# Brocade® Fabric OS® Software Licensing User Guide, 8.2.x

**User Guide**
**3 June 2020**

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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 FOS licenses, the licensing model and tasks, and the licensing requirements for individual features.

## What Is New in This Document

Starting with this release, all new modified content is listed in the "Revision History" section at the end of this document.

## Supported Hardware and Software

The following hardware platforms are supported by Brocade Fabric OS 8.2.x.

**Brocade Gen 5 (16Gb/s) Fixed-Port Switches**

- Brocade 6505 Switch
- Brocade 6510 Switch
- Brocade 6520 Switch
- Brocade M6505 Blade Server SAN I/O module
- Brocade 6542 Blade Server SAN I/O module
- Brocade 6543 Blade Server SAN I/O module
- Brocade 6545 Blade Server SAN I/O module
- Brocade 6546 Blade Server SAN I/O module
- Brocade 6547 Blade Server SAN I/O module
- Brocade 6548 Blade Server SAN I/O module
- Brocade 6558 Blade Server SAN I/O module
- Brocade 7840 Extension Switch

**Brocade Gen 5 (16Gb/s) 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 DCX 8510-4 Director
- Brocade DCX 8510-8 Director

**Brocade Gen 6 (32Gb/s) Fixed-Port Switches**

- Brocade G610 Switch
- Brocade G620 Switch
- Brocade G630 Switch
- Brocade 7810 Extension Switch

**Brocade Gen 6 (32Gb/s) Directors**

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

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| Online | Telephone |
|---|---|
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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, preinstalled, 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 require a valid software license to operate on the device.
- License key – The key produced by the Brocade software portal when the license is generated. The key is installed in Fabric OS 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 used in conjunction with a transaction key to generate and download a software license from the Brocade software portal. The software license is tied to the LID of the Brocade device for which the license was ordered and generated.
- Transaction key – A unique key, along with the LID, used to generate a software license from the Brocade software portal. The transaction key is issued by Brocade 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 e-mail message that is sent to the customer after the order is placed. The customer receives the e-mail 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 is ordered for selected features on specific units when it is first shipped from the factory, or a switch SKU can be ordered that includes factory-installed licenses.

When a license is ordered separately (not preinstalled), a paperpack or e-mail with a transaction key is sent to you by Brocade. The transaction key and license ID (LID) of the Brocade switch are used to generate a license key from the Brocade software licensing portal. The FOS license keys are provided through an alpha-numeric string, and you can add the license key to a switch using the `licenseAdd` command.

Once a license is installed on the Brocade 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 `licenseAdd` command prompts you to reboot the switch. For port-related licenses, use the `portEnable` command to enable a port or to disable and reenable 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 Types

Fabric OS supports the following license types:

- Permanent license – A permanent license enables a license-controlled feature to run on the switch indefinitely.
- Temporary license – A temporary license enables a license-controlled feature to run on the switch on a temporary basis. A temporary license enables the 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.
- Slot-based license – A slot-based license allows you to select the slots that the license will enable (up to the capacity purchased) and to increase the capacity without disrupting slots that already have licensed features running. Each licensed feature supported on the blade has a separate slot-based license key. See Slot-Based Licensing for more information.

# 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

The following table lists the optionally licensed features available in Fabric OS.

**Table 1: Available Fabric OS Licenses**

| License | Description |
|---|---|
| 10 Gigabit FCIP/Fibre Channel (10G license) | • Allows 10Gb/s operation of FC ports on the Brocade 6510 or 6520 Switches or the FC ports of FC16-32 or FC16-48 port blades installed on a Brocade DCX 8510 Backbone.<br>• Enables the two 10GbE ports on the FX8-24 extension blade when installed on a Brocade DCX 8510-4 or Brocade DCX 8510-8 Backbone.<br>• Allows selection of the following operational modes on the FX8-24 blade:<br>– Ten 1GbE ports and one 10GbE port<br>– Two 10GbE ports<br>• The license is slot-based when applied to a Brocade DCX Backbone. It is chassis-based when applied to a Brocade 6510 or 6520 Switch.<br>Not applicable on Brocade Gen 6 platforms. |
| Advanced Extension | • Enables two advanced extension features: FCIP Trunking and Adaptive Rate Limiting.<br>• The FCIP Trunking feature allows the following:<br>– Multiple (up to four) IP source and destination address pairs (defined as FCIP circuits) using multiple (up to four) 1GbE or 10GbE interfaces to provide a high-bandwidth FCIP tunnel and failover resiliency.<br>– Support for up to four of the following QoS classes: Class-F, high, medium, and low priority, each as a TCP connection.<br>• The Adaptive Rate Limiting feature provides a minimum bandwidth guarantee for each tunnel with full usage of available network bandwidth without any negative impact to throughput performance under a high traffic load.<br>• Available on the Brocade 7840 Extension Switch and Brocade DCX 8510 Backbone for the FX8-24 blade on an individual slot basis.<br>• This license is not required on Brocade Gen 6 platforms with a Brocade SX6 blade. |
| Advanced FICON Acceleration | • Allows use of specialized data management techniques and automated intelligence to accelerate FICON tape read and write and IBM Global Mirror data replication operations over a distance, while maintaining the integrity of command and acknowledgment sequences.<br>• Available on the Brocade 7840 Extension Switch and Brocade DCX 8510 Backbone for the FX8-24 blade on an individual slot basis.<br>This license is not required on a Brocade X6 director with a Brocade SX6 blade. |
| BrocadeAdvanced Performance Monitoring | The Advanced Performance Monitor features are deprecated, but the license is available for upgrade to Fabric Vision features on Brocade Gen 5 platforms.<br>The Fabric Vision license is equivalent to the combination of the Advanced Performance Monitor (APM) and Fabric Watch (FW) licenses. If you have both the Advanced Performance Monitoring and Fabric Watch licenses installed, you do not need the Fabric Vision license.<br>Applies to Brocade Gen 5 platforms only. |
| 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).<br>This license is not required for long-distance connectivity using licensed 10Gb ports. |

| License | Description |
|---|---|
| Brocade Fabric Watch | The Fabric Watch feature is deprecated, but the license is available for upgrade to Fabric Vision features on Brocade Gen 5 platforms.<br>The Fabric Vision license is equivalent to the combination of the APM and FW licenses. If you have both the APM and FW licenses installed, you do not need the Fabric Vision license.<br>Applies to Brocade Gen 5 platforms only. |
| Brocade ISL Trunking | • Provides the ability to aggregate multiple physical links into one logical link for enhanced network performance and fault tolerance.<br>• Includes Access Gateway ISL Trunking on those products that support Access Gateway deployment. |
| BrocadePorts on Demand | Allows you to instantly scale the fabric by provisioning additional ports using license key upgrades.<br>Applies to the Brocade G610, G620, G630, M6505, 6505, 6510, 6520, and 6547 Switches. |
| Enterprise Inter-Chassis Links | Allows you to connect four or more chassis to a Brocade DCX 8510 using Inter-Chassis Links (ICL). For each Brocade DCX 8510 Backbone, you can connect up to three chassis through ICLs without this license. This license is required only on a chassis that is connected to four or more chassis.<br>This license requirement does not depend on the total number of chassis that exist in a fabric, but only on the number of chassis connected directly to a device through ICLs.<br>You must also have an ICL POD license on each chassis to activate the ICL ports. The Enterprise ICL license allows only connection of more than four chassis using ICLs; it does not enable the ICL ports on a chassis.<br>Applies to the Brocade DCX 8510 Backbones only. |
| Fabric Vision (FV) | Allows you to activate the following features:<br>• Monitoring and Alerting Policy Suite (MAPS)<br>• Flow Vision<br>• Running D_Port tests between a switch and non-Brocade HBAs<br>The Fabric Vision license is equivalent to the combination of the Advanced Performance Monitor (APM) and Fabric Watch (FW) licenses. If you have both the Advanced Performance Monitoring and the Fabric Watch licenses installed, you do not need the Fabric Vision license.<br>On Brocade Gen 6 platforms, this license enables the IO Insight capability and is displayed as *Fabric Vision and IO Insight* in the `licenseshow` 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 6510, 6520, and 7840 Switches, DCX 8510, and Brocade G620 platforms to be configured as an EX_Port supporting FC-FC routing. |
| Integrated Routing Ports on Demand | On Brocade X6 director family and Brocade G630 switch, 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 will fail with the warning message *Ex_Port IR POD License Limit Exceeded* and the port will be disabled. |
| Inter-Chassis Link (ICL) POD | This license activates ICL ports on DCX8510 or X6 platform core blades. An ICL license must be installed on the director platforms at both ends of the ICL connection.<br>On the directors, each ICL POD license activates the specified number of QSFP ports in a trunk group. |

| License | Description |
|---|---|
| Inter-Chassis Link (ICL) 1st POD | • **On the Brocade DCX8510-8 or X6-8:**<br>The 1st ICL POD license enables 16 (half of the total) UltraScale ICL QSFP ports on DCX 8510-8 or X6-8 directors, enabling eight ICL ports on each core blade. These are QSFP port number 0, 1, 2, 3, 4, 5, 6, and 7 on DCX8510-8; while on X6-8, the QSFP port numbers are 0, 1, 2, 3, 8, 9, 10, and 11.<br>• **On the Brocade X6-4:**<br>ICL POD licenses are different between X6-4 and DCX8510-4 directors. On an X6-4, the 1st ICL POD license enables eight (half of the total) UltraScale ICL QSFP ports on the director, enabling four ICL ports on each core blade, which are QSFP port number 0, 1, 4, and 5.<br>• **On the Brocade DCX8510-4:**<br>A single ICL POD license enables all 16 UltraScale ICL QSFP ports on the director. |
| Inter-Chassis Link (ICL) 2nd POD | • **On the Brocade DCX8510-8 or X6-8:**<br>The 2nd ICL POD license enables the remaining 16 UltraScale ICL QSFP ports on the directors. These are QSFP port number 8, 9, 10, 11, 12, 13, 14, and 15 on each core blade of DCX8510-8; while on X6-8, these are QSFP port number 4, 5, 6, 7, 12, 13, 14, and 15 on each core blade.<br>• **On the Brocade X6-4:**<br>ICL POD licenses are different between X6-4 and DCX8510-4 directors. On an X6-4, the 2nd ICL POD license enables the remaining eight UltraScale ICL QSFP ports on the director, which are QSFP port numbers 2, 3, 6, and 7 on each core blade. |
| 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 enabled by the license is displayed as the capacity for this license. |
| WAN Rate Upgrade 1 | Provides additional WAN transmission throughput up to 10Gb/s on a Brocade 7840 Extension Switch. Without the WAN Rate Upgrade 1 license, the device provides WAN throughput of 5Gb/s.<br>Upgrade licenses do not impose restrictions on the number of physical ports used as long as the aggregate bandwidth of all configured FCIP tunnels does not exceed the licensed limit. |
| WAN Rate Upgrade 2 | Provides unlimited WAN transmission throughput (other than the physical port limit) and enables two 40GbE ports on a Brocade 7840 Extension Switch. You cannot use the 40GbE ports without the WAN Rate Upgrade 2 license.<br>You must have the WAN Rate Upgrade 1 license installed to install and activate the WAN Rate Upgrade 2 license. You cannot remove the WAN Rate Upgrade 1 license before removing the WAN Rate Upgrade 2 license. |

The Brocade G610 Switch supports the following licenses:

- Enterprise Bundle (Extended Fabrics, ISL Trunking, Fabric Vision)
- Ports on Demand

The Brocade G620 Switch supports the following licenses:

- Ports on Demand
- Q-Flex Ports on Demand
- Enterprise Bundle (Extended Fabrics, ISL Trunking, Fabric Vision)
- Integrated Routing
- Mainframe Enterprise Bundle (Extended Fabrics, ISL Trunking, Fabric Vision, and FICON CUP)

The Brocade G630 Switch supports the following licenses:

- Ports on Demand
- Q-Flex Ports on Demand
- Enterprise Bundle (Extended Fabrics, ISL Trunking, Fabric Vision)
- Integrated Routing Ports on Demand

The Brocade X6 director supports the following licenses:

- Extended Fabrics
- ISL Trunking
- FICON Management Server
- Inter-Chassis Link
- Integrated Routing Ports on Demand
- Fabric Vision and IO Insight

# ICL Licensing on Brocade Directors

Brocade ICL links operate between the core blades of the Brocade DCX 8510 and Brocade X6 family. ICL ports on core blades of a Brocade DCX 8510-8 or X6-8 or X6-4 can be used with the ICL 1st or ICL 2nd POD license. ICL ports on core blades of a Brocade DCX 8510-4 can be used only with the ICL 1st POD license.

After the addition or removal of a license, the license enforcement is performed on the ICL ports only when the `portdisable` and `portenable` commands are issued on the ports. An ICL license must be installed on the enterprise platforms at both ends of the ICL connection.

## ICL 1st POD License

For more information on ICL 1st POD licensing, see the available licenses table.

## ICL 2nd POD License

For more information on ICL 2nd POD licensing, see the available licenses table.

## Enterprise ICL License

The Enterprise ICL (EICL) license allows you to connect a single Brocade DCX 8510 Backbone to four or more other Brocade DCX 8510 or Brocade X6 Backbones through ICLs. This license is available on the Brocade DCX 8510-8 and Brocade DCX 8510-4 platforms only.

The EICL license is required in addition to the ICL POD license.

The following requirements apply:

- Connection to three or fewer Brocade DCX 8510 Backbones with ICLs does not require an EICL license. However, an EICL license is required on a Brocade DCX 8510 chassis when that chassis is connected to four or more Brocade DCX 8510 or Brocade X6 Backbones through ICLs.
- With an EICL license installed, a maximum of nine other chassis are allowed to be connected to a single Brocade DCX 8510 chassis through ICLs.
- When Virtual Fabrics are used, the limit on the number of chassis connected through ICLs depends only on the physical chassis and not on the logical switches.
- If the maximum number of ICL-connected chassis exceeds the allowed limit with or without an EICL license, additional links may be disabled or segmented. The disabling or segmenting reason code depends on whether the EICL license is installed.
- If ICL links to a chassis become segmented for non-EICL-related reasons, these links are part of the fabric, and the chassis containing these segmented links is included in the maximum chassis count. If the maximum chassis count (with or without the EICL license) is reached with these segmented links, any additional links will become segmented. Therefore, to add additional links, you must disable the links that became segmented due to non-EICL reasons. This should reduce the maximum chassis count and allow the new links to join.

**Example: switchShow Output If No Enterprise ICL License Is Installed**

The following message is displayed if a required EICL license is not installed:

```
440    8   24   ------   id    16G        Online      FC  E-Port  segmented,10:00:00:05:33:0d:52:00 (No EICL
 License)(Trunk master)
441    8   25   ------   id    16G        Online      FC  E-Port  segmented,10:00:00:05:33:0d:52:00 (No EICL
 License)(Trunk master)
```

**Example: switchShow Output If the Maximum Number of Chassis Is Reached**

The following message is displayed if the maximum number of supported chassis is reached:

```
384    5    0   ------   id    16G        Online      FC  E-Port  segmented,10:00:00:05:1e:39:bf:9a (EICL
 License Limited)(Trunk master)
385    5    1   ------   id    16G        Online      FC  E-Port  segmented,10:00:00:05:1e:39:bf:9a (EICL
 License Limited)(Trunk master)
```

# 10G Licensing

The 10Gb/s FCIP/Fibre Channel license (10G license) enables the following:

- 10Gb/s access on 16Gb/s FC ports on Brocade 6510 or Brocade 6520 switches and on FC16-32 and FC16-48 port blades.
- The two 10-GbE ports on the FX8-24 extension blade.

This 10G license is applied as a slot-based license on the FC16-32 and FC16-48 port blades and on the FX8-24 extension blade; generic rules for adding slot-based licenses apply, as described in Slot-Based Licensing. When this license is applied to a Brocade 6510 or Brocade 6520 Switch, it is applied to the entire platform.

Whether you have a director or fixed-port switch, you must add the 10G license to the platform using the `licenseadd` command.

For blade platforms, you can either allow automatic license assignment or choose the blades that you want the licenses assigned to manually, as you would do for any slot-based license. Automatic assignment is done sequentially by slot number, beginning with the lowest numbered slot with an enabled blade that supports this feature (FX8-24, FC16-32, or FC16-48 blade) and that does not already have the license applied. If the automatic license assignment does not match your needs, you can use the `licenseslotcfg --remove` and `licenseslotcfg --add` commands to remove the license manually from a slot and assign it to a different slot with an FX8-24, FC16-32, or FC16-48 blade.

The same multiple slot-based 10G license can be applied to a mixture of 16Gb/s blades and FX8-24 blades. For example, if you have a 10G license for two-slot capacity, and you have an FX8-24 blade in one slot and an FC16-48 blade in a second slot, the same license can activate the 10GE ports on the FX8-24 blade and enable 10Gb/s operation on the 10Gb/s FC ports on the FC16-48 blade.

After applying a 10G license to the Brocade 6510 or Brocade 6520 chassis or to a 16Gb/s FC blade, you must also configure the port octet (`portcfgoctetspeedcombo` command) with the correct port octet speed group, and you must configure each port to operate at 10Gb/s (`portcfgspeed` command). The port octet configuration is required to allow only the certain combinations of port speeds within the port octet. No license is required for the octet group. If the speed configuration operation succeeds and a 10G-capable SFP is inserted in the port connector, the port allows operation at 10Gb/s when the link becomes active at that speed.

Before removing a 10G license from an entire platform (`licenseremove` command) or from a specific blade (`licenseslotcfg --remove` command), you must first de-configure all affected FC ports to no longer operate at 10Gb/s.

**NOTE**
An FC port that is operating at 10Gb/s FC speed on a 16Gb/s FC blade or 16Gb/s FC switch does not need an Extended Fabrics license to be used for FC long-distance connectivity. FC ports licensed and configured to operate at 10Gb/s on a Brocade 6510 or Brocade 6520 Switch or 16Gb/s FC port blade cannot interoperate with 10Gb/s FC ports on the M6140 platform or FC10-6 blade. The new FC ports use different protocols and physical connections.

# Slot-Based Licensing

Slot-based licensing is used on the Brocade DCX 8510 Backbone family to support the FX8-24 blade and the 16Gb/s FC port blades (FC16-32, FC16-48, and FC16-64).

Slot-based licenses allow you to select the slots that the license will enable up to the capacity purchased and to increase the capacity without disrupting slots that already have licensed features running. Each slot-based license key is for a single feature.

Features that use slot-based licenses on the FX8-24 blade include:

- 10 Gigabit FCIP/Fibre Channel
- Advanced Extension
- Advanced FICON Acceleration

**NOTE**
The 10-GbE feature on the FX8-24 blade and the 10Gb/s FC feature on the 16Gb/s FC blades are both enabled by the same 10 Gigabit FCIP/Fibre Channel license (10G license). This license can also enable the 10Gb/s FC feature on a Brocade 6510 or Brocade 6520 switch as a chassis-based license.

Any unassigned slot-based license will be automatically assigned to applicable blades that are detected in the chassis when the license is installed. If you have more applicable blades than available license capacity, you can manually assign or re-assign the licenses as necessary.

Once a license is automatically or manually assigned to a slot, the assignment remains until you manually reassign the license to another slot. This design allows for various maintenance operations to occur without having the license move around to other slots.

The 10 Gigabit FCIP/Fibre Channel, Advanced Extension, Advanced FICON Acceleration, WAN Rate Upgrade 1, and WAN Rate Upgrade 2 licenses are slot-based features. After running the `configDefault` command, you must explicitly remove and add these slot-based licenses for the license slot assignment to be activated on non-DCX 8510 and non-X6 platforms. The `configDefault -all` command returns the license slot assignments to default and FX8-24 blades/slots will not have 10 Gigabit (FTR_10G) or Advanced Extension (FTR_AE) licenses assigned.

# Brocade 7810 Upgrade License Support

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 following licenses:

- 10Gb FCIP/Fiber Channel
- Advanced Extension
- Extension Fabric
- Fabric Vision and IO Insight
- Integrated Routing Ports on Demand
- Ports on Demand
- Trunking
- WAN Rate Upgrade 1

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 2: 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 | 1Gb/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 |
| 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 installed on one switch, but it can be applied to 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:

- 10 Gigabit FCIP/Fibre Channel (slot-based)
- Advanced Extension (slot-based)
- Advanced FICON Acceleration (slot-based)
- Advanced Performance Monitoring
- Enterprise ICL
- Fabric Watch
- 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 trial license, contact your Brocade representative.

**NOTE**
On Brocade Gen 5 platforms, a combination of Advanced Performance Monitoring and Fabric Watch licenses is equivalent to the Fabric Vision license.

## Restrictions on Upgrading Temporary Slot-Based Licenses

If the capacity of the permanent license is equal to or greater than the capacity of the temporary license and you use the same slot assignments, then replacing the temporary license with the permanent license is nondisruptive. If the capacity of the permanent license is less than that of the temporary license and the number of slots assigned is not less than the capacity of the permanent license, then the process is nondisruptive. If any condition changes, however, the process is disruptive.

If the permanent license is for fewer slots than the temporary license and does not match the associated criteria, you must do the following:

1. Remove the temporary license. This disables the feature.
2. Install the permanent license on the appropriate slots.
3. If the permanent license is for different slots than the temporary license, you must do the following:
   a) Install the permanent license. The temporary license is automatically replaced on the original slots.
   b) Reconfigure the application that uses the licensed feature on the original slots.
   c) Remove the license from the original slots using the `licenseslotcfg --remove` command.
   d) Add the license to the new slots using the `licenseslotcfg --add` command.

## 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` and `configupload` commands download the legacy, enhanced, consumed capacities, and temporary licenses.

## Expired Licenses

The `licenseshow` 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 every hour for licenses present in the database that have expired or are going to expire in the next five days. 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 should 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 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, ICL, or Enterprise 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 `licenseshow` output as having capacity incorrectly specified.

**NOTE**
Either or both POD1 and POD2 features cannot be included in a single combination license with any other features.

**NOTE**
Trial licenses are supported only for a single feature and combination of trial licenses are not supported.

**Table 3: License Requirements and Location by Feature**

| Feature | License | Where the License Should Be Installed |
|---|---|---|
| Adaptive Rate Limiting | Advanced Extension | Local switch. |
| Administrative domains | No license required. | N/A |
| Brocade Network Advisor | No license required for base use. | Refer to the corresponding firmware specific to *Brocade Network Advisor User Manual*. |
| ClearLink Diagnostics (D_Port) | No license required for D_Port tests between two switches or between a switch and a Brocade HBA.<br>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. |

| Feature | License | Where the License Should Be Installed |
|---|---|---|
| Configuration upload and download | No license required.<br>The `configupload` and `configdownload` commands are provided automatically with Fabric OS on the switch. | N/A |
| Diagnostic tools | No license required. | N/A |
| Distributed Management Server | No license required. | N/A |
| Enterprise ICL | Enterprise ICL | Brocade DCX 8510, where four or more chassis are connected using an ICL. |
| Extended Fabrics | Extended Fabrics | Local switch and any attached switches. |
| Fabric Performance Impact | No license required. | N/A |
| FCIP trunking | Advanced Extension | Local and attached switches. |
| Fibre Channel Routing/EX_Ports | Integrated Routing or Integrated Routing Ports On Demand | Local switch. |
| FICON | No license required. | N/A |
| FICON-CUP | FICON Management Server | Local switch. |
| FICON Tape Read and Write Emulation over an FCIP Tunnel | • FICON Tape<br>• High Performance Extension over FCIP/FC license | Local and attached switches. |
| FICON XRC Sequence Emulation over an FCIP Tunnel | • FICON XRC<br>• High Performance Extension over FCIP/FC license | Local and attached switches. |
| FIPS | No license required. | N/A |
| Firmware download | No license required.<br>The `firmwaredownload` command is provided automatically with Fabric OS on the switch. | N/A |
| Flow Vision:<br>• Flow Generator<br>• Flow Performance Monitor<br>• Flow Mirror | Fabric Vision<br>On Gen 5 platforms, if you have both the Advanced Performance Monitoring and the Fabric Watch licenses installed, you do not need the Fabric Vision license. | Local switch. |
| Full fabric connectivity | No license required. | Local switch. May be required on attached switches. |
| Inband management | No license required. | N/A |
| In-flight encryption and compression | No license required. | N/A |
| Ingress rate limiting | No license required.<br>An Adaptive Networking with QoS license is required for switches running Fabric OS versions earlier than 7.2.0.<br>The Brocade 6520 does not require a license regardless of Fabric OS version. | N/A for local switches running Fabric OS 7.2.0 or later.<br>License required on local switches running Fabric OS versions earlier than 7.2.0. |

| Feature | License | Where the License Should Be Installed |
|---|---|---|
| Inter-chassis link (ICL) | • ICL 1st POD (Ports on Demand) on the Brocade DCX 8510 Backbone family only.<br>• ICL 2nd POD on the Brocade DCX 8510-8 only. ICL POD license on the Brocade X6 Director.<br>• Enterprise ICL on the Brocade DCX 8510 Backbone family only, for topologies with more than four chassis with ICLs. | Local and attached platforms. For Brocade DCX 8510Backbone family where four or more chassis are connected through an ICL, do not have to install on each attached chassis if those chassis are not connected to four other chassis through an ICL. |
| IPsec | No license required. | N/A |
| IPsec for FCIP tunnels | No license required. | N/A |
| LDAP | No license required. | N/A |
| Logical fabric | No license required. | N/A |
| Logical switch | No license required. | N/A |
| Long distance | Extended Fabrics | Local and attached switches.<br>A license is needed on both sides of the connection. |
| Monitoring and Alerting Policy Suite (MAPS) | Fabric Vision<br>If you have both 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. |
| NPIV | No license required. | N/A |
| OpenSSH public key | No license required. | N/A |
| Port fencing | No license required. | Local switch. |
| Ports | • Ports on Demand and Q-Flex Ports on Demand licenses required; applicable to a select set of switches only.<br>• 10 Gigabit FCIP/Fibre Channel license to use 10-Gb FC ports on FC16-32 blades, FC16-48 blades, and the Brocade 6510 and 6520.<br>• 10 Gigabit FCIP/Fibre Channel license to enable 10-Gb Ethernet ports on the FX8-24 extension blades. | Local switch. |
| QoS | No license required. | N/A |
| QoS on HBA | No license required. | N/A |
| RADIUS | No license required. | N/A |
| RBAC | No license required. | N/A |
| Routing traffic | No license required.<br>Port-based or exchanged-based routing, static routes, frame-order delivery, and dynamic routes are all included. | N/A |
| SANnav | Enterprise License – The Enterprise license enables management of up to 15,000 ports and can be used to manage fixed-port switches and directors.<br>Base License – The Base license enables management of up to 600 ports and can be used to manage fixed-port switches. The Base license cannot be used to manage directors. | The license is installed on the SANnav server or virtual machine.<br>Refer to the *Brocade SANnav Management Portal and Global View User Guide* for more information. |

| Feature | License | Where the License Should Be Installed |
|---|---|---|
| Security | No license required.<br>DCC, SCC, FCS, IP Filter, and authentication policies are all included. | N/A |
| Slow Drain Device Quarantine | Fabric Vision | Local and attached switches. |
| SNMP | No license required. | N/A |
| Speed | A 10 Gigabit FCIP/Fibre Channel license is needed to support 10Gb FC ports on FC16-32 blades, FC16-48 blades, and the Brocade 6510 and 6520, as well as to support the 10Gb Ethernet ports on FX8-24 blades. (Refer to the previous Ports feature for more information.) | Local switch. |
| SSH public key | No license required. | N/A |
| TACACS+ | No license required. | N/A |
| Traffic Isolation | No license required. | N/A |
| Trunking | • ISL trunking<br>• ISL trunking Over Extended Fabrics<br>For ICL trunking, no license is required. | Local and attached switches. |
| Two-to-four domains in a fabric | Value Line (Two/Four) | Local switch. May be required on attached switches. |
| USB usage | No license required. | N/A |
| Virtual Fabrics | No license required. | N/A |
| Web Tools | No license required for Brocade Gen 5 (16Gb/s) and Brocade Gen 6 (32Gb/s) platforms. | Local and any switch that you will be managing using Web Tools. |
| Zoning | No license required. | N/A |

# 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. You can also use the Checking the List of Available Licenses option on the Brocade software license portal to view the software licenses available for your switch.

   **NOTE**

   To obtain a trial license, contact your Brocade representative.
2. When you receive the transaction key, retrieve the license ID (LID) of the switch.

   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 key. For instructions on obtaining a license, refer to the Generating a License task.
4. Install the license on the switch. For instructions on adding a license, refer to the Adding a Licensed Feature 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 4: Fabric OS Commands Related to Licensing**

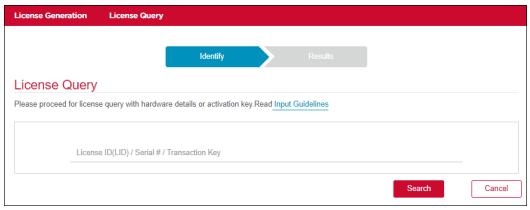
| Command | Description |
|---|---|
| `licenseAdd` | Adds a license to the switch. The license key is case-sensitive and must be entered exactly. |
| `licenseIdShow` | Displays the license ID of the system. |
| `licensePort` | Manages and displays Dynamic Ports on Demand (DPOD) license assignments. |
| `licenseRemove` | Removes a license from the switch. |
| `licenseShow` | Displays current license keys, along with a list of licensed products enabled by these keys. |
| `licenseSlotCfg` | Configures and manages licenses for the Brocade FX8-24 extension blade on the slot where the blade is installed. |

# Checking the List of Available Licenses

On the Broadcom Licensing Portal, you can retrieve your license key and view detailed information about your license.

To query a license, you must have either the transaction key or the license serial number.

1. Log in to Broadcom Licensing Portal, and complete the software license request. If you do not have a login ID and password, request access by following the online registration instructions.
2. Click **Licensing Management** in the **Brocade Products** section.
3. Click **License Query** in the top navigation bar.




4. Enter the **License ID (LID)** or **Serial #** or **Transaction Key** to query a particular product.
5. Click **Search**.

   The **License Query** page displays information about the license, including the license serial number, transaction key, expiration date, and unique ID (UID).
6. Click the **License** hyperlink to download the license key.
7. Click **Export to Excel** to download the report for sharing or archiving purposes, or click **Search Another Unit** to query another product.

# Generating a License

Access the Broadcom Licensing Portal to generate a FOS license key. Before you generate the license, make sure that you have a unique ID (UID). After you install the FOS device, you can obtain the UID by entering the `licenseidshow` command on the device. If you have received a paperpack transaction key, write the UID in the space provided on the paperpack and on the unit ID label.

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

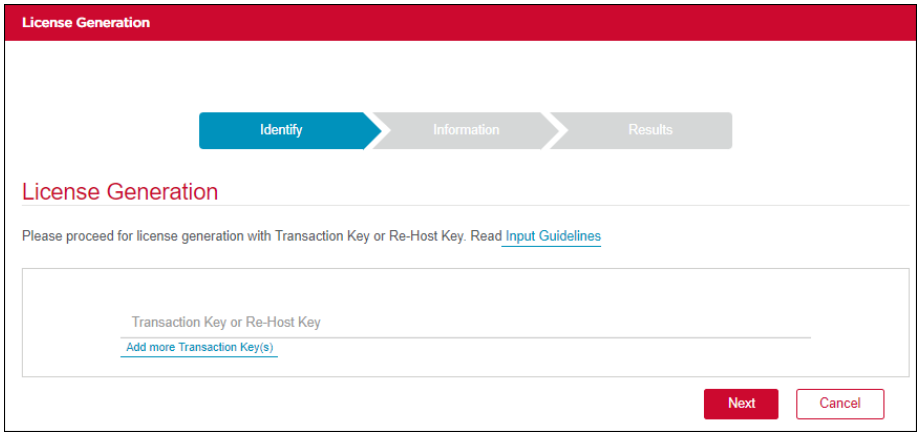
1. Obtain a license key from your FOS vendor.

   You will receive an email with the license transaction key in the form of an electronic transaction key. Do not discard the email with the electronic key. Keep it in a safe place in case it is needed for technical support or product replacement (RMAs).

   **NOTE**

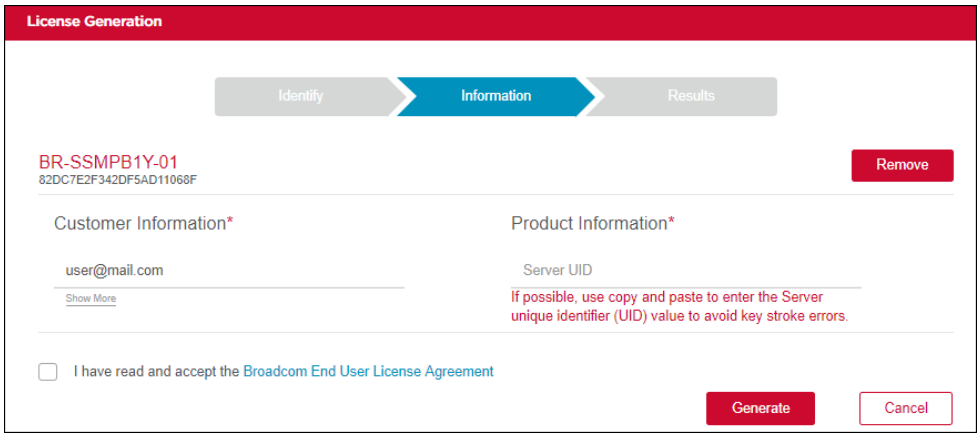
   - To order and obtain a trial license, contact your Broadcom representative.

2. Log in to Broadcom Licensing Portal, and complete the software license request. If you do not have a login ID and password, request access by following the online registration instructions.
3. Click **License Management** in the **Brocade Products** section.
4. Enter the licensing transaction key in the **License Generation** window, and click **Next**.




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

5. Enter the server UID that you obtained from FOS in the **Product Information** parameter.




6. Read the Broadcom End User License Agreement, and if you agree to the terms, select the **I have read and accept** check box.
7. Click **Generate**.

   The **Results** window displays an order summary and the results of the license request.

   - If the license request is successful, the **License** field contains a hyperlink to the generated license file. The license file is automatically sent by email to the specified customer email address.
   - If the license request fails, the reason for failure and the action to be taken are displayed on the page.

8. Click the hyperlink in the **License** field to display the license key.


9. Copy the license key to a .txt file and save it. You will use this license key when you add the license to the FOS device.
10. Click **Export to Excel** to export the results to a Microsoft Excel file, or click **Generate Another License** to generate a new license.

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

# 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.

For Brocade backbones and directors, licenses are effective on both control processor (CP) blades, but are valid only when the CP blade is inserted into a backbone or director that has an appropriate license ID stored in the WWN card. If a CP is moved from one backbone to another, the license works in the new backbone or director only if the WWN card is the same in the new backbone or director. Otherwise, you must transfer licenses from the old platform to the new platform by obtaining new licenses for the previously licensed features using the new license ID.

For example, if you swap one CP blade at a time or replace a single CP blade, the existing CP blade (the active CP blade) propagates the licenses to the new CP blade if the WWN card has been moved to the new platform.

If you move a standby CP from one backbone to another, the active CP will propagate its configuration (including license keys) onto that standby CP.

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 `licenseadd <license_key>` command.
3. Verify that the license was added by entering the `licenseshow` command. The licensed features that are currently installed on the switch are listed. If the feature is not listed, enter the `licenseadd` command again.

   Some features may require additional configuration, or you may need to disable and re-enable the switch to make them operational; refer to the feature documentation in the *Brocade Fabric OS Administration Guide* for details.

   The following is an example of adding all possible other licenses besides the Ports on Demand licenses for the Brocade G630 Switch running Fabric OS 8.2.0, including a combination license for the noncapacity licensed features supported by the Brocade G630 Switch. 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> licenseshow
No licenses installed.
switch:admin> licenseidshow
10:00:00:27:f8:f0:2a:e8
switch:admin> licenseadd R7NgAQZ3m4FWYMJaK7JrH7DaJDDYFPfKBAYHA
```

```
License Added [R7NgAQZ3m4FWYMJaK7JrH7DaJDDYFPfKBAYHA]

2017/02/23-15:19:25, [SEC-3051], 1834, CHASSIS, INFO, G630, The license key
 R7NgAQZ3m4FWYMJaK7JrH7DaJDDYFPfKBAYHA is Added.
For license change to take effect, it may be necessary to enable affected ports...
switch:admin> licenseadd AMLRWtSS3FXXmHga4DNFSKZDQANmKWJPCSFYMWHAXHAA

License Added [AMLRWtSS3FXXmHga4DNFSKZDQANmKWJPCSFYMWHAXHAA]
2017/02/23-15:20:23, [SEC-3051], 1835, CHASSIS, INFO, G630, The license key
 AMLRWtSS3FXXmHga4DNFSKZDQANmKWJPCSFYMWHAXHAA is Added.
switch:admin> licenseshow
R7NgAQZ3m4FWYMJaK7JrH7DaJDDYFPfKBAYHA:
    Extended Fabric license
    Trunking license
    FICON_CUP license
    Fabric Vision and IO Insight license
AMLRWtSS3FXXmHga4DNFSKZDQANmKWJPCSFYMWHAXHAA:
    Integrated Routing Ports on Demand license
    Capacity 64
```

# Activating a Slot-Based Licensed Feature

Use the following procedure to activate a slot-based licensed feature.

1. Install a slot-based license on the platform with a sufficient slot count for the number of slots on which you plan to activate the feature.

   If an incorrect license is entered, a 10-second pause is initiated by the switch.

2. Configure the slots so that the licensed feature is assigned to the slots. No more slots can be configured than specified in the license.

3. Configure the application that uses the licensed feature to use the blade in the licensed slot. This operation verifies that the previous two steps have been successfully completed.

   Once these steps are complete, the feature will work on the blade.

# Assigning a License to a Slot

Use the following procedure to assign a license to a slot.

1. Connect to the switch, and log in using an account with admin permissions or an account with OM permissions in the license class of RBAC commands.

2. Use the `licenseslotcfg --add` command to add the license to the appropriate slot.

# Assigning 10G Licenses

This section describes the procedures to assign 10G licenses.

# Enabling 10Gb/s Operation on an FC Port

Use the following procedure to enable 10Gb/s operation on an FC port on a Brocade 6510 or Brocade 6520 Switch or an FC16-32 or FC16-48 blade.

1. Connect to the switch, and log in using an account with admin permissions or an account with OM permissions for the license and SwitchPortConfiguration classes of RBAC commands.
2. Use the `licenseadd` command to add the 10G license.
3. Use the `licenseshow` command to verify the license.

   *Chassis platforms only:* If the results of the automatic license assignment are not what you intended, use the `licenseslotcfg` command to reassign the license to the desired blades.
4. Use the `portcfgoctetspeedcombo` command to set the combination speed for the port octet to a setting that supports 10Gb/s operations. Valid settings for 10Gb/s operations include:
   - **2** – Auto-negotiated or fixed-port speeds of 10, 8, 4, and 2Gb/s.
   - **3** – Auto-negotiated or fixed-port speeds of 16Gb/s and 10Gb/s.
5. Use the `portcfgspeed` command to set the port speed on each port that you want to operate at 10Gb/s.

   The following example assigns a license to slot 4 on a Brocade DCX 8510-8 Backbone and enables 10Gb/s operation on port 2 of the port blade in that slot. In this example, the 10G license was first automatically assigned to slot 1.

```
8510-8switch:admin> licenseadd aTFPNFXGLmABANMGtT4LfSBJSDLWTYD3EFrr4WGAEMBA
8510-8switch:admin> licenseshow
aTFPNFXGLmABANMGtT4LfSBJSDLWTYD3EFrr4WGAEMBA
        10 Gigabit FCIP/Fibre Channel (FTR_10G) license
        Capacity 1
        Consumed 1
        Configured Blade Slots 1
8510-8switch:admin> licenseslotcfg --remove FTR_10G 1
8510-8switch:admin> licenseslotcfg --add FTR_10G 4
8510-8switch:admin> licenseshow
aTFPNFXGLmABANMGtT4LfSBJSDLWTYD3EFrr4WGAEMBA
        10 Gigabit FCIP/Fibre Channel (FTR_10G) license
        Capacity 1
        Consumed 1
        Configured Blade Slots 4
8510-8switch:admin> portcfgoctetspeedcombo 4/2 2
8510-8switch:admin> portcfgspeed 4/2 10
8510-8switch:admin>
```

   The following example assigns a license to a Brocade 6510 Switch and enables 10Gb/s operation on port 2.

```
6510-switch:admin> licenseadd aTFPNFXGLmABANMGtT4LfSBJSDLWTYD3EFrr4WGAEMBA
6510-switch:admin> licenseshow
aTFPNFXGLmABANMGtT4LfSBJSDLWTYD3EFrr4WGAEMBA
        10 Gigabit FCIP/Fibre Channel (FTR_10G) license
        Capacity 1
        Consumed 1
    6510-switch:admin> portcfgoctetspeedcombo 2 2
6510-switch:admin> portcfgspeed 2 10
```

# Enabling the 10GbE Ports on an FX8-24 Blade

Use the following procedure to enable the 10GbE ports on an FX8-24 blade.

1. Connect to the chassis, and log in using an account with admin permissions or an account with OM permissions for the license class of RBAC commands.
2. Use the `licenseadd` command to add the 10G license.
3. Use the `licenseshow` command to check the results of automatic license assignment. If the results are not what you intended, use the `licenseslotcfg` command to reassign the license to the desired FX8-24 blade.
4. Use the `licenseshow` command to verify the license.
5. Use the `bladecfggemode --set` command to configure GbE port mode for the FX8-24 blade.

   ```
   bladecfggemode --set  mode -slot  slot
   ```

   To enable the 10GbE ports, set the mode to one of the following:

   - `10g` – Enables both 10GbE ports and disables all ten 1GbE ports.
   - `dual` – Enables the xge0 port (but not xge1) and also enables all ten 1GbE ports.

   The following example assigns a license to slot 7 on a Brocade DCX 8510-4 Backbone and enables both 10GbE ports on the FX8-24 blade in that slot. In this example, the license was first automatically assigned to slot 1.

```
8510-4switch:admin> licenseadd aTFPNFXGLmABANMGtT4LfSBJSDLWTYD3EFrr4WGAEMBA
8510-4switch:admin> licenseshow
aTFPNFXGLmABANMGtT4LfSBJSDLWTYD3EFrr4WGAEMBA
        10 Gigabit FCIP/Fibre Channel (FTR_10G) license
        Capacity 1
        Consumed 1
        Configured Blade Slots 1
8510-4switch:admin> licenseslotcfg -remove FTR_10G 1
8510-4switch:admin> licenseslotcfg -add FTR_10G 7
8510-4switch:admin> licenseshow
aTFPNFXGLmABANMGtT4LfSBJSDLWTYD3EFrr4WGAEMBA
        10 Gigabit FCIP/Fibre Channel (FTR_10G) license
        Capacity 1
        Consumed 1
        Configured Blade Slots 7
8510-4switch:admin> bladecfggemode --set 10G -slot 7
8510-4switch:admin> switchshow -slot 7
...
158    7   30   019e00   --    --   Offline     VE
159    7   31   019f00   --    --   Offline     VE
       7  ge0            --     1G   No_Module FCIP  Disabled (10G Mode)
       7  ge1            --     1G   No_Module FCIP  Disabled (10G Mode)
       7  ge2            --     1G   No_Module FCIP  Disabled (10G Mode)
       7  ge3            --     1G   No_Module FCIP  Disabled (10G Mode)
       7  ge4            --     1G   No_Module FCIP  Disabled (10G Mode)
       7  ge5            --     1G   No_Module FCIP  Disabled (10G Mode)
       7  ge6            --     1G   No_Module FCIP  Disabled (10G Mode)
       7  ge7            --     1G   No_Module FCIP  Disabled (10G Mode)
       7  ge8            --     1G   No_Module FCIP  Disabled (10G Mode)
       7  ge9            --     1G   No_Module FCIP  Disabled (10G Mode)
```

```
7 xge0            --    10G   No_Module FCIP
7 xge1            --    10G   No_Module FCIP
```

# 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 `licenseshow` command to display the active licenses.
3. Remove the license key using the `licenseremove` 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.
4. Enter the `licenseshow` command to verify that the license is disabled.

```
switch:admin> licenseshow

bQebzbRdScRfc0iK:
  Enterprise ICL license
SybbzQQ9edTzcc0X:
  Full Fabric license
switch:admin> licenseremove "bQebzbRdScRfc0iK"
removing license key "bQebzbRdScRfc0iK"
```

Entering the `licenseshow` command after the `licenseremove` command displays the remaining licenses.

```
switch:admin> licenseshow
SybbzQQ9edTzcc0X:
    Full Fabric license
```

If there are no license keys, `licenseshow` displays *No licenses*.

## Removing a License from a Slot

Use the following procedure to remove a slot-based license from a blade slot.

1. Connect to the switch, and log in using an account with admin permissions or an account with OM permissions in the license class of RBAC commands.
2. Deconfigure the application that uses the licensed feature on the blade slot.
3. Enter the `licenseslotcfg --remove` command to remove the license from the slot.

## 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 Information about Software Licenses

This section describes the procedures to view installed licenses. You can also view information about software licenses from the Brocade software portal.

## 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 `licenseshow` command.

```
switch:admin> licenseshow
Scz9y9QQSdTf0AzV:
    FICON_CUP license
Scz9y9QQSdTt4Azn:
    Full Ports on Demand license - additional 24 port upgrade license
Sbccb9QzbRTcddcP:
    Full Fabric license
    Extended Fabric license
BTPMBmMNSTmEN7PSYYJ3WtHCWTQfHRPYBAHNL:
    Trunking license
```

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 still installed on a switch.

## Viewing the License ID Using a Telnet Session

Use the following procedure to view the license ID using Telnet.

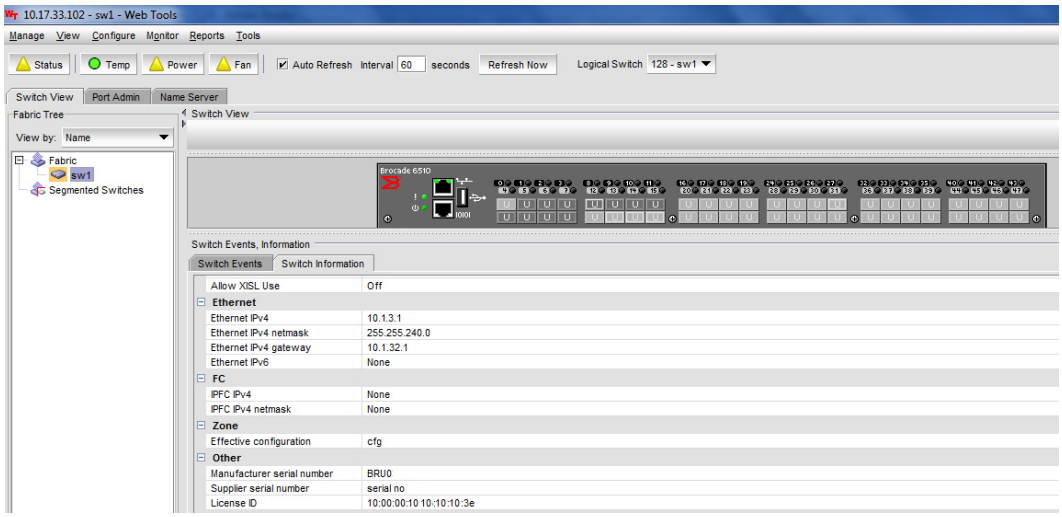
1. Connect to the switch, and log in using an account with admin permissions.
2. Enter the `licenseidshow` command.

```
switch:admin> licenseidshow
a4:f8:69:33:22:00:ea:18
```

## Viewing the License ID Using Web Tools

Use the following procedure to view the license ID using the Brocade Web Tools application.

1. Connect to the switch using a web browser; Web Tools opens automatically.
2. Log on as admin and enter your switch password. The license ID value is shown in the **Switch Information** tab for the 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 Features. Licenses are created using a switch license ID (LID), so that 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 `licenseshow` command.

1. Connect to the switch, and log in using an account with admin permissions.
2. Enter the `licenseshow` 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 `licenseadd` command.

# Activating or Removing Licenses Using Web Tools

The licensed features currently installed on the switch are listed in the **License** tab of the **Switch Administration** window. For time-based licenses, the expiry date is included. Right-click a license key to export data, copy data, or search the table.

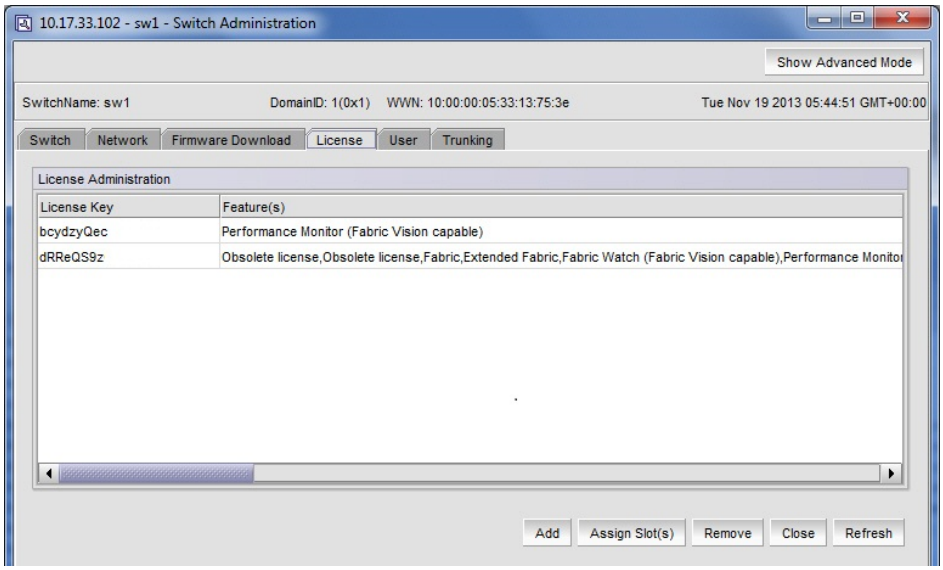
## Activating the License on a Switch

Before you can unlock a licensed feature, you must obtain a license key. See Generating a License for instructions on how to obtain a license key using the Brocade website.

To activate a license, perform the following steps.

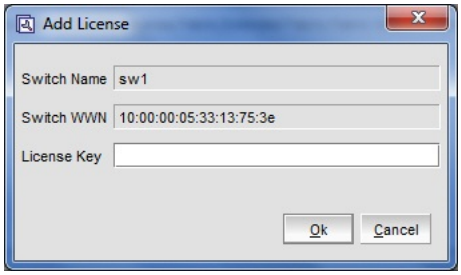
1. Click **Configure** > **Switch Admin**.

   The **Switch Administration** window is displayed.




2. Select the **License** tab and click **Add**.

   The **Add License** dialog is displayed.




3. Paste or enter a license key in the **License Key** field, and click **Ok**.
4. Click **Refresh** to display the new licenses in the **License** tab.

   If the feature is listed, the licensed feature is installed and immediately available. When you enable some licenses, such as ISL Trunking, you may need to change the state of the port to enable the feature on the link. Some licenses, such as the Trunking license, do not take effect until the switch is restarted.

## Assigning Slots for a License Key

This feature allows you to increase the capacity without disrupting the slots that already have licensed features running.

> **NOTE**
> You can enable slot-based licenses only on the 10 Gigabit Ethernet (FTR_10G), Advanced Extension (FTR_AE), and Advanced FICON Acceleration (FTR_AFA) features.

Use the following procedure to assign slots for a license key.

1. Click **Configure** > **Switch Admin** to open the **Switch Administration** window.
2. Select the **License** tab.
3. Select the license key for which you want to assign slots from the **License Administration** table.
4. Click **Assign Slot(s)**.

   The **Assign Slots** window is displayed.

5. Select the slots that you want to assign.
6. Click **OK**.

## Removing a License from a Switch

To remove a license from a switch, perform the following steps.

**ATTENTION**

Use care when removing licenses. If you remove a license for a feature, that feature no longer works.

1. Click **Configure** > **Switch Admin** to open the **Switch Administration** window.
2. Select the **License** tab.
3. Select the license key that you want to remove.
4. Click **Remove**.

# 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 5: 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.<br>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 M6505 | Can be purchased with 12 or 24 licensed ports. A maximum of 24 ports is allowed. |
| Brocade 6505 | Can be purchased with 12 or 24 licensed ports. A maximum of 24 ports is allowed. |
| Brocade 6510 | Can be purchased with 24, 36, or 48 licensed ports. A maximum of 48 ports is allowed. |
| Brocade 6520 | Can be purchased with 48, 72, or 96 licensed ports. A maximum of 96 ports is allowed. |
| Brocade 6547 | Can be purchased with 12, 24, or 48 licensed ports. A maximum of 48 ports is allowed. |
| Brocade 6548 | Can be purchased with 16, 22, or 28 licensed ports. A maximum of 28 ports is allowed. |
| Brocade 7810 Extension | Can be purchased with 4 or 12 licensed ports. A maximum of 12 ports is allowed. |

**ATTENTION**

Licenses are not interchangeable between units. For example, if you bought a POD license for a Brocade 6505, you cannot use that license on a Brocade 6510 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 6: Available User Ports When Implementing PODs**

| Platform | Available User Ports With No POD License | Available User Ports With POD License | POD Increments | QSFP POD |
|---|---|---|---|---|
| Brocade G610 | 0–8 | 0–24 | 8 | N/A |
| Brocade G620 | 24 SFP+ ports | Ports on Demand: 48 SFP+ ports | 12 | Q-Flex Ports on Demand: 16 QSFP ports (four ports on each QSFP) |
| Brocade G630 | 48 SFP+ ports | Ports on Demand: 96 SFP+ ports | 24 | Q-Flex Ports on Demand: 32 QSFP ports (four ports on each QSFP) |
| Brocade M6505 | 1–8 and 17–20 | N/A | 12 | N/A |

| Platform | Available User Ports With No POD License | Available User Ports With POD License | POD Increments | QSFP POD |
|---|---|---|---|---|
| Brocade 6505 | 0–11 | N/A | 12 | N/A |
| Brocade 6510 | 0–23 | 0–47 | 12 | N/A |
| Brocade 6520 | 0–47 | 0–95 | 12 | N/A |
| Brocade 6547 | 0–8 and 29–31 | 0–47 | 12 | N/A |
| Brocade 6548 | 1–10 and 17–22 | 0–27 | 12 | N/A |
| Brocade 7810 Extension | 4 SFP+ ports | Ports on Demand: 12 SFP+ ports | 12 | N/A |

**NOTE**
A Ports on Demand license adds SFP ports to the standard 24 SFP ports in 12-port increments. Therefore, the possible SFP port configurations are 24 SFP ports, 36 SFP ports, 48 SFP ports, and 96 SFP ports. With any of the SFP port configurations, the Q-Flex license adds up to 32 QSFP ports (four ports on each QSFP).

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 for instructions on generating a license key.

Each Ports on Demand license activates the next group of ports in numerical order in either 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.

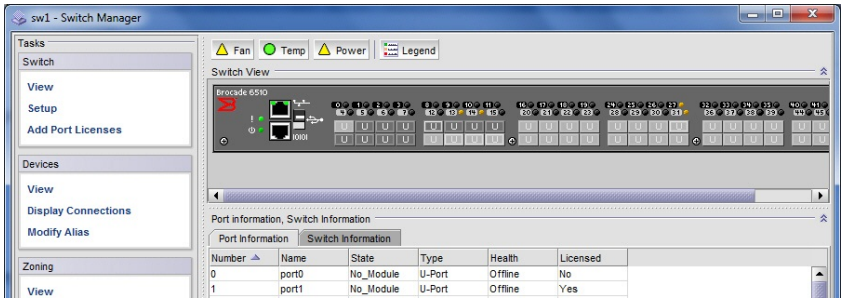
   Alternatively, you can disable and then enable the switch to activate the ports.
5. Use the `portshow` command to check the newly activated ports.

# Activating Ports on Demand Using EZSwitchSetup

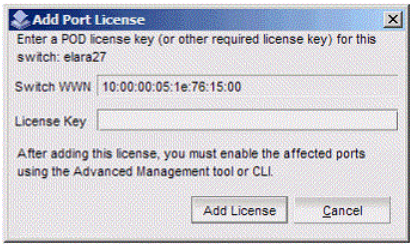
EZSwitchSetup Switch Manager allows you to enable Ports on Demand (POD) if you have a license available.

Use the following procedure to activate Ports on Demand using EZSwitchSetup.

1. Launch the EZSwitchSetup wizard.
   - On Windows: EZSwitchSetup starts automatically after it is installed. If it does not, from the **Start** menu, select **Programs** > **EZSwitchSetup** > **EZSwitchSetup**.
   - On Linux: EZSwitchSetup does not start automatically, so you must reboot it manually.
2. Click **Add Port Licenses** under **Switch** in the **Tasks** panel.




The **Add Port License** dialog is displayed.




3. Enter the license key in the **License Key** field to add additional ports.
4. Click **Add License**.
5. Enable the ports using one of the following methods:
   - Use the `portdisable` and `portenable` commands on the command-line interface.
   - Reboot or power-cycle the switch.
   - Use the Advanced Management tool. Refer to the *Brocade EZSwitchSetup Administration Guide* for information on accessing Web Tools for advanced management.

# Activating Ports on Demand Using Web Tools

To enable Ports on Demand using web tools, perform the following steps.

1. Install the Brocade Ports on Demand licensed product. For instructions, see Activating the License on a Switch.
2. Enable the port by performing the following steps.
   a) Click the port in the **Switch View** to open the **Port Admin** tab.
   b) Select the **FC Ports** or **GigE Ports** tab.
   c) From the tree on the left, select the switch or slot that contains the port that you want to enable.
   d) From the table, select one or more ports.

**NOTE**
Use **Shift** + click and **Ctrl** + click to select multiple ports from the table. You cannot select multiple ports from the tree.

e) Select **Enable/Disable** > **Enable** from the **Actions** list.
f) Click **Yes** in the confirmation window.

# Displaying Installed Licenses

To display the installed licenses, perform the following steps:

1. Connect to the switch, and log in using an account with admin permissions.
2. Enter the `licenseshow` command.

```
switch:admin> licenseshow
RSrMDB39KRYrBfFM4QSRQQGXSf3ttKHaQL97fWHASL4B:
    WAN Rate Upgrade 1 (FTR_UPG1) license
    Capacity 4
    Consumed 3
    Configured Blade Slots 1,2,3
PMJmKQXTmHt9QDNACgT3MMT4AR4NgRgKBAPZR:
   WAN Rate Upgrade 2 (FTR_UPG2) license
   Capacity 4
   Consumed 2
   Configured Blade Slots 1,3
```

**ATTENTION**

If you enable or disable an active port, you will disrupt any traffic and potentially lose data flowing on that port. If the port is connected to another switch, you will segment the switch from the fabric, and all traffic flowing between the disabled port and the fabric will be lost. If you remove a Ports on Demand license, the licensed ports will be disabled the next time the platform reboots or when the next port is deactivated.

# 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 platforms support Dynamic POD:

- Switches:
  - Brocade G610
  - Brocade G620
  - Brocade G630
  - Brocade 6505
  - Brocade 6510
  - Brocade 6520
  - Brocade 7810 Extension
- Blade server SAN I/O modules:
  - Brocade M6505
  - Brocade 6547
  - Brocade 6548

For the blade server SAN I/O modules, Dynamic POD detects and assigns ports to a POD license only if the server blade is installed with an HBA. A server blade that does not have a functioning HBA is treated as an inactive link during initial POD port assignment. For the non-server-blade switches, the dynamic assignment occurs when an attached Fibre Channel link transitions to the *link active* state.

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 `licenseport --show` command.

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

```
switch:admin> licenseport --show
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> licenseport --show
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 *)
```

## Reserving a Port License

You can allocate licenses by reserving and releasing POD assignments for specific ports. Disabled ports are not candidates for 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 will not be 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 `licenseport --show` command to verify that port reservations are available.

```
switch:admin> licenseport --show
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 `licenseport --reserve` command to reserve a license for a port or range of ports.

     ```
     switch:admin> licenseport --reserve 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.

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

```
switch:admin> licenseport --release 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 `licenseport --show` command to verify that the port is no longer assigned to a POD set.

```
switch:admin> licenseport --show
  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 back the port online.
7. Enter the `portshow` command to verify that the state of the port is now online.

# Revision History

**FOS-821-SW-Lic-UG104; 3 June 2020**

- Updated the Fabric OS Licenses chapter.

**FOS-821-SW-Lic-UG103; 13 February 2019**

- Added the SANnav licensing requirement in Table 3.
- Updated Checking the List of Available Licenses using the new Broadcom software licensing portal.
- Updated Generating a License using the new Broadcom software licensing portal.

**FOS-821-SW-Lic-UG102; 4 December 2018**

- Updated the copyright statement and the customer support topic in the Introduction chapter.

**FOS-821-SW-Lic-UG101; 28 September 2018**

- Updated Combo License Support in the Fabric OS Licenses chapter.
- Updated Counterfeit License Support in the Fabric OS Licenses chapter.

**FOS-821-SW-Lic-UG100; 28 August 2018**

- Added the section License Model in the Software Licensing Overview chapter.
- Added the section Combo License Support in the Fabric OS Licenses chapter.
- Added the section Counterfeit License Support in the Fabric OS Licenses chapter.
- Updated Generating a License with v3.0 license information.
- Updated Ports on Demand Overview with Brocade 7810 Extension Switch support.
- Updated Dynamic Ports on Demand with Brocade 7810 Extension Switch support.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