Ruckus FastIron Software Licensing Guide, 08.0.61

Supporting FastIron Software Release 08.0.61

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Document Conventions

The following tables list the text and notice conventions that are used throughout this guide.

TABLE 1 Text conventions

Convention	Description	Example
`monospace`	Identifies command syntax examples.	`device(config)# interface ethernet 1/1/6`
bold	User interface (UI) components such as screen or page names, keyboard keys, software buttons, and field names	On the **Start** menu, click **All Programs**.
italics	Publication titles	Refer to the *Ruckus Small Cell Release Notes* for more information

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.

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.

Command Syntax Conventions

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

Convention	Description
bold text	Identifies command names, keywords, and command options.
italic text	Identifies a variable.
[ ]	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.
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, *member*[*member*...].
\	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.

Document Feedback

Ruckus is interested in improving its documentation and welcomes your comments and suggestions.

You can email your comments to Ruckus at: docs@ruckuswireless.com

When contacting us, please include the following information:

- Document title and release number
- Document part number (on the cover page)
- Page number (if appropriate)
- For example:
  - Ruckus Small Cell Alarms Guide SC Release 1.3
  - Part number: 800-71306-001
  - Page 88

Ruckus Product Documentation Resources

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

Release Notes and other user documentation are available at https://support.ruckuswireless.com/documents. You can locate documentation by product or perform a text search. Access to Release Notes requires an active support contract and Ruckus Support Portal user account. Other technical documentation content is available without logging into the Ruckus Support Portal.

White papers, data sheets, and other product documentation are available at https://www.ruckuswireless.com.

Online Training Resources

To access a variety of online Ruckus training modules, including free introductory courses to wireless networking essentials, site surveys, and Ruckus products, visit the Ruckus Training Portal at https://training.ruckuswireless.com.

Contacting Ruckus Customer Services and Support

The Customer Services and Support (CSS) organization is available to provide assistance to customers with active warranties on their Ruckus Networks products, and customers and partners with active support contracts.

For product support information and details on contacting the Support Team, go directly to the Support Portal using https://support.ruckuswireless.com, or go to https://www.ruckuswireless.com and select **Support**.

What Support Do I Need?

Technical issues are usually described in terms of priority (or severity). To determine if you need to call and open a case or access the self-service resources use the following criteria:

- Priority 1 (P1)—Critical. Network or service is down and business is impacted. No known workaround. Go to the **Open a Case** section.
- Priority 2 (P2)—High. Network or service is impacted, but not down. Business impact may be high. Workaround may be available. Go to the **Open a Case** section.
- Priority 3 (P3)—Medium. Network or service is moderately impacted, but most business remains functional. Go to the **Self-Service Resources** section.
- Priority 4 (P4)—Low. Request for information, product documentation, or product enhancements. Go to the **Self-Service Resources** section.

Open a Case

When your entire network is down (P1), or severely impacted (P2), call the appropriate telephone number listed below to get help:

- Continental United States: 1-855-782-5871
- Canada: 1-855-782-5871
- Europe, Middle East, Africa, and Asia Pacific, toll-free numbers are available at https://support.ruckuswireless.com/contact-us and Live Chat is also available.

Self-Service Resources

The Support Portal at https://support.ruckuswireless.com/contact-us offers a number of tools to help you to research and resolve problems with your Ruckus products, including:

- Technical Documentation—https://support.ruckuswireless.com/documents
- Community Forums—https://forums.ruckuswireless.com/ruckuswireless/categories
- Knowledge Base Articles—https://support.ruckuswireless.com/answers

- Software Downloads and Release Notes—https://support.ruckuswireless.com/software
- Security Bulletins—https://support.ruckuswireless.com/security

Using these resources will help you to resolve some issues, and will provide TAC with additional data from your troubleshooting analysis if you still require assistance through a support case or RMA. If you still require help, open and manage your case at https://support.ruckuswireless.com/case_management

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Supported hardware

This guide supports the following product families from Ruckus:

- Ruckus ICX 7150 Series
- Ruckus ICX 7250 Series
- Ruckus ICX 7450 Series
- Ruckus 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.

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 *Ruckus 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 08.0.61.

TABLE 2 Summary of enhancements in FastIron release 08.0.61

Feature	Description	Described in
Stacking support on Ruckus ICX 7150 devices	10-Gbps licenses support stacking on Ruckus ICX 7150 devices.	For more information, refer to Ruckus ICX 7150 Licensed Features on page 48 and Licensing on the Ruckus ICX 7150 on page 41.

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How software licensing works

Software licensing provides increased scalability and rapid deployment of hardware and software features on the supported Ruckus family of switches. One or more valid software licenses are required to run licensed features on the device.

A permanent license (for select features on specific units) can be ordered pre-installed in a Ruckus 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 Ruckus as proof of purchase. The transaction key and license ID (LID) of the Ruckus device are used to generate a license key from the Ruckus 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 Ruckus device.

Once a license is installed on the Ruckus 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.

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 35 for details.

Software licensing terminology

The following terms are used in this document:

- Entitlement certificate—The proof-of-purchase certificate (*paperpack or e-license*) issued by Ruckus when a license is purchased. The certificate contains a unique transaction key that is used in conjunction with the license ID (LID) of the Ruckus device to generate and download a software license from the Ruckus software portal.
- License file—The file produced by the Ruckus software portal when the license is generated. The file is uploaded to the Ruckus device and controls access to a licensed feature or feature set.
- License ID (LID)—The identification number that uniquely identifies the Ruckus device. The LID is used in conjunction with a transaction key to generate and download a software license from the Ruckus software portal. The software license is tied to the LID of the Ruckus device for which the license was ordered and generated.

  NOTE
  The License ID is not applicable for non-node locked licenses.

- 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 Ruckus software portal. The transaction key is issued by Ruckus 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 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 serial number of the Ruckus device for which the license was ordered and generated.

NOTE

Trial premium licenses are built into the Ruckus ICX 7450 and Ruckus ICX 7250 devices. Enabling any premium layer 3 feature will activate a 45-day trial period which will require the user to accept the Ruckus terms and conditions of use.

ICX 7750 Certificate of Entitlement

The Ruckus ICX 7750 base system ships with a Certificate of Entitlement (CoE). You must purchase the CoE (ICX7750-L3-COE) to use the full base Layer 3 Premium feature set and functionality.

You do not need to load a license onto the switch to use the full Layer 3 Premium feature set. The purchase of the CoE gives entitlement for the use of the full feature set and functionality. The CoE can be transferred between switches. You must first disable the features on the switch you want to transfer the CoE to. Once the features are disabled, you can transfer the CoE to the switch.

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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 Ruckus device. Perform the tasks in the order as given in the following list.

Following are the configuration tasks for software licensing:

1. Order the desired license.
2. Retrieve the LID of the Ruckus device after you receive the transaction key. If the transaction key is received by way of paperpack, record the LID on the entitlement certificate in the space provided.
3. Log in to the Ruckus software portal (https://support.ruckuswireless.com) to generate and obtain the license file.
4. Upload the license file to the Ruckus device.
5. Verify that the license is installed.

Generating a license

You must generate your software license from the Ruckus Support portal and upload it to your device.

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

You need the following:

- Activation Code.
- Serial number of the device.
- Support account.

1. Order a license.

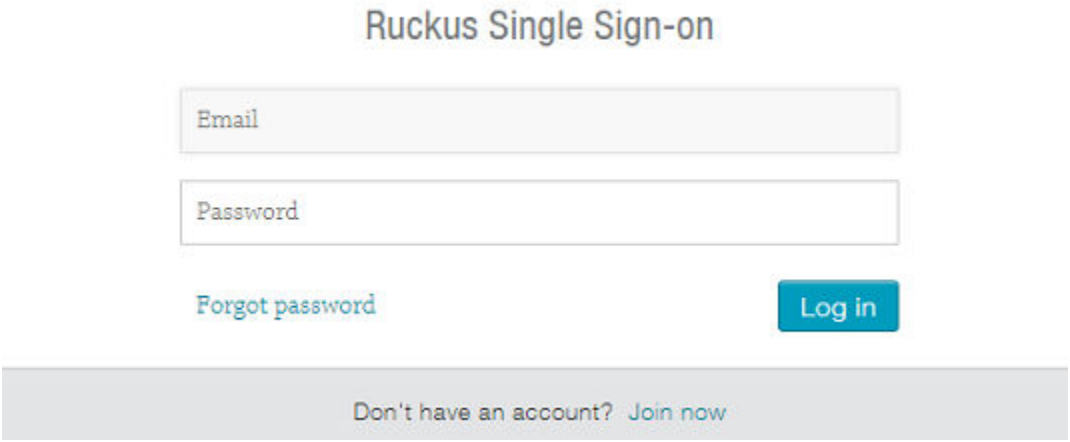
   You receive the license Activation Code in the form of an e-mail. When you receive the Activation Code, retrieve the serial number of your Ruckus device by entering the **show version** command on the device.

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

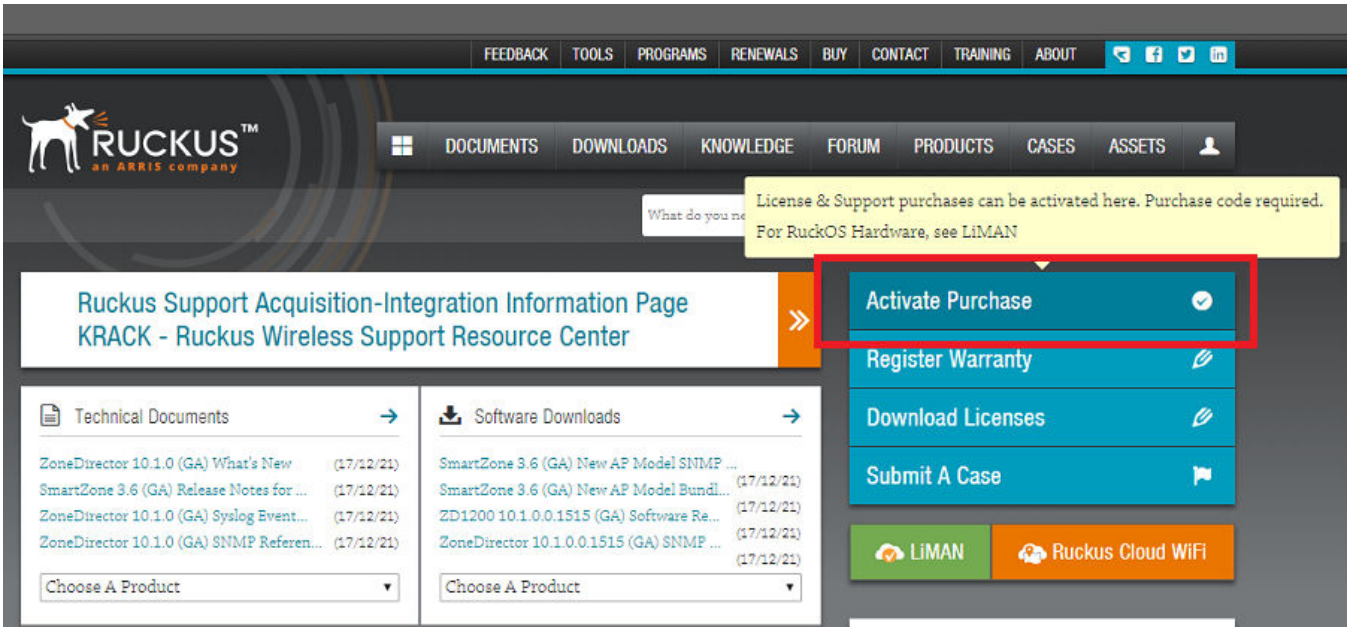
   NOTE
   Do not delete the e-mail with the electronic Activation Code. in case it is needed for technical support or product replacement (RMAs).

2. Click on the Activation Code link in the -email or log in to the Ruckus support portal at https://support.ruckuswireless.com.

FIGURE 1 Logging on to the Ruckus support portal



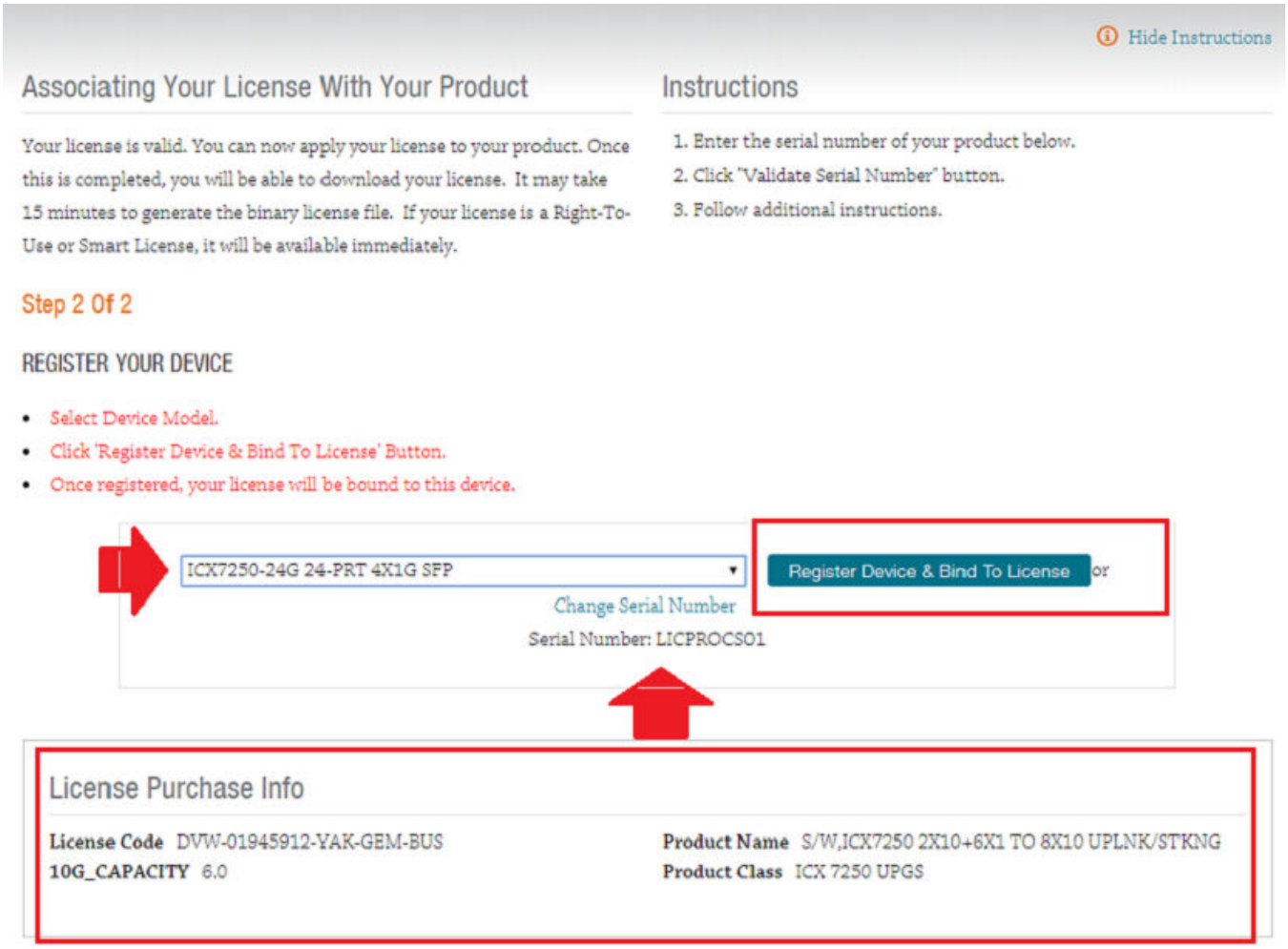
3. Enter your e-mail address and password, and click **Log in**. If you do not have an account, click **Join now** and follow the instructions.
4. Click **Activate Purchase**.



5. Enter your Activation Code received by e-mail and click **Validate**.
6. Accept the terms and conditions. Click **Activate Purchase**.

7. Enter the Serial Number of the device. Click **Validate Serial Number**. The device information appears. Review the device information.
   - If the information is correct, click **Bind License To Device**.
   - If the information is incorrect, click **Change Serial Number**. Re-enter the Serial Number of the device.

FIGURE 2 Reviewing Device Information



If you selected **Validate Serial Number**, the **Pending License** status appears. The **Pending License** status can remain for up to 30 minutes.

8. Once the license is available, the **Pending License** status changes to **Download License**. Click **Download License** to download the XML license file to your PC.

FIGURE 3 Downloading your license



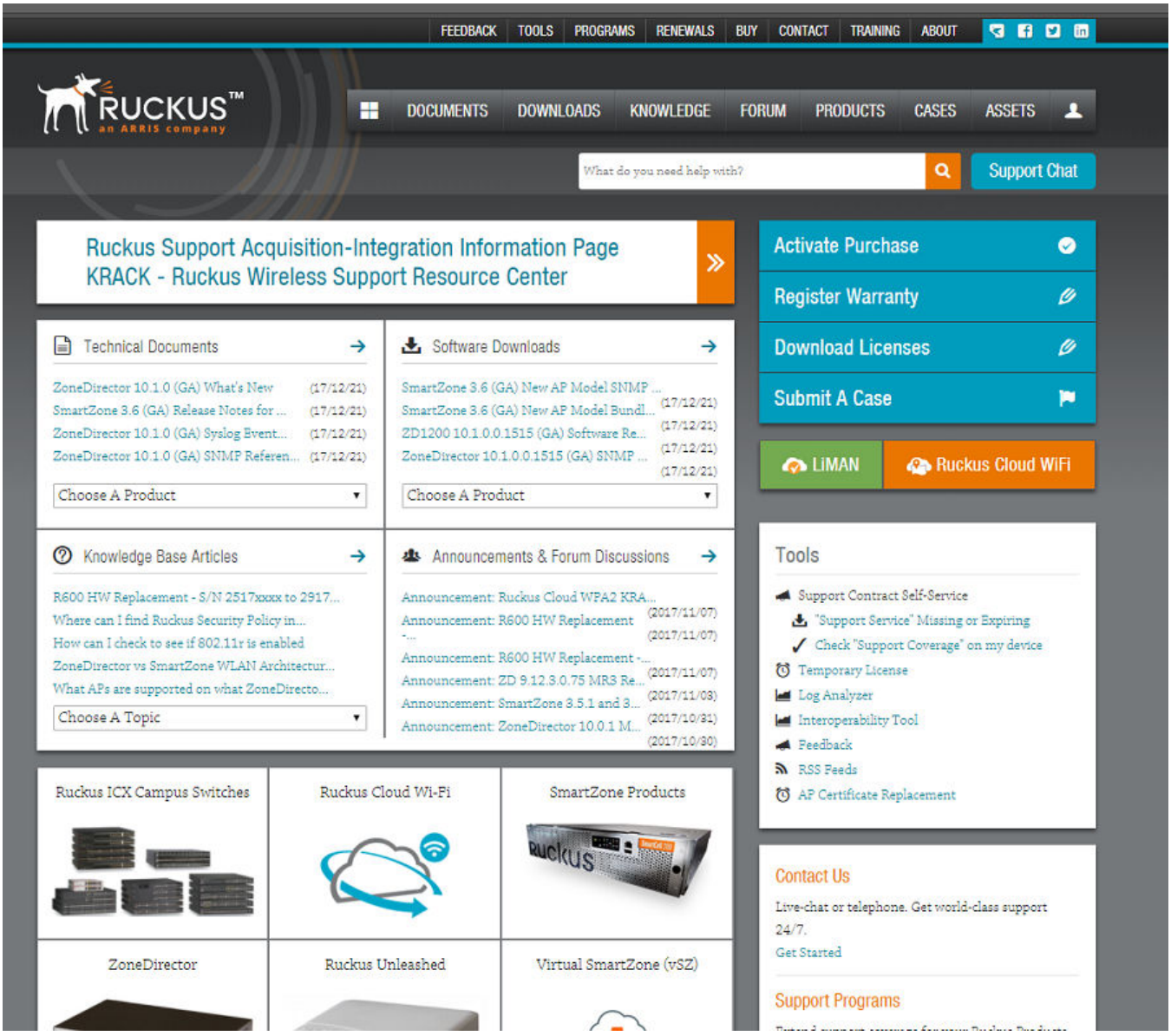
9. Upload the license file to the Ruckus device.

Querying a license

To view software license information for a particular product, you can use the License Query option with an Activation Code or serial number.

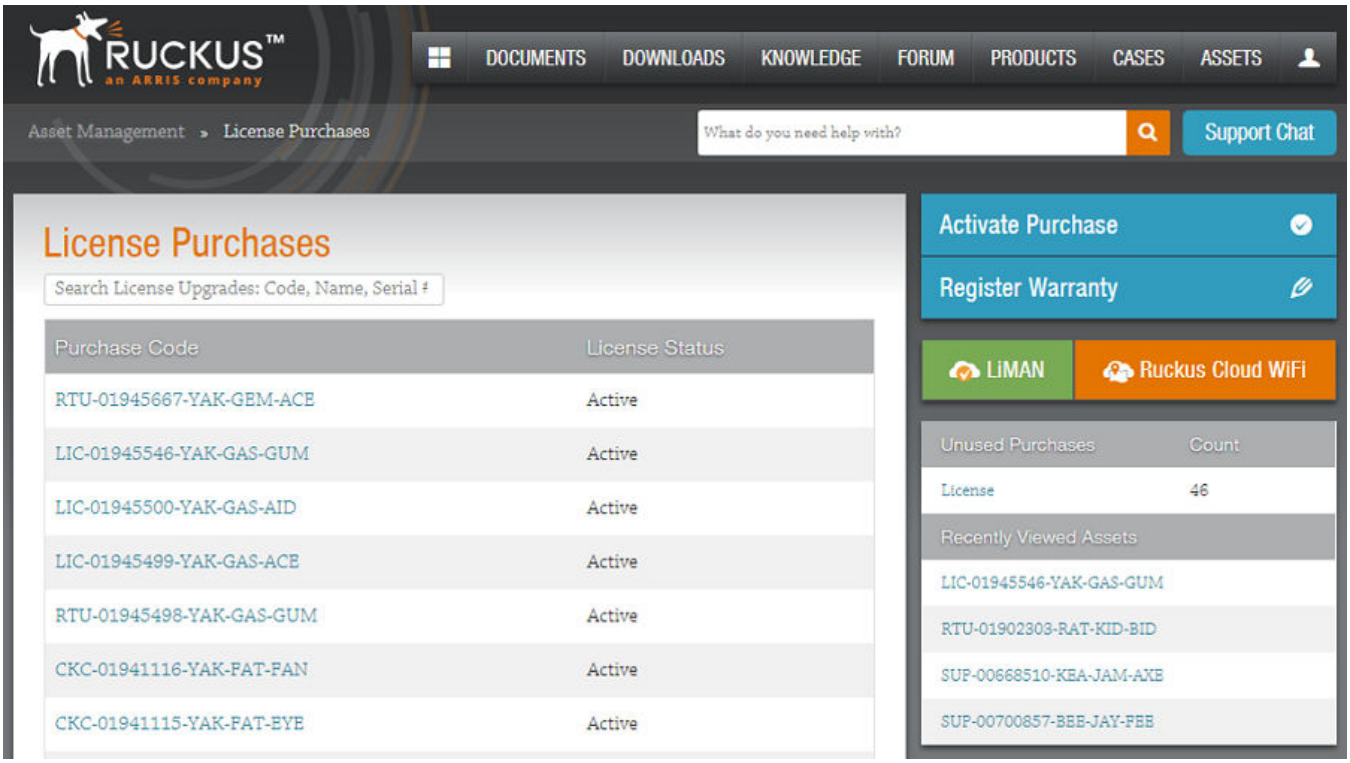
1. To view software license information, go to https://support.ruckuswireless.com//. The Support window appears.

FIGURE 4 Support page



2. Select **Download Licenses**.

3. Search for your license using either your Activation Code or Serial Number.



4. 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 code
   - License
   - Created date
   - Capacity
   - Customer name
   - Description

   If the query is performed before the Activation Code 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.
5. Click **more** or **less** in **ID value** to view the serial number.
6. Click the **License** hyperlink to download the license information.
7. Click **Export to Excel** to download the report for sharing or archiving purposes, or Click **Search Another Unit** to query another product.

Installing a license using TFTP

The following procedure shows how to download a license file from a TFTP server and install the license on a device.

Obtain the license file from Ruckus. After obtaining a license, use the following commands to install and verify the license installation.

1. Use TFTP to copy the license file from a TFTP server to the license database of the device.

```
device# copy tftp license 10.120.54.185 lic.xml unit 1
```

   For units that are part of a stack, you can copy a license file from the active controller unit to all other member units by referencing their stack unit ID. You do not have to physically disable the stack to install a license for each unit.

2. Use the **show license** command to verify that the license is installed on the device.

```
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 EN0E5FDBC90 Normal Active Unlimited 1
Stack unit 2:
1   Non-Node Lock ICX7450-PREM-LIC-SW EN0DD67E7C0 Normal Active Unlimited 1
```

   Some column names in the output are condensed to keep the output from breaking across lines. For example, Idx is Index, L/Type is License Type, and LCap is License Capacity.

The following example shows how to install a license in a Campus Fabric (SPX) system.

In a SPX system, enter the **copy tftp license** command from the control bridge (the ICX 7750 active controller unit) to the ICX 7250 PE unit. The PE unit range is from 17 - 56.

```
device# copy tftp license 10.120.54.185 lic.xml unit 17
device# show license unit 17

Idx Lic Mode      Lic Name            LID/Serial  Lic Type Status Lic Period LCap
Stack unit 17:
1   Node Lock ICX7250-10G-LIC-POD EN0DD67E7C0 Normal   Active Unlimited  2
```

Installing a license using Secure Copy

Download a license file from an SCP-enabled client to the license database and install the license.

Obtain the license file.

SSH and Secure Copy (SCP) must be enabled on the device before this task can be performed.

After obtaining a license, use the following commands to install and verify the license installation.

1. Use Secure Copy to copy the license file from an SCP-enabled client to the license database of the device.

```
device# scp license.xml marketing@10.20.91.39:license:1
```

   For units that are part of a stack, 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.

2. Use the **show license** command to verify that the license is installed on the device.

```
device# show license

Idx Lic Mode      Lic Name            Lid/Serial  L/Type Status L/Period LCap
Stack unit 1:
1   Node Lock     ICX7250-10G-LIC-POD fwpIHJKmFFt Normal Active Unlimited 8
2   Non-Node Lock ICX7250-PREM-LIC-SW EN000606F58 Normal Active Unlimited 1
Stack unit 11:
1   Node Lock     ICX7250-10G-LIC-POD fwpIHJKmFGc Normal Active Unlimited 8
2   Non-Node Lock ICX7250-PREM-LIC-SW EN04FCF6250 Normal Active Unlimited 1
```

Note that we have had to condense some column names in the output to keep the output from breaking across lines. For example, Idx is Index, L/Type is License Type, and LCap is License Capacity.

The following example shows how to install a license for an ICX stack.

```
device# scp license.xml marketing@10.20.91.39:license:11
device# show license unit 11
Idx Lic Mode      Lic Name            Lid/Serial  Lic Type Status Lic Period LCap
Stack unit 11:
1   Node Lock     ICX7250-10G-LIC-POD fwpIHJKmFGc Normal   Active Unlimited  8
2   Non-Node Lock ICX7250-PREM-LIC-SW EN04FCF6250 Normal   Active Unlimited  8
```

Viewing the serial number

Ruckus 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) 2017 Ruckus Wireless. All rights reserved.
    UNIT 1: compiled on Jul 31 2015 at 02:17:35 labeled as SWR08050b375
      (31547588 bytes) from Primary SWR08050b375.bin
        SW: Version 08.0.50b375T203
      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 database

NOTE
The **show license** command can be used to display software license information for the ICX 7250 and ICX 7450 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.

NOTE
Some column names are condensed in the output to keep the output from breaking across lines. For example, Idx is Index, L/Type is License Type, and LCap is License Capacity.

```
device# show license
Idx Lic Mode      Lic Name            lid/Serial  Lic Type Status Lic Period LCap
Stack unit 1:
1   Non-Node Lock ICX7450-PREM-LIC-SW EN0E5FDBC90 Normal   Active Unlimited  1
Stack unit 2:
1   Non-Node Lock ICX7450-PREM-LIC-SW EN0DD67E7C0 Normal   Active Unlimited  1
```

To display software license information on an ICX 7250 device, enter the following command. In the following example, the premium and PoD licenses are installed on stack unit 1, and on stack unit 11 only the premium license is installed.

```
device# show license
Idx Lic Mode      Lic Name            lid/Serial  Lic Type Status Lic Period LCap
Stack unit 1:
1   Node Lock     ICX7250-10G-LIC-POD fwpIHJKmFFt Normal   Active Unlimited  8
2   Non-Node Lock ICX7250-PREM-LIC-SW EN000606F58 Normal   Active Unlimited  1
Stack unit 11:
1   Non-Node Lock ICX7250-PREM-LIC-SW EN04FCF6250 Normal   Active Unlimited  1
```

To display specific software license information installed on an ICX 7250 device, enter the following command.

```
device# show license unit 11 index 1
License information for unit 11 license <1>:
        +license mode:        Node Lock
        +license name:        ICX7250-10G-LIC-POD
        +lid:                 fwpIHJKmFGc
        +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 7250 device, enter the following command. In the following output example, the ICX premium license, and the PoD license are installed on unit **1.**

```
device# show license unit 1
Idx Lic Mode      Lic Name            lid/Serial  Lic Type Status Lic Period LCap
Stack unit 11:
1   Node Lock     ICX7250-10G-LIC-POD fwpIHJKmFFt Normal   Active Unlimited  8
2   Non-Node Lock ICX7250-PREM-LIC-SW EN000606F58 Normal   Active Unlimited  1
```

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

The **unit** *unit_id* parameter specifies the unit ID number. The unit ID number is available only on ICX devices.

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

TABLE 3 Output from the show license unit command

Output field	Description
Index	The index number specifies the software license file for a specific stack. The index number is generated by the member unit.
LID	The license ID. This number is embedded in the device.
Lic Mode	Indicates whether the license is a non-node-locked license or node-locked license.
License name	The name of the license installed for the license index number on the stack unit.
LID/Serial No	The license ID. The number is embedded in the device. The serial number for only a non-node locked license. The serial number is generated when you request a license through the license portal. The serial number is not the device name.
License Type	Indicates whether the license is normal (permanent) or trial (temporary).
Status	Indicates the status of the license: • 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. • Invalid - The LID does not match the license ID of the device for which the license was purchased. • Active - The license is valid and in effect on the device. • Not used - The license is not in effect on the device. • Expired - For trial licenses only, this indicates that the trial license has expired. • Duplicated - For non-node-locked licenses, this indicates that the same serial number is used for devices in a stacking system.
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 Ports of Demand (PoD) license.
Trial license information	Indicates the trial license information details as displayed in the **show license** command output. • days used - The number of days the trial license has been effect. • hours used - The number of hours the trail 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.

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

```
device#show license unit 1 index 1
License information for unit 1 license <1>:
        +license mode:        Node Lock
        +license name:        ICX7250-10G-LIC-POD
        +lid:                 fwpIHJKmFFt
        +license type:        Normal
        +status:              Active
        +license period:      Unlimited
```

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.

Deleting a license file

A license remains in the license database until it is deleted. If you want to delete a license, Ruckus 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 software portal.

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
```

Transferring a license

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

A license transfer is intended for retrieving licenses from defective units. The licenses are removed from the defective unit in the database and the unit is flagged as removed from service. Transferring a license is only available within Ruckus, and externally for designated partners with specific accounts in the Ruckus software portal. Contact your Ruckus representatives for more information.

You can transfer a non-node locked license without assistance from Ruckus technical staff (this type of license is not locked to a device). Non-node locked licensing is supported only on the specific product families of the Ethernet IP switches. For example, you cannot install a non-node locked license of an ICX 7450 to an ICX 7250 device. To transfer a non-node locked license, you must disable the feature associated with the license before you transfer the license to another device. Only the Technical Assistance Center (TAC) can perform a transfer of a node-locked license.

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 36 for non-node locked license messaging.

TABLE 4 Syslog messages

Message level	Message	Explanation
Informational	License: Package *package_name* with LID *LID_number* is added	The license package has been added.
Informational	License: Package *package_name* with LID *LID_number* is removed	The license package has been deleted.
Informational	License: *The feature is not enabled and requires user acceptance by typing 'Y' for compliance*	The reason for feature deactivation is non-acceptance of the EULA agreement.
Informational	License: *The (license_name) lis a duplicate license installed with serial number (serial_number).*	An already valid license is installed and the installed license is a duplicate license with a different license serial number.
Warning	License: Package *package_name* with LID *LID_number* expires in *number* 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 *package_name* with LID *LID_number* has expired	The trial license has expired.

Ports on Demand Licensing

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- Ports on Demand licensing on the Ruckus ICX 7250 27
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- Displaying the license configuration for PoD ports after a license upgrade.....29
- Campus Fabric Licensing on the Ruckus ICX 7250..... 30

Overview of Ports on Demand licensing

NOTE
Licensing for Ports on Demand is applicable to Ruckus ICX 7250 devices.

You can use the Ports on Demand (PoD) feature to enable 1-Gbps ports to 10-Gbps speed.

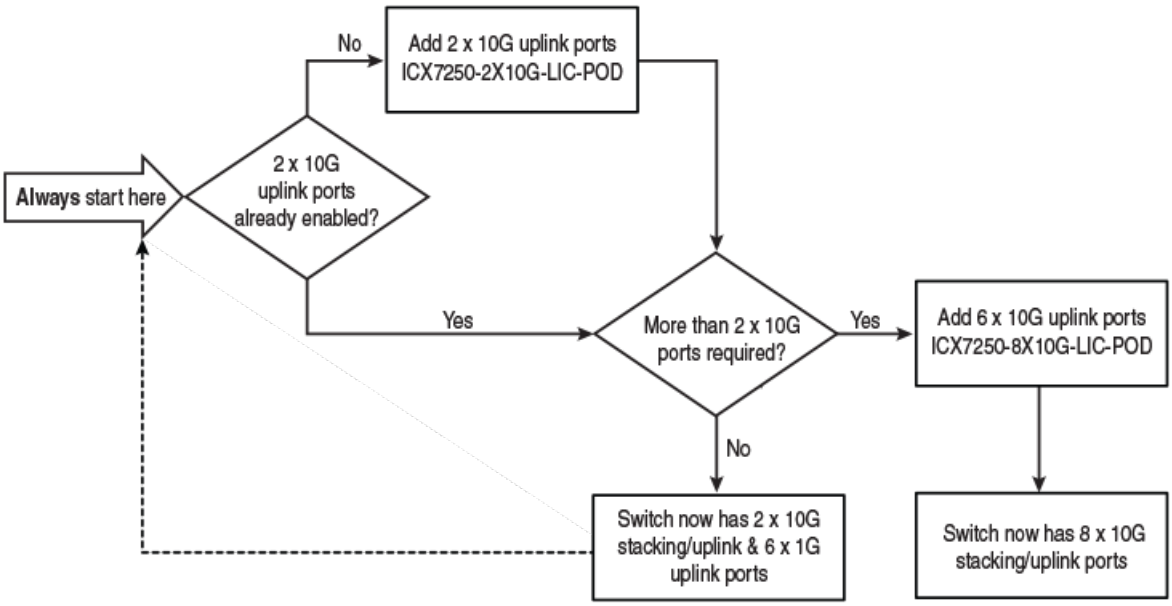
Ports on Demand licensing on the Ruckus ICX 7250

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

The number of licenses that you need depends on the number of ports that you want to upgrade:

- To upgrade the two default stacking ports (port numbers 1/2/1 and 1/2/3), you need the 2-port capacity PoD license, part number ICX7250-2X10G-LIC-POD.
- To upgrade the eight PoD ports (ports numbers 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.
- Multiple 2-port 10Gbps PoD licenses (ICX7250-2X10G-LIC-POD) cannot be installed on the Ruckus ICX 7250. The only permitted combination is one 2-port capacity PoD license, part number ICX7250-2X10G-LIC-POD, and one 8-port capacity PoD license, part number ICX7250-8X10G-LIC-POD.

FIGURE 5 ICX 7250 10G PoD licenses



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 10 Gbps. The 8-port capacity license enables you to upgrade the 6 remaining ports on the device to 10-Gbps speed. To upgrade all 8 ports to 10 Gbps, you must first install the 2-port capacity PoD license, and then install the 8-port capacity license.

The upgrade process

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

NOTE
The software portal checks the unit record to make sure that 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.

The upgrade process involves the following basic steps.

1. Log in to the Ruckus Support portal to generate and obtain the license file that you need.

2. Upgrade the ports to 10-Gbps speed (refer to Configuring PoD on an interface on page 29 for the steps to complete the upgrade).

NOTE
When the device boots 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 installed correctly. The command output shows the license capacity (Lic Capacity field), and the license name as ICX7250-10G-LIC-POD (Lic Name field).

If issuing 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 or 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-port or 8-port capacity license), the affected ports continue working in 10G mode until you reload the device. When you reload the device, the ports are returned to 1-Gbps 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, refer to Ruckus ICX 7250 licensed features on page 48.

Configuring PoD on an interface

NOTE
Configuring PoD on an interface is supported on the ICX 7250 ports when upgrading to 10-Gbps speed.

To upgrade the ports from 1-Gbps to 10-Gbps 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 Installing a license using TFTP on page 21.
2. Insert the 10-Gbps optic transceiver.
3. Enter the **speed-duplex 10g-full** command on a single interface, multiple interfaces, or an interface range on the ICX 7250.

```
device(config)# interface ethernet 1/2/2
device(config-if-e10000-1/2/2)# speed-duplex 10g-full
```

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** keyword allows you to enable the port speed to 10-Gbps.

   The **1000-full-master** keyword allows you to enable the port speed to 1-Gbps.
   On the ICX 7250, if you enable the port to 10-Gbps speed and then issue the **no speed-duplex** command, the port continues to run at 10-Gbps speed. When the device boots, the port reverts to 1-Gbps speed.

Displaying the license configuration for PoD ports after a license upgrade

The **show pod** command is used to display the license configuration for PoD ports in a stack after a license upgrade on the ICX 7250.

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

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

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

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

```
device# show pod
Unit-Id: 1
PoD license capacity:  8
PoD license capacity used:   8

PoD-ports  Lic-Available Lic-Used
1/2/1      Yes             Yes
1/2/2      Yes             Yes
1/2/3      Yes             Yes
1/2/4      Yes             Yes
1/2/5      Yes             Yes
1/2/6      Yes             Yes
1/2/7      Yes             Yes
1/2/8      Yes             Yes

Unit-Id: 11
PoD license capacity:  8
PoD license capacity used:   8

PoD-ports  Lic-Available Lic-Used
11/2/1     Yes             Yes
11/2/2     Yes             Yes
11/2/3     Yes             Yes
11/2/4     Yes             Yes
11/2/5     Yes             Yes
11/2/6     Yes             Yes
11/2/7     Yes             Yes
11/2/8     Yes             Yes
```

TABLE 5 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 was purchased.
PoD license capacity used	The number of PoD ports that are upgraded to 10-Gbps 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.

Campus Fabric Licensing on the Ruckus ICX 7250

Ruckus ICX 7250 devices configured as port extender (PE) units require the PoD license.

In Campus Fabric (802.1BR or SPX), the ICX 7750 is configured as the 802.1BR control bridge, and the ICX 7450 and ICX 7250 are configured as PE units. To connect to a control bridge over a 10-Gbps SPX link, the ICX 7250 must have a 10-Gbps PoD license installed. For information about PoD licensing on the ICX 7250, refer to Ports on Demand licensing on the Ruckus ICX 7250 on page 27. In an SPX system, the PoD license is required only on the ICX 7250 PE unit. The SPX system supports copying a license file to the ICX 7250 on the control bridge through TFTP or SCP. From the control bridge (ICX 7750 active controller unit), copy the ICX 7250 license file to the ICX 7250 PE unit. To view an example configuration of copying a license file using TFTP, refer to Installing a license using TFTP on page 21. To copy a license file using SCP, refer to Installing a license using Secure Copy on page 21.

MACSec Key-Based Licensing

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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.

How MACsec handles data and control traffic

All traffic is controlled on an active MACsec port; that is, data is encrypted, or its integrity is protected, or both. If a MACsec session cannot be secured, all data and control traffic is dropped.

When MACsec is active on a port, the port blocks the flow of data traffic. Data traffic is not forwarded by the port until a MACsec session is secured. If an ongoing session is torn down, traffic on the port is again blocked until a new secure session is established.

Control traffic (such as STP, LACP, or UDLD traffic) is not transmitted by an active MACsec port until a MACsec session is secured. While a session is being established, only 802.1x protocol packets are transmitted from the port. Once a secure session is established, control traffic flows normally through the port.

MACsec Key Agreement protocol

MACsec Key Agreement (MKA) protocol installed on a device relies on an IEEE 802.1X Extensible Authentication Protocol (EAP) framework to establish communication.

MACsec peers on the same LAN belong to a unique connectivity association. Members of the same connectivity association identify themselves with a shared Connectivity Association Key (CAK) and Connectivity Association Key Name (CKN). The CAK is a static key that is preconfigured on each MACsec-enabled interface. MACsec authentication is based on mutual possession and acknowledgment of the preconfigured CAK and Connectivity Association Key Name (CKN).

Each peer device establishes a single unidirectional secure channel for transmitting MACsec frames (Ethernet frames with MACsec headers that usually carry encrypted data) to its peers within the connectivity association. A connectivity association consists of two secure channels, one for inbound traffic, and one for outbound traffic. All peers within the connectivity association use the same cipher suite, Galois/Counter Mode Advanced Encryption Standard 128 (GCM-AES-128), for MACsec-authenticated security functions.

MACsec Key Agreement (MKA) protocol uses the Connectivity Association Key to derive transient session keys called Secure Association Keys (SAKs). SAKs and other MKA parameters are required to sustain communication over the secure channel and to perform encryption and other MACsec security functions. SAKs, along with other essential control information, are distributed in MKA protocol control packets, also referred to as MKPDUs.

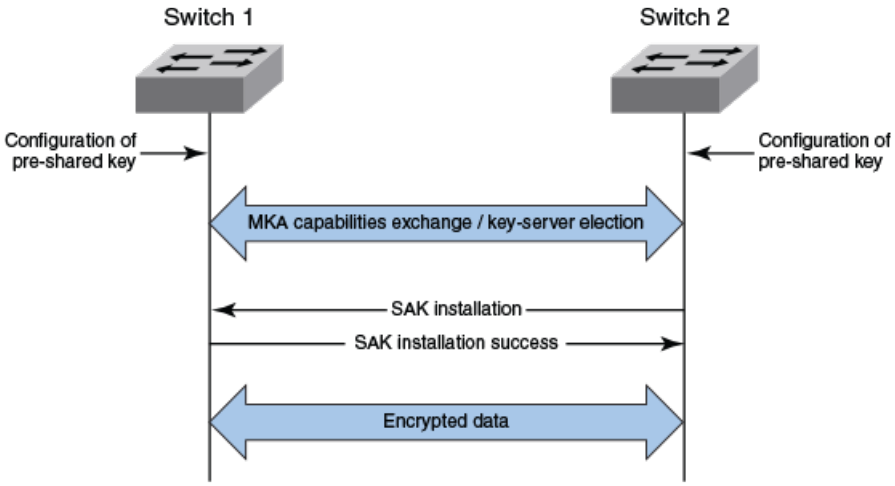
MKA message exchange between two switches

When two MACsec peers confirm possession of a shared CAK and CKN, MKA protocol initiates key-server election.

The key-server is responsible for determining whether MACsec encryption is used and what cipher suite is used to encrypt data. The key-server is also responsible for generating Secure Association Keys (SAKs) and distributing them to the connected device. Once a SAK is successfully installed, the two devices can exchange secure data.

The following figure shows the message flow between two switches during MACsec communication.

FIGURE 6 MKA pre-shared key and key name exchange between two switches



Secure channels

Communication on each secure channel takes place as a series of transient sessions called secure associations. These sessions can only be established with a unique Secure Association Key (SAK) assigned to the session.

Secure associations expire and must be re-established after transmission of a certain number of frames, or after a peer disconnects and reconnects.

The secure association is designated by a Secure Association Identifier (SAI), formed from the Secure Channel Identifier (SCI) combined with an Association Number (AN). When a MACsec frame is received by a peer interface, the device identifies the session key from the SAI carried in the MACsec frame and uses the key to decrypt and authenticate the received frame.

MACsec licensing

Devices that support MACsec functionality can be enabled for MACsec by purchasing a MACsec license.

There is no license capacity and no trial license associated with the MACsec license. The MACsec license works independently of Premium, Advance, or PoD licenses already installed on ICX devices. You can obtain this license from the Ruckus Support 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 MACsec 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 for 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 MACsec encryption 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 2 of device 1 is enabled for MACsec security.

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

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

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

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

Verifying the MACsec license

After installing the MACsec license on a supported device, you can verify the installation.

Use the **show license** command to ensure that the correct license is installed.

From the user EXEC or privileged EXEC prompts, enter the **show license** command.

The following example shows how to verify the MACsec license on an ICX 7450 stack device.

```
ICX6610-48 Router# 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 EN0E5FDBC90 Normal Active Unlimited 1
2   Node Lock     ICX-MACSEC-LIC      eatIIHJmFFc 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 serial number is associated with each device. Non-node locked licenses do not require an activation process and can be installed as received from Ruckus.

You can now enable non-node locked licensed features prior to purchasing the license. The licenses are fulfilled directly, without the need for an Activation Code 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
Ruckus 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 using a purchase order.

To obtain a non-node locked 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 36.
2. Place a purchase order with Ruckus 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 device as instructed in Installing a license using TFTP on page 21 or Installing a license using Secure Copy on page 21. 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 38.

Recovering a lost non-node locked license

If you misplace or lose the license, contact your Ruckus representative for further assistance.

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 Installing a license using TFTP on page 21 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 6 License syslog and trap messaging definitions

Scenario	Message	Displayed	Frequency	Notes
Case 0	By selecting “Y” you have read and accept the End USER License Agreement.	On initial feature activation.	One-time message.	You must select "Y" and accept the 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.
Case 1	By selecting “Y” you have read and accept the End USER License Agreement. If you select "Y" the following message will display: "Stack *(stack_unit_number)*": Use of the feature *(feature_name)* 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.
Case 2	The feature *(feature _name)* 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.
Case 3:	This unit is not compliant. A license for feature *(feature_name)* must be	45+ days after feature activation with no license installed or 24 hours after	One-time message.	At any time, only one feature name is displayed in the set of premium routing

TABLE 6 License syslog and trap messaging definitions (continued)

Scenario	Message	Displayed	Frequency	Notes
	purchased and installed or the feature must be deactivated to become compliant with the terms and conditions of use.	deletion of an installed license if any of the associated features are still enabled.		features list, as it does not matter when the feature is enabled.
Case 4	The license *(licence_name)* 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	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. 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 (**Case 3** 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.

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 is not affected by the existence of a non-node locked license. The features can be enabled without a license on one or more units of 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 on 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 36 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 36 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
Idx License Mode    License Name        LID/SN   L/Type Status L/Period  Cap
Stack unit 1:
1   Non-node Locked ICX7450-PREM-LIC-SW xxxyyyy1 Normal Active Unlimited 1
Stack unit 2:
1   Non-node Locked ICX7450-PREM-LIC-SW xxxyyyy2 Normal Active Unlimited 1
Stack unit 3:
1   Non-node Locked ICX7450-PREM-LIC-SW xxxyyyy3 Normal Active Unlimited 1
```

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
Idx License Mode License Name        LID/SN   L/Type Status  L/Period  Cap
Stack unit 2:
1   Node Locked  ICX7450-PREMLIC-SW  xxxyyyy3 Normal Invalid Unlimited 8
```

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
Idx License Mode    License Name        LID/SN   L/Type Status L/Period  Cap
Stack unit 1:
1   Non-node Locked ICX7450-PREM-LIC-SW xxxyyyy1 Normal Active Unlimited 1
Stack unit 2:
1   Non-node Locked ICX7450-PREM-LIC-SW xxxyyyy2 Normal Active Unlimited 1
Stack unit 3:
1   Non-node Locked ICX7450-PREM-LIC-SW xxxyyyy3 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
Idx License Mode    License Name        LID/SN   L/Type Status L/Period  Cap
Stack unit 1:
1   Non-node Locked ICX7450-PREM-LIC-SW xxxyyyy1 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:      ICX-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:       xxxyyyy1
        +license capacity:     1
```

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

TABLE 7 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: • 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. • Invalid - The LID does not match the license ID of the device for which the license was purchased. • Active - The license is valid and in effect on the device. • Not used - The license is not in effect on the device. • Expired - For trial licenses only, this indicates that the trial license has expired. • Duplicate - The license is duplicated.
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.

Licensing on the Ruckus ICX 7150

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Overview of licensing on the Ruckus ICX 7150

A Self-Authenticated Upgrade (SAU) method has been implemented for installing licenses on Ruckus ICX 7150 devices. With this method, the **license install** command allows you to upgrade or downgrade to a licensed feature set using one command. The **license install** command is available only on the Ruckus ICX 7150 and replaces the licensing commands for installing or deleting a license. For example, you no longer need to install a license using TFTP or SCP, or to delete a license using the **license delete** command.

The following table displays Ruckus ICX 7150 part number and license information available when upgrading to a licensed feature set. The licensed feature set includes the Premium Layer 3 license, and the Ports on Demand license. When upgrading to a licensed feature set, a Certificate of Entitlement (CoE) is shipped to you upon purchase of the license. The CoE is a "proof of purchase" for any features that have been purchased. The CoE is a .PDF certificate that has a unique serial number. One CoE is issued for each feature license that is purchased.

TABLE 8 Ruckus ICX 7150 SKU and license information

Part Number for Upgrades	License Name	Description
BR-ICX-7150-41U210-P-01	2X10G	CoE license to upgrade any ICX 7150 24-port or 48-port model from 4x1G SFP to a 2x1G SFP and 2x10G SFP+ uplink or stacking ports.
BR-ICX-7150-210U410R-P-01	4X10GR	CoE license to upgrade any ICX 7150 24-port or 48-port model from 2x1G SFP and 2x10G SFP+ to a 4x10G SFP+ uplink or stacking ports. Two default ports are available for stacking. Layer 3 Premium license features (OSPF, VRRP, PIM, PBR) are also included.
BR-ICX-7150-41U410R-P-01	4X10GR	CoE license to upgrade any ICX 7150 24-port or 48-port model from 4x1G SFP to a 4x10G SFP+ uplink or stacking ports. Two default ports are available for stacking. Layer 3 Premium license features (OSPF, VRRP, PIM, PBR) are also included.
BR-ICX-7150C-21U210R-P-01	2X10GR	CoE license to upgrade the ICX 7150-C12P switch from 2x1G SFP to a 2x10G SFP+ uplink or stacking ports. Layer 3 Premium license features (OSPF, VRRP, PIM, PBR) are also included.
BR-ICX-7150Z210U810R-P-01	8X10GR	CoE license to upgrade an ICX 7150-48ZP Z-Series switch from 6x1G SFP & 2x10G SFP+ to 8x10G SFP+ uplink or stacking ports. Layer 3 Premium license features (OSPF, VRRP, PIM, PBR) are also included.

Ports on Demand Licensing on the Ruckus ICX 7150

PoD ports can be upgraded from 1-Gbps to 10-Gbps port speed.

Ruckus ICX 7150-48ZP devices are shipped with two 10-Gbps ports (1/2/1 and 1/2/3). By default, ports 1/2/1 and 1/2/3 on Ruckus ICX 7150-48ZP devices are 10-Gbps ports that do not require a PoD license (although Premium features are not included). Additional 10-Gbps ports require a PoD license. The PoD ports on Ruckus ICX 7150-48ZP devices are ports 1/2/2 and 1/2/4 through 1/2/8.

On other 24-port and 48-port models of the Ruckus ICX 7150, the PoD ports are 1/3/1 through 1/3/4. On the Ruckus ICX 7150-C12 model, the PoD ports are 1/3/1 and 1/3/2.

To upgrade the port speed, you must first upgrade the Ruckus ICX 7150 license set using the **license install perpetual** command, and then configure the port speed to 10 Gbps. To upgrade to a licensed feature set, refer to Upgrading or downgrading licenses on the Ruckus ICX 7150 on page 42. To upgrade the ports from 1 Gbps to 10 Gbps, refer to Configuring PoD on the Ruckus ICX 7150 on page 44.

Stacking support on Ruckus ICX 7150 devices

All Ruckus ICX 7150 devices support stacking on specific licensed 10-Gbps ports. On Ruckus ICX 7150-48ZP devices, two 10-Gbps ports that support stacking are pre-installed. Licenses must be purchased for all other 10-Gbps ports and for Premium feature support. The following table summarizes stacking support and available licenses for all Ruckus ICX 7150 models.

TABLE 9 Ruckus ICX 7150 stacking options

Model	License Name	10-Gbps ports	Premium feature support	Default stacking ports
ICX7150-24, ICX7150-24P, ICX7150-48, ICX7150-48P, and ICX7150-48PF	4X1G	0	No	None
	2X10G	2	No	x/3/1, x/3/3
	4X10GR	4	Yes	x/3/1, x/3/3
ICX7150-C12P	2X1G	0	No	None
	2X10GR	2	Yes	x/3/1, x/3/2
ICX7150-48ZP (2.5G)	2X10 (default)	2	No	x/2/1, x/2/3
	8X10GR	8	Yes	x/2/1, x/2/3

Upgrading or downgrading licenses on the Ruckus ICX 7150

Upgrading and downgrading to a licensed feature set on the Ruckus ICX 7150 uses the same commands and similar steps.

Upgrading licenses on the Ruckus ICX 7150

To upgrade a license on an ICX 7150 device, for example, from a 2X10G license to a 4X10GR license, perform the following steps.

1. (Optional) Enter the **show license installed** command to check the licenses already installed on the device.

```
ICX7150-24P Router# show license installed
Unit License Name L3 Premium Port Speed Upgrade Speed Ports
1    2X10G        No         Yes               10G   2
```

2. Enter the **show version** command to verify license details. The current license field displays the license you have currently installed in the device.

```
device# show version
=========================================================
UNIT 1: SL 1: ICX7150-24P-2X10G 24-port Management Module
Serial #:CYT3346K035
Current License: 2X10G
P-ASIC 0: type B548, rev 01 Chip BCM56548_A0
=========================================================
```

3. Place a purchase order with Ruckus order management as needed.

4. Enter the **license install perpetual** command, followed by the unit number and the purchased license name.

```
device# license install perpetual 1 4x10gr
```

   The example installs a perpetual 4X10GR license on unit 1.

5. Enter **y** to accept the End User License Agreement (EULA), or **n** to cancel.

```
By selecting 'y' you have read and accept the End USER License Agreement.
Continue?(enter 'y' to continue, 'n' to cancel): y
```

6. Confirm the license installation with the show license installed command.

```
ICX7150-24P Router# show license installed
Unit License Name L3 Premium Port Speed Upgrade Speed Ports
1    4X10GR       Yes        Yes                10G   4
2    2X10G        No         Yes                10G   2
```

   The example shows a 4X10GR license with premium Layer 3 features is installed on unit 1, and a 2X10G license is installed on unit 2.

7. Enter the **show version** command for additional details to verify that the license is installed correctly.

```
device# show version
=================================================================
UNIT 1: SL 1: ICX7150-24P-2X10G 24-port Management Module
Serial #:CYT3346K035
Current License: 4X10GR
P-ASIC 0: type B548, rev 01 Chip BCM56548_A0
=================================================================
```

NOTE

If you attempt to update a license that is already installed on the device, an error message is displayed on the CLI. The following is an example of the error message.

```
device# update-license perpetual 1 2x10g
License package 2x10g is already installed.
device#
```

Downgrading licenses on the Ruckus ICX 7150

To downgrade a license on an ICX 7150 device, for example, from a 4X10GR license to a 2X10G license, perform the following steps.

1. (Optional) Use the **show license installed** command to check the licenses already installed on the device.

```
ICX7150-24P Router# show license installed
Unit License Name L3 Premium Port Speed Upgrade Speed Ports
1    4X10GR       Yes        Yes                10G   4
2    2X10G        No         Yes                10G   2
```

   In the example, a 4X10GR license is installed on unit 1.

2. Enter the **license install perpetual** command followed by the unit number for the device and the name of the license to which you are downgrading.

```
device# license install perpetual 1 2x10g
```

   The example installs a perpetual 2X10G license on unit 1.

3. Enter **y** to accept the downgrade of the license, or **n** to cancel.

```
By selecting 'y' current license will be downgraded. All licensed configurations will be lost after
reload.
Continue?(enter 'y' to continue, 'n' to cancel): y
License downgrade successful. Reboot may be required for licensed features to be automatically
disabled. If you did not intend to perform a license downgrade, you can use the license install
command to upgrade the license.
```

NOTE
When performing a license downgrade, the licensed features continue working until you reload the device.

4. Enter the **show version** command to verify the correct license to which you have downgraded. The **Current License** field displays the license you have currently installed in the device.

```
device# show version
==========================================================
UNIT 1: SL 1: ICX7150-24P-2X10G 24-port Management Module
Serial #:CYT3346K035
Current License: 2X10G
P-ASIC 0: type B548, rev 01 Chip BCM56548_A0
==========================================================
```

The example shows that a 2X10G license is currently installed on the device and provides details on the license.

Upgrading Ruckus ICX 7150 licenses for a stack

Licenses for members of an Ruckus ICX 7150 stack can be managed from the active controller.

License updates for stack members can be entered from the active controller. As with standalone Ruckus ICX 7150 devices, the **license install perpetual** command is used to update licenses on a stack. Licenses can be installed on each stack member by referencing its stack unit ID in the command. The updates are retained and applied by the individual stack member, and related information is then shared with the active controller. If a stack unit is non-operational, license updates are applied when the unit returns to active mode. If a stack member goes down, it retains its own license information, but the stack controller does not retain it.

The active and standby controller for the stack store and sync license information. License information is retained during controller switchover or failover. When a device joins the stack, its license information is synced to the active and standby controller.

An ICX 7150 must have a PoD license installed to join a stack because the minimum speed for ICX stacking ports is 10-Gbps. A PoD license must be installed on a port before it can be upgraded to 10 Gbps.

NOTE
ICX 7150-48ZP devices are an exception because they are shipped with two 10-Gbps ports pre-installed.

In an ICX 7150 stack, Layer 3 Premium features can be enabled if all units in the stack have a Premium license installed. If a Layer 3 Premium feature is enabled, any unit that joins the stack without a Premium license becomes non-operational. EIther the Premium feature must be disabled, or the unit must be upgraded with a Premium license to become operational.

Configuring PoD on the Ruckus ICX 7150

NOTE
Configuring PoD is supported on the Ruckus ICX 7150 ports when upgrading to 10-Gbps speed.

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

1. Insert the 10-Gbps optic transceiver.
2. Enter the **speed-duplex 10g-full** command on a single interface, multiple interfaces, or an interface range on the Ruckus ICX 7150.

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

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

```
device(config-if-e10000-1/3/1)# write memory
```

   On the Ruckus ICX 7150, if you enable the port to 10-Gbps speed and then issue the **no speed-duplex** command, the port continues to run at 10-Gbps speed. When the device boots, the port reverts to 1-Gbps speed.

   If the **speed-duplex 10g-full** command fails, a syslog message is generated and displayed. The command fails because there is no license available for the port. The following is a syslog message 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 1/3/1.
```

Displaying the license configuration for PoD ports on the Ruckus ICX 7150

The **show pod** command is used to display the license configuration for PoD ports configured at 10-Gbps port speed.

To display the license configuration for all PoD ports on module three, enter the following command.

```
device# show pod
Unit-Id: 1
PoD license capacity: 4
PoD license capacity used: 4

PoD-ports    Lic-Available    Lic-Used
1/3/1     Yes             Yes
1/3/2     Yes             Yes
1/3/3     Yes             Yes
1/3/4     Yes             Yes
```

FastIron Licensed Features and Software

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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.

This table lists the associated image file names, and related part numbers. There are no changes to the part numbers for products with pre-installed (factory-installed) licenses.

Product	Image file name	License name	Hardware with pre-installed software license
Ruckus ICX 7250	SPRXXXX.bin	ICX7250-PREM-LIC-SW (software license only)	Sold separately. To purchase this license, contact your Ruckus representative.
	• SPRxxxx.bin • SPSxxxx.bin	ICX7250-10G-LIC-POD (Ports on Demand license)	• 2 port capacity = 1 license (enables ports 1/2/1 and 1/2/3). • 8 port capacity = 1 license (enables ports 1/2/1 to 1/2/8).
Ruckus ICX 7450	SPRXXXX.bin	ICX7450-PREM-LIC-SW	Sold separately. To purchase this license, contact your Ruckus representative.
	• SPRxxxx.bin • SPRSxxxx.bin	ICX-MACSEC-LIC (MACsec license)	Sold separately. To purchase this license, contact your Ruckus representative.
Ruckus ICX 7150	• SPSxxxx.bin • SPRxxxx.bin	The following license names are for ICX7150-24, ICX7150-24P, ICX7150-48, ICX7150-48P, ICX7150-48PF models: • 4X1G • 2X10G • 4X10GR The following license names are for the ICX 7150-C12P model: • 2X1G • 2X10GR The following license names are for the ICX 7150-48ZP model: • 8X10GR	Sold separately. To purchase this license, contact your Ruckus representative. ICX 7150-48ZP devices are shipped with two 10-Gbps ports, 1/2/1 and 1/2/3.

FastIron feature licenses are available for the following devices:

- Ruckus ICX 7150 (Refer to Ruckus ICX 7150 Licensed Features on page 48.)
- Ruckus ICX 7250 (Refer to Ruckus ICX 7250 licensed features on page 48.)
- Ruckus ICX 7450(Refer to Ruckus ICX 7450 licensed features on page 49.)

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

Ruckus ICX 7150 Licensed Features

The Ruckus ICX 7150 device supports the use of licensed FastIron features or feature sets.

The Premium Layer 3 license is available for the Ruckus ICX 7150.

NOTE
Static routing and RIP features are available on the Ruckus ICX 7150 without the Premium Layer 3 license.

Premium Layer 3

The Premium Layer 3 license enables you to use the following features or feature sets:

- OSPF v2
- OSPF v3
- VRRP
- VRRP v3
- VRRP-E
- PBR
- PIM-SM, PIM-SSM, PIM-DM
- PIM Passive

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.

Ruckus ICX 7250 licensed features

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

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

- Premium Layer 3 (non-node locked license)

  NOTE
  Static routing, RIP v1/v2, and RIPng (IPv6) features are available on the Ruckus ICX 7250 without the Premium Layer 3 license.

- Ports on Demand (PoD) license

Premium Layer 3 (non-node locked license)

The Premium Layer 3 (non-node locked license) license enables you to use the following features or feature sets:

- OSPFv2
- OSPFv3 (IPv6)
- VRRP
- VRRPv3 (IPv6)
- VRRP-E
- GRE
- PBR
- PIM-SM, PIM-SSM, PIM-DM
- PIM Passive
- 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.

For more information about non-node locked licenses, refer to Non-Node Locked Licensing on page 35.

Ports on Demand license (upgrading ports from 1-Gbps to 10-Gbps port speed)

The Ports on Demand license upgrades 1-Gbps ports to 10-Gbps port speed. The port capacities for this license are two ports or eight ports.

For more information about upgrading 1-Gbps ports to 10-Gbps ports for this device, refer to Ports on Demand licensing on the Ruckus ICX 7250 on page 27.

Ruckus ICX 7450 licensed features

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

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

- Premium Layer 3 (non-node locked license)

  NOTE
  Static routing, RIP, RIPng (IPv6), and IPv6 IPsec tunneling features are available on the Ruckus ICX 7450 without the Premium Layer 3 license.

- MACsec license

Premium Layer 3 (non-node locked license)

The Premium Layer 3 (non-node locked license) license enables you to use the following features or feature sets:

- OSPFv2
- OSPFv3 (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.

For more information about non-node locked licenses, refer to Non-Node Locked Licensing on page 35.

MACsec license

The MACsec license enables MACsec functionality for any 10-Gbps port on an Ruckus 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 Ruckus ICX 7450 device.

For more information about MACsec licensing, refer to MACsec licensing on page 32.

FastIron Non-Licensed Features

You are entitled to use the following features with the purchase of the Ruckus ICX 7750 Certificate of Entitlement:

- OSPF v2
- OSPF v3 (IPv6)
- 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

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



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