



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

*for Version 30.2*



Copyright © 2019 Extreme Networks, Inc. All rights reserved.

## Legal Notice

Extreme Networks, Inc. reserves the right to make changes in specifications and other information contained in this document and its website without prior notice. The reader should in all cases consult representatives of Extreme Networks to determine whether any such changes have been made.

The hardware, firmware, software or any specifications described or referred to in this document are subject to change without notice.

## Trademarks

Extreme Networks and the Extreme Networks logo are trademarks or registered trademarks of Extreme Networks, Inc. in the United States and/or other countries.

All other names (including any product names) mentioned in this document are the property of their respective owners and may be trademarks or registered trademarks of their respective companies/owners.

For additional information on Extreme Networks trademarks, please see:

[www.extremenetworks.com/company/legal/trademarks](http://www.extremenetworks.com/company/legal/trademarks)

## Open Source Declarations

Some software files have been licensed under certain open source or third-party licenses. End-user license agreements and open source declarations can be found at:

[www.extremenetworks.com/support/policies/software-licensing](http://www.extremenetworks.com/support/policies/software-licensing)

# Table of Contents

---

<b>Preface</b> .....	<b>4</b>
Text Conventions.....	4
Related Publications.....	4
Providing Feedback to Us.....	5
Getting Help.....	5
<b>Chapter 1: Overview</b> .....	<b>7</b>
Displaying the Installed Licenses and Feature Packs.....	8
Trial Licenses.....	8
<b>Chapter 2: Switch License Features</b> .....	<b>9</b>
Edge License Features.....	9
Advanced Edge License Features.....	14
Core License Features.....	15
<b>Chapter 3: Feature Pack Features</b> .....	<b>16</b>
MPLS Feature Pack.....	19
Network Timing Feature Pack.....	19
ExtremeSwitching X440-G2 10 Gigabit Port Licensing.....	19
ExtremeSwitching X870-96x-8c Switch Port Speed License.....	20
MAC Security Feature Pack License.....	21
Optics XMOD.....	21







# Preface

This section discusses the conventions used in this guide, ways to provide feedback, additional help, and other Extreme Networks® publications.

## Text Conventions

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

**Table 1: Notice Icons**

Icon	Notice Type	Alerts you to...
	General Notice	Helpful tips and notices for using the product.
	Note	Important features or instructions.
	Caution	Risk of personal injury, system damage, or loss of data.
	Warning	Risk of severe personal injury.
<i>New!</i>	New Content	Displayed next to new content. This is searchable text within the PDF.

**Table 2: Text Conventions**

Convention	Description
Screen displays	This typeface indicates command syntax, or represents information as it appears on the screen.
The words <b>enter</b> and <b>type</b>	When you see the word “enter” 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 “type.”
<b>[Key]</b> names	Key names are written with brackets, such as <b>[Return]</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>
<i>Words in italicized type</i>	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.

## Related Publications

### ExtremeXOS Publications

- [ACL Solutions Guide](#)
- [ExtremeXOS 30.2 Command Reference Guide](#)
- [ExtremeXOS 30.2 EMS Messages Catalog](#)

- *ExtremeXOS 30.2 Feature License Requirements*
- *ExtremeXOS 30.2 User Guide*
- *ExtremeXOS OpenFlow User Guide*
- *ExtremeXOS Quick Guide*
- *ExtremeXOS Legacy CLI Quick Reference Guide*
- *ExtremeXOS Release Notes*
- *Extreme Hardware/Software Compatibility and Recommendation Matrices*
- *Switch Configuration with Chalet for ExtremeXOS 21.x and Later*
- *Using AVB with Extreme Switches*

## 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/).

## Providing Feedback to Us

Quality is our first concern at Extreme Networks, and we have made every effort to ensure the accuracy and completeness of this document. We are always striving to improve our documentation and help you work better, so we want to hear from you! We welcome all feedback but especially want to know about:

- Content errors or confusing or conflicting information.
- Ideas for improvements to our documentation so you can find the information you need faster.
- Broken links or usability issues.

If you would like to provide feedback to the Extreme Networks Information Development team, you can do so in two ways:

- Use our short online feedback form at <https://www.extremenetworks.com/documentation-feedback/>.
- Email us at [documentation@extremenetworks.com](mailto:documentation@extremenetworks.com).

Please 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.

## Getting Help

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

- |                       |  |
|-----------------------|--|
| <b>Extreme Portal</b> | Search the GTAC (Global Technical Assistance Center) knowledge base, manage support cases and service contracts, download software, and obtain product licensing, training, and certifications.  |
| <b>The Hub</b>        | 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.         |
| <b>Call GTAC</b>      | For immediate support: 1-800-998-2408 (toll-free in U.S. and Canada) or +1 408-579-2826. For the support phone number in your country, visit: <a href="http://www.extremenetworks.com/support/contact">www.extremenetworks.com/support/contact</a> |

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

- Your Extreme Networks service contract number and/or serial numbers for all involved Extreme Networks products
- A description of the failure
- A description of any action(s) 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

## Subscribing to Service Notifications

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

- 1 Go to [www.extremenetworks.com/support/service-notification-form](http://www.extremenetworks.com/support/service-notification-form).
- 2 Complete the form with your information (all fields are required).
- 3 Select the products for which you would like to receive notifications.



### Note

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

---

- 4 Click **Submit**.

# 1 Overview

## Displaying the Installed Licenses and Feature Packs Trial Licenses

This document introduces the licenses and feature packs available for the ExtremeXOS® 30.2 software and lists the features they support.

The ExtremeXOS software supports the following license options:

- Edge
- Advanced Edge
- Core
- Feature Packs

The 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. The following table lists the software licenses available for each platform that supports ExtremeXOS software.



### Note

The Advanced Core license is no longer offered.

**Table 3: Standard and Upgrade Licenses for ExtremeXOS Switches**

Switch Platform	Edge License	Advanced Edge License	Core License
ExtremeSwitching X440-G2	Standard	Upgrade	—
ExtremeSwitching X620	Standard	Upgrade	—
Summit X450-G2	Standard	Upgrade	Upgrade
Summit X460-G2	—	Standard	Upgrade
ExtremeSwitching X465	—	Standard	Upgrade
Summit X670-G2	—	Standard	Upgrade
ExtremeSwitching X870	—	Standard	Upgrade
ExtremeSwitching X690	—	Standard	Upgrade
ExtremeSwitching X590	—	Standard	Upgrade

Software keys are stored in the EEPROM and, once 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 returns 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.
```

---

## Displaying the Installed Licenses and Feature Packs

---

You can display the types of licenses and feature packs installed on your Extreme Networks switch by using the `show licenses` command.

---

## Trial Licenses

---

You can obtain a trial license, which allows 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 packs are enabled. After you enable the trial license, the switch behaves as if all software license levels and feature packs 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 pack is not included in the trial license.

---

To enable a trial license, execute `debug epm enable trial-license`.

To clear a trial license, execute `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.

---



# 2 Switch License Features

Edge License Features  
Advanced Edge License Features  
Core License Features

## Edge License Features

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



### Note

Listed platforms that do not support this license support these features with a higher license level.

**Table 4: ExtremeXOS Edge License Features**

ExtremeXOS Software Feature	Supported Platforms
Fabric Attach	All platforms
Extended Edge Switching	Summit X670-G2, ExtremeSwitching X465, X590, X690
EDP	All platforms.
Extreme Network Virtualization (XNV)	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.
VMAN Customer Edge Port (CEP—also known as Selective Q-in-Q)	All platforms.

**Table 4: ExtremeXOS Edge License Features (continued)**

ExtremeXOS Software Feature	Supported 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 14).	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.
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.

**Table 4: ExtremeXOS Edge License Features (continued)**

ExtremeXOS Software Feature	Supported 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.
Convergence End Point (CEP) detection	All platforms.
CPU DoS protect	All platforms.
CPU Monitoring	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.
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.
IPv4 multicast L2 switching	All platforms.

**Table 4: ExtremeXOS Edge License Features (continued)**

ExtremeXOS Software Feature	Supported 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.
CLEARFlow	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.

**Table 4: ExtremeXOS Edge License Features (continued)**

ExtremeXOS Software Feature	Supported 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)	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X465, X870, X690, X590
Local-only, user-created virtual routers (VR).	ExtremeSwitching 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  <b>Note:</b> This feature has limitations in the Edge and Advanced Edge licenses. See the <a href="#">ExtremeXOS 30.2 User Guide</a> .	All platforms.
IPv4 Duplicate Address Detection (DAD)	All platforms.
IPv6 unicast routing, including static routes	All platforms.
IPv6 interworking—IPv6-to-IPv4 and IPv6-in-IPv4 configured tunnels	All platforms, except X620 and X440-G2.
IPv6 Duplicate Address Detection (DAD) without CLI management	All platforms.
IPv6 Duplicate Address Detection (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)	Summit X460-G2.
Multi-Switch Link Aggregation Group (MLAG)	All platforms.

**Table 4: ExtremeXOS Edge License Features (continued)**

ExtremeXOS Software Feature	Supported 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 <i>ExtremeXOS 30.2 User Guide</i> .	All platforms.
Protocol-based VLANs	All platforms.
RIP v1/v2	All platforms.
RIPng	All platforms.
Routing access policies	All platforms.
Route maps	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.
SummitStack (switch stacking using native or dedicated ports)	Summit X460-G2 with X460-G2-VIM-2SS optional card, and X450-G2.
SummitStack-V (switch stacking using dual purpose data ports)	All platforms. See the specific models listed in the "Support for Alternate Stacking Ports" section of the <i>ExtremeXOS 30.2 User Guide</i> .
SyncE	Summit X460-G2.
Python scripting	All platforms.

## Advanced Edge License Features

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

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

ExtremeXOS Software Feature	Supported Platforms
BGP Auto-peering	Summit X670-G2, ExtremeSwitching X465, X690, X870, X590
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.

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

ExtremeXOS Software Feature	Supported Platforms
OSPFv2-Edge (limited to max of 4 active interfaces)	All platforms that support the Advanced Edge or Core licenses (see <a href="#">Table 3</a> on page 7).
OSPFv3-Edge (limited to max of 4 active interfaces)	All platforms that support the Advanced Edge or Core licenses (see <a href="#">Table 3</a> on page 7).
PIM-SM-Edge (limited to max of 4 active interfaces)	All platforms that support the Advanced Edge or Core licenses (see <a href="#">Table 3</a> on page 7).
VRRP	All platforms that support the Advanced Edge or Core licenses (see <a href="#">Table 3</a> on page 7).
VXLAN	Summit X670-G2, and ExtremeSwitching X465, X870, X690, X590.
OVSDB	Summit X670-G2, and ExtremeSwitching X465, X870, X690, X590.
PSTag	Summit X460-G2, X670-G2, and ExtremeSwitching X465, X870, X690, X590 series switches.

## Core License Features

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

**Table 6: ExtremeXOS Core License Features**

ExtremeXOS Software Feature	Supported Platforms
PIM DM "Full"	Core license platforms listed in <a href="#">Table 3</a> on page 7
PIM SM "Full"	Core license platforms listed in <a href="#">Table 3</a> on page 7
PIM SSM "Full"	Core license platforms listed in <a href="#">Table 3</a> on page 7
OSPFv2 "Full" (not limited to 4 active interfaces)	Core license platforms listed in <a href="#">Table 3</a> on page 7
OSPFv3 "Full" (not limited to 4 active interfaces)	Core license platforms listed in <a href="#">Table 3</a> on page 7
BGP4 and MBGP (BGP4+) for IPv4 ECMP	Core license platforms listed in <a href="#">Table 3</a> on page 7
BGP4 and MBGP (BGP4+) for IPv6	Core license platforms listed in <a href="#">Table 3</a> on page 7
IS-IS for IPv4	Core license platforms listed in <a href="#">Table 3</a> on page 7
IS-IS for IPv6	Core license platforms listed in <a href="#">Table 3</a> on page 7
MSDP	Core license platforms listed in <a href="#">Table 3</a> on page 7
Anycast RP	Core license platforms listed in <a href="#">Table 3</a> on page 7
GRE tunneling	Core license platforms listed in <a href="#">Table 3</a> on page 7
EVPN	Summit X670-G2, and ExtremeSwitching X465, X590, X690, X870 series switches.

# 3 Feature Pack Features

---

MPLS Feature Pack  
Network Timing Feature Pack  
ExtremeSwitching X440-G2 10 Gigabit Port Licensing  
ExtremeSwitching X870-96x-8c Switch Port Speed License  
MAC Security Feature Pack License  
Optics XMOD

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

- **In ExtremeXOS software** (standard software component)—You must purchase a license to use the feature pack.
- **Modular software package** (xmod file, due to .xmod filename extension)—You must request the xmod file from your supplier and install it.

For feature pack license and installation instructions, see *Installing a Modular Software Package* in the [ExtremeXOS 30.2 User Guide](#).



**Table 7: ExtremeXOS Feature Pack Features**

Feature Pack	Feature	Platform Support	XMOD Required
MPLS Feature Pack See <a href="#">MPLS Feature Pack</a> on page 19.	<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>	Summit X460-G2 (with Advanced Edge license or higher), X670-G2, ExtremeSwitching X465, X590, X870, X690.	No
Network Timing Feature Pack See <a href="#">Network Timing Feature Pack</a> on page 19.	Precision Time Protocol (PTPv2)	Summit X460-G2, X670-G2 switches.	No
AVB Feature Pack	<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, except the ExtremeSwitching X870 and X690, X590.	No
OpenFlow Feature Pack	OpenFlow	All platforms, except X465.	No
ExtremeSwitching X440-G2 10 Gigabit Port Licensing See <a href="#">ExtremeSwitching X440-G2 10 Gigabit Port Licensing</a> on page 19.	10 Gigabit Port Licensing	ExtremeSwitching X440-G2.	No
ExtremeSwitching X870-96x-8c Switch Port Speed License See <a href="#">ExtremeSwitching X870-96x-8c Switch Port Speed License</a> on page 20.	100 Gigabit Port Licensing	ExtremeSwitching X870-96x-8c.	No

**Table 7: ExtremeXOS Feature Pack Features (continued)**

Feature Pack	Feature	Platform Support	XMOD Required
MAC Security License See <a href="#">MAC Security Feature Pack License</a> on page 21.	MAC Security licensing.	See <a href="#">MACsec Platform Support</a>	No
Optics See <a href="#">Optics XMOD</a> on page 21.	Optical transceiver support available outside of ExtremeXOS release cycle.	ExtremeSwitching X465, X590, X690, and X870.	Yes

## MACsec Platform Support

Platform	Ports	LRM/MACsec Adapter Required?
Summit X460-G2-24p-24hp, X460-G2-24t-24ht switches	Half-duplex, 1G ports (25–48)	No
	All other SFP/SFP+ ports *	Yes
Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X440-G2, X590, X620, and X690 series switches	SFP/SFP+ ports *	Yes
ExtremeSwitching X465	X465-24W: ports 1–24 X465-48T, X465-48P, X465-48W: 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: first 2 ports only	No
<b>Note:</b> * For Summit X460-G2 series switches, the VIM-2X option does not support the LRM/MACsec Adapter.		

### Note



Starting with ExtremeXOS 21.1, Secure Shell 2 (SSH2) is no longer provided as a feature pack. 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 30.2 User Guide](#). For more information on SSH2, see *Using Secure Shell 2* in the [ExtremeXOS 30.2 User Guide](#).

## MPLS Feature Pack

---

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

A separate feature pack 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 pack, the feature CLI commands are visible; without an enabled MPLS feature pack, you do not see any feature commands on the console.

## Network Timing Feature Pack

---

The Network Timing Feature Pack supports the Precision Time Protocol (PTPv2).

This feature pack is included with all ExtremeXOS software licenses and can be enabled by purchasing and enabling a feature pack license key.



### Note

Network-Clock module is required in addition to Network Timing Feature Pack to enable PTPv2 in ExtremeXOS.

For more information about PTPv2, see *Overview of PTP* in the [ExtremeXOS 30.2 User Guide](#).

## 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 8: 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.

## ExtremeSwitching X870-96x-8c Switch Port Speed License

This license increases the rate from 10G to 100G on QSFP28+ ports 1 through 24 on ExtremeSwitching X870-96x-8c switches.

Each license enables a group of six ports. You can purchase a total of four licenses per switch, which enables the first 24 QSFP28+ ports to operate in the following partition modes: 4x10G, 4x25G, 2x50G, 1x40G and 1x100G. Each license enables the highest numbered six-port group that is not already activated (first 19-24, then 13-18, then 7-12, and finally 1-6).



### Note

The first 24 unlicensed ports are 4x10G by default.



### Note

A switch reboot is not required when a license is successfully installed.

A port speed license cannot be downgraded. However, you can disable the license by clearing all of the installed port speed licenses.

## MAC Security Feature Pack License

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

Slot-based MACsec licenses have the following behaviors (see [Table 9](#)).

**Table 9: 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.