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Cisco Nexus 7000 NX-OS Licensing Guide, Release 4.0

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Licensing allows you to access specified premium features on the device after you install the appropriate license for that feature. This publication contains information related to licensing types, options, procedures, installation, and management for the Cisco NX-OS software.

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Licensing Terminology

The following terms are used in this chapter:

- **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.
- **Incremental license**—An additional licensed feature that was not in the initial license file. License keys are incremental—if you purchase some features now and others later, the license file and the software detect the sum of all features for the specified device.
- **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/warp/public/687/Directory/DirTAC.shtml>

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Licensing Model

The licensing model for the Cisco NX-OS software is feature-based. Feature-based licenses make features available to the entire physical device. [Table 1](#) lists the feature-based license packages.



Note

Any feature not included in a license package is bundled with the Cisco NX-OS software and is provided at no extra charge to you.

Table 1 Feature-Based Licenses

Feature License	Features
Enterprise Services Package (LAN_ENTERPRISE_SERVICES_PKG)	<ul style="list-style-type: none"> • Open Shortest Path First (OSPF) Protocol • Border Gateway Protocol (BGP) • Intermediate System-to-Intermediate System (IS-IS) Protocol (Layer 3 only) • Protocol Independent Multicast (PIM) (sparse mode, bidirectional mode, and source-specific mode (SSM)) • Multicast Source Discovery Protocol (MSDP) • Policy-Based Routing • Generic routing encapsulation (GRE) tunnel • Enhanced Interior Gateway Routing Protocol (EIGRP)
Advanced Services Package (LAN_ADVANCED_SERVICES_PKG)	<ul style="list-style-type: none"> • Cisco TrustSec • Virtual device contexts (VDCs)



Note

The licenses are independent of each other. If you want to use features that are covered by different licenses, you must install both licenses. For example, if you want to use EIGRP and VDCs, you must install both the Enterprise Services Package license and the Advanced Services Package license.

Licensing Virtualization Support

You install and manage licenses on the physical device in the default VDC (VDC 1). Licenses apply to features in all virtual device contexts (VDCs) and Virtual Routing and Forwarding instances (VRFs) on the physical device. You do not need to obtain a separate license for each VDC or VRF.

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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.



Note Cisco TrustSec does not have a grace period.

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 Installation

You can either obtain a factory-installed license (only applies to new device orders) or perform a manual license installation of the license (applies to existing devices in your network).



Note Only users with the network-admin role can install licenses on Cisco NX-OS devices. For information on user accounts and roles, see the [Cisco NX-OS Security Configuration Guide, Release 4.0](#).

This section includes the following topics:

- [Obtaining a Factory-Installed License, page 5](#)
- [Performing a Manual Installation, page 5](#)

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Obtaining a Factory-Installed License

You can obtain factory-installed licenses for a new Cisco NX-OS device.

To obtain a factory-installed license, follow these steps:

Step 1 Contact your reseller or Cisco representative and request this service.



Note 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/warp/public/687/Directory/DirTAC.shtml>

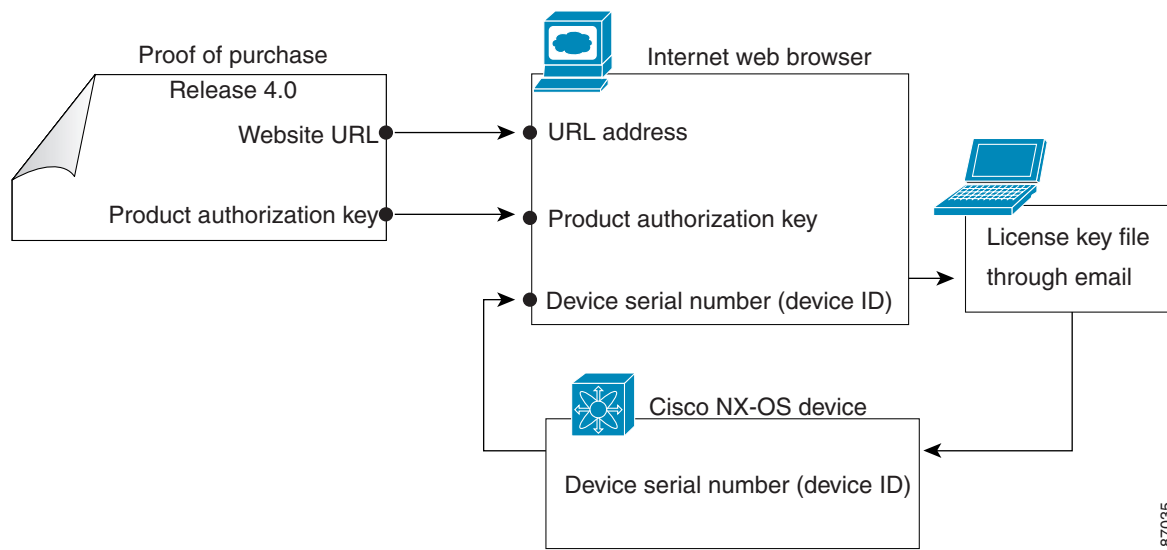
Your device is shipped with the required licenses installed in the system.

Step 2 Start using the device and the licensed features.

Performing a Manual Installation

If you have existing devices or if you wish to install the licenses on your own, you must first obtain the license key file and then install that file in the device (see [Figure 1](#)).

Figure 1 Obtaining a License Key File



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Obtaining the License Key File

To obtain new or updated license key files, follow these steps:

- Step 1** Use the **show license host-id** command to obtain the serial number for your device. The host ID is also referred to as the device serial number.

```
switch# show license host-id
License hostid: VDH=FOX064317SQ
```



Tip Use the entire ID that appears after the equal sign (=). In this example, the host ID is FOX064317SQ.

- Step 2** Obtain your claim software license certificate document. If you cannot locate your software license claim certificate, contact Cisco Technical Support at this URL:
<http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml>

- Step 3** Locate the product authorization key (PAK) from the software license claim certificate document.

- Step 4** Locate the website URL from the software license claim certificate document. You can access the Product License Registration website from the Software Download website at this URL:
<http://www.cisco.com/kobayashi/sw-center/index.shtml>

- Step 5** Follow the instructions on the Product License Registration website to register the license for your device.

The license key file is sent to you by e-mail and is digitally signed to only authorize use on the requested device. The requested features are also enabled once the Cisco NX-OS software on the specified device accesses the license key file.



Caution Do not make any modifications to the license key file.

A license is permanent. If you do not have a license, the grace period for using a feature starts from the first time you start using a feature offered by a license (see the “[Configuring the Grace Period Feature](#)” section on page 12).



Note Cisco TrustSec does not have a grace period. You must obtain an Advanced Services license to use Cisco TrustSec.

- Step 6** Use the **copy licenses** command from the default VDC to save your license file to one of four locations—the bootflash: directory, the slot0: device, the usb1: device, or the usb2: device (see the “[Backing Up Licenses](#)” section on page 8).



Note Only users with the network-admin role can copy licenses on Cisco NX-OS devices. For information on user accounts and roles, see the [Cisco NX-OS Security Configuration Guide, Release 4.0](#).

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Installing the License Key File

You install the license for the physical device in the default VDC (VDC 1). License applies to features in all VDCs and VRFs on the physical device.



Note

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.



Tip

If you need to install multiple licenses in any device, be sure to provide unique filenames for each license key file.

To install a license key file in the default VDC, follow these steps:

Step 1 Log into the device through the console port of the active supervisor.



Note

Only users with the network-admin role can install licenses on Cisco NX-OS devices. For information on user accounts and roles, see the [Cisco NX-OS Security Configuration Guide, Release 4.0](#).

Step 2 Perform the installation by using the **install license** command on the active supervisor module from the device console.

```
switch# install license bootflash:license_file.lic
Installing license ..done
```



Note

If you provide a target name for the license key file, the file is installed with the specified name. Otherwise, the filename specified in the license key file is used to install the license.

Step 3 (Optional) Back up the license key file (see the [“Backing Up Licenses” section on page 8](#))

Step 4 Exit the device console and open a new terminal session to view all license files installed on the device using the **show license** command.

```
switch# show license
Enterprise.lic:
SERVER this_host ANY
VENDOR cisco
INCREMENT LAN_ENTERPRISE_SERVICES_PKG cisco 1.0 permanent uncounted \
  VENDOR_STRING=<LIC_SOURCE>MDS_SWIFT</LIC_SOURCE><SKU>N7K-LAN1K9=</SKU> \
  HOSTID=VDH=TBC10412106 \
  NOTICE="<LicFileID>20071025133322456</LicFileID><LicLineID>1</LicLineID>
  \
  <PAK></PAK>" SIGN=0CC6E2245FBE
```



Note

If the license meets all guidelines when the **install license** command is used, all features and modules continue functioning as configured.

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You can use the **show license brief** command to display a list of license files installed on the device.

```
switch# show license brief
Enterprise.lic
```

You can use the **show license file** command to display information about a specific license file installed on the device.

```
switch# show license file Enterprise.lic
Enterprise.lic:
SERVER this_host ANY
VENDOR cisco
INCREMENT LAN_ENTERPRISE_SERVICES_PKG cisco 1.0 permanent uncounted \
  VENDOR_STRING=<LIC_SOURCE>MDS_SWIFT</LIC_SOURCE><SKU>N7K-LAN1K9=</SKU> \
  HOSTID=VDH=TBC10412106 \
  NOTICE="<LicFileID>20071025133322456</LicFileID><LicLineID>1</LicLineID>
  \
  <PAK></PAK>" SIGN=0CC6E2245FBE
```

Step 5 (Optional) Enable licensed features, if necessary, using the **feature *feature-name*** command in global configuration mode. For example, you can enable the BGP feature as follows:

```
switch# configure terminal
switch(config)# feature bgp
```

For a list of the licensed features, see the [“Licensing Model” section on page 3](#). For information on enabling other licensed features, see the [“Related Documentation” section on page 16](#) for the configuration guides for those features.

Backing Up Licenses

If the configuration or bootflash memory on your device becomes corrupted, you might need to reinstall your license. You can do this from a backed up copy of the license key file. If you do not have a license key file, you can create a copy of the license key file from your installed license.



Note

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, which you can from the backed up copy.



Caution

If you erase any existing licenses installed on your device, you can only reinstall them using the **install license** command using the license key file.



Note

Only users with the network-admin role can backup licenses on Cisco NX-OS devices from the default VDC (VDC 1). For information on user accounts and roles, see the [Cisco NX-OS Security Configuration Guide, Release 4.0](#).

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Backing Up the License Key File

You can back up your license key file to an external Flash device or to a remote server using the **copy** command. This example shows how to save a license key file to an external Flash device:

```
switch# copy bootflash:license_file.lic slot0:license_file.lic
```

This example shows how to save a license key file to a remote server:

```
switch# copy bootflash:license_file.lic tftp://10.10.1.1/license_file.lic
```

For more information on copying files, see the *Cisco NX-OS Fundamentals Configuration Guide, Release 4.0*.

Backing Up an Installed License

You can back up your license key file to an external Flash device or to a remote server using the **copy** command.

This example saves all licenses installed on your device to a .tar file and copies it to a remote UNIX-based server:

```
switch# copy licenses bootflash:Enterprise.tar
Backing up license done
switch# copy bootflash:Enterprise.tar tftp://10.10.1.1/Enterprise.tar
```

You can uncompress the .tar file on the remote UNIX-based server to create one or more backup license key files, depending on how many licenses you have installed.

For more information on copying files, see the *Cisco NX-OS Fundamentals Configuration Guide, Release 4.0*.

Identifying License Features in Use

When a Cisco NX-OS software feature is enabled in a VDC, it can activate a license grace period. To identify the features active in a VDC for a specific license, use the **show license usage license-name** command.

```
switch# show license usage LAN_ADVANCED_SERVICES_PKG
Application
-----
bgp
ospf
-----
```

To identify the features active in all VDCs for a specific license, use the **show license usage vdc-all license-name** command in the default VDC.

```
switch# show license usage vdc-all LAN_ADVANCED_SERVICES_PKG
Application
-----
bgp
ospf
bgp@2
ospf@2
-----
```

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**Note**

The “@2” after the feature name in the **show license usage** command output indicates that the feature is enabled in VDC 2.

Use the **show license usage** command to identify all of the active features in a VDC.

```
switch# show license usage
Feature                               Ins  Lic  Status Expiry Date Comments
                                   Count
-----
LAN_ADVANCED_SERVICES_PKG             No   -   In use          Grace 119D 22H
LAN_ENTERPRISE_SERVICES_PKG           Yes  -   In use Never      -
```

Use the **show license usage vdc-all** command from the default VDC to identify all of the active features in all VDCs.

```
switch# show license usage vdc-all
```

Uninstalling Licenses

You can only uninstall a permanent license that is not in use. If you try to delete a permanent license that is currently being used, the software rejects the request and issues an error message. Uninstalling an unused license causes the grace period to come into effect. The grace period is counted from the first use of the feature without a license and is reset when a valid license file is installed. You can uninstall a license only from the default VDC (VDC 1).

**Note**

Only users with the network-admin role can uninstall licenses on Cisco NX-OS devices. For information on user accounts and roles, see the [Cisco NX-OS Security Configuration Guide, Release 4.0](#).

**Note**

Permanent licenses cannot be uninstalled if they are currently being used. Features turned on by permanent licenses must first be disabled, before that license is uninstalled.

**Tip**

If you are using an evaluation license and would like to install a new permanent license, you can do so without service disruption and before the evaluation license expires. Removing an evaluation license immediately triggers a grace period without service disruption.

**Caution**

You must disable the features that are related to the feature before uninstalling a license. The delete procedure fails if the license is in use.

To uninstall a license from the default VDC, follow these steps:

Step 1

Save your running configuration to a remote server using the **copy** command.

```
switch# copy running-config tftp://server/path/filename
```

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- Step 2** Use the **show license brief** command to view a list of all installed license key files and identify the file to be uninstalled. In this example, the file to be uninstalled is the Enterprise.lic file.

```
switch# show license brief
Enterprise.lic
```

- Step 3** Disable the features provided by the license to be uninstalled. Use the **show license usage vdc-all package_name** command in the default VDC to view the enabled features for a specified package in all VDCs.

```
switch# show license usage vdc-all LAN_ENTERPRISE_SERVICES_PKG
Application
-----
bgp
ospf
bgp@2
ospf@2
-----
```



Note If the features names in the **show license usage vdc-all** command output are followed by “@” and a number, that means that the feature is enabled in a nondefault VDC and must be disabled from that VDC. The number after the feature name is the nondefault VDC identifier number. Use the **show vdc** command and **switchto vdc** command to reach the nondefault VDC where you can disable the features.

- Step 4** Uninstall the Enterprise.lic file using the **clear license filename** command, where *filename* is the name of the installed license key file.

```
switch# clear license Enterprise.lic
Clearing license Enterprise.lic:
SERVER this_host ANY
VENDOR cisco
```

- Step 5** Continue uninstalling the license by entering **yes**.

```
Do you want to continue? (y/n) y
Clearing license ..done
```

The Enterprise.lic license key file is now uninstalled.

Updating Licenses

If your license is time bound, you must obtain and install an updated license. Contact technical support to request an updated license. You can update the license only from the default VDC (VDC 1).



Note 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/warp/public/687/Directory/DirTAC.shtml>



Note Only users with the network-admin role can update licenses on Cisco NX-OS devices. For information on user accounts and roles, see the *Cisco NX-OS Security Configuration Guide, Release 4.0*.

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To update a license, follow these steps:

Step 1 Obtain the updated license file using the procedure described in the [“Obtaining the License Key File” section on page 6](#).

Step 2 Save your running configuration to a remote server using the **copy** command.

Step 3 Use the **show license brief** command to verify the name of the file to be updated.

```
switch# show license brief
Enterprise.lic:
```

Step 4 Update the license file using the **update license url** command, where *url* specifies the bootflash:, slot0:, usb1:, or usb2: location of the updated license file.

```
switch# update license bootflash:Enterprise1.lic Enterprise.lic
```

Step 5 Continue with the license update by entering **yes** (yes is the default).

```
Do you want to continue? (y/n) y
Updating license ..done
switch#
```

The Enterprise.lic license key file is now updated.

Step 6 (Optional) Enable licensed features, if necessary, using the **feature *feature-name*** command in global configuration mode. For example, you can enable the BGP feature as follows:

```
switch# configure terminal
switch(config)# feature bgp
```

For a list of the licensed features, see [“Licensing Model” section on page 3](#). For information on enabling licensed features, see the [“Related Documentation” section on page 16](#) for the configuration guides for those features.

Configuring the Grace Period Feature

The grace period feature allows you to use licensed features that do not have a license key. By default the license period feature is disabled. While the grace period feature is disabled, users cannot accidentally enable licensed features. You can enable and disable the grace period only from the default VDC (VDC 1).



Note

Only users with the network-admin role can enable the grace period on Cisco NX-OS devices. For information on user accounts and roles, see the [Cisco NX-OS Security Configuration Guide, Release 4.0](#).

This section includes the following topics:

- [Enabling the License Grace Period, page 13](#)
- [Disabling the License Grace Period, page 13](#)

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Enabling the License Grace Period

Use the **license grace-period** command to enable the grace period feature from the default VDC:

```
switch# configure terminal
switch(config)# license grace-period
```

You might have to enable a licensed feature to configure it. To enable a licensed feature, use the **feature feature-name** command in global configuration mode. For example, you can enable the BGP feature as follows:

```
switch# configure terminal
switch(config)# feature bgp
```

For a list of the licensed features, see the “[Licensing Model](#)” section on page 3. For information on enabling licensed features, see the “[Related Documentation](#)” section on page 16 for the configuration guides for those features.

Disabling the License Grace Period

To disable the grace period, you must disable all features in all VDCs that use the license grace period. Otherwise, the Cisco NX-OS software rejects the request and issues an error message. To disable the license grace period, follow these steps:

Step 1 Use the **show license usage** command in the default VDC to display the licenses using the grace period.

```
switch# show license usage
Feature                               Ins Lic  Status Expiry Date Comments
                                      Count
-----
LAN_ADVANCED_SERVICES_PKG            Yes  -    In use Never          -
LAN_ENTERPRISE_SERVICES_PKG          No   -    In use              Grace 119D 22H
-----
```

Step 2 Disable the features provided by the license using the grace period. Use the **show license usage vdc-all package_name** command in the default VDC to view the enabled features for a specified package in all VDCs.

```
switch# show license usage vdc-all LAN_ENTERPRISE_SERVICES_PKG
Application
-----
bgp
ospf
bgp@2
ospf@2
-----
```



Note

If a feature name in the **show license usage vdc-all** command output is followed by “@” and a number, that means that the feature is enabled in a nondefault VDC and you must disable it from that VDC. The number after the feature name is the nondefault VDC identifier number. Use the **show vdc** command and **switchto vdc** command to reach the nondefault VDC where you can disable the feature.

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Step 3 Disable the grace period from the default VDC.

```
switch# configure terminal
switch(config)# no license grace-period
```

Grace Period Alerts

Cisco NX-OS gives you a 120-day grace period. This grace period starts or continues when you are evaluating a feature for which you have not installed a license. The grace period applies to all VDCs on the physical device. If you start the grace period by enabling a licensed feature in one VDC, the grace period starts for all VDCs.

The grace period stops if you disable a feature that you are evaluating, but if you enable that feature again without a valid license, the grace period countdown continues where it left off.

The grace period operates across all features in a license package. License packages can contain several features. If you disable a feature during the grace period and there are other features in that license package that are still enabled, the countdown does not stop for that license package. To suspend the grace period countdown for a license package, you must disable every feature in that license package in all VDCs on the physical device. Use the **show license usage vdc-all license-name** command in the default VDC to determine which features to disable.

```
switch# show license usage LAN_ENTERPRISE_SERVICES_PKG
Application
-----
bgp
ospf
bgp@2
ospf@2
-----
```



Note

If a feature name in the **show license usage vdc-all** command output is followed by “@” and a number, that means that the feature is enabled in a nondefault VDC and you must disable it from that VDC. The number after the feature name is the nondefault VDC identifier number. Use the **show vdc** command and **switchto vdc** command to reach the nondefault VDC where you can disable the feature.

The Cisco NX-OS license counter keeps track of all licenses on a device. If you are evaluating a feature and the grace period has started, you will receive console messages, SNMP traps, system messages, and Call Home messages on a daily basis.

Beyond that, the frequency of these messages become hourly during the last seven days of the grace period. The following example uses the VDC feature. On January 30th, you enabled the VDC feature, using the 120-day grace period. You will receive grace period ending messages as follows:

- Daily alerts from January 30th to May 21st.
- Hourly alerts from May 22nd to May 30th.

On May 31st, the grace period ends, and the VDC feature is automatically disabled. You will not be allowed to use VDC until you purchase a valid license.



Note

You cannot modify the frequency of the grace period messages.

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Caution

After the final seven days of the grace period, the feature is turned off and your network traffic may be disrupted. Any future upgrade will enforce license requirements and the 120-day grace period.

Use the **show license usage** command to display grace period information for a device.

```
switch# show license usage
Feature                               Ins  Lic   Status Expiry Date Comments
                                Count
-----
LAN_ADVANCED_SERVICES_PKG             Yes  -    In use Never          -
LAN_ENTERPRISE_SERVICES_PKG           No   -    In use              Grace 119D 22H
-----
```

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. If you need to transfer a license from one physical device to another, contact your customer service representative.



Note

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/warp/public/687/Directory/DirTAC.shtml>

Verifying the License Configuration

To display the license configuration information, perform one of the following tasks:

Command	Purpose
show license [brief]	Displays information for all installed license files.
show license file	Displays information for a specific license file.
show license host-id	Displays the host ID for the physical device.
show license usage	Displays the usage information for installed licenses.

For detailed information about the fields in the output from these commands, see the *Cisco NX-OS Fundamentals Command Reference, Release 4.0*.

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Additional References

For additional information related to implementing AAA, see the following sections:

- [MIBs, page 16](#)

MIBs

MIBs	MIBs Link
<ul style="list-style-type: none"> • CISCO-LICENSE_MGR-MIB 	To locate and download MIBs, go to the following URL: http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml

Related Documentation

The following Cisco NX-OS documents are published on [Cisco.com](http://www.cisco.com):

Release Notes

Cisco NX-OS Release Notes, Release 4.0

NX-OS Configuration Guides

Cisco NX-OS Getting Started with Virtual Device Contexts, Release 4.0

Cisco NX-OS Fundamentals Configuration Guide, Release 4.0

Cisco NX-OS Interfaces Configuration Guide, Release 4.0

Cisco NX-OS Layer 2 Switching Configuration Guide, Release 4.0

Cisco NX-OS Quality of Service Configuration Guide, Release 4.0

Cisco NX-OS Unicast Routing Configuration Guide, Release 4.0

Cisco NX-OS Multicast Routing Configuration Guide, Release 4.0

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Other Software Document

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Feature History for Licensing

Table 1-2 lists the release history for this feature.

Table 1-2 *Feature History for Licensing*

Feature Name	Releases	Feature Information
Licensing	4.0(1)	This feature was introduced.

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