

# Configure Cisco Smart Licenses with NSO

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## Introduction

This document describes the various Network Services Orchestrator (NSO) licenses and how they can be activated using the Cisco Smart License®.

## Prerequisites

### Requirements

Cisco recommends that you have knowledge of these topics:

- How to use the NSO CLI
- Troubleshooting NSO
- Basic Linux knowledge


### Components Used

The information in this document is based on these software and hardware versions:

- NSO 6.x
- NSO 5.x
  
- NSO 4.5 and later
- NSO 4.4
- NSO 4.1/4.2/4.3

## NSO Licenses

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 **Note:** The user must possess a valid NSO license.

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The licenses used by NSO are as follows:

PID	Display on SSM	type	Description
R-NSO-K 9		Top level	Required for each instance of NSO
NSO-P-PAK	NSO-platform-production	server	Required for Active node
NSO-HA-LIC-P	NSO-platform-production-standby	server	Required for Standby node
NSO-DEV-P-PAK	NSO-platform-development-test	server	Required for development environment
NSO-PNF-()	NSO-network-element	Network element	Southbound If the connected device is a physical device
NSO-VNF-()	NSO-network-element	Network element	Southbound The connected device is a virtual device
NED-()	Different for each NED Example: Cisco-ios-NED Cisco-iosxr-NED	NED	For NED. It is necessary for each type of various devices. Example: NED-IOS-P: For IOS NED NED-IOX-P: For IOS-XR NED

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 **Note:** This could be included in a package Packet Identifier (PID) (bundle which includes ESC, and more), so it is possible that these PIDs do not appear in the order.

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## Smart Account and Virtual Account

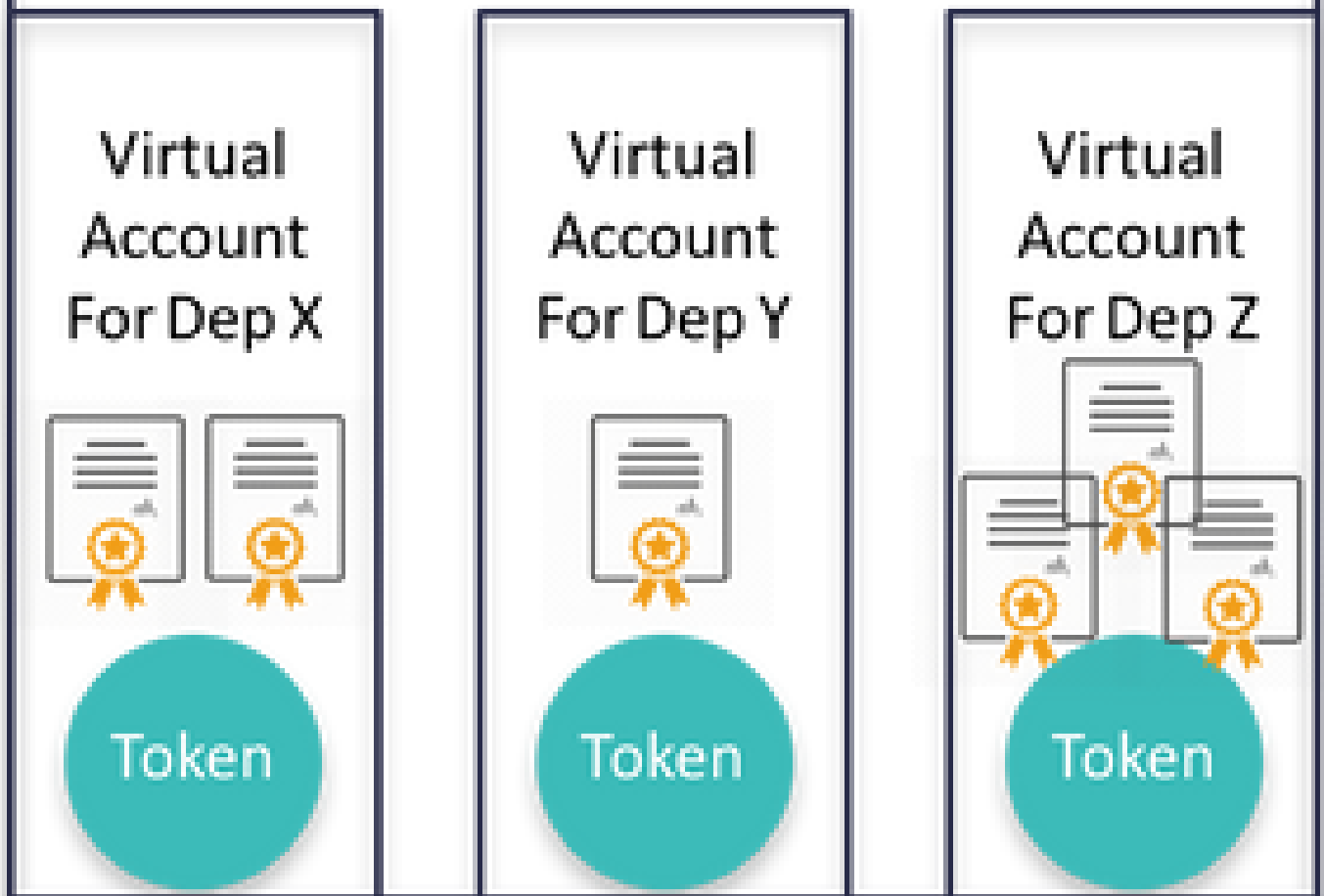
Each product, including NSO, asks the Cisco server to acquire a license to activate itself. Essentially it checks if you have purchased the enough number of licenses for the product and they are available to use.

One smart account is assigned to an organization, a company A, for example.

Company A may be having Department X, Y and Z, and they want to manage their licenses separately.

A virtual account can be assigned to each department.

# Smart Account For Company A



Tokens can be generated for each virtual account. We use the token to access to the virtual account from the product.

From the Smart Software Manager, license status in virtual accounts are seen like this:

License	Quantity	In Use	Surplus (+) / Shortage (-)	Alerts	Actions
<a href="#">cisco-ios-NED</a>	20	1		19	<a href="#">Transfer..</a>
<a href="#">cisco-iosxr-NED</a>	20	1		19	<a href="#">Transfer..</a>
<a href="#">juniper-junos-NED</a>	0	1		-1 <span style="color: red;">✘</span> <b>Insufficient Licenses</b>	<a href="#">Transfer..</a>
<a href="#">NSO-network-element</a>	40	1		39	<a href="#">Transfer..</a>
<a href="#">NSO-platform-development-test</a>	40	0		40	<a href="#">Transfer..</a>
<a href="#">NSO-platform-production</a>	40	1		39	<a href="#">Transfer..</a>
<a href="#">NSO-platform-production-standby</a>	20	0		20	<a href="#">Transfer..</a>

Showing All 7 Records

## Configure

There can be various methods of how the NSO connects to the Smart Licensing server and it depends upon the environment where the NSO is installed. This document also talks about the different integrations between the NSO and the Cisco Licensing servers.

### Step 1. Generate a Token

1. To create a new token, log into **Cisco Smart Software Manager (CSSM)** with the user id/or the CCO ID and select the appropriate virtual account. Click on "Manage licenses" to proceed. Find the link in [Cisco Software Central](#)

## Download and manage

<p><b>Smart Software Manager</b></p> <p>Track and manage your licenses. Convert traditional licenses to Smart Licenses.</p> <p><a href="#">Manage licenses &gt;</a></p>	<p><b>Download and Upgrade</b></p> <p>Download new software or updates to your current software.</p> <p><a href="#">Access downloads &gt;</a></p>	<p><b>Traditional Licenses</b></p> <p>Generate and manage PAK-based and other device licenses, including demo licenses.</p> <p><a href="#">Access LRP &gt;</a></p>
<p><b>Manage Smart Account</b></p> <p>Update your profile information and manage users.</p> <p><a href="#">Manage account &gt;</a></p>	<p><b>EA Workspace</b></p> <p>Generate and manage licenses purchased through a Cisco Enterprise Agreement.</p> <p><a href="#">Access EA Workspace &gt;</a></p>	<p><b>Manage Entitlements</b></p> <p>eDelivery, version upgrade, and more management functionality is now available in our new portal.</p> <p><a href="#">Access MCE &gt;</a></p>

2. Click on the **Inventory tab** and select a virtual account you want to work with.

Virtual Account: NSO

14 Major | 60 Minor | Hide Alerts

General Licenses Product Instances Event Log

**Virtual Account**

Description: For NSO

Default Virtual Account: No

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**Product Instance Registration Tokens**

The registration tokens below can be used to register new product instances to this virtual account.

New Token...

Token	Expiration Date	Uses	Export-Controlled	Description	Created By	Actions
-------	-----------------	------	-------------------	-------------	------------	---------

3. In CSSM click on **New Token**.

Fill out the required information. Please note that expiring date indicates how long the token is valid, so users need to use the created token within the days. Short and Long needs to be balanced between convenience and security risk. Also, it is NOT about how long the licenses are going to be valid.

**Create Registration Token**

This will create a token that is used to register product instances, so that they can use licenses from this virtual account. Once it's created, go to the Smart Licensing configuration for your products and enter the token, to register them with this virtual account.

Virtual Account: NSO

Description: For Managing NSO

\* Expire After: 30 Days

*Between 1 - 365, 30 days recommended*

Max. Number of Uses:

*The token will be expired when either the expiration or the maximum uses is reached*

Allow export-controlled functionality on the products registered with this token

Create Token Cancel

5. The newly created token is in the table.

General Licenses Product Instances Event Log

**Virtual Account**

Description: For NSO

Default Virtual Account: No

**Product Instance Registration Tokens**

The registration tokens below can be used to register new product instances to this virtual account.

New Token...

Token	Expiration Date	Uses	Export-Controlled	Description	Created By	Actions
MmU1MjBINTktNGEz...	2023-Oct-19 03:34:55 (in 30 days)		Allowed	For Managing NSO	cisco	Actions

6. Click on the token link to show a popup window. Copy the token from the dialogue window into your clipboard.

## Registration Token



```
YzY2YjFIOTYtOWYzZi00MDg1LTk1MzgtMzlxYjhiZjcyN
WYyLTE0NjQyNjM0%0AMzc2MDR8cIFKNkdScVBjSXd
uMmRubXF6dXZDN0tuM0Z1TkhKa2ItRIJINVZV%0AU3
R2cz0%3D%0A
```

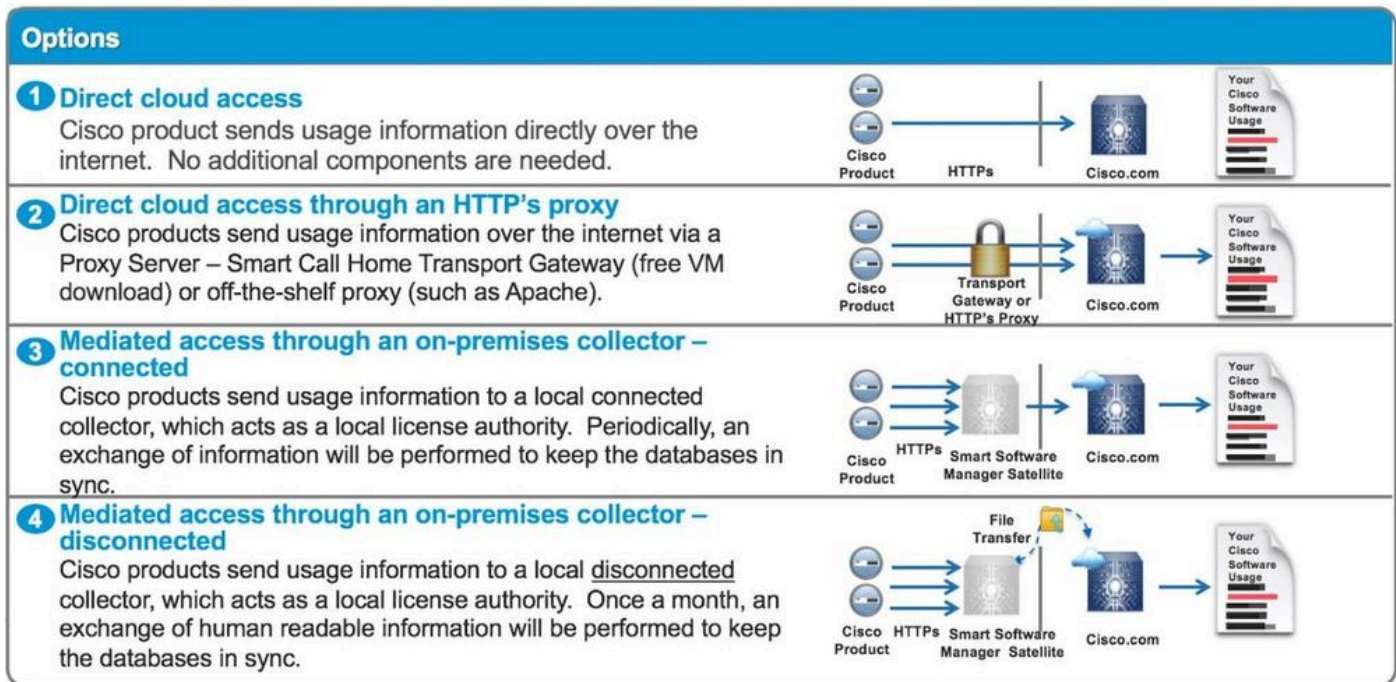
*Press ctrl + c to copy selected text to clipboard.*

## Step 2. Token Registration Preparation

Here are the Registration methods (direct/proxy/satellite).

If NSO or any Cisco products need smart licenses talk to Cisco Smart Software Manager (or Cisco Cloud) to register themselves.

There are four main options to set-up Smart License Supported Environment:



### Option 1. Direct Cloud Access

With this method, NSO server needs to be able to talk to Cisco Cloud directly with https. Using HTTP is supported, however, it is not recommended for security reason.

In this method, the registration process can be started without special configuration.

### Option 2. Direct Cloud Access through an HTTPS Proxy

If you need to use HTTP(S) proxy server to connect to the web on the Internet, the smart agent in NSO has to be configured with proxy server information.

When option 2 is used, smart-agent needs to be instructed to send its registration request to the proxy server instead of directly sending to Cisco.

It depends on versions, the way to configure is different.

### NSO 4.5 or Later

From NSO 4.5, it is now possible to configure smart-license configuration through ncs.conf. If smart-license configuration exists in both **ncs.conf** and NSO CDB, the configuration in ncs.conf takes precedence.

This means that the commands such as "`smart-license smart-agent override-url url https://10.1.2.3/`"; do not take effect if a different configuration is present in ncs.conf. When doing an NSO system install, ncs.conf by default includes the following:

```
<smart-license>
  <smart-agent>
    <java-executable>DEFAULT</java-executable>
    <java-options>DEFAULT</java-options>
    <production-url>DEFAULT</production-url>
    <alpha-url>DEFAULT</alpha-url>
```

```
<override-url>
  <url>DEFAULT</url>
</override-url>
<proxy>
  <url>DEFAULT</url>
</proxy>
</smart-agent>
</smart-license>
```

DEFAULT means it uses the default values as defined in \$install\_dir/src/ncs/yang/tailf-ncs-smart-license.yang.

To configure leafs listed in ncs.conf in NSO CDB instead, make sure to remove the respective entry from ncs.conf and perform **"/etc/init.d/ncs reload**.

## NSO 4.4

Configure proxy URL on this path.

**smart-license smart-agent proxy url <proxy url>**

```
admin@ncs(config)# smart-license smart-agent proxy url https://10.10.10.10:8080
admin@ncs(config)#
```

In the default configuration, NSO connects to <https://tools.cisco.com/its/service/oddce/services/DDCEService>, so HTTPS proxy needs to be used.

This proxy configuration sets for both HTTPS and HTTP automatically, so if you change the target URL to HTTP for usage of Satellite that is explained at Option 3. or 4., one configuration is still able to handle both cases.

### Option 3. Mediated Access through an On-premises Collector-Connected

In many cases, the NSO network is not connected to the Internet directly. Other than Option 2., the Smart Software Manager Satellite can be introduced; so that NSO does not need to exchange messages directly to the Cisco Cloud.

The product details of Smart Software Manager Satellite can be found [here](#).

For how to install, find installation guide in the link.

When you use this method, NSO1 talks to the Satellite instead of the Cisco Cloud.

To change the target, you can modify override-url:

```
admin@ncs(config)# smart-license smart-agent override-url url https://10.1.2.3/
admin@ncs(config)#
```



This URL can be found in the administrative web of Smart Software Manager Satellite.

#### **Option 4: Mediated Access through an On-premises Collector-Disconnected**

This method is exactly the same with method (3) from NSO point of view. The difference is only how to sync with Cisco Cloud from Smart Software Manager Satellite.

### **Step 3. Token Registration**

After you use the token, activate NSO with the generated token to the Cisco Server. The token is used on the NSO CLI to register to CSSM. When the command is entered, the registration process is initiated asynchronously.

```
admin@ncs# smart-license register idtoken YWV1MmQ3ZjEtYT...
result Registration process in progress. Use the 'show license status' command to check the progress and
admin@ncs#
```

## **Verify**

Use this section in order to confirm that your configuration works properly.

**Before Registration:** Smart Licensing is always enabled. The output indicates that NSO is not registered, and in EVAL MODE which expires in 89 days 23 hours.

```
admin@ncs# show license status

Smart Licensing is ENABLED

Registration:
  Status: UNREGISTERED
  Export-Controlled Functionality: Allowed

License Authorization:
  Status: EVAL MODE
  Evaluation Period Remaining: 89 days, 23 hr, 17 min, 36 sec
  Last Communication Attempt: NONE
  Next Communication Attempt: NONE
Development mode: enabled
admin@ncs#
```

The registration status can be checked with **show license status** command. If the registration is still in process, the command shows this output and says; "REGISTRATION PENDING".

**<Still registering...>**

```
admin@ncs# show license status

Smart Licensing is ENABLED
```

Registration:

Status: UNREGISTERED - REGISTRATION PENDING  
Initial Registration: First Attempt Pending  
Export-Controlled Functionality: Allowed

License Authorization:

Status: EVAL MODE  
Evaluation Period Remaining: 89 days, 23 hr, 16 min, 36 sec  
Last Communication Attempt: SUCCEEDED on Aug 3 09:41:56 2016 UTC  
Next Communication Attempt: NONE

Development mode: enabled

admin@ncs#

After a while, the registration gets completed. When you see the status REGISTERED, the system is registered to CSSM.

<Registered!!>

<#root>

admin@ncs# show license status

Smart Licensing is ENABLED

Registration:

Status:

**REGISTERED**

Smart Account: BU Production Test  
Virtual Account: TAC-Japan-Cloudorch  
Export-Controlled Functionality: Allowed  
Initial Registration: SUCCEEDED on Aug 4 05:29:52 2016 UTC  
Last Renewal Attempt: SUCCEEDED on Aug 4 05:30:03 2016 UTC  
Next Renewal Attempt: Jan 31 05:30:03 2017 UTC  
Registration Expires: Aug 4 05:24:56 2017 UTC  
Export-Controlled Functionality: Allowed

License Authorization:

License Authorization:

Status: AUTHORIZED on Aug 4 05:30:05 2016 UTC  
Last Communication Attempt: SUCCEEDED on Aug 4 05:25:02 2016 UTC  
Next Communication Attempt: Sep 3 05:30:07 2016 UTC  
Communication Deadline: Aug 4 05:24:56 2017 UTC

Development mode: enabled

admin@ncs#

## Usage (Authorized Status)

What license is used can be seen with **show license summary** command. In the this example, NSO-platform-production, NSO-network-element and cisco-ios-NED are used in the system. Notice that License Authorization status is "AUTHORIZED". This means that the all components that require licenses are correctly working under a legal state.

<#root>

```
admin@ncs# show license summary
Smart Licensing is ENABLED
```

Registration:

```
Status: REGISTERED
Smart Account: COMPANY A
Virtual Account: Network Department
Last Renewal Attempt: None
Next Renewal Attempt: Jan 31 05:33:02 2017 UTC
```

License Authorization:

Status:

**AUTHORIZED**

```
Last Communication Attempt: SUCCEEDED
Next Communication Attempt: Sep 3 05:33:06 2016 UTC
```

License Usage:

License	Entitlement Tag
---------	-----------------

-----  
348fbb21-7edf-42bb-baa7-198903058a54regid.2016-04.com.cisco.

**NSO-platform-production**

,4.2_348fbb21-7edf-42bb-baa7-198903058a54	1	InCompliance
5d641fa0-757d-43b0-a926-166cb6e3cfdregid.2015-10.com.cisco.		

**NSO-network-element**

,1.0_5d641fa0-757d-43b0-a926-166cb6e3cfd	3	InCompliance
d9eca34d-1f6a-4595-ad74-9c0c57e03c27regid.2015-10.com.cisco.		

**cisco-ios-NED**

,1.0_d9eca34d-1f6a-4595-ad74-9c0c57e03c27	1	InCompliance
---	---	--------------

Development mode: disabled

admin@ncs#

This is an output of **show license usage** command in a different example. In this example, cisco-iosxr-NED is also added, and the status is OutOfCompliance. This indicates that to register to CSSM is fine, however, a license for cisco-iosxr-NED is insufficient in the virtual account. Because of out of compliance status of cisco-iosxr-NED, the overall status is OUT\_OF\_COMPLIANCE.

<#root>

```
admin@ncs # show license usage
```

License Authorization Status :

**OUT\_OF\_COMPLIANCE**

as of Oc 24 06:14:11 2016 UTC

```
NSO-platform-production (regid.2016-04.com.cisco.NSO-platform-production, 1.0_d1445dab-9d96-4593-99f2-6
Description : API unavailable
Count : 1
Version : 1.0
Status :
```

## InCompliance

NSO-network-element (regid.2015-10.com.cisco.NSO-network-element, 1.0\_5d641fa0-757d-43b0-a926-166cb6e3c  
Description : API unavailable  
Count : 3  
Version : 1.0  
Status :

## InCompliance

cisco-ios-NED (regid.2015-10.com.cisco.cisco-ios-NED, 1.0\_d9eca34d-1f6a-4595-ad74-9c0c57e03c27)  
Description : API unavailable  
Count : 1  
Version : 1.0  
Status :

## InCompliance

cisco-iosxr-NED (regid.2015-10.com.cisco.cisco.cisco-iosxr-NED, 1.0\_9956fc34-cbed-4d13-a1ea-6a36f4e40a9  
Description : API unavailable  
Count : 1  
Version : 1.0  
Status :

## OutOfCompliance

# Troubleshoot

Try to enable debug on smart license feature. When debug is enabled, debug log is generated into the file specified in /smart-license/smart-agent/stdout-capture/file. smart license debug generates much logs, and it is recommended to disable the debug after collecting data.

## Debug enable

```
admin@ncs# debug smart_lic all  
ok  
admin@ncs#
```

## Debug disable

```
admin@ncs# no debug smart_lic all  
ok  
admin@ncs#
```

## Smart license log config

```
admin@ncs# show running-config smart-license
smart-license smart-agent stdout-capture disabled
smart-license smart-agent stdout-capture file ./logs/ncs-smart-licensing.log
admin@ncs#
```

## **Enable smart license log**

```
admin@ncs(config)# smart-license smart-agent stdout-capture enabled
admin@ncs(config)# commit
Commit complete.
admin@ncs(config)#
```