

# FastIron Ethernet Switch Software Licensing Guide, 08.0.30

Supporting FastIron Software Release 08.0.30

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# Preface

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## Document conventions

The document conventions describe text formatting conventions, command syntax conventions, and important notice formats used in Brocade technical documentation.

## Notes, cautions, and warnings

Notes, cautions, and warning statements may be used in this document. They are listed in the order of increasing severity of potential hazards.

### NOTE

A Note provides a tip, guidance, or advice, emphasizes important information, or provides a reference to related information.

### ATTENTION

An Attention statement indicates a stronger note, for example, to alert you when traffic might be interrupted or the device might reboot.



### CAUTION

A Caution statement alerts you to situations that can be potentially hazardous to you or cause damage to hardware, firmware, software, or data.



### DANGER

A Danger statement indicates conditions or situations that can be potentially lethal or extremely hazardous to you. Safety labels are also attached directly to products to warn of these conditions or situations.

## Text formatting conventions

Text formatting conventions such as boldface, italic, or Courier font may be used to highlight specific words or phrases.

Format	Description
<b>bold text</b>	Identifies command names. Identifies keywords and operands. Identifies the names of GUI elements.
<i>italic text</i>	Identifies text to enter in the GUI. Identifies emphasis. Identifies variables.
Courier font	Identifies document titles. Identifies CLI output.

Format	Description
	Identifies command syntax examples.

## Command syntax conventions

Bold and italic text identify command syntax components. Delimiters and operators define groupings of parameters and their logical relationships.

Convention	Description
<b>bold text</b>	Identifies command names, keywords, and command options.
<i>italic text</i>	Identifies a variable.
value	In Fibre Channel products, a fixed value provided as input to a command option is printed in plain text, for example, <code>--show WWN</code> .
[ ]	Syntax components displayed within square brackets are optional.  Default responses to system prompts are enclosed in square brackets.
{ x   y   z }	A choice of required parameters is enclosed in curly brackets separated by vertical bars. You must select one of the options.  In Fibre Channel products, square brackets may be used instead for this purpose.
x   y	A vertical bar separates mutually exclusive elements.
< >	Nonprinting characters, for example, passwords, are enclosed in angle brackets.
...	Repeat the previous element, for example, <code>member[member...]</code> .
\	Indicates a "soft" line break in command examples. If a backslash separates two lines of a command input, enter the entire command at the prompt without the backslash.

## Brocade resources

Visit the Brocade website to locate related documentation for your product and additional Brocade resources.

White papers, data sheets, and the most recent versions of Brocade software and hardware manuals are available at [www.brocade.com](http://www.brocade.com). Product documentation for all supported releases is available to registered users at [MyBrocade](http://MyBrocade).

Click the **Support** tab and select **Document Library** to access product documentation on [MyBrocade](http://MyBrocade) or [www.brocade.com](http://www.brocade.com). You can locate documentation by product or by operating system.

Release notes are bundled with software downloads on [MyBrocade](http://MyBrocade). Links to software downloads are available on the MyBrocade landing page and in the Document Library.

## Document feedback

Quality is our first concern at Brocade, and we have made every effort to ensure the accuracy and completeness of this document. However, if you find an error or an omission, or you think that a topic needs further development, we want to hear from you. You can provide feedback in two ways:

- Through the online feedback form in the HTML documents posted on [www.brocade.com](http://www.brocade.com)
- By sending your feedback to [documentation@brocade.com](mailto:documentation@brocade.com)

Provide the publication title, part number, and as much detail as possible, including the topic heading and page number if applicable, as well as your suggestions for improvement.



# Contacting Brocade Technical Support

As a Brocade customer, you can contact Brocade Technical Support 24x7 online or by telephone. Brocade OEM customers should contact their OEM/solution provider.

## Brocade customers

For product support information and the latest information on contacting the Technical Assistance Center, go to [www.brocade.com](http://www.brocade.com) and select **Support**.

If you have purchased Brocade product support directly from Brocade, use one of the following methods to contact the Brocade Technical Assistance Center 24x7.

Online	Telephone
<p>Preferred method of contact for non-urgent issues:</p> <ul style="list-style-type: none"> <li>• Case management through the <a href="#">MyBrocade</a> portal.</li> <li>• Quick Access links to Knowledge Base, Community, Document Library, Software Downloads and Licensing tools</li> </ul>	<p>Required for Sev 1-Critical and Sev 2-High issues:</p> <ul style="list-style-type: none"> <li>• Continental US: 1-800-752-8061</li> <li>• Europe, Middle East, Africa, and Asia Pacific: +800-AT FIBREE (+800 28 34 27 33)</li> <li>• <a href="#">Toll-free numbers</a> are available in many countries.</li> <li>• For areas unable to access a toll-free number: +1-408-333-6061</li> </ul>

## Brocade OEM customers

If you have purchased Brocade product support from a Brocade OEM/solution provider, contact your OEM/solution provider for all of your product support needs.

- OEM/solution providers are trained and certified by Brocade to support Brocade® products.
- Brocade 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, contact Brocade or your OEM.
- For questions regarding service levels and response times, contact your OEM/solution provider.



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## Supported hardware

This guide supports the following product families from Brocade:

- FastIron X Series (FSX 800 and FSX 1600)
- Brocade FCX Series
- Brocade ICX 6610 Series
- Brocade ICX 6450 Series (ICX 6450, ICX 6450-C12-PD)
- Brocade ICX 6650 Series
- Brocade ICX 7250 Series
- Brocade ICX 7450 series
- Brocade ICX 7750 Series

For information about the specific models and modules supported in a product family, refer to the hardware installation guide for that product family.

### NOTE

The Brocade ICX 6450-C switch supports the same feature set as the Brocade ICX 6450 switch unless otherwise noted.

## How command information is presented in this guide

For all new content supported in FastIron release 08.0.20 and later, command information is documented in a standalone command reference guide.

In the *Brocade FastIron Command Reference*, the command pages are in alphabetical order and follow a standard format to present syntax, parameters, mode, usage guidelines, examples, and command history.

### NOTE

Many commands introduced before FastIron release 08.0.20 are also included in the guide.

## What's new in this document

This document is updated for FastIron software release 08.0.30.

**TABLE 1** Summary of enhancements in FastIron release 08.0.30

Feature	Description	Described in
Brocade ICX 7250 Licensed Features	The Brocade ICX 7250 Premium Layer 3 feature list is updated.	<a href="#">ICX 7250 Licensed Features</a> on page 75

**TABLE 1** Summary of enhancements in FastIron release 08.0.30 (continued)

Feature	Description	Described in
Non-node locked licensing	A new license introduced for the ICX 7250.	See <a href="#">Non-Node Locked Licensing</a> on page 57
MACSec key based licensing	A license introduced for the ICX 7450.	See <a href="#">MACSec Key-Based Licensing</a> on page 53
Ports on Demand (PoD) based licensing	A license introduced for ICX 7250.	See <a href="#">Ports on Demand (PoD) Licensing</a> on page 35

# Software Licensing Overview

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## Software licensing

Prior to the introduction of software licensing, Brocade supported hardware-based licensing, where an EEPROM was used to upgrade a Layer 2 or base Layer 3 switch to a premium or advanced Layer 3 switch. With the introduction of software licensing, one or more valid software licenses are required to run licensed features on the device.

Software licensing is designed to work together with hardware-based licensing. The first release of software licensing employed a combination of hardware-based and software licensing. A Brocade device can use hardware-based licensing, software licensing, or both. Current releases that support software licensing use software licensing only, eliminating the need for a customer- or factory-installed EEPROM on the management module or switch backplane.

Software licensing provides increased scalability and rapid deployment of hardware and software features on the supported Brocade family of switches. For example, for premium upgrades, it is no longer necessary to physically open the chassis and install an EEPROM to upgrade the system. Instead, the Web is used to generate, download, and install a software license that enables premium features on the device.

### NOTE

An ICX device only supports software licensing. Hardware-based licensing is not supported on ICX devices.

## How software licensing works

A permanent license (for select features on specific units) can be ordered pre-installed in a Brocade device when first shipped from the factory, or later ordered and installed by the customer. In either case, additional licenses can be ordered as needed.

When a license is ordered separately (not pre-installed), an entitlement certificate or e-mail message, along with a transaction key, are issued to the customer by Brocade as proof of purchase. The transaction key and license ID (LID) of the Brocade device are used to generate a license key from the Brocade software portal. The license key is contained within a license file, which is downloaded to your PC, where the file can then be transferred to a TFTP or SCP server, and then uploaded to the Brocade device.

Once a license is installed on the Brocade devices, the license unlocks the licensed feature and it becomes available immediately. There is no need to reload the software.

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

## Seamless transition for legacy devices

The term "legacy device" refers to a Brocade device that was shipped prior to the introduction of software-based licensing, has an EEPROM installed, and is running a FastIron release prior to 07.1.00.

The transition to software licensing is seamless for legacy devices. When upgraded to a release that supports software-based licensing, these devices will continue to operate as previously configured.

### NOTE

There are special considerations and instructions for FastIron legacy devices in need of replacement (by way of a Return Merchandise Agreement [RMA]). For details, refer to [Special replacement instructions for legacy devices](#) on page 27.

## License types

The following license types are supported on the devices:

- Application-related - Enables premium or advanced features on the device.
- Permanent licenses - A permanent license (also referred to as a chassis-wide license) has no expiration date and is locked to a single switch identified by the switch license ID. The switch license ID is initially the same as the switch World Wide Name (WWN). The switch WWN may change through configuration changes on the product, but the switch license ID remains unchanged.
- Trial/Temporary licenses - A temporary license (also known as a time-based license) enables a license-controlled feature to run on the device on a temporary basis. A trial license enables demonstration and evaluation of a licensed feature and can be valid for a period of 45 days.
- Non-node locked license - This license enables the licensed features prior to obtaining a license file. Refer to [Non-Node Locked Licensing](#) on page 57 for details.

## Software licensing terminology

The following terms are used in this document:

- Entitlement certificate - The proof-of-purchase certificate (*paperpack*) issued by Brocade when a license is purchased. The certificate contains a unique transaction key that is used in conjunction with the license ID (LID) of the Brocade device to generate and download a software license from the Brocade software portal.
- License file - The file produced by the Brocade software portal when the license is generated. The file is uploaded to the Brocade device and controls access to a licensed feature or feature set.
- License ID (LID) - The identification number that uniquely identifies the 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.
- Licensed feature - Any hardware or software feature or set of features that require a valid software license in order to operate on the device.
- 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 according to the method specified when the order is placed:
  - Paperpack - The transaction key is recorded on an entitlement certificate, which is mailed to the customer.

- Electronic - The transaction key is contained in an e-mail message, which is sent instantly to the customer after the order is placed. The customer receives the e-mail message within a few minutes after the order is placed, though the timing will vary depending on the network, Internet connection, and so on.

If a delivery method is not specified at the time of the order, the key will be delivered by the way of paperpack.

## Licensing rules

The following licensing rules apply to all devices that support software licensing:

- A license is tied to the unique LID of the management module or fixed configuration switch for which the license was ordered. Therefore, a license can be used on one device only. It cannot be used on any other device.

### NOTE

However, a non-node locked license can be moved from one device and redeployed to another device within the same product platform.

- More than one license can be installed per device concurrently.
- More than one trial license can be in effect at the same time, as long as each trial license applies to a unique licensed feature.
- A trial license cannot replace or supersede a normal license.

## Licensing rules for FCX, ICX 6610, and ICX 6450 devices

The following licensing rule applies to FCX and ICX 6610 devices for software-based licensing. To describe the behavior for running software-based licensing in an FCX traditional stack, the FCX-ADV-LIC-SW license is used as an example.

### NOTE

Beginning with FastIron release 08.0.30, the advance L3 features for ICX 6610 are available with the ICX 6610 premium license. For details, see the FastIron licensed features and software section (Appendix A).

### NOTE

For FCX devices running any version of FastIron, and for ICX 6610 devices running FastIron releases prior to 08.0.30, the behavior for running software licensing with different licenses (Premium, Advance, or Upgrade licenses) is the same. One license allows multiple protocols to run in a stack. If a member unit without a license joins a stack, the Active controller must make sure that no protocols are enabled in a stack before putting a member unit into full operational state.

### NOTE

To enable the VRF-Lite feature on an ICX 6610 device, an Advanced Layer 3 license is required. For a list of supported features on an ICX 6610 device, see the FastIron licensed features and software section (Appendix A).

- Each stack unit in an FCX traditional stack must have a separate software license for the same licensed feature. For example, if there are eight units in a traditional stack, eight separate licenses must be purchased to run the licensed features in the stack. If there is any unit in a stack without the FCX-ADV-LIC-SW license, the Active controller cannot run the licensed features on the stack.

For example, to run BGP on the stack, the **router bgp** command must be enabled through the CLI on the Active controller. If the Active controller does not have the FCX-ADV-LIC-SW license, the user cannot configure the **router bgp** command at the CLI level. If the Active controller has the FCX-ADV-LIC-SW license, and the **router bgp** command is enabled at the CLI level, the system checks all operational units to verify that each unit has the FCX-ADV-LIC-SW license. Only if all the operational units have the FCX-ADV-LIC-SW license will

the licensed feature run in the stack. If any unit does not have the FCX-ADV-LIC-SW license, the **router bgp** command is rejected and the licensed feature cannot run in the stack. For example, the following error message is displayed on the console.

```
device(config)#router bgp
Error! cannot run BGP because unit 2 has no FCX-ADV license
```

If the Active controller is running BGP (and all other licensed features if enabled), and a unit without the FCX-ADV-LIC-SW license joins the stack, the unit is put into a non-operational state. If a user copies the FCX-ADV-LIC-SW license to a non-operational unit, it takes effect immediately and the unit becomes operational. If the operational unit has a higher priority than the current Standby controller, the unit replaces the existing Standby controller and becomes the new Standby controller. This behavior applies to all cases in which a non-operational unit becomes operational. If a user disables BGP from the stack, the Active controller puts all non-operational units in the operational state. The Active controller and the Standby controller must have the same non-operational units.

When the Standby controller receives the runtime configuration from the Active controller, the Standby controller must update the state of every unit (operational or non-operational state). If a user deletes the FCX-ADV-LIC-SW license in any stack unit, the Active controller does not change the unit to the non-operational state regardless of running BGP or not. Even if a new election algorithm change occurs, an operational unit is not changed to a non-operational unit. The stack continues its BGP running state. The stack cannot run BGP again after the user disables BGP, or after a reload. If BGP is not enabled on the Active controller, a stack unit is operational whether or not the Active controller or the stack units have the FCX-ADV-LIC-SW license. This implies that in a stack where all units (Active controller, Standby controller, and member units) have the FCX-ADV-LIC-SW license, a stack can be formed whether or not BGP is enabled. However, if there is a license mismatch between any of the units in a stack, a stack can still be formed provided that the **router bgp** command is not enabled on the Active controller. The FCX-ADV-LIC-SW license is not considered when selecting a unit to be the Standby controller.

## Licensing rules for FSX 800 and FSX 1600 devices

FSX 800 and FSX 1600 devices with redundant management modules must have two separate licenses to run the same licensed feature on both management modules. The license file in the active management module is never copied to or updated on the standby management module.

Upon bootup, the active management module compares its license with the standby management module. If the license differs, the active management module immediately shuts down the standby management module. To enable the standby management module, you must install a separate license. For example, if the active management module has the SX-FIL3U-SW license, the standby management module must also have this license.

## Licensing rules for ICX 7450 and ICX 7250 devices

Non-node locked licensing features can be activated prior to obtaining a valid license, based on an agreement to obtain a license. A non-node locked license is not tied to the LID of the Brocade device for which the license was ordered and generated.

# Software portal tasks

## Generating a license

Before you can use a software license, you must generate it from the Brocade software portal.

The following procedure demonstrates how to generate and obtain a software license.



**NOTE**

For information on obtaining a non-node license refer to Obtaining a non-node locked license.

## 1. Order a license.

You will receive the license transaction key in the form of a paperpack or electronic transaction key. When you receive the paperpack or electronic transaction key, retrieve the LID of your Brocade device by entering the **show version** command on the device. If you have received a paperpack transaction key, write the LID in the space provided on the entitlement certificate and on the unit ID label.

**NOTE**

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

**NOTE**

Do not discard the entitlement certificate or e-mail with the electronic key. Keep it in a safe place in case it is needed for technical support or product replacement (RMAs).

2. Log in to the Brocade software portal at <http://swportal.brocade.com> and complete the software license request. If you do not have a login ID and password, request access by following the instructions on the screen.

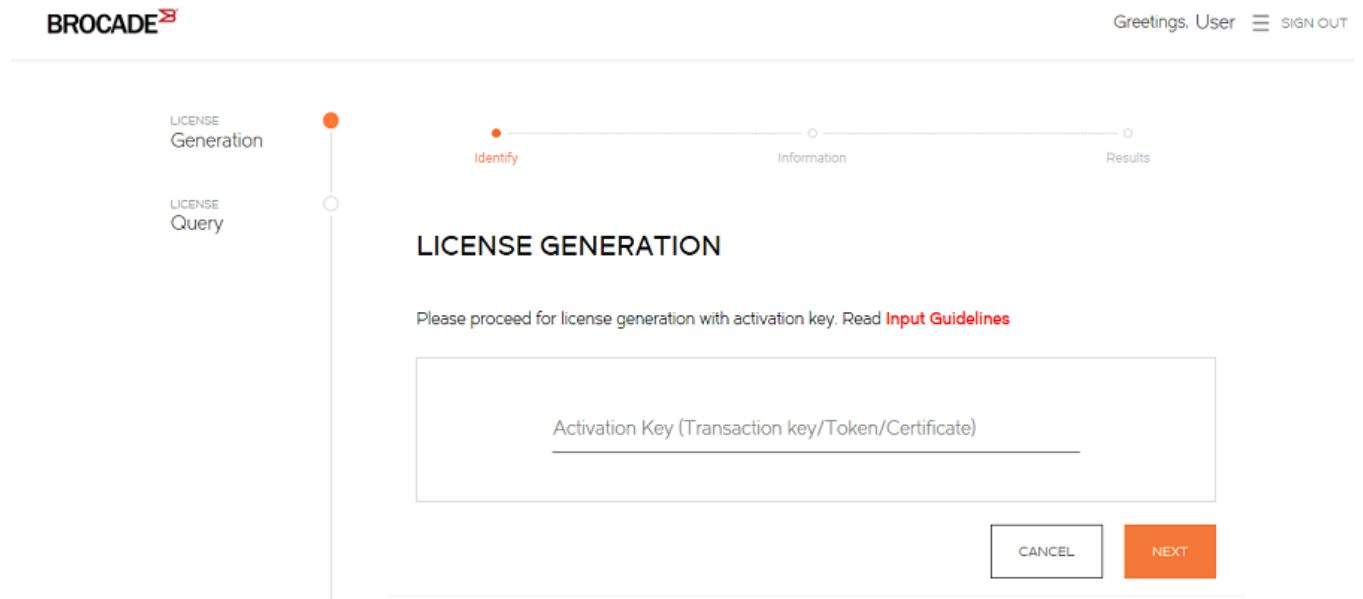
The following figure shows the Software Licensing portal login window.

**FIGURE 1** Software Licensing portal login window

The screenshot shows the Brocade Software Licensing portal login window. At the top, there is a navigation bar with the following links: PRODUCTS & SERVICES, POSSIBILITIES, SUPPORT, MORE, and SEARCH. On the right side of the navigation bar, there is a link for SIGN IN / REGISTER. The main content area is divided into two columns. The left column is titled "LOGIN" and contains the following elements: a "User Name" input field, a "Password" input field, a "Software Licensing" dropdown menu, an orange "LOGIN" button, and links for "Help" and "Forgot your ID or password?". Below these elements, there is a message for RUCKUS CUSTOMERS: "RUCKUS CUSTOMERS, please continue to use the RUCKUS SUPPORT PORTAL." The right column is titled "REGISTER WITH BROCADE" and contains the following elements: a registration description: "Register your Brocade products and gain access to MyBrocade, Brocade Communities and Brocade Training.", an orange "REGISTER NOW" button, and a link for users who did not receive their registration email: "If you did not receive your registration activation email, [Click Here](#)." At the bottom right, there is a section for "MORE PURCHASE OPTIONS" with a link for "How to buy".

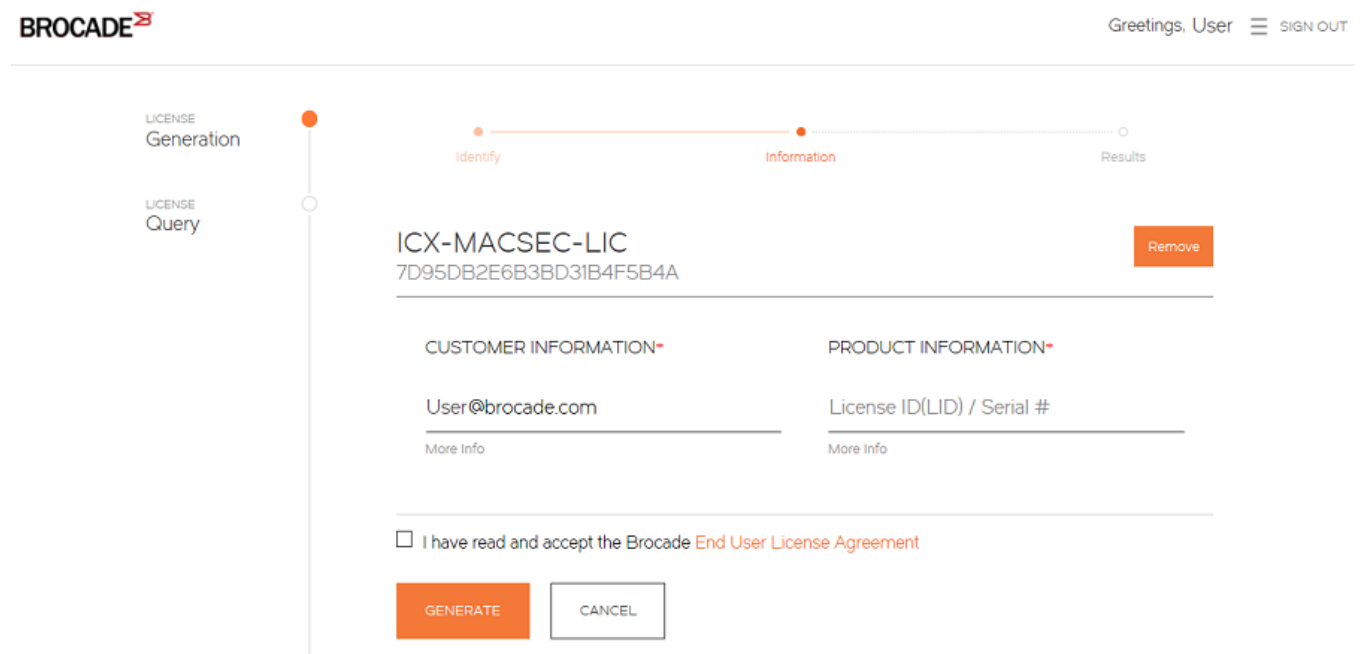
3. Enter your user name and password and click **LOGIN**.  
The **License Generation** window appears.

FIGURE 2 License Generation window



4. Enter the licensing transaction key, token, or certificate and click **Next**.  
The **License Information** window is displayed.

FIGURE 3 License Information window

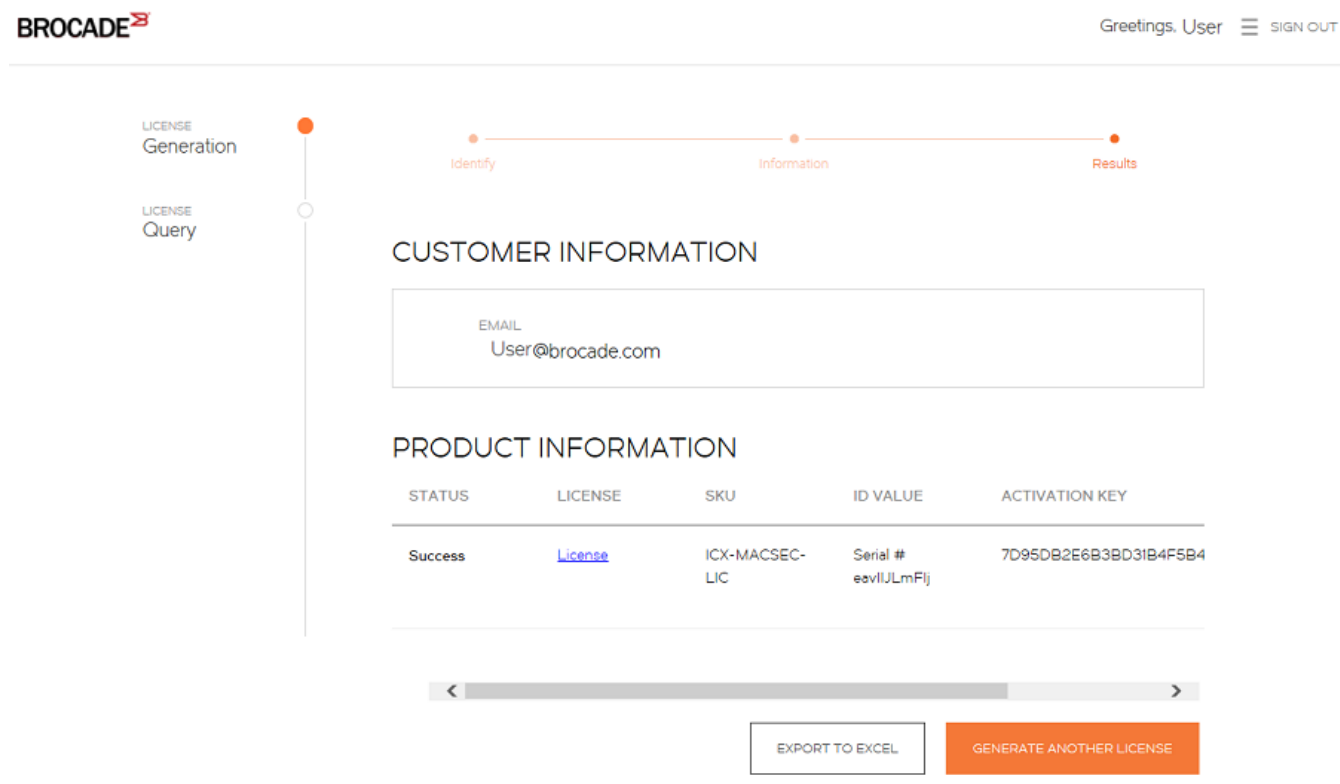


5. Enter the requested information in the **Product Information** field.
6. Read the Brocade End User License Agreement and select the **I have read and accept** check box.
7. Click **Generate**.

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

- If the license request is successful, the Status field shows "Success" and the **License** field contains a hyperlink to the generated license file. The license file is automatically sent by e-mail to the specified customer e-mail address.
- If the license request fails, the reason it failed and the action to be taken is displayed on the page.

FIGURE 4 Results window



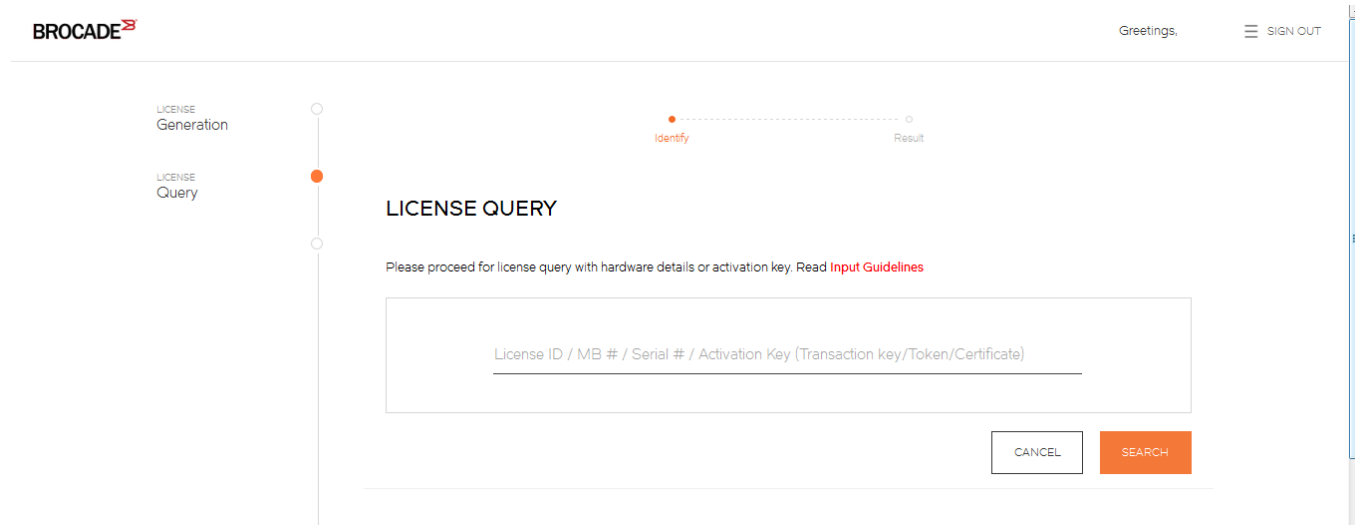
8. Click the hyperlink in the **License** field to download the license file to your PC.
9. Upload the license file to the Brocade device. You can also refer to the e-mail sent with the license files for instruction on installing a license.
10. Click **Export to Excel** to export the results to a Microsoft Excel file or click **Generate Another License** to generate a new license.

## Querying a license

To view software license information for a particular product, you can use the License Query option with an Activation key or License ID (LID).

1. To display the License Query window, you must enter the **License Query** option, from the **License Management Welcome** window, select **License Management > Brocade vADC > License Generation and Query > License Query**.

FIGURE 5 License Query window



Click **input guidelines** for more information on the input value.

2. You must enter the **License ID, Serial #** or **Activation Key** to query a particular product.

3. Click **Search**. Depending on the status of the license (for example, whether or not the license was generated), the report includes the following product information:
  - Product name SKU
  - ID value
  - Activation key
  - License
  - Created date
  - Capacity
  - Customer name
  - Description

**FIGURE 6** License Product Information window

The screenshot shows the Brocade software portal interface. At the top, there is a navigation bar with the Brocade logo, a user greeting, and a 'SIGN OUT' button. Below the navigation bar, there is a sidebar with two options: 'LICENSE Generation' and 'LICENSE Query'. The main content area is titled 'PRODUCT INFORMATION' and displays a table with the following data:

SKU	ID VALUE	ACTIVATION KEY	LICENSE	CREATED DATE	CAPACITY	CUSTOMER
ICK7450-24-E	Serial # CVT3349K02W LID <a href="#">more</a>					
ICK-MACSEC-LIC	SW Serial # DBJ00003385	C68AF644268F00448BC3E7	<a href="#">License</a>	07-May-2015		

At the bottom of the window, there are two buttons: 'EXPORT TO EXCEL' and 'SEARCH ANOTHER UNIT'.

In the figure, the first row under PRODUCT INFORMATION displays hardware-related information and the second row displays software-related information. If the query is performed before the transaction key is generated, the hardware-related information will not appear as part of the search results. Similarly, if the query is performed before the license is generated, some of the information in the software-related information will not be displayed.

4. Click **more** or **less** in **ID value** to view the License ID.
5. Click the **License** hyperlink to download the license information.
6. Click **Export to Excel** to download the report for sharing or archiving purposes, or Click **Search Another Unit** to query another product.



# Software Licensing Tasks

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## Software licensing configuration tasks

This section describes the configuration tasks for generating and obtaining a software license, and then installing it on the Brocade device. Perform the tasks in the order as given in the following table.

**NOTE**

For more information on obtaining a non-node locked license, refer to [Non-Node Locked Licensing](#) on page 57.

**TABLE 2** Configuration tasks for software licensing

Configuration task	Reference	
1	Order the desired license.	For a list of available licenses and associated part numbers, refer to the Licensed features and part numbers (Appendix A).
2	When you receive the transaction key, retrieve the LID of the Brocade device.  If you received the transaction key by way of paperpack, record the LID on the entitlement certificate in the space provided.	<a href="#">Viewing the license ID</a> on page 29
3	Log in to the Brocade software portal to generate and obtain the license file.	<a href="#">Generating a license</a> on page 16
4	Upload the license file to the Brocade device.	<a href="#">Installing a license file</a> on page 23
5	Verify that the license is installed.	<a href="#">Using a trial license</a> on page 26
6	For FSX 800, FSX 1600, FCX, ICX 6610, ICX 6450, ICX 6650, ICX 7250, ICX 7750, and ICX 7450 devices, upload the software image to the device.	Refer to the release notes.

## Installing a license file

Once you obtain a license file, place it on a TFTP or SCP server to which the Brocade device has access, and then use TFTP or SCP to copy the file to the license database of the Brocade device.

## Using TFTP to copy a license file on FSX 800 and FSX 1600 devices

To copy a license file from a TFTP server to the license database of the Brocade device, enter a command such as the following at the privileged EXEC level of the CLI.

```
device# copy tftp license 10.1.1.1 lic.xml
```

**Syntax:** `copy tftp license [ IP_address | ipv6_address ] license_filename_on_host`

The `IP_address` variable is the address of the IPv4 TFTP server.

The `ipv6_address` variable is the address of the IPv6 TFTP server.

The `license_filename_on_host` variable is the file name of the license file.

If you attempt to download the same license twice on the device, the following error message is displayed on the console.

```
Can't add the license string - 93 (DUPLICATE_LICENSE)
```

## Using TFTP to copy a license file on FCX and ICX devices

You can copy a license file from the active unit to all other member units without having to physically disable the stack to install a license for each unit. To copy a license file from the active unit to all other member units in the system, enter a command such as the following at the privileged EXEC level of the CLI.

```
device# copy tftp license 10.120.54.185 FCX_ADV_LIC_PERP.xml unit 2
```

**Syntax:** `copy tftp license [ IP_address | ipv6_address ] license_filename_on_host unit unit_id`

The `IP_address` variable is the address of the IPv4 TFTP server.

The `ipv6_address` variable is the address of the IPv6 TFTP server.

The `license_filename_on_host` variable is the file name of the license file.

The `unit unit_id` parameter specifies a unit for which you want to add a software license file. The `unit_id` variable can be from 1 through 8.

If you attempt to download the same license twice on the device, the following error message is displayed on the console.

```
Can't add the license string - 93 (DUPLICATE_LICENSE)
```

## Using Secure Copy to install a license

SSH and Secure Copy (SCP) must be enabled on the Brocade device before the procedures in this section can be performed. For details, refer to the "SSH2 and SCP" chapter in the *FastIron Ethernet Switch Security Configuration Guide*.

The `scp license_file_on_hostuser @IP_address:license` command is supported on FSX 800 and FSX 1600 devices.

To copy a license file from an SCP-enabled client to the license database of the Brocade device, enter a command such as the following on the SCP-enabled client.

```
scp c:\license\license101 terry@10.1.1.1:license
```

**Syntax:** `scp license_file_on_hostuser@IP_address:license`

On FCX and ICX devices, to copy a license file from an SCP-enabled client to the license database of a specific unit, enter a command such as the following on the SCP-enabled client.

```
scp license.xml terry@10.20.91.39:license:3
```

In the example the license is copied to unit 3.



**Syntax:** `scp license_file_on_hostuser@IP_address:license:unit_id`

The `unit_id` variable specifies a unit for which you want to add a software license file. The `unit_id` variable can be from 1 through 8.

## Verifying the license file installation

Use the **show license** command to verify that the license is installed on the device. Details about this command are in [Viewing information about software licenses](#) on page 28.

## Deleting a license file

A license remains in the license database until it is deleted. If you want to delete a license, Brocade recommends that you first disable the licensed feature before deleting the associated license.

### NOTE

If a trial license and a normal license for the same licensed feature are added to the system (in either order), the normal license cannot be deleted first. The trial license should be deleted first, and then the normal license can be deleted. If necessary, the same trial license can be reinstalled and used as long as it has not expired.

### NOTE

Non-node locked licenses can be removed and reinstalled on another unit without interaction with the Brocade software portal.

## Deleting a license on FSX 800 and FSX 1600 devices

To delete a license, enter a command such as the following at the privileged EXEC level of the CLI.

```
device# license delete 7
```

The **license delete** command immediately removes the license from the license database. The CLI commands related to the licensed feature will no longer be available from the CLI. The licensed feature will continue to run as configured until the software is reloaded, at which time the feature will be disabled and removed from the system. Syslog and trap messages are generated when the license is deleted.

**Syntax:** `license delete index_number`

The `index_number` variable is a valid license index number. The license index number can be retrieved from the **show license** command output. For more information, refer to [Viewing information about software licenses](#) on page 28.

### NOTE

When removing a license on an FSX device running a release 08.0.01 image, Brocade recommends an immediate reboot.

## Deleting a license on ICX devices

To delete all license files for a specific unit, enter the following command at the privileged EXEC level of the CLI.

```
device# license delete unit 3 all
```

To delete a specific license file from a unit, enter the following command at the privileged EXEC level of the CLI.

```
device# license delete unit 3 index 3
```

**Syntax:** `license delete unit unit_id [ all | index license_index ]`

The `unit_id` variable specifies the unit ID number.

The `all` option allows you to delete all license files for a specific unit.

The `index license_index` parameter specifies the software license file, and is generated by the member unit. The license index number is the license file you want to delete from a unit. The license index number is not unique across stack units, and the user must specify both the unit number and the index number to delete a license from a specific unit. For example, the ICX-ADV-LIC-SW license is installed on both stack unit 3, index 1, and stack unit 5, index 1. Because the index numbers are the same, the user must specify both the unit number and the index number to delete a license from a specific unit.

In the ICX 7250 devices, if more than one non-node locked license file is installed, the deletion of the license file sequence should start from the software license file identified by index 1. If this is not done, any attempt to delete the license file returns an error

```
141 (LICENSE_IN_USE).
```

```
device# show license
Idx Lic Mode      Lic Name                Lid/Serial  L/Type Status    L/Period  LCap
Stack unit 1:
 1  Non-Node Lock  ICX7450-PREM-LIC-SW  ENG0985E0A8 Normal active    Unlimited 1
 2  Non-Node Lock  ICX7450-PREM-LIC-SW  ENG012132E8 Normal duplicate Unlimited 1
```

Delete the license file as specified in the following example.

```
device# license delete unit 1 index 1
device# license delete unit 1 index 2
```

Use the `all` option to delete all license files for a specific unit.

```
device# license delete unit 1 all
```

## Using a trial license

### NOTE

A trial license must be requested and installed by a Brocade representative.

A trial license enables demonstration and evaluation of a licensed feature. The trial license is valid for a period of up to 45 days, and is renewable for an additional 45 days. A licensed feature operating under a trial license has the same functionality (CLI and `show` commands) as does a licensed feature operating under a normal license. You cannot install more than one trial license of the same license ID on the device. Only one trial license of the same license ID is operational.

## What happens when a trial license expires

A trial license expires when it exceeds the specified expiration time or date. The countdown starts when the trial license is generated. When the license expires, the CLI commands related to the licensed feature will no longer be available from the CLI. The licensed feature will continue to run as configured until the system is reloaded, at which time the feature will be disabled and removed from the system.

### NOTE

Trial licenses are not cumulative. The new license replaces the current license. To extend the license, you must contact your Brocade representative.

## Console, syslog, and trap messages for trial license expiration

Three days prior to the date that a trial license is set to expire, the following warning message will appear daily on the console. On the day that the license will expire, the warning message will appear every two hours. Syslog and trap messages will also be generated.

```
SYSLOG: <12>Jan 1 00:00:00 624-top License: Package FSX624-L3U-IPV6 with LID NFLXXXX expires in 3 days
```

When the license has expired, the following message will appear on the console. Syslog and trap messages will also be generated.

```
SYSLOG: <13>Jan 1 00:00:00 624-top License: Package FSX624-L3U-IPV6 with LID NFLXXXX has expired
```

## Renewing or extending a trial license

A trial license can be extended once by another trial license of the same type, or by a normal license of the same type. To avoid any interruptions to the network, obtain and install the second trial license before the first license expires. You must remove the first license before installing the second license. An error message (`BETTER_LICENSE_EXISTS`) displays if you attempt to add the second license before removing the first license. When extended by another trial license, the duration is not cumulative. The countdown starts when the trial license is generated.

To extend the license, you must contact your Brocade representative.

## Transferring a license

Depending on the type of license (non-node locked or node locked), licenses can be transferred from one Brocade device to another Brocade device.

You can transfer a non-node locked license without assistance from Brocade technical staff (this type of license is not locked to a device). Non-node locked licensing is supported by any new Brocade Ethernet IP switch, including ICX 7450 or ICX 7250 devices.

### NOTE

To transfer a non-node locked license, you must disable the feature associated with the license before you transfer the license to another device.

If you need to transfer a node-locked license, contact your Brocade representative for more information.

### NOTE

Only the Technical Assistance Center (TAC) can perform a transfer of a node-locked license.

Regardless of the type of license (non-node locked or node locked), a license can be transferred between Brocade devices only if both the following conditions are true:

- The device is under an active support contract.
- The license is being transferred between two similar models (for example, from a 24-port model to another 24-port model or from a 48-port model to another 48-port model).

## Special replacement instructions for legacy devices

A legacy device refers to a Brocade device that was shipped prior to the introduction of software licensing, has an EEPROM installed, and is running a FastIron release prior to 07.1.00.

For Brocade legacy devices in need of replacement (by way of a Return Merchandise Agreement [RMA]), the following actions must be taken:

- If the replacement device will be upgraded to a software release that supports software licensing, registration of the replacement device is required after the software is upgraded.
- If the replacement device will be using a software release that does not support software licensing, follow these instructions:

**NOTE**

This procedure is not supported on FCX and ICX platforms.

1. Prior to shipping the device in need of replacement back to the factory, remove the EEPROM from the device. To remove the EEPROM, follow the instructions in the appropriate hardware installation guide or in the instructions that shipped with the EEPROM.
2. After removing the EEPROM, store it in a safe place.
3. When the replacement device is received from the factory, install the previously removed EEPROM in the device. To do so, follow the instructions that shipped with the EEPROM.

## Syslog messages and trap information

The following table lists the syslog messages and traps that are supported for software licensing.

Refer to [License messaging](#) on page 59 for non-node locked license messaging.

**TABLE 3** Syslog messages

Message level	Message	Explanation
Informational	License: Package <i>package_name</i> with LID <i>LID_number</i> is added	The license package has been added.
Informational	License: Package <i>package_name</i> with LID <i>LID_number</i> is removed	The license package has been deleted.
Informational	License: <i>The feature is not enabled and requires user acceptance by typing 'Y' for compliance</i>	The reason for feature deactivation is non-acceptance of the Brocade EULA agreement.
Informational	License: <i>The (license_name) lis a duplicate license installed with serial number (serial_number).</i>	An already valid license is installed and the installed license is a duplicate license with a different license serial number.
Warning	License: Package <i>package_name</i> with LID <i>LID_number</i> expires in <i>number</i> days	The trial license is about to expire. This message will begin to display three days before the expiration date, and every two hours on the last day that the license will expire.
Notification	License: Package <i>package_name</i> with LID <i>LID_number</i> has expired	The trial license has expired.

## Viewing information about software licenses

The **show** commands associated with software licensing are issued on the Brocade device, at any level of the CLI.

**NOTE**

You can also view information about software licenses from the Brocade software portal.

Brocade devices that ship during and after the release of software licensing have the license ID (LID) imprinted on the label affixed to the device. You can use the **show version** command as well to view the LID on these devices, and on devices that shipped before the release of software licensing.

Use the **show version** command to verify the serial number, software and hardware license package name, and LID of all units in the device. The following example is sample output from an ICX unit with the ICX7450\_L3\_SOFT\_PACKAGE package installed on unit 1.

```
device#show version
Copyright (c) 1996-2015 Brocade Communications Systems, Inc. All rights reserved.
  UNIT 1: compiled on Jul 31 2015 at 02:17:35 labeled as SPR08030b
    (31547588 bytes) from Primary SPR08030b.bin
      SW: Version 08.0.30bT213
    Compressed Boot-Monitor Image size = 786944, Version:10.1.05T215 (spz10105)
HW: Stackable ICX7450-48F
Internal USB: Serial #: 9900614053000006
  Vendor: ATP Electronics, Total size = 1919 MB
=====
UNIT 1: SL 1: ICX7450-48F 48-port Management Module
  Serial #:CYS3324K00A
  License: ICX7450_L3_SOFT_PACKAGE (LID: eauIIHJmFFc)
  License Compliance: ICX7450-PREM-LIC-SW is Compliant
  P-ASIC 0: type B548, rev 01 Chip BCM56548_A0
=====
UNIT 1: SL 2: ICX7400-4X10GF 4-port 40G Module
  Serial #:CYV3324K09K
=====
UNIT 1: SL 3: ICX7400-1X40GQ 1-port 40G Module
  Serial #:CYX3324K027
=====
UNIT 1: SL 4: ICX7400-1X40GQ 1-port 40G Module
  Serial #:CYX3324K034
=====
```

## Viewing the license ID

Brocade devices that ship during and after the release of software licensing have the license ID (LID) imprinted on the label affixed to the device. You can use the **show version** command as well to view the LID on these devices, and on devices that shipped before the release of software licensing.

Use the **show version** command to display the serial number, software and hardware license package name, and LID of all units in the device. The following example is sample output from an FCX unit with the FCX\_ADV\_ROUTER\_SOFT\_PACKAGE package installed on units 1, 3, and 5.

```
device#show version
Copyright (c) 1996-2011 Brocade Communications Systems, Inc.
  UNIT 5: compiled on Jun 24 2011 at 14:20:38 labeled as FCXR07203a
    (6674957 bytes) from Primary FCXR07203a.bin
UNIT 1: compiled on Jun 24 2011 at 14:20:38 labeled as FCXR07203a
    (6674957 bytes) from Primary FCXR07203a.bin
UNIT 2: compiled on Jun 24 2011 at 14:20:38 labeled as FCXR07203a
    (6674957 bytes) from Primary FCXR07203a.bin
UNIT 3: compiled on Jun 24 2011 at 14:20:38 labeled as FCXR07203a
    (6674957 bytes) from Primary FCXR07203a.bin
UNIT 4: compiled on Jun 24 2011 at 14:20:38 labeled as FCXR07203a
    (6674957 bytes) from Primary FCXR07203a.bin
Boot-Monitor Image size = 369286, Version:07.0.01T7f5 (grz07001)
HW: Stackable FCX648S
=====
UNIT 1: SL 1: FCX-48GS POE 48-port Management Module
  Serial #: BCYxxxxxxxx
  License: FCX_ADV_ROUTER_SOFT_PACKAGE (LID: deaHHKIgFro)
  P-ENGINE 0: type DB90, rev 01
  P-ENGINE 1: type DB90, rev 01
  PROM-TYPE: FCX-ADV-U
=====
```

```

UNIT 1: SL 2: FCX-2XGC 2-port 16G Module (2-CX4)
=====
UNIT 1: SL 3: FCX-2XG 2-port 10G Module (2-XFP)
=====
UNIT 2: SL 1: FCX-48GS POE 48-port Management Module
Serial #: upgrade7072
License: FCX_FULL_ROUTER_SOFT_PACKAGE (LID: ZU0W478MFMH)
P-ENGINE 0: type DB90, rev 01
P-ENGINE 1: type DB90, rev 01
=====
UNIT 2: SL 2: FCX-2XGC 2-port 16G Module (2-CX4)
=====
UNIT 3: SL 1: FCX-48GS POE 48-port Management Module
Serial #: BCYxxxxxxxx
License: FCX_ADV_ROUTER_SOFT_PACKAGE (LID: deaHHKIgFrN)
P-ENGINE 0: type DB90, rev 01
P-ENGINE 1: type DB90, rev 01
=====
UNIT 3: SL 2: FCX-2XGC 2-port 16G Module (2-CX4)
=====
UNIT 4: SL 1: FCX-24GS 24-port Management Module
Serial #: BCVxxxxxxxx
License: FCX_FULL_ROUTER_SOFT_PACKAGE (LID: dexHHIIgFFd)
P-ENGINE 0: type DB90, rev 01
=====
UNIT 4: SL 2: FCX-2XGC 2-port 16G Module (2-CX4)
=====
UNIT 5: SL 1: FCX-48GS 48-port Management Module
Serial #: UPGRADE7072
License: FCX_ADV_ROUTER_SOFT_PACKAGE (LID: writcfgMFMH)
P-ENGINE 0: type DB90, rev 01
P-ENGINE 1: type DB90, rev 01
=====

```

In the **show license** command output, only unit 3 and unit 5 are shown with the software license, FCX-ADV-LIC-SW. Unit 1 is not displayed in the **show license** command output because it has a hardware license installed on the device as indicated by the PROM-TYPE: FCX-ADV-U. For more information about the **show license** command, refer to [Viewing the license database](#) on page 30.

```

device #show license
Index  Lic Mode          Lic Name          Lid/Serial No    Lic Type    Status    Lic Period  Lic
Capacity
Stack unit 1:
1      Non-Node Lock    ICX7450-PREM-LIC-SW  ENG012132E8    Normal    active    Unlimited    1
2      Non-Node Lock    ICX7450-PREM-LIC-SW  ENG0985E0A8    Normal    duplicate  Unlimited    1
3      Non-Node Lock    ICX7450-PREM-LIC-SW  ENG00180608    Normal    duplicate  Unlimited    1
4      Node Lock        ICX-MACSEC-LIC      dzrHKHIjFFt    Normal    Invalid    Unlimited    1
5      Node Lock        ICX6610-10G-LIC-POD  FJdnjFJFGiF    Normal    Invalid    Unlimited    8
6      Node Lock        ICX6450-PREM-LIC-SW  dbuHKIKjFHu    Normal    Invalid    Unlimited    1
Stack unit 2:
1      Non-Node Lock    ICX7450-PREM-LIC-SW  ENG012132E8    Normal    active    Unlimited    1
2      Non-Node Lock    ICX7450-PREM-LIC-SW  ENG0985E0A8    Normal    duplicate  Unlimited    1
3      Non-Node Lock    ICX7450-PREM-LIC-SW  ENG00180608    Normal    duplicate  Unlimited    1
4      Node Lock        ICX-MACSEC-LIC      dzrHKHIjFFt    Normal    Invalid    Unlimited    1

```

## Viewing the license database

### NOTE

The **show license** command can be used to display software license information for the FSX 800 and FSX 1600, FCX, ICX 6610, ICX 6450, and ICX 6650 devices.

To display general information about all software licenses for all units in a device, use the **show license** command. The **show license** command only displays software license information for a unit, not hardware license information, as shown in the following example.

```
device#show license
Index      License Name Lid      License Type  Status  License Period
License Capacity
Stack unit 3:
1 FCX-ADV-LIC-SW deaHHKIGFrN Normal      Unlimited      Active
Stack unit 5:
1 FCX-ADV-LIC-SW writcfgMFMH Normal      Unlimited      Active
```

To display software license information on an ICX 6610 device, enter the following command.

```
device#show license
Index      License Name      Lid      License Type  Status  License Period  License
Capacity
Stack unit 1:
1          ICX6610-PREM-LIC-SW      FJdnjFJFGiF Normal      Active  Unlimited      1
2          ICX6610-10G-LIC-POD      FJdnjFJFGiF Normal      Active  Unlimited      8
Stack unit 2:
1          ICX6610-ADV-LIC-SW      FJdnmFJFGiF Normal      Active  Unlimited      1
2          ICX6610-10G-LIC-POD      FJdnjFJFGiF Normal      Invalid  Unlimited      8
Stack unit 3:
1          ICX6610-ADV-LIC-SW      FJdnlFJFGiF Normal      Active  Unlimited      1
4          ICX6610-10G-LIC-POD      FJdnlFJFGiF Normal      Active  Unlimited      8
```

To display software license information on an ICX 6450 device, enter the following command. In the following example, the premium and PoD licenses are installed on stack unit 1, and on stack unit 2 only the premium license is installed.

```
device#show license
Index      License Name      Lid      License Type  Status  License Period  License
Capacity
Stack unit 1:
1          ICX6450-PREM-LIC-SW      dbtFJIKiFFI Normal      Active  Unlimited      2
2          ICX6450-10G-LIC-POD      dbtFJIKiFFI Normal      Active  Unlimited      2
Stack unit 2:
1          ICX6450-PREM-LIC-SW      dbtFJIKiFFI Normal      Active  Unlimited      2
```

The output from the **show license** command is the same for an FSX 800 or FSX 1600 device.

```
device# show license
Index      Package Name      Lid      License Type  Status  License
Period
1          FCX624-EL3U      cpFNJHFFGO  normal      active  unlimited
```

To display specific software license information installed on an FSX 800 or FSX 1600 device, enter the following command.

```
device# show license 1
License information for license <1>:
+package name:      FCX624-EL3U
+lid:               cpFNJHFFGO
+license type:      normal
+status:            active
+license period:    unlimited
```

### Syntax: **show license***index\_number*

The *index\_number* variable specifies the specific license file installed on the device.

To display software license information for a specific stack unit on an ICX 6610, ICX 6450, or an FCX device, enter the following command. In the following output example, the ICX 6610 premium license, and the PoD license are installed on unit 3.

```
device# show license unit 3
Index      License Name      Lid      License Type  Status  License Period  License
Capacity
Stack unit 3:
```

1	ICX6610-PREM-LIC-SW	FJdnjFJFGiF	Normal	Active	Unlimited	1
2	ICX6610-10G-LIC-POD	FJdnjFJFGiF	Normal	Active	Unlimited	8

**Syntax:** `show license [ unit unit_id ]`

The `unit unit_id` parameter specifies the unit ID number. The unit ID number is available only on FCX, ICX 6610, and ICX 6450 devices.

The following table describes the information displayed by the `show license unit` command.

**TABLE 4** Output from the show license unit command

Field	Description
Index	The index number specifies the software license file for a specific stack. The index number is generated by the member unit.
License Name	The name of the license installed for the license index number on the stack unit.
Lid	The license ID. This number is embedded in the Brocade device.
License Type	Indicates whether the license is normal (permanent) or trial (temporary).
Status	Indicates the status of the license: <ul style="list-style-type: none"> <li>Valid - A license is valid if the LID matches the license ID of the device for which the license was purchased, and the package name is recognized by the system.</li> <li>Invalid - The LID does not match the license ID of the device for which the license was purchased.</li> <li>Active - The license is valid and in effect on the device.</li> <li>Not used - The license is not in effect on the device.</li> <li>Expired - For trial licenses only, this indicates that the trial license has expired.</li> </ul>
License Period	If the license type is trial (temporary), this field displays the number of days the license is valid. If the license type is normal (permanent), this field displays Unlimited.
License Capacity	The port capacity of the PoD license. For ICX 6610 devices, the PoD license can be a 4-port capacity license or an 8-port capacity license depending on the number of licenses purchased. For the ICX 6450 and ICX 6650 devices, the field displays license capacity 2 when the PoD license is purchased for two ports (ports 2 and 4). The License Capacity field is displayed in the <code>show license</code> command outputs for ICX 6610, ICX 6450, ICX 6650, and FCX devices only. For ICX 6650 devices, the capacity can be 8, 16, or 24 for a 10 Gbps PoD license, and 2, 4, or 6 for a 40 Gbps PoD license.

To display detailed information about a license for a specific unit, use the `show license unit` command. The following example shows sample output.

```
device#show license unit 3 index 1
License information for unit 3 license <1>:
+license name:      FCX-ADV-LIC-SW
+lid:               deaHHKIgFrN
+license type:      Normal
+status:            Active
+license period:    Unlimited
Trial license information:
+days used:        10
+hours used:        21
+days left:        30
+hours left:        18
```

**Syntax:** `show license unit unit_id [index index_number]`

The `index index_number` parameter specifies the software license file for which you want to display information. The `index index_number` option is available only on FCX, ICX 6610, and ICX 6450 devices.



The following table describes the information displayed by the **show license unit** command.

**TABLE 5** Output from the show license unit index command

Field	Description
+license name	The name of the license installed on the unit.
+lid	The license ID. This number is embedded in the Brocade device.
+license type	Indicates whether the license is normal (permanent) or trial (temporary).
+status	Indicates the status of the license: <ul style="list-style-type: none"> <li>Valid - A license is valid if the LID embedded in the license matches the license ID of the device for which the license was purchased, and the package name is recognized by the system.</li> <li>Invalid - The LID does not match the license ID of the device for which the license was purchased.</li> <li>Active - The license is valid and in effect on the device.</li> <li>Not used - The license is not in effect on the device.</li> <li>Expired - For trial licenses only, this indicates that the trial license has expired.</li> </ul>
+license period	If the license type is trial (temporary), this field displays the number of days the license is valid. If the license type is normal (permanent), this field displays Unlimited.
+ days used	The number of days the trial license has been in effect.
+ hours used	The number of hours the trial license has been in effect.
+ days left	The number of days left before the trial license expires.
+ hours left	The number of hours left before the trial license expires.

## Viewing software packages installed in the device

Use the **show version** command to view the software packages that are currently running in the device.

### NOTE

The software package name is not the same as the license name.

The following example is sample output from an FCX unit with the FCX\_ADV\_ROUTER\_SOFT\_PACKAGE package installed on units 1, 3, and 5.

```
device#show version
Copyright (c) 1996-2011 Brocade Communications Systems, Inc.
  UNIT 5: compiled on Jun 24 2011 at 14:20:38 labeled as FCXR07203a
(6674957 bytes) from Primary FCXR07203a.bin
  UNIT 1: compiled on Jun 24 2011 at 14:20:38 labeled as FCXR07203a
(6674957 bytes) from Primary FCXR07203a.bin
  UNIT 2: compiled on Jun 24 2011 at 14:20:38 labeled as FCXR07203a
(6674957 bytes) from Primary FCXR07203a.bin
  UNIT 3: compiled on Jun 24 2011 at 14:20:38 labeled as FCXR07203a
(6674957 bytes) from Primary FCXR07203a.bin
  UNIT 4: compiled on Jun 24 2011 at 14:20:38 labeled as FCXR07203a
(6674957 bytes) from Primary FCXR07203a.bin
Boot-Monitor Image size = 369286, Version:07.0.01T7f5 (grz07001)
HW: Stackable FCX648S
=====
UNIT 1: SL 1: FCX-48GS POE 48-port Management Module
Serial #: BCYxxxxxxxx
License: FCX_ADV_ROUTER_SOFT_PACKAGE (LID: deaHhKIgFro)
P-ENGINE 0: type DB90, rev 01
P-ENGINE 1: type DB90, rev 01
PROM-TYPE: FCX-ADV-U
=====
```

```
UNIT 1: SL 2: FCX-2XGC 2-port 16G Module (2-CX4)
=====
UNIT 1: SL 3: FCX-2XG 2-port 10G Module (2-XFP)
=====
UNIT 2: SL 1: FCX-48GS POE 48-port Management Module
      Serial #: upgrade7072
      License: FCX_FULL_ROUTER_SOFT_PACKAGE (LID: ZU0W478MFMH)
      P-ENGINE 0: type DB90, rev 01
      P-ENGINE 1: type DB90, rev 01
=====
UNIT 2: SL 2: FCX-2XGC 2-port 16G Module (2-CX4)
=====
UNIT 3: SL 1: FCX-48GS POE 48-port Management Module
      Serial #: BCYxxxxxxxx
      License: FCX_ADV_ROUTER_SOFT_PACKAGE (LID: deaHHKIgFrN)
      P-ENGINE 0: type DB90, rev 01
      P-ENGINE 1: type DB90, rev 01
=====
UNIT 3: SL 2: FCX-2XGC 2-port 16G Module (2-CX4)
=====
UNIT 4: SL 1: FCX-24GS 24-port Management Module
      Serial #: BCVxxxxxxxx
      License: FCX_FULL_ROUTER_SOFT_PACKAGE (LID: dexHHIIgFFd)
      P-ENGINE 0: type DB90, rev 01
=====
UNIT 4: SL 2: FCX-2XGC 2-port 16G Module (2-CX4)
=====
UNIT 5: SL 1: FCX-48GS 48-port Management Module
      Serial #: UPGRADE7072
      License: FCX_ADV_ROUTER_SOFT_PACKAGE (LID: writcfgMFMH)
      P-ENGINE 0: type DB90, rev 01
      P-ENGINE 1: type DB90, rev 01
=====
```

For a list of supported software packages installed on the device, refer to the Licensed features and part numbers section.

# Ports on Demand (PoD) Licensing

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## Overview of Ports on Demand (PoD) licensing

### NOTE

Licensing for Ports on Demand is applicable to ICX 6610, ICX 6450, ICX 6650, and ICX 7250 devices.

You can use the Ports on Demand (PoD) feature to enable 1 Gbps ports to 40 Gbps port speed.

By default, regardless of what SFP+ media optic is used, the ICX 6610 device has eight active 1 Gbps uplink ports. To increase the uplink capacity of four ports from 1 Gbps to 10 Gbps port speed, purchase a single ICX6610-10G-LIC-POD license. To increase the uplink capacity of all eight ports from 1 Gbps to 10 Gbps port speed, purchase a second ICX6610-10G-LIC-POD license.

### NOTE

For 10 Gbps PoD licenses, the ICX 6610 device does not support a trial license along with a permanent license at the same time for different ports. The permanent license causes the trial license to be marked as obsolete.

The ICX 6450 device has four active uplink and stacking ports on slot 2. By default, regardless of what SFP+ media optic is used, ports 1 and 3 are 10 Gbps ports. By default, without a license at bootup, ports 2 and 4 come up in 10 Gbps port speed in an error-disabled state. To enable ports 2 and 4 to 10 Gbps port speed, purchase the ICX6450-2X10G-LIC-POD license. For more information about enabling ports 2 and 4 to 10 Gbps port speed, refer to [Configuration considerations when configuring PoD for ICX 6450 devices only](#) on page 41.

The PoD feature is not applicable to ICX 6430 devices because there are no 10 Gbps ports on the device.

### For more information

For details on PoD feature for specific devices, see:

- [Ports on Demand licensing on the ICX 6650](#) on page 43
- [Ports on Demand Licensing on the ICX 7250](#) on page 50

## Configuring PoD on an interface

### NOTE

Configuring PoD on an interface is supported on the ICX 6610, ICX 6450, ICX 6650, and ICX 7250 ports when upgrading to 10 Gbps port speed.

To upgrade the ports from 1 Gbps to 10 Gbps port speed, perform the following steps.

1. Download the PoD license to the device. For more information about copying the license file on ICX devices, refer to [Using TFTP to copy a license file on FCX and ICX devices](#) on page 24.

2. Insert the 10 Gbps optic transceiver.
3. Enter the **speed-duplex 10g-full** command on a single, multiple, or interface range on the ICX 6610 and ICX 7250 devices only. The following example output is from an ICX 6610 device.

```
device(config)# interface ethernet 1/3/1
device(config-if-e10000-1/3/1)# speed-duplex 10g-full
```

**NOTE**

For ICX 6450 devices, you do not need to enter the **speed-duplex 10g-full** command. Ports 2 and 4 are UP after you insert the 10 Gbps optic transceiver.

**NOTE**

For ICX 6650 devices, you do not need to enter the **speed-duplex 10g-full** command. For more information on PoD licensing for the ICX 6650 devices, refer to [Ports on Demand licensing on the ICX 6650](#) on page 43.

4. Enter the **write memory** command to save the configuration. The ports are automatically configured to 10 Gbps speed

**Syntax:** no speed-duplex [ 10g-full | 1000-full-master ]

The **10g-full** parameter allows you to enable the port speed to 10 Gbps speed.

The **1000-full-master** parameter allows you to enable the port speed to 1 Gbps speed.

On the ICX 6610 and ICX 7250 devices, if you enable the port to 10 Gbps port speed, and then issue the **no speed-duplex** command, the port continues to run at 10 Gbps speed. Upon bootup, the port reverts to 1 Gbps speed.

## Configuring the upper PoD ports in a stack for ICX 6610 devices only

By default, when a single ICX6610-10G-LIC-POD license is downloaded onto the device, all four lower PoD ports in the stack (1/3/1 to 1/3/4) are eligible for an upgrade to 10 Gbps port speed. If you have a single ICX6610-10G-LIC-POD license, and you want to enable the upper four PoD ports (1/3/5 to 1/3/8) to 10 Gbps port speed, instead of the lower four PoD ports (1/3/1 to 1/3/4), complete the following steps. If the lower four PoD ports are already configured for 10 Gbps speed, you must first issue the **no speed-duplex 10g-full** command on the lower four PoD ports before configuring the upper four PoD ports to 10 Gbps port speed.

The following procedure assumes that you have already downloaded the license.

**NOTE**

If you purchased a second ICX6610-10G-LIC-POD license, you do not need to perform the following steps. The **flexible-10g-ports upper** command is used to configure the upper four PoD ports to 10 Gbps port speed using a single ICX6610-10G-LIC-POD license. The command can only be used on the upper four PoD ports.

1. Enter the **flexible-10g-ports upper** command at the stack unit configuration level.

```
device(config)# stack unit 2
device(config-unit-2)#flexible-10g-ports upper
device(config-unit-2)#exit
```

2. Specify the upper four PoD ports in a group with a single ICX6610-10G-LIC-POD license at the interface configuration level.

```
device(config)#interface ethernet 2/3/5 to 2/3/8
```

3. Enable the 10 Gbps port speed for the upper four PoD ports by entering the following command.

```
device(config-mif-2/3/5-2/3/8)#speed-duplex 10g-full
Port 2/3/5 mode changed from 1G to 10G
Port 2/3/6 mode changed from 1G to 10G
Port 2/3/7 mode changed from 1G to 10G
Port 2/3/8 mode changed from 1G to 10G
device(config-mif-2/3/5-2/3/8)#end
```

**Syntax:** [no] flexible-10g-ports upper

Use the **no** form of the **flexible-10g-ports upper** command when you want to enable the lower four PoD ports, instead of the upper four PoD ports, to 10 Gbps port speed. Before you issue the **no flexible-10g-ports upper** command, you must first issue the **no speed-duplex 10g-full** command on the upper four PoD ports.

To display the configuration for the **flexible-10g-ports upper** command on a stack unit, use the **show stack** command with the appropriate parameters.

```
device#show stack 1
alone: standalone, D: dynamic config, S: static config
ID  Type           Role      Mac Address   Pri State  Comment
1   S ICX6610-48     standby  748e.f834.32cc 180 remote Ready
```

**Syntax:** show stack stack-unit

## Displaying license configuration for PoD ports after a license upgrade

### NOTE

The **show pod** command cannot be used to display the configuration for 1 Gbps or 40 Gbps ports on ICX 6610 and ICX 6450 devices.

The **show pod** command is used to display a license configuration for PoD ports in a stack after a license upgrade on ICX 6610, ICX 6450, ICX 6650, and ICX 7250 devices. To display general license information about the PoD license in a stack unit, use the **show license** command. For more information about the **show license** command, see [Viewing information about software licenses](#) on page 28.

## Displaying license configuration for PoD ports for ICX 6610 devices

To display a license configuration for all PoD ports for all units in a stack, enter the following command at the CLI level.

```
device#show pod
Unit-Id: 1
PoD license capacity: 8
PoD license capacity used: 8
PoD-ports  Lic-Available Lic-Used
1/3/1      Yes                Yes
1/3/2      Yes                Yes
1/3/3      Yes                Yes
```

**Syntax:** show pod [ unitunit-id ]

The *unit-id* variable specifies the unit ID number of the PoD you want to display.

The following table describes the information displayed in the output of the **show pod** command.

**TABLE 6** Output from the show pod command

Field	Description
Unit-Id	The unit ID number of the PoD.
PoD license capacity	The port capacity of the PoD license that is purchased. For ICX 6610 devices, the port capacity can be four or eight 10 Gbps ports. UPPER is displayed in parentheses when the upper four PoD ports are selected using the <b>flexible-10g-ports upper</b> command. LOWER is displayed in parentheses when the four lower PoD ports are selected for an upgrade to 10 Gbps port speed.
PoD license capacity used	The number of PoD ports that are upgraded to 10 Gbps port speed.
PoD-ports	The list of PoD ports in the PoD unit.
Lic-Available	Whether the license is available for the port.
Lic-Used	Whether the license is used by the port.

## Displaying license configuration for PoD ports for ICX 6450 devices

By default at bootup, the license state for ports 2 and 4 are in the enabled state. The following output from the **show pod** command displays port 2 and 4 as acquired. Upon installing the ICX6450-2X10G-LIC-POD license, ports 2 and 4 can be enabled to run in 10 Gbps port speed. The license state for ports 2 and 4 remains in the acquired state.

```
Brocade#show pod
Unit-Id: 1
PoD-ports  Lic-Available Lic-Used
1/2/2      Yes                Yes
1/2/4      Yes                Yes
Unit-Id: 2
PoD-ports  Lic-Available Lic-Used
2/2/2      Yes                Yes
2/2/4      Yes                Yes
```

If ports 2 and 4 are configured to 1 Gbps port speed, the license state changes to the default. The following output from the **show pod** command displays port 2 and 4 in the default state.

```
Brocade#show pod
Unit-Id: 1
PoD-ports  Lic-Available Lic-Used
1/2/2      No                No
1/2/4      No                No
```

**Syntax:** **show pod** [ **unit** *unit-id* ]

The *unit id* variable specifies the unit ID number of the PoD you want to display.

For a description of the fields in the **show pod** command output, refer to [Displaying license configuration for PoD ports for ICX 6610 devices](#) on page 37.

## Displaying license configuration for PoD ports for ICX 6650 devices

To display the license configuration for PoD ports in the system, enter the **show pod** command at the CLI level. In the following output, the 16-port capacity license is used for the 10 GbE PoD license, and the 6-port capacity license is used for the 40 GbE PoD license.

```
Brocade#show pod
Unit-Id: 1
PoD 10G license capacity: 16
PoD 10G license capacity used: 16
PoD 40G license capacity: 6
PoD 40G license capacity used: 6
PoD-ports Lic-Available Lic-Used
```

1/1/33	Yes	Yes
1/1/34	Yes	Yes
1/1/35	Yes	Yes
1/1/36	Yes	Yes
1/1/37	Yes	Yes
1/1/38	Yes	Yes
1/1/39	Yes	Yes
1/1/40	Yes	Yes
1/1/41	Yes	Yes
1/1/42	Yes	Yes
1/1/43	Yes	Yes
1/1/44	Yes	Yes
1/1/45	Yes	Yes
1/1/46	Yes	Yes
1/1/47	Yes	Yes
1/1/48	Yes	Yes
1/1/49	No	No
1/1/50	No	No
1/1/51	No	No
1/1/52	No	No
1/1/53	No	No
1/1/54	No	No
1/1/55	No	No
1/1/56	No	No
1/2/1	Yes	Yes
1/2/2	Yes	Yes
1/2/3	Yes	Yes
1/2/4	Yes	Yes
1/3/1	Yes	Yes
1/3/2	Yes	Yes
1/3/3	Yes	Yes
1/3/4	Yes	Yes
1/3/5	Yes	Yes
1/3/6	Yes	Yes
1/3/7	Yes	Yes
1/3/8	Yes	Yes

**Syntax: show pod**

The following table describes the information displayed in the output of the **show pod** command.

**TABLE 7** Output from the show pod command

Field	Description
Unit-Id	The unit ID number of the PoD.
PoD license capacity	The port capacity of the PoD license (10 GbE or 40 GbE license) that is purchased. The 10 GbE PoD license consists of an 8-, 16-, or 24-port capacity license. The 40 GbE PoD license consists of a 2-, 4-, or 6-port capacity license.
PoD license capacity used	The port capacity of the PoD license (10 GbE or 40 GbE license) that is in use by the port. The 10 GbE PoD license consists of an 8-, 16-, or 24-port capacity license. The 40 GbE PoD license consists of a 2-, 4-, or 6-port capacity license.
PoD-ports	The list of PoD ports in the PoD unit.
Lic-Available	Whether the license is available for the port.
Lic-Used	Whether the license is used by the port.

## Upgrading or downgrading configuration considerations for PoD

Consider the following when upgrading or downgrading PoD ports for ICX 6610 or ICX 6450 devices:

- When a single ICX6610-10G-LIC-POD license is downloaded onto the device, you can upgrade the first four or the last four PoD ports to 10 Gbps port speed. However, if you upgrade the fifth port to 10 Gbps port speed, the following syslog message and error message displays.

```
SYSLOG: <14>Jul 31 00:33:46 10.20.147.22 PoD: No license present for port 1/3/3".  
POD:No license present for port 3.
```

The error message is displayed because the port you are attempting to upgrade to 10 Gbps port speed has exceeded the license capacity that is downloaded onto the device. To upgrade all eight ICX 6610 ports to 10 Gbps port speed, purchase a second ICX6610-10G-LIC-POD license.

- There is no trial license available for the PoD feature for ICX 6610 and ICX 6450 devices.

## Configuration considerations for stacking or trunking PoD ports

Consider the following when stacking or trunking PoD ports for ICX 6610 or ICX 6450 devices:

- In an ICX traditional stack, a stack member unit without a PoD license can join a stack even when the active or master stack unit has a PoD license.
- All trunk ports must operate at 1 Gbps or 10 Gbps speed in a stack. You cannot mix and match trunk ports with different port speeds.
- In a trunk formation, if there is no license installed in a stack upon bootup or hot swap of a stack unit, a port is disabled. This does not affect the trunk formation.

## Configuration considerations when configuring PoD on an interface

Consider the following when configuring PoD on an interface or a range of interfaces on ICX 6610 or ICX 6450 devices:

- The **speed-duplex 10g-full** command is rejected when there is no license or an insufficient license in the unit. For example, an insufficient license implies that you are attempting to upgrade all eight ports to 10 Gbps port speed, and you have downloaded a single ICX6610-10G-LIC-POD license. The following syslog message and error message is generated.

```
SYSLOG: <14>Jul 31 00:33:46 10.20.147.22 PoD: No license present for port 1/3/3".  
POD:No license present for port 2
```

- When the **speed-duplex 10g-full** command is configured for a port or multiple ports on an interface, and there is no license or an insufficient license in the stack upon bootup or hot swap of a stack unit, the port is configured to 10 Gbps port speed. However, the port is in ERROR\_DISABLED state until you install the correct license in the stack. A syslog message is generated every 30 seconds stating that the license is not present on the port. The error disable recovery timer checks every 30 seconds to see if the correct license is installed in the stack. Once the correct license is installed, the port is automatically enabled to operate at 10 Gbps port speed on the next cycle of the timer. You can also enable the port manually to operate at 10 Gbps port speed once the correct license is installed.
- In a stack, the **speed-duplex 10g-full** command is rejected on the primary port if all ports in a trunk do not have the correct license installed to upgrade to 10 Gbps port speed. The following error message is displayed.

```
Error:Not enough 10Gig License present for all the ports in trunk
```



- If you delete the license from the stack, the port runs in 10 Gbps mode until the switch is reloaded. If the **speed-duplex 10g-full** command is entered, the following syslog message is displayed.

```
SYSLOG: <14>Jul 31 00:33:46 10.20.147.22 PoD: No license present for port 1/3/3".
```

- The **show interface ethernet** command can be used to display the configuration for a disabled 10 Gbps interface port or a range of port interfaces after bootup for both ICX 6610 and ICX 6450 devices. The **show interface ethernet** command displays the port in the ERROR\_DISABLED state. The following example output is from an ICX 6450 device.

```
device#show interface ethernet 3/2/2
10GigabitEthernet3/2/2 is ERR-DISABLED (invalid license), line protocol is
down
  Hardware is 10GigabitEthernet, address is 0000.0083.01fa (bia
0000.0083.01fa)
  Configured speed 10Gbit, actual unknown, configured duplex fdx, actual
unknown
  Stacking Port, port state is DISABLED
  BPDU guard is Disabled, ROOT protect is Disabled
  Link Error Dampening is Disabled
  STP configured to ON, priority is level0, mac-learning is enabled
  Flow Control is enabled
  Mirror disabled, Monitor disabled
  Not member of any active trunks
  Not member of any configured trunks
  No port name
```

Once the correct license is installed, the port displays the state as up as shown in the following example output.

```
device#show interface ethernet 3/2/2
10GigabitEthernet6/2/2 is up, line protocol is up
  Hardware is 10GigabitEthernet, address is 0000.0082.f872 (bia 0000.0082.f872)
  Configured speed 10Gbit, actual 10Gbit, configured duplex fdx, actual fdx
  Stacking Port, port state is FORWARDING
  BPDU guard is Disabled, ROOT protect is Disabled
  Link Error Dampening is Disabled
  STP configured to ON, priority is level0, mac-learning is enabled
  Flow Control is enabled
  Mirror disabled, Monitor disabled
  Not member of any active trunks
  Not member of any configured trunks
  No port name
```

## Configuration considerations when configuring PoD for ICX 6450 devices only

Consider the following when configuring PoD for ICX 6450 devices only:

- By default, without a license at bootup, ports 2 and 4 come up in 10 Gbps port speed in an error-disabled state. The **show interface ethernet** command displays the port in the ERROR\_DISABLED state at bootup. Refer to [Configuration considerations when configuring PoD on an interface](#) on page 40 for output examples from the **show interface ethernet** command.
- From the default state, ports 2 and 4 can be configured to 1 Gbps port speed using the **speed-duplex 1000-full-master** command without a license. You do not need to reboot the switch for the links to come up in 1 Gbps port speed.
- If you download the ICX6450-2X10G-LIC-POD license to the device, insert the correct 10 Gbps optic transceiver, and enter the **speed-duplex 10g-full** command on the interface, you can immediately begin using ports 2 and 4 in 10 Gbps port speed. You do not need to reboot the switch for the links to come up.

- For any of the four uplink ports on slot 2, if you reconfigure any port from 1 Gbps to 10 Gbps port speed, you must reload the switch to begin using the ports in 10 Gbps port speed. Until you reload the switch, the ports will remain in an error-disabled state. The following example output displays Ethernet port 4 in an error-disabled state.

```
device#show interface ethernet 1/2/4
10GigabitEthernet1/2/4 is ERR-DISABLED (Reload the switch or stack to enable
this port in 10G speed), line protocol is down
  Hardware is 10GigabitEthernet, address is 0000.0082.e39c (bia 0000.0082.e39c)
  Configured speed 10Gbit, actual unknown, configured duplex fdx, actual
unknown
  Member of L2 VLAN ID 1, port is untagged, port state is DISABLED
  BPDU guard is Disabled, ROOT protect is Disabled
  Link Error Dampening is Disabled
  STP configured to ON, priority is level0, mac-learning is enabled
  Flow Control is enabled
  Mirror disabled, Monitor disabled
  Not member of any active trunks
  Not member of any configured trunks
  No port name
  MTU 1500 bytes
  300 second input rate: 0 bits/sec, 0 packets/sec, 0.00% utilization
  300 second output rate: 0 bits/sec, 0 packets/sec, 0.00% utilization
  0 packets input, 0 bytes, 0 no buffer
  Received 0 broadcasts, 0 multicasts, 0 unicasts
  0 input errors, 0 CRC, 0 frame, 0 ignored
  0 runts, 0 giants
  0 packets output, 0 bytes, 0 underruns
  Transmitted 0 broadcasts, 0 multicasts, 0 unicasts
  0 output errors, 0 collisions
  Relay Agent Information option: Disabled
```

## Configuration considerations when configuring PoD for ICX 6650 devices only

Consider the following when configuring PoD for ICX 6650 devices:

- You can add an ICX6650-2P40G-POD license to any configuration. For example, you can add an ICX6650-2P40G-POD license to a base 32-port configuration.
- In a trunk formation, if there is no license upon bootup or hot swap of a unit, a port is disabled. This does not affect the trunk formation.
- A 10 GbE or 40 GbE port can be in one of the following port states:
  - Error-disabled (invalid license)
  - Down
  - Up

A port is in an error-disabled (invalid license) state when there is no license installed in the device. An invalid license implies that you have incorrectly installed a license that is not tied to the device. When a physical link is established between two devices, but a license is not installed in the device, the port remains in an error-disabled state. A port is operational only when you install the correct license in the device. The **show interface ethernet** command displays the port in the ERROR\_DISABLED state because there is no license installed, and there is no physical link between two devices. The following example output is from a Brocade ICX 6650 device.

```
device#show interface ethernet 1/1/33
10GigabitEthernet1/1/33 is ERR-DISABLED (invalid license), line protocol is
down
  Hardware is 10GigabitEthernet, address is 748e.f80c.5f40 (bia 748e.f80c.5f40)
  Interface type is unknown
  Configured speed 10Gbit, actual unknown, configured duplex fdx, actual
unknown
```

```

Member of L2 VLAN ID 1, port is untagged, port state is DISABLED
BPDU guard is Disabled, ROOT protect is Disabled
Link Error Dampening is Disabled
STP configured to ON, priority is level0, mac-learning is enabled
Flow Control is enabled
Mirror disabled, Monitor disabled
Not member of any active trunks
Not member of any configured trunks
No port name

```

A port is in a down state when there is no physical link between two devices, and a license is installed in the device. The **show interface ethernet** command displays the port in the down state. The following example output is from a Brocade ICX 6650 device.

```

device#show interface ethernet 1/1/33
10GigabitEthernet1/1/33 is down, line protocol is down
Hardware is 10GigabitEthernet, address is 748e.f80c.5f40(bia 748e.f80c.5f40)
Interface type is unknown
Configured speed 10Gbit, actual unknown, configured duplex fdx, actual
unknown
Member of L2 VLAN ID 1, port is untagged, port state is BLOCKING
BPDU guard is Disabled, ROOT protect is Disabled
Link Error Dampening is Disabled
STP configured to ON, priority is level0, mac-learning is enabled
Flow Control is enabled
Mirror disabled, Monitor disabled
Not member of any active trunks
Not member of any configured trunks
No port name

```

A port is in an up state when a physical link is established between two devices, and a license is installed in the device. The **show interface ethernet** command displays the port in the up state. The following example output is from a Brocade ICX 6650 device.

```

device#show interface ethernet 1/2/1
40GigabitEthernet1/2/1 is up, line protocol is up
Hardware is 40GigabitEthernet, address is 748e.f80c.5f40(bia 748e.f80c.5f40)
Interface type is 40Gig Copper
Configured speed 40Gbit, actual 40Gbit, configured duplex fdx, actual fdx
Configured mdi mode AUTO, actual none
Member of 1 L2 VLANs, port is tagged, port state is FORWARDING
BPDU guard is Disabled, ROOT protect is Disabled
Link Error Dampening is Disabled
STP configured to ON, priority is level0, mac-learning is enabled
Flow Control is enabled
Mirror disabled, Monitor disabled
Member of active trunk ports 1/2/1,1/2/2,1/2/3,1/2/4, primary port
Member of configured trunk ports 1/2/1,1/2/2,1/2/3,1/2/4, primary port
No port name

```

## Ports on Demand licensing on the ICX 6650

The Brocade ICX 6650 device features Ports on Demand licensing. With Ports on Demand licensing, software features do not require licenses and you can add port licenses as needed. The Brocade ICX 6650 device supports:

- 56 front-panel, dual-speed 1/10 GbE SFP+ ports
- 4 rear-panel 40 GbE QSFP+ ports
- 2 rear-panel 4x10 GbE QSFP+ breakout ports

The details for obtaining a license are provided in the Software Licensing Tasks section.

**NOTE**

There is no trial license available for the PoD feature for the ICX 6650 device.

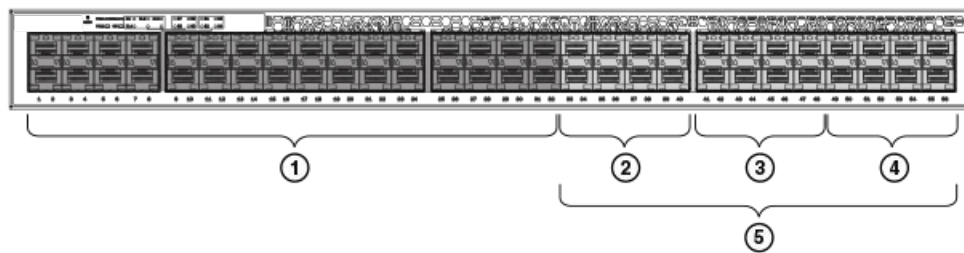
## Front-panel PoD ports

The front panel has the following fixed PoD ports:

- Ports 1/1/1 to 1/1/32 are enabled by default.
- Ports 1/1/33 to 1/1/56 are disabled by default and are in an error-disabled state.

For a detailed description of the port states (up, down, or error-disabled), refer to [Configuration considerations when configuring PoD for ICX 6650 devices only](#) on page 42. The following figure shows the front-panel ports.

**FIGURE 7** Brocade ICX 6650 front-panel ports



1. Base (32x10 GbE)
2. 8x10 GbE (33-40)
3. 8x10 GbE (41-48)
4. 8x10 GbE (49-56)
5. Blocks of 8x10 GbE SFP+ ports

## Rear-panel Flexible Ports on Demand

The rear panel has 6 QSFP+ ports:

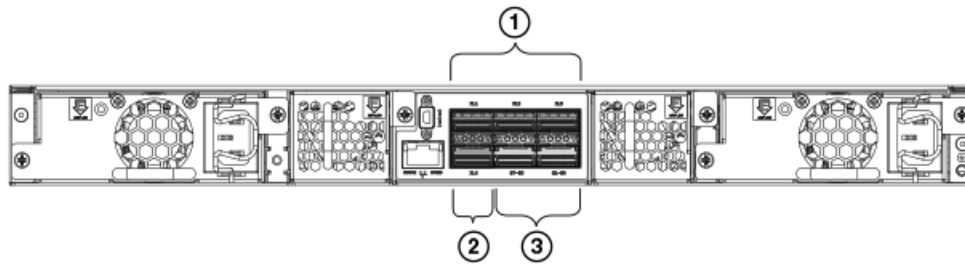
- 2 pairs of 40 GbE ports that are error-disabled by default.
- 2 ports that can be converted to eight ports using a breakout cable. The ports are error-disabled by default.

The ports on the rear panel are categorized into groups. Each group requires a Flexible PoD (FPoD) license to enable the ports. For more information about using the FPoD license with a group of ports, refer to [Disabling the FPoD ports on the rear panel](#) on page 49.

- Group 1 = Ports 1/2/1 - 1/2/2. When enabled, these ports operate at 40 GbE.
- Group 2 = Ports 1/2/3 - 1/2/4. When enabled, these ports operate at 40 GbE.
- Group 3 = Ports 1/3/1-4, 1/3/5-8. When enabled, these breakout ports operate at 10 GbE.

The following figure shows the rear-panel ports.

FIGURE 8 Brocade ICX 6650 rear-panel ports



1. 2/1-2: Any pair of QSFP+ ports—2x40 GbE ports (2/1-2, 2/3-4), 2 4x10 GbE ports (3/1-4,3/5-8)
2. 2/4
3. 3/1-8: 4x10 GbE breakout ports (3/1-4, 3/5-8)

## Enabling ports on the front panel

By default, ports 1/1/33 to 1/1/56 are in an error-disabled state. Use the ICX6650-10G-LIC-POD license to enable these ports. Once enabled, the ports are up at 10 GbE port speed. One ICX6650-10G-LIC-POD license enables eight ports at a time in sequential order.

1. Download the ICX6650-10G-LIC-POD license from the Brocade software portal onto the Brocade device.
2. Place the license file on a TFTP or SCP server to which the Brocade device has access.
3. Use TFTP or SCP to copy the file to the license database of the Brocade device. To use TFTP to copy the file to the license database of the Brocade device, enter the following command.

```
Brocade# copy tftp license 10.120.54.185 lic.xml unit 1
Brocade#Flash Memory Write (8192 bytes per dot)
Copy Software License from TFTP to Flash Done.
```

**Syntax:** `copy tftp license [ IP_address | ipv6_address ] license_filename_on_host unit unit_id`

The *IP\_address* variable is the address of the IPv4 TFTP server.

The *ipv6\_address* variable is the address of the IPv6 TFTP server.

The *license\_filename\_on\_host* variable is the file name of the license file.

The **unit** *unit\_id* parameter specifies a unit for which you want to add a software license file. The *unit\_id* variable is 1.

If you attempt to download the same license twice on the device, the following error message is displayed on the console.

```
Can't add the license string - 93 (DUPLICATE_LICENSE)
```

SSH and Secure Copy (SCP) must be enabled on the Brocade device before the procedures in this section can be performed.

To copy the file from an SCP-enabled client to the license database of a specific unit, enter the following command. In the example, the license is copied to unit 1.

```
scp license.xml terry@10.20.91.39:license:1
```

**Syntax:** `scp license_filename_on_host@IP_address:license:unit_id`

The *unit\_id* variable specifies a unit for which you want to add a software license file. The *unit\_id* variable is 1.

4. Insert an SFP+ optical transceiver to enable ports to 10 GbE speed.
5. Insert an SFP+ or SFP optical transceiver to enable the ports to 1 GbE speed.
6. Repeat step 1 through step 3 to enable ports 1/1/33 to 1/1/48.

- Repeat step 1 through step 3 to enable ports 1/1/33 to 1/1/56.

By default, once the license is installed, the ports are up in 10 GbE port speed. You do not need to use the **speed-duplex** command or reload the system to enable the ports to 10 GbE port speed. As you upgrade from a lower port to a higher port capacity license, the new license replaces the previous license.

## Deleting an ICX6650-10G-LIC-POD license

When downgrading to a lower port capacity license using the ICX6650-10G-LIC-POD license, you must first delete the higher port capacity license and then re-install the lower port capacity license in your system. A reload is required for the license to take effect.

- Delete the 16-port ICX6650-10G-LIC-POD license file from the device.

```
Brocade#license delete unit 1 index 1
```

- Use TFTP or SCP to copy the 8-port ICX6650-10G-LIC-POD license file to the license database of the device. To use TFTP to copy the file to the license database of the Brocade device, enter the following command.

```
Brocade# copy tftp license 10.120.54.185 lic.xml unit 1
Brocade#Flash Memory Write (8192 bytes per dot)
Copy Software License from TFTP to Flash Done.
```

**Syntax:** `copy tftp license [ IP_address | ipv6_address ] license_filename_on_host unit unit_id`

The *IP\_address* variable is the address of the IPv4 TFTP server.

The *ipv6\_address* variable is the address of the IPv6 TFTP server.

The *license\_filename\_on\_host* variable is the file name of the license file.

The **unit** *unit\_id* parameter specifies a unit for which you want to add a software license file. The *unit\_id* variable is 1.

If you attempt to download the same license twice on the device, the following error message is displayed on the console.

```
Can't add the license string - 93 (DUPLICATE_LICENSE)
```

SSH and Secure Copy (SCP) must be enabled on the Brocade device before the procedures in this section can be performed.

To copy the file from an SCP-enabled client to the license database of a specific unit, enter the following command. In the example, the license is copied to unit 1.

```
scp license.xml terry@10.20.91.39:license:1
```

```
scp license_file_on_host user@IP_address:license:unit id
```

The *unit\_id* variable specifies a unit for which you want to add a software license file. The *unit\_id* variable is 1.

- Reload the device for the 8-port ICX6650-10G-LIC-POD license file to take effect.

```
Brocade#reload
```

4. Use the **show pod** command to display configuration information for the 8-port ICX6650-10G-LIC-POD license.

```

Brocade#show pod
Unit-Id: 1
PoD 10G license capacity: 8
PoD 10G license capacity used: 8
PoD 40G license capacity: 6
PoD 40G license capacity used: 6
PoD-ports Lic-Available Lic-Used
1/1/33 Yes Yes
1/1/34 Yes Yes
1/1/35 Yes Yes
1/1/36 Yes Yes
1/1/37 Yes Yes
1/1/38 Yes Yes
1/1/39 Yes Yes
1/1/40 Yes Yes
1/1/41 No No
1/1/42 No No
1/1/43 No No
1/1/44 No No
1/1/45 No No
1/1/46 No No
1/1/47 No No
1/1/48 No No
1/1/49 No No
1/1/50 No No
1/1/51 No No
1/1/52 No No
1/1/53 No No
1/1/54 No No
1/1/55 No No
1/1/56 No No

```

## Enabling ports on the rear panel

By default, ports on the rear panel are in an error-disabled state. Use the ICX6650-40G-LIC-POD license to enable these ports. Once enabled, ports 1/2/1 through 1/2/4 are at 40 GbE port speed, and ports 1/3/1 through 1/3/8 are at 10 GbE port speed.

1. Download the ICX6650-40G-LIC-POD license from the Brocade software portal.
2. Place the license file on a TFTP or SCP server to which the Brocade device has access.

- Use TFTP or SCP to copy the file to the license database of the Brocade device. To use TFTP to copy the file to the license database of the Brocade device, enter the following command.

```
Brocade# copy tftp license 10.120.54.185 lic.xml unit 1
Brocade#Flash Memory Write (8192 bytes per dot)
Copy Software License from TFTP to Flash Done.
```

**Syntax:** `copy tftp license [ IP_address | ipv6_address ] license_filename_on_host unit unit_id`

The `IP_address` variable is the address of the IPv4 TFTP server.

The `ipv6_address` variable is the address of the IPv6 TFTP server.

The `license_filename_on_host` variable is the file name of the license file.

The `unit unit_id` parameter specifies a unit for which you want to add a software license file. The `unit_id` variable is 1.

If you attempt to download the same license twice on the device, the following error message is displayed on the console.

```
Can't add the license string - 93 (DUPLICATE_LICENSE)
```

SSH and Secure Copy (SCP) must be enabled on the Brocade device before the procedures in this section can be performed.

To copy the file from an SCP-enabled client to the license database of a specific unit, enter the following command. In the example, the license is copied to unit 1.

```
scp license.xml terry@10.20.91.39:license:1
```

```
scp license_file_on_host user@IP_address:license:unit id
```

The `unit_id` variable specifies a unit for which you want to add a software license file. The `unit_id` variable is 1.

- Insert the 40 GbE QSFP optical transceiver for ports 1/2/1 through 1/2/4.
- Insert the QSFP to 4 SFP+ copper breakout cable or the breakout-capable QSFP+ optical transceiver for ports 1/3/1 through 1/3/8.
- Enter the following command.

```
Brocade(config)# fpod-40g-enable group 1
Brocade(config)# fpod-40g-enable group 2
```

**Syntax:** `[no] fpod-40g-enable group groupID`

Enter one of the following values for `groupID`:

- 1 = Ports 1/2/1 - 1/2/2
- 2 = Ports 1/2/3 - 1/2/4
- 3 = Ports 1/3/1 - 1/3/8

The ports in the group are enabled without a system reload. The port status is up in 30 seconds. You can use the `no fpod-40g-enable group` command to disable the port speed for the groups specified. The ports become non-operational and revert back to the default state, error-disabled. A system reload is not required.

- Use the `show pod` and `show license` commands to display information on port licensing.



## Disabling the FPoD ports on the rear panel

With a 2-port capacity license, you can choose to enable any one group out of the three groups (group 1, group 2, or group 3). With a 4-port capacity license, you can choose to enable any two groups out of the three groups.

Perform the following steps to disable FPoD ports in one group out of three groups.

Disable ports in a group.

```
Brocade(config)# no fpod-40g-enable group 1
```

Use the **fpod-40g-enable group** *group-id* command to enable ports. A system reload is not required.

**Syntax:** [**no**] **fpod-40g-enable group** *group-id*

With a 4-port capacity license, you can choose to enable any two groups out of the three groups. If the ports in two groups (group 1 or group 2) are already enabled, you must disable either group 1 or group 2 before enabling the ports in the third group (group 3). The following example shows that group 1 is disabled and group 3 is enabled.

```
Brocade(config)# no fpod-40g-enable group 1  
Brocade(config)# fpod-40g-enable group 3
```

If you do not disable the ports in group 1 or group 2, the following error message is displayed.

```
Error: 40G PoD license capacity has been exceeded
```

Use the **show pod** command to display configuration information for the groups enabled as shown in the following example output.

```
Brocade(config)#show pod
Unit-Id: 1
PoD 10G license capacity: 24
PoD 10G license capacity used: 24
PoD 40G license capacity: 4
PoD 40G license capacity used: 4
PoD-ports Lic-Available Lic-Used
1/1/33 Yes Yes
1/1/34 Yes Yes
1/1/35 Yes Yes
1/1/36 Yes Yes
1/1/37 Yes Yes
1/1/38 Yes Yes
1/1/39 Yes Yes
1/1/40 Yes Yes
1/1/41 Yes Yes
1/1/42 Yes Yes
1/1/43 Yes Yes
1/1/44 Yes Yes
1/1/45 Yes Yes
1/1/46 Yes Yes
1/1/47 Yes Yes
1/1/48 Yes Yes
1/1/49 Yes Yes
1/1/50 Yes Yes
1/1/51 Yes Yes
1/1/52 Yes Yes
1/1/53 Yes Yes
1/1/54 Yes Yes
1/1/55 Yes Yes
1/1/56 Yes Yes
1/2/1 Yes Yes
1/2/2 Yes Yes
1/2/3 No No
1/2/4 No No
1/3/1 Yes Yes
1/3/2 Yes Yes
1/3/3 Yes Yes
1/3/4 Yes Yes
1/3/5 Yes Yes
1/3/6 Yes Yes
1/3/7 Yes Yes
1/3/8 Yes Yes
```

## Ports on Demand Licensing on the ICX 7250

The ICX 7250 device has 8 ports (ports 1/2/1 through 1/2/8) that can be upgraded to 10Gbps port speed. To upgrade the ports, you must purchase one or more PoD licenses for this device.

The number of licenses you need varies depending on how many ports you want to upgrade. The license requirements are:

- **To upgrade the 2 default stacking ports (port number 1/2/1 and 1/2/3):** You need the 2 port capacity PoD license, part number ICX7250-2X10G-LIC-POD.
- **To upgrade the 8 PoD ports (ports number 1/2/1 through 1/2/8):** You need the 2 port capacity PoD license **and** the 8 port capacity PoD license, part number ICX7250-8X10G-LIC-POD.
- **NOTE**  
Although the ICX7250-8X10G-LIC-POD license is referred to as an 8 port capacity license, it cannot be used by itself to upgrade all 8 ports to 10Gbps. The 8 port capacity license enables you to upgrade the 6 remaining ports on the device to 10Gbps port speed. To upgrade all 8 ports to 10Gbps, you must first install the 2 port capacity PoD license, then install the 8 port capacity license.

## The upgrade process

If you are installing the 8 port capacity license and you do not have the 2 port capacity license already installed, you must complete the upgrade process twice (once to install the 2 port capacity license, and the second time to install the 8 capacity license).

### NOTE

The software portal checks the unit record to make sure the 2 port capacity license is already installed. You cannot activate the 8 port capacity license unless the 2 port capacity license is already installed on the device.

To upgrade process involves the following basic steps:

1. Login to the Brocade portal to generate and obtain the license file you need.
2. Upgrade the ports to 10Gbps port speed (refer to [Configuring PoD on an interface](#) on page 35 for the steps to complete the upgrade).

### NOTE

At initial boot-up, the running configuration displays the ports at speed-duplex 1000-full.

3. After you install the license, use the **show license** command to confirm that the license was correctly installed. The output from the **show license** command shows the license capacity (Lic Capacity field), and the license name as ICX7250-10G-LIC-POD (Lic Name field).

If the execution of the **speed-duplex 10g-full** command fails because of a licensing issue, one or more syslog messages are automatically generated. A licensing issue can occur because:

- No license is installed on the device.
- You have incorrectly installed a license that is not tied to the LID of the device.

The following example shows the output from a device with the 8 port capacity version of the PoD license.

- A syslog is generated informing you about the failure. For example:
 

```
SYSLOG: <14>Jul 31 00:33:46 10.20.147.22 PoD: No license present for port 1/2/1.
```
- A system message made up of individual syslog errors is generated that gives details about each port. For example:
 

```
ICX7250-48 Router(config-if-e10000-1/2/1)#speed-duplex 10g-full
PoD: No license present for port 1/2/1

SYSLOG: <14>Jul 29 07:20:47 PoD: No license present for port 1/2/1
ICX7250-48 Router(config-if-e10000-1/2/1)#
```

If you delete a PoD license (either the 2 or 8 port capacity license), the affected ports continue working in 10G mode until you reload the box. When you reload the box, the ports are returned to 1Gbps port speed. For more information about deleting a license, refer to [Deleting a license on ICX devices](#) on page 25.

For information on the different licenses that are supported on the ICX 7250 device, refer to [ICX 7250 Licensed Features](#) on page 75.



# MACSec Key-Based Licensing

---

- [How MACsec works.....](#) 53
- [MACSec licensing.....](#) 53

## How MACsec works

MACsec capabilities prevent Layer 2 security threats, such as passive wiretapping, denial of service, intrusion, man-in-the-middle, and playback attacks.

MACsec protects communications using several configurable techniques. Data origin is authenticated and data is transported over secured channels. Frames are validated as MACsec Ethernet frames. The integrity of frame content is verified on receipt. Frame sequence is monitored using an independent replay protection counter. Invalid frames are discarded or monitored.

Data traffic carried within the MACsec frame is encrypted and decrypted using an industry-standard cipher suite.

## MACSec licensing

Devices that support MACSec functionality can be enabled for MACSec by purchasing a MACSec license. This license is available for the ICX 6610 and ICX 7450 devices.

There is no license capacity and no trial license associated with this license. The MACSec license works independently of Premium, Advance, or PoD licenses already installed on Brocade devices. You can obtain this license from the Brocade software portal. The MACSec license is a node-locked license, and is required per device. In a stacking system, the MACSec license is required only for the specific units in the stacking system that enable MACSec and use the encryption capabilities at the port level. This license is not required for other units within the stacking system that do not enable MACSec.

The MACSec feature-related CLI commands are not controlled by the MACSec license. The MACSec preconfiguration commands and enabling commands are visible and available without a MACSec license. However, a valid MACSec license is required to execute the command to enable MACSec encryption at the port level on that device. When you enter the CLI command to enable MACSec at the port level without a MACSec license, the command does not execute, and an error message is displayed. The command enables the MACSec encryption capability on that port only when a valid MACSec license is installed on the device.

## Enabling and configuring group interfaces for MACsec

After MACsec is enabled for the device, each MACsec interface must be individually enabled, and a configured group of parameters must be applied.

1. To enable MACsec, at the dot1x-mka configuration level, enter the **enable-mka ethernet** command, and specify the interface as *device/slot/port*.

In the following example, Ethernet port 2 on slot 3 of device 1 is enabled for MACsec security.

```
device# configure terminal
device(config)# dot1x-mka
device(config-dot1x-mka)# mka-cfg-group test1
device (config-dot1x-mka)# enable-mka ethernet 1/3/2
device(config-dot1x-mka-1/3/2)#
```

### NOTE

The following output is displayed if there is no MACsec license present on the device.

```
device(config-dot1x-mka)# enable-mka ethernet 1/3/2
Error: No MACsec License available for the port 1/3/2. Cannot enable MACsec !!!
Error: MKA cannot be enabled on port 1/3/2
```

2. At the dot1x-mka interface configuration level, enter the **mka-cfg-group** command, and specify the MKA group configuration to apply to the interface.

In the following example, MACsec options configured for group test1 are applied to the enabled interface.

```
device# configure terminal
device(config)# dot1x-mka
device(config-dot1x-mka)# mka-cfg-group test1
device (config-dot1x-mka)# enable-mka ethernet 1/3/2
device(config-dot1x-mka-1/3/2)# mka-cfg-group test1
```

## Verifying the MACsec license

Describes how to verify the MACsec license on a supported Brocade device.

If required, you can verify the MACsec license on your device.

From the enable prompt, enter the **show license** command.

The following example shows how to verify the MACsec license on an ICX 6610 stack.

```

ICX6610-48 Router# show license
Index      License Name          Lid          License Type  Status  License Period  License
Capacity
Stack unit 1:
1          ICX6610-PREM-LIC-SW  dzpHKFHLGam Normal        Active
Unlimited 65535
2          ICX6610-10G-LIC-POD dzpHKFHLGam Normal        Active
Unlimited 8
3          ICX-MACSEC-LIC      dzpHKFHLGam Normal        Active
Unlimited 1
4          ICX6610-ADV-UPG-LIC-SW dzpHKFHLGam Normal        Active
Unlimited 1
Stack unit 2:
1          ICX6610-10G-LIC-POD dzpHKFHLGzm Normal        Active
Unlimited 8
2          ICX6610-PREM-LIC-SW  dzpHKFHLGzm Normal        Active
Unlimited 1
3          ICX-MACSEC-LIC      dzpHKFHLGzm Normal        Active
Unlimited 1
Stack unit 3:
1          ICX6610-10G-LIC-POD dzpHKFHLGbb Normal        Active
Unlimited 8
2          ICX-MACSEC-LIC      dzpHKFHLGbb Normal        Active
Unlimited 1
3          ICX6610-PREM-LIC-SW  dzpHKFHLGbb Normal        Active
Unlimited 1
4          ICX6610-ADV-UPG-LIC-SW dzpHKFHLGbb Normal        Active
Unlimited 1
Stack unit 4:
1          ICX6610-ADV-UPG-LIC-SW dzmHKHOLHHI Normal        Active
Unlimited 1
2          ICX6610-PREM-LIC-SW  dzmHKHOLHHI Normal        Active
Unlimited 1
3          ICX6610-10G-LIC-POD  dzmHKHOLHHI Normal        Active
Unlimited 8
4          ICX-MACSEC-LIC      dzmHKHOLHHI Normal        Active
Unlimited 1

```





# Non-Node Locked Licensing

---

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## Non-node locked licensing

Non-node locked licensing enables the licensed features prior to obtaining a license file.

The device can use a licensed feature without a license for up to 30 days. After 30 days the device console displays syslog messages and traps, reminding you that a license must be installed. Once a valid license is installed, the syslog messages stop.

A non-node locked license is applicable to a product platform. The license can be moved from one device and redeployed to another device within the same product platform. The non-node locked license is not specific to a device, unlike a node locked license for which the LID is associated with each device. Non-node locked licenses do not require an activation process and can be installed as received from Brocade.

You can now enable non-node locked licensed features prior to purchasing the license. The licenses are fulfilled directly, without the need for an transaction key and activation process, which dramatically simplifies the deployment process.

### NOTE

Non-node locked licensing is available for the ICX 7450 and ICX 7250 devices. Installation of the same non-node locked license on multiple units is prohibited.

### NOTE

Brocade recommends that you configure the correct system clock, date and time before enabling any of the non-node locked premium features.

## Obtaining a non-node locked license

A non-node locked license can be obtained by submitting a request to Brocade using a purchase order.

To obtain a non-node license, follow these steps.

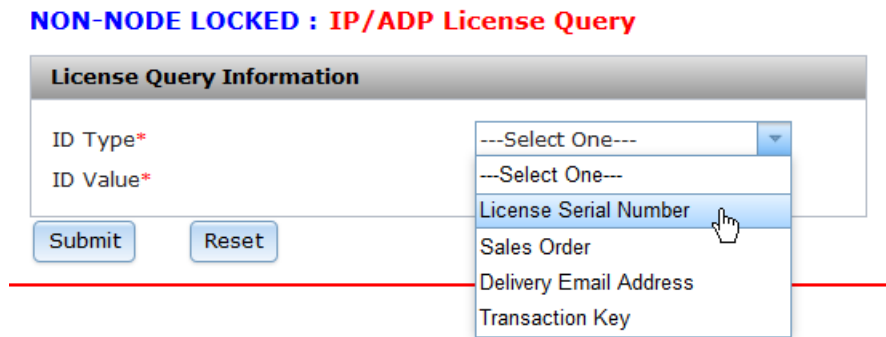
1. Submit a request to obtain a license per the End User License Agreement (EULA). For more information about the EULA, refer to [License messaging](#) on page 59.
2. Place a purchase order with Brocade order management.
3. Retrieve the license file from the email attachment and follow the instructions provided in the email to install the license.
4. Upload the license file to the Brocade device as instructed in [Installing a license file](#) on page 23. The license is ready to install as is.
5. Verify that the license is installed correctly. For more information on verifying the license, refer to [Viewing non-node locked license information](#) on page 61.

# Recovering a lost non-node locked license

If you misplace or lose the license, you can recover the license from the Brocade Software Portal. Follow the steps below to recover the license.

1. Log in to the Brocade software portal at <http://swportal.brocade.com> and complete the software license request. If you do not have a login ID and password, request access by following the instructions on the screen.
2. From the **License Management** menu, select **IP/ADP > Non-Node Locked License Query**. The **Non-Node Locked: IP/ADP License Query** window appears.

FIGURE 9 Non-node locked license query window



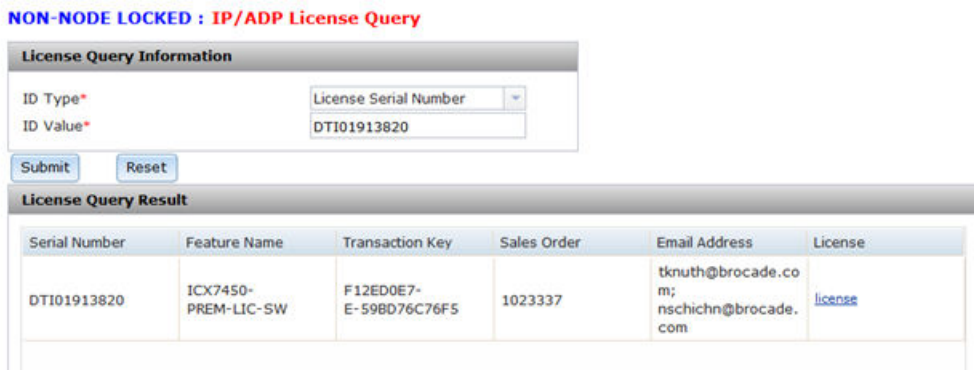
3. Select an ID type from the drop-down menu. Enter the corresponding value in the ID value field.

**NOTE**

The **Transaction Key** selection from the drop-down menu is not applicable at this time for non-node locked licensing.

4. Click **submit**. The **License Query Result** window appears.

FIGURE 10 License query result window



5. Download the license file to your PC by clicking the hyperlink in the **License** field.
6. Upload the license file to the Brocade device as instructed in [Installing a license file](#) on page 23.

## License installation and deletion

Non-node locked licenses are installed or deleted in the same way as node-locked licenses on the ICX devices.

You can either copy a license using either TFTP directly, or through SCP to each device individually. Similarly, you can use the license deletion commands to delete a non-node locked license.

Refer [Using TFTP to copy a license file on FCX and ICX devices](#) on page 24 to install a non-node locked license. For non-node locked license deletion, refer [Deleting a license on ICX devices](#) on page 25.

## License messaging

The device console displays log messages, syslog messages and traps if a valid non-node locked license is not installed.

Once you install a valid license, the messages stop. The device will also echo out the End User License Agreement (EULA) link that you must accept to enable features. The various scenarios for the non-node locked licensing syslog and trap messages are described in the following table.

**TABLE 8** License syslog and trap messaging definitions

Scenario	Message	Displayed	Frequency	Notes
<b>Case 0</b>	By selecting "Y" you have read and accept the Brocade End USER License Agreement found at the following URL <a href="http://brocade.com/services-support/software-license-keys/">http://brocade.com/services-support/software-license-keys/</a>	On initial feature activation.	One-time message.	You must select "Y" and accept the Brocade End USER License Agreement to configure Layer 3 premium features on the device.  The user acceptance message for user entry is requested only once per lifetime of the unit, including power cycle/reboot scenarios. For a stack scenario, the user acceptance one time per unit is applied to all the units even if they leave the stack at a later point of time.
<b>Case 1</b>	By selecting "Y" you have read and accept the Brocade End USER License Agreement found at the following URL <a href="http://brocade.com/services-support/software-license-keys/">http://brocade.com/services-support/software-license-keys/</a>  If you select "Y" the following message will display: "Stack ( <i>stack_unit_number</i> ): Use of the feature ( <i>feature_name</i> ) requires a license to be purchased and installed within 30 days."	On initial feature activation with no license installed.	One-time message.	The user acceptance message for user entry is requested only once per lifetime of the unit including power cycle/reboot scenarios. For a stack scenario, the user acceptance one time per unit is applied to all the units even if they leave the stack at a later point of time.
<b>Case 2</b>	The feature ( <i>feature_name</i> ) has been activated for x days. To ensure compliance, please purchase and install a license as soon as possible.	30-44 days after feature activation with no license installed.	Three times on day 30, 37 and 44.	At any time, only one feature name is displayed in the set of premium routing features list, as it does not matter when the feature is enabled.
<b>Case 3:</b>	This unit is not compliant. A license for feature ( <i>feature_name</i> ) must be purchased and installed or the feature must be deactivated to become compliant with the terms and conditions of use.	45+ days after feature activation with no license installed or 24 hours after deletion of an installed license if any of the associated features are still enabled.	One-time message.	At any time, only one feature name is displayed in the set of premium routing features list, as it does not matter when the feature is enabled.

TABLE 8 License syslog and trap messaging definitions (continued)

Scenario	Message	Displayed	Frequency	Notes
<b>Case 4</b>	The license ( <i>licence_name</i> ) has been deleted on this unit and is available for redeployment on another unit in accordance with the terms and conditions of use. All features associated to this license must be disabled.	License is deleted (user wants to move license to another unit).	Daily message	<p>You must disable all features associated to a license when the license is re-purposed to another product. When the license is deleted, you will be notified that it can now be re-purposed on another unit and that all features associated to the license must be disabled.</p> <p>If any features are still enabled, an out of compliance message is sent 24 hours after the license has been deleted. If the premium license features are still active, an assertive message (<b>Case 3</b> message) will be displayed, followed by every 24 hours to notify the customer that they are out of compliance to the terms and conditions of the EULA.</p>

**NOTE**

The syslog for case 2 and 3 may trigger duplicate compliance messages during scenarios like failover, switchover or reboot.

## License messaging in a stacking system

The stack election of a member unit joining or leaving a stack does not get impacted by the existence of a non-node locked license. The features can be enabled without a license on one or more units on a stacking system.

**NOTE**

Configuring the NTP server is a suggested option for a standalone or stacking system.

When one of the features is enabled in the stacking system, the member unit will be in an operational state even if the unit does not have a valid non-node locked license. The operational state of the member unit does not depend on whether or not this unit has a license.

### Member unit with license

If a member unit with a license joins the stacking system, none of the messages described in the [License messaging](#) on page 59 are displayed. But if the user deletes the license from that unit, then the daily message will be displayed if one of the features is enabled on this stacking system.

### Member unit without license

In a stacking system, if a member unit without license joins the stack, and the stacking is operating normally, a **Case 2** message described in [License messaging](#) on page 59 displays if one of the features is enabled on this system. The messages will stop if the license is installed on that unit.

## Viewing non-node locked license information

The show commands can be used to view information about non-node locked licensing.

The **show license** command displays all license information on the active unit and other member units in a stacking system, as shown in the following example.

```
device# show license
Index License Mode      License Name      LID/SN      License Type  Status  License  Period
capacity
Stack unit 1:
1      Non-node Locked  ICX7450-PREM-LIC-SW xxxyyyyy1      Normal      Active  Unlimited  1
Stack unit 2:
1      Non-node Locked  ICX7450-PREMLIC-SW xxxyyyyy2      Normal      Active  Unlimited  1
Stack unit 3:
1      Non-node Locked  ICX7450-PREMLIC-SW xxxyyyyy3      Normal      Active  Unlimited  1
ICX7450 Router#
```

### Syntax: show license

The **show license node-locked** command displays all node-locked license information on the active unit and other member units in a stacking system.

```
device# show license node-locked
Index License Mode      license Name      Lid/SN      License Type  Status  License  Period
capacity
Stack unit 1:
1      Node Locked      FCX-ADV-LIC-SW    dheHHIOgFJF    Normal      Invalid  Unlimited  1
Stack unit 2:
1      Node Locked      ICX6610-10G-LIC-POD rtIHFJFFHNO    Normal      Invalid  Unlimited  8
ICX7450 Router#
```

### Syntax: show license node-locked

This **show license non-node-locked** command displays all non-node locked license information on the active unit and other member units in a stacking system.

```
device# show license non-node-locked
Index License Mode      License Name      LID/SN      License Type  Status  License  Period capacity
Stack unit 1:
1      Non-node Locked  ICX7450-PREM-LIC-SW xxxyyyyy1      Normal      Active  Unlimited  1
Stack unit 2:
1      Non-node Locked  ICX7450-PREM-LIC-SW xxxyyyyy2      Normal      Active  Unlimited  1
Stack unit 3:
1      Non-node Locked  ICX7450-PREM-LIC-SW xxxyyyyy3      Normal      Active  Unlimited  1
```

### Syntax: show license non-node-locked

The **show license unit *unit-id*** command displays all license information for that specific unit.

```
device# show license unit 1
Index License Mode      License Name      LID/SN      License Type  Status  License  Period
capacity
Stack unit 1:
1      Non-node Locked  ICX7450-PREM-LIC-SW xxxyyyyy1      Normal      Active  Unlimited  1
```

### Syntax: show license unit *unit-id*

The **show license unit *unit-id* index *license-index*** command displays license information for the given license index on that specific unit. For a non-node locked license, it displays more detailed information.

Example of the output of a node locked license:

```
device#show license unit 1 index 2
License information for unit 1 license <2>:
```

```

+license mode:      node locked
+license name:     FCX-ADV-LIC-SW
+lid:              dheHHIOgFJF
+license type:     normal
+status:          active
+license period:   unlimited

```

Example of the output of a non-node locked license:

```

device# show license unit 1 index 1
License information for unit 1 license <1>:
+license mode:     non-node locked
+license name:     ICX7450-PREM-LIC-SW
+license type:     normal
+status:          active
+license period:   unlimited
+serial number:    xxxyyyyy1
+license capacity: 1

```

**Syntax:** `show license unit unit-id index license-index`

**TABLE 9** Output from the show license unit command

Field	Description
License mode	Describes whether the license is node locked or non-node locked.
License name	The name of the license installed for the license index number on the stack unit.
License type	Indicates whether the license is normal (permanent) or trial (temporary).
Status	Indicates the status of the license: <ul style="list-style-type: none"> <li>• Valid - A license is valid if the LID matches the license ID of the device for which the license was purchased, and the package name is recognized by the system.</li> <li>• Invalid - The LID does not match the license ID of the device for which the license was purchased.</li> <li>• Active - The license is valid and in effect on the device.</li> <li>• Not used - The license is not in effect on the device.</li> <li>• Expired - For trial licenses only, this indicates that the trial license has expired.</li> <li>• Duplicate - The license is duplicated.</li> </ul>
License period	If the license type is trial (temporary), this field displays the number of days the license is valid. If the license type is normal (permanent), this field displays Unlimited.
Serial number	The serial number of the license unit. The serial number is used in non-locked licensing to differentiate license files. This is a software-defined unique key to manage non-node locked license files.
License capacity	The port capacity of the license.

# Appendix A: FastIron Licensed Features and Part Numbers

- [FastIron Licensed Features.....](#) 68
- [FastIron Licensed Software.....](#) 77

This appendix lists the supported licensed features, associated image file names, and related part numbers. There are no changes to the part numbers for products with pre-installed (factory-installed) licenses. These part numbers are listed for reference in the last column.

**TABLE 10** Licensed features and part numbers

Product	Licensed feature or feature set	Image file name	Part numbers for software license only	Part numbers for hardware with pre-installed software license
ICX 6610 ICX 6610 devices only support software licensing.	Premium Layer 3: <ul style="list-style-type: none"> <li>• IPv6 static routing</li> <li>• OSPF v2</li> <li>• OSPF v3</li> <li>• PIM-DM</li> <li>• PIM-SM</li> <li>• PIM-SSM</li> <li>• PIM passive</li> <li>• PBR</li> <li>• RIPng</li> <li>• VRRP</li> <li>• VRRP v3 for IPv6</li> <li>• VRRP-E</li> <li>• VRRP-E for IPv6</li> <li>• IPv6 unicast routing</li> </ul>	N/A <sup>1</sup>	ICX6610-PREM-LIC-SW	ICX 6610-24-PE ICX 6610-24-PI ICX 6610-24P-PE ICX 661X0-24P-PI ICX 6610-24F-PE ICX 6610-24F-PI ICX 6610-48-PE ICX 6610-48-PI ICX 6610-48P-PE ICX 6610-48P-PI
	Advance Layer 3: <ul style="list-style-type: none"> <li>• All features in the Premium license (see the cell above - Premium Layer 3).</li> <li>• BGP4</li> <li>• BGP4+</li> <li>• GRE</li> <li>• IPv6 over IPv4 tunnels</li> <li>• VRF-Lite</li> </ul>	N/A <sup>1</sup>	ICX6610-ADV-LIC-SW	Sold separately. To purchase the ICX 6610 Advance license, contact your Brocade representative.
	Upgrade from Premium to Advance license  This license is used to upgrade from Premium to Advance license. The license can only be installed	N/A <sup>1</sup>	ICX6610-ADV-UPG-LIC-SW	Sold separately. To purchase the Upgrade license, contact your Brocade representative.

**TABLE 10** Licensed features and part numbers (continued)

Product	Licensed feature or feature set	Image file name	Part numbers for software license only	Part numbers for hardware with pre-installed software license
	on all hardware that has a Premium license installed.			
	<p>ICX 6610 - Ports on Demand license.</p> <p>To upgrade the ICX 6610 1 Gbps ports to 10 Gbps port speed, use the ICX6610-10G-LIC-POD license. By default, the ICX 6610 device has eight active 1 Gbps uplink ports. To increase the uplink capacity of four ports from 1 Gbps to 10 Gbps port speed, purchase a single ICX6610-10G-LIC-POD license. To increase the uplink capacity of all eight ports from 1 Gbps to 10 Gbps port speed, purchase a second ICX6610-10G-LIC-POD license.</p>	N/A <sup>1</sup>	ICX 6610-10G-LIC-POD	Sold separately. To purchase the Ports on Demand license, contact your Brocade representative.
	<p>ICX 6610 - MACSec license</p> <p>The MACSec license can be purchased for any ICX 6610 device. MACSec capability can be enabled for any 10 Gbps port on a licensed device.</p> <p>MACsec uses MACsec Key Agreement protocol (MKA) for exchange and agreement of secure keys between supported devices. MKA uses the EAP framework specified in IEEE 802.1X-2010 for communication.</p>	N/A <sup>1</sup>	ICX-MACSEC-LIC	Sold separately per device. To purchase the MACSec license, contact your Brocade representative.
<p>ICX 6450</p> <p>ICX 6450C</p> <p>Software licensing is supported on ICX 6450C devices for VRRP, VRRP-E, and GRE.</p>	<p>Premium Layer 3:</p> <ul style="list-style-type: none"> <li>• IPv4 OSPF v2</li> <li>• IPv4 OSPF v3</li> <li>• RIP v1, v2</li> <li>• RIPng</li> <li>• VRRP</li> <li>• VRRP-E</li> <li>• GRE</li> </ul>	N/A <sup>1</sup>	ICX6450-PREM-LIC	N/A
	<p>ICX 6450- Ports on Demand license</p> <p>The ICX 6450 device has four active uplink or</p>	N/A <sup>1</sup>	ICX6450-2X10G-LIC-POD	<p>FCX624-E-ADV</p> <p>FCX-624-I-ADV</p> <p>FCX624S-ADV</p>



**TABLE 10** Licensed features and part numbers (continued)

Product	Licensed feature or feature set	Image file name	Part numbers for software license only	Part numbers for hardware with pre-installed software license
	stacking ports on slot 2. By default, ports 1 and 3 are 10 Gbps ports. By default, without a license at bootup, ports 2 and 4 come up in 10 Gbps port speed in an error-disabled state. To enable ports 2 and 4 to 10 Gbps port speed, purchase the ICX6450-2X10G-LIC-POD license.			FCX624S-HPOE-ADV  Sold separately. To purchase the Ports on Demand license, contact your Brocade representative.
				FCX624S-F-ADV FCX648-E-ADV FCX648-I-ADV
FCX	Advance Layer 3: <ul style="list-style-type: none"> <li>• BGP</li> <li>• BGP4+</li> <li>• GRE</li> <li>• IPv6 over IPv4 tunnels</li> </ul>	N/A <sup>1</sup>	FCX-ADV-LIC-SW	FCX648S-ADV FCX648S-HPOE-ADV
ICX 6650	ICX 6650 - Ports on Demand license for 10 Gbps	N/A <sup>1</sup>	ICX6650-10G-LIC-POD	Enables ports 1/1/33-1/1/56 in blocks of eight in sequential order. You need three ICX6650-8P10G-POD licenses to enable all front-panel ports. When you purchase a license, a new transaction key is generated as you upgrade to a higher port capacity. Purchase the following: <ul style="list-style-type: none"> <li>• 8-port capacity = 1 ICX6650-8P10 G-POD license. Enables ports 1/1/33 -1/1/40.</li> <li>• 16-port capacity = 2 ICX6650-8P10 G-POD licenses. Enables ports 1/1/33 - / 1/1/48.</li> <li>• 24-port capacity = 3 ICX6650-8P10 G-POD licenses. Enables ports 1/1/33- 1/1/56.</li> </ul>
	ICX 6650 - Ports on Demand license for 40 Gbps	N/A <sup>1</sup>	ICX6650-40G-LIC-POD	Enables the rear-panel ports by port groups. You need three ICX6650-2P40G-POD licenses to enable all rear-

TABLE 10 Licensed features and part numbers (continued)

Product	Licensed feature or feature set	Image file name	Part numbers for software license only	Part numbers for hardware with pre-installed software license
				<p>panel ports. Purchase the following:</p> <ul style="list-style-type: none"> <li>• 2-port capacity = 1 ICX6650-2P40 G-POD license. Enables one group out of the three groups (group 1, group 2, or group 3).</li> <li>• 4-port capacity = 2 ICX6650-2P40 G-POD licenses. Enables two groups out of the three groups.</li> <li>• 6-port capacity = 3 ICX6650-2P40 G-POD licenses. Enables all three groups.</li> </ul>
FSX 800 and FSX 1600	<p>IPv4 and IPv6 PREM Layer 3 for XL management modules:</p> <ul style="list-style-type: none"> <li>• BGP4+</li> <li>• IPv6 Layer 3 forwarding</li> <li>• IPv6 over IPv4 tunnels in hardware</li> <li>• IPv6 redistribution</li> <li>• IPv6 static routes</li> <li>• RIPng</li> <li>• IPv6 VRRPv3</li> <li>• IPv6 over GRE</li> <li>• IPv6 PIM-DM<sup>2</sup></li> <li>• IPv6 PIM-SM<sup>2</sup></li> <li>• IPv6 PIM passive<sup>2</sup></li> <li>• IPv6 PIM SSM<sup>2</sup></li> <li>• IPv6 Policy-based routing<sup>2</sup></li> <li>• IPv6 over IPv4 tunnels</li> <li>• 6,000 active host routes</li> <li>• OSPF v2</li> </ul>	SXLRxxxxx.bin (full Layer 3)	SX-FIL3U-6-IPV6-SW	<p>SX-FI-ZMR-XL SX-FI-ZMR-XL-PREM6 SX-FIZMRXL6 SX-FI2XGMRXL6</p>

**TABLE 10** Licensed features and part numbers (continued)

Product	Licensed feature or feature set	Image file name	Part numbers for software license only	Part numbers for hardware with pre-installed software license
	<ul style="list-style-type: none"> <li>• OSPF v3</li> <li>• Anycast RP</li> <li>• BGP</li> <li>• DVMRP V2</li> <li>• IGMP V1, V2, and V3</li> <li>• ICMP redirect messages</li> <li>• IGMP V3 fast leave (for routing)</li> <li>• MSDP</li> <li>• PIM-DM</li> <li>• PIM-SM</li> <li>• PIM passive</li> <li>• PIM SSM</li> <li>• Policy-based routing</li> <li>• VRRP-E</li> <li>• GRE</li> <li>• Multicast over GRE</li> <li>• IPv4 over GRE</li> <li>• Multi-VRF</li> </ul>			
<p>ICX 7450 Non-node locked license</p> <p>Software licensing is supported on ICX 7450 devices.</p>	<ul style="list-style-type: none"> <li>• OSPF v2</li> <li>• OSPF v3 (IPv6)</li> <li>• RIP v1/v2</li> <li>• RIPng (IPv6)</li> <li>• VRRP</li> <li>• VRRPv3 (IPv6)</li> <li>• VRRP-E</li> <li>• GRE</li> <li>• PBR</li> <li>• PIM-SM, PIM-SSM, PIM-DM</li> <li>• PIM Passive</li> <li>• BGP, BGP4+ (IPv6)</li> <li>• VRF (IPv4 and IPv6)</li> <li>• IPv6 over IPv4 Tunnels</li> </ul>	SPRXXXX.bin	ICX7450-PREM-LIC-SW	N/A

1 Basic Layer 3 functionality is available in an FSX router image that does not require a license.

2 Third generation only

The following table lists the supported software packages.

**TABLE 11** Software packages

Product	Software package name	License needed?
FCX	BASE_SOFT_PACKAGE	No
	FCX_FULL_ROUTER_SOFT_PACKAGE	No
	FCX_ADV_ROUTER_SOFT_PACKAGE	Yes
ICX 6610	ICX6610_BASE_ROUTER_SOFT_PACKAGE	No
	ICX6610_PREM_ROUTER_SOFT_PACKAGE	Yes
	ICX6610_ADV_ROUTER_SOFT_PACKAGE	Yes
ICX 6450	ICX6450_BASE_ROUTER_SOFT_PACKAGE	No
	ICX6450_PREM_ROUTER_SOFT_PACKAGE	Yes
ICX 6650	ICX6650_L3_SOFT_PACKAGE	No
FSX 800, FSX 1600	BASE_SOFT_PACKAGE	No
	SX_V4_HW_BASE_L3_SOFT_PACKAGE	No <sup>1</sup>
	SX_V4_HW_ROUTER_SOFT_PACKAGE	Yes
	SX_V6_HW_BASE_L3_SOFT_PACKAGE	No <sup>1</sup>
	SX_V6_HW_ROUTER_IPV4_SOFT_PACKAGE	Yes
	SX_V6_HW_ROUTER_IPV6_SOFT_PACKAGE	Yes
ICX 7450		
ICX7450_L3_SOFT_PACKAGE	Yes	
ICX 7750		
ICX7750_L3_SOFT_PACKAGE	No	

<sup>1</sup> Basic Layer 3 functionality is available in an FSX router image that does not require a license.

## FastIron Licensed Features

FastIron features or features sets require that you have a license to use them. Software licenses can be purchased to enable you to use these features or feature sets. Each license has its own part number.

Some FastIron devices come with pre-installed feature licenses. For devices that do not have pre-installed licenses, you can purchase licenses separately for the features or feature sets you want to use.

FastIron feature licenses are available for the following products:

- ICX 6610 (see [ICX 6610 Licensed Features](#) on page 69)
- ICX 6450 and ICX 6450C (see [ICX 6450 and ICX 6450C Licensed Features](#) on page 71)
- FCX (see [FCX Licensed Features](#) on page 72)
- ICX 6650 (see [ICX 6650 Licensed Features](#) on page 73)
- FSX 800 and FSX 1600 (see [FSX 800 and FSX 1600 Licensed Features](#) on page 73)
- ICX 7450 (see [ICX 7450 Licensed Features](#) on page 75)
- ICX 7250 (see [ICX 7250 Licensed Features](#) on page 75)

### NOTE

Premium Layer 3 licenses are supported only on Layer 3 devices. Premium Layer 3 licenses are not supported on Layer 2 devices.

**NOTE**

FastIron software packages are available for each of the different products. Some of the software packages require licenses. For information about licensing for these software packages, see [FastIron Licensed Software](#) on page 77.

## ICX 6610 Licensed Features

The ICX 6610 device supports the use of licensed FastIron features or feature sets.

The following feature licenses are available for the ICX 6610 device:

- Premium Layer 3 license
- Ports on Demand license
- MACSec license

### Premium Layer 3 license

This license enables you to use the following features or feature sets:

- BGP4
- BGP4+
- GRE
- IPv6 static routing
- IPv6 unicast routing
- IPv6 over IPv4 tunnels
- OSPF v2
- OSPF v3
- PIM-DM
- PIM-SM
- PIM-SSM
- PIM passive
- PBR
- RIPng
- VRRP
- VRRP v3 for IPv6
- VRRP-E
- VRRP-E for IPv6
- VRF-Lite

The following table lists the name of the image file for the feature or feature set, and the part numbers for this license.

Image file name	License name	Hardware with pre-installed software license
FCXRxxxx.bin	ICX6610-PREM-LIC-SW	ICX 6610-24-PE
Basic Layer 3 functionality is available in an ICX 6610 router image that does not require a license.	ICX6610-ADV-LIC	ICX 6610-24-PI
	ICX6610-ADV-UPG-LIC	ICX 6610-24P-PE
	ICX6610-PREM-LIC	ICX 661X0-24P-PI

Image file name	License name	Hardware with pre-installed software license
		ICX 6610-24F-PE ICX 6610-24F-PI ICX 6610-48-PE ICX 6610-48-PI ICX 6610-48P-PE ICX 6610-48P-PI

### Affect of upgrades and downgrades on licensed features

If you decide to change the version of your FastIron software, there are two types of changes that can affect the available of licensed features on ICX 6610 devices. The types of changes are:

- Upgrading from an earlier version of FastIron to version 08.0.30 or later.
- Downgrading from version 08.0.30 or later of FastIron to an earlier version.

The following table lists the impact of these upgrades and downgrades to the availability of licensed ICX 6610 features.

Type of change	Previous license	Current license	Affect on licensed features
Upgrade	Premium (previous to 08.0.30)	Premium (08.0.30 or later)	After upgrade, all licensed features are available (including those that were designated in previous releases as advance features). The features gained are: <ul style="list-style-type: none"> <li>• BGP4</li> <li>• BGP4+</li> <li>• GRE</li> <li>• IPv6 over IPv4 tunnels</li> <li>• VRF-Lite</li> </ul> <p><b>NOTE</b> To ensure stacking election and operation is not affected, make sure you configure the advance features after the upgrade.</p>
Upgrade	Advance (previous to 08.0.30)	Premium (08.0.30 or later)	No impact to the availability of licensed features or to stacking functionality.
Downgrade	Premium (08.0.30 or later)	Premium (previous to 08.0.30)	<p><b>NOTE</b> To prevent the loss of configuration settings, install the old advance license prior to the downgrade.</p> After downgrade, all features that were designated in previous releases as advance features are lost. The features lost are: <ul style="list-style-type: none"> <li>• BGP4</li> </ul>

Type of change	Previous license	Current license	Affect on licensed features
			<ul style="list-style-type: none"> <li>BGP4+</li> <li>GRE</li> <li>IPv6 over IPv4 tunnels</li> <li>VRF-Lite</li> </ul> <p>You may encounter some parser errors while rebooting the system (this should be a one-time event).</p>
Downgrade	Premium (08.0.30 or later)	Advance (previous to 08.0.30)	No impact to the availability of licensed features or to stacking functionality.

### Ports on Demand license

This license enables you to increase the uplink capacity of the ICX 6610 from 1 Gbps to 10 Gbps port speed (1G is the default port speed). The port capacities for this license are 4 ports or 8 ports.

The following table lists the name of the image file for the feature or feature set, and the part numbers for this license.

Image file name	License name	Hardware with pre-installed software license
<ul style="list-style-type: none"> <li>FCXSxxx.bin</li> <li>FCXRxxx.bin</li> </ul>	ICX6610-10G-LIC-POD	Sold separately. To purchase this license, contact your Brocade representative.

For more information about Ports on Demand licensing, see [Ports on Demand \(PoD\) Licensing](#) on page 35.

### MACSec license

This license enables MACSec functionality for any 10 Gbps port on an ICX 6610 device. A license is required for each device on which you want to enable MACSec functionality. The MACSec license can be purchased for any ICX 6610 device.

The following table lists the name of the image file for the feature or feature set, and the part numbers for this license.

Image file name	License name	Hardware with pre-installed software license
<ul style="list-style-type: none"> <li>FCXSxxx.bin</li> <li>FCXRxxx.bin</li> </ul>	ICX-MACSEC-LIC	Sold separately per device. To purchase this license, contact your Brocade representative.

For more information MACSec licensing, see [MACSec licensing](#) on page 53.

## ICX 6450 and ICX 6450C Licensed Features

The ICX 6450 and ICX 6450C devices support the use of licensed FastIron features or feature sets.

### Premium Layer 3 license

This license is available for the ICX 6450 and ICX 6450C devices. It enables you to use the following features or feature sets:

- IPv4 OSPF v2 (ICX 6450 only)
- IPv4 OSPF v3 (ICX 6450 only)
- RIP v1, v2 (ICX 6450 only)

- RIPng (ICX 6450 only)
- VRRP (ICX 6450 and ICX 6450C)
- VRRP-E (ICX 6450 and ICX 6450C)
- GRE (ICX 6450 and ICX 6450C)

Image file name	License name	Hardware with pre-installed software license
ICX64Rxxxx.bin Basic Layer 3 functionality is available in an ICX 6450 router image that does not require a license.	ICX6450-PREM-LIC-SW	Sold separately. To purchase this license, contact your Brocade representative.

### Ports on Demand license

This license is available for the ICX 6450 device (it is not supported by the ICX 6450C device. It enables enable ports 2 and 4 to 10 Gbps port speed (without this license, these ports are by default in an error disabled state at boot-up).

Image file name	License name	Hardware with pre-installed software license
<ul style="list-style-type: none"> <li>• ICX64Rxxxx.bin</li> <li>• ICX64Sxxxx.bin</li> </ul>	ICX6450-10G-LIC-POD	Sold separately. To purchase this license, contact your Brocade representative.

For more information about Ports on Demand licensing, see [Ports on Demand \(PoD\) Licensing](#) on page 35.

## FCX Licensed Features

The FCX device supports the use of licensed FastIron features or feature sets.

### Advance Layer 3 license

This license enables you to use the following features or feature sets:

- BGP
- BGP4+
- GRE
- IPv6 over IPv4 tunnels

Image file name	License name	Hardware with pre-installed software license
FCXRxxxx.bin Basic Layer 3 functionality is available in an FCX router image that does not require a license.	FCX-ADV-LIC-SW	FCX624S-F-ADV FCX648-E-ADV FCX648-I-ADV FCX648S-ADV FCX648S-HPOE-ADV



## ICX 6650 Licensed Features

The ICX 6650 device supports the use of licensed FastIron features or feature sets.

### Ports on Demand license for 10 GbE

This license enables front panel ports 1/1/33 to 1/1/56 for 10 GbE port speed. One license can be used to enable eight ports. Without this license, front panel ports are in an error disabled state.

Image file name	License name	Hardware with pre-installed software license
<ul style="list-style-type: none"> <li>ICXRxxxx.bin</li> <li>ICXSxxxx.bin</li> </ul>	ICX6650-10G-LIC-POD  One license can be used to enable eight ports. You need three copies of the license to enable all front-panel ports.	ICX6650-8P10G-POD  One license can be used to enable eight ports. You need three copies of the same license to enable all front-panel ports. <ul style="list-style-type: none"> <li>8 port capacity = 1 license. Enables ports 1/1/33 -1/1/40.</li> <li>16 port capacity = 2 licenses. Enables ports 1/1/33 - /1/1/48.</li> <li>24 port capacity = 3 licenses. Enables ports 1/1/33- 1/1/56.</li> </ul>

### Ports on Demand license for 40 GbE

This license enables rear panel ports 1/2/1 through 1/2/4 for 40 GbE port speed (ports 1/3/1 through 1/3/8 are enabled at 10 GbE port speed). Without this license, rear panel ports are in an error-disabled state.

Image file name	License name	Hardware with pre-installed software license
<ul style="list-style-type: none"> <li>ICXRxxxxx.bin</li> <li>ICXSxxxxx.bin</li> </ul>	ICX6650-40G-LIC-POD  The different capacity licenses are: <ul style="list-style-type: none"> <li>ICX6650-2P40G-LIC-POD</li> <li>ICX6650-8P10G-LIC-POD</li> <li>ICX6650-24P10G-LIC-POD</li> <li>ICX6650-16P10G-LIC-POD</li> <li>ICX6650-6P40G-LIC-POD</li> </ul> The port count is specified in each SKU.	ICX6650-2P40G-POD  One license can be used to enable 2 ports. You need three copies of the same license to enable all rear panel ports. <ul style="list-style-type: none"> <li>2 port capacity = 1 license. Enables one group of ports.</li> <li>4 port capacity = 2 licenses. Enables two groups of ports.</li> <li>6 port capacity = 3 licenses. Enables all three groups of ports.</li> </ul>

For more information about Ports on Demand licensing, see [Ports on Demand \(PoD\) Licensing](#) on page 35.

## FSX 800 and FSX 1600 Licensed Features

The FSX 800 and FSX 1600 devices support the use of licensed FastIron features or feature sets.

### IPv4 and IPv6 PREM Layer 3 license (XL management modules)

This license enables you to use the following features or feature sets:

- BGP
- BGP4+

- IPv6 Layer 3 forwarding
- IPv6 over IPv4 tunnels in hardware
- IPv6 redistribution
- IPv6 static routes
- RIPng
- IPv6 VRRPv3
- IPv6 over GRE
- IPv6 PIM-DM (third generation only)
- IPv6 PIM-SM (third generation only)
- IPv6 PIM passive (third generation only)
- IPv6 PIM SSM (third generation only)
- IPv6 Policy-based routing (third generation only)
- IPv6 over IPv4 tunnels
- 6,000 active host routes
- OSPF v2
- OSPF v3
- Anycast RP
- DVMRP V2
- IGMP V1, V2, and V3
- ICMP redirect messages
- IGMP V3 fast leave (for routing)
- MSDP
- PIM-DM
- PIM-SM
- PIM passive
- PIM SSM
- Policy-based routing
- VRRP-E
- GRE
- Multicast over GRE
- IPv4 over GRE
- Multi-VRF

Image file name	License name	Hardware with pre-installed software license
SXLRxxxxx.bin (full Layer 3)	SX-FIL3U-6-IPV6	SX-FI-ZMR-XL SX-FI-ZMR-XL-PREM6 SX-FIZMRXL6 SX-FI2XGMRXL6

## ICX 7250 Licensed Features

The ICX 7250 device supports the use of licensed FastIron features or feature sets.

The following feature licenses are available for the ICX 7250 device:

- Premium Layer 3 (non-node locked license)
- Ports on Demand (PoD) license

### Premium Layer 3 (non-node locked license)

This license enables you to use the following features or feature sets:

- OSPF v2
- RIP v1/v2
- VRRP
- VRRP-E
- GRE
- IPv6 over IPv4 Tunnels

#### NOTE

You can enable the licensed features prior to purchasing the license and you can move the license from one device and re-deploy it on another device within the same product platform.

Image file name	License name	Hardware with pre-installed software license
SPRXXXX.bin	ICX7250-PREM-LIC-SW	Sold separately. To purchase this license, contact your Brocade representative.

For more information about non-node locked licenses, see [Non-Node Locked Licensing](#) on page 57.

### Ports on Demand license (upgrading ports from 1G to 10G port speed)

This license upgrades 1G ports to 10G port speed (1G is the default port speed). The port capacities for this license are 2 ports or 8 ports.

Image file name	License name	Hardware with pre-installed software license
<ul style="list-style-type: none"> <li>• SPRxxxx.bin</li> <li>• SPSxxxx.bin</li> </ul>	ICX7250-10G-LIC-POD	<ul style="list-style-type: none"> <li>• 2 port capacity = 1 license (enables ports 1/2/1 and 1/2/3).</li> <li>• 8 port capacity = 1 license (enables ports 1/2/1 to 1/2/8).</li> </ul>

For more information upgrading 1G ports to 10G for this device, see [Ports on Demand Licensing on the ICX 7250](#) on page 50.

## ICX 7450 Licensed Features

The ICX 7450 device supports the use of licensed FastIron features or feature sets.

The following feature licenses are available for the ICX 7450 device:

- Premium Layer 3 (non-node locked license)
- MACSec license

### Premium Layer 3 (non-node locked license)

This license enables you to use the following features or feature sets:

- OSPF v2
- OSPF v3 (IPv6)
- RIP v1/v2
- RIPng (IPv6)
- VRRP
- VRRPv3 (IPv6)
- VRRP-E
- GRE
- PBR
- PIM-SM, PIM-SSM, PIM-DM
- PIM Passive
- BGP, BGP4+ (IPv6)
- VRF (IPv4 and IPv6)
- IPv6 over IPv4 Tunnels

#### NOTE

You can enable the licensed features prior to purchasing the license and you can move the license from one device and re-deploy it on another device within the same product platform.

Image file name	License name	Hardware with pre-installed software license
SPRXXXX.bin	ICX7450-PREM-LIC-SW	N/A

For more information about non-node locked licenses, see [Non-Node Locked Licensing](#) on page 57.

### MACSec license

This license enables MACSec functionality for any 10 Gbps port on an ICX 7450 device. A license is required for each device on which you want to enable MACSec functionality. The MACSec license can be purchased for any ICX 7450 device.

The following table lists the name of the image file for the feature or feature set, and the part numbers for this license.

Image file name	License name	Hardware with pre-installed software license
<ul style="list-style-type: none"> <li>• SPRxxxx.bin</li> <li>• SPRSxxxx.bin</li> </ul>	ICX-MACSEC-LIC	Sold separately per device. To purchase this license, contact your Brocade representative.

For more information MACSec licensing, see [MACSec licensing](#) on page 53.

## FastIron Licensed Software

Each FastIron product (like the ICX 6610, FCX, or ICX 7250) supports one or more FastIron software packages. Some of the software packages require a license, and others do not.

The following table lists the software packages supported by each of the FastIron products, and whether a license is required to use a particular software package.

Product	Software package name	Licensed needed?
FCX	BASE_SOFT_PACKAGE	No
	FCX_FULL_ROUTER_SOFT_PACKAGE	No
	FCX_ADV_ROUTER_SOFT_PACKAGE	Yes
ICX 6610	ICX6610_BASE_ROUTER_SOFT_PACKAGE	No
	ICX6610_PREM_ROUTER_SOFT_PACKAGE	Yes
	ICX6610_ADV_ROUTER_SOFT_PACKAGE	Yes
ICX 6450	ICX6450_BASE_ROUTER_SOFT_PACKAGE	No
	ICX6450_PREM_ROUTER_SOFT_PACKAGE	Yes
ICX 6650	ICX6650_L3_SOFT_PACKAGE	No
FSX 800, FSX 1600	BASE_SOFT_PACKAGE	No
	SX_V4_HW_BASE_L3_SOFT_PACKAGE	No Basic Layer 3 functionality is available in an FSX router image that does not require a license.
	SX_V4_HW_ROUTER_SOFT_PACKAGE	Yes
	SX_V6_HW_BASE_L3_SOFT_PACKAGE	No Basic Layer 3 functionality is available in an FSX router image that does not require a license.
	SX_V6_HW_ROUTER_IPV4_SOFT_PACKAGE	Yes
	SX_V6_HW_ROUTER_IPV6_SOFT_PACKAGE	Yes
ICX 7250	ICX7250_L3_SOFT_PACKAGE	Yes
ICX 7450	ICX7450_L3_SOFT_PACKAGE	Yes
ICX 7750	ICX7750_L3_SOFT_PACKAGE	No

For information about software licensing for FastIron products, see [FastIron Licensed Features](#) on page 68.



# Appendix B: FastIron Non-Licensed Features

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This appendix lists the FastIron software images that do not require a license to run on the device.

**TABLE 12** Software image files that do not require a license

Product	Image filename
ICX 7250	SPSXXXX.bin
ICX 7450	SPSXXXX.bin
ICX 7750	SWSXXXX.bin SWRXXXX.bin

For a list of features supported with these images, refer to the release notes.