BROADCOM®

Brocade® Fabric OS® Software Licensing User Guide, 9.0.x

User Guide
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Copyright Statement

Introduction

About This Document

This document describes the basics of Fabric OS® (FOS) licensing and provides a list of Fabric OS licenses, the licensing models and tasks, and the licensing requirements for individual features.

Supported Hardware and Software

The following hardware platforms are supported by Brocade® Fabric OS 9.0.x.

Brocade Gen 7 (64G) Fixed-Port Switches

- Brocade G720 Switch

Brocade Gen 7 (64G) Directors

For ease of reference, Brocade chassis-based storage systems are standardizing on the term *director*. The legacy term *backbone* can be used interchangeably with the term *director*.

- Brocade X7-4 Director
- Brocade X7-8 Director

Brocade Gen 6 (32G) Fixed-Port Switches

- Brocade G610 Switch
- Brocade G620 Switch
- Brocade G630 Switch
- Brocade 7810 Extension Switch
- Brocade G648 Blade Server SAN I/O Module
- Brocade MXG610 Blade Server SAN I/O Module

Brocade Gen 6 (32G) Directors

- Brocade X6-4 Director
- Brocade X6-8 Director

Contacting Technical Support for Your Brocade® Product

For product support information and the latest information on contacting the Technical Assistance Center, go to https://www.broadcom.com/support/fibre-channel-networking/. If you have purchased Brocade® product support directly from Broadcom, use one of the following methods to contact the Technical Assistance Center 24x7.

Online	Telephone
For nonurgent issues, the preferred method is to log in to myBroadcom at https://www.broadcom.com/mybroadcom. (You must initially register to gain access to the Customer Support Portal.) Once there, select **Customer Support Portal** > **Support Portal**. You will now be able to navigate to the following sites: • **Knowledge Search**: Clicking the top-right magnifying glass brings up a search bar. • **Case Management**: The legacy MyBrocade case management tool (MyCases) has been replaced with the Fibre Channel Networking case management tool. • **DocSafe**: You can download software and documentation. • **Other Resources**: Licensing Portal (top), SAN Health (top and bottom), Communities (top), Education (top).	Required for Severity 1 (critical) issues: Please call Fibre Channel Networking Global Support at one of the numbers listed at https://www.broadcom.com/support/fibre-channel-networking/.

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- OEM/solution providers are trained and certified by Broadcom to support Brocade products.
- Broadcom provides backline support for issues that cannot be resolved by the OEM/solution provider.
- Brocade Supplemental Support augments your existing OEM support contract, providing direct access to Brocade expertise. For more information on this option, contact Broadcom or your OEM.
- For questions regarding service levels and response times, contact your OEM/solution provider.

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Software Licensing Overview

Licensing Overview

Certain Fabric OS features require licenses to be enabled. These licenses, called feature licenses, are often factory-installed and supplied with your switch hardware; if they are not, they can be purchased separately from your switch vendor, who provides the transaction keys to activate the associated feature or features. Each product, each feature, and each individual switch within a fabric require its own license key.

Fabric OS includes a switch, fabric software, and support for optionally licensed software that is enabled using license keys.

See Available Fabric OS Licenses for a list of the optionally licensed features available in Fabric OS.

Software Licensing Terminology

The following terms are used in this document:

- **Licensed feature** – Any hardware or software feature or set of features that requires a valid software license to operate on the device.
- **License file** – The file produced by the Broadcom licensing portal when the license is generated. The license file can be an alphanumeric string formatted license or an XML file formatted license. The file is installed using the CLI, SANnav, or Brocade Network Advisor and controls access to a licensed feature or feature set.
- **License ID (LID)** – The identification number that uniquely identifies a Brocade device. The LID is the same value as the WWN. The LID is used in conjunction with a transaction key to generate and download a software license from the Broadcom licensing portal. The software license is tied to the LID of the Brocade device for which the license was ordered and generated. You can view the LID using either the CLI or the GUI:
  - **CLI** – Connect to the switch and log in as an admin user. Enter `license --show -lid` to display the license ID of the switch.
  - **Web Tools GUI** – Connect to the switch using a web browser, which opens the Web Tools GUI. Log in as an admin and enter your switch password. Click **Switch Overview** in the top menu bar to view the switch details and WWN (LID).
- **Transaction key** – A unique key, along with the LID, used to generate a software license from the Broadcom licensing portal. The transaction key is issued when a license is purchased. The transaction key is delivered in one of two methods:
  - **Paperpack** – The transaction key is printed and delivered within a POD Optic Hardware Kit.
  - **E-license** – The transaction key is contained in an email that is sent instantly to the customer after the sales order is created. The customer is sent the email message within a few minutes after the sales order is submitted, although the timing will vary depending on the network, internet connection, and so on.

How Software Licensing Works

A permanent license can be ordered for selected features after a switch is first shipped from the factory, or a switch SKU can be ordered that includes the factory-installed license.

When a license is ordered separately (not preinstalled), a paperpack or email with a transaction key is sent to you by Broadcom. The transaction key and license ID (LID) of the FOS switch are used to generate a license key from the Broadcom licensing portal. The FOS license keys are generated as an alphanumeric string format or as a license certificate in XML file format. You can install the license on the switch using the `license --install` command.

Once a license is installed on the Fabric OS switch, the licensed feature is generally available immediately without requiring a switch reboot. However, some licenses may require that you reboot the switch to activate the license; the

`license --install` command prompts you to reboot the switch. For port-related licenses, use the `portEnable` command to enable a port or to disable and re-enable the switch to make all newly added ports available simultaneously.

When a temporary license expires, the CLI commands related to the feature are disabled; but the feature itself cannot be disabled until the system reloads.

License Type for Different Platforms

Brocade Platforms	License Type
Brocade G610 Switch	License string or XML file
Brocade G620 Switch	License string or XML file
Brocade G630 Switch	License string or XML file
Brocade 7810 Extension Switch	License string
Brocade X6 Director	License string or XML file
Brocade G720 Switch	XML file
Brocade X7 Director	XML file

License Types for Different FOS Platforms

You can identify the license type for different Gen 6 and Gen 7 platforms based on their switch type. The following table provides you the type of license used in different platforms.

License Type for Different Platforms and Switch Types

Brocade Platforms	Switch Type	License Type
Brocade G610 Switch	170	License string or XML file
Brocade G620 Switch	162	License string
Brocade G620 Switch	183	XML file
Brocade G630 Switch	173	License string
Brocade G630 Switch	184	XML file
Brocade 7810 Extension Switch	178	License string
Brocade X6-4 Director	165	License string or XML file
Brocade X6-8 Director	166	License string or XML file
Brocade G720 Switch	181	XML file
Brocade X7-4 Director	179	XML file
Brocade X7-8 Director	180	XML file

License Types

Fabric OS supports the following license types:

- Permanent license – A permanent license enables a license-controlled feature to run on the switch indefinitely. The customers with an active support can transfer the permanent license from the failed switch to the replacement switch.
- Temporary license – A temporary license enables a license-controlled feature to run on the switch on a temporary basis. A temporary license enables demonstration and evaluation of a licensed feature and can be valid for a period of 45 days.
- Universal temporary license – A universal temporary license can be installed only once on a switch, but it can be applied to as many switches as required. The temporary use duration (the length of time for which the feature will be enabled on a switch) is provided with the license keys.

License Models

Fabric OS supports the following license models:

- Regular model – This license model is associated with a feature that has no scale or count parameter associated with it. Only a single instance of this license is supported on a target platform, and that license allows all capability for that feature.
- Capacity model – This license model is for a feature that has a scale or count parameter such as the count of additional ports or towers allowed. A previous capacity-based license that is installed is overwritten by any new license for the same feature with a higher capacity that is subsequently installed. Downgrading the capacity is not allowed.
- Combo license – This license model is for a group of features that have no scale or count parameter associated with them. This license includes a capacity-based feature only on the Brocade 7810 Extension Switch.

Fabric OS Licenses

Available Fabric OS Licenses through the Enterprise Bundle

The following table lists the optionally licensed features in Fabric OS. On Gen 7 platforms, many of these features may be included in the base product. On Gen 6 platforms, several of these features are available through the Enterprise Bundle in Fabric OS.

Table 1: Fabric OS Licenses Available through the Enterprise Bundle

License	Description
Brocade Extended Fabrics	Provides greater than 10 km of switched fabric connectivity at full bandwidth over long distances (depending on the platform, the distance can be up to 3000 km). This license is not required for long-distance connectivity using licensed 10G ports.
Brocade Trunking	• Provides the ability to aggregate multiple physical links into one logical link for enhanced network performance and fault tolerance.
Brocade Ports on Demand	Allows you to instantly scale the fabric by provisioning additional ports using license key upgrades. Applies to the Brocade G610, G620, G630, and G720 switches.
Fabric Vision (FV)	Allows you to activate the following features: • Monitoring and Alerting Policy Suite (MAPS) • Flow Vision • Running D_Port tests between a switch and non-Brocade HBAs On Brocade Gen 6 platforms, this license enables the IO Insight capability and is displayed as `Fabric Vision and IO Insight` in the `license --show` output.
FICON Management Server (Also known as Control Unit Port or "CUP")	Enables host control of switches in mainframe environments.
Full Fabric	Enables a switch to connect to a multi-switch fabric through E_Ports, forming ISL connections.
Integrated Routing	Allows any port in Brocade G620 and G720 platforms to be configured as an EX_Port supporting FC-FC routing.
Integrated Routing Ports on Demand	Supported only on Gen 6 platforms. It allows any port, within the license capacity limit, to be configured as an EX_Port supporting FC-FC routing. If the maximum limit of EX_Ports that can be enabled is reached, enabling a new EX_Port fails with the warning message `Ex_Port IR POD License Limit Exceeded` and the port is disabled.
Inter-Chassis Link (ICL)	Supported on Gen 6 and Gen 7 directors. See ICL Licensing on Brocade Directors.
Q-Flex Ports on Demand	On Brocade G620 and Brocade G630 Switches, this license enables ports with QSFP media module. For a Brocade G630 Switch, each module allows eight QSFPs, each containing four links up to a capacity of 32. The total number of user ports that are enabled by the license is displayed as the capacity for this license.

Table 2: Supported Fabric OS Licenses on Different Platforms

License	G610	G620	G630	7810	X6 Director	G720	X7 Director
Ports on Demand	Yes	Yes	Yes	Yes	No	Yes	No
Q-Flex Ports on Demand	No	Yes	Yes	No	No	No	No

License	G610	G620	G630	7810	X6 Director	G720	X7 Director
Integrated Routing	No	Yes	No	No	No	Yes	Yes
Integrated Routing Port on Demand	No	No	Yes	Yes	Yes	No	No
Extended Fabrics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Trunking	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FICON Management Server	No	Yes	No	No	Yes	Yes	Yes
Fabric Vision	Yes	Yes	Yes	Yes	Yes	Yes	Yes
ICL	No	No	No	No	Yes	No	Yes

ICL Licensing on Brocade Directors

Brocade inter-chassis links (ICLs) are high-performance ports for interconnecting multiple Brocade X7, X6, and DCX 8510 Directors. The ICL feature is used on the X7-4, X7-8, X6-4, X6-8, DCX 8510-4, and DCX 8510-8. This document focuses on the Brocade X7 and X6 product families that are supported by Fabric OS version 9.0.x and higher.

After the addition or removal of a license, license enforcement is performed on the ICL ports only after being disabled and enabled. An ICL license must be installed on the enterprise platforms at both ends of the ICL connection.

ICL License on Brocade X6 Directors

The ICL license activates ICL ports on the X6 platform core blades.

- **On the Brocade X6-8** – For an X6-8 director, a maximum of two licenses is required to fully enable all ICL ports on each blade. Each core blade in the X6-8 supports 16 QSFP ports or 64 ICL links, for a total of 32 QSFP ports or 128 ICL links per system. Each ICL license has a capacity that can be displayed by the licenseShow command. The capacity defines the number of ICL links that can be enabled on each core blade once a license is installed.
  - **ICL license with 32-link capacity** – This license capacity enables the QSFP ports 0–3 (links 0–15) and 8–11 (links 32–47) on each core blade of the switch. This enables 64 ICL links on the system.
  - **ICL license with 64-link capacity** – This license capacity enables all of the QSFP ports 0–15 (links 0–63) on each core blade of the switch. This enables 128 ICL links on the system.

- **On the Brocade X6-4** – For an X6-4 director, a maximum of two licenses is required to fully enable all ICL ports on each blade. Each core blade in the X6-4 supports 8 QSFP ports or 32 ICL links. Each ICL license has a capacity that can be displayed by the licenseShow command. The capacity defines the number of ICL links that can be enabled on each core blade once a license is installed.
  - **ICL license with 16-link capacity** – This license capacity enables the QSFP ports 0–1 (links 0–7) and 4–5 (links 16–23) on each core blade of the switch. This enables 32 ICL links on the system.
  - **ICL license with 32-link capacity** – This license capacity enables all of the QSFP ports 0–7 (links 0–31) on each core blade of the switch. This enables 64 ICL links on the system.

ICL License on Brocade X7 Directors

The ICL license activates ICL ports on the X7 platform core blades. An ICL license must be installed on director platforms at both ends of the ICL connection. X7 licenses can be applied to either X7-4 or X7-8 directors and can support 8 QSFP ports (or 32 links).

- **On the Brocade X7-8** – For an X7-8 director, four licenses are required to fully enable all ICL ports, with a minimum of two licenses installed. Each core blade in the X7-8 supports 16 QSFP ports or 64 ICL links. Each ICL license has a capacity that can be displayed by the licenseShow command. The capacity defines the number of ICL links that can be enabled on each core blade once a license is installed.

- **ICL license with 16-link capacity** – This license capacity enables the QSFP ports 0–1 (links 0–7) and 8–9 (links 32–39) on each core blade of the switch. This enables 32 ICL links on the system.
  - **ICL license with 32-link capacity** – This license capacity enables the QSFP ports 0–3 (links 0–15) and 8–11 (links 32–47) on each core blade of the switch. This enables 64 ICL links on the system.
  - **ICL license with 48-link capacity** – This license capacity enables the QSFP ports 0–5 (links 0–23) and 8–13 (links 32–55) on each core blade of the switch. This enables 96 ICL links on the system.
  - **ICL license with 64-link capacity** – This license capacity enables all the QSFP ports on each core blade of the switch. This enables 128 ICL links on the system.
- **On the Brocade X7-4** – A 4-slot X7 director requires two licenses to enable all 16 ICL QSFP ports on both core blades. Each core blade in the X7-4 supports 8 QSFP ports or 32 ICL links. Each ICL license has a capacity that can be displayed by the `licenseShow` command. The capacity defines the number of ICL links that can be enabled on each core blade once a license is installed.
  - **ICL license with 16-link capacity** – This license capacity enables the QSFP ports 0–1 (links 0–7) and 4–5 (links 16–23) on each core blade of the switch. This enables 32 ICL links on the system.
  - **ICL license with 32-link capacity** – This license capacity enables all QSFP ports on each core blade of the switch. This enables 64 ICL links on the system.

Support for the Brocade 7810 Upgrade License

The Brocade 7810 Extension Switch supports a single upgrade license to enable features and capabilities available in a fully upgraded switch model.

A single upgrade license key supports a combination of the following licenses:

- Advanced Extension
- Extension Fabric
- Fabric Vision and IO Insight
- Integrated Routing Ports on Demand
- Ports on Demand
- Trunking
- WAN Rate Upgrade

The following table lists the limitations of the base model, the base model with an upgrade license, and the fully upgraded license model for the Brocade 7810 Extension Switch.

Table 3: Base Model and Upgrade License for the Brocade 7810 Extension Switch

Features	Base Model	Base Model with Upgrade License or Fully Upgraded License Model
FC Port Limits	4	12
VE Port Limits	2	4
GE WAN Port Limits	2	6
GE LAN Port Limits	4	4
GE Port Speed Limit	10Gb/s	10Gb/s
WAN Bandwidth Limit	1Gb/s	2.5Gb/s
Max IPEX Flows (LAN TCP Connections)	128 per DP/128 per box	128 per DP/128 per box
IPsec Support	Yes	Yes
Compression Support	Yes	Yes
FC Trunking Support	No	Yes

Features	Base Model	Base Model with Upgrade License or Fully Upgraded License Model
Extension Trunking Support	No	Yes
Fabric Vision Support	No	Yes
Adaptive Rate Limiting Support	Yes	Yes
FICON Support	No	No

Temporary Licensing

A temporary license uses a "try-before-you-buy" approach for certain features so that you can experience the feature and its capabilities before buying the license. Once you have installed the license, you are given a time limit to use the feature. A temporary license can be either a regular temporary license or a universal temporary license.

- A regular temporary license is available on a per-switch basis.
- A universal temporary license can be applied on multiple switches.

A regular temporary license can be added to replace a universal temporary license and vice-versa, but neither can be added when a permanent license for the feature is already installed.

The following licenses are available as regular temporary or universal temporary licenses:

- Advanced Extension
- Advanced FICON Acceleration
- FICON Management Server (CUP)
- Integrated Routing
- Integrated Routing Ports on Demand
- ISL Trunking
- WAN Rate Upgrade 1
- WAN Rate Upgrade 2

> **NOTE**
> To obtain a temporary license, contact your Broadcom representative.

Date Change Restriction

Once the temporary license is installed, you cannot change the time maintained by the switch until the temporary license is removed. To change the time, you must remove the license, change the date and time, and then re-install the license on the switch.

> ⚠️ **CAUTION**
> If you are using NTP to synchronize the time between your network devices, including switches and backbones, do not attempt to change the system date and time when a temporary license is installed.

Configuration Upload and Download Considerations

The `configdownload` or `configupload` commands download or upload the legacy, enhanced, consumed capacities, and temporary licenses respectively.

The string-based licenses are uploaded and installed on `configdownload` after license validation. The XML-based file licenses are installed as license certificates, and all license certificates are appended to the configuration file on `configupload`.

On `configdownload`, each license certificate is validated and installed on the switch.

Expired Licenses

The `license --show` command allows you to see installed temporary licenses, even after they have expired. Expired licenses have the output string `License has expired`. RASLog warning messages are generated, once the license is expired. An expired license may become unusable after a reboot, failover, firmware download, or disable or enable operation for a port or switch.

Universal Temporary Licenses

Universal temporary license keys include a duration period. Once installed on a switch, an expiration date is calculated and the duration is decremented on a daily basis until there is no remaining time, at which point the license expires. Consequently, universal temporary licenses must not be installed on a switch until you are ready to use or test the feature, so as not to unnecessarily consume a portion of the temporary-use duration.

The expiration date is based on the system time at the installation of the license plus the number of days for which the universal temporary license is valid. Universal temporary licenses cannot be removed and reinstalled on the same switch.

Universal temporary licenses are always retained in the product's license database even though they can be explicitly deleted from any user interface.

Extending a Universal Temporary License

Extending a universal temporary license is done either by adding a temporary license with an expiry date after the universal temporary license expiry date or by adding a permanent license. Re-applying an existing universal temporary license is not allowed.

Universal Temporary License Shelf Life

All universal temporary licenses are encoded with a "shelf life" expiration date. Once this date is reached, the temporary licensed feature can no longer be used on the switch.

License Requirements for Individual Features

The following table lists licensed features, each feature's associated license name, and, if applicable, the location on the local or any connecting switch on which the license must be installed.

> **NOTE**
> - Capacity-based feature licenses (IR Ports on Demand, Ports on Demand, Q-Flex Ports on Demand, or ICL) are not allowed to be created as combination licenses with any other features in the same license (only the capacity-based feature and its capacity are allowed in the license). Capacity in a capacity feature license cannot be zero or "not specified". Any licenses that are already installed before Fabric OS 8.2.0, will be flagged in `license --show` output as having the capacity incorrectly specified.
> - The POD features cannot be included in a single combination license with any other features.
> - Trial licenses are supported only for a single feature, and a combination of trial licenses is not supported.

Table 4: License Requirements and Location by Feature

Feature	License	Where the License Should Be Installed
ClearLink Diagnostics (D_Port)	No license required for D_Port tests between two switches or between a switch and a Brocade HBA. A Fabric Vision license is required for D_Port tests between a switch and a non-Brocade HBA.	If a Fabric Vision license is required, it must be installed on the local switch.
Extended Fabrics	Extended Fabrics	Local and attached switches.
FCIP Trunking	Advanced Extension	Local and attached switches.
Fibre Channel Routing/EX_Ports	Integrated Routing or Integrated Routing Ports On Demand	Local switch.
FICON-CUP	FICON Management Server	Local switch.
Flow Vision: • Flow Generator • Flow Performance Monitor • Flow Mirror	Fabric Vision	Local switch.
Inter-Chassis Link (ICL)	ICL POD license on the Brocade X6 and X7 Director.	Local and attached platforms.
Long Distance	Extended Fabrics	Local and attached switches. A license is needed on both sides of the connection.
Monitoring and Alerting Policy Suite (MAPS)	Fabric Vision If you have the Advanced Performance Monitoring and the Fabric Watch licenses installed, you do not need the Fabric Vision license. MAPS basic monitoring (system resources, SFP, Fabric Performance Impact) does not require a license.	Local switch.
Ports	Ports on Demand and Q-Flex Ports on Demand licenses required; applicable to a select set of switches only.	Local switch.
Slow Drain Device Quarantine	Fabric Vision	Local and attached switches.
Trunking	Trunking license For ICL trunking, no license is required.	Local and attached switches.

Licensing Tasks

Software Licensing Configuration Tasks

The following steps describe the configuration tasks for generating and obtaining a software license and then installing it on the Brocade Fabric OS switch.

1. Order the desired license. For a list of available licenses, refer to the Available Fabric OS Licenses section.

   NOTE
   To obtain a trial license, contact your Broadcom representative.

2. When you receive the transaction key, retrieve the license ID (LID) of the switch using the CLI or Web Tools GUI. See Obtaining the License ID.

   If you received the transaction key in a paperpack, record the LID on the entitlement certificate in the space provided.

3. Log in to the Brocade software portal to generate and obtain the license string or XML-file based license key. For instructions on obtaining a license, refer to the Generating a License Key task.

4. Install the license on the switch.

   a. For instructions on installing the license using license string, refer to the Installing the License Using License String task.

   b. For instructions on installing the license using XML file, refer to the Installing the License Using XML File task.

5. Verify that the license is installed. For instructions on viewing an installed license, refer to the Viewing Licenses Installed on a Switch task.

Licensing Commands

The following table summarizes the Fabric OS CLI commands that can be used to manage licensed features. For detailed information on these commands, refer to the *Brocade Fabric OS Command Reference Manual*.

Table 5: Fabric OS Commands Related to Licensing

Command	Description
`license --install`	Adds a license to the switch. The license key is case-sensitive and must be entered exactly.
`license --show`	Displays the license ID of the system. It also displays current license keys, along with a list of licensed products enabled by these keys.
`license --{{release|reserve} – port <portnum|portnum-portnum>}`	Manages the release and reservation of a port before using a port on Dynamic Ports on Demand (DPOD) or Double Density Ports on Demand (DDPOD) license assignments.
`license --show -port`	Displays the DPOD license details.
`license --remove`	Removes a license from the switch.

Obtaining the License ID

You must have a license ID to generate the license file in the Broadcom licensing portal.

Obtain the license ID of the switch or chassis using the CLI method:

1. Connect to the switch, and log in using an account with admin permissions.

2. Enter `license --show -lid` to display the license ID of the switch.

```
switch:admin> license --show -lid
10:00:c4:f5:7c:01:3a:78
```

> **NOTE**
> To obtain the license ID using the Web Tools GUI, refer to the *Brocade Fabric OS Web Tools User Guide*.

Generating a License Key

Use the following procedure to generate and obtain a FOS license key.

1. Go to https://www.broadcom.com, and then select the **LOGIN** drop-down at the top-right of the web page.

2. Click **LOGIN** or **REGISTER**. Once logged in, you will be redirected to the Broadcom support portal.

3. Click **Brocade Products**. You will be redirected to the **Brocade Products** page.

4. Click **Licensing**. You will be redirected to the **Broadcom Licensing Portal** page.

5. Enter the transaction key. Click **Next** to continue.

Note: Re-host keys are generated only by the SANnav^TM application and are used only on SANnav.

6. Enter the license ID (LID) that you obtained earlier in the **Unit Information** field. Click **Next** to continue.

7. Read the Broadcom End User License Agreement, and if you agree to the terms, select the **I have read and accept** checkbox.

8. Click **Generate** to generate the license.

9. The license key will be sent by email and can also be downloaded by selecting the blue license hyperlink from the Broadcom licensing portal UI.

10. If a license string is generated, save it to your local folder for future reference.

11. If an XML certificate file is generated, save it to the remote server, where it will be retrieved for installing the license.

Next, you must install the license to the FOS device.

Installing the FOS Software License

This section describes the procedure to install the FOS software license.

Installing the License Using a License String

This method is used to install licenses on Gen 6 platforms with specific switch types. For more information on supported platforms, see License Type for Different FOS Platforms.

For Brocade Gen 6 switches and directors, you must pass the license key in the `license --install` command to install the licenses.

1. Connect to the switch, and log in using an account with admin permissions.

2. Activate the license using the `license --install -key <lic_key>` command.

   ```
   switch:admin> license --install -key HP9ttZNSgmB4MCD3NmNWgQDWtAKBFtXtBSFJF

   2019/09/19-03:06:06, [SEC-3051], 4715, SLOT 1 | CHASSIS, INFO, G620, The license key/serial number
     HP9ttZNSgmB4MCD3NmNWgQDWtAKBFtXtBSFJF is Added.
   ```

3. Verify that the license was installed by entering the `license --show` command. The licensed features that are currently installed on the switch are listed. If the feature is not listed, use the `license --install` command to install the license.

   ```
   sw0:FID128:admin> license --show

   License Id: 10:00:c4:f5:7c:66:df:c8
   License 1 :
   ----------------------------------------------------------------
   License key            : HP9ttZNSgmB4MCD3NmNWgQDWtAKBFtXtBSFJF
   License features       : Ports on Demand
   License Capacity       : 24
   ```

Installing the License Using an XML File

This method is used to install licenses on Gen 6 and Gen 7 platforms using an XML certificate file. For more information on supported platforms, see License Type for Different FOS Platforms.

For Brocade Gen 6 and Gen 7 switches or directors, you must use the XML-based certificate file in the `license --install` command to install the licenses.

1. Connect to the switch, and log in using an account with admin permissions.

2. Activate the license using the `license --install` command.

   ```
   switch:admin> license --install {-key <lic_key>} | {-h <hostip> -t <protocol> [-m <server_port_number>] -u
    <user> [-p <password>] -f <filepath/xmlfile>}

    -h  is remote host ip address
    -t   transport protocol
    -m   server port number.
    -u  username to login into remote system.
    -p  password of the remote system
    -f   file path in the remote system.
   ```

3. Verify that the license was installed by entering the `license --show` command. The licensed features that are currently installed on the switch are listed. If the feature is not listed, use the `license --install` command to install the license.

   ```
   switch:admin> license --show

   License Id: 10:00:c4:f5:7c:66:df:c8
   ```

```
License 1:
--------------------------------------------------------------------------------
License serial number: FOS-01-0-03-11201017
License features    : Trunking
Generation Date     : 09/17/2019
```

Adding a Licensed Feature

> **NOTE**
> Enabling a feature on a switch may be a separate task from adding the license. Refer to the *Brocade Fabric OS Administration Guide* for information on enabling a feature.

Use the following procedure to add a licensed feature.

1. Connect to the switch, and log in using an account with admin permissions.

2. Activate the license using the `license --install` command.

3. Verify that the license was installed by entering the `license --show` command. The licensed features that are currently installed on the switch are listed. If the feature is not listed, use the `license --install` command to install the license.
   Some features may require additional configuration, or you may need to disable and re-enable the switch to make them operational; refer to *license --install* in the *Brocade Fabric OS Administration Guide* for more information on feature configuration.

The following is an example of adding all possible other licenses besides the Ports on Demand licenses for the Brocade G630 Switch with switch type 173 running Fabric OS 9.0.0, including a combination license for the non-capacity-licensed features. Note that any capacity license is overwritten when a license with equal or higher capacity for that same feature is added. Removing a newly added license leaves the switch without any license for the feature, as the prior license is not retained.

```
switch:admin> license --show
License Id:  10:00:00:27:f8:f0:2a:e8

switch:admin> license --install -key R7NgAQZ3m4FWYMJaK7JrH7DaJDDYFPfKBAY

2019/09/12-03:06:06, [SEC-3051], 4715, CHASSIS, INFO, G630, The license key/serial number
 R7NgAQZ3m4FWYMJaK7JrH7DaJDDYFPfKBAY is Added.

For license change to take effect, it may be necessary to enable affected ports...

switch:admin> license --install -key AMLRWtSS3FXXmHga4DNFSKZDQANmKWJPCSFYMWHAXHAA

2017/02/23-15:20:23, [SEC-3051], 1835, CHASSIS, INFO, G630, The license key
 AMLRWtSS3FXXmHga4DNFSKZDQANmKWJPCSFYMWHAXHAA is Added.
switch:admin> license --show
License Id:  10:00:00:27:f8:f0:2a:e8

License 1 :
----------------------------------------------------------------
License key      : R7NgAQZ3m4FWYMJaK7JrH7DaJDDYFPfKBAYHA
License features : Extended Fabric
                   Trunking
                   Integrated Routing
                   Fabric Vision and IO Insight
```

```
Generation date   : 03/11/2020
```

The following is an example of adding the Ports on Demand licenses for the Brocade G720 Switch running Fabric OS 9.0.0 using an XML file. Here, the example shows the Enterprise bundle has been factory installed to include all FOS feature licenses.

```
switch:admin> license --show
License Id:  10:00:c4:f5:7c:01:b3:f0
License 1 :
------------------------------------------------------
License serial number   : FOS-01-0-01-11201306
License features        : Extended Fabric
                          Trunking
                          Integrated Routing
                          Fabric Vision and IO Insight
Generation date         : 02/09/2020


switch:admin> license --install -h 10.1.1.1 -t scp -u scp -p fwdlacct -f var/ftp/pub/path/pm410308/i/
lc_new/lc_1000c4f57c013a78_f_8_12_43.xml

lc_1000c4f57c013a78_f_8_12_43.xml
100%   1365    36.2KB/s    00:00

License Installed [FOS-01-0-02-11201018]

switch:admin> license --show
License Id:  10:00:c4:f5:7c:01:b3:f0

License 1 :
------------------------------------------------------
License serial number   : FOS-01-0-01-11201306
License features        : Extended Fabric
                          Trunking
                          Integrated Routing
                          Fabric Vision and IO Insight
Generation date         : 02/09/2020

License 2 :
----------------------------------------------------------------
License serial number   : FOS-01-0-02-11201018
License features        : Ports on Demand
License Capacity        : 8
Generation date         : 03/11/2020
```

Removing Software Licenses

This section describes the procedures to remove software licenses.

Removing a Licensed Feature

Use the following procedure to remove a licensed feature.

1. Connect to the switch, and log in using an account with admin permissions.

2. Enter the `license --show` command to display the active licenses.

```
switch:admin> license --show

License Id : 10:00:c4:f5:7c:01:b3:f0
License 1 :
 --------------------------------------------------------------
License serial number   : FOS-01-0-01-11201306
License features        : Q-Flex Ports on Demand
License Capacity        : 16
Generation date         : 09/11/2019
License 2 :
 --------------------------------------------------------------
License serial number   : FOS-01-0-03-11201311
License features        : Trunking
Generation date         : 09/11/2019
```

3. Remove the license key using the `license --remove` command.

   The license key is case-sensitive and must be entered exactly as given. The quotation marks are optional. After removing a license key, the licensed feature is disabled when the switch is rebooted or when it is disabled and enabled.

```
switch:admin> license --remove "FOS-01-0-03-11201311"
removing license serial number "FOS-01-0-03-11201311"
```

4. Enter the `license --show` command to verify that the license is disabled.

   Entering the `license --show` command after the `license --remove` command displays the remaining licenses.

```
switch:admin> license --show

License Id : 10:00:c4:f5:7c:01:b3:f0
License 1 :
 --------------------------------------------------------------
License serial number   : FOS-01-0-01-11201306
License features        : Q-Flex Ports on Demand
License Capacity        : 16
Generation date         : 09/11/2019
```

If there are no license keys, `license --show` displays `No licenses`.

Removing an Expired License

⚠ **CAUTION**

This procedure is disruptive to the switch.

Use the following procedure to remove an expired license.

1. Connect to the switch, and log in using an account with admin permissions.

2. Enter the `reboot` command for the expiration to take effect.

Viewing Licenses Installed on a Switch

Use the following procedure to view all installed licenses.

1. Connect to the switch, and log in using an account with admin permissions.

2. Enter the `license --show` command.
   The first example shows the output for an XML-file-based license key, and the second example shows the output for a license string.

   Example 1:

   ```
   switch:admin> license --show

   License Id : 10:00:c4:f5:7c:01:b3:f0
   License 1 :
    ------------------------------------------------------------
   License serial number   : FOS-01-0-01-11201306
   License features        : Q-Flex Ports on Demand
   License Capacity        : 16
   Generation date         : 09/11/2019
   License 2 :
    ------------------------------------------------------------
   License serial number   : FOS-01-0-03-11201311
   License features        : Trunking
   Generation date         : 09/11/2019
   ```

   Example 2:

   ```
   sw0:FID128:root> license --show
   License Id : 10:00:c4:f5:7c:94:81:4c
   License 1 :
    ------------------------------------------------------------
   License key             : 3XRfaNRgmYZ7F3A7WCaPr4mmHXWJ9mG3BSQ3D
   License features        : Fabric Vision and IO Insight
   ```

   Save the output to a text file in a secure location. If licenses are lost or removed from the switch, you can use the saved output to recover or add them.

   Some licenses may display with the text "Obsolete license" or "Unknown license". This happens because of changes in the licensing requirements of some features that no longer require a license key but are still installed on a switch.

Troubleshooting Licensing Issues

Some features require licenses to work properly. To view a list of features and their associated licenses, see License Requirements for Individual Features. Licenses are created using a switch license ID (LID), so you cannot apply one license to different switches. Before calling your switch support provider, verify that you have the correct licenses installed by using the `license --show` command.

1. Connect to the switch, and log in using an account with admin permissions.

2. Enter the `license --show` command to determine if the appropriate licenses are installed on the local switch and any connecting switches. A list of the currently installed licenses on the switch is displayed. If the license is not listed, install the license using the `license --install` command.

Ports on Demand Licensing

Ports on Demand Overview

The Brocade models in the following table can be purchased with the number of licensed ports indicated. As your needs increase, you can activate unlicensed ports up to a device-constrained maximum by purchasing and installing the optional Ports on Demand licensed product.

Table 6: Ports on Demand Licensed Port Count by Platform

Platform	Description
Brocade G610	Can be purchased with 8, 16, or 24 licensed ports. A maximum of 24 ports is allowed.
Brocade G620	Can be purchased with 24, 36, or 48 licensed SFP ports. A maximum of 48 SFP ports is allowed. The Q-Flex Ports on Demand license provides 4 QSFP ports, providing a total of 16 individual links.
Brocade G630	Can be purchased with a base allowance of 48 licensed SFP ports and two license step upgrades of 24 ports each. A maximum of 96 SFP ports is allowed. The Q-Flex Ports on Demand license provides 8 QSFP ports, providing a total of 32 individual links.
Brocade 7810 Extension	Can be purchased with 4 or 12 licensed Fibre Channel ports. A maximum of 12 Fibre Channel ports is allowed.
Brocade G720	Can be purchased with 24, 32, 40, 48, or 56 licensed SFP ports. A maximum of 56 SFP ports is allowed.

ATTENTION

Licenses are not interchangeable between platforms. For example, if you bought a POD license for a Brocade G720, you cannot use that license on an another Brocade G720 or Brocade G620. The licenses are based on the switch license IDs and are not interchangeable.

The following table shows the ports that are enabled by default and the ports that can be enabled after you install the first and second Ports on Demand licenses for each switch type.

Table 7: Available User Ports When Implementing PODs

Platform	Available User Ports Without a POD License	Available User Ports With a POD License	POD Increments	QSFP POD
Brocade G610	8 SFP+ ports	Ports on Demand: 24 SFP+ ports	8	N/A
Brocade G620	24 SFP+ ports	Ports on Demand: 48 SFP+ ports	12	Q-Flex Ports on Demand: 16 QSFP ports (4 ports on each QSFP)
Brocade G630	48 SFP+ ports	Ports on Demand: 96 SFP+ ports	24	Q-Flex Ports on Demand: 32 QSFP ports (4 ports on each QSFP)
Brocade 7810 Extension	4 SFP+ ports	Ports on Demand: 12 SFP+ ports	8	N/A
Brocade G720	24 SFP+ ports	Ports on Demand: 56 SFP+ ports	8	N/A

Ports on Demand is ready to be unlocked in the switch firmware. Its license key may be part of the licensed paperpack supplied with the switch software, or you can purchase the license key separately from your switch vendor. You may

need to generate a license key from a transaction key supplied with your purchase. See Generating a License Key for instructions on generating a license key.

Each Ports on Demand license activates the next group of ports in numerical order in 8-, 12-, or 24-port increments, depending on the model. Before installing a license key, you must insert transceivers in the ports to be activated. Remember to insert the transceivers in the lowest group of inactive port numbers first. For example, if only 16 ports are currently active and you are installing one Ports on Demand license key, make sure to insert the transceivers in ports 16 through 23. If you install a second license key later, insert the transceivers in ports 24 through 31. For details on inserting transceivers, refer to the switch's hardware reference manual.

With Dynamic Ports on Demand mode on fixed-port switches, the order in which the ports are enabled does not matter; any ports can be used so long as the total number of ports does not exceed the licensed capacity.

Activating Ports on Demand Using an SSH Session

Use the following procedure to activate Ports on Demand using an SSH session.

1. Connect to the switch, and log in using an account with admin permissions.

2. Verify the current states of the ports using the `portshow` command.

   In the `portshow` output, the Licensed field indicates whether the port is licensed.

3. Install the Brocade Ports on Demand license.

   For instructions on how to install a license, see Adding a Licensed Feature.

4. Use the `portenable` command to enable the ports.

   Alternatively, you can disable and then enable the switch to activate the ports.

5. Use the `portshow` command to check the newly activated ports.

Dynamic Ports on Demand

The Dynamic Ports on Demand (DPOD) feature automatically assigns POD licenses from a pool of available licenses based on the server blade or switch installation.

The following switches support Dynamic POD:

- Brocade G610
- Brocade G620
- Brocade G630
- Brocade 7810 Extension
- Brocade G720

   NOTE
   The static POD is not supported on the above platforms.

Dynamic POD assigns ports to the POD license as they come online. Typically, assignments are sequential, starting with the lowest port number. However, variations in the equipment attached to the ports can cause the ports to come online at different times. This means that the port assignment order is not guaranteed.

If the switch detects more active links than allowed by the current POD licenses, some ports will not be assigned a POD license. Ports that do not receive a POD assignment have a state of "No Sync" or "On Sync"; these ports are not allowed to progress to the online state. Ports that cannot be brought online because of insufficient POD licenses have a state of "(No POD License) Disabled." You can use the `switchshow` command to display the port states.

Displaying Port License Assignments

When you display the available licenses, you can also view the current port assignment of those licenses.

Use the following procedure to display the port license assignments.

1. Connect to the switch, and log in using an account with admin permissions.

2. Enter the `license --show -port` command.

   The following example shows manually assigned POD licenses for the Brocade G620 Switch.

   ```
   switch:admin> license --show -port
    24 SFP-based ports are available in this switch
    Ports on Demand license is installed
      Dynamic POD method is in use

    24 SFP-based port assignments are provisioned for use in this switch:
      8 SFP-based port assignments are provisioned by the base switch allowance
      16 SFP-based port assignments are provisioned by the Ports on Demand license
    24 SFP-based ports are assigned to the base switch allowance or installed licenses:
      8 ports are assigned to the Ports on Demand base switch allowance
      14 SFP-based ports are assigned to the Ports on Demand license
    SFP-based ports assigned to the base switch allowance:
      0, 1*, 2, 3, 4, 5, 6, 7*
    SFP-based ports assigned to the Ports on Demand license:
      8, 9, 10, 11, 12, 13, 14, 15,
      16*, 17, 18, 19, 20, 21
    SFP-based ports that are not assigned:
      22, 23
    2 license reservations are still available for use by unassigned ports

    3 license assignments are held by offline ports (indicated by *)
   ```

   The following example shows manually assigned POD licenses for the Brocade 7810 Extension Switch.

   ```
   switch:admin> license --show -port
    12 SFP-based ports are available in this switch
    Ports on Demand license is installed
      Dynamic POD method is in use

    12 SFP-based port assignments are provisioned for use in this switch:
      4 SFP-based port assignments are provisioned by the base switch allowance
      8 SFP-based port assignments are provisioned by the Ports on Demand license
    SFP-based ports assigned to the base switch allowance:
      0, 1*, 2, 3
    SFP-based ports assigned to the Ports on Demand license:
      8, 9, 10, 11*
    SFP-based ports that are not assigned:
      4, 5, 6, 7
    4 license reservations are still available for use by unassigned ports

    3 license assignments are held by offline ports (indicated by *)
   ```

   The following example shows manually assigned POD licenses for the Brocade G720 Switch.

   ```
   switch:admin> license --show -port
      64 ports are available in this switch
      Ports on Demand license is installed
        Dynamic POD method is in use
   ```

```
   32 port assignments are provisioned for use in this switch:
        24 port assignments are provisioned by the base switch allowance
         8 port assignments are provisioned by the Ports on Demand license
   32 ports are assigned to the base switch allowance or installed licenses:
        24 ports are assigned to the Ports on Demand base switch allowance
         8 ports are assigned to the Ports on Demand license
   ports assigned to the base switch allowance:
      0*, 1*, 2*, 3*, 4*, 5*, 6*, 7*, 8*, 9*
      10*, 11*, 12*, 13*, 14*, 15*, 16*, 17*, 18*, 19*
      20*, 21*, 22*, 23*
   ports assigned to the Ports on Demand license:
      24*, 25*, 26*, 27*, 28*, 29*, 30*, 31*
   ports that are not assigned:
      32, 33, 34, 35, 36, 37, 38, 39, 40, 41
      42, 43, 44, 45, 46, 47, 48, 49, 50, 51
      52, 53, 54, 55, 56, 57, 58, 59, 60, 61
      62, 63
    0 license reservations are still available for use by unassigned ports

   32 license assignments are held by offline ports (indicated by *)
```

Reserving a Port License

You can allocate licenses by reserving and releasing POD assignments for specific ports. Disabled ports are not candidates for an automatic license assignment by the Dynamic POD feature. To preserve a license assignment for other ports, you can persistently disable an otherwise viable port to prevent it from coming online.

Reserving a license for a port assigns a POD license to that port whether the port is online or offline. That license is not available to other ports that come online before the specified port.

To allocate licenses to a specific port instead of automatically assigning them as the ports come online, reserve a license for the port. The port receives a POD assignment if any are available.

Use the following procedure to reserve Dynamic Ports on Demand licenses.

1. Connect to the switch, and log in using an account with admin permissions.

2. Enter the `switchshow` and `license --show -port` commands to verify that port reservations are available.

```
sw0:FID128:root> switchshow
switchName:     sw0
switchType:     181.0
switchState:    Offline   (Persistent)
switchMode:     Native
switchRole:     Disabled
switchDomain:   8 (unconfirmed)
switchId:       fffc08
switchWwn:      10:00:c4:f5:7c:01:3a:78
zoning:         ON (TEST)
switchBeacon:   OFF
FC Router:      OFF
Fabric Name:    abs
HIF Mode:       OFF
```

```
Allow XISL Use: OFF
LS Attributes:  [FID: 128, Base Switch: No, Default Switch: Yes, Ficon Switch: No, Address Mode 0]
Index Port Address  Media Speed   State      Proto
===============================================================
   4   4  080400   --    N64    No_Module   FC  Disabled
   5   5  080500   --    N64    No_Module   FC  Disabled
   6   6  080600   --    N64    No_Module   FC  Disabled
   7   7  080700   --    N64    No_Module   FC  Disabled
   8   8  080800   --    N64    No_Module   FC  Disabled
   9   9  080900   id    N64    No_Light    FC  Disabled
  10  10  080a00   --    N64    No_Module   FC  Disabled
  11  11  080b00   --    N64    No_Module   FC  Disabled
  12  12  080c00   id    N64    No_Light    FC  Disabled
  13  13  080d00   id    N64    No_Light    FC  Disabled
  14  14  080e00   --    N64    No_Module   FC  Disabled
  15  15  080f00   --    N64    No_Module   FC  Disabled
  16  16  081000   --    N64    No_Module   FC  Disabled
  17  17  081100   --    N64    No_Module   FC  Disabled
  18  18  081200   id    N64    No_SigDet   FC  Disabled
  19  19  081300   --    N64    No_Module   FC  Disabled
  20  20  081400   --    N64    No_Module   FC  Disabled
  21  21  081500   --    N64    No_Module   FC  Disabled
  22  22  081600   --    N64    No_Module   FC  Disabled
  23  23  081700   --    N64    No_Module   FC  Disabled
  24  24  081800   --    N64    No_Module   FC  Disabled
  25  25  081900   --    N64    No_Module   FC  Disabled
  26  26  081a00   --    16G    No_Module   FC  Disabled
  26  27  081a00   --    16G    No_Module   FC  Disabled
  28  28  081c00   --    N64    No_Module   FC  Disabled
  29  29  081d00   --    N64    No_Module   FC  Disabled
  30  30  081e00   --    N64    No_Module   FC  Disabled
  31  31  081f00   --    N64    No_Module   FC  Disabled
  32  32  082000   id    N64    No_Light    FC  (No Ports on Demand license) Disabled
  33  33  082100   id    N64    No_Light    FC  (No Ports on Demand license) Disabled
  34  34  082200   id    N64    No_SigDet   FC  (No Ports on Demand license) Disabled
  35  35  082300   --    N64    No_Module   FC  (No Ports on Demand license) Disabled
  36  36  082400   --    N64    No_Module   FC  (No Ports on Demand license) Disabled
  37  37  082500   --    N64    No_Module   FC  (No Ports on Demand license) Disabled
  38  38  082600   --    N64    No_Module   FC  (No Ports on Demand license) Disabled
  39  39  082700   --    N64    No_Module   FC  (No Ports on Demand license) Disabled
  40  40  082800   --    N64    No_Module   FC  (No Ports on Demand license) Disabled
  41  41  082900   --    N64    No_Module   FC  (No Ports on Demand license) Disabled
  42  42  082a00   id    N64    No_SigDet   FC  (No Ports on Demand license) Disabled
  43  43  082b00   id    N64    No_SigDet   FC  (No Ports on Demand license) Disabled
  44  44  082c00   --    N64    No_Module   FC  (No Ports on Demand license) Disabled
  45  45  082d00   --    N64    No_Module   FC  (No Ports on Demand license) Disabled
  46  46  082e00   --    N64    No_Module   FC  (No Ports on Demand license) Disabled
  47  47  082f00   --    N64    No_Module   FC  (No Ports on Demand license) Disabled
  48  48  083000   --    N64    No_Module   FC  (No Ports on Demand license) Disabled
  49  49  083100   --    N64    No_Module   FC  (No Ports on Demand license) Disabled
  50  50  083200   --    N64    No_Module   FC  (No Ports on Demand license) Disabled
  51  51  083300   --    N64    No_Module   FC  (No Ports on Demand license) Disabled
  52  52  083400   --    N64    No_Module   FC  (No Ports on Demand license) Disabled
```

```
    53   53   083500   --    N64     No_Module  FC  (No Ports on Demand license) Disabled
    54   54   083600   --    N64     No_Module  FC  (No Ports on Demand license) Disabled
    55   55   083700   --    N64     No_Module  FC  (No Ports on Demand license) Disabled
    56   56   083800   --    N64     No_Module  FC  (No Ports on Demand license) Disabled
    57   57   083900   id    N64     No_SigDet  FC  (No Ports on Demand license) Disabled
    58   58   083a00   id    N64     No_SigDet  FC  (No Ports on Demand license) Disabled
    59   59   083b00   id    N64     No_SigDet  FC  (No Ports on Demand license) Disabled
    60   60   083c00   --    N64     No_Module  FC  (No Ports on Demand license) Disabled
    61   61   083d00   --    N64     No_Module  FC  (No Ports on Demand license) Disabled
    62   62   083e00   --    N64     No_Module  FC  (No Ports on Demand license) Disabled
    63   63   083f00   --    N64     No_Module  FC  (No Ports on Demand license) Disabled
switch:admin> license --show -port
24 SFP-based ports are available in this switch
Ports on Demand license is installed
  Dynamic POD method is in use

24 SFP-based port assignments are provisioned for use in this switch:
  8 SFP-based port assignments are provisioned by the base switch allowance
  16 SFP-based port assignments are provisioned by the Ports on Demand license
24 SFP-based ports are assigned to the base switch allowance or installed licenses:
  8 ports are assigned to the Ports on Demand base switch allowance
  14 SFP-based ports are assigned to the Ports on Demand license
SFP-based ports assigned to the base switch allowance:
  0, 1*, 2, 3, 4, 5, 6, 7*
SFP-based ports assigned to the Ports on Demand license:
  8, 9, 10, 11, 12, 13, 14, 15,
  16*, 17, 18, 19, 20, 21
SFP-based ports that are not assigned:
  22, 23
2 license reservations are still available for use by unassigned ports

3 license assignments are held by offline ports (indicated by *)
```

3. Take the following action based on whether port reservations are available:

   - If a port reservation is available, enter the `license --reserve -port` command to reserve a license for a port or range of ports.
     ```
     switch:admin> license --reserve -port 0-47
     ```
   - If all port reservations are assigned, select a port to release its POD license. Follow the instructions in Releasing a Port from a POD Set to release a port from its POD assignment. Once the port is released, you can reserve it.

4. Enter the `switchshow` and `license --show -port` commands to verify that port reservations are available.

   The following example shows the remaining POD licenses after the reservation in the Brocade G720 Switch.

```
switch:admin> license --show -port
   64 ports are available in this switch
   Ports on Demand license is installed
     Dynamic POD method is in use

   32 port assignments are provisioned for use in this switch:
       24 port assignments are provisioned by the base switch allowance
        8 port assignments are provisioned by the Ports on Demand license
   32 ports are assigned to the base switch allowance or installed licenses:
```

```
      24 ports are assigned to the Ports on Demand base switch allowance
       8 ports are assigned to the Ports on Demand license
  ports assigned to the base switch allowance:
    0*, 1*, 2*, 3*, 4*, 5*, 6*, 7*, 8*, 9*
    10*, 11*, 12*, 13*, 14*, 15*, 16*, 17*, 18*, 19*
    20*, 21*, 22*, 23*
  ports assigned to the Ports on Demand license:
    24*, 25*, 26*, 27*, 28*, 29*, 30*, 31*
  ports that are not assigned:
    32, 33, 34, 35, 36, 37, 38, 39, 40, 41
    42, 43, 44, 45, 46, 47, 48, 49, 50, 51
    52, 53, 54, 55, 56, 57, 58, 59, 60, 61
    62, 63
   0 license reservations are still available for use by unassigned ports

  32 license assignments are held by offline ports (indicated by *)
```

Releasing a Port from a POD Set

Releasing a port removes it from the POD set; the port then appears as "unassigned" until it comes back online. Persistently disabling the port ensures that the port cannot come back online and be automatically assigned to a POD. Before you can re-assign a license, you must disable the port and release the license.

After a port is assigned to the POD set, the port is licensed until it is manually removed from the POD port set. When a port is released from its POD port set (base, single, or double), a vacancy is created in that port set.

Use the following procedure to release a port from a POD set.

1. Connect to the switch, and log in using an account with admin permissions.

2. Enter the `portdisable` command to take the port offline.

```
switch:admin> portdisable 0
```

3. Enter the `portshow` command to verify that the port state is offline.

4. Enter the `license --release -port` command to remove a port or range of ports from the POD license.

```
switch:admin> license --release -port 0-47
port 4 must be Offline to make changes to POD assignment
port 16 must be Offline to make changes to POD assignment
port 31 must be Offline to make changes to POD assignment
```

5. Enter the `license --show -port` command to verify that the port is no longer assigned to a POD set.

```
switch:admin> license --show -port
  48 ports are available in this switch
    Full POD license is installed
    Dynamic POD method is in use
  48 port assignments are provisioned for use in this switch:
    24 port assignments are provisioned by the base switch license
    24 port assignments are provisioned by a full POD license
   3 ports are assigned to installed licenses:
    3 ports are assigned to the base switch license
    0 ports are assigned to the full POD license
```

```
Ports assigned to the base switch license:
    4, 16, 31
Ports assigned to the full POD license:
    None
Ports not assigned to a license:
    0, 1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17
    18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 32, 33, 34
    35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47
```

6. Enter the `portenable` command to bring the port back online.

7. Enter the `portshow` command to verify that the state of the port is now online.

Revision History

FOS-90x-Licensing-UG104; 30 April 2021

- Updated the Available Fabric OS Licenses through the Enterprise Bundle section.
- Updated the Software Licensing Terminology section.
- Updated the How Software Licensing Works section.
- Updated the License Types for Different FOS Platforms section.
- Made editorial and stylistic revisions.

FOS-90x-Licensing-UG103; 15 March 2021

- Updated the Support for the Brocade 7810 Upgrade License section.

FOS-90x-Licensing-UG102; 30 September 2020

- Updated the ICL Licensing on Brocade Directors section.
- Updated the ICL License on Brocade X6 Directors section.
- Updated the ICL License on Brocade X7 Directors section.
- Updated the Support for the Brocade 7810 Upgrade License section.
- Updated the Ports on Demand Overview section.

FOS-90x-Licensing-UG101; 17 July 2020

- Updated the Fabric OS Licenses chapter.
- Updated the ICL License on Brocade X7 Directors section.

FOS-90x-Licensing-UG100; 30 April 2020

- Updated the License Type for Different FOS Platforms section.
- Updated the ICL Licensing on Brocade Directors section.
- Added the Obtaining the License ID section.
- Added the Installing the FOS Software License section.