RUCKUS FastIron Software Licensing Guide, 10.0.00

Supporting FastIron Software Release 10.0.00

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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 products, and customers and partners with active support contracts.

For product support information and details on contacting the Support Team, go directly to the RUCKUS Support Portal using https://support.ruckuswireless.com, or go to https://www.commscope.com/ruckus 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. Requests 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, Central and South America, and Asia Pacific, toll-free numbers are available at https://support.ruckuswireless.com/contact-us and Live Chat is also available.
- Worldwide toll number for our support organization. Phone charges will apply: +1-650-265-0903

We suggest that you keep a physical note of the appropriate support number in case you have an entire network outage.

Self-Service Resources

The RUCKUS Support Portal at https://support.ruckuswireless.com 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://community.ruckuswireless.com
- Knowledge Base Articles—https://support.ruckuswireless.com/answers
- Software Downloads and Release Notes—https://support.ruckuswireless.com/#products_grid
- 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.

Document Feedback

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

You can email your comments to RUCKUS at #Ruckus-Docs@commscope.com.

When contacting us, include the following information:

- Document title and release number
- Document part number (on the cover page)
- Page number (if appropriate)

For example:

- RUCKUS SmartZone Upgrade Guide, Release 5.0
- Part number: 800-71850-001 Rev A
- Page 7

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 the documentation by product or perform a text search. Access to Release Notes requires an active support contract and a RUCKUS Support Portal user account. Other technical documentation content is available without logging in to the RUCKUS Support Portal.

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

Online Training Resources

To access a variety of online RUCKUS training modules, including free introductory courses to wireless networking essentials, site surveys, and products, visit the RUCKUS Training Portal at https://commscopeuniversity.myabsorb.com/. The registration is a two-step process described in this video. You create a CommScope account and then register for, and request access for, CommScope University.

Document Conventions

The following table lists the text 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 Safety 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 some information that you must read before continuing with the current action or task.



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.

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New In This Document

The following table describes changes to this guide for the FastIron 10.0.00 release.

TABLE 2 Summary of Enhancements in FastIron Release 10.0.00

Feature	Description	Described in
RUCKUS ICX 8200	**New**: Added support for RUCKUS ICX 8200 devices.	Throughout the guide
Discontinuation of support for a separate switch image	**Updated**: This release and future releases support a single image for ICX platforms that provides both switching and routing functionality. As a result, support for a separate switch ("Layer 2") image is discontinued.	References have been removed throughout the guide.
Unsupported hardware	**Updated**: This release and future releases do not support RUCKUS ICX 7150, 7250, or 7450 devices.	References have been removed throughout the guide.
Updates to address defects	**Updated**: Minor updates on content throughout to address defects.	All chapters
Minor editorial updates	**Updated**: Minor editorial updates were made throughout the guide.	All chapters

Supported Hardware

This guide supports the following RUCKUS products:

- RUCKUS ICX 8200 Switches
- RUCKUS ICX 7850 Switches
- RUCKUS ICX 7650 Switches
- RUCKUS ICX 7550 Switches

For information about what models and modules these devices support, refer to the hardware installation guide for the specific product family.

Software Licensing Overview

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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 on 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.

After a license is installed on the RUCKUS device, the license unlocks the licensed feature and the feature becomes available immediately. There is no need to reload the software.

Self-Authenticated Upgrade Licensing

Self-Authenticated Upgrade (SAU) licensing allows you to upgrade or downgrade to a licensed feature set with a single command. The **license install** command replaces other licensing commands for installing or deleting a license. You no longer need to install a license file using TFTP or SCP.

Software Licensing Terminology

The following terms are used in this document:

- **Activation Code**: The Activation Code is issued by RUCKUS when a license is purchased. The Activation Code is delivered in an email message a few minutes after the order is placed, though the timing will vary depending on the network, Internet connection, and so on.
- **Licensed feature**: Any hardware or software feature or set of features that require a valid software license to operate on the device.
- **Self-Authenticated Upgrade (SAU) licensing**: A licensing model that allows you to upgrade to a licensed feature set with a single CLI command, rather than the installation of a license file using TFTP or SCP.

Licensing Rules

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

- A license is not tied to a specific device. It can be removed from one device and redeployed on another device.
- More than one license can be installed per device concurrently.
- Licensed features can be activated prior to obtaining a valid license and used for a trial period of 45 days, based on an agreement to obtain a license.

- Trial licenses for all licensed features are built into the device. Enabling any licensed feature activates a 45-day trial period requiring acceptance of the RUCKUS terms and conditions of use.
- 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.

FastIron Licensed Features and Platform Support

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

The following table lists the licenses that are available for each RUCKUS ICX platform. Note the following descriptions of the fields:

- **Licensed Feature**: Licensed features available for the platform.
- **License Install Options**: Names of the licenses that can be installed on the platform. These are the license names used in the CLI when installing a license. Note that the "R" in the license name indicates the L3 PREM license.
- **License Delete Options**: Names of the licenses that can be deleted from the platform. These are the license names used in the CLI when deleting a license.
- **Default Package**: Pre-installed licenses on the platform.
- **Possible Packages**: Possible license packages available for the platform. These license package names are displayed in the **show license** command output.

TABLE 3 Licensed features and Platform support

Platform	Licensed Feature	License Install Options	License Delete Options	Default Package	Possible Packages	10-Gbps and 25-Gbps Ports
ICX 7550	L3 PREM MACSec	l3-prem macsec	l3-prem macsec	l3-base	l3-base, l3-prem, l3-base-macsec, l3-prem-macsec	N/A
ICX 7650	L3 PREM MACSec	l3-prem macsec	l3-prem macsec	l3-base	l3-base, l3-prem, l3-base-macsec, l3-prem-macsec	N/A
ICX 7850	L3 PREM MACsec	l3-prem macsec	l3-prem macsec	l3-base	l3-base, l3-prem, l3-base-macsec, l3-prem-macsec	N/A
ICX 8200-24, ICX 8200-24P, ICX 8200-48, ICX 8200-48P, ICX 8200-48PF and ICX 8200-48PF2	L3 PREM	4x25gr	4x25gr	4x25g	4x25G and 4x25GR	x/2/1 to x/2/4
ICX 8200-C08PF	L3 PREM	2x10gr	2x10gr	2x10g	2x10G and 2x10GR	x/2/1 and x/2/2 (10Gbps only)

Upgrading from FastIron 08.0.70 or Earlier to 09.0.10a or Later for the ICX 7650

When upgrading directly from FastIron 08.0.70 or earlier to FastIron 09.0.10a or later, all preexisting licensed features and in some cases access control lists (ACLs) will be lost. To prevent the loss of licensed features and ACLs, perform the upgrade in two steps:

1. Upgrade to the FastIron 08.0.80f non-UFI version. Upgrade the respective boot image also, and save the configuration with the **write memory** command.
2. Upgrade to the FastIron 08.0.90 UFI or a later. When upgrading to the UFI version, the boot image will be upgraded automatically.

The upgrade path is FastIron 08.0.70 or earlier to FastIron 08.0.80f (non-UFI) to the target release (UFI).

NOTE
This upgrade consideration applies only when the ICX 7650 platform is upgraded from FastIron 08.0.70 or earlier. It does not apply to upgrades from FastIron 08.0.80f or later.

NOTE
If you are upgrading an ICX switch for the first time from a version earlier than FastIron 08.0.95, RUCKUS recommends that you upgrade to FastIron 08.0.95d as the intermediate version and then upgrade to FastIron 09.0.10a or later. This step is required to ensure that the FPGA version is compatible with the target release.

Upgrading from FastIron 08.0.70 or Earlier to 09.0.10a or Later

Beginning in FastIron 08.0.80, the Self-Authenticated Upgrade (SAU) licensing model was implemented on all the RUCKUS ICX platforms. When upgrading from FastIron 08.0.70 or earlier, existing software feature licenses on the device will be converted to SAU licenses. The original XML licenses are preserved on the system in case the switch is downgraded to an earlier version that requires them.

For more details regarding upgrade process, refer to *RUCKUS FastIron Software Upgrade Guide*.

Beginning with FastIron release 10.0.00, a switch ("Layer 2") image will no longer be provided for ICX devices. Only the router ("Layer 3") image will be available. The switch image for the ICX 7550 and ICX 7650 is discontinued in FastIron 10.0.00. On upgrade to FastIron 10.0.00, the configuration of any ICX devices operating with the switch image will automatically be translated to the equivalent router image configuration.

Refer to the following topics for important considerations when upgrading:

- Upgrade Considerations for the Layer 3 Premium License on page 13
- Upgrade Considerations for MACsec Licenses on page 14

Upgrade Considerations for the Layer 3 Premium License

Beginning with FastIron 08.0.80, all Layer 3 Premium licenses are Self-Authenticated Upgrade (SAU) licenses.

Upgrading a System Without a Layer 3 Premium License from FastIron 08.0.70 or Earlier Releases

Layer 3 Premium licensed features are not available until the user has enabled the Layer 3 Premium SAU license. Without the Layer 3 Premium license, the Layer 3 licensed features cannot be used.

In an upgrade from FastIron 08.0.70 or earlier releases to FastIron 08.0.80 or later releases, the system enables the Layer 3 Base license package automatically, which means all Layer 3 premium features are disabled.

However, if the system does not have a Layer 3 Premium XML license and Layer 3 Premium features are configured, these L3 features will be lost after the upgrade. In order to avoid losing Layer 3 configurations, perform one of the following actions before or after the upgrade:

- Before upgrading the system, check the license compliance status. Purchase and install the Layer 3 Premium XML license on the device if needed. Always back up the configuration, and keep a backup of all license files.
- Before upgrading the system, back up the configuration. After the upgrade, enable the Layer 3 Premium SAU license and copy the configuration back to the system.
- After upgrading the system, immediately enable the Layer 3 Premium SAU license, but do not save the configuration, and then reload. After the system is back up, the Layer 3 Premium configuration should be back as it was before the upgrade.

  NOTE
  In this case, the running configuration is lost, but the Layer 3 premium configuration remains in the startup configuration as long as the user does not enter the **write mem** command after the upgrade.

In a stacking configuration, if Layer 3 licensed features are required then a valid Layer 3 Premium license must be installed on all members of the stack.

If the active unit has an XML Layer 3 Premium license installed, the Layer 3 Premium configuration should remain the same after the upgrade, but member units without a Layer 3 Premium XML license will enter a non-operational state. To prevent member units from becoming non-operational, copy the Layer 3 Premium XML license to relevant units before the upgrade, or enable the Layer 3 Premium SAU license on relevant units after the upgrade.

If the active unit does not have a Layer 3 Premium XML license, the configuration of any premium Layer 3 features will be lost after the upgrade. Use one of the three preceding methods to prevent the loss of or to recover the Layer 3 configuration.

ICX Device with an Existing Layer 3 Premium XML License

If there is an existing Layer 3 Premium XML license on the device, the system will automatically enable the Layer 3 Premium SAU license upon upgrade to 08.0.80, and Layer 3 feature configuration will be retained. All Layer 3 features will function as before the upgrade.

All XML license files will be preserved in case the device is loaded with a non-SAU license image (that is, in case of a downgrade).

Upgrade Considerations for MACsec Licenses

Beginning with FastIron 08.0.80, all Layer 3 Premium licenses are Self-Authenticated Upgrade (SAU) licenses.

Upgrading a System Without a Layer 3 Premium License from FastIron 08.0.70 or Earlier Releases

Layer 3 Premium licensed features are not available until the user has enabled the Layer 3 Premium SAU license. Without the Layer 3 Premium license, the Layer 3 licensed features cannot be used.

In an upgrade from FastIron 08.0.70 or earlier releases to FastIron 08.0.80 or later releases, the system enables the Layer 3 Base license package automatically, which means all Layer 3 premium features are disabled.

However, if the system does not have a Layer 3 Premium XML license and Layer 3 Premium features are configured, these L3 features will be lost after the upgrade. In order to avoid losing Layer 3 configurations, perform one of the following actions before or after the upgrade:

- Before upgrading the system, check the license compliance status. Purchase and install the Layer 3 Premium XML license on the device if needed. Always back up the configuration, and keep a backup of all license files.
- Before upgrading the system, back up the configuration. After the upgrade, enable the Layer 3 Premium SAU license and copy the configuration back to the system.

- After upgrading the system, immediately enable the Layer 3 Premium SAU license, but do not save the configuration, and then reload. After the system is back up, the Layer 3 Premium configuration should be back as it was before the upgrade.

  NOTE
  In this case, the running configuration is lost, but the Layer 3 premium configuration remains in the startup configuration as long as the user does not enter the **write mem** command after the upgrade.

In a stacking configuration, if Layer 3 licensed features are required then a valid Layer 3 Premium license must be installed on all members of the stack.

If the active unit has an XML Layer 3 Premium license installed, the Layer 3 Premium configuration should remain the same after the upgrade, but member units without a Layer 3 Premium XML license will enter a non-operational state. To prevent member units from becoming non-operational, copy the Layer 3 Premium XML license to relevant units before the upgrade, or enable the Layer 3 Premium SAU license on relevant units after the upgrade.

If the active unit does not have a Layer 3 Premium XML license, the configuration of any premium Layer 3 features will be lost after the upgrade. Use one of the three preceding methods to prevent the loss of or to recover the Layer 3 configuration.

ICX Device with an Existing Layer 3 Premium XML License

If there is an existing Layer 3 Premium XML license on the device, the system will automatically enable the Layer 3 Premium SAU license upon upgrade to 08.0.80, and Layer 3 feature configuration will be retained. All Layer 3 features will function as before the upgrade.

All XML license files will be preserved in case the device is loaded with a non-SAU license image (that is, in case of a downgrade).

Downgrading from FastIron 09.0.10a or Later to 08.0.70 or Earlier

When downgrading from FastIron 09.0.10a or later to 08.0.70 or earlier on an ICX 7650, licensed features will be lost unless there is a pre-installed XML license on the device. Licensed features that have an XML license will be retained during the downgrade.

Downgrading from FastIron 09.0.10a or later to a release between 08.0.80 and 08.0.95 will not impact licensed features.

Because of the many software design and CLI changes implemented in FastIron 09.0.10a, downgrading to a previous release is complex and may produce unexpected results.

NOTE
Downgrading software is not recommended.

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Software Licensing Configuration Tasks

Software licensing configuration tasks require generating and obtaining a software license, and then installing the license on the RUCKUS device. The following tasks must be performed in the order given.

1. Order the desired license.
2. Retrieve the serial number of the RUCKUS device and the license Activation Code, which will be delivered by email.
3. Log in to the RUCKUS Support portal (https://support.ruckuswireless.com) to generate the CoE.
4. Install the SAU license on the RUCKUS device.
5. Verify that the license is installed.

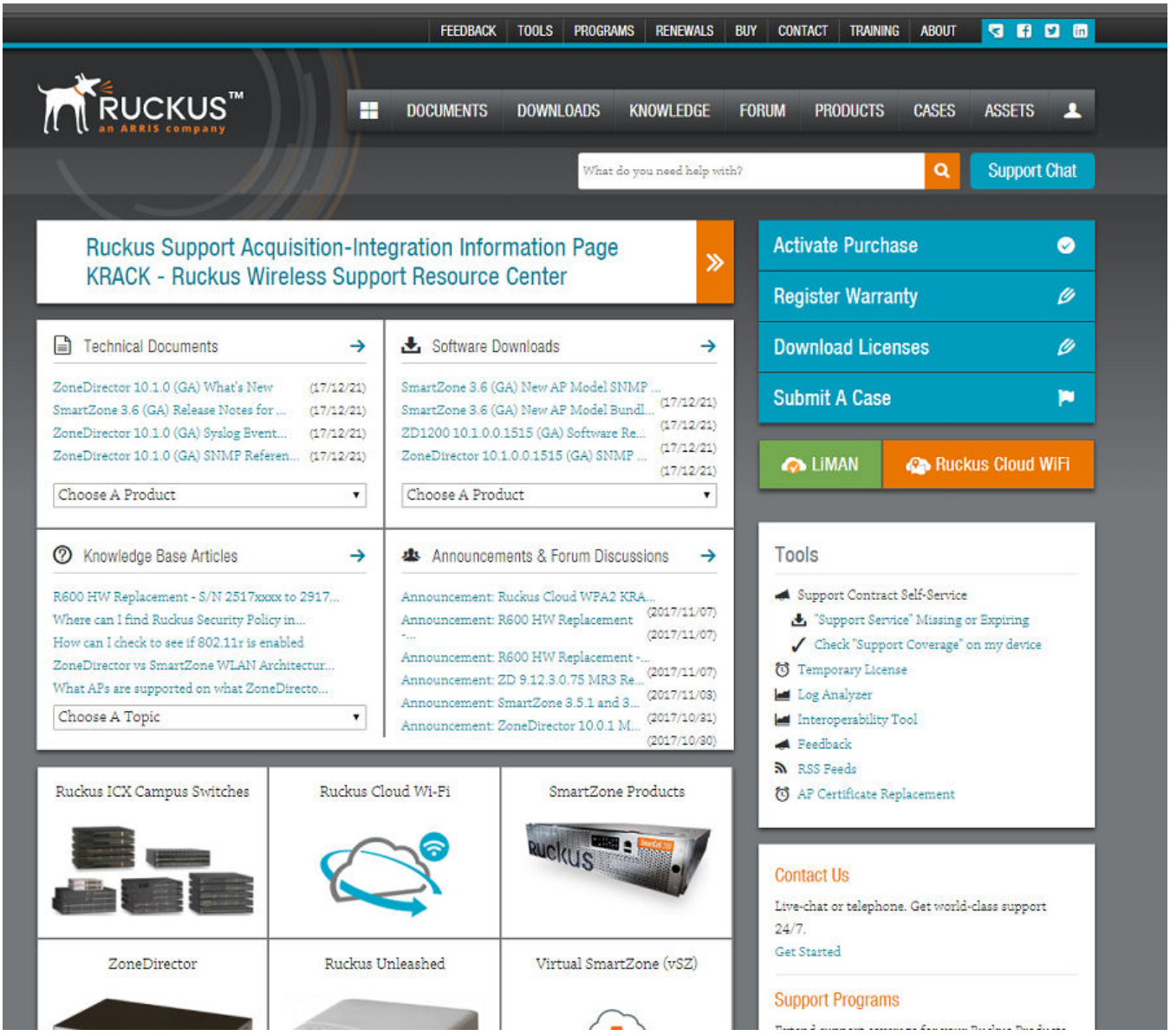
NOTE
Certificate of Entitlement (CoE) is not required for ICX 8200 devices.

Querying the Licensing Portal

To view software license information for a particular product, you can find that information on the RUCKUS Licensing Portal with an Activation Code or serial number.

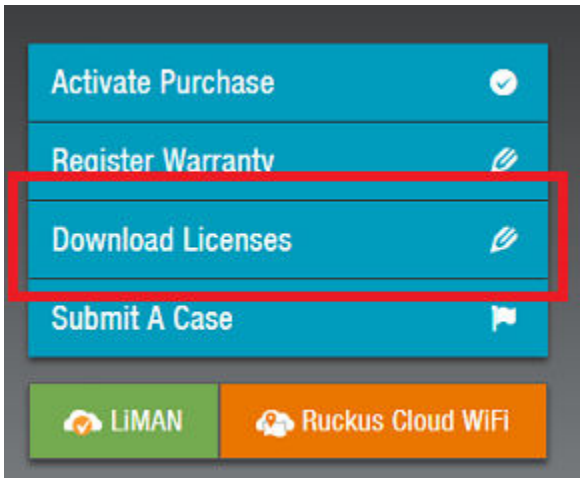
1. To view software license information, go to https://support.ruckuswireless.com//. The **Support** window is displayed.

FIGURE 1 Support Window



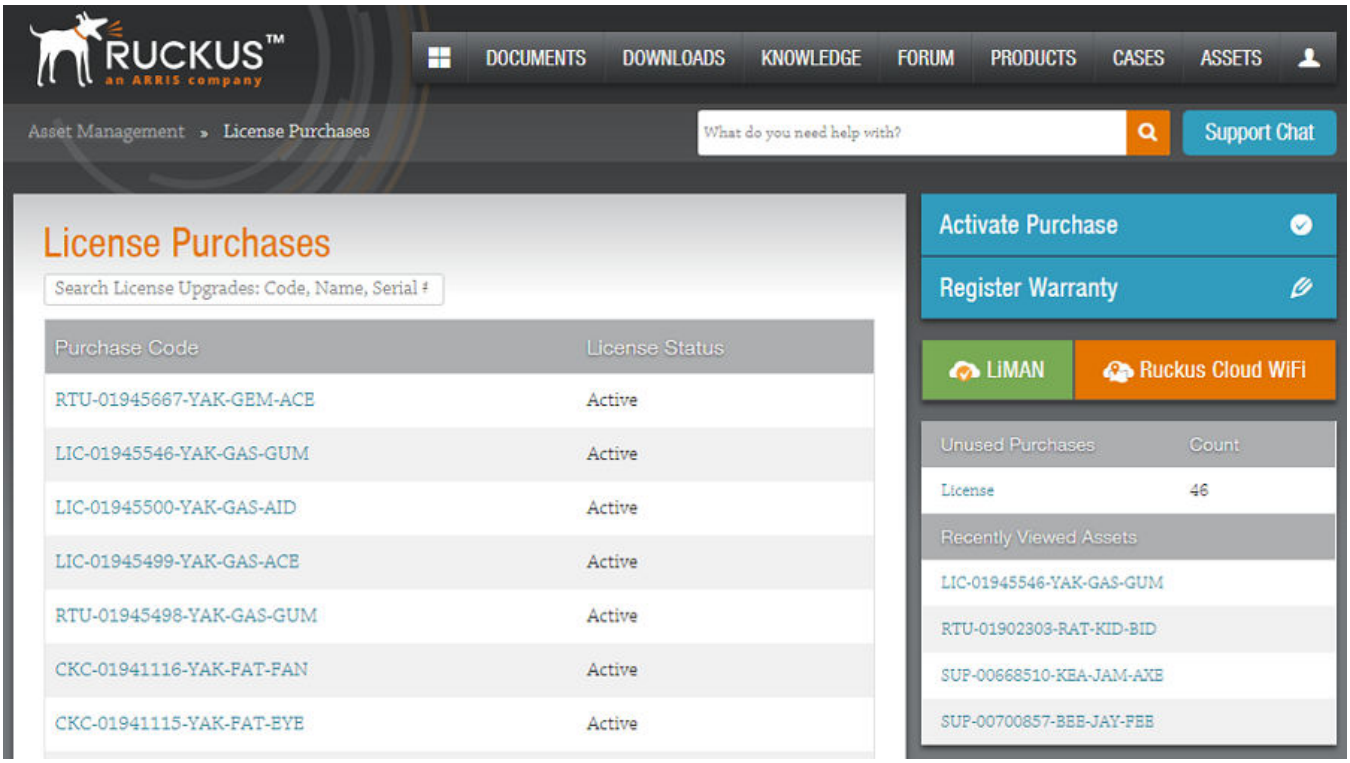
2. Select **Download Licenses**.

FIGURE 2 Download Licenses



3. Search for your license using either your Activation Code or serial number.

FIGURE 3 Searching for Your License



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 and Downgrading SAU Licenses

You can use the same commands and similar steps to install or downgrade an SAU licensed feature set.

Installing an SAU License

The examples in the following steps show how to upgrade from a 4x25G license to a 4x25GR license on a RUCKUS ICX 8200.

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

```
device# show license
Unit  License Name    L3 Premium Port Speed Upgrade   Speed    Ports    MACsec
1     4x25G             Yes        NA                  25G       NA       No
```

2. Enter the **show version** command to verify license details. The Current License field displays the license package you have currently installed on the device.
3. Enter the **license install perpetual** command followed by the unit number and the purchased license name.

```
device# license install perpetual 1 4x25gr
```

   The example installs a perpetual 4X25GR license on unit 1.
4. Enter **y** to accept the End User License Agreement (EULA).

```
The Ruckus FastIron End User License Agreement (EULA) terms and conditions found at https://
www.ruckuswireless.com/icxfastironeula apply to your use of this software.
The evaluation license period is 45 days after which you must purchase a license should you continue
using the software. Please confirm that you have read and accept these terms and conditions (enter
'y' or 'n'): y

By selecting 'y' you have read and accepted the Ruckus End USER License Agreement found at the
following URL https://www.ruckuswireless.com/icxfastironeula
```

5. Enter the **show license** command to confirm the license installation.

```
device# show license
Unit  License Name    L3 Premium Port Speed Upgrade   Speed    Ports    MACsec
1     4X25GR          Yes        Yes                  25G      4        NA
```

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

```
device# show version
Copyright (c) Ruckus Networks, Inc. All rights reserved.
    UNIT 1: compiled on Nov 25 2022 at 04:48:53 labeled as RDR10010dev
      (131334264 bytes) from Primary RDR10010dev.bin (UFI)
        SW: Version 10.0.10devT253
      Compressed Primary Boot Code size = 2097664, Version:10.2.01T255 (rdu1021b4)
       Compiled on Wed Nov  9 13:26:24 2022



  HW: Stackable ICX8200-48ZP2-POE
==============================================================================
UNIT 1: SL 1: ICX8200-48ZP2 POE 48-port Management Module
      Serial  #:FNC4318T00P
      Software Package: ICX8200_L3_SOFT_PACKAGE
      Current License: 4X25GR
      P-ASIC  0: type 9823, rev 01  Chip 98DX3530
==============================================================================
UNIT 1: SL 2: ICX8200-4x25G 4-port 100G Module
==============================================================================
1500 MHz ARMv8.2 Cortex-A55 processor 857 MHz bus
    8 MB boot flash memory
    8 GB code flash memory
    4 GB DRAM
STACKID 1  system uptime is 4 day(s) 17 hour(s) 7 minute(s) 34 second(s)
The system started at 18:08:25 GMT+00 Fri Nov 25 2022
The system : started=warm start   reloaded=by "reload"
*** NOT FOR PRODUCTION ***
```

NOTE

If you attempt to install a license that is already installed on the device, an error message is displayed, as shown in the following example.

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

7. (Optional) Enter the **license set serial-number** command to add the purchased serial number to the device.

```
device# license set serial-number 1 icx8200 FNC4318T00P
```

Once entered, the serial number will be displayed as part of the **show license** command output.

Downgrading an SAU License

The examples in the following steps show how to upgrade from a 4x25GR license to a 4x25G license on a RUCKUS ICX 8200.

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

```
device# show license
Unit  License Name    L3 Premium Port Speed Upgrade   Speed    Ports    MACsec
1     4X25GR          Yes        Yes                  25G      4        NA
```

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

```
device# license install perpetual 1 4x25g
```

   The example installs a perpetual 4X25G license on unit 1.

3. Enter **y** to accept the downgrade of the license.

```
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.
```

4. Enter the **show license** command to confirm the license installation.

```
device# show license
Unit  License Name    L3 Premium Port Speed Upgrade   Speed    Ports    MACsec
1     4X25G           No         Yes                  25G      4        NA
```

Viewing the Serial Number of the Device

Use the **show version** command to verify the serial number and software and hardware license package name of all units in the device. The following example is a sample output from an ICX 8200 unit.

```
device# show version
   Copyright (c) Ruckus Networks, Inc. All rights reserved.
    UNIT 1: compiled on Jun 12 2022 at 11:04:06 labeled as RDR10000_b250
      (80954784 bytes) from Primary RDR10000_b250.bin (UFI)
        SW: Version 10.0.00_b250T253
      Compressed Primary Boot Code size = 1573376, Version:10.2.01T255 (rdu1021b61)
       Compiled on Wed Apr  6 14:07:47 2022

  HW: Stackable ICX8200-24
==========================================================================
UNIT 1: SL 1: ICX8200-24 24-port Management Module
      Serial  #:FNC4318T00P
      Software Package: ICX8200_L3_SOFT_PACKAGE
      Current License: 4X25GR
      P-ASIC  0: type 9820, rev 01  Chip 98DX3500
==========================================================================
UNIT 1: SL 2: ICX8200-4x25G 4-port 100G Module
==========================================================================
 1500 MHz ARMv8.2 Cortex-A55 processor 857 MHz bus
   10 MB boot flash memory
    4 GB code flash memory
    4 GB DRAM
```

Viewing the License Database

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

```
device# show license
Unit  License Name    L3 Premium Port Speed Upgrade   Speed    Ports    MACsec
1     4X25GR          Yes        Yes                  25G      4        NA
2     4X25GR          Yes        Yes                  25G      4        NA
3     2X10GR          Yes        Yes                  10G      2        NA
```

Use the **show license unit** *unit-id* command to display license information for a specific unit. Both SAU and pre-existing XML licenses are displayed. In the following output example, the ICX premium license is installed on unit 1.

```
device# show license unit 1
Unit  License Name    L3 Premium Port Speed Upgrade   Speed    Ports    MACsec
1     4X25GR          Yes        Yes                  25G      4        NA
```

Deleting SAU Licenses from an ICX Device

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

1. From the privileged EXEC mode, enter the **license delete perpetual** command to delete an SAU license and restore the default license option.

```
device# license delete perpetual 1 4x25gr

By selecting 'y' current license will be deleted. The licensed configurations may be lost after
reload.
(enter 'y' or 'n'): y
License delete 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.
```

2. Enter the **show license** to display the license information.

```
device# show license
Unit  License Name    L3 Premium Port Speed Upgrade   Speed    Ports    MACsec
1     4X25G           No         Yes                  25G      4        NA
```

Upgrading Licenses for a Stack

Licenses for members of a stack can be managed from the active controller.

License updates for stack members can be entered from the active controller. As with standalone 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 active controller does not retain it.

The active and standby controllers 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 controllers.

In an ICX 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.

Stacking Support on RUCKUS ICX 8200 Devices

All RUCKUS ICX 8200 devices support stacking on 10-Gbps and 25-Gbps ports. Licenses must be purchased for Layer 3 Premium feature support.

The following table summarizes stacking support and available licenses for all RUCKUS ICX 8200 models.

TABLE 4

Model	License Name	L3 Premium Feature Support	License Package	Default Stacking Ports
ICX 8200-24, ICX 8200-24P, ICX 8200-48, ICX 8200-48P, ICX 8200-48PF, and ICX 8200-48PF2	4x25g	No	4X25G	x/2/1and x/2/3
	4x25gr	Yes	4X25GR	x/2/1and x/2/3
ICX 8200-C08PF	2x10gr	Yes	2X10GR	x/2/1 and x/2/2 (10G only)

Transferring a License

SAU licenses can be transferred from one RUCKUS device to another RUCKUS device if the license is being transferred between two similar models (for example, from an ICX 7650 to another ICX 7650).

A license transfer is intended for retrieving licenses from defective units. The licenses are removed from the defective unit within the support database and the unit is flagged as removed from service.

You can transfer an SAU license without assistance from RUCKUS Support staff (this type of license is not locked to a specific device). To transfer an SAU license, you must disable the feature associated with the license on the original device before you transfer the license to another device.

Syslog Messages and Trap Information

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

TABLE 5 Syslog Messages

Message level	Message	Explanation M
Informational	Stack: SAU license option on <*unit_id*> is changed to <*license_name*>	The SAU license option on the unit has changed.
Informational	Stack: unit <*unit_id*> deleted SAU license option <*license_name*>	The SAU license option on the unit has been deleted.

Layer 3 Premium Licensing

- Layer 3 Premium Features and Platform Support..... 25

Layer 3 Premium Features and Platform Support

A RUCKUS FastIron Layer 3 Premium license enables Layer 3 Premium features to be configured on an ICX switch.

In a stacking system, the Layer 3 Premium features can be enabled if all units in the stacking system have the premium license. If a Layer 3 Premium feature is enabled, any unit without a Layer 3 Premium license will go into a non-operational state when the unit is added to the stack. This unit will become operational if the Layer 3 Premium feature is disabled or if the Layer 3 Premium license is enabled on that unit.

The Layer 3 Premium feature set varies according to the ICX platform on which the license is used. The following sections list the Layer 3 features that are supported by the Layer 3 Premium license for each platform.

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

ICX 7550 Layer 3 Premium Features

The Layer 3 Premium license supports the following features on an ICX 7550.

- 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)

Static routing, RIP, RIPng (IPv6), and IPv6 IPsec tunneling features are available on the ICX 7550 without the Layer 3 Premium license.

ICX 7650 Layer 3 Premium Features

The Layer 3 Premium license supports the following features on an ICX 7650.

- OSPFv2
- OSPFv3
- VRRP
- VRRPv3
- VRRP-E
- GRE

- PBR
- PIM-SM, PIM-SSM, PIM-DM
- PIM Passive
- BGP, BGP4+ (IPv6)
- VRF (IPv4 and IPv6)
- IPv6 over IPv4 Tunnels

Static routing and RIP features are available on the Ruckus ICX 7650 without the Layer 3 Premium license.

ICX 7850 Layer 3 Premium Features

The Layer 3 Premium license supports the following features on an ICX 7850.

- OSPFv2
- OSPFv3
- VRRP
- VRRPv3
- VRRP-E
- GRE
- PBR
- PIM-SM, PIM-SSM, PIM-DM
- PIM Passive
- BGP, BGP4+ (IPv6)
- VRF (IPv4 and IPv6)
- IPv6 over IPv4 Tunnels

Static routing and RIP features are available on the RUCKUS ICX 7850 without the Layer 3 Premium license.

ICX 8200 Layer 3 Premium Features

The Layer 3 Premium license supports the following features on an ICX 8200.

- 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)

Static routing and RIP features are available on the RUCKUS ICX 8200 without the Layer 3 Premium license.

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, either Galois/Counter Mode Advanced Encryption Standard 128 or 256 (GCM-AES-128 or GCM-AES-256), 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.

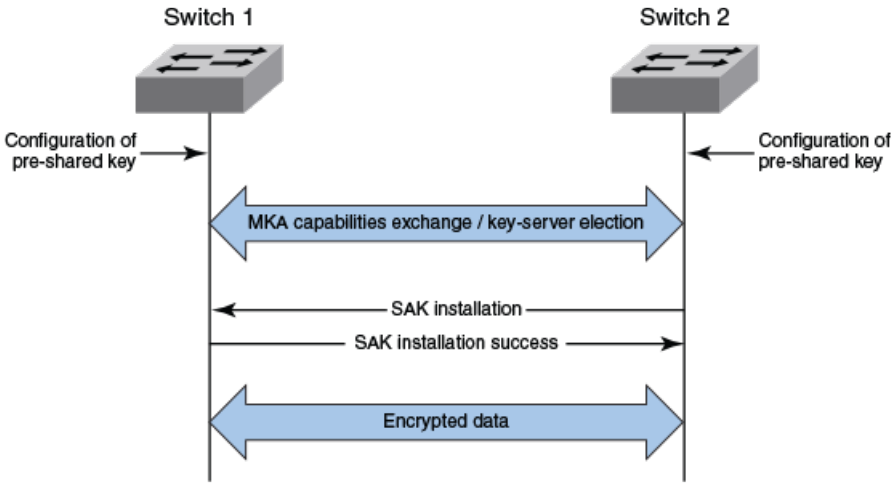
MKA Message Exchange between Two Switches

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 4 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 or PoD licenses already installed on ICX devices. 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 set of parameters must be applied.

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

   In the following example, Ethernet port 1 on slot 2 of unit 2 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.

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

3. This step is an option to configuring the pre-shared key as described later. At the dot1x-mka interface configuration level, enter the **mka-keychain** command, and specify the previously configured keychain to apply to the interface.

   ```
   device(config-dot1x-mka-2/2/1)# mka-keychain macsec1
   ```

In the following example, MACsec options configured for "group test1" and MKA keychain "macsec1" 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
device(config-dot1x-mka-2/2/1)# mka-keychain macsec1
device(config-dot1x-mka-2/2/1)# end
device#
```

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.

```
device# show license
Unit  License Name        L3 Premium  Port Speed Upgrade  Speed  Ports  MACSec
1     l3-prem-macsec      Yes         NA                  NA     NA     Yes
2     l3-base-macsec      No          NA                  NA     NA     Yes
```

Appendix: ICX License Serial Number Prefixes and Sample CoE

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- Sample Certificate of Entitlement..... 31

ICX License Serial Number Prefixes

The Certificate of Entitlement (CoE) issued for each license purchased includes a unique serial number.

The CoE license serial numbers have the format: PPPRabcdefg. In this format,

- PPP is the Serial Number Prefix, which identifies the type of license
- R is a serial number produced by Ruckus
- abcdefg is a unique number string.

An example CoE serial number is DVVR1234567.

The serial number prefixes are unique to each license type, as shown in the following table.

TABLE 6 Serial number prefix for each license

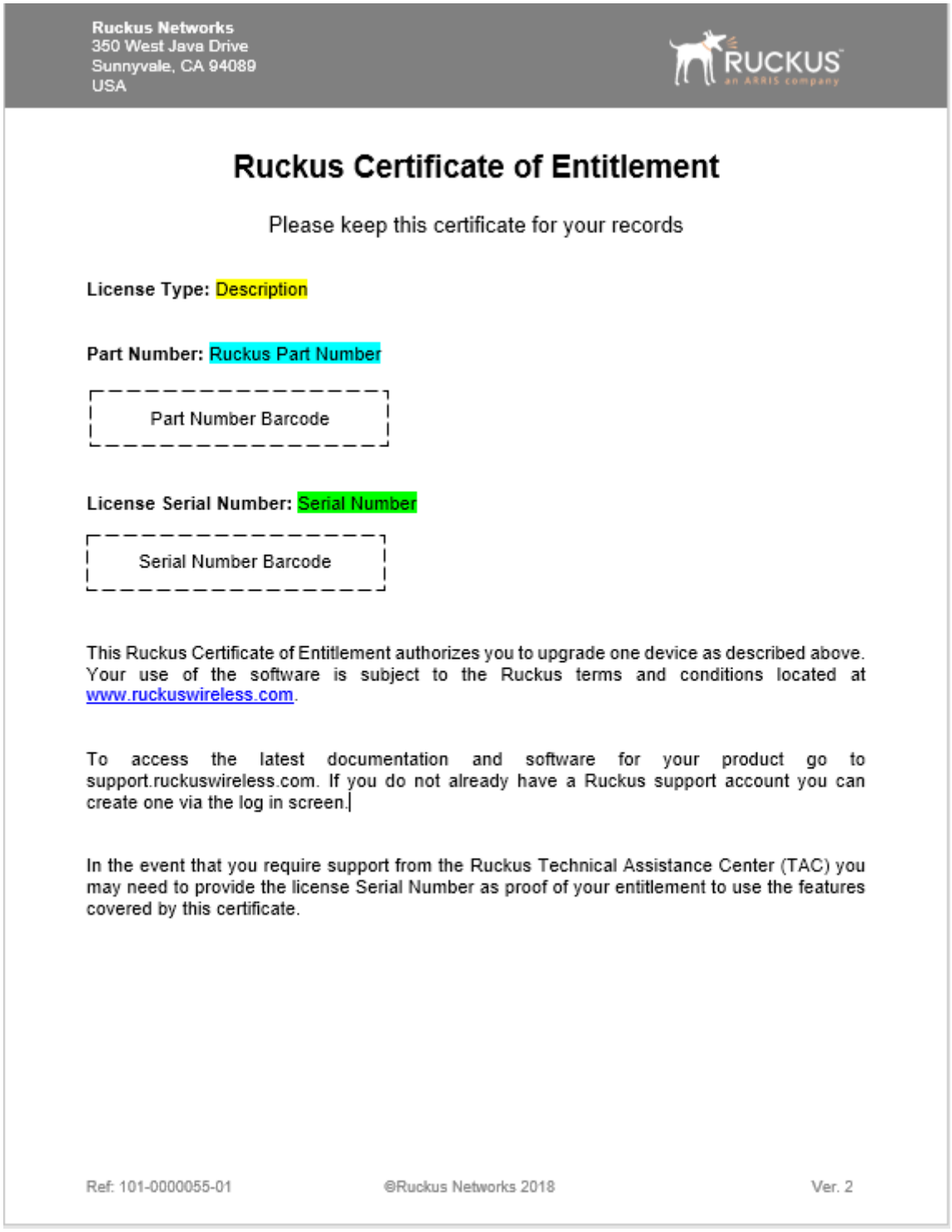
Ruckus Part Number	Description	Product Type	Serial Number Prefix
ICX-MACSEC-LIC	ICX MACSec License	ICX 7550 ICX 7650 ICX 7850	DBJ
ICX7550-PREM-LIC	ICX 7550 Layer 3 Premium Software License	ICX 7550	FMT
ICX7650-PREM-LIC	ICX 7650 layer 3 Premium software license	ICX 7650	FJE
ICX7850-PREM-LIC	ICX 7850 layer 3 Premium software license	ICX 7850	FMC

Sample Certificate of Entitlement

The license Certificate of Entitlement (CoE) is a proof of purchase that includes a description of the license, the Ruckus part number, and the license serial number.

See the following figure for a example of a CoE.

FIGURE 5 Sample CoE



Ruckus Networks
350 West Java Drive
Sunnyvale, CA 94089
USA

RUCKUS
an ARRIS company

Ruckus Certificate of Entitlement

Please keep this certificate for your records

License Type: Description

Part Number: Ruckus Part Number

Part Number Barcode

License Serial Number: Serial Number

Serial Number Barcode

This Ruckus Certificate of Entitlement authorizes you to upgrade one device as described above. Your use of the software is subject to the Ruckus terms and conditions located at www.ruckuswireless.com.

To access the latest documentation and software for your product go to support.ruckuswireless.com. If you do not already have a Ruckus support account you can create one via the log in screen.

In the event that you require support from the Ruckus Technical Assistance Center (TAC) you may need to provide the license Serial Number as proof of your entitlement to use the features covered by this certificate.

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