



# ExtremeXOS<sup>®</sup> Feature License Requirements

for Version 32.2

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# Preface

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Read the following topics to learn about:

- The meanings of text formats used in this document.
- Where you can find additional information and help.
- How to reach us with questions and comments.






## Text Conventions

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Unless otherwise noted, information in this document applies to all supported environments for the products in question. Exceptions, like command keywords associated with a specific software version, are identified in the text.

When a feature, function, or operation pertains to a specific hardware product, the product name is used. When features, functions, and operations are the same across an entire product family, such as ExtremeSwitching switches or SLX routers, the product is referred to as *the switch* or *the router*.

**Table 1: Notes and warnings**

Icon	Notice type	Alerts you to...
	Tip	Helpful tips and notices for using the product
	Note	Useful information or instructions
	Important	Important features or instructions
	Caution	Risk of personal injury, system damage, or loss of data
	Warning	Risk of severe personal injury

**Table 2: Text**

Convention	Description
screen displays	This typeface indicates command syntax, or represents information as it is displayed on the screen.
The words <i>enter</i> and <i>type</i>	When you see the word <i>enter</i> in this guide, you must type something, and then press the Return or Enter key. Do not press the Return or Enter key when an instruction simply says <i>type</i> .
<b>Key</b> names	Key names are written in boldface, for example <b>Ctrl</b> or <b>Esc</b> . If you must press two or more keys simultaneously, the key names are linked with a plus sign (+). Example: Press <b>Ctrl+Alt+Del</b>
Words in italicized type	Italics emphasize a point or denote new terms at the place where they are defined in the text. Italics are also used when referring to publication titles.
<b>NEW!</b>	New information. In a PDF, this is searchable text.

**Table 3: Command syntax**

Convention	Description
<b>bold</b> text	Bold text indicates command names, keywords, and command options.
<i>italic</i> text	Italic text indicates variable content.
[ ]	Syntax components displayed within square brackets are optional. Default responses to system prompts are enclosed in square brackets.
{ <b>x</b>   <b>y</b>   <b>z</b> }	A choice of required parameters is enclosed in curly brackets separated by vertical bars. You must select one of the options.
<b>x</b>   <b>y</b>	A vertical bar separates mutually exclusive elements.
< >	Nonprinting characters, such as passwords, are enclosed in angle brackets.
...	Repeat the previous element, for example, <i>member</i> [ <i>member</i> . . .].
\	In command examples, the backslash indicates a “soft” line break. When a backslash separates two lines of a command input, enter the entire command at the prompt without the backslash.

## Related Publications

### ExtremeXOS Publications

- [ExtremeXOS 32.2 Command Reference Guide](#)
- [ExtremeXOS and Switch Engine 32.2 EMS Messages Catalog](#)
- [ExtremeXOS 32.2 Feature License Requirements](#)
- [ExtremeXOS and Switch Engine 32.2 SNMP Traps Reference](#)
- [ExtremeXOS 32.2 User Guide](#)
- [ExtremeXOS Release Notes](#)

- [ExtremeXOS Quick Guide](#)
- [ACL Solutions Guide](#)
- [Extreme Hardware/Software Compatibility and Recommendation Matrices](#)
- [Extreme Optics Compatibility](#)
- [Switch Configuration with Chalet for ExtremeXOS 21.x and Later](#)
- [Using AVB with Extreme Switches](#)

## Extreme Management Center Publications

- [Extreme Management Center User Guide](#)
- Management Center online help is available by clicking the ? icon on all screens. The online help provides detailed explanations of how to configure and manage your network using Management Center.

## Open Source Declarations

Some software files have been licensed under certain open source licenses. More information is available at: [www.extremenetworks.com/support/policies/open-source-declaration/](http://www.extremenetworks.com/support/policies/open-source-declaration/).

## Send Feedback

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The Information Development team at Extreme Networks has made every effort to ensure that this document is accurate, complete, and easy to use. We strive to improve our documentation to help you in your work, so we want to hear from you. We welcome all feedback, but we especially want to know about:

- Content errors, or confusing or conflicting information.
- Improvements that would help you find relevant information.
- Broken links or usability issues.

To send feedback, do either of the following:

- Access the feedback form at <https://www.extremenetworks.com/documentation-feedback/>.
- Email us at [documentation@extremenetworks.com](mailto:documentation@extremenetworks.com).

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

## Help and Support

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If you require assistance, contact Extreme Networks using one of the following methods:

### Extreme Portal

Search the GTAC (Global Technical Assistance Center) knowledge base; manage support cases and service contracts; download software; and obtain product licensing, training, and certifications.

### The Hub

A forum for Extreme Networks customers to connect with one another, answer questions, and share ideas and feedback. This community is monitored by Extreme Networks employees, but is not intended to replace specific guidance from GTAC.

### Call GTAC

For immediate support: (800) 998 2408 (toll-free in U.S. and Canada) or 1 (408) 579 2826. For the support phone number in your country, visit: [www.extremenetworks.com/support/contact](http://www.extremenetworks.com/support/contact)

Before contacting Extreme Networks for technical support, have the following information ready:

- Your Extreme Networks service contract number, or serial numbers for all involved Extreme Networks products
- A description of the failure
- A description of any actions already taken to resolve the problem
- A description of your network environment (such as layout, cable type, other relevant environmental information)
- Network load at the time of trouble (if known)
- The device history (for example, if you have returned the device before, or if this is a recurring problem)
- Any related RMA (Return Material Authorization) numbers

## Subscribe to Product Announcements

You can subscribe to email notifications for product and software release announcements, Field Notices, and Vulnerability Notices.

1. Go to [The Hub](#).
2. In the list of categories, expand the **Product Announcements** list.
3. Select a product for which you would like to receive notifications.
4. Select **Subscribe**.
5. To select additional products, return to the **Product Announcements** list and repeat steps 3 and 4.

You can modify your product selections or unsubscribe at any time.

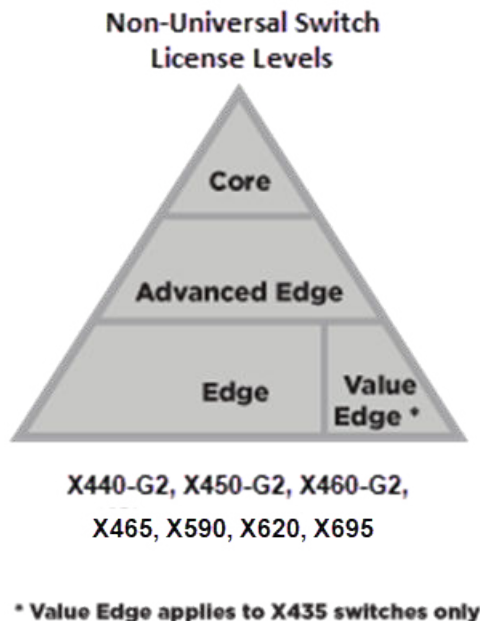


# License Overview

The ExtremeSwitching family of switches includes one category of switches with different license levels:

Switch Category	Switches	Applicable License Levels
<b>Non-Universal Hardware switches</b> (see <a href="#">Overview for non-Universal Hardware Switches</a> on page 9)	X435 *, X440-G2, X450-G2, X460-G2, X465, X590, X620, X695	Value Edge *, Edge, Advanced Edge, Core
<b>Note:</b> * The X435 is the only switch that supports the Value Edge license level.		

The following figure illustrates that each license level builds on the features of the license level below it. For example, the Advanced Edge license includes all of the features in the Edge license, plus the features in the Advance Edge license level.



**Figure 1: License Levels for non-Universal Switches**





# Overview for non-Universal Hardware Switches

[Installing and Uninstalling Licenses on non-Universal Hardware Switches](#) on page 10

[Displaying the Installed License Levels and Feature Licenses](#) on page 11

[Trial Licenses for ExtremeSwitching non-Universal Hardware Switches](#) on page 11

This document explains the license levels and feature licenses available for non-Universal Hardware switches, and lists the features that they support.

The ExtremeXOS software supports the following license levels for all non-Universal Hardware series switches:

- Value Edge (see [Value Edge](#))
- Edge (see [Edge](#))
- Advanced Edge (see [Advanced Edge License Features](#) on page 18)
- Core (see [Core License Features](#) on page 19)

The Value Edge license provides a basic feature set and the Core license includes the highest level of functionality. Each license level builds on the features of the license level below it. For example, the Advanced Edge license includes all of the features in the Edge license, plus the features in the Advanced Edge license. The Core license includes all of the features in the Edge license, Advanced Edge license, plus the features in the Core license.

**Table 4: Standard and Upgrade Licenses for ExtremeSwitching non-Universal Hardware Switches**

Switch platform	Value Edge	Edge	Advanced Edge	Core
ExtremeSwitching X435	Standard	—	—	—
ExtremeSwitching X440-G2	—	Standard	Upgrade	—
ExtremeSwitching X620	—	Standard	Upgrade	—
ExtremeSwitching X450-G2	—	Standard	Upgrade	Upgrade
ExtremeSwitching X460-G2	—	—	Standard	Upgrade
ExtremeSwitching X465	—	—	Standard	Upgrade
ExtremeSwitching X590	—	—	Standard	Upgrade
ExtremeSwitching X695	—	—	Standard	Upgrade

## Feature Licenses

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To supplement the license levels, additional capabilities can be added by purchasing feature licenses (see [Feature Licenses](#) on page 21).

### Additional General License Information

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Software licenses are stored in the EEPROM and, after enabled, persist through reboots, software upgrades, power outages, and reconfigurations. The keys are unique to the switch and are not transferable.

If you attempt to execute a command and you either do not have the required license or have reached the limits defined by the current license level, the system displays one of the following messages:

Error: This command cannot be executed at the current license level.

Error: You have reached the maximum limit for this feature at this license level.

## Installing and Uninstalling Licenses on non-Universal Hardware Switches

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This section explains how to obtain and install/uninstall licenses for non-Universal Hardware switches.

For the ExtremeSwitching series switches, in addition to the CLI method listed below, you can use ExtremeCloud IQ to obtain licenses. For information about using ExtremeCloud IQ, go to <https://www.extremenetworks.com/support/documentation/extremecloud-iq/>.

To obtain and install a license:



#### Note

You should have received by email a license voucher after your purchase of a switch. You will need the voucher ID number on this email to generate a license.

1. Go to the [Extreme Portal](#) to obtain a license file:
  - a. Select **Asset > Licenses Home**.
  - b. Select **Generate License**.
  - c. In the **Generate License** dialog, type the ID number in the **Voucher ID** box, and then select **Next**.
  - d. Enter the hardware serial number of the device the license will be applied to.
  - e. Select the box to acknowledge the terms and conditions, and then select **Submit**.

The Voucher Details page displays the license key or license file at the bottom.

2. If you have a license file (extension `.lic`):
  - a. Load the license file onto the switch using either of the following commands:
 

```
download [url
url {vr vrname} | image [active | inactive] [[hostname | ipaddress]
filename {{vr} vrname} {block-size block_size}] {partition} {install
{reboot}}
```

```
tftp get [ ip-address | host-name] { vr vr_name } { block-size
block_size } remote-file local-file} {force-overwrite}
```

To copy from a USB: `cp old_name new_name` specifying `/usr/local/ext`. For example:  
`cp /usr/local/ext/old_name /usr/local/cfg/new_name.`

You can place the license file anywhere within the user-visible file system (for example: `/usr/local/*`).

- b. Run the following command to install the license:

```
enable license file filename
```

3. If you have a license key (format `xxxx-xxxx-xxxx-xxxx-xxxx`), run the following command to install the license:

```
enable license {software} [key ]
```

To remove a license:

```
clear license [{software} | port-speed]
```



#### Caution

This command should be used only with the advice of a representative from Extreme Networks.

## Displaying the Installed License Levels and Feature Licenses

You can display the license level and feature licenses installed on your Extreme Networks switch by using the `show licenses {[slot slot |all]} {detail}` command.

## Trial Licenses for ExtremeSwitching non-Universal Hardware Switches

For non-Universal Hardware switches, you can obtain a trial license, which enables you to use the license for 30 days, and you can downgrade trial licenses to a lower software license level during the trial period. You can extend the time of the trial by 30 days two times (for a total of 90 days). Most feature licenses are enabled. After you enable the trial license, the switch behaves as if all software license levels and feature licenses are enabled. The trial license key contains all the necessary information on the license level and the number of days. Trial licenses can be applied only once for each software version; if you upgrade to a different software version, you can reapply your trial license. It is not recommended to use a trial license in production.



#### Note

The Network Timing feature license is not included in the trial license.

To enable a trial license, issue the command `debug epm enable trial-license`.

To clear a trial license, issue the command `debug epm clear trial-license`. A reboot is required before the clear license takes effect.



#### Note

Enabling a newly obtained license requires clearing the trial license, and then rebooting the switch.



# Switch License Features

[Value Edge License Features](#) on page 12

[Edge License Features](#) on page 16

[Advanced Edge License Features](#) on page 18

[Core License Features](#) on page 19

## Value Edge License Features

The Value Edge License includes features for L2 switching and L3 routing. The following table lists the features included in the Value Edge License.



**Note**

Listed platforms that do not support the Value Edge license do support these features with a higher license level.

**Table 5: ExtremeXOS Value Edge License Features**

ExtremeXOS software feature	Supported platforms
EDP	All platforms
Fabric Attach	All platforms
Identity Management	All platforms
LLDP 802.1ab	All platforms
LLDP-MED extensions	All platforms
VLANs—Port based and tagged trunks	All platforms
VLANs—MAC-based	All platforms
VLANs—Protocol-based	All platforms
VLANs—Private VLANs	All platforms
VLANs—VLAN translation	All platforms
VMANs—Q-in-Q tunneling (IEEE 802.1ad VMAN tunneling standard)	All platforms
VMANs—Egress queue selection based on 802.1p value in S-tag	All platforms
VMANs—Egress queue selection based on 802.1p value in C-tag	All platforms
VMANs—Secondary ethertype support	All platforms

**Table 5: ExtremeXOS Value Edge License Features (continued)**

ExtremeXOS software feature	Supported platforms
VMAN Customer Edge Port (CEP—also known as Selective Q-in-Q)	All platforms
VMAN Customer Edge Port CVID Egress Filtering / CVID Translation	All platforms
VMAN—CNP port	All platforms
VMAN—CNP port, double tag support	All platforms
VMAN—CNP port, double tag with egress filtering	All platforms
L2 Ping / Traceroute 802.1ag	All platforms
Jumbo frames (including all related items, MTU disc. IP frag.)	All platforms
QoS—egress port rate shaping/limiting	All platforms
QoS—egress queue rate shaping/limiting	All platforms
Link Aggregation Groups (LAG), static 802.3ad	All platforms
LAG dynamic (802.3ad LACP) edge, to servers only	All platforms
LAG (802.3ad LACP) core, between switches	All platforms
Port loopback detection and shutdown (ELRP CLI)	All platforms
Software redundant port	All platforms
STP 802.1D	All platforms
STP EMISTP +, PVST+ Compatibility mode (1 domain per port)	All platforms
STP EMISTP, PVST+ Full (multi-domain support)	All platforms
STP 802.1s	All platforms
STP 802.1w	All platforms
ERPS (4 max rings with matching ring ports)	All platforms
ESRP aware	All platforms
EAPS edge (4 max domains with matching ring ports)  <b>Note:</b> You can increase the number of domains by upgrading to the Advanced Edge license (see <a href="#">Advanced Edge License Features</a> on page 18).	All platforms
Link Fault Signaling (LFS)	All platforms
ELSM (Extreme Link Status Monitoring)	All platforms
ACLs, applied on ingress ports <ul style="list-style-type: none"> <li>• IPv4</li> <li>• Static</li> </ul>	All platforms

**Table 5: ExtremeXOS Value Edge License Features (continued)**

ExtremeXOS software feature	Supported platforms
ACLs, applied on ingress ports <ul style="list-style-type: none"> <li>IPv6</li> <li>Dynamic</li> </ul>	All platforms
ACLs, applied on egress ports	All platforms
ACLs, ingress meters	All platforms
ACLs, egress meters	All platforms
ACLs <ul style="list-style-type: none"> <li>Layer-2 protocol tunneling</li> <li>Byte counters</li> </ul>	All platforms
CPU DoS protect	All platforms
CPU Monitoring	All platforms
SNMPv3	All platforms
SSH2 server	All platforms
SSH2 client	All platforms
SCP/SFTP client	All platforms
SCP/SFTP server	All platforms
RADIUS and TACACS+ per command authentication	All platforms
Network Login <ul style="list-style-type: none"> <li>Web-based method</li> <li>802.1X method</li> <li>MAC-based method</li> <li>Local database for MAC/web-based methods</li> <li>Integration with Microsoft NAP</li> <li>Multiple supplicants - same VLAN</li> <li>HTTPS/SSL for web-based method</li> </ul>	All platforms
Network Login—Multiple supplicants - multiple VLANs	All platforms
Trusted OUI	All platforms
MAC security <ul style="list-style-type: none"> <li>Lockdown</li> <li>Limit</li> </ul>	All platforms
IP security—DHCP Option 82—L2 mode	All platforms
IP security—DHCP Option 82—L2 mode VLAN ID	All platforms
IP security—DHCP IP lockdown	All platforms
IP security—Trusted DHCP server ports	All platforms
Static IGMP membership, IGMP filters	All platforms
IPv4 unicast L2 switching	All platforms

**Table 5: ExtremeXOS Value Edge License Features (continued)**

ExtremeXOS software feature	Supported platforms
IPv4 multicast L2 switching	All platforms
IPv4 directed broadcast	All platforms
IPv4 <ul style="list-style-type: none"> <li>• Fast-direct broadcast</li> <li>• Ignore broadcast</li> </ul>	All platforms
IPv6 unicast L2 switching	All platforms
IPv6 multicast L2 switching	All platforms
IPv6 netTools—Ping, traceroute, BOOTP relay, DHCP, DNS, and SNTP	All platforms
IPv4 netTools—Ping, traceroute, BOOTP relay, DHCP, DNS, NTP, and SNTP	All platforms
IGMP v1/v2 snooping	All platforms
IGMP v3 snooping	All platforms
Multicast VLAN Registration (MVR)	All platforms
Static MLD membership, MLD filters	All platforms
MLD v1 snooping	All platforms
MLD v2 snooping	All platforms
sFlow accounting	All platforms
CLI scripting	All platforms
Web-based device management	All platforms
Web-based management—HTTPS/SSL support	All platforms
XML APIs (for partner integration)	All platforms
MIBs - Entity, for inventory	All platforms
Connectivity Fault Management (CFM)	All platforms
Remote mirroring	All platforms
Egress mirroring	All platforms
Y.1731 compliant frame delay and delay variance measurement	All platforms
MVRP - VLAN Topology Management	All platforms
EFM OAM - Unidirectional Link Fault Management	All platforms
Universal Port—VoIP auto configuration	All platforms
Universal Port—Dynamic user-based security policies	All platforms
Universal Port—Time-of-day policies	All platforms

## Edge License Features

The Edge License includes all Value Edge license features and the features in the following table.

**Table 6: ExtremeXOS and Switch Engine Edge License Features**

Software feature	Supported platforms
Extended Edge Switching	ExtremeSwitching X465 , X590
Convergence End Point (CEP) detection	All platforms
Direct Attach—based on the IEEE version of VEPA, eliminates the virtual switch layer, simplifying the network and improving performance. Direct Attach enables data center simplification by reducing network tiers from four or five tiers to just two or three tiers, depending on the size of the data center.	All platforms
CLEAR-Flow	All platforms
System virtual routers (VRs)	All platforms
DHCPv4: <ul style="list-style-type: none"> <li>• DHCPv4 server</li> <li>• DHCv4 client</li> <li>• DHCPv4 relay</li> <li>• DHCPv4 smart relay</li> </ul>	All platforms
DHCPv6: <ul style="list-style-type: none"> <li>• DHCPv6 relay</li> <li>• DHCPv6 prefix delegation snooping</li> <li>• DHCPv6 client</li> <li>• DHCPv6 smart relay</li> <li>• DHCPv6 remote ID</li> </ul>	All platforms
User-created virtual routers (VRs) Virtual router and forwarding (VRF)	ExtremeSwitching X450-G2, X460-G2, X465, X590, X695
Local-only, user-created virtual routers (VR)	ExtremeSwitching X435, X440-G2, X620
VLAN aggregation	All platforms
Multinetting for forwarding	All platforms
UDP Forwarding	All platforms
UDP BootP relay forwarding	All platforms
IPv4 unicast routing, including static routes	All platforms
IPv4 multicast routing, including static routes	All platforms
<b>Note:</b> This feature has limitations in the Edge and Advanced Edge licenses. See the <a href="#">ExtremeXOS 32.2 User Guide</a> .	
IPv4 Duplicate Address Detection (DAD)	All platforms
IPv6 unicast routing, including static routes	All platforms



**Table 6: ExtremeXOS and Switch Engine Edge License Features (continued)**

Software feature	Supported platforms
IPv6 interworking—IPv6-to-IPv4 and IPv6-in-IPv4 configured tunnels	All platforms, except X435, X620, and X440-G2
IPv6 DAD without CLI management	All platforms
IPv6 DAD with CLI management	All platforms
IP security: <ul style="list-style-type: none"> <li>DHCP Option 82—L3 mode</li> <li>DHCP Option 82—L3 mode VLAN ID</li> <li>Disable ARP learning</li> <li>Gratuitous ARP protection</li> <li>DHCP secured ARP / ARP validation</li> <li>Source IP lockdown</li> </ul>	All platforms
IP address security: <ul style="list-style-type: none"> <li>DHCP snooping</li> <li>Trusted DHCP server</li> <li>Source IP lockdown</li> <li>ARP validation</li> </ul>	All platforms
IP Flow Information Export (IPFIX)	ExtremeSwitching X460-G2
IP NAT	ExtremeSwitching X590, X465, X695
Keychain Manager	All platforms
Multi-Switch Link Aggregation Group (MLAG)	All platforms
ONEPolicy	All platforms
Policy based routing (PBR) for IPv4	All platforms
Policy based routing (PBR) for IPv6	All platforms
PIM snooping <b>Note:</b> This feature has limitations in the Edge and Advanced Edge licenses. See the <a href="#">ExtremeXOS 32.2 User Guide</a> .	All platforms
Protocol-based VLANs	All platforms
RIP v1/v2	All platforms
RIPng	All platforms
Routing access policies	All platforms
Route maps	All platforms
SummitStack (switch stacking using native or dedicated ports)	ExtremeSwitching X460-G2 with X460-G2-VIM-2SS optional card, and X450-G2
SummitStack-V (switch stacking using dual-purpose data ports)	All platforms, except X435. See the specific models listed in the "Support for Alternate Stacking Ports" section of the <a href="#">ExtremeXOS 32.2 User Guide</a> .

**Table 6: ExtremeXOS and Switch Engine Edge License Features (continued)**

Software feature	Supported platforms
SyncE	ExtremeSwitching X460-G2
Python scripting	All platforms
Extreme Network Virtualization (XNV)	All platforms, except X435

## Advanced Edge License Features

The Advanced Edge License includes all Edge License features and the features in the following table.

**Table 7: ExtremeXOS Advanced Edge License Features**

Software Feature	Supported Platforms
AVB <ul style="list-style-type: none"> <li>Generalized Precision Time Protocol (GPTP)</li> <li>Multiple VLAN Registration Protocol (MVRP)</li> <li>Multiple Stream Registration Protocol (MSRP)</li> <li>Platform Support</li> </ul>	All platforms. The ExtremeSwitching X590, and X695 series switches have the AVB Feature License included in the Advanced Edge or Base License. You do not need to separately purchase and install the AVB Feature License for these switches.  <b>Note:</b> The ExtremeSwitching X465 series switches support AVB on the front panel ports only, and only on the following VIMs (all ports): <ul style="list-style-type: none"> <li>VIM5-4X</li> <li>VIM5-2Y</li> <li>VIM5-4Y</li> <li>VIM5-2Q</li> </ul>
BGP Auto-peering	ExtremeSwitching X465, X590, X695.
EAPS Advanced Edge—multiple physical rings, and "common links", also known as "shared port".	All platforms
ERPS-more domains (allows 32 rings with matching ring ports) and multi-ring support	All platforms
ESRP-Full	All platforms
ESRP-Virtual MAC	All platforms
OSPFv2-Edge (limited to max of 4 active interfaces)	All platforms that support the Advanced Edge or Core licenses (see <a href="#">Table 4</a> on page 9).
OSPFv2 Auto-peering	ExtremeSwitching X465, X590, X695.
OSPFv3-Edge (limited to max of 4 active interfaces)	All platforms that support the Advanced Edge or Core licenses (see <a href="#">Table 4</a> on page 9).

**Table 7: ExtremeXOS Advanced Edge License Features (continued)**

Software Feature	Supported Platforms
PIM-SM-Edge	All platforms that support the Advanced Edge or Core licenses (see <a href="#">Table 4</a> on page 9).
PSTag	ExtremeSwitching X460-G2, X465, X590, X695.
VRRP	All platforms that support the Advanced Edge or Core licenses (see <a href="#">Table 4</a> on page 9).
VXLAN	ExtremeSwitching X465, X590, X695.

## Core License Features

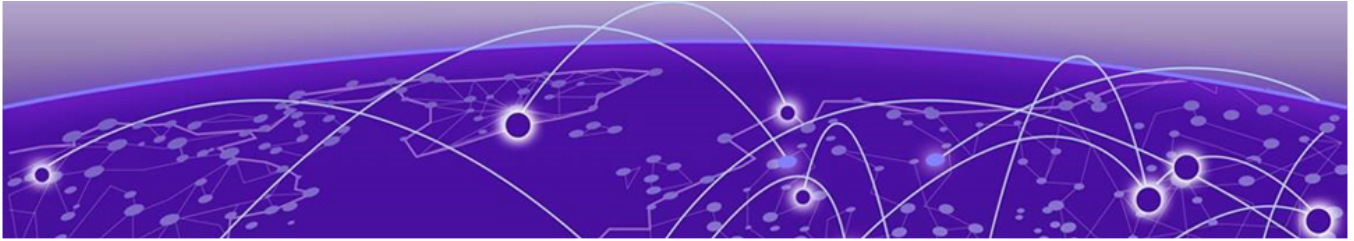
The Core License includes all Edge License features, Advanced Edge License features, and the features in the following table.

**Table 8: ExtremeXOS Core License Features**

ExtremeXOS software feature	Supported platforms
PIM DM "Full"	Core license platforms listed in <a href="#">Table 4</a> on page 9.
PIM SM "Full"	Core license platforms listed in <a href="#">Table 4</a> on page 9.
PIM SSM "Full"	Core license platforms listed in <a href="#">Table 4</a> on page 9.
Anycast RP Using PIM (RFC 4610)	Core license platforms listed in <a href="#">Table 4</a> on page 9.
OSPFv2 "Full" (not limited to 4 active interfaces)	Core license platforms listed in <a href="#">Table 4</a> on page 9.
OSPFv3 "Full" (not limited to 4 active interfaces)	Core license platforms listed in <a href="#">Table 4</a> on page 9.
BGP4 and MBGP (BGP4+) for IPv4 ECMP	Core license platforms listed in <a href="#">Table 4</a> on page 9.
BGP4 and MBGP (BGP4+) for IPv6	Core license platforms listed in <a href="#">Table 4</a> on page 9.
IS-IS for IPv4	Core license platforms listed in <a href="#">Table 4</a> on page 9.
IS-IS for IPv6	Core license platforms listed in <a href="#">Table 4</a> on page 9.
MSDP	Core license platforms listed in <a href="#">Table 4</a> on page 9.
Anycast RP	Core license platforms listed in <a href="#">Table 4</a> on page 9.

**Table 8: ExtremeXOS Core License Features (continued)**

ExtremeXOS software feature	Supported platforms
GRE tunneling	Core license platforms listed in <a href="#">Table 4</a> on page 9.
EVPN	ExtremeSwitching X465, X590, and X695 series switches.
Integrated Application Hosting (IAH)	ExtremeSwitching X465-24MU, X465-2MU-24W, X465i-48W, and X465-24XE switches, X695.



## Feature Licenses

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[MPLS Feature License on page 25](#)

[Network Timing Feature License on page 25](#)

[ExtremeSwitching X440-G2 10 Gigabit Port Licensing on page 26](#)

[MAC Security Feature License on page 27](#)

[Optics XMOD on page 27](#)

The ExtremeXOS software features are listed in the following table are managed as feature licenses. Feature licenses are distributed in one of the following forms:

- **In ExtremeXOS software** (standard software component)—You must purchase a license to use the feature.
- **Modular software package** (XMOD file, so named because of its .xmod file extension)—You must request the XMOD file from your supplier and install it.

For feature license and installation instructions, see *Installing a Modular Software Package* in the [ExtremeXOS 32.2 User Guide](#).



#### Note

Starting with ExtremeXOS 21.1, Secure Shell 2 (SSH2) is no longer provided as a feature license. It is incorporated into the main ExtremeXOS software image and is no longer provided as an XMOD. However, SSH2 contains strong encryption algorithms that heighten the export controls required in the US and other countries. When downloading the ExtremeXOS software image, you are required to verify that you meet the export clearance requirements. For more information, see *Software Upgrade and Boot Options* in the [ExtremeXOS 32.2 User Guide](#).

For more information on SSH2, see *Using Secure Shell 2* in the [ExtremeXOS 32.2 User Guide](#).

**Table 9: ExtremeXOS Feature Licenses**

Feature License	Feature	Platform support	XMOD Required
MPLS Feature License See <a href="#">MPLS Feature License</a> on page 25.	<ul style="list-style-type: none"> <li>• MPLS</li> <li>• LDP</li> <li>• Static LSPs</li> <li>• OSPF-TE</li> <li>• MPLS label</li> <li>• EXP bit replacement and classification</li> <li>• RSVP-TE</li> <li>• VPLS / H-VPLS for VLANs</li> <li>• VPLS STP redundancy</li> <li>• VPLS with ESRP redundancy</li> <li>• VPLS with EAPS redundancy</li> <li>• Fast Reroute (FRR)</li> <li>• Support for PW counters</li> <li>• User Virtual Routers</li> <li>• L3VPN</li> </ul>	ExtremeSwitching X460-G2, X465, X590, X695 series switches.	No
AVB Feature License	<ul style="list-style-type: none"> <li>• Generalized Precision Time Protocol (GPTP)</li> <li>• Multiple VLAN Registration Protocol (MVRP)</li> <li>• Multiple Stream Registration Protocol (MSRP)</li> <li>• Platform Support</li> </ul>	<p>All platforms. The ExtremeSwitching X590 and X695 series switches have the AVB Feature License included in the Advanced Edge License. You do not need to separately purchase and install the AVB Feature License for these switches.</p> <p><b>Note:</b> The ExtremeSwitching X465 series switches support AVB on the</p>	No

**Table 9: ExtremeXOS Feature Licenses (continued)**

Feature License	Feature	Platform support	XMOD Required
		<p>front panel ports only, and only on the following VIMs (all ports):</p> <ul style="list-style-type: none"> <li>• VIM5-4X</li> <li>• VIM5-2Y</li> <li>• VIM5-4Y</li> <li>• VIM5-2Q</li> </ul> <p><b>Note:</b> The ExtremeSwitching X590 series switch supports AVB on all ports, except ports 25–36.</p> <p><b>Note:</b> The ExtremeSwitching X440-G2 series switches support AVB, but AVB support on 48-port models is limited to ports on the front-panel ports 1-24 and 51-52.</p>	
Network Timing Feature License See <a href="#">Network Timing Feature License</a> on page 25.	Precision Time Protocol (PTPv2)	Not supported	No
ExtremeSwitching X440-G2 10 Gigabit Port Licensing See <a href="#">ExtremeSwitching X440-G2 10 Gigabit Port Licensing</a> on page 26.	10 Gigabit Port Licensing	ExtremeSwitching X440-G2 series switches.	No
MAC Security License See <a href="#">MAC Security Feature License</a> on page 27.	MAC Security licensing.	See <a href="#">MACsec Platform Support</a>	No

**Table 9: ExtremeXOS Feature Licenses (continued)**

Feature License	Feature	Platform support	XMOD Required
Optics See <a href="#">Optics XMOD</a> on page 27.	Optical transceiver support available outside of ExtremeXOS release cycle.	ExtremeSwitching X465 and X590 series switches.	Yes
ExtremeCloud™ IQ Agent	ExtremeCloud IQ provides device discovery, basic monitoring, visibility into homogenous stacking, ability to configure an optional user-defined VR and address of the server for to connect to. For more information about ExtremeCloud IQ, go to <a href="https://www.extremenetworks.com/extremecloud-iq/">https://www.extremenetworks.com/extremecloud-iq/</a> .	See <a href="#">ExtremeCloud IQ Platform Support</a> on page 25	Yes

## MACsec Platform Support

Platform	Ports	LRM/MACsec Adapter Required?
ExtremeSwitching X460-G2-24p-24hp, X460-G2-24t-24ht switches	Half-duplex, 1G ports (25–48)	No
	All other SFP/SFP+ ports *	Yes
ExtremeSwitching X450-G2, X460-G2, X440-G2, X590, X620, and X695 series switches	SFP/SFP+ ports *	Yes
ExtremeSwitching X465	X465-24W, X465-24XE: ports 1–24 X465-48T, X465-48P, X465-48W, X465i-48W: ports 1–48 X465-24MU-24W: ports 25–48 VIM5-4XE: all 4 ports VIM5-4YE in X465-24MU, X465-24MU-24W switches: all 4 ports VIM5-4YE in X465-24W, X465-48T, X465-48P, X465-48W, X464.24S, X465-24S, X465i-48W: first 2 ports only	No
<b>Note:</b> * For ExtremeSwitching X460-G2 series switches, the VIM-2X option does not support the LRM/MACsec Adapter.		



## ExtremeCloud IQ Platform Support

**Table 10: Supported Platforms**

Switch Series	Switch Models
ExtremeSwitching X435	X435-8T-4S X435-8P-4S X435-8P-2T-W X435-24T-4S X435-24P-4S
ExtremeSwitching X440-G2	X440-G2-24P-10GE4 X440-G2-48P-10GE4 X440-G2-12T-10GE4 X440-G2-12P-10GE4 X440-G2-24T-10GE4 X440-G2-48T-10GE4
ExtremeSwitching X450-G2	X450-G2-24P-10GE X450-G2-48P-10GE X450-G2-24P-GE4 X450-G2-48P-GE4
ExtremeSwitching X460-G2	X460-G2-24P-10GE4 X460-G2-48P-10GE4 X460-G2-16MP-32P-10GE4 X460-G2-24P-48HP-10GE4
ExtremeSwitching X465	X465-48P X465-24MU-24W X465-24W X465-48W X465-24MU

### MPLS Feature License

MPLS support, including VPLS L2 VPNs and L3 VPNs, can be obtained from Extreme Networks at an additional cost, as a feature license.

A separate feature license must be purchased for each switch that runs MPLS and VPLS.

MPLS requires an Advanced Edge or Core software license.

After you enable the feature license, the feature CLI commands are visible; without an enabled MPLS feature license, you do not see any feature commands on the console.

### Network Timing Feature License

This feature is not supported on any platforms in this release. Support for X670-G2 series switches was removed in ExtremeXOS 30.7, and for X460-G2 series switches in ExtremeXOS 31.2.

## ExtremeSwitching X440-G2 10 Gigabit Port Licensing

ExtremeSwitching X440-G2 10 Gigabit model switches require a license to upgrade the four SFP+ 1GbE ports to 10G:

- Dual 10GbE Upgrade License—enables 10G Ethernet on the non-stack capable ports
- Quad 10GbE Upgrade License—enables 10G Ethernet on all four uplink ports
- Dual to Quad 10 GbE Upgrade License—enables two more (total of four) 10G Ethernet on the uplink ports



### Note

SFP+ ports that can be used as stack ports after enabling stacking-support do not require a license to operate as stack ports.

The following table summarizes the specific ports licensed with each license type along with the ports that can be used as stack ports without any license.

**Table 11: ExtremeSwitching X440-G2 10G Port Licensing**

Model	Dual License	Quad License	Convert to Stack Port (No License Required)
X440-G2-48t-10GE4 X440-G2-48p-10GE4 X440-G2-48t-10GE4-DC	51-52	49-52	49-50
X440-G2-24t-10GE4 X440-G2-24p-10GE4 X440-G2-24t-10GE4-DC X440-G2-24x-10GE4	25-26	25-28	27-28
X440-G2-12t-10GE4 X440-G2-12p-10GE4	13-14	13-16	15-16

These licenses take effect immediately after successful installation. No reboot is required to activate the installed license. Following successful installation of the license, 10G speed is supported on these ports. Ports with 10G optics installed are re-enabled at 10G speed and ports without optics are defaulted to 10G speed.

Without a license installed, these ports are set at 1G, autonegotiation enabled, and cannot be configured for 10G.

In a stack, a 10G upgrade license must be applied to each node in the stack for which 10G capability is required on the individual node's non-stack 10G ports. There is no requirement to match or install any 10G licenses on master-capable nodes.

For example, consider a stack of three nodes, all 10G-capable X440-G2 models with slot-1 as master, slot-2 as backup, and slot-3 as standby, and not master-capable. In this stack, you only require the 10G capability on the standby slot-3, non-stack 10G ports. In this case, a Dual 10G upgrade license should be installed on slot-3. Slots 1 and 2 do not require any license. Note also that a Quad 10G license can be used in this configuration, but adds no extra capability since the two stacking capable 10G ports are used as stack ports.

## MAC Security Feature License

Use of the MAC Security (MACsec) feature requires a slot-based MACsec Feature License.

Slot-based MACsec licenses have the following behaviors (see [Table 12](#)).

**Table 12: MACsec License Behavior**

	No License	License Installed
Standalone Switch	<ul style="list-style-type: none"> <li>The command <code>show macsec</code> is the only available command.</li> <li>MACsec cannot be configured or enabled.</li> </ul>	<ul style="list-style-type: none"> <li>All MACsec commands are available.</li> <li>MACsec can be configured and enabled.</li> </ul>
Stack	<ul style="list-style-type: none"> <li>All MACsec commands are available.</li> <li>MACsec can be configured on MACsec-capable slots.</li> <li>If configured, MACsec cannot be enabled.</li> </ul>	<ul style="list-style-type: none"> <li>All MACsec commands are available.</li> <li>MACsec can be configured and enabled on licensed slots.</li> </ul>



### Note

In a stack, any slot configured with a MACsec-capable module (with `configure slot slot module module_type`) can be configured for MACsec, even if the slot is not physically present, or if the slot is present, but does not have a valid MACsec license installed.

## Optics XMOD

The Optics XMOD is a separate software package that can add optical transceiver support between ExtremeXOS releases.

## Limitations

The Optics XMOD does not have the capability to communicate directly with the hardware, so not all transceivers can be supported solely through the Optics XMOD. If a new transceiver requires some type of unique initialization that requires direct hardware access, it may require a new ExtremeXOS release.