager only after enabling Smart Call Home. For switches in which Smart Software Licensing is enabled by default, Smart Call Home is also enabled by default, along with the associated messages.

To disable Smart Software Licensing, see Disabling Smart Software Licensing.

Smart Software Manager Satellite

Smart Software Manager satellite is a component of Smart Software Licensing and works in conjunction with the Smart Software Manager to manage software licenses. You can intelligently manage product licenses and get near real-time visibility and reports pertaining to the Cisco licenses you purchased and consumed.

If you do not want to manage your installed base using a direct Internet connection, the Smart Software Manager satellite will be installed on your premises to provide a subset of the Smart Software Manager functionality. You can download the satellite application, deploy it, and register it with the Smart Software Manager.

You can perform the following functions using the satellite application on your premises:

- Activate or register a license
- Get visibility to your company's licenses
- · Transfer licenses between company entities

To learn more about the Smart Software Manager satellite, go to http://www.cisco.com/go/smartsatellite.

Requesting a Smart Account

Requesting a Smart account is a one-time process. Subsequent management of users is a capability provided through the tool.

Before you begin

Ensure that you have a Cisco Employee Connection (CEC) ID.

Procedure

- **Step 1** Go to http://software.cisco.com, and log in to your account.
- **Step 2** Click the **Request a Smart Account** link in the **Administration** section.
- **Step 3** Perform one of the following tasks to select the Account Approver:
 - To select yourself as the approver, click **Yes**, I will be the Approver for the account option.
 - To select a different person as the approver, click **No, the person specified below will be the Approver for the account** option and specify the person's email ID.
 - **Note** The specified approver must have the authority to enter legal agreements. The approver serves as the primary owner and nominates account administrators.
- **Step 4** Depending on the approver type, perform one of the following procedures:
 - If you are the approver, perform the following tasks:
 - a. Enter Account Name, Company/Organization Name, Country, and State/Province/Region information.
 - b. (Optional) Click Edit.
 - c. In the Edit Account Identifier window, enter a valid Proposed Domain Identifier and Contact Phone Number, and click OK.
 - **Note** The default domain identifier is the approver's email domain. If you edit the domain identifier, the change goes through a manual approval process.
 - d. Click Continue to select the legal address to be linked to your Smart account.
 - If you are not the approver, perform the following procedure:
 - a. Enter the Account Name and an optional Message to the approver.
 - **b.** (Optional) Click **Edit**.
 - c. In the Edit Account Identifier window, enter a valid Proposed Domain Identifier, and click OK.
 - **Note** The default domain identifier is the approver's email domain. If you edit the domain identifier, the change goes through a manual approval process.
 - d. Click Continue.

e. Follow the instructions in the email that is sent to you to complete the request.

Adding a User to a Smart Account

Smart account user management is available in the Administration section of Cisco Software Central.

Procedure

	(Define roles to manage the entire Smart account or specific virtual accounts.)
Step 5	Provide the required information in the New User section.
Step 4	Click New User.
Step 3	Click the Users tab.
Step 2	Click the Manage Smart Account link in the Administration section.
Step 1	Go to http://software.cisco.com, and log in to your account.

Converting a Traditional License to a Smart License Through GUI

Traditional licenses associated with Product Activation Keys (PAK) can be converted to Smart Licenses. Access Traditional licenses through the License Registration Portal by clicking the **PAKs/Tokens** tab, and then use the information provided in this section to convert PAKs to smart licenses.

Procedure

Step 1	Go to http://software.cisco.com, and log in to your account.	
Step 2	Click the Traditional Licensing link in the License section. You will be redirected to the LRP window.	
Step 3	Click the PAKs/Tokens tab under Manage, if it is not already selected.	
Step 4	Check the	PAK/Token ID check box.
Step 5	Select Co	nvert to Smart Entitlements from the Actions drop-down menu.
Step 6	Select a smart account from the Smart Account drop-down list.	
	Note	You can view only the smart accounts that are assigned to you.
Step 7	Select a v	irtual account from the Virtual Account drop-down list.

Note You can view only the virtual accounts that are assigned to you.

Step 8Click Assign.The selected PAK will be converted to a smart license.

Converting a Traditional License to a Smart License Through CLI

Traditional licenses associated with Product Activation Keys (PAK) can be converted to smart licenses using CLI.

Before you begin

- Ensure that Smart Software Licensing is enabled.
- Ensure that you have a valid smart account.
- Ensure that you have valid user rights for the smart account.

Procedure

Step 1 switch# license smart conversion start

Starts a manual conversion of a traditional license to a smart license. The conversion takes place in the background. After the conversion succeeds or fails, a system log message is displayed on the switch console.

Step 2 (Optional) switch# **license smart conversion stop**

Stops the manual conversion.

Step 3 (Optional) switch# show license status

Displays the license conversion status. If you run this command from an active device in an high availability (HA) configuration, this will display the status of all the devices in the HA configuration.

Converting a Traditional License to a Smart License Through CLI

The following example shows how to convert a traditional license to a smart license using the CLI:

switch# license smart conversion start

Smart License Conversion process is in progress. Use the 'show license status' command to check the progress and result.

The following example shows how to stop the process of converting a traditional license to smart license using the CLI:

The following example shows the status of the license conversion for a standalone device:

switch# license smart conversion stop
stop manual conversion failed:
Some Smart Licensing Conversion jobs stopped successfully.

The following example shows the status of line conversion for a standalone device:

```
switch# show license status
```

```
Smart Licensing is ENABLED.
Registration:
Status: REGISTERED
Smart Account: Big-U University
Virtual Account: Physics
Export-Controlled Functionality: Not Allowed
Initial Registration: SUCCEEDED on Feb 24 23:30:12 2014 PST
Last Renewal Attempt: SUCCEEDED on Feb 24 23:30:12 2014 PST
Next Renewal Attempt: Aug 24 23:30:12 2014 PST
Registration Expires: Feb 24 23:30:12 2015 PST
```

```
!The following show output is applicable from Cisco NX-OS Release 8.2(1) onwards!
Smart License Conversion:
Automatic Conversion Enabled: False
Status: SUCCEEDED on Jan 1 00:00:00 1970 UTC
```

```
License Authorization:
Status: AUTHORIZED on Aug 31 17:04:56 2017 UTC
Last Communication Attempt: SUCCEEDED on Aug 31 17:04:56 2017 UTC
Next Communication Attempt: Sep 30 17:04:56 2017 UTC
Communication Deadline: Nov 29 16:58:31 2017 UTC
```

Configuring Smart Software Licensing

Configuring a DNS Client



To avoid any issues during configuring a DNS client, ensure to check if the name server is reachable before you configure a DNS client.

Procedure

Step 1	switch# configure terminal
	Enters global configuration mode.
Step 2	switch(config)# ip domain-lookup
	Enables DNS-based address translation.
Step 3	switch(config)# ip domain-name name
	Defines the default domain name that Cisco NX-OS uses to resolve unqualified host names.
	Cisco NX-OS appends the default domain name to any hostname that does not contain a complete domain

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name before starting a domain-name lookup.
Step 4 switch(config)# **ip name-server** address1 [address2... address6]

Defines up to six name servers. The address can be either an IPv4 address or an IPv6 address.

Enabling Smart Software Licensing

	Note	From Cisco MDS NX-OS Release 9.2(2), Smart Software Licensing is enabled by default and cannot be disabled.			
	Pro	cedure			
Step 1	switch# configure terminal.				
	Ente	ers global configuration mode.			
Step 2	Use	one of the following commands to enable Smart Software Licensing: • switch(config)# license smart enable • switch(config)# feature license smart			
	Ena	bles Smart Software Licensing.			

Disabling Smart Software Licensing

Procedure Step 1 switch# configure terminal. Enters global configuration mode. Step 2 Use one of the following commands to disable Smart Software Licensing: • switch(config)# no license smart enable • switch(config)# no feature license smart Disables Smart Software Licensing.

Registering a Device

Before you begin

- Ensure that Smart Software Licensing is enabled.
- Ensure that you have the token to be used to register your device to the smart account.

Procedure

switch# license smart register idtoken token [force]

Registers your device to the smart account using the token.

Renewing Device Registration

Procedure

switch# **license smart renew ID** Renews the device registration.

Renewing Device Authorization

Procedure

switch# license smart renew auth

Renews the device authorization.

Unregistering a Device

Procedure

switch# license smart deregister

L

Unregisters a device.

Configuring Smart Call Home for Smart Software Licensing

Viewing a Smart Call Home Profile

Procedure

switch# show callhome smart-licensing Displays the Smart Call Home profile.

Enabling Smart Call Home Data Privacy

Procedure

Step 1	switch# configure terminal
	Enters global configuration mode.
Step 2	switch(config)# callhome Enters Call Home configuration mode.
Step 3	switch(config-callhome)# data-privacy hostname Enables Call Home data privacy.

Verifying Smart Software Licensing

Commands	Purpose
show license	Displays the contents of all the license files.
show license all	Displays all smart license agent information.
show license brief	Displays a list of license files.
show license status	Displays the smart license agent status.

Verify Smart Software Licensing using the following commands:

show license summary	Displays a summary of the smart license agent status.
show license tech support	Gathers information for troubleshooting.
show license udi	Displays device UDI information.
show license usage	Displays show license usage table information.
show tech-support license	Displays licensing technical support information.

Configuration Examples for Smart Software Licensing

This example shows how to register your device with the Cisco portal and enable Smart Software Licensing:



```
Note T
```

To avoid any issues during registering your device, ensure to check if the name server is reachable before registering your device.

```
switch# configure terminal
switch(config)# ip domain-lookup
switch(config)# ip domain-name cisco.com
switch(config)# ip name-server 171.70.168.183
switch(config)# callhome
switch(config-callhome)# dest xml trans http
switch(config-callhome)# dest xml email sl-sch-test@cisco.com
switch(config-callhome)# dest xml http
https://tools.cisco.com/its/service/oddce/services/DDCEService
switch(config-callhome)# enable
switch(config-callhome)# commit*
switch(config-callhome)# exit
switch(config-callhome)# exit
```

```
Ø
```

Note

* Ensure that callhome distribute is enabled. If not the commit fails.

This example shows how to disable Smart Software Licensing:

```
switch# configure terminal
switch(config)# no feature license smart
```

This example shows how to register a device:

```
switch# configure terminal
switch(config)# license smart register idtoken sampletokenID
register status: Registration process is in progress. Use the 'show license status' command
to check the progress and result
```

This example shows how to unregister a device:

switch# license smart deregister

This example shows how to provide the URL for CSSM satellite as part of smart call home configuration:

```
switch(config-callhome)# destination-profile xml email-addr example@cisco.com
alert-group Add alert group
email-addr Add email addr
http Add http or https url
transport-method Callhome message sending transport-method
destination-profile xml http https://tools.cisco.com/its/service/oddce/services/DDCEService
services/DeviceRequestHandler*
```



```
Note
```

* The IP address should have the format: https://<CSSM satellite IP:443>/Transportgateway/services/DeviceRequestHandler

Verification Examples for Smart Software Licensing

These examples show how to verify Smart Software Licensing:

```
switch# show license status
Smart Licensing is ENABLED
Registration:
  Status: REGISTERED
  Smart Account: MDS-9148S
  Virtual Account: Default
  Export-Controlled Functionality: Allowed
  Initial Registration: SUCCEEDED on Apr 18 08:20:47 2017 UTC
  Last Renewal Attempt: None
  Next Renewal Attempt: Oct 15 08:20:46 2017 UTC
  Registration Expires: Apr 18 08:17:43 2018 UTC
License Authorization:
  Status: AUTHORIZED on Apr 18 08:25:08 2017 UTC
  Last Communication Attempt: SUCCEEDED on Apr 18 08:25:08 2017 UTC
  Next Communication Attempt: May 18 08:25:08 2017 UTC
  Communication Deadline: Jul 17 08:22:07 2017 UTC
switch# show callhome smart-licensing
Current smart-licensing transport settings:
Smart-license messages: enabled
 Profile: CiscoTAC-1 (status: ACTIVE)
switch# show license summary
Smart Licensing is ENABLED
Registration:
  Status: REGISTERED
  Smart Account: Cisco Systems, Inc.
  Virtual Account: NexusSmartLicensing Test
  Export-Controlled Functionality: Allowed
License Authorization:
  Status: AUTHORIZED on Dec 14 10:43:48 2016 UTC
  Last Communication Attempt: SUCCEEDED
```

```
Communication Deadline: Dec 14 08:07:20 2017 UTC
switch# show license brief
Status Legend:
 u - unenforced, e - enforced
 d -
    - platform default, f - factory installed SLP license,
 p-

    converted from PAK, s - migrated from Smart Licensing,

 a - installed using SLP, h - honored (pending SLP authorization)
General Legend:
 NA - not applicable
_____
                                                     License Port
                                                     Count Count Used Status
License Name
_____
                                                                     1 pu
MDS 9700 series Modular Enterprise package
                                                          1
                                                               NA
                                                                     1 u
                                                               NA
MDS 9700 series Modular Mainframe package
                                                          1
                                                                     0 pu
SAN Analytics
                                                          1
                                                                NA
                                                                     1 u
MDS 9300V Series Enterprise
                                                          1
                                                               NA
                                                              48 48 d
MDS 9396V 64G FC 16 Port Activation License
                                                         NA
MDS 9396V 64G FC 16 Port Activation License
                                                          3 48 48 ae
switch# show license all
Smart Licensing Status
_____
Smart Licensing is ENABLED
Registration:
 Status: REGISTERED
 Smart Account: Cisco Systems, Inc.
 Virtual Account: NexusSmartLicensing Test
 Export-Controlled Functionality: Allowed
 Initial Registration: SUCCEEDED on Dec 14 10:43:33 2016 UTC
 Last Renewal Attempt: None
 Next Renewal Attempt: Jun 12 10:43:32 2017 UTC
 Registration Expires: Dec 14 08:07:20 2017 UTC
License Authorization:
 Status: AUTHORIZED
 Last Communication Attempt: SUCCEEDED on Dec 14 10:43:48 2016 UTC
 Next Communication Attempt: Jan 13 10:43:48 2017 UTC
 Communication Deadline: Dec 14 08:07:21 2017 UTC
License Usage
_____
Product Information
_____
UDI: SN:JAF1428DTAH
Agent Version
_____
Smart Agent for Licensing: 1.6.6 rel/88
```

The **show license tech support** command displays the smart licensing status along with the smart agent logs.

```
switch# show license tech support
Smart Licensing Tech Support info
Smart Licensing Status
```

_____ Smart Licensing is ENABLED License Conversion: Automatic Conversion Enabled: True Status: Not started 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: cslu Cslu address: <empty> Proxy: Address: <empty> Port: <empty> Username: <empty> Password: <empty> Server Identity Check: False Miscellaneous: Custom Id: <empty> Policy: Policy in use: Merged from multiple sources. Reporting ACK required: yes (CISCO default) Unenforced/Non-Export Attributes: First report requirement (days): 90 (CISCO default) Reporting frequency (days): 365 (CISCO default) Report on change (days): 90 (CISCO default) Enforced (Perpetual/Subscription) License Attributes: First report requirement (days): 0 (CISCO default) Reporting frequency (days): 0 (CISCO default) Report on change (days): 0 (CISCO default) Export (Perpetual/Subscription) License Attributes: First report requirement (days): 0 (CISCO default) Reporting frequency (days): 0 (CISCO default) Report on change (days): 0 (CISCO default) Usage Reporting: Last ACK received: <none> Next ACK deadline: May 10 2022 10:06:40 UTC Reporting push interval: 30 days State(2) InPolicy(90) Next ACK push check: <none> Next report push: Apr 12 2022 08:53:29 UTC Last report push: <none> Last report file write: <none> License Usage _____

```
Handle: 1
  License: LAN ENTERPRISE SERVICES PKG
 Entitlement Tag:
regid.2019-06.com.cisco.LAN Nexus9300 XF,1.0 76a87ea7-465b-40fd-b403-1bf9d845aa1b
 Description: LAN license for Nexus 9300-XF
  Count: 1
  Version: 1.0
 Status: IN USE(15)
  Status time: Apr 12 2022 08:52:59 UTC
 Request Time: Apr 12 2022 08:52:59 UTC
 Export status: NOT RESTRICTED
  Feature Name: LAN ENTERPRISE SERVICES PKG
  Feature Description: LAN license for Nexus 9300-XF
 Enforcement type: NOT ENFORCED
 License type: Generic
 Measurements:
   ENTITLEMENT:
     Interval: 00:15:00
     Current Value: 1
Product Information
_____
UDI: PID:N9K-C93240YC-FX2, SN:FD024450MBL
Agent Version
_____
Smart Agent for Licensing: 5.2.4 rel/79
Upcoming Scheduled Jobs
  _____
Current time: Apr 12 2022 10:35:37 UTC
Daily: Apr 13 2022 08:51:24 UTC (22 hours, 15 minutes, 47 seconds remaining)
Init Flag Check: Expired Not Rescheduled
Reservation configuration mismatch between nodes in HA mode: Expired Not Rescheduled
Start Utility Measurements: Apr 12 2022 10:38:09 UTC (2 minutes, 32 seconds remaining)
Send Utility RUM reports: Apr 13 2022 08:53:29 UTC (22 hours, 17 minutes, 52 seconds
remaining)
Save unreported RUM Reports: Apr 12 2022 11:23:19 UTC (47 minutes, 42 seconds remaining)
Process Utility RUM reports: Apr 13 2022 08:51:25 UTC (22 hours, 15 minutes, 48 seconds
remaining)
External Event: May 10 2022 10:06:40 UTC (27 days, 23 hours, 31 minutes, 3 seconds remaining)
Operational Model: Expired Not Rescheduled
Communication Statistics:
_____
Communication Level Allowed: INDIRECT
Overall State: <empty>
Trust Establishment:
 Attempts: Total=0, Success=0, Fail=0 Ongoing Failure: Overall=0 Communication=0
 Last Response: <none>
   Failure Reason: <none>
 Last Success Time: <none>
 Last Failure Time: <none>
Trust Acknowledgement:
 Attempts: Total=0, Success=0, Fail=0 Ongoing Failure: Overall=0 Communication=0
  Last Response: <none>
   Failure Reason: <none>
 Last Success Time: <none>
 Last Failure Time: <none>
Usage Reporting:
  Attempts: Total=0, Success=0, Fail=0 Ongoing Failure: Overall=0 Communication=0
  Last Response: <none>
   Failure Reason: <none>
  Last Success Time: <none>
```

```
Last Failure Time: <none>
Result Polling:
  Attempts: Total=0, Success=0, Fail=0 Ongoing Failure: Overall=0 Communication=0
  Last Response: <none>
   Failure Reason: <none>
  Last Success Time: <none>
  Last Failure Time: <none>
Authorization Request:
 Attempts: Total=0, Success=0, Fail=0 Ongoing Failure: Overall=0 Communication=0
  Last Response: <none>
   Failure Reason: <none>
  Last Success Time: <none>
 Last Failure Time: <none>
Authorization Confirmation:
 Attempts: Total=0, Success=0, Fail=0 Ongoing Failure: Overall=0 Communication=0
 Last Response: <none>
   Failure Reason: <none>
 Last Success Time: <none>
 Last Failure Time: <none>
Authorization Return:
 Attempts: Total=0, Success=0, Fail=0 Ongoing Failure: Overall=0 Communication=0
  Last Response: <none>
   Failure Reason: <none>
 Last Success Time: <none>
 Last Failure Time: <none>
Trust Sync:
 Attempts: Total=0, Success=0, Fail=0 Ongoing Failure: Overall=0 Communication=0
 Last Response: <none>
   Failure Reason: <none>
 Last Success Time: <none>
  Last Failure Time: <none>
Hello Message:
  Attempts: Total=2, Success=0, Fail=2 Ongoing Failure: Overall=2 Communication=2
  Last Response: NO REPLY on Apr 12 2022 08:53:29 UTC
   Failure Reason: <none>
  Last Success Time: <none>
 Last Failure Time: Apr 12 2022 08:53:29 UTC
License Certificates
_____
Production Cert: True
Not registered. No certificates installed
HA Info
_____
RP Role: Active
Chassis Role: Active
Behavior Role: Active
RMF: True
CF: True
CF State: Stateless
Message Flow Allowed: True
Reservation Info
 _____
License reservation: DISABLED
Overall status:
  Active: PID:N9K-C93240YC-FX2, SN:FD024450MBL
     Reservation status: NOT INSTALLED
     Request code: <none>
     Last return code: <none>
     Last Confirmation code: <none>
     Reservation authorization code: <none>
```

Status:PAK Specified license reservations: Purchased Licenses: No Purchase Information Available Other Info _____ Software ID: regid.2017-11.com.cisco.Nexus 9300,1.0 ac6d6e6b-8ca9-4de7-8699-4ee1cb8f422d Agent State: authorized TS enable: True Transport: cslu 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) : 8 sizeof(char *): 8 sizeof(time t): 8 sizeof(size t): 8 Endian: Little Write Erase Occurred: False XOS version: 0.12.0.0 Config Persist Received: True Message Version: 1.3 connect info.name: <empty> connect_info.version: <empty> connect_info.additional: <empty> connect info.prod: False connect info.capabilities: <empty> agent.capabilities: UTILITY, DLC, AppHA, MULTITIER, EXPORT 2, OK TRY AGAIN Check Point Interface: False Config Management Interface: False License Map Interface: True HA Interface: True Trusted Store Interface: True Platform Data Interface: True Crypto Version 2 Interface: False SAPluginMgmtInterfaceMutex: False SAPluginMgmtIPDomainName: False SmartAgentClientWaitForServer: 2000 SmartAgentCmReTrySend: False SmartAgentClientIsUnified: True SmartAgentCmClient: True SmartAgentClientName: UnifiedClient builtInEncryption: True SmartAgentXMLEntriesAreUnique: True enableOnInit: true chassisRole: Active SmartTransportServerIdCheck: False SmartTransportProxySupport: True SmartAgentPolicyDisplayFormat: 2 SmartAgentReportOnUpgrade: true SmartAgentIndividualRUMEncrypt: 2 SmartAgentUsageStatisticsEnable: False SmartAgentMaxRumMemory: 4 SmartAgentConcurrentThreadMax: 10 SmartAgentPolicyControllerModel: False SmartAgentPolicyModel: true

```
SmartAgentFederalLicense: False
SmartAgentMultiTenant: False
attr365DayEvalSyslog: False
checkPointWriteOnly: False
SmartAgentDelayCertValidation: False
enableByDefault: False
conversionAutomatic: True
conversionAllowed: true
storageEncryptDisable: False
storageLoadUnencryptedDisable: False
TSPluginDisable: False
bypassUDICheck: False
loggingAddTStamp: False
loggingAddTid: true
HighAvailabilityOverrideEvent: UnknownPlatformEvent
platformIndependentOverrideEvent: UnknownPlatformEvent
platformOverrideEvent: UnknownPlatformEvent
WaitForHaRole: False
standbyIsHot: True
chkPtType: 2
delayCommInit: False
roleByEvent: true
maxTraceLength: 100
traceAlwaysOn: False
debugFlags: 7
Event log max size: 512 KB
Event log current size: 68 KB
Local Device: No Trust Data
Overall Trust: No ID
Clock sync-ed with NTP: False
```

Platform Provided Mapping Table

regid.2017-11.com.cisco.Nexus_9300,1.0_ac6d6e6b-8ca9-4de7-8699-4ee1cb8f422d: Total licenses found: 17 Enforced Licenses: P:N9K-C93240YC-FX2,S:FD024450MBL: No PD enforced licenses

The **show tech-support license** command displays information about the license installed on the device.

```
switch# show tech-support license
`show license host-id
License hostid: VDH=JPG2551000X
show license usage
License Authorization:
 Status: Not Applicable
(ENTERPRISE PKG):
 Description: MDS 9100V Series Enterprise
 Count: 1
 Version: 1.0
 Status: IN USE
 Enforcement Type: NOT ENFORCED
  License Type: Generic
(PORT ACTIV 9148V PKG):
 Description: MDS 9148V FC 8 port-activation
 Count: 24
  Version: 1.0
 Status: IN USE
 Enforcement Type: ENFORCED
 License Type: Enforced
```

```
`show license status`
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.cisco.com/licservice/license
   Proxv:
       Not configured
Policy:
    Policy in use: Merged from multiple sources
    Reporting ACK required: Yes
   Unenforced/Non-Export:
       First report requirement (days): 90 (CISCO default)
       Ongoing reporting frequency (days): 365 (CISCO default)
       On change reporting (days): 90 (CISCO default)
    Enforced (Pepertual/Subscription):
       First report requirement (days): 0 (CISCO default)
       Ongoing reporting frequency (days): 0 (CISCO default)
       On change reporting (days): 0 (CISCO default)
    Export (Perpetual/Subscription):
       First report requirement (days): 0 (CISCO default)
       Ongoing reporting frequency (days): 0 (CISCO default)
       On change reporting (days): 0 (CISCO default)
Miscellaneous:
   Custom Id: <empty>
Usage reporting:
   Last ACK received: <none>
   Next ACK deadline: Jun 29 13:27:54 2022 UTC
   Reporting push interval: 30 days
   Next ACK push check: <none>
   Next report push: Jul 14 12:09:43 2022 UTC
   Last report push: <none>
   Last report file write: <none>
Trust Code installed: Mar 31 11:17:43 2022 UTC
   Active: PID: DS-C9148V-K9, SN: JPG2551000X
       Mar 31 11:17:43 2022 UTC
`show license summary`
License Usage:
License
                        Entitlement tag
                                                       Count Status
_____
                                                        1 IN USE
24 IN USE
MDS 9100V Series Enterp... (ENTERPRISE PKG)
MDS 9148V FC 8 port-act... (PORT ACTIV 9148V PKG)
`show running-config license all`
```

```
!Command: show running-config license all
!Running configuration last done at: Thu Jul 21 06:52:51 2022
!Time: Wed Jul 27 06:26:21 2022
version 9.3(1)
license grace-period
license smart transport smart
license smart url smart https://smartreceiver.cisco.com/licservice/license
license smart url cslu cslu-local
license smart usage interval 30
`test license platformInfo`
SL Status
             : Enabled
Chassis ID
                : 43
Trad spec file : mds_nellis
SL spec file
                : smartpd spec m9148V
SLP spec file
                : sle_spec_m9148V
IPS bootup ports : 0
Bootup ports
              : 0
                : Disabled
Hport Status
SL(Prev) Status : Disabled
`show system internal license event-history error`
switch# show license udi
UDI: SN:JAF1428DTAH
switch# show license usage
License Authorization:
 Status: AUTHORIZED on Apr 18 08:25:08 2017 UTC
(ENTERPRISE PKG):
 Description: This entitlement tag was created via Alpha Extension application
  Count: 1
 Version: 1.0
 Status: AUTHORIZED
(PORT ACTIV 9148S PKG):
 Description: This entitlement tag was created via Alpha Extension application
  Count: 48
  Version: 1.0
 Status: AUTHORIZED
switch# show running-config callhome
!Time: Thu Dec 15 08:55:26 2016
version 8.0(1)
callhome
  email-contact sch-smart-licensing@cisco.com
  destination-profile xml transport-method http
  destination-profile xml http https://tools.cisco.com/its/service/oddce/
services/DDCEService
 transport http use-vrf management
```

```
enable
```

Use Cases for Smart Software Licensing

Scenario 1

1. Configure and order a with licenses and select the release that will be preinstalled on the hardware prior to shipment.



- **Note** To convert the preinstalled licenses on the hardware to smart licenses, you must have a Smart Account set up, and then convert the licenses by going to the License Registration Portal.
- 2. Click the Devices tab under the Manage section. Click the corresponding Device ID, and choose Convert to Smart Entitlements from the Device ID drop-down list. This will convert all the licenses that are preinstalled on the switch to smart licenses. Note that this task must be performed for each switch that you want to convert to smart license.
- **3.** The service will validate if license Stock Keeping Units (SKUs) on the switch have been mapped to smart licenses before proceeding with the conversion.
- **4.** Enable smart mode on the switch and start using the smart licenses.

Scenario 2

- 1. Configure and order a with licenses and select the release that will be preinstalled in the hardware prior to shipment.
- 2. Upgrade the switch to .



- **Note** To convert the preinstalled licenses on the hardware to smart licenses, you must have a Smart account set up and then perform the conversion by going to the License Registration Portal.
- 3. Click the **Devices** tab under the **Manage** section. Click the corresponding Device ID, and choose **Convert** to **Smart Entitlements** from the Device ID drop-down list. This will convert all the licenses that are preinstalled on the switch to smart licenses. Note that this task must be performed for each switch that you want to convert to smart license.
- 4. The service will validate if license SKUs on the switch are mapped to smart licenses before proceeding with the conversion.
- 5. You enable smart mode on the switch and start using the smart licenses.

Scenario 3

 Order a spare license SKU and do not associate a Smart account to the order in Cisco Commerce Workspace (CCW).
 Note
 You must have a Smart account set up before using Smart Software Licensing.

- 2. Get a PAK delivered to yourself and load it to your Smart account.
- 3. License Registration Portal service will validate if a spare license SKU is mapped to a smart license.
- **4.** The Smart Software Manager (SSM) will notify you via email that your Smart Account has licenses that can be fulfilled as traditional licenses or smart licenses.
- 5. Specify the PAKs as smart licenses in SSM.
- 6. Ensure that is installed on the switch, enable smart mode, and start using the smart entitlements.

Scenario 4

- 1. Order a spare license SKU and assign a Smart account to the order in CCW.
- 2. The existing License Registration Portal service will auto deposit the PAK to the LRP Smart account.
- **3.** License Registration Portal service will validate if the spare license SKU has been mapped to smart entitlements. If the spare license SKU are mapped to smart entitlements, the service sends out a confirmation notification to CSSM.
- 4. The Smart Software Manager will notify you via email that your Smart Account has licenses that can be fulfilled as traditional licenses or smart licenses.
- 5. Specify the PAKs as Smart Software Licenses in SSM.
- 6. Ensure that is installed on the switch, enable smart mode, and start using the smart licenses.

Additional References for Smart Software Licensing

Table 10: Technical Assistance

Description

Link

I

Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies.	http://www.cisco.com/cisco/web/support/index.html
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), 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.	
License Registration Port (LRP) documentation	https://www.cisco.com/web/fw/tools/swift/xui/html/help.html

Feature History for Smart Software Licensing

Feature Name	Release	Feature Information
Smart agent log display	9.3(1)	The show license tech support command is enhanced to display only the smart agent logs.

Feature Name	Release	Feature Information
Smart Software Licensing	8.4(2)	Smart Software Licensing is a standardized licensing platform that simplifies the Cisco software experience and helps you understand how Cisco software is used across your network. Smart Software Licensing is the next generation licensing platform for Cisco MDS 9000 Series Switches.
		The following commands were introduced in this feature:
		• feature license smart
		• license smart deregister
		• license smart enable
		• license smart register
		• license smart renew
		• show license all
		 show license status
		 show license summary
		 show license tech support
		• show license udi
		• show license usage



Smart Licensing Using Policy

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- Overview, on page 54
- About Smart Licensing using Policy, on page 55
- Enforced Licensing (Port Licensing), on page 76
- Common Tasks for Configuring Smart Licensing Using Policy, on page 88
- Interactions with Other Features, on page 99
- Migrating to Smart Licensing Using Policy, on page 102
- Evaluation or Eval Expired to Smart Licensing Using Policy, on page 108
- Migration Scenarios for Enforced Port Licenses, on page 110
- Troubleshooting Smart Licensing Using Policy, on page 112
- Additional References for Smart Licensing Using Policy, on page 120
- Glossary, on page 121

Feature History for Smart Licensing Using Policy

This table provides release and related information for features that are explained in this module.

These features are available on all releases after the one they were introduced in, unless noted otherwise.

Release	Feature	Feature Information
Cisco MDS NX-OS Release 9.2(2)	Smart Licensing Using Policy (SLP)	This feature was introduced.

Use Cisco Feature Navigator to find information about platform and software image support. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn.

Overview

Introduction to Smart Licensing Using Policy

Note

te If you are purchasing licenses via third-party vendors or partners, check with your vendors or partners for instructions on implementing SLP.

Smart Licensing using Policy (SLP) is an enhanced version of Smart Licensing, the objective of which is to provide a cloud-based licensing solution that does not interrupt the operations of your network, rather enables a compliance relationship to account for the hardware and software licenses purchased and used.

SLP is supported starting with Cisco MDS NX-OS Release 9.2(2) and is the only licensing mechanism available.

The primary benefits of this enhanced licensing model are:

· Seamless day-0 operations

After a license is ordered, no preliminary steps, such as registration or generation of keys, are required unless an enforced license is used.

· Visibility and manageability of licenses

View and manage all your switch licenses at one place.

· Flexible, time series reporting of licenses to remain compliant

Easy reporting options are available, whether you are directly or indirectly connected to Cisco Smart Software Manager (CSSM) or are using an air-gapped approach.

This document provides conceptual, configuration, and troubleshooting information for SLP on Cisco MDS switches. For a more detailed overview on Cisco Licensing, go to cisco.com/go/licensingguide.

The conceptual information includes an overview of SLP, supported products, supported topologies, and explains how SLP interacts with other features. SLP is a software license management solution that provides a seamless experience for customers:

• Purchase: Purchase licenses through the existing channels and use the Cisco Smart Software Manager (CSSM) portal to view switches and licenses.

To simplify the implementation of SLP, we recommend that you provide your Smart Account and Virtual Account information when placing an order for new hardware or software. This allows Cisco to install applicable licenses on switches (terms explained in the Concepts, on page 55 section) and deposit entitlements to SA/VA at the time of manufacturing. Also, purchase information will be populated under the **show license authorizations** command.

License Types: Licenses on Cisco MDS switches are of two categories — enforced and unenforced.

Enforced licensing prevents a feature from being used without first obtaining a license.

Unenforced licensing does not need to complete any licensing-specific operations before using the feature. License usage is recorded on your switch with timestamps and the required workflows to report usage to Cisco can be completed later.

 Report: License usage should be reported to CSSM. Multiple options are available for license usage reporting. You can use the Cisco Smart Licensing Utility (CSLU) or SSM On-Prem, or report usage information directly to CSSM. For air-gapped networks, a provision for offline reporting where usage information can be downloaded from switches and uploaded to CSSM is also available. The usage report is in plain text XML format.

Guidelines and Limitations

The SLP feature has the following guidelines and limitations:

- CSLU-initiated pull mode is not supported in Cisco MDS NX-OS Release 9.2(2).
- When upgrading to Cisco MDS NX-OS Release 9.2(2) for SL registered switches, the transport mode may go to CSLU instead of Call Home. We recommend configuring the transport mode to Call Home manually and establish the trust with CSSM.
- During upgrade from earlier release with traditional licensing (PAK) to Cisco MDS NX-OS Release 9.2(2), reflection of RUM sync in the **show** command may take up to 24 hours after migration.
- While using the transport mode as CSLU, if licenses do not get released from the SA/VA after write-erase and reload of a switch, it is recommended to delete the switch from SA/VA.
- For SL registered switches with CSSM, when upgrading from pre-SLP releases to Cisco NX-OS MDS Release 9.2(2), duplicate entry may occur for the same switch on CSSM or SSM On-Prem. The duplicate entry will be deleted automatically within a day from CSSM, but needs to be deleted manually by users from SSM On-Prem.
- Ports enabled in SL mode in pre-SLP releases will not be enabled if boot variables are used for migration instead of ISSU.
- Syslogs will be printed on a weekly basis for port licenses that are not authorized. This scenario is specific to SL based migration.
- For CSLU, single SA/VA is supported, but multitenant is not supported.
- For autodiscovery (when only one IP is configured in CSLU local), only one CSLU can be used in the network.
- SLP MIB is not supported.
- Only CSLU mode of transport is supported with SSM On-Prem.
- Authorization code cannot be returned to the SA/VA pool for enforced port licenses.

About Smart Licensing using Policy

Concepts

This section explains the key concepts of SLP.

License Enforcement Types

Cisco MDS 9000 Series switches support enforced and unenforced license types. Port licenses are enforced license and all other licenses are unenforced and do not require authorization before being used in air-gapped networks or in connected air-gapped deployment approach. The terms of use for such licenses are as per the end user license agreement (EULA).

License Duration

This refers to the duration or term for which a purchased license is valid. A given license may be enforced or unenforced and be valid for the following durations:

• Perpetual: There is no expiration date for such a license.

Port and Enterprise licenses are examples of perpetual licenses that are available on Cisco MDS switches.

• Subscription: The license is valid only until a certain date.

SAN Analytics is an example of subscription license and it is an unenforced license.

Policy

A policy provides the switch with these reporting instructions:

- License usage report acknowledgment requirement (Reporting ACK required): The license usage report is known as a RUM Report and the acknowledgment is referred to as an ACK (See RUM Report and Report Acknowledgment). This is a yes or no value that specifies if the report for this switch requires CSSM acknowledgment. The default value is set to Yes.
- First report requirement (days): The first report must be sent within the timeframe that is specified here. Cisco default value is 0 days.
- Reporting frequency (days): The subsequent report must be sent within the timeframe that is specified here. Cisco default value is 0 days.
- Report on change (days): If there is a change in license usage, a report must be sent within the timeframe that is specified here. Cisco default value is 0 days.

Understanding the Policy Selection

CSSM determines the policy that is applied to a switch. Only one policy is in use at a given point in time. The policy and its values are based on several factors, including the licenses being used.

cISCO default is the default policy that is always available in the switch. If no other policy is applied, the switch applies this default policy. Table 11: Cisco Default Policy, on page 58 shows the CISCO default policy values.

While a new policy cannot be configured, user can request for a customized one by contacting the Cisco Global Licensing Operations team. Go to Support Case Manager. Click **OPEN NEW CASE** > Select **Software Licensing**. The licensing team will contact you to start the process or for any additional information. Customized policies will be made available through your Smart account in CSSM.

Note To know which policy is applied (the policy in-use) and its reporting requirements, enter the **show license status** command in EXEC mode.

```
switch# show license status
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: CSLU
   Cslu address: cslu-local
Policy:
    Policy in use: Merged from multiple sources
   Reporting ACK required: Yes
   Unenforced/Non-Export:
        First report requirement (days): 90 (CISCO default)
        Ongoing reporting frequency (days): 365 (CISCO default)
       On change reporting (days): 90 (CISCO default)
    Enforced (Pepertual/Subscription):
        First report requirement (days): 0 (CISCO default)
        Ongoing reporting frequency (days): 0 (CISCO default)
        On change reporting (days): 0 (CISCO default)
   Export (Perpetual/Subscription):
        First report requirement (days): 0 (CISCO default)
        Ongoing reporting frequency (days): 0 (CISCO default)
        On change reporting (days): 0 (CISCO default)
Miscellaneous:
   Custom Id: <empty>
Usage reporting:
   Last ACK received: <none>
   Next ACK deadline: Jan 12 08:39:14 2022 UTC
   Reporting push interval: 30 days
   Next ACK push check: <none>
   Next report push: Oct 14 10:20:48 2021 UTC
   Last report push: <none>
    Last report file write: <none>
```

Trust Code installed: <none>

Table	11:	Cisco	Default	Policy
-------	-----	-------	---------	--------

Policy: CISCO default	Default Policy Values
Unenforced	Reporting ACK required: Yes
	Unenforced/Non-Export:
	First report requirement (days): 90 (CISCO default)
	Ongoing reporting frequency (days): 365 (CISCO default)
	On change reporting (days): 90 (CISCO default)
Enforced	Reporting ACK required: Yes
	Enforced (Pepertual/Subscription):
	First report requirement (days): 0 (CISCO default)
	Ongoing reporting frequency (days): 0 (CISCO default)
	On change reporting (days): 0 (CISCO default)

RUM Report and Report Acknowledgment

A Resource Utilization Measurement report (RUM report) is a license usage report, which the switch generates automatically at a periodic interval or can be generated manually before the interval expiry, to fulfill reporting requirements as specified by the policy.

An acknowledgment (ACK) is a response from CSSM and provides information about the status of a RUM report.

The policy that is applied to a switch determines the following reporting requirements:

- Whether a RUM report should be sent to CSSM and the maximum number of days provided to meet this requirement.
- Whether the RUM report requires an acknowledgment from CSSM or not.
- The maximum number of days provided to report a change in license consumption.

A RUM report may be accompanied by other requests, such as a trust code request. In addition to the RUM report ID for the received report, an acknowledgment from CSSM may include trust codes and policy files as well.

Trust Code

Trust code is a UDI-tied public key with which the switch signs a RUM report. This prevents tampering and ensures data authenticity.

Architecture

This section explains the various components that can be part of your implementation of SLP.

Product Instance or Switch

A product instance or switch is a single instance of a Cisco product, identified by a Unique Device Identifier (UDI).

A switch records and reports license usage (Resource Utilization Measurement reports) and provides alerts and system messages about issues such as overdue reports and communication failures toward CSSM. Resource Utilization Measurement (RUM) reports and usage data are securely stored on the switch.

Throughout this document, the term *product instance* refers to all supported swtiches, unless noted otherwise.

CSSM

Cisco Smart Software Manager (CSSM) is a web portal that enables to manage all your Cisco software licenses from a centralized location. CSSM helps manage current requirements and review usage trends to plan for future license requirements.

Access the CSSM Web UI at https://software.cisco.com/software/smart-licensing/alerts.

CSSM supports the following features:

- · Create, manage, or view virtual accounts.
- Create and manage switch registration tokens.
- Transfer licenses between virtual accounts or view licenses.
- · Transfer, remove, or view switches.
- Run reports against your virtual accounts.
- Modify your email notification settings.
- View overall account information.

CSLU

Cisco Smart License Utility (CSLU) is a reporting utility that is to be deployed on premises that provides aggregate licensing workflows. This utility performs the following key functions:

- Provides options relating to how workflows are triggered. The workflows can be triggered by CSLU (**Product Instance Initiated Only**) or by the switch.
- Collects usage reports from the switch and uploads these usage reports to the corresponding Smart Account or Virtual Account, online or offline, using files. Similarly, the RUM report ackowledge is collected online or offline and sent back to the switch.
- Sends authorization code requests to CSSM and receives authorization codes from CSSM, if applicable.

CSLU can be part of your implementation in the following ways:

- Install the Windows or Linux application to use CSLU as a standalone tool that is connected to CSSM.
- Install the Windows or Linux application to use CSLU as a standalone tool that is disconnected from CSSM. With this option, the required usage information is downloaded to a file and then uploaded to CSSM. This is suited for an air-gapped deployment approach.

For more information, see New Deployment Method for Smart Licensing.

SSM On-Prem

Smart Software Manager On-Prem (SSM On-Prem) is an asset manager, which works in conjunction with CSSM. It enables administering products and licenses on your premises instead of having to directly connect to CSSM. It incorporates functionalities from CSLU.

Information about the required software versions to implement SLP with SSM On-Prem, is provided below:

Minimum Required SSM On-Prem Version for SLP	Minimum Required Cisco MDS NX-OS Version
Version 8, Release 202108	Cisco MDS NX-OS Release 9.2(2)

For more information about SSM On-Prem, see Smart Software Manager On-Prem on the Software Download page. Hover over the *.iso* image to display the documentation links to the following guides:

- Installation Guide: SSM On-Prem Installation Guide
- Release Notes: Cisco Smart Software Manager On-Prem Release Notes
- User Guide: Smart Software Manager On-Prem User Guide
- Console Guide: Smart Software Manager On-Prem Console Reference Guide
- · Quick Start Guide: Smart Software Manager On-Prem Quick Start Installation Guide

Supported Topologies

This section describes the various ways in which SLP can be implemented. For each topology, refer to the accompanying overview to know how the setup is designed to work and refer to the considerations and recommendations, if any.

After Topology Selection

After a topology is selected, you can configure the SLP as per the listed procedure. These workflows are only for new deployments. They provide the simplest and fastest way to implement a topology.

For migrating from an existing licensing model, see Migrating to Smart Licensing Using Policy, on page 102.

To perform any additional configuration tasks, for instance, to configure a different license, use an add-on license, or to configure a narrower reporting interval, see the Common Tasks for Configuring Smart Licensing Using Policy, on page 88.

Choosing a Topology

Table 12: Choosing a Topology, on page 61 allows you to choose a topoplogy depending on your network deployment.

Topology	Recommendations
Topology 1: Connected to CSSM Through CSLU, on page 61	Use this topology when you do not want the switches to be directly connected to CSSM. This topology will support only one SA/VA combination. You cannot view license consumption locally.
Topology 2: Connected Directly to CSSM, on page 64	Use this topology when you have switches that are already registered to CSSM and need to continue in the same mode. If you need to continue using this topology after upgrading to SLP, then Smart Transport is the preferred transport method.
Topology 3: Connected to CSSM Through SSM On-Prem, on page 67	Use this topology when you need to manage or view license consumption locally. You can also use multiple VA.
Topology 4: CSLU Disconnected from CSSM, on page 70	Use this topology when you want to collect licensing information from a single source and when there is no connectivity to CSSM. You cannot view license consumption locally. Also, only a single VA can be used.
Topology 5: No Connectivity to CSSM and No CSLU, on page 73	Use this topology when you want to collect licensing information from each switch in the network and when there is no connectivity to CSSM.
Topology 6: SSM On-Prem Disconnected from CSSM, on page 74	Use this topology when you want to manage or view licenses from a single source. You can view license consumption locally. You can also use multiple VA combinations.

Table 12: Choosing a Topology

Topology 1: Connected to CSSM Through CSLU

Here, switches in the network are connected to CSLU, and CSLU becomes the single point of interface with CSSM. A switch can be configured to push the required information to CSLU.

Switch-initiated communication (push): A switch initiates communication with CSLU by connecting to a REST endpoint in CSLU. Data that is sent is unsecure and includes RUM reports.

Configure the switch to automatically send RUM reports to CSLU at required intervals. CSLU is the default method for a switch.

Figure 2: Topology: Connected to CSSM Through CSLU



SLP Configuration - Connected to CSSM Through CSLU Topology

Procedure

Step 1	CSLU Installation			
	Wł env	here task is performed: ISO image that you would download and deploy it as a VM as per your orchestration vironment.		
	Do	Download the file from Smart Software Manager > Smart Licensing Utility.		
	Re	fer to the Cisco Smart License Utility Quick Start Setup Guide for help with installation and setup.		
Step 2	CS	LU Preference Settings		
	Where tasks are performed: CSLU Interface			
	a.	Logging into Cisco		
	b.	Configuring a Smart Account and a Virtual Account		
	c.	Adding a Product Instances in CSLU		
Step 3	Switch Configuration			
	Where tasks are performed: MDS Switch			
	a.	Ensuring Network Reachability for Product Instance Initiated Communication.		
	b.	Ensure that transport type is set to cslu.		
		CSLU is the default transport type. If a different option is configured, enter the license smart transport cslu command in global configuration mode. Save any changes to the configuration file.		

switch(config)# license smart transport cslu
switch(config)# exit
switch# copy running-config startup-config

- c. No action is required beyond basic configuration. Name server does not need to be configured in the network. Enter the ip host cslu-localcslu_ip command in global configuration mode. For cslu_ip enter the IP address of Windows or Linux host where CSLU is installed.
- **d.** Specify how CSLU is to be discovered (choose one):
 - Option1:

No action required beyond basic configuration. Name server configured for zero-touch DNS discovery of cslu-local.

The assumption here is that the name server (DNS) IP address is configured on the switch and the DNS server has an entry where hostname cslu-local is mapped to the CSLU IP address, then no further action is required. The switch automatically discovers hostname cslu-local.

• Option2:

No action required beyond basic configuration. Name server and domain configured for zero-touch DNS discovery of cslu-local.<domain>.

The assumption here is that the name server (DNS) IP address is configured on the switch and the DNS server has an entry where cslu-local.<domain> is mapped to the CSLU IP address, then no further action is required. The switch automatically discovers hostname cslu-local.

• Option3:

Configure a specific URL for CSLU.

Enter the **license smart url cslu** *http://<cslu_ip_or_host>:8182/cslu/v1/pi* command in global configuration mode. For <cslu_ip_or_host>, enter the hostname or the IP address of the Windows or Linux host where CSLU is installed. 8182 is the TCP port number and it is the only port number that CSLU uses.

```
switch(config)# license smart url cslu http://192.168.0.1:8182/cslu/v1/pi
switch(config)# exit
switch# copy running-config startup-config
```

As the switch initiates communication, it automatically sends out the first RUM report at the scheduled time as per the policy. To know when the switch will be sending this information, enter the **show license status** command in privileged EXEC mode and check the date in the Next report push: field in the output.

```
switch# show license status
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: CSLU
   Cslu address: cslu-local
Policv:
   Policy in use: Merged from multiple sources
    Reporting ACK required: Yes
    Unenforced/Non-Export:
        First report requirement (days): 90 (CISCO default)
        Ongoing reporting frequency (days): 365 (CISCO default)
        On change reporting (days): 90 (CISCO default)
    Enforced (Pepertual/Subscription):
        First report requirement (days): 0 (CISCO default)
        Ongoing reporting frequency (days): 0 (CISCO default)
        On change reporting (days): 0 (CISCO default)
    Export (Perpetual/Subscription):
        First report requirement (days): 0 (CISCO default)
        Ongoing reporting frequency (days): 0 (CISCO default)
        On change reporting (days): 0 (CISCO default)
Miscellaneous:
   Custom Id: <empty>
Usage reporting:
   Last ACK received: <none>
    Next ACK deadline: Jan 12 08:39:14 2022 UTC
   Reporting push interval: 30 days
   Next ACK push check: <none>
   Next report push: Oct 14 10:20:48 2021 UTC
   Last report push: <none>
   Last report file write: <none>
Trust Code installed: <none>
```

CSLU forwards the information to CSSM and returns the acknowledgment from CSSM to the switch.

Topology 2: Connected Directly to CSSM

This method was available in the earlier version of Smart Licensing and remains supported with SLP.

Here, establish a direct and trusted connection from a switch to CSSM. The direct connection requires network reachability to CSSM. For the switch to then exchange messages and communicate with CSSM, configure one of the transport options available with this topology. Lastly, the establishment of trust requires the generation of a token from the corresponding Smart Account and Virtual Account in CSSM and installation on the switch.

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

• Use smart transport to communicate with CSSM (recommended)

Smart transport is a transport method where a Smart Licensing (JSON) message is contained within an HTTPs message and exchanged between a switch and CSSM to communicate.

The following smart transport configuration options are available:

- Smart transport: In this method, a switch 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 switch uses a proxy server to communicate with the licensing server and CSSM.

• Use Call Home to communicate with CSSM.

Call Home provides email-based and web-based notification of critical system events. This method of connecting to CSSM was available in the earlier Smart Licensing environment and remains available with SLP.

The following Call Home configuration options are available:

- Direct cloud access: In this method, a switch sends usage information directly over the Internet to CSSM; no additional components are needed for the connection.
- Cloud access through an HTTPs proxy: In this method, a switch 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.

Figure 3: Topology: Connected Directly to CSSM



SLP Configuration - Connected Directly to CSSM Topology

Procedure

Step 1 Switch Configuration

Where tasks are performed: MDS Switch

- a. Set up switch connection to CSSM: Setting Up a Connection to CSSM.
- **b.** Configure a connection method and transport type (choose one):
 - Option1:

Smart transport: Set the transport type to **smart** using the **license smart transport smart** command. Save any changes to the configuration file.

```
switch(config)# license smart transport smart
switch(config)# license smart url smart
https://smartreceiver.cisco.com/licservice/license
switch(config)# copy running-config startup-config
```

• Option2:

Configure smart transport through an HTTPs proxy. See Configuring Smart Transport Through an HTTPs Proxy.

• Option3:

Configure Call Home service for direct cloud access. See Configuring the Call Home Service for Direct Cloud Access.

Step 2 Establishment of Trust with CSSM

Where task is performed: CSSM Web UI and then switch

- **a.** Generate one token for each *Virtual Account*. Use the same token for all the switches that are part of one Virtual Account: Generating a New Token for a Trust Code from CSSM.
- **b.** Having downloaded the token, install the trust code on the switch: Installing a Trust Code.

After establishing trust, CSSM returns a policy. The policy is automatically installed on all switches of that Virtual Account. The policy specifies if and how often the switch reports usage.

To change the reporting interval to report more frequently: on the switch, configure the **license smart usage interval** command.

```
switch# show license status
Utility:
   Status: DISABLED
Smart Licensing using Policy:
   Status: ENABLED
Data Privacy:
   Sending Hostname: ves
    Callhome Hostname Privacy: DISABLED
        Smart Licensing Hostname Privacy: DISABLED
   Version Privacy: DISABLED
Transport:
   Type: Smart >>>>>Mode
   URL: https://smartreceiver.cisco.com/licservice/license
   Proxy:
       Not configured
Policy:
    Policy in use: Merged from multiple sources
   Reporting ACK required: Yes
   Unenforced/Non-Export:
        First report requirement (days): 90 (CISCO default)
        Ongoing reporting frequency (days): 365 (CISCO default)
       On change reporting (days): 90 (CISCO default)
    Enforced (Perpetual/Subscription):
```

```
First report requirement (days): 0 (CISCO default)
        Ongoing reporting frequency (days): 0 (CISCO default)
        On change reporting (days): 0 (CISCO default)
    Export (Perpetual/Subscription):
        First report requirement (days): 0 (CISCO default)
        Ongoing reporting frequency (days): 0 (CISCO default)
        On change reporting (days): 0 (CISCO default)
Miscellaneous:
    Custom Id: <emptv>
Usage reporting:
   Last ACK received: <none>
   Next ACK deadline: Sep 8 09:16:32 2023 EST
   Reporting push interval: 30 days
   Next ACK push check: Jun 14 11:55:56 2023 EST
   Next report push: Jul 14 11:50:59 2023 EST
    Last report push: Jun 14 11:50:59 2023 EST
   Last report file write: <none>
Trust Code installed : Jun 14 11:49:17 2023 EST >>>>Trust code for PID
    Active: PID: DS-C9706, SN: FXS2250Q299
        Jun 14 11:49:17 2023 EST
    Standby: PID: DS-C9706, SN: FXS2250Q299
        Jun 14 11:49:17 2023 EST
```

Topology 3: Connected to CSSM Through SSM On-Prem



Note When the SSM On-Prem server is associated with virtual account in CSSM, it will be required that all product instance registration tokens to be generated from their Smart Software On-Prem management interface.

Here, switches in the network are connected to SSM On-Prem and SSM On-Prem becomes the single point of interface with CSSM. You can also configure the switch to *push* the required information to SSM On-Prem.

Switch-initiated communication (push): A switch initiates communication with CSSM by connecting to a REST endpoint in SSM On-Prem. Data that is sent includes RUM reports. Configure the switch to automatically send RUM reports to SSM On-Prem at required intervals.

Figure 4: Topology: Connected to SSM On-Prem Through CSSM



SLP Configuration - Connected to CSSM Through SSM On-Prem Topology

Note If the switch is registered On-Prem with pre-SLP release, the transport mode will change to CSLU after the migration. Also, the CSLU URL will be populated on the switch from **OnPrem CSLU tenant ID**. Ensure that the configuration is saved using the **copy running-config startup-config** command.

Procedure

Step 1 SSM On-Prem Installa	tion
-----------------------------	------

Where task is performed: ISO image that you would download and deploy it as a VM as per your orchestration environment.

Download the file from Smart Software Manager > Smart Licensing Utility.

Refer to the Cisco Smart License Utility Quick Start Setup Guide for help with installation and setup.

Step 2 SSM On-Prem Preference Settings

Where tasks are performed: SSM On-Prem

- a. Logging into Cisco (SSM On-Prem Interface), on page 88
- b. Configuring a Smart Account and a Virtual Account, on page 89
- c. Adding a Product Instances in CSLU, on page 89

Step 3 Switch Configuration

Where tasks are performed: MDS Switch

a. Ensure that transport type is set to **cslu**.

CSLU is the default transport type. If a different option is configured, enter the **license smart transport cslu** command in global configuration mode. Save any changes to the configuration file.

```
switch(config)# license smart transport cslu
switch(config)# exit
switch# copy running-config startup-config
```

b. Specify how SSM On-Prem is to be discovered (choose one):

Configure a specific URL for SSM On-Prem. If SSM On-Prem was previously configured, then the URL is automatically configured. Otherwise, copy the URL from SSM On-Prem and configure the URL.

Enter the **license smart url cslu** *http://<ssm_on_prem_ip_or_host>/cslu/v1/pi/<Tenant_ID>*, command in global configuration mode. This command can be obtained by the following:

- Log into SSM On-prem web interface.
- Select the correct Account Name.
- Go to Smart Licensing >> Inventory
- Under the General tab, click on "CSLU Transport URL" and copy the URL

For <ssm_on_prem_ip_or_host>, enter the hostname or the IP address of the Windows or Linux host where SSM On-Prem is installed.

```
switch(config)# license smart url cslu http://192.168.0.1/cslu/v1/pi/<Virtual Account>
switch(config)# exit
switch# copy running-config startup-config
```

Since the switch initiates communication, it automatically sends out the first RUM report at the scheduled time, as per the policy. To know when the switch will be sending this information, enter the **show license all** command in privileged EXEC mode and check the date in the Next report push: field in the output.

SSM On-Prem forwards the information to CSSM and returns acknowledgment from CSSM to the switch .

```
switch# show license status
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: CSLU
   Cslu address: https://Cisco_SSM_OnPrem/cslu/v1/pi/SSM-On-Prem-92-1
Policy:
        Policy in use: Merged from multiple sources
```

```
Reporting ACK required: Yes
    Unenforced/Non-Export:
        First report requirement (days): 90 (CISCO default)
        Ongoing reporting frequency (days): 365 (CISCO default)
        On change reporting (days): 90 (CISCO default)
    Enforced (Pepertual/Subscription):
        First report requirement (days): 0 (CISCO default)
        Ongoing reporting frequency (days): 0 (CISCO default)
        On change reporting (days): 0 (CISCO default)
    Export (Perpetual/Subscription):
        First report requirement (days): 0 (CISCO default)
        Ongoing reporting frequency (days): 0 (CISCO default)
        On change reporting (days): 0 (CISCO default)
Miscellaneous:
   Custom Id: <empty>
Usage reporting:
   Last ACK received: <none>
   Next ACK deadline: Jul 5 13:17:21 2022 UTC
   Reporting push interval: 30 days
   Next ACK push check: <none>
   Next report push: May 6 13:24:44 2022 UTC
   Last report push: Apr 6 13:24:44 2022 UTC
   Last report file write: <none>
Trust Code installed: <none>
```

Topology 4: CSLU Disconnected from CSSM

The CSLU utility is installed on-premises and the switches communicate with it. The other side of the communication, between CSLU and CSSM, is offline. In fact, CSLU provides the option of working in a mode that is disconnected from CSSM.

Communication between CSLU and CSSM is sent and received in the form of signed files (xml) that are saved offline and then uploaded to or downloaded from CSLU or CSSM.



Figure 5: Topology: CSLU Disconnected from CSSM
SLP Configuration - CSLU Disconnected from CSSM Topology

Procedure

Step 1	CS	LU Installation
	Wł env	here task is performed: ISO image that you would download and deploy it as a VM as per your orchestration vironment.
	Do	wnload the file from Smart Software Manager > Smart Licensing Utility.
	Re	fer to the Cisco Smart License Utility Quick Start Setup Guide for help with installation and setup.
Step 2	CS	LU Preference Settings
	Wł	nere tasks are performed: CSLU Interface
	a.	In the CSLU Preferences tab, click the Cisco Connectivity toggle switch to off . The field switches to <i>Cisco Is Not Available</i> .
	b.	Configuring a Smart Account and a Virtual Account, on page 89
	c.	Adding a Product Instances in CSLU, on page 89
Step 3	Sw	itch Configuration
	Wł	nere tasks are performed: MDS Switch
	a.	Ensuring Network Reachability for Product Instance Initiated Communication, on page 91.
	b.	Ensure that transport type is set to cslu .
		CSLU is the default transport type. If a different option is configured, enter the license smart transport cslu command in global configuration mode. Save any changes to the configuration file.
		<pre>switch(config)# license smart transport cslu switch(config)# exit switch# copy running-config startup-config</pre>
	c.	Specify how CSLU is to be discovered (choose one):
		Configure a specific URL for CSLU.
		Enter the license smart url cslu <i>http://<cslu_ip_or_host>:8182/cslu/v1/pi</cslu_ip_or_host></i> command in global configuration mode. For <cslu_ip_or_host>, enter the hostname or the IP address of the Windows or Linux host where CSLU is installed. 8182 is the port number and it is the only port number that CSLU uses.</cslu_ip_or_host>
		<pre>switch(config)# license smart url cslu http://192.168.0.1:8182/cslu/v1/pi switch(config)# exit switch# copy running-config startup-config</pre>
Step 4	Do	wnload and upload PIs from a file. You can also choose a single or multiple PIs.
	Wł	nere tasks are performed: CSLU and CSSM
	a.	Export CSV (CSLU Interface), on page 90
	b.	Uploading Usage Data to CSSM and Downloading an ACK, on page 96

c. Import CSV (CSLU Interface), on page 90

As the switch initiates communication, it automatically sends out the first RUM report at the scheduled time, as per the policy. To know when the switch will be sending this information, enter the **show license status** command in EXEC mode and check the date in the Next report push: field in the output.

```
switch# show license status
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: CSLU
   Cslu address: cslu-local
Policy:
    Policy in use: Merged from multiple sources
    Reporting ACK required: Yes
   Unenforced/Non-Export:
        First report requirement (days): 90 (CISCO default)
        Ongoing reporting frequency (days): 365 (CISCO default)
        On change reporting (days): 90 (CISCO default)
    Enforced (Pepertual/Subscription):
        First report requirement (days): 0 (CISCO default)
        Ongoing reporting frequency (days): 0 (CISCO default)
        On change reporting (days): 0 (CISCO default)
    Export (Perpetual/Subscription):
        First report requirement (days): 0 (CISCO default)
        Ongoing reporting frequency (days): 0 (CISCO default)
        On change reporting (days): 0 (CISCO default)
Miscellaneous:
   Custom Id: <empty>
Usage reporting:
   Last ACK received: <none>
    Next ACK deadline: Jan 12 08:39:14 2022 UTC
   Reporting push interval: 30 days
   Next ACK push check: <none>
   Next report push: Oct 14 10:20:48 2021 UTC
   Last report push: <none>
   Last report file write: <none>
```

Trust Code installed: <none>

As the CSLU is disconnected from CSSM, save usage data which CSLU has collected from the switch to a file. Then, from a workstation that is connected to Cisco, upload it to CSSM. After this, download the acknowledgment from CSSM. In the workstation where CSLU is installed and connected to the switch, upload the file to CSLU which will then push the acknowledgment to all the switches.

Topology 5: No Connectivity to CSSM and No CSLU

Here we have a switch and CSSM disconnected from each other without any other intermediary CSLU or components. All communication is in the form of uploaded and downloaded files.

```
Figure 6: Topology: No Connectivity to CSSM and No CSLU
```



SLP Configuration - No Connectivity to CSSM and No CSLU Topology

Procedure

Switch Configuration

Where task is performed: MDS Switch. Set transport type to off.

Enter the **license smart transport off** command in global configuration mode. Save any changes to the configuration file.

```
switch(config)# license smart transport off
switch(config)# exit
switch# copy running-config startup-config
```

All communication to and from the switch is disabled. To report license usage, save RUM reports to a file (on your switch) and upload it to CSSM (from a workstation that has connectivity to the internet and Cisco):

1. Generate and save RUM reports

Enter the **license smart save usage** command in privileged EXEC mode if you have any features enabled. In the following example, all RUM reports are saved to the flash memory of the switch, in the all_rum.txt file. In the example, the file is first saved to the bootflash and then copied to a TFTP location:

```
switch# license smart save usage all bootflash:all_rum.txt
switch# copy bootflash:all_rum.txt tftp://10.8.0.6/all_rum.txt
```

- 2. Upload usage data to CSSM: Uploading Usage Data to CSSM and Downloading an ACK, on page 96.
- 3. Install the acknowledgment on the switch: Installing a File on the Switch, on page 96.

Topology 6: SSM On-Prem Disconnected from CSSM

Here, a switch communicates with SSM On-Prem and the switch-initiated communication must be implemented. The other side of the communication, between SSM On-Prem and CSSM, is offline. SSM On-Prem provides the option of working in a mode that is disconnected from CSSM.

Communication between SSM On-Prem and CSSM is sent and received in the form of signed files (xml) that are saved offline and then uploaded to or downloaded from SSM On-Prem or CSSM.

Figure 7: Topology: SSM On-Prem Disconnected from CSSM



SLP Configuration - SSM On-Prem Disconnected from CSSM Topology

Ø

Note If the switch is registered On-Prem with pre-SLP release, the transport mode will change to CSLU after migration. Ensure to save the configuration using the **copy running-config startup-config** command.

```
Procedure
```

Step 1 SSM On-Prem Installation

Where task is performed: ISO image that you would download and deploy it as a VM as per your orchestration environment.

Download the file from Smart Software Manager > Smart Software Manager On-Prem. Refer to the Smart Software Manager On-Prem Installation Guide for help with installation and setup.

Step 2 Switch Configuration

Where tasks are performed: MDS Switch

- a. Ensuring Network Reachability for Product Instance Initiated Communication, on page 91.
- **b.** Ensure that transport type is set to **cslu**.

CSLU is the default transport type. If a different option is configured, enter the **license smart transport cslu** command in global configuration mode. Save any changes to the configuration file.

```
switch(config)# license smart transport cslu
switch(config)# exit
switch# copy running-config startup-config
```

c. Configure the SSM On-Prem URL. Login to the SSM On-Prem. Click Inventory > General. Then, click CSLU Transport URL to copy the URL.

Enter the **license smart url cslu** *http://<ssm_on_prem_ip_or_host>/cslu/v1/pi/<Tenant_ID>* command in global configuration mode. This command can be obtained by the following:

- Log into SSM On-prem web interface.
- Select the correct Account Name.
- Go to Smart Licensing >> Inventory
- Under the General tab, click on "CSLU Transport URL" and copy the URL

For <ssm_on_prem_ip_or_host>, enter the hostname or the IP address of the Windows or Linux host where SSM On-Prem is installed.

```
switch(config)# license smart url cslu http://192.168.0.1:8182/cslu/v1/pi
switch(config)# exit
switch# copy running-config startup-config
```

Step 3Download and upload PIs from a file. Login to the SSM On-Prem. Click Inventory > Product Instances >
Export Usage to Cisco or Import From Cisco.

Where tasks are performed: CSLU and CSSM

- a. Export CSV (CSLU Interface), on page 90
- **b.** Uploading Usage Data to CSSM and Downloading an ACK, on page 96

Since the switch initiates communication, it automatically sends out the first RUM report at the scheduled time, as per the policy. To know when the switch will be sending this information, enter the **show license all** command in privileged EXEC mode check the date in the Next report push: field in the output.

Since SSM On-Prem is disconnected from CSSM, save usage data which SSM On-Prem has collected from the switch to a file. Then, from a workstation that is connected to Cisco, upload it to CSSM. After this,

download the acknowledgment from CSSM. In the workstation where SSM On-Prem is installed and connected to the switch, upload the file to SSM On-Prem.

Enforced Licensing (Port Licensing)

Enforced licensing prevents a feature from being used without first obtaining a license. Ports on Cisco MDS 9000 Series switches use enforced licensing and will require authorization before using them in SLP. Use the instructions in this section to migrate existing licenses to SLP. For more information about enforced licenses, see the "Licensing Cisco MDS 9000 Series NX-OS Software Features" chapter in Cisco MDS 9000 Series Licensing Guide, Release 9.x.

Port Licensing Verification

Port licensing is available for the ports used in Cisco MDS 9000 switches. The following table describes the default port licenses for the ports.

Platform	Default Port license
9396V	48
9124V	8
9148V	24
9148S	12
9250i	20
9220i	FC Port 4, IPS Port 2
9396S	48
9132T	8
9148T	24
9396T	48

Table 13: Default Port License

Port licensing is verified using the following commands:

- · show license default
- show license usage
- show port-license
- show license version
- · show license brief

Command	Output		
switch# show license default	Feature License Count PORT_ACTIV_9396T_PKG	Default 48	
switch# show license usage	License Authorization: Status: Not Applicable (PORT_ACTIV_9396T_PKG): Description: MDS 9396T 32G 16 port-activation Count: 48 Version: 1.0 Status: IN USE Enforcement Type: ENFORCED License Type: Enforced		

Command	Output
switch# show port-license	

Command	Output		
	Available po	ort activat	ion licenses are O
	Interface License	Cookie	Port Activation
	fc1/1	16777216	acquired
	fc1/2	16781312	acquired
	fc1/4	16789504	acquired
	fc1/5	16793600	acquired
	fc1/6	16797696	acquired
	fc1/7	16801792	acquired
	fc1/8	16805888	acquired
	fc1/9	16809984	acquired
	fc1/10	16814080	acquired
	fc1/11	16818176	acquired
	fc1/12	16822272	acquired
	fc1/13	16826368	acquired
	fc1/14	16830464	acquired
	fc1/15	16834560	acquired
	IC1/16	16838656	acquired
	IC1/1/ fa1/19	16842752	acquired
	fc1/10	16950040	acquired
	fc1/20	16855040	acquired
	fc1/21	16859136	acquired
	fc1/22	16863232	acquired
	fc1/23	16867328	acquired
	fc1/24	16871424	acquired
	fc1/25	16875520	acquired
	fc1/26	16879616	acquired
	fc1/27	16883712	acquired
	fc1/28	16887808	acquired
	fc1/29	16891904	acquired
	fc1/30	16896000	acquired
	fc1/31	16900096	acquired
	fc1/32	16904192	acquired
	fc1/33	16908288	acquired
	fc1/34	16912384	acquired
	101/35	16020576	acquired
	fc1/37	16920570	acquired
	fc1/38	16928768	acquired
	fc1/39	16932864	acquired
	fc1/40	16936960	acquired
	fc1/41	16941056	acquired
	fc1/42	16945152	acquired
	fc1/43	16949248	acquired
	fc1/44	16953344	acquired
	fc1/45	16957440	acquired
	fc1/46	16961536	acquired
	fc1/47	16965632	acquired
	fc1/48	16969728	acquired
	fc1/49	16973824	acquired
	fc1/50	16977920	acquired
	fc1/51	16982016	acquired
	tc1/52	16986112	acquired
	IC1/53	160990208	acquired
	101/54 fo1/55	16000400	acquired
	TCT/33	エロヲヲロ400	acquired

Command	Output		
	fc1/56	17002496	acquired
	fc1/57	17006592	acquired
	fc1/58	17010688	acquired
	fc1/59	17014784	acquired
	fc1/60	17018880	acquired
	fc1/61	17022976	acquired
	fc1/62	17027072	acquired
	fc1/63	17031168	acquired
	fc1/64	17035264	acquired
	fc1/65	17039360	acquired
	fc1/66	17043456	acquired
	fc1/67	17047552	acquired
	fc1/68	17051648	acquired
	fc1/69	17055744	acquired
	fc1/70	17059840	acquired
	fc1/71	17063936	acquired
	fc1/72	17068032	acquired
	fc1/73	17072128	acquired
	fc1/74	17076224	acquired
	fc1/75	17080320	acquired
	fc1/76	17084416	acquired
	fc1/77	17088512	acquired
	fc1/78	17092608	acquired
	fc1/79	17096704	acquired
	fc1/80	17100800	acquired
	fc1/81	17104896	acquired
	fc1/82	17108992	acquired
	fc1/83	17113088	acquired
	fc1/84	17117184	acquired
	fc1/85	17121280	acquired
	fc1/86	17125376	acquired
	fc1/87	17129472	acquired
	fc1/88	17133568	acquired
	fc1/89	17137664	acquired
	fc1/90	17141760	acquired
	fc1/91	17145856	acquired
	fc1/92	17149952	acquired
	fc1/93	17154048	acquired
	fc1/94	17158144	acquired
	fc1/95	17162240	acquired
	fc1/96	17166336	acquired
switch# show license version	Smart Agent	for Licensing:	5.5.19_rel/83

Command	Output
switch# show license brief	<pre>Status Legend: u - unenforced, e - enforced d - platform default, f - factory installed SLP license, p - converted from PAK, s - migrated from Smart Licensing, a - installed using SLP, h - honored (pending SLP authorization) General Legend: NA - not applicable</pre>
	License Port License Name Count Count Used Status
	DCNM SAN Adv. Features for MDS 9300 Switch based (FM-SERVER) 1 NA 0 pu DCNM for SAN Adv License for MDS9300 (DCNM-SAN) 1 NA 1 u MDS 9300 series Enterprise package 1 NA 1 pu MDS 9396T 32G 16 port activation NA 48 48 d MDS 9396T 32G 16 port activation 2 32 5 ae SAN Analytics 1 NA 1 pu

Generating Authorization Code in Online Mode- CSLU/Smart Transport/Callhome

Authorization code for your license is generated in online mode and installed on your switch for use. You will need to request for the authorization code from a switch for a specific port license of a specific port-block size depending on the type of switch. Then, CSSM will receive the authorization request, generate the authorization code, and install the returned code on the switch automatically. You can use the **show license authorizations** command to verify the installation of the requested licenses and view the authorization code under the *Last Confirmation code:* field in the output.

Use the **license smart authorization request** {**add** | **replace**} *port-feature* {**local** | **all**} *count port-range* command to enable ports or replace the existing authorization code.



Note

• Use the **add** option to install authorization code for the first time.

• Use the **replace** option to increase authorization code to enable new ports.

The count *port-range* value will depend on the type of deployment:

- Greenfield deployment: This value is the sum of installed authorization code and new ports that needs to be enabled.
- PAK license: This value is the sum of PAK license count and new ports that needs to be enabled.
- SL 1.0 license: This value is the sum of ports that are enabled without the authorization code and new ports that needs to be enabled.

Port count can only be in multiples of block size. Table 14: Port Count for Switches, on page 82 provide the block size for different MDS switches.

Table 14: Port Count for Switches

Switch	Block Size Count
Cisco MDS 9148V	8
Cisco MDS 9124V	8
Cisco MDS 9148S	12
Cisco MDS 9250i	20
Cisco MDS 9220i	12
Cisco MDS 9132T	8
Cisco MDS 9148T	8
Cisco MDS 9396S	12
Cisco MDS 9396T	16

Greenfield Deployment

Authorization code will be generated, and licenses will be factory-installed. Your switch will be shipped with the required licenses installed.

The following example displays how to request authorization code to activate 16 ports in greenfield deployment:

```
switch# configure t
Enter configuration commands, one per line. End with CNTL/Z.
switch (config) # license smart authorization request add PORT ACTIV 9148T PKG all count 9
Request is being sent for 16 ports(in multiples of 8)
Initiated authorization request with backend. run 'show license authorizations', for request
status
switch(config) # show license authorizations
Overall status:
  Active: PID:DS-C9148T-K9, SN:JPG220700PY
      Status: SMART AUTHORIZATION INSTALLED on Jan 11 2022 10:15:31 UTC
      Last Confirmation code: 9d60e04c
Authorizations:
 MDS 9148T 32G FC switch 8-port upgrade license (MDS 9148T 8P):
   Description: MDS 9148T 32G FC switch 8-port upgrade license
   Total available count: 16
   Enforcement type: ENFORCED
   Term information:
     Active: PID:DS-C9148T-K9, SN:JPG220700PY
        Authorization type: SMART AUTHORIZATION INSTALLED
        License type: PERPETUAL
         Term Count: 16
Purchased Licenses:
  No Purchase Information Available
```

Note In this example, the port count is 9 but the request is sent for 16 ports. This is because the port count can only be in multiples of the block size.

Brownfield Deployment

Migrating from PAK Licenses

Previously installed license will continue to be usable. The PAK licenses will be automatically converted to Smart Licensing entitlement tags and will be added to your SA/VA. To enable more ports than the PAK based license, authorization code needs to be installed.

The following example displays how to request authorization code to activate 12 ports after migrating from PAK license:

```
switch# show license authorizations
Overall status:
  Active: PID:DS-C9148T-K9, SN:XXX22020071
     Status: NOT INSTALLED
      Status:PAK
Legacy License Info:
  regid.2018-04.com.cisco.MDS 9148T 8P,1.0 c2a52df2-b5a0-49eb-896f-36a46c203d89:
    DisplayName: PORT ACTIV 9148T PKG
    Description: MDS 9148T 32G FC switch 8-port upgrade license
    Total available count: 8
   Term information:
      Active: PID:DS-C9148T-K9, SN:XXX22020071
        License type: PERPETUAL
          Term Count: 8
Purchased Licenses:
  No Purchase Information Available
switch# configure t
switch(config) # license smart authorization request replace PORT_ACTIV_9148T_PKG all count
16
Request is being sent for 16 ports (in multiples of 8)
Initiated authorization request with backend. run 'show license authorizations', for request
status
switch(config) # show license authorizations
Overall status:
  Active: PID:DS-C9148T-K9, SN:XXX22020071
      Status: SMART AUTHORIZATION INSTALLED on Jan 11 2022 13:40:18 UTC
      Last Confirmation code: 13ff57a7
      Status:PAK
Authorizations:
  MDS 9148T 32G FC switch 8-port upgrade license (MDS 9148T 8P):
    Description: MDS 9148T 32G FC switch 8-port upgrade license
    Total available count: 16
   Enforcement type: ENFORCED
   Term information:
      Active: PID:DS-C9148T-K9, SN:XXX22020071
        Authorization type: SMART AUTHORIZATION INSTALLED
        License type: PERPETUAL
```

```
Term Count: 16
Legacy License Info:
regid.2018-04.com.cisco.MDS_9148T_8P,1.0_c2a52df2-b5a0-49eb-896f-36a46c203d89:
DisplayName: PORT_ACTIV_9148T_PKG
Description: MDS 9148T 32G FC switch 8-port upgrade license
Total available count: 8
Term information:
Active: PID:DS-C9148T-K9,SN:XXX22020071
License type: PERPETUAL
Term Count: 8
Purchased Licenses:
No Purchase Information Available
```

Migration from SL 1.0 License

The ports that were enabled in prior to the migration will continue to work. The request for authorization code will be sent for the existing enabled ports after 10 minutes of migration. If the authorization code is not installed for the existing enabled ports, a weekly syslog will be generated to alert the same.

The following example displays how to request authorization code to activate 16 ports after migrating from SL 1.0 license:

```
Overall status:
 Active: PID:DS-C9148T-K9, SN:XXX22020071
      Status: SMART AUTHORIZATION INSTALLED on Jan 11 2022 15:13:27 UTC
      Last Confirmation code: 6b60deef
Authorizations:
 MDS 9148T 32G FC switch 8-port upgrade license (MDS 9148T 8P):
   Description: MDS 9148T 32G FC switch 8-port upgrade license
   Total available count: 8
   Enforcement type: ENFORCED
   Term information:
      Active: PID:DS-C9148T-K9, SN:XXX22020071
        Authorization type: SMART AUTHORIZATION INSTALLED
        License type: PERPETUAL
         Term Count: 8
Purchased Licenses:
 No Purchase Information Available
switch# configure t
switch (config) # license smart authorization request replace PORT_ACTIV_9148T_PKG all count
16
Request is being sent for 16 ports (in multiples of 8)
Initiated authorization request with backend. run 'show license authorizations', for request
status
switch(config) # show license authorizations
Overall status:
  Active: PID:DS-C9148T-K9, SN:XXX22020071
      Status: SMART AUTHORIZATION INSTALLED on Jan 11 2022 15:18:17 UTC
      Last Confirmation code: bd3f5056
Authorizations:
```

switch# show license authorizations

```
MDS 9148T 32G FC switch 8-port upgrade license (MDS_9148T_8P):
    Description: MDS 9148T 32G FC switch 8-port upgrade license
    Total available count: 16
    Enforcement type: ENFORCED
    Term information:
    Active: PID:DS-C9148T-K9,SN:XXX22020071
    Authorization type: SMART AUTHORIZATION INSTALLED
    License type: PERPETUAL
    Term Count: 16
Purchased Licenses:
    No Purchase Information Available
```

Generating Authorization Code in Online Mode with SSM On-Prem

You need to first add the switch to product instance (PI) inventory on SSM On-Prem, if not already added earlier.

switch# license smart sync all

Run this command on the switch after the license URL is correctly configured for your SSM On-Prem. Perform the following steps to generate authorization code in online mode with SSM On-Prem.

1. Generate authorization code on CSSM for the PI and required number of licenses Make sure that you always use the actual number of ports for which the license is needed. The port count can only be in multiples of block size. It will usually be the sum of existing authorized port count plus the new ports that needs to be enabled.

switch# license smart authorization request {add | replace} port-feature {local | all} count port-range

- 2. Login to CSSM \rightarrow Inventory \rightarrow select VA \rightarrow PI tab \rightarrow Authorize License-Enforced Features
- 3. Save the generated authorization code as a file.
- 4. Import the generated authorization code to SSM On-Prem.
- 5. Login to SSM On-Prem → Smart Licensing → Inventory → SL Using Policy → Export/Import All → Import from Cisco and import the file saved in step-3.
- 6. Check that you received the code correctly (status for PI displays "Authorization message received from CSSM")
- 7. Initiate authorization request from the switch. For example:

license smart authorization request add PORT_ACTIV_9396T_PKG all count 16

- 8. Verify that you have received the authorization using show license authorization command.
- **9.** Once the Authorization Code is installed, PI will send the authorization confirmation code (Last Confirmation code) to the SSM On-Prem to complete the reservation.

Generating Authorization Code in Offline Mode

Previously installed licenses will not be automatically converted. The license will be converted only after the first usage is reported manually to CSSM.

To generate authorization code in offline mode, perform these steps:

Procedure

Step 1 Log in to the CSSM Web UI at https://software.cisco.com/software/smart-licensing/alerts.

```
Step 2 Click Inventory > Product Instances > Authorize License-Enforced Features.
```



- **Step 3** In the Enter Request Code section, select the **Single Device** option from the drop-down option if it is not already selected.
- **Step 4** Enter the Serial Number and PID information of your switch and click **Next**. You will only need to provide the serial number and PID information and need not provide other information on this pane.

The Serial Number and PID information can be viewed using the **show license udi** command on your switch or PI.



Step 5 In the Selected Licenses section, enter the number of licenses (multiples of block size) under **Reserve** for the appropriate switch and click **Next**.

STEP 1 🗸 Enter Request Code	STEP 2 Select Licenses	STEP 3 Review and confirm	STEP Authoriz	4 ation Code	
MOS 91307 300 PC wellsh & Port Active	dor Loante				
MDS 91485 163 FC 12 port-a MDS 91485 163 FC 12 port-administer	ctivation	100	76	0	
MDS 9148T 32G FC 12 port-at MDS 9148T 320 PC 12 port-attuation	otivation	120	120	0	
MOS 9148T 32G FC switch 8-p ACC PTET 300 PC switch 8-pt - ptp	port upgrade license In cense	1536	1496	8	\geq
MDS 92201 FC 8 port-activation MDS 92201 PC 8 port-activation	n.	640	640	0	
MDS 92201 IPS 4 port-activatio MDI 92207 IPS 4 port-activation	m	320	320	0	
MDS 92501 16G FC 20 port-ad- MDI 9250 16G FC 20 port-advator	Ovation	100	100	0	
MDS 93965 16G FC 12 port-at MDI KING 16G FC 12 port-athlator	ctivation	268	227	0	
MDS 93967 32G 16 port-activa ACID IORE7 32G 16 port-activator	ation	3692	3660	0	
					Created Back

Step 6 Select a **Device Type** and click **Continue**.

Step 7 Click Generate Authorization Code.

Enter Request Code Select Litenses Review and confirm Authorization Code Product Instance Details D5-C91487-X3 Authorization Code UDI PID: D5-C91487-X3 Authorization Code UDI Sensi Number: JPO25300086 Authorization Code Device Type: M055000 Authorization Code Litenses to Reserve Total Quantity to Reserve	Enter Request Code Select Lisenses Review and confirm Authorization Code Product Instance Details DS-C91487.45 Frequest Code Frequest Code UDI RPID: DS-C91487.45 Frequest Code Frequest Code UDI Servit Number: IP02550008 Frequest Code Frequest Code UDI Servit Number: IP02550008 Frequest Code Frequest Code UDI Servit Number: IP02550018 Frequest Code Frequest Code UDI Servit Soft Code Servit Sport Appendenterer Bread Code Bread Code	step 1 🗸	STEP 2 ~	STEP 3	STEP 4
Product Instance Details Ds.Ce1487.xe UDI PD: Ds.Ce1487.xe UDI Serial Number: JP025300086 Device Type: MD55000 Licenses to Reserve Licenses to Reserve	Product Instance Details DB-CB1487-KS UDI PD: DB-CB1487-KS UDI Sensit Number: JR025500086 Device Type: MD55000 Uberset: MD55000 Uberset: MD55000 Uberset: MD55000 Uberset: Total Quantity to Reserve: Uberset: 8	Enter Request Code	Select Licenses	Review and confirm	Authorization Code
UDI PID: D5-C91487436 UDI Breist Number: uP025590086 Device Type: MD55900 Licenses to Reserve	UDI PRD: D5-C9148TX/9 UDI Benit Number: JP02550086 Device Type: MD59000 Uberses to Reserve MD59000 Uberse: MD59000 Uberse: Total Quantity to Reserve MD59 Stridt Top CP entry Fyort Representement 8	roduct Instance Details			
UDI Senal Number: JP0253000R6 Device Type: MD5000 Licenses to Reserve License Total Quantity to Reserve	UDI Sensi Number: JPG2530008 Device Type: MD5800 Licenses to Reserve License to Reserve 8 000 9140T 20 FC webs The por upgrade license 1 8	UDI PID:	DS-C9148T-K9		
Device Type: MD35000 Licenses to Reserve License Tridal Quantity to Reserve	Device Type::::::::::::::::::::::::::::::::::::	UDI Serial Number:	JPG253900R6		
Licenses to Reserve License Total Quantity to Reserve	Licenses to Reserve License Total Quantity to Reserve Add 91467 320 FC wetch 8-port upgrade license 8	Device Type:	MD/\$9000		
License . Total Quantity to Reserve	Literate Total Quantity to Reserve MDG 81487 320 FC witch 8-port upgrade license 8 ACI 81487 300 FC witch 8-port upgrade license 8	icenses to Reserve			
	MDS 91487 32G F/C switch 8-port upgrade license 8 ACE 9-487 200 F/C switch R-port upgrade interne	License		Total Qu	antity to Reserve
MDS 9148T 32G FC switch 8-port upgrade license 8	ACIE 81487 2015 FC awith Root approximations	MDS 9148T 32G FC switch 8-port	t upgrade license	8	

Step 8

Click **Download as File** to save the code.

STEP 1 V	STEP 2 V	STEP 3 V	STEP 🛓		
Enter Request Code	Select Licenses	Review and confirm	Authorization Code		
The Reservation Authorization	on Code below has been generater if Licensing settings for the produc	d for this product instance. I, to enable the licensed features.			
Product Instance Details					
UDI PID:	DS-C9148T-K9				
UDI Serial Number:	JPG253900R6				
Authorization Code:					
<smartlicense><smartlicenseau virtualAccountPMDS-SLP-1 1077-49-40-<date -="" entitle<br="" stamps=""><istartdate><enddate><ienddate 320 FC switch 8-port upgrade for <success> true <success> come!</success></success></ienddate </enddate></istartdate></date></smartlicenseau </smartlicense>	morization=+udi=P_DS_C3148T4K haliAccount=+loustomerinto=+flag ements=+entitement=+tag=egid to=-licenseType=PERPETUAL=+lice mes= <tagdescription=+tagtype=p ationID=61dtb913486de8b5033bo</tagdescription=+tagtype=p 	.5. JPG253900R6+Udi>+authorization A+(flag=+version>C+/version>pid>1 018-04.com.cisco.MD5_0148T_887.0 nnseType>+displayName>MD5.9148T [EPPETUAL+togType>+status>+succo 5648bc04a-b033bc05afbb024a+(com	CodecustomerinforsmartAccou Bo58231-330e-4ac5-0191-3132505 c2a2512-65a0-4tee-806-36446 325 FC switch 8-port upgrade foer set-fue-discossvirtation-virtation adontD =-tstatusvirtation-C	nt-BU Production Test 1-termatAccount- 32660-rglid=retateStamp=2022-01- 20369-rugs-count-8-tocount-estattDates- res-retaplaryNames-rtagDesortption-MDS 8146T emerts-relationersta-rstatus> oder	ĺ
To learn how to enter this code, see	the configuration guide for the pro	duct being Roensed			
				1.	

Step 9 Copy the authorization code to the bootflash of your switch.

Step 10 Use the **license smart import** command to import the authorization code on your switch.

```
switch# configure t
switch(config)# license smart import bootflash:authcode.txt
```

Done smart import.
switch(config)# show license authorizations
Overall status:
Active: PID:DS-C9148T-K9,SN:XXX253900X6
Status: SMART AUTHORIZATION INSTALLED on Apr 18 2017 22:29:18 UTC
Last Confirmation code: xxxxxxx
Status:PAK
Authorizations:
MDS 9148T 32G FC 8 port activation (MDS_9148T_8P):
Description: MDS 9148T 32G FC 8 port activation
Total available count: 8
Enforcement type: ENFORCED
Term information:
Active: PID:DS-C9148T-K9,SN:XXX253900X6
Authorization type: SMART AUTHORIZATION INSTALLED

Step 11

Upload the authorization confirmation code (Last Confirmation code) in the show license authorizations command output to CSSM for completing reservation.

Common Tasks for Configuring Smart Licensing Using Policy

This section includes the common tasks that are performed on a switch, on the CSLU interface, and on the CSSM Web UI when configuring SLP.

To implement a particular topology, refer to the corresponding workflow to know the sequential order of tasks that apply.

To perform any additional configuration tasks, for instance, to configure a different license, or use an add-on license, or to configure a narrower reporting interval, refer to the corresponding task. Check the Supported Topologies, on page 60 before you proceed.

Logging into Cisco

View the instructions for this section in the Cisco Smart License Utility User Guide.

Procedure

Step 1	Go to https://software.cisco.com/download/home/286285506/type/286327971/release/.
o. o	

- **Step 2** Click the appropriate release.
- Step 3 Under the Related Links and Documentation section, click User Guide.

Logging into Cisco (SSM On-Prem Interface)

Depending on your needs, when working in SSM On-Prem, either be in connected or disconnected mode. To work in the connected mode, perform these steps to connect to Cisco.

Procedure

Step 1	Go to https://software.cisco.com/download/home/286285506/type/286326948/release/.
Step 2	Click the appropriate release.
Step 3	Under the Related Links and Documentation section, click User Guide.
Step 4	View the "Logging into Cisco SSM On-Prem" section.

Configuring a Smart Account and a Virtual Account

Both the Smart Account and Virtual Account are configured through the **Preferences** tab. Complete the following steps to configure both the Smart and Virtual Accounts for connecting to Cisco.

Procedure

Step 1	Select the P	Preferences tab from the CSLU home screen.
Step 2	Perform the	e following steps for adding both a Smart Account and Virtual Account:
	a. In the P	Preferences window, navigate to the Smart Account field and add a Smart Account Name.
	b. Next, na	avigate to the Virtual Account field and add a Virtual Account Name.
	Note	Virtual Account Name is case-sensitive.
	If CSSM is Accounts an	connected (in the Preferences tab, Cisco is Available), select from the list of available Smart nd Virtual Accounts.
	If CSSM is	not connected (in the Preferences tab, Cisco Is Not Available), enter the SAs/VAs manually.
Step 3	Click Save.	The SA/VA accounts are saved to the system.
	Only one SA SA/VA pair pair.	A/VA pair can reside on CSLU at a time. Multiple accounts cannot be added. To change to another :, repeat Steps 2a and 2b and then Save . A new SA/VA account pair replaces the previously saved

Adding a Product Instances in CSLU

View the instructions for this section in the Cisco Smart License Utility User Guide.

Procedure

Step 1Go to https://software.cisco.com/download/home/286285506/type/286327971/release/.

Step 2 Click the appropriate release.

Step 3 Under the Related Links and Documentation section, click User Guide.

Collecting Usage Reports — CSLU Initiated

View the instructions for this section in the Cisco Smart License Utility User Guide.

Procedure

Step 1	Go to https://software.cisco.com/download/home/286285506/type/286327971/release/.
Step 2	Click the appropriate release.
Step 3	Under the Related Links and Documentation section, click User Guide.

Export CSV (CSLU Interface)

View the instructions for this section in the Cisco Smart License Utility User Guide.

Procedure

Step 1	Go to https://software.cisco.com/download/home/286285506/type/286327971/release/.
Step 2	Click the appropriate release.
Step 3	Under the Related Links and Documentation section, click User Guide.

Import CSV (CSLU Interface)

View the instructions for this section in the Cisco Smart License Utility User Guide.

Procedure

Step 1	Go to https://software.cisco.com/download/home/286285506/type/286327971/release/.
Step 2	Click the appropriate release.
Step 3	Under the Related Links and Documentation section, click User Guide.

Export to CSSM

View the instructions for this section in the Cisco Smart License Utility User Guide.

Procedure

Step 1	Go to https://software.cisco.com/download/home/286285506/type/286327971/release/.
Step 2	Click the appropriate release.
Step 3	Under the Related Links and Documentation section, click User Guide.

Import from CSSM

View the instructions for this section in the Cisco Smart License Utility User Guide.

Procedure

Step 1	Go to https://software.cisco.com/download/home/286285506/type/286327971/release/.
Step 2	Click the appropriate release.
Step 3	Under the Related Links and Documentation section, click User Guide.

Ensuring Network Reachability for Product Instance Initiated Communication

This task provides possible configurations that may be required to ensure network reachability for switch-initiated communication. Steps marked as (*Required*) are required for all switches and all other steps may be required or optional depending on the kind of switch and network requirements. Configure the applicable commands.

Before you begin

Supported topologies: Connected to CSSM Through CSLU (switch-initiated communication).

Procedure

Ensure that CSLU is reachable from switch. For more information, see SLP Configuration - Connected to CSSM Through CSLU Topology, on page 62.

Setting Up a Connection to CSSM

Ensure switch is reachable to CSSM. For more information about DNS configuration, see Configuring the Call Home Service for Direct Cloud Access, on page 92.

Configuring Smart Transport Through an HTTPs Proxy

To use a proxy server to communicate with CSSM when using the smart transport mode, perform these steps:



Note

Authenticated HTTPs proxy configurations are not supported.

Procedure

Step 1	Enter global configuration mode:
	Device# configure terminal
Step 2	Enable smart transport mode:
	switch(config)# license smart transport smart
Step 3	Perform this step only when HTTPS proxy is used in the network:
	<pre>switch(config)# license smart proxy {address address_hostname port port_num}</pre>
	Configures a proxy for the smart transport mode. When a proxy is configured, licensing messages are sent to the proxy along with the final destination URL (CSSM). The proxy sends the message on to CSSM. Provide the address and port information:
	• address <i>address_hostname</i> : Specifies the proxy address. Enter the IP address or hostname of the proxy server.
	• port <i>port_num</i> : Specifies the proxy port. Enter the proxy port number.
Step 4	Exit global configuration mode and return to EXEC mode:
	switch(config)# exit
Step 5	Save your entries in the configuration file:
	switch# copy running-config startup-config

Configuring the Call Home Service for Direct Cloud Access

Make sure that Smart Call Home is enabled on the switch before configuring Smart Software Licensing.

Configuring a DNS Client

Before you begin

Make sure that the name server is reachable before configuring a DNS client.

Procedure

Siehi	Enter global configuration mode.
	switch# configure terminal

Step 2Enable DNS-based address translation:switch(config)# ip domain-lookup

Step 3	Enable the default domain name feature used to complete unqualified host names:
	switch(config)# ip domain-name name
	Any IP host name that does not contain a domain name (that is, any name without a dot) will have the dot and the confoigured domain name appended to it before being added to the host table.
Step 4	Define a list of default domain names to complete unqualified host names:
	<pre>switch(config)# ip domain-list domain-name</pre>
	You can define up to 10 domain names in this list.
Step 5	Specify the first address as the primary server and the second address as the secondary server:
	switch(config)# ip domain-server ip-address
	You can configure a maximum of six servers.

Viewing a Smart Call Home Profile

Procedure

Display the Smart Call Home profile:

switch# show running-config callhome

Removing the Switch from CSSM

To remove a switch and return all licenses to the license pool, perform these steps:

Before you begin

Supported topologies: all

Procedure

Step 1	Log in to the CSSM Web UI at https://software.cisco.com/software/smart-licensing/alerts.
	Log in using the username and password provided by Cisco.

- **Step 2** Click the **Inventory** tab.
- **Step 3** From the **Virtual Account** drop-down list, choose your Virtual Account.
- Step 4 Click the Product Instances tab.

The list of switches that are available is displayed.

Step 5	Locate the required switch from the switches list. Optionally, enter a name or product type string in the search tab to locate the switch
Step 6	In the Actions column of the switch to be removed, click the Remove link.
Step 7	Click Remove Product Instance.
Step 8	The license is returned to the license pool and the switch is removed.

Generating a New Token for a Trust Code from CSSM

To generate a token to request a trust code, perform these steps.

Generate one token for each *Virtual Account*. Use the same token for all the switches that are part of one Virtual Account.

Before you begin

Supported topologies: Connected Directly to CSSM

Procedure

Step 1	Log in to the CSSM Web UI at https://software.cisco.com/software/smart-licensing/alerts.
	Log in using the username and password that is provided by Cisco.
Step 2	Click the Inventory tab.
Step 3	From the Virtual Account drop-down list, choose the required virtual account.
Step 4	Click the General tab.
Step 5	Click New Token. The Create Registration Token window is displayed.
Step 6	In the Description field, enter the token description.
Step 7	In the Expire After field, enter the number of days the token must be active.
Step 8	(Optional) In the Max. Number of Uses field, enter the maximum number of uses allowed after which the token expires.
Step 9	Click Create Token.
Step 10	You will see your new token in the list. Click Actions and download the token as a .txt file.

Installing a Trust Code

To manually install a trust code, perform these steps.

Before you begin

Supported topologies: Connected Directly to CSSM

Procedure

Step 1 In case this task was not already completed, generate and download a trust code file from CSSM:

Generating a New Token for a Trust Code from CSSM

Step 2 Establish a trusted connection with CSSM:

switch# license smart trust idtoken id_token_value {local | all} [force]

For *id_token_value*, enter the token that was generated in CSSM.

Enter one of following options:

- **local**: Submits the trust request only for the active supervisor is in a High Availability setup. This is the default option.
- all: Submits the trust request for active and standby supervisors in a High Availability setup.

Enter the **force** keyword to submit the trust code request despite an existing trust code on the switch.

Trust codes are node-locked to the UDI of the switch. If a UDI is already registered, CSSM does not allow a new registration for the same UDI. Entering the **force** keyword sets a force flag in the message sent to CSSM to create a new trust code even if one exists.

Step 3 Display date and time if trust code is installed:

switch# show license status

Date and time are in the local time zone. See the Trust Code Installed: field.

Downloading a Policy File from CSSM

If a custom policy was requested or if a policy needs to be applied that is different from the default that is applied to the switch, perform these steps:

Before you begin

Supported topologies:

- No Connectivity to CSSM and No CSLU
- CSLU Disconnected from CSSM
- SSM On-Prem disconnected from CSSM

Procedure

 Step 1
 Log in to the CSSM Web UI at https://software.cisco.com/software/smart-licensing/alerts.

Log in using the username and password provided by Cisco.

Step 2 Follow this directory path: **Reports** > **Reporting Policy**.

Step 3 Click **Download**, to save the *.xml* policy file.

You can now install the file on the switch. See Installing a File on the Switch, on page 96.

Uploading Usage Data to CSSM and Downloading an ACK

To upload a RUM report to CSSM and download an ACK *when the switch is not connected to CSSM or CSLU*, perform these steps.

Before you begin

Supported topologies: No Connectivity to CSSM and No CSLU

Procedure

Step 1	Log in to the CSSM Web UI at https://software.cisco.com/software/smart-licensing/alerts.			
	Log in using the username and password that is provided by Cisco.			
Step 2	Select Reports > Usage Data Files.			
Step 3	Click Upload Usage Data . Browse to the file location (RUM report in .txt format), select, and click Upload Data .			
	You cannot delete a usage report in CSSM after it has been uploaded.			
Step 4	From the Select Virtual Accounts pop up, select the Virtual Account that will receive the uploaded file. The file is uploaded to Cisco and is listed in the Usage Data Files table in the Reports screen showing the File Name, the time it was Reported, which Virtual Account it was uploaded to, the Reporting Status, the Number of Product Instances reported, and the Acknowledgment status.			
Step 5	In the Acknowledgment column, click Download to save the tar.gz acknowledge file for the report that was uploaded.			
	Wait for the ACK (.txt format) to appear in the Acknowledgment column. If there are many RUM reports to process, CSSM may take a few minutes.			
	Now, install the file on the switch or transfer it to CSLU or SSM On-Prem.			

Installing a File on the Switch

To install a policy or acknowledgment on the switch when the switch is not connected to CSSM, CSLU, or SSM On-Prem, perform these steps.

Before you begin

Supported topologies: No Connectivity to CSSM and No CSLU

You must have the corresponding file saved in a location that is accessible to the switch.

• For a policy, see Downloading a Policy File from CSSM, on page 95.

• For an acknowledgment, see Uploading Usage Data to CSSM and Downloading an ACK, on page 96.

Procedure

Step 1	Copy file from its source location or directory to the flash memory of the switch:		
	switch# copy source bootflash:file-name		
	• <i>source</i> : This is the location of the source file or directory to be copied. The source can be either local or remote.		
	• bootflash : This is the destination for boot flash memory.		
Step 2	Import and install the file on the switch:		
	switch# license smart import bootflash: file-name		
	After installation, a system message displays the status of installation.		
Step 3	Display license authorization, policy, and reporting information for the switch:		
	switch# show license all		

Setting the Transport Type, URL, and Reporting Interval

To configure the mode of transport for a switch, perform these steps.

Before you begin

Supported topologies: all

Procedure

Step 1	Enter global configuration mode:
	switch# configure terminal
Step 2	Select the type of message transport that the switch will use:
	<pre>switch(config)# license smart transport {callhome cslu off smart}</pre>
	Choose from the following options:
	• callhome: Enables Call Home as the transport mode.
	• cslu: Enables CSLU as the transport mode. This is the default transport mode.
	• off: Disables all communication from the switch.
	• smart: Enables smart transport.
Step 3	Set an URL for the configured transport mode (except Call Home, which is in the Call Home configuration):

switch(config)# license smart url {cslu cslu_url | smart smart_url}

Depending on the transport mode that was chosen to configure in the previous step, configure the corresponding URL here:

• cslu *cslu_url*: The default value for *cslu_url* is set to cslu_local. To set a custom URL, follow below steps:

If the transport mode is configured as cslu, configure this option. Enter the CSLU URL as follows:

http://<cslu ip or host>:8182/cslu/v1/pi

Note When we use SSM On-Prem, the URL may be different and you must get it directly from SSM On-Prem.

For <cslu_ip_or_host>, enter the host name or the IP address of the Windows host where CSLU is installed. 8182 is the port number and it is the only port number that CSLU uses.

The **no license smart url cslu** *cslu_url* command reverts to cslu_local.

• **smart** *smart_url*: If the transport type is configured as **smart**, then URL will be automatically configured to:

https://smartreceiver.cisco.com/licservice/license

The no license smart url smart smart_url command reverts to the default URL as above.

Step 4 (Optional) Set the reporting interval in days:

switch(config)# license smart usage interval interval_in_days

By default, the RUM report is sent every 30 days. The valid value range is 1 to 365 and default value is 30 days.

If a value that is greater than one is set and the transport type is set to **off**, then, between the *interval_in_days* and the policy value for Ongoing reporting frequency(days):, the lower of the two values is applied. For example, if *interval_in_days* is set to 100 and the value in the in the policy says Ongoing reporting frequency (days): 90, RUM reports are sent every 90 days.

If no interval is set and the default is effective, the reporting interval is determined entirely by the policy value. For example, if the default value is effective and only unenforced licenses are in use, if the policy states that reporting is not required, then RUM reports are not sent.

Step 5 Exit global configuration mode and return to EXEC mode:

switch(config)# exit

Step 6 Save your entries in the configuration file:

switch# copy running-config startup-config

Interactions with Other Features

High Availability

High Availability refers to the MDS Director switches with dual supervisors installed. This section explains considerations that apply to a high availability configuration, when running a software version that supports SLP.

Trust Code Requirements in a High Availability Setup

In a dual supervisor setup, two trust codes are installed. The active switch can submit the requests for both the supervisors and install the trust codes that are returned in an ACK.

Policy Requirements in a High Availability Setup

There are no policy requirements that apply exclusively to a high availability setup. As in case of a standalone switch, only one policy exists in a high availability setup as well, and this is on the active supervisor. The policy on the active applies to the standby in the setup.

Switch Functions in a High Availability Setup

This section explains general switch functions in a high availability setup, as well as what the switch does when a standby is added.

For trust codes: The active switch can request and install trust codes for standby supervisor.

For policies: The active switch synchronizes with the standby supervisor.

For reporting: Only the active switch reports usage for standby supervisor in the High Availability set-up.

In addition to scheduled reporting, the following events trigger reporting:

- The addition or removal of a standby supervisor. The RUM report includes information about the standby supervisor that was added or removed.
- A switchover.
- A reload.

For addition of a standby:

- A switch that is connected to CSLU does not take any further action.
- A switch that is directly connected to CSSM performs trust synchronization.

Trust synchronization involves the following:

- Installation of trust code on the standby, if not installed already.
- Installation of policy and purchase information, if applicable.
- · Sending of a RUM report with current usage information.

Upgrades

This section describes how upgrade or migration to SLP is handled. It also clarifies how SLP handles all earlier licensing models including: the earlier version of Smart Licensing and how evaluation or expired licenses from any of the earlier licensing models are handled in SLP environment.

To migrate to SLP, upgrade to a software version that supports SLP. After upgrading, SLP is the only supported licensing model and the switch continues to operate *without any licensing changes*. The SLP section provides details and examples for migration scenarios that apply to Cisco MDS switches.



Note

When migrating from traditional licensing model to SLP, license conversion takes place automatically.

Identifying the Current Licensing Model Before Upgrade

Before upgrading to SLP, enter the **show running-config license all** command in privileged EXEC mode to know the current licensing model that is effective on the switch. This command displays information about the current licensing model for all except the RTU licensing model.

Cisco MDS NX-OS Release 9.2(1) and earlier	Cisco MDS NX-OS Release 9.2(2) and later
<pre>switch# show running-config license all</pre>	<pre>switch# show running-config license all</pre>
<pre>!Command: show running-config license all !Running configuration last done at: Wed Dec 15 06:05:02 2021 !Time: Thu Dec 16 08:04:07 2021</pre>	!Command: show running-config license all !No configuration change since last restart !Time: Thu Dec 16 08:03:40 2021
	version 9.2(2)
version 9.1(1)	license grace-period
license grace-period	license smart transport smart
no feature license smart	license smart url smart
	https://smartreceiver-stage.cisco.com/licservice/license
	license smart url cslu cslu-local
	license smart usage interval 30

How an Upgrade Affects Enforcement Types for Existing Licenses

An unenforced license that was being used before upgrade continues to be available after the upgrade. This includes licenses from the earlier licensing models as follows:

- Traditional Licensing (PAK)
- Smart Licensing
- · Evaluation or expired licenses from any of the above-mentioned licensing models

How an Upgrade Affects Reporting for Existing Licenses

When upgrading to a software version which supports SLP, reporting is based on the reporting requirements in the policy which can be displayed in the output of the **show license status** command for the following licenses:

- Traditional Licenses (PAK)
- Smart Licenses (Registered and Authorized licenses)

· Evaluation or expired licenses

How an Upgrade Affects Transport Type for Existing Licenses

The transport type, if configured in your existing setup, is retained after upgrade to SLP.

When compared to the earlier version of Smart Licensing, additional transport types are available with SLP. There is also a change in the default transport mode.

The following table clarifies how this may affect upgrades:

Migration	Transport Type Before Upgrade	Transport Type After Upgrade
SL (Eval)	callhome	CSLU
SL (Registered)		callhome
PAK-based	—	CSLU
On-Prem	callhome	CSLU

How an Upgrade Affects the ID Token Registration Process

In the earlier version of Smart Licensing, an ID token was used to register and connect to CSSM. ID token registration is not required in SLP. The ID token generation feature is still available in CSSM and is used to *establish trust* when a switch is directly connected to CSSM. See SLP Configuration - Connected Directly to CSSM Topology.

Downgrades

To downgrade, first downgrade the software version on the switch. This section provides information about downgrades for new deployments and existing deployments (you upgraded to SLP and now want to downgrade).

New Deployment Downgrade

This section applies when there is a newly purchased switch with a software version where SLP was already enabled by default and want to downgrade to a software version where SLP is not supported.

The outcome of the downgrade depends on whether a Trust Code was installed while the SLP environment was operating and further action may be required depending on the release to be downgraded to.

If the topology that was implemented while the SLP environment was connected directly to CSSM, then a trust code installation can be expected or assumed, because it is required as part of topology implementation. For any of the other topologies, trust establishment is not mandatory. Downgrading switches with one of these other topologies will therefore mean that licenses to a registered and authorized state must be restored by following the procedures that are applicable in the Smart Licensing environment. See Table 15: Outcome and Action for New Deployment Downgrade to Smart Licensing, on page 102.

In the SLP Environment	Downgrade to	Outcome and Further Action
Switch, which is connected directly to CSSM, and trust established.	Cisco MDS NX-OS Release 9.2(1) or any lower version that supports Smart Licensing	Moves the switch back to the traditional licensing mode. Action is required: Reregister the switch if the switch was using smart license prior to Cisco MDS NX-OS Release 9.2(2). Generate an ID token in the CSSM Web UI. On the switch, enable smart licensing using license smart enable and configure the license smart register idtoken <i>idtoken</i> command in global configuration mode.
High Availability setup, which is connected directly to CSSM, and trust established.	Cisco MDS NX-OS Release 9.2(1) or any lower version that supports Smart Licensing	Action is required: Reregister the switch. Generate an ID token in the CSSM Web UI. On the switch, enable smart licensing using license smart enable and configure the license smart register idtoken <i>idtoken</i> all command in global configuration mode.
Any other topology. (Connected to CSSM Through CSLU, CSLU Disconnected from CSSM, No Connectivity to CSSM and No CSLU)	Cisco MDS NX-OS Release 9.2(1) or any lower version that supports Smart Licensing	Action is required. Restore licenses to a registered and authorized state by following the procedures that are applicable in the Smart Licensing environment.

Table 15: Outcome and Action for New Deployment Downgrade to Smart Licensing

Upgrade and Then Downgrade

When upgrading to a software version that supports SLP and then downgrading to any of the earlier licensing models, *license consumption does not change*, and any product features that were configured on the switch are preserved — only the features and functions that are available with SLP are not available anymore. Earlier licensing model will be preserved.

Migrating to Smart Licensing Using Policy

To upgrade to SLP, upgrade the software version (image) on the switch to a supported version.

Before you Begin

Read the Upgrades section to understand how SLP handles various aspects of all earlier licensing models.

When migrating from traditional licensing model to SLP, license conversion takes place automatically.

Upgrading the Switch Software

See the corresponding release note for the upgrade procedure. If there are any general release-specific considerations, these are called-out in the corresponding release notes.

Also refer to the sample **show** command outputs of the migration scenarios provided below. Sample outputs are provided for before and after migration, for comparison.

Smart Licensing to Smart Licensing Using Policy

The following is an example of a Cisco MDS 9000 switch migrating from Smart Licensing to SLP. This is a High Availability setup with an active and standby.

The show command outputs below call-out key fields to check, before and after migration.

Smart Licensing to Smart Licensing Using Policy: show Commands

show license summary

Before Upgrade (Smart Licensing)

```
switch# show license summary
Smart Licensing is ENABLED
Registration:
 Status: REGISTERED
 Smart Account: BU Production Test
 Virtual Account: MDS-Avalon
 Export-Controlled Functionality: Allowed
License Authorization:
  Status: OUT OF COMPLIANCE on Oct 14 06:26:13 2021 UTC
 Last Communication Attempt: SUCCEEDED
 Next Communication Attempt: Oct 14 18:26:56 2021 UTC
  Communication Deadline: Jan 12 06:21:55 2022 UTC
Smart License Conversion:
 Automatic Conversion Enabled: False
 Status: Not started
License Usage:
                                                       Count Status
License
                        Entitlement tag
      _____
                                        _____
MDS 9396T 32G 16 port a... (PORT ACTIV 9396T PKG)
                                                    48 OUT OF COMPL
TANCE
                                                               OUT OF COMPL
MDS 9300 series Enterpr... (ENTERPRISE PKG)
                                                         1
IANCE
```

After Upgrade (SLP)

<pre>switch# show license summary License Usage:</pre>				
License	Entitlement tag	Count	Status	
MDS 9396T 32G 16 port-a ED	(PORT_ACTIV_9396T_PKG)	48	NOT AUTHORIZ	
MDS 9300 series Enterpr	(ENTERPRISE_PKG)	1	IN USE	

The status field shows that the licenses are now IN USE instead of registered and authorized. The Count filed indicates the total number of ports that are consuming port licenses.

show license usage

Before Upgrade (Smart Licensing)

```
switch# show license usage
License Authorization:
   Status: OUT OF COMPLIANCE on Oct 14 06:26:13 2021 UTC
(PORT_ACTIV_9396T_PKG):
   Description: MDS 9396T 32G 16 port activation
   Count: 48
   Version: 1.0
   Status: OUT OF COMPLIANCE
(ENTERPRISE_PKG):
   Description: MDS 9300 series Enterprise package
   Count: 1
   Version: 1.0
```

After Upgrade (SLP)

Status: OUT OF COMPLIANCE

```
switch# show license usage
License Authorization:
 Status: Not Applicable
(PORT ACTIV 9396T PKG):
 Description: MDS 9396T 32G 16 port-activation
  Count: 48
 Version: 1.0
 Status: NOT AUTHORIZED
 Enforcement Type: ENFORCED
 License Type: Enforced
(ENTERPRISE PKG):
 Description: MDS 9300 series Enterprise package
 Count: 1
 Version: 1.0
 Status: IN USE
 Enforcement Type: NOT ENFORCED
  License Type: Generic
```

The license counts remain the same.

show license status

Before Upgrade (Smart Licensing)

```
switch# show license status
Smart Licensing is ENABLED
Registration:
  Status: REGISTERED
  Smart Account: BU Production Test
  Virtual Account: MDS-Avalon
  Export-Controlled Functionality: Allowed
  Initial Registration: SUCCEEDED on Oct 14 06:27:26 2021 UTC
  Last Renewal Attempt: None
  Next Renewal Attempt: Apr 12 06:27:26 2022 UTC
  Registration Expires: Oct 14 06:22:22 2022 UTC
```

```
License Authorization:
Status: OUT OF COMPLIANCE on Oct 14 06:26:13 2021 UTC
Last Communication Attempt: SUCCEEDED on Oct 14 06:27:57 2021 UTC
Next Communication Attempt: Oct 14 18:27:56 2021 UTC
Communication Deadline: Jan 12 06:22:54 2022 UTC
Smart License Conversion:
Automatic Conversion Enabled: False
Status: Not started
```

After Upgrade (SLP)

```
switch# show license status
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: CSLU
   Cslu address: cslu-local
Policy:
    Policy in use: Merged from multiple sources
    Reporting ACK required: Yes
    Unenforced/Non-Export:
        First report requirement (days): 90 (CISCO default)
        Ongoing reporting frequency (days): 365 (CISCO default)
        On change reporting (days): 90 (CISCO default)
    Enforced (Pepertual/Subscription):
        First report requirement (days): 0 (CISCO default)
        Ongoing reporting frequency (days): 0 (CISCO default)
        On change reporting (days): 0 (CISCO default)
    Export (Perpetual/Subscription):
        First report requirement (days): 0 (CISCO default)
        Ongoing reporting frequency (days): 0 (CISCO default)
        On change reporting (days): 0 (CISCO default)
Miscellaneous:
   Custom Id: <empty>
Usage reporting:
    Last ACK received: <none>
    Next ACK deadline: Jan 12 08:39:14 2022 UTC
    Reporting push interval: 30 days
   Next ACK push check: <none>
   Next report push: Oct 14 08:40:00 2021 UTC
   Last report push: <none>
   Last report file write: <none>
Trust Code installed: Jan 12 08:39:14 2022 UTC
Active: PID: DS-C9148T-K9, SN: JPG220700PY
Jan 12 08:39:14 2022 UTC
```

The Transport: field: A transport type was configured and therefore retained after upgrade.

The Policy: header and details: A custom policy was available in the Smart Account or Virtual Account — this has also been automatically installed on the switch. (After establishing trust, CSSM returns a policy. The policy is then automatically installed.)

The Usage Reporting: header: The Nextreport push: field provides information about when the switch will send the next RUM report to CSSM.

The Trust Code Installed: field: The ID token is successfully converted and a trusted connection has been established with CSSM.

show license udi

Before Upgrade (Smart Licensing)

switch# show license udi
UDI: SN:JPG22060061

After Upgrade (SLP)

```
switch# show license udi
UDI: PID:DS-C9396T-K9, SN:JPG22060061
HA UDI List:
    Active: PID:DS-C9396T-K9, SN:JPG22060061
```

This is a High Availability setup, and the command displays all UDIs in the setup.

The CSSM Web UI After Migration

Log in to the CSSM Web UI at https://software.cisco.com/software/smart-licensing/alerts. Under Inventory > Product Instances.

Registered licenses in the Smart Licensing environment were displayed with the hostname of the switch in the Name column. After upgrading to SLP, they are displayed with the UDI of the switch. All migrated UDIs are displayed. In this example, they are PID:C9500-16X,SN:FCW2233A5ZV and PID:C9500-16X,SN:FCW2233A5ZY.

Only the active switch reports usage. Therefore, PID:C9500-16X,SN:FCW2233A5ZV displays license consumption information under License Usage.
0 :

e ×

General Licenses Product Instances	Event Log			
Authorize License-Enforced Features		Search by L	levice or by Product Type	q
Name	Product Type	Last Contact	Alerts	Actions
10.104.122.150	MDS9000	2021-Apr-07 13:12:56		Actions +
10.106.229.150	MDS9000	2021-Apr-22 04:57:34		Actions +
10.197 107,200	MDS9000	2021-Apr-30 01:49:00		Actions +
NPEX-C10	MD59000	2021-Apr-21 09:36:47		Actions +
narjulaMDS	MD59000	2021-Sep-27 12 19 23		Actions +
w-9148s	MD59000	2021-Aug-13 05 38 33	A Failed to Connect	Actions +
ee-6250i-31	MDS9000	2021-Sep-27 10:03:27		Actions +
w-tan-23	MDS9000	2021-Sep-14 06 29 35		Actions +
w2	MDS9000	2021-Jul-07 21:40:00	O Failed to Renew	Actions -
JDL_PID DS-C9096T-K9; UDL_SN JPG22060061;	MDS9000	2021-Oct-14 10:27:56		Actions •

Figure 8: Smart Licensing to Smart Licensing Using Policy: Active and Standby Switches After Migration

Figure 9: Smart Licensing to Smart Licensing Using Policy: UDI and License Usage under Active Switch

UDI	PID:DS-C	9396T-K9	UDI	SN:JP	G22060061	:

Overview	Event Log						
Description	1						
MDS 9396T Se	ries Product						
General							
Name:	Name: UDI_PID.DS-C9396T-K8, UDI_SN JP022080061;						
Product:		MDS 9396T Series Proc	duct.				
Host Identifie	r.	-					
MAC Addres	5	2					
PID:		DS-C9396T-K9					
Serial Numb	er.	JPG22080061					
UUID		-					
Virtual Accou	int:	MDS-Avalon					
Registration	ion Date: 2021-Oct-14 10 27 07						
Last Contact		2021-Oct-14 10 27:56					
License Us	age						
License			Billing	Expires	Required		
MDS 9300 ser	ies Enterprise pac	kage	Prepaid	27	9		
MD/S 9396T 3	2G 16 port activati	n	Prepaid	2	48		

Figure 10: Smart Licensing to Smart Licensing Using Policy: DCN NDB/RTU Licenses Showing up After Upgrade

MDS	9396T	32G	16	port	activation	in	MDS
	00001	~~~		port			

03 33301	526 TO POIL activ	auon in mo	5
Overview	Product Instances	Event Log	Transaction History
Product Instan	ice		
UDI_PID DS-C	C9396T-K9, UDI_SN JPG2	2060061;	

Reporting After Migration

The switch sends the next RUM report to CSSM, based on the policy.

To change the reporting interval to report more frequently: on the switch, configure the **license smart usage interval** command.

Evaluation or Eval Expired to Smart Licensing Using Policy

The following is an example of a Cisco MDS 9000 switch with evaluation licenses (Smart Licensing) that were migrated to SLP.

The notion of evaluation licenses does not apply to SLP. When the software version is upgraded to one that supports SLP, all licenses are displayed as *IN USE* and the Cisco default policy is applied to the switch.

The following table calls out key changes or new fields to check for in the **show** command outputs, after upgrade to SLP.

Evaluation or Eval Expired to Smart Licensing Using Policy: show Commands

show license summary

Before Upgrade (Smart Licensing, Evaluation Mode)

switch# show license summa Smart Licensing is ENABLED	ГY		
Registration: Status: UNREGISTERED Export-Controlled Function	onality: Not Allowed		
License Authorization: Status: EVAL MODE Evaluation Period Remain:	ing: 89 days, 21 hours, 13 minut	es, 49	seconds
Smart License Conversion: Automatic Conversion Enal Status: Not started	oled: False		
License Usage: License	Entitlement tag	Count	Status
<empty> <empty></empty></empty>	(ENTERPRISE_PKG) (PORT_ACTIV_9396T_PKG)	1 48	EVAL MODE EVAL MODE

After Upgrade (SLP)

switch# show license summar	сy		
License	Entitlement tag	Count	Status
MDS 9396T 32G 16 port-a MDS 9300 series Enterpr	(PORT_ACTIV_9396T_PKG) (ENTERPRISE_PKG)	48 1	NOT AUTHORIZED IN USE

All licenses are migrated and IN USE. There are no EVAL MODE licenses.

show license usage

Before Upgrade (Smart Licensing, Evaluation Mode)

```
switch# show license usage
License Authorization:
   Status: EVAL MODE
   Evaluation Period Remaining: 89 days, 21 hours, 13 minutes, 10 seconds
```

```
(ENTERPRISE_PKG):
  Description: <empty>
  Count: 1
  Version: 1.0
  Status: EVAL MODE
(PORT_ACTIV_9396T_PKG):
  Description: <empty>
  Count: 48
  Version: 1.0
  Status: EVAL MODE
```

After Upgrade (SLP)

```
switch# show license usage
License Authorization:
 Status: Not Applicable
(PORT ACTIV 9396T PKG):
 Description: MDS 9396T 32G 16 port-activation
 Count: 48
 Version: 1.0
 Status: NOT AUTHORIZED
 Enforcement Type: ENFORCED
 License Type: Enforced
(ENTERPRISE PKG):
 Description: MDS 9300 series Enterprise package
 Count: 1
 Version: 1.0
 Status: IN USE
 Enforcement Type: NOT ENFORCED
 License Type: Generic
```

show license status

Before Upgrade (Smart Licensing, Evaluation Mode)

```
switch# show license status
Smart Licensing is ENABLED
Registration:
   Status: UNREGISTERED
   Export-Controlled Functionality: Not Allowed
License Authorization:
   Status: EVAL MODE
   Evaluation Period Remaining: 89 days, 21 hours, 12 minutes, 51 seconds
Smart License Conversion:
   Automatic Conversion Enabled: False
   Status: Not started
```

After Upgrade (SLP)

```
switch# show license status
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: CSLU
    Cslu address: cslu-local
Policv:
    Policy in use: Merged from multiple sources
    Reporting ACK required: Yes
   Unenforced/Non-Export:
       First report requirement (days): 90 (CISCO default)
        Ongoing reporting frequency (days): 365 (CISCO default)
        On change reporting (days): 90 (CISCO default)
    Enforced (Pepertual/Subscription):
        First report requirement (days): 0 (CISCO default)
        Ongoing reporting frequency (days): 0 (CISCO default)
        On change reporting (days): 0 (CISCO default)
    Export (Perpetual/Subscription):
        First report requirement (days): 0 (CISCO default)
        Ongoing reporting frequency (days): 0 (CISCO default)
        On change reporting (days): 0 (CISCO default)
Miscellaneous:
   Custom Id: <empty>
Usage reporting:
   Last ACK received: <none>
   Next ACK deadline: Jan 12 08:39:14 2022 UTC
   Reporting push interval: 30 days
   Next ACK push check: <none>
   Next report push: Oct 14 08:40:00 2021 UTC
   Last report push: <none>
   Last report file write: <none>
Trust Code installed: <none>
```

The CSSM Web UI After Migration

No changes in the CSSM Web UI.

Reporting After Migration

Implement any one of the supported topologies and fulfill reporting requirements. See Supported Topologies, on page 60. The reporting method depends on the implemented topology.

Migration Scenarios for Enforced Port Licenses

This section provides the different scenarios for migrating to SLP.

Configuration	Greenfield	Traditional to SL	SL 1.0 to SLP	Traditional to SL 1.0 to SLP
Default port licenses	Default port licenses authorization code to	will work as usual. A be installed.	ny additional port that	t comes up will need
Default and factory installed licenses	Default and factory i comes up (over and installed.	nstalled port licenses above the purchase co	will work as usual. Ar bunt) will need author	ny additional port that ization code to be
Default and PAK licenses		Default and PAK port licenses will work as usual. Any new port licenses will need authorization code to be installed. Automatic DLC will trigger on migration.		Default and PAK port licenses that were enabled in SL 1.0 will continue to work after upgrading to SLP. Any new port licenses will need authorization code to be installed. If DLC was not performed in SL 1.0, automatic DLC will not trigger in SLP. Contact Cisco TAC for migrating the licenses.
Default and port licenses in SL 1.0 (Evaluation only)			Default and extra port licenses will work as usual. Any new port will need authorization code to be installed. If DLC was not performed in SL 1.0, automatic DLC will not trigger in SLP. Contact Cisco TAC for migrating the licenses.	

Table 16: Migration Scenarios for Enforced Port Licenses

Configuration	Greenfield	Traditional to SL	SL 1.0 to SLP	Traditional to SL 1.0 to SLP
Default and port licenses in SL 1.0 (Registered or Out of Compliance (OOC))			Default and extra port licenses will work as usual. Any new port will need authorization code to be installed. If DLC was not performed in SL 1.0, automatic DLC will not trigger in SLP. Contact Cisco TAC for migrating the licenses.	

Troubleshooting Smart Licensing Using Policy

This section provides the list of SLP-related system messages that maybe encountered, possible reasons for failure, and recommended action.

System Message Overview

The system software sends system messages to the console (and, optionally, to a logging server on another system). Not all system messages mean problems with your system. Some messages are informational, and others can help diagnose problems with communications lines, internal hardware, or the system software.

How to Read System Messages

System log messages can contain up to 80 characters. Each system message begins with a percent sign (%) and is structured as follows:

%FACILIY-SEVERITY-MNEMONIC: Message-text

%FACILITY

Two or more uppercase letters that show the facility to which the message refers. A facility can be a hardware switch, a protocol, or a module of the system software.

SEVERITY

A single-digit code from 0 to 7 that reflects the severity of the condition. The lower the number, the more serious the situation.

Table 17: Message Severity Levels

Severity Level	Description
0 - emergency	System is unusable.
1 - alert	Immediate action required.

Severity Level	Description
2 - critical	Critical condition.
3 - error	Error condition.
4 - warning	Warning condition.
5 - notification	Normal but significant condition.
6 - informational	Informational message only.
7 - debugging	Message that appears during debugging only.

MNEMONIC

A code that uniquely identifies the message.

Message-text

Message-text is a text string describing the condition. This portion of the message sometimes contains detailed information about the event, including terminal port numbers, network addresses, or addresses that correspond to locations in the system memory address space. Because the information in these variable fields changes from message to message, it is represented here by short strings that are enclosed in square brackets ([]). A decimal number, for example, is represented as [dec].

Table	18:	Variable	Fields in	Messages
-------	-----	----------	-----------	----------

Severity Level	Description
[char]	Single character
[chars]	Character string
[dec]	Decimal number
[enet]	Ethernet address (for example, 0000.FEED.00C0)
[hex]	Hexadecimal number
[inet]	Internet address (for example, 10.0.2.16)
[int]	Integer
[node]	Address or node name
[t-line]	Terminal line number in octal (or in decimal if the decimal-TTY service is enabled)
[clock]	Clock (for example, 01:20:08 UTC Tue Mar 2 1993

System Messages

This section provides the list of SLP-related system messages that maybe encountered, possible reasons for failure (in case it is a failure message), and recommended action (if action is required).

For all error messages, contact your Cisco technical support representative with the following information if you are unable to resolve it by yourself:

The message, exactly as it appears on the console or in the system log.

The output from the **show license tech support** and **show license history message** commands.

SLP-related system messages:

- SMART_LIC-3-POLICY_INSTALL_FAILED
- SMART LIC-3-COMM FAILED
- SMART LIC-3-COMM RESTORED
- SMART_LIC-3-POLICY_REMOVED
- SMART_LIC-3-TRUST_CODE_INSTALL_FAILED
- SMART_LIC-4-REPORTING_NOT_SUPPORTED
- SMART_LIC-6-POLICY_INSTALL_SUCCESS
- SMART_LIC-6-REPORTING_REQUIRED
- SMART_LIC-6-TRUST_CODE_INSTALL_SUCCESS

SMART_LIC-3-POLICY_INSTALL_FAILED

Error Message %SMART_LIC-3-POLICY_INSTALL_FAILED: The installation of a new licensing policy has failed: [chars].

Explanation

A policy was installed, but an error was detected while parsing the policy code and installation failed. [chars] is the error string with details of the failure.

Possible reasons for failure include:

- A signature mismatch: This means that the system clock is not accurate.
- A timestamp mismatch: This means that the system clock on the switch is not synchronized with CSSM.

Recommended Action

For both possible failure reasons, ensure that the system clock is accurate and synchronized with CSSM. Configure the **ntp server** command.

For example:

switch(config) # ntp server 1.1.1.1 prefer

If the above does not work and policy installation still fails, contact your Cisco technical support representative.

SMART_LIC-3-AUTHORIZATION_INSTALL_FAILED

Error Message %SMART_LIC-3-AUTHORIZATION_INSTALL_FAILED: The install of a new licensing authorization code has failed on [chars]: [chars].

Explanation

Authorization code installation has failed for enforced license.

Recommended Action

Use the **license smart authorization request** {**add** | **replace**} *port-feature* {**local** | **all**} **count** *port-range* command to enable ports or replace the existing authorization code.

SMART_LIC-3-COMM_FAILED

Error Message %SMART LIC-3-COMM FAILED: Communications failure with the [chars] : [chars]

Explanation

Smart Licensing communication either with CSSM or with CSLU failed. The first [chars] is the currently configured transport type, and the second [chars] is the error string with details of the failure. This message appears for every communication attempt that fails.

Possible reasons for failure include:

- CSSM or CSLU is not reachable: This means that there is a network reachability problem.
- 404 host not found: This means that the CSSM server is down.

For topologies where the switch initiates the sending of RUM reports (Connected to CSSM Through CSLU: Product Instance Initiated Only, Connected Directly to CSSM, and CSLU Disconnected from CSSM: Product Instance Initiated Only) if this communication failure message coincides with scheduled reporting (**license smart usage interval** *interval_in_days*), the switch attempts to send out the RUM report for up to 4 hours after the scheduled time has expired. If it is still unable to send out the report (because the communication failure persists), the system resets the interval to 15 minutes. After the communication failure is resolved, the system reverts the reporting interval to the value that was last configured.

Recommended Action

Troubleshooting steps are provided for when CSSM is not reachable and when CSLU is not reachable.

If CSSM is not reachable and the configured transport type is **smart**:

- Check if the smart URL is configured correctly. Use the show license status command to check if the URL is exactly as follows: https://smartreceiver.cisco.com/licservice/license. If it is not, reconfigure the license smart url smart smart_URL command.
- 2. Check DNS resolution. Verify that the switch can ping smartreceiver.cisco.com or the *nslookup* translated IP. The following example shows how to ping the translated IP:

```
switch# ping 171.70.168.183
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 171.70.168.183, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/2 ms
```

If CSSM is not reachable and the configured transport type is callhome:

- Check if the URL is entered correctly. Use the show license status command to check if the URL is exactly as follows: https://tools.cisco.com/its/service/oddce/services/DDCEService.
- 2. Check if Call Home profile CiscoTAC-1 is active and destination URL is correct. Use the show call-home smart-licensing command.

```
switch# show callhome smart-licensing
Current smart-licensing transport settings:
```

```
Smart-license messages: enabled
Profile: xml (status: ACTIVE)
```

3. Check DNS Resolution. Verify that the switch can ping tools.cisco.com or the *nslookup* translated IP.

```
switch# ping tools.cisco.com
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 173.37.145.8, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 41/41/42 ms
```

If the above resolution does not work, check if the switch's mgmt0 interface is set with IP address and the management interface is up. To ensure that the network is up, configure the **no shutdown** command.

Check if the switch is subnet masked with a subnet IP and if the DNS IP and default gateway are configured.

4. Verify if the IP gateway is set.

Use the **show ip interface** command to display the current configuration.

In case the above resolution does not work, double-check your routing rules and firewall settings.

If CSLU is not reachable:

- Check if CSLU discovery works.
 - Zero-touch DNS discovery of cslu-local or DNS discovery of your domain.

In the **show license all** command output, check the Last ACK received: field. If this has a recent timestamp, it means that the switch has connectivity with CSLU. If not, check if the switch can ping cslu-local. A successful ping confirms that the switch is reachable.

If the above resolution does not work, configure the name server with an entry where hostname cslu-local is mapped to the CSLU IP address (the Windows or Linux host where CSLU is installed). Configure the **ip domain-lookup**, **ip domain-name** *domain-name*, and **ip name-server** *server-address* commands. Here the CSLU IP is 192.168.0.1 and name-server creates entry cslu-local.example.com.

```
switch(config)# ip domain-name example.com
switch(config)# ip name-server 192.168.2.1
```

• CSLU URL is configured.

In the **show license all** command output, under the Transport: header check the following:

The Type: must be cslu and Cslu address: must have the hostname or the IP address of the Windows or Linux host where CSLU is installed. Check if the rest of the address is configured as shown below and check if the port number is 8182.

```
Transport:
Type: CSLU
Cslu address: http://192.168.0.1:8182/cslu/v1/pi
```

If not, configure the **license smart transport cslu** and **license smart url cslu** *http://<cslu_ip_or_host>:8182/cslu/v1/pi* commands.

If the above resolution does not work and policy installation still fails, contact your Cisco technical support representative.

SMART_LIC-3-COMM_RESTORED

Error Message %SMART_LIC-3-COMM_RESTORED: Communications with the [chars] restored. [chars] - depends on the transport type - Cisco Smart Software Manager (CSSM) - Cisco Smart License utility (CSLU) Smart Agent communication with either the Cisco Smart Software Manager (CSSM) or the Cisco Smart License utility (CSLU) has been restored. No action required.

Explanation

Switch communicating with either the CSSM or CSLU is restored.

Recommended Action

No action required.

SMART_LIC-3-POLICY_REMOVED

Error Message %SMART_LIC-3-POLICY_REMOVED: The licensing policy has been removed.

Explanation

A previously installed licensing policy has been removed. The Cisco default policy is then automatically enabled. This may cause a change in the behavior of smart licensing.

Possible reasons for failure include:

If the **license smart factory reset** command is executed in EXEC mode, all licensing information including the policy is removed.



Note The switch must be reloaded after using the license smart factory reset command.

Recommended Action

If the policy was removed intentionally, no further action is required.

If the policy was removed inadvertently, reapply the policy. Depending on the topology that is implemented, follow the corresponding method to retrieve the policy:

Connected Directly to CSSM:

Enter the **show license status** command, and check the Trust Code installed: field. If trust is established, then CSSM will automatically return the policy. The policy is automatically reinstalled on switches of the corresponding Virtual Account.

If trust has not been established, complete these tasks:

Generating a New Token for a Trust Code from CSSM, on page 94 and Installing a Trust Code, on page 94. When these tasks are completed, CSSM will automatically return the policy. The policy is then automatically installed on all switches of that Virtual Account.

Connected to CSSM Through CSLU:

For switch-initiated communication, enter the **license smart sync** command in privileged EXEC mode. The synchronization request causes CSLU to push the missing information (a policy or authorization code) to the switch.

• CSLU Disconnected from CSSM:

For switch-initiated communication, enter the **license smart sync** command. The synchronization request causes CSLU to push the missing information (a policy or authorization code) to the switch. Then, complete these tasks in the given order: Export to CSSM, on page 90 > Uploading Usage Data to CSSM and Downloading an ACK, on page 96 > Import from CSSM, on page 91.

No Connectivity to CSSM and No CSLU

In an entirely air-gapped network, from a workstation that has connectivity to the Internet and CSSM complete this task: Downloading a Policy File from CSSM, on page 95.

Then, complete this task on the switch: Installing a File on the Switch, on page 96.

SSM On-Prem Disconnected from CSSM

For switch-initiated communication, enter the **license smart sync** command in privileged EXEC mode. The synchronization request causes CSLU on SSM On-Prem to push the missing information (a policy or authorization code) to the switch.

SMART_LIC-3-TRUST_CODE_INSTALL_FAILED

Error Message %SMART_LIC-3-TRUST_CODE_INSTALL_FAILED: The install of a new licensing trust code has failed on [chars]: [chars].

Explanation

Trust code installation has failed. The first [chars] is the UDI where trust code installation was attempted. The second [chars] is the error string with details of the failure.

Possible reasons for failure include:

- A trust code is already installed: Trust codes are node-locked to the UDI of the switch. If the UDI is
 already registered and you try to install another one, installation fails.
- Smart Account-Virtual Account mismatch: This means that the Smart Account or Virtual Account (for which the token ID was generated) does not include the switch on which the trust code was installed. The token that is generated in CSSM applies at the Smart Account or Virtual Account level and applies only to all switches in that account.
- A signature mismatch: This means that the system clock is not accurate.
- Timestamp mismatch: This means the switch time is not synchronized with CSSM and can cause installation to fail.

Recommended Action

- A trust code is already installed: To install a trust code despite an existing trust code on the switch, reconfigure the license smart trust idtoken *id_token_value* {local | all}[force] command in privileged EXEC mode and ensure to include the force keyword. Using the force keyword sets a force flag in the message sent to CSSM to create a new trust code even if one exists.
- Smart Account-Virtual Account mismatch: Login to the CSSM Web UI at https://software.cisco.com/ software/smart-licensing/alerts. Click Inventory > Product Instances.

Check if the switch on which the token is to be generated is listed in the selected Virtual Account. If it is, proceed to the next step. If not, check and select the correct Smart Account and Virtual Account. Then, complete these tasks again: Generating a New Token for a Trust Code from CSSM, on page 94 and Installing a Trust Code, on page 94.

• Timestamp mismatch and signature mismatch: Configure the **ntp server** command. For example:

switch(config) # ntp server 1.1.1.1 prefer

SMART_LIC-4-REPORTING_NOT_SUPPORTED

Error Message %SMART_LIC-4-REPORTING_NOT_SUPPORTED: The CSSM OnPrem that this product instance is connected to is down rev and does not support the enhanced policy and usage reporting mode.

Explanation

The previous version of SSM On-Prem (formerly known as Cisco Smart Software Manager satellite) is not supported in the SLP environment. The switch will behave as follows:

- Stop sending registration renewals and authorization renewals.
- Start recording usage and saving RUM reports locally. The RUM reports are stored locally at <*CSLU_Working_Directory*>/*data/default/rum/unsent*.

Recommended Action

Refer to and implement one of the supported topologies instead. For more information, see Supported Topologies, on page 60.

SMART_LIC-6-POLICY_INSTALL_SUCCESS

Error Message %SMART_LIC-6-POLICY_INSTALL_SUCCESS: A new licensing policy was successfully
installed.

Explanation

A policy was installed as part of an ACK response.

Recommended Action

No action is required. To know which policy is applied (the policy in-use) and its reporting requirements, enter the **show license all** command.

SMART_LIC-6-AUTHORIZATION_INSTALL_SUCCESS

Error Message %SMART_LIC-6-AUTHORIZATION_INSTALL_SUCCESS: A new licensing authorization code was successfully installed on: [chars].

Explanation

A new licensing authorization code was installed.

Recommended Action

No action is required. To know installed license status, enter the show license all command.

SMART_LIC-6-AUTHORIZATION_REMOVED

Error Message %SMART_LIC-6-AUTHORIZATION_REMOVED: A licensing authorization code has been removed from [chars]

Explanation

[chars] is the UDI where the authorization code was removed. This removes the licenses from the switch and may cause a change in the behavior of smart licensing and the features using the licenses.

Recommended Action

No action is required. To see the current state of the license, enter the show license all command.

SMART_LIC-6-REPORTING_REQUIRED

Error Message %SMART_LIC-6-REPORTING_REQUIRED: A Usage report acknowledgement will be required in [dec] days.

Explanation

This is an alert which means that RUM reporting to Cisco is required. [dec] is the amount of time (in days) left to meet this reporting requirement.

Recommended Action

Ensure that RUM reports are sent within the requested time.

• If the switch is directly connected to CSSM or to CSLU and the switch is configured to initiate communication, wait untill the next schedule time (use the **show license all | grep "Next report push:"** command) or manually trigger the sync using **license smart sync** command from EXEC mode.. The switch will automatically send usage information at the scheduled time.

If it is not sent at the scheduled time because of technical difficulties, use the **license smart sync** command in EXEC mode.

- If the switch is connected to CSLU but CSLU is disconnected from CSSM, complete these tasks: Export to CSSM, on page 90 > Uploading Usage Data to CSSM and Downloading an ACK, on page 96 > Import from CSSM, on page 91.
- If the switch is disconnected from CSSM and CSLU is not being used either, enter the license smart save usage command in EXEC mode to save the required usage information in a file. Then, from a workstation that is connected to CSSM, complete these tasks: Uploading Usage Data to CSSM and Downloading an ACK, on page 96 > Installing a File on the Switch, on page 96.

SMART_LIC-6-TRUST_CODE_INSTALL_SUCCESS

Error Message %SMART_LIC-6-TRUST_CODE_INSTALL_SUCCESS: A new licensing trust code was successfully installed on [chars].

Explanation

[chars] is the UDI where the trust code was successfully installed.

Recommended Action

No action is required. To verify that the trust code is installed, enter the **show license status** command in EXEC mode. Look for the updated timestamp under the Trust Code installed: field in the output.

Additional References for Smart Licensing Using Policy

Торіс	Document
Cisco Smart Software Manager Help	Smart Software Manager Help
Cisco Smart License Utility (CSLU) Installation and User Guides	Cisco Smart License Utility Quick Start Setup Guide
	Cisco Smart License Utility User Guide

Торіс	Document
Cisco Smart Software Licensing for Cisco MDS 9000 Series Switches	Cisco MDS 9000 Series Licensing Guide

Glossary

The following list acronyms and definitions for terms used throughout this document:

- SLP: Smart License using Policy. A Cisco NX-OS feature that allows a switch to integrate with the Cisco cloud-based licensing infrastructure.
- CSLU: Cisco Smart License Utility. A software agent that collects license usage (RUM) reports from a switch and forwards them to the CSSM. If used, this agent runs on a customer premise server.
- PI: Product Instance. An MDS switch running Cisco MDS NX-OS.
- SA: Smart Account. The top level customer account in CSSM where purchased licenses are deposited by Cisco.
- VA: Virtual Account. Represents an organization within a customer Smart Account, in agreement with customer preferences. There can be multiple VAs per customer Smart Account.
- UDI: Unique Device Identifier. An identifier made of the Product ID (PI) and serial number. This is used by the PI to identify itself to the CSSM.
- CSSM: Cisco Smart Software Manager. Cisco cloud portal where Cisco licenses can be activated and managed.
- LCS: Licensing Crypto Services. When you initially register to CSSM, the SSM On-Prem license server sends a registration file that contains Certificate Signing Requests (CSRs) which will be signed by the Cisco License Crypto Service (LCS).
- **RUM** : Resource Usage Measurement. A license usage report created by a PI and consumed by the CSSM.
- **Pull mode**: A mode in which the CSLU uses netconf/restconf/grpc and YANG or REST to connect to the PI and exchange data.
- **Push mode**: A mode in which the PI initiates communications with the CSLU by sending requests to a REST endpoint in the CSLU.
- **Enforced license**: Enforced license represents a feature set that the product should not be allowed to use without authorization.
- Unenforced license: An unenforced license (honor mode) represents a feature set that the MDS will allow to use without an active license. It remains true that a license should be purchased to stay in compliance.
- **Product Authorization Key (PAK)**: The PAK allows you to obtain a license key from one of the sites listed in the software license claim certificate document. After registering at the specified website, you will receive your license key file and installation instructions through email. From Cisco MDS NX-OS Release 9.2(2), PAK licenses are deprecated. Customers using PAK licenses should migrate to SLP at their earliest convenience.

- **Reported state**: Occurs when the switch has reported its license usage to the CSSM and received an acknowledgment.
- Un-Reported state: The switch has not yet reported its license usage to CSSM nor received an acknowledgment back from CSSM.
- **Greenfield deployment**: A greenfield deployment is the installation and configuration of a network where none existed before, for example in a new data center.
- **Brownfield deployment**: A brownfield deployment is an upgrade or addition to an existing network and uses some legacy components.