



# ExtremeXOS Release Notes

*Software Version ExtremeXOS 30.2*



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# Preface

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





## Conventions

This section discusses the conventions used in this guide.

### 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.
<b><i>New!</i></b>	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.

## Platform-Dependent Conventions

Unless otherwise noted, all information applies to all platforms supported by ExtremeXOS software, which are the following:

- ExtremeSwitching® switches
- Summit® switches
- SummitStack™

When a feature or feature implementation applies to specific platforms, the specific platform is noted in the heading for the section describing that implementation in the ExtremeXOS command documentation (see the Extreme Documentation page at [www.extremenetworks.com/documentation/](http://www.extremenetworks.com/documentation/)). In many cases, although the command is available on all platforms, each platform uses specific keywords. These keywords specific to each platform are shown in the Syntax Description and discussed in the Usage Guidelines sections.

## Terminology

When features, functionality, or operation is specific to a switch family, such as ExtremeSwitching, the family name is used. Explanations about features and operations that are the same across all product families simply refer to the product as the switch.

## Providing Feedback to Us

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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

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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: 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: [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 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**.

## 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*

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# 1 Overview

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Security Information  
Upgrading ExtremeXOS  
Default ExtremeXOS Settings  
New and Corrected Features in ExtremeXOS 30.2  
New Hardware Supported in ExtremeXOS 30.2  
Firmware Update Needed for ExtremeSwitching X465 Series Switches  
Extreme Loop Recovery Protocol (ELRP) MAC Address Change  
Changed Ping Behavior  
Updating the Programmable Logic Firmware on the Summit X440-G2 and ExtremeSwitching X620 Series Switches  
Extreme Hardware/Software Compatibility and Recommendation Matrices  
Compatibility with Extreme Management Center (Formerly NetSight)  
Supported MIBs  
Tested Third-Party Products  
Extreme Switch Security Assessment  
Service Notifications

These release notes document ExtremeXOS 30.2, which adds features and resolves software deficiencies.

## Security Information

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The following section covers important security information for ExtremeXOS 30.2.

### OpenSSL Version

ExtremeXOS 30.2 uses FIPS fips-ecp-2.0.16.

### Linux Kernel

ExtremeXOS 30.2 uses Linux Kernel 4.14.

## Upgrading ExtremeXOS

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For instructions about upgrading ExtremeXOS software, see "Software Upgrade and Boot Options" in the *ExtremeXOS 30.2 User Guide*.

Beginning with ExtremeXOS 12.1, an ExtremeXOS core image (.xos file) must be downloaded and installed on the alternate (non-active) partition. If you try to download to an active partition, the error message `Error: Image can only be installed to the non-active partition.`



appears. An ExtremeXOS modular software package (.xmod file) can still be downloaded and installed on either the active or alternate partition.

## Default ExtremeXOS® Settings

Table 3 shows the default settings for ExtremeXOS starting with version 22.6, and shows any changes that have been made to these setting and in what version these changes were made.

**Table 3: Default ExtremeXOS Settings**

ExtremeXOS Feature	ExtremeXOS 22.6 Settings	ExtremeXOS 30.1 Settings
Account lockout	After 3 consecutive login failures, account is locked for 5 minutes. <sup>a</sup>	
AVB	Disabled.	
BGP	Disabled.	
BOOTP Relay	Disabled.	
CDP	Enabled.	
Configuration auto save	Disabled.	
Clear-flow	Disabled.	
Diagnostics	Admin level privileges required to show diagnostics. <sup>a</sup>	
DHCP	Disabled.	
IPFIX	Disabled.	
EAPS	Disabled.	
EDP	Enabled.	Enabled on management port.
ELRP	Disabled.	
ESRP	Disabled.	
Extended Edge Switching (VPEX)	Disabled.	
Identity Management	Disabled.	
IGMP	Enabled, set to IGMPv2 compatibility mode.	
IGMP Snooping	Enabled.	
IP Route Compression	Enabled.	
ISIS	Disabled.	
Log	Admin level privileges required to show log. <sup>a</sup>	
Logging memory buffer	Generate an event when the logging memory buffer exceeds 90% of capacity. <sup>a</sup>	
MAC Security	N/A	Disabled.
MLD	Disabled.	

**Table 3: Default ExtremeXOS Settings (continued)**

ExtremeXOS Feature	ExtremeXOS 22.6 Settings	ExtremeXOS 30.1 Settings
MLD Snooping	Disabled.	
MPLS	Disabled.	
MSRP	Disabled.	
MSTP	Enabled.	
NetLogin	All types of authentication are disabled.	
NTP	Disabled.	
ONEPolicy	Disabled.	
OpenFlow	Disabled.	
OSPF	Disabled.	
OVSDB	Disabled.	
Passwords	Plain text password entry not allowed. <sup>a</sup>	
PIM	Disabled.	
PIM Snooping	Disabled.	
RADIUS	Disabled for both switch management and network login.	
RIP	Disabled.	
RMON	Disabled. However, even in the disabled state, the switch responds to RMON queries and sets for alarms and events.	
sFlow	Disabled.	
SNMP server	Disabled. <sup>a</sup>	
SSH	Disabled.	
Stacking	Disabled.	
STP	Enabled.	
Syslog	Disabled.	
TACACS	Disabled.	
Telnet	Disabled. <sup>a</sup>	
VPLS	All newly created VPLS instances are enabled.	
Watchdog	Enabled.	
Web HTTP server	Disabled. <sup>a</sup>	

<sup>a</sup> If you choose enhanced security mode when initially setting up the switch or after running `unconfigure switch all`.

## New and Corrected Features in ExtremeXOS 30.2

This section lists the new and corrected features supported in the 30.2 software:

### Fabric Attach Support for Multi-switch Link Aggregation Groups (MLAG) and Authentication

Starting with ExtremeXOS 30.2, Fabric Attach server and proxy can work over Multi-switch Link Aggregation Groups (MLAG). ExtremeXOS 30.2 also introduces authentication for Fabric Attach. By default, all ports are configured in the authentication disabled state. When enabled, the default key is used until otherwise configured. If the authentication fails, the Fabric Attach information is dropped whether or not authentication is enabled on the receiving port.

#### *Supported Platforms*

For Fabric attach proxy mode:

Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X440-G2, X465, X590, X620, X690, X870 series switches.

For Fabric Attach server mode:

Summit X670-G2, and ExtremeSwitching X465, X590, X690, X870 series switches.

#### *New CLI Commands*

```
configure fabric attach ports [port_list | all] authentication [disable
| enable | key {key | default | encrypted encrypted_key}]

show fabric attach ports [port_list | all] authentication {detail}
```

#### *Changed CLI Commands*

The following show command now shows Fabric Attach authentication information:

```
show lldp {port [all | port_list]} neighbors {detailed}
```

### Ethernet Virtual Private Network (EVPN) Support for External Border Gateway Protocol (EBGP)

BGP was standardized in *RFC 7432* and *RFC 8365* to carry Layer-2 information for virtualized networks. Ethernet virtual private network (EVPN) was initially targeted for MPLS and WAN, but later adopted as a VXLAN control plane protocol. ExtremeXOS supports EVPN control plane for VXLAN. At a high level, BGP supports the following constructs to distribute information for any virtualized network:

- **Identify the network address family with AFI/SAFI**—For VXLAN, AFI of 25 (L2VPN) and a SAFI (EVPN) of 70 is used.
- **Within the address family, identify the type of route being advertised**—Different route types are defined.
- **Identify which device originated the route and virtual network the route belongs to**—This is the role of the route distinguisher (RD) and route target (RT).

EVPN requires the Core License. For more information about licensing, see [ExtremeXOS 30.2 Feature License Requirements](#).

### Supported Platforms

Summit X670-G2, and ExtremeSwitching X465, X590, X690, X870 series switches.



#### Note

Summit X670-G2 and X870 ExtremeSwitching series switches do not support asymmetric routing.

### Limitations

- EVPN functionality is not supported between switches running ExtremeXOS 30.2 and switches running earlier ExtremeXOS versions. The earlier versions rely on auto-creation of IBGP peers, which is disabled functionality in ExtremeXOS 30.2. However, the proprietary AFI are supported and can be used to establish tunnels to RTEPs so that native VXLAN functionality using data plane learning functions is supported.
- A maximum of 1,024 EVI instances are supported.
- IPv6 Type 2 routes are not supported.
- Stacking is not supported.
- ExtremeXOS only supports asymmetric routing model.
- ExtremeXOS does not support Type 5 routes. Received Type 5 routes are not processed.
- Configuring VMANs as VXLAN tenant VLANs is not supported.
- Anycast gateway is not supported.
- ExtremeXOS does not advertise default gateway extended community.
- Multi-hop BFD is not supported.
- Peer-group configuration for L2VPN-EVPN address family is not supported.
- If silent hosts are expected, static ARP/FDB should be created on tenant VLANs for these hosts. To configure static ARP entries it is necessary to configure IP address on tenant VLANs.

### New CLI Commands

```
create bgp evpn instance evpn_instance_name

delete bgp evpn instance evpn_instance_name

configure bgp evpn instance evpn_instance_name vxlan vni [vni_value | none]

configure bgp evpn instance evpn_instance_name route-target {import | export | both} [add | delete] route_target

configure bgp evpn instance evpn_instance_name rd [rd_value | auto]

configure bgp neighbor [all | remoteaddr] alternate-local-as asNumber

enable bgp {neighbor [remoteaddr | all]} {{address-family} l2vpn-evpn} next-hop-unchanged
```

```
disable bgp {neighbor [remoteaddr | all]} {{address-family} l2vpn-evpn}
next-hop-unchanged
```

```
show bgp evpn evi {evi-index evi_index} {vni vni}
```

```
show bgp evpn mac {mac-address mac_address}
```

```
show bgp evpn ipv4 {evi-index evi_index} {ip-address ip_address}
```

```
show bgp evpn ipv6 {evi-index evi_index} {ip-address ip_address}
```

### *Changed CLI Commands*

Changes are underlined.

```
enable bgp neighbor [all | remoteaddr] capability [ipv4-unicast | ipv4-
multicast | ipv6-unicast | ipv6-multicast | vpnv4 | route-refresh |
ipv4-vxlan | l2vpn-evpn]
```

```
disable bgp neighbor [all | remoteaddr] capability [ipv4-unicast | ipv4-
multicast | ipv6-unicast | ipv6-multicast | vpnv4 | route-refresh |
ipv4-vxlan | l2vpn-evpn]
```

```
show bgp routes {address-family [ipv4-unicast | ipv4-multicast | ipv6-
unicast | ipv6-multicast | ipv4-vxlan | {l2vpn-evpn [inclusive-multicast
| mac-ip]}]} {detail} [ipv4-vxlan | all | as-path path-expression |
community [no-advertise | no-export | no-export-subconfed | number
community_number | autonomous-system-id : bgp-community] | network [any/
netMaskLen | networkPrefixFilter] {exact}]
```

The output of the following show command displays L2VPN EVPN information:

```
show bgp {neighbor} remoteaddr {address-family [ipv4-unicast | ipv4-
multicast | ipv6-unicast | ipv6-multicast | ipv4-vxlan | {l2vpn-evpn
[inclusive-multicast | mac-ip]}]} [accepted-routes | received-routes |
rejected-routes | transmitted-routes] {detail} [all | as-path path-
expression | community [no-advertise | no-export | no-export-subconfed |
number community_number | autonomous-system-id : bgp-community] |
network [any/netMaskLen | networkPrefixFilter] {exact}]
```

## New Command to Configure Ethernet Ring Protection Switching (ERPS) Control MAC Address

There is a new command that configures control MAC (either default or auto) on a particular Ethernet Ring Protection Switching (ERPS) ring instance.

### *Supported Platforms*

Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X440-G2, X465, X590, X620, X690, X870 series switches.

*New CLI Commands*

```
configure erps ring-name control-mac [auto | default]
```

## Ability to Configure Ethernet Ring Protection Switching (ERPS) Ring ID

ExtremeXOS 30.2 now has the ability to configure an Ethernet Ring Protection Switching (ERPS) ring ID when creating the ring.

*Supported Platforms*

Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X440-G2, X465, X590, X620, X690, X870 series switches.

*Changed CLI Commands*

Changes are underlined.

```
create erps ring-name {ring-id ring_id}
```

## New Command for External Python Scripting Support

Previously, when Federal Information Processing Standards (FIPS) mode was turned off, external Python scripting support was automatically on.

ExtremeXOS 30.2 includes a new command to turn on/off external Python scripting support when FIPS mode is off.

*Support Platforms*

Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X440-G2, X465, X590, X620, X690, X870 series switches.

*New CLI Commands*

```
configure security python [on | off]
```

*Changed CLI Commands*

The following command now shows external Python scripting support status. Changes are underlined:

```
show security [fips-mode | python]
```

## Stacking V400 Alternative Configuration Required for Certain Fiber Cables

V400 is the default mode that sets the stack ports to 106G. V400 alternative configuration is required when using specific fiber cables. This mode sets the stack ports to 100G, enables pre-emphasis, and FEC (clause\_91).

Cables requiring Alternative Configuration include:

- QSFP28 SR4
- QSFP28 LR4

- QSFP28 CWDM4
- QSFP28 PSM4
- QxQ AOC cable - 5m
- QxQ AOC cable - 7m
- QxQ AOC cable - 10m
- QxQ AOC cable - 20m

For a complete list of supported cables, see [ExtremeSwitching and Summit Switches: Hardware Installation Guide for Switches Using ExtremeXOS Version 30](#).

#### *Supported Platforms*

ExtremeSwitching X590, X690, X870 series switches.

#### *Changed CLI Commands*

Changes are underlined.

```
configure stacking-support stack-port [stack-ports | all] selection
[native {V80 | V160} | V320 | V400 {alternative-configuration} | help} |
alternate]
```

## New Command for Copying an Image from the Active to the Inactive Partition

To avoid needing to perform multiple downloads of the same image in order to install it into both partitions of a switch, a new command is introduced in ExtremeXOS 30.2. This command copies the image (.xos image and all .xmod and .lst files) on the active partition to the inactive partition.

#### *Supported Platforms*

Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X440-G2, X465, X590, X620, X690, X870 series switches.

#### *New CLI Commands*

```
install image inactive {slot slot}
```

## ONEPolicy Classification Rule Precedence Re-ordering

Starting with ExtremeXOS 30.2, you can modify the default precedence of ONEPolicy profile rules. You can configure the precedence for the rule types within each rule group. The rule groups currently supported are MAC, IPv6, IPv4, and Layer2.

#### *Supported Platforms*

Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X440-G2, X465, X590, X620, X690, X870 series switches.

#### *Changed CLI Commands*

Changes are underlined.

```
configure policy profile profile_index {name name} {pvid pvid} {pvid-  
status pvid_status} {cos cos} {cos-status cos_status} {egress-vlans  
egress_vlan_list} {forbidden-vlans forbidden_vlans} {untagged-vlans  
untagged_vlans} {append | clear} {tci-overwrite tci_overwrite}  
{precedence [precedence | default]} {auth-override auth_override} {nsi  
[nsi | none]} {web-redirect web_redir_index}
```

## CLI History Lookup

You can now find and re-execute CLI commands from the history.

To find a previously entered command:

- 1 Press **CTRL + R**. The prompt changes to `reverse-i-search`.
- 2 Start typing any part of the desired command. The CLI shows matching commands from the history. If there are multiple matches, press **CTRL + R** again to view additional matches.
- 3 To use the recovered command:
  - To execute the command with no changes, press **ENTER**.
  - To modify the command at the searched word, press **ESC** to place the command in the prompt with the cursor on the searched word.
  - To modify the command from the end of the command, press **CTRL + E** to place the command in the prompt with the cursor at the end of the command.

### *Supported Platforms*

Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X440-G2, X465, X590, X620, X690, X870 series switches.

## Command Line Interface (CLI) History Expansion

The history expansion character `!` can be used to specify a command from the history that is substituted into the command line. All occurrences of the form `“!n:w”` in the command are replaced with the w<sup>th</sup> word from the n<sup>th</sup> line in the command history. Specification of the word is optional.

### *Supported Platforms*

Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X440-G2, X465, X590, X620, X690, X870 series switches.

### *New CLI Commands*

```
enable cli history expansion {session | permanent}
```

```
disable cli history expansion {session | permanent}
```

### *Changed CLI Commands*

The following show command now shows the CLI history expansion status:

```
show management
```



## Support for Multiple Service-Unavailable VLANs for Network Login

To cope with an interruption when an authentication service is not available, you can configure ExtremeXOS to move Network Login (NetLogin) clients to an authentication service-unavailable VLAN that provides restricted access. For ExtremeXOS 30.2, you now have the ability to configure multiple service-unavailable VLANs per port.

### *Supported Platforms*

Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X440-G2, X465, X590, X620, X690, X870 series switches.

### *Limitations*

A maximum of 10 service-unavailable VLANs are allowed per port.

### *Changed CLI Commands*

Changes are underlined.

```
configure netlogin authentication service-unavailable [{add} | {delete}
| {{vlan vlan_name} {ports port_list {tagged | untagged}}}]
```

The output of the following show commands now shows information for the multiple service-unavailable VLANs feature:

```
show netlogin authentication service-unavailable [ {vlan} vlan_name |
vlan vlan_list]
```

## Simple Loop Prevention Protocol (SLPP) Guard Feature

Simple Loop Prevention Protocol (SLPP) is an application that detects loops in an MLAG or Split Multi-link Trunking (SMLT) network on VOSS/BOSS switches. SLPP Guard is a new complementary feature for ExtremeXOS switches that helps prevent loops in networks by administratively disabling an edge port if a switch receives an SLPP PDU from an SMLT network.

SLPP Guard detects and discards SLPP control PDUs on a per port basis. SLPP Guard identifies SLPP PDUs using the Ethernet type field of the packet, which is configurable. When an SLPP PDU is received on a port that has SLPP Guard activated on it, it is immediately disabled. After a configurable timeout value expires (associated with each port), the port is automatically re-enabled.

### *Supported Platforms*

Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X440-G2, X465, X590, X620, X690, X870 series switches.

### *Limitations*

- SNMP for SLPP Guard is not supported.
- The SLPP Guard active state per port is limited by the number of available ACL filters.

### *New CLI Commands*

```
enable slpp guard ports [port_list | all]
```

```

disable slpp guard ports [port_list | all]

configure slpp guard ethertype hex

configure slpp guard [ports [port_list | all] recovery-timeout [seconds
| none]

show slpp guard {ports port_list} {disabled-ports}

```

## MAC Security (MACsec) Cipher Support

MAC Security (MACsec) now supports a non-default cipher suite (GCM-AES-256), as well as the default MACsec cipher suite (GCM-AES-128). These cipher suites use 128-bit and 256-bit secure association keys (SAKs), respectively.

### Supported Platforms



#### Note

The MACsec feature requires the installation of the MAC Security feature pack license.

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.		

### New CLI Commands

```

configure macsec cipher-suite [gcm-aes-128 | gcm-aes-256] ports
port_list

```

### Changed CLI Commands

The following show commands now display associated 256-cipher information:

```

show macsec { connectivity-association {ca_name}

```

```
show macsec ports port-list configuration
```

```
show macsec ports port-list detail
```

The following command now supports 128-bit and 256-bit connectivity association keys (CAK). The GCM-AES-256 cipher suite requires a 256-bit CAK:

```
configure macsec connectivity-association ca_name [pre-shared-key {ckn  
ckn} cak {encrypted} cak | ports [port-list] [enable | disable]]
```

## Remote End Advertised Ability

Auto-negotiation is an Ethernet feature that facilitates the selection of port speed, duplex, and flow control between the two members of a link. It first shares these capabilities, and then selects the fastest transmission mode that both ends of the link can support.

Current ExtremeXOS `show port` commands show the local end of the link's advertised ability for duplex and flow control, but there was no show command to find the remote end of the link's advertised ability. This feature provides a new command that shows the remote end of the link's advertised ability.

### *Supported Platforms*

Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X440-G2, X465, X590, X620, X690, X870 series switches.

### *New CLI Commands*

```
show ports {port-list} advertised
```

## Dynamic Port Partitioning

Partitioning multi-speed ports no longer requires a reboot for the partitioning to take effect.

### *Supported Platform*

Summit X670-G2 and ExtremeSwitching X465, X590, X690, and X870 series switches.

### *Changed CLI Commands*

The following command no longer needs a reboot to take effect:

```
configure ports [port-list | all] partition [1x100G | 1x40G | 2x50G |  
4x10G | 4x25G]
```

The following show command no longer displays separate configured and current port partition information, since they are now the same:

```
show port {port-list | tag tag} information {detail}
```

## Downloadable Optics Support (XMOD)

To decouple optical transceiver support from ExtremeXOS releases, optics support can be supplied by an ExtremeXOS module software package (XMOD). The Optics XMOD is a separate software package (identified by .XMOD extension) from ExtremeXOS (identified by .xos extension) that can be released between ExtremeXOS releases providing greater flexibility to support new optics.

For more information about XMODs, see the [ExtremeXOS 30.2 Feature License Requirements](#). For information about installing XMODs, see the [Software Upgrade and Boot Options](#) chapter in the [ExtremeXOS 30.2 User Guide](#).

### *Supported Platforms*

Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X440-G2, X465, X590, X620, X690, X870 series switches.

### *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.

## Dynamic Host Configuration Protocol (DHCP) Snooping and Address Resolution Protocol (ARP) Validation/Learning Configuration Persistence on Dynamic VLANs

This feature provides support for IP security for Dynamic Host Configuration Protocol (DHCP) Snooping and Address Resolution Protocol (ARP) learning/validation on dynamic VLANs so that the configuration persists after reboots.

### *Supported Platforms*

Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X440-G2, X465, X590, X620, X690, X870 series switches.

### *Changed CLI Commands*

Changes are underlined.

```
enable ip-security dhcp-snooping [dynamic | {vlan} vlan_name] ports [all
| ports] violation-action [drop-packet [{block-mac | block-port}
[duration duration_in_seconds | permanently] | none]] {snmp-trap}
```

```
disable ip-security dhcp-snooping [dynamic | {vlan} vlan_name] ports
[all | ports]
```

```
configure trusted-servers [dynamic vlan_id | {vlan} vlan_name] add server
ip_address trust-for dhcp-server
```

```
configure trusted-servers [dynamic vlan_id | vlan vlan_name] delete
server ip_address trust-for dhcp-server
```

```
enable ip-security arp learning learn-from-arp [dynamic | {vlan}
vlan_name] ports [all | ports]
```

```

disable ip-security arp learning learn-from-arp [dynamic | {vlan}
vlan_name] ports [all | ports]

enable ip-security arp validation {destination-mac} {source-mac} {ip}
[dynamic vlan_id | {vlan} vlan_name] [all | ports] violation-action
[drop-packet [{block-port} [duration duration_in_seconds |
```

**permanently**]]] {**snmp-trap**}

```

disable ip-security arp validation [dynamic | {vlan} vlan_name] [all |
ports]

enable ip-security arp gratuitous-protection [dynamic | {vlan} all |
vlan_name]

disable ip-security arp gratuitous-protection [dynamic | {vlan}
vlan_name | all ]

configure ip-security dhcp-snooping information circuit-id vlan-
information vlan_info [dynamic | {vlan} vlan_name | all]

unconfigure ip-security dhcp-snooping information circuit-id vlan-
information [dynamic | {vlan} vlan_name | all]

configure ip-security dhcp-binding add ip ip_address mac mac_address
[dynamic vlan_id | {vlan} vlan_name] server-port server_port client-port
client_port lease-time seconds

configure ip-security dhcp-binding delete ip ip_address [dynamic vlan_id
| {vlan} vlan_name]

enable ip-security arp learning learn-from-dhcp [dynamic vlan | {vlan}
vlan_name] ports [all | ports]

disable ip-security arp learning learn-from-dhcp [dynamic vlan | {vlan}
vlan_name] ports [all | ports]

```

## New Policy Resource Profiles and Profile Modifier

ExtremeXOS 30.2 introduces four new policy resource profiles that allow you take resources from the L2 allocation and give more to IPv4:

- less-acl more-ipv4-no-l2
- less-acl more-ipv4-no-mac-no-ipv6-no-l2
- more-ipv4-no-l2
- more-ipv4-no-mac-no-ipv6-no-l2

ExtremeXOS 30.2 also introduces a new profile modifier: "no-l2".

### *Supported Platforms*

Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X440-G2, X465, X590, X620, X690, X870 series switches.

### Changed CLI Commands

Changes are underlined.

```
configure policy resource-profile [default | less-acl [more-ipv4 | more-ipv4-no-ipv6 | more-ipv4-no-l2 | more-ipv4-no-mac-no-ipv6] | more-ipv4-no-mac-no-ipv6-no-l2 | more-ipv4-no-ipv6 | more-ipv4-no-mac-no-ipv6 | more-mac-no-ipv6] {profile-modifier [{no-mac no_mac} {no-ipv4 no_ipv4} {no-ipv6 no_ipv6} {no-l2 no_l2}]}
```

```
show policy resource-profile [{default | less-acl [more-ipv4 | more-ipv4-no-ipv6 | more-ipv4-no-l2 | more-ipv4-no-mac-no-ipv6 | more-ipv4-no-mac-no-ipv6-no-l2 | more-ipv4-no-ipv6 | more-ipv4-no-mac-no-ipv6 | more-mac-no-ipv6] {profile-modifier [ {no-mac} {no-ipv4} {no-ipv6} {no-l2}]}
```

## Policy-Based Mirroring

You can now apply mirrors to policy profile rules by using a "control group" mirror referenced by a unique control index number. These control group mirrors are etsysMirrorDestinationControlEntry entries in the ENTERASYS-MIRROR-CONFIG-MIB (Mirror MIB). A Mirror MIB instance (designated by a control index) can be associated with up to four "physical" mirrors, each being one destination port (or tunnel).

### Supported Platforms

Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X440-G2, X465, X590, X620, X690, X870 series switches.

### Limitations

- Mirrors with multiple destination ports are not supported.
- A maximum of four concurrently enabled mirrors is supported.
- A maximum of four control group (Mirror MIB) instances can be created using the CLI.
- Mirrors on admin profile rules are not supported.
- Mirroring cannot be enabled on LAG and MLAG ports.
- Mirroring index cannot be assigned for default mirrors.

### New CLI Commands

```
create mirror control_index
```

```
configure mirror control_index [ add | delete ] mirror_name
```

```
enable mirror control_index {mirror mirror_name}
```

```
disable mirror control_index {mirror mirror_name}
```

### Changed CLI Commands

Changes are underlined.

```
configure policy rule profile_index [ether ether | icmp6type icmp6type | icmp icmp | ip6dest ip6dest | ipdestsocket ipdestsocket | ipfrag
```

```

| ipproto ipproto | ipsourcesocket ipsourcesocket | iptos iptos | ipttl
ipttl | macdest macdest | macsource macsource | port port |
tcpdestportIP tcpdestportIP | tcpsourceportIP tcpsourceportIP |
udpdestportIP udpdestportIP | udpsourceportIP udpsourceportIP ] {mask
mask } {port-string [ port_string | all] } {storage-type [non-volatile |
volatile] } {drop | forward} {syslog syslog} {trap trap} {cos cos }
{mirror-destination control_index} {clear-mirror}

delete mirror mirror_name {control_index} | all]

show mirror [mirror_name | control_index | mirror_name_li] | [all |
enabled]

```

The following show commands now display mirror action information:

```
show policy capability
```

```

show policy rule {all | {profile-index profile_index | admin-profile}
ether {ether} | icmp6type {icmp6type} | icmptype {icmptype} | ip6dest
{ip6dest} | ipdest {ipdest} | ipfrag | ipproto {ipproto} | ipsource
{ ipsource } | iptos { iptos } | ipttl { ipttl } | macdest { macdest } |
macsource { macsource } | port { port } | tcpdestportIP
{ tcpdestportIP } | tcpsourceportIP { tcpsourceportIP } | udpdestportIP
{ udpdestportIP } | udpsourceportIP { udpsourceportIP }} {mask mask }
{port-string [ port_string | all] } {storage-type [non-volatile |
volatile] } {drop | forward} {cos cos | admin-pid admin_pid }} {detail |
wide} {port-hit}

```

## Rule Trap and Syslog for Policy

You can be notified when a policy rule is used by enabling Syslog or trap actions:

- The Syslog action sends an entry in the log after first rule use with the EMS tag "Policy.LogRuleHit".
- The trap action sends an etsysPolicyRulePortHitNotification SNMP trap to the configured trap receiver.

By default, the Syslog and trap actions only occur when the rule is first used. However, for the Syslog action, you can configure the system to send messages every time the rule is used. Show commands are available to display the list of used rules and Syslog action configuration.

### Supported Platforms

Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X440-G2, X465, X590, X620, X690, X870 series switches.

### Limitations

Not supported on admin profile rules.

### New CLI Commands

```

configure policy syslog [machine-readable machine_readable | extended-
format extended_format | every-time every_time]

```

```

unconfigure policy syslog {machine-readable} {extended-format} {every-time}

clear counters policy

show policy syslog {machine-readable} {extended-format} {every-time}

configure policy autoclear {interval interval}

unconfigure policy autoclear interval

show policy autoclear interval

show policy rule port-hit {data} {detail} {wide}

```

### *Changed CLI Commands*

Changes are underlined.

```

configure policy rule profile_index [ether ether | icmp6type icmp6type | icmptype icmptype | ip6dest ip6dest | ipdestsocket ipdestsocket | ipfrag | ipproto ipproto | ipsourcesocket ipsourcesocket | iptos iptos | ipttl ipttl | macdest macdest | macsource macsource | port port | tcpdestportIP tcpdestportIP | tcpsourceportIP tcpsourceportIP | udpdestportIP udpdestportIP | udpsourceportIP udpsourceportIP ] {mask mask } {port-string [ port_string | all ] } {storage-type [non-volatile | volatile ] } {drop | forward} {syslog syslog} {trap trap} {cos cos } {mirror-destination control_index} {clear-mirror}

show policy dynamic [override | syslog-default | trap-default ]

```

The following show command now displays rule hit counter information:

```
show policy rule detail
```

## New Access Control List (ACL) Match Condition

ExtremeXOS 30.2 introduces a new Access Control List (ACL) match condition:

```
packet-lookup-status status1 {,status2 {,status3}}
```

This new ACL match condition matches if the packet's lookup status satisfies all the statuses listed in the match condition. The lookup status value can be one of the following:

- destination-mac-hit or destination-mac-miss
- source-mac-miss or source-mac-hit or source-mac-move
- source-mac-static

### *Supported Platforms*

Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X440-G2, X465, X590, X620, X690, X870 series switches.



## Enabling/Disabling Ports for a Multi-switch Link Aggregation Group (MLAG) ID

ExtremeXOS 30.2 introduces a new pair of commands to enable and disable ports for a multi-switch link aggregation group (MLAG) ID.

### *Supported Platforms*

Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X440-G2, X465, X590, X620, X690, X870 series switches.

### *New CLI Commands*

```
enable ports [mlag-id mlag_id]
```

```
disable ports [mlag-id mlag_id]
```

## New Count Filter for Show Commands

ExtremeXOS 30.2 introduces a new count filter for show commands. This filter adds the ability to display the number of lines of output from a show command with or without actual filtering.

### *Supported Platforms*

Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X440-G2, X465, X590, X620, X690, X870 series switches.

### *Changed CLI Commands*

Changes are underlined.

```
show specific show command syntax | [ [ begin | exclude | grep |  
include ] { ignore-case } regex { | count } | count ]
```

## Ability to Rename Existing MLAG Peers

You can now rename an existing MLAG peer without having to delete, and then re-create it.

### *Supported Platforms*

Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X440-G2, X465, X590, X620, X690, X870 series switches.

### *New CLI Commands*

```
configure { mlag peer } peer_name name new_peer_name
```

## Convergence End Point (CEP) Added to Network Login Authentication Protocol Order Command

In ExtremeXOS 30.2, Convergence End Point (CEP) has been added to the command that configures the order of the Network Login (NetLogin) port's authentication protocols.

*Supported Platforms*

Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X440-G2, X465, X590, X620, X690, X870 series switches.

*Changed CLI Commands*

Changes are underlined.

```
configure netlogin authentication protocol-order [[dot1x [web-based | mac | cep]] | [mac [dot1x | web-based | cep]] | [web-based [dot1x | mac | cep]] | [cep [dot1x | web-based | mac]]]
```

## Ability to Send Router Advertisements Only with Virtual Router Redundancy Protocol's (VRRP) Virtual Link Local Address (LLA)

In Virtual Router Redundancy Protocol (VRRP) IPv6 environment, previously ExtremeXOS sent the router advertisements (RA) using link local address (LLA) configured on VLAN interface from VRRP master, backup, and router advertisements having VRRP's link local address from VRRP master. This caused the host to have three default gateways (host gets gateway address from RA). This in turn could cause the host to use the VLAN link local IP address of the VRRP Backup as the gateway, and thus the host would experience connectivity issues.

This new feature introduces a command to avoid this problem that allows you to specify sending the RAs having only the VRRP's LLA from the VRRP master.

*Supported Platforms*

Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X440-G2, X465, X590, X620, X690, X870 series switches.

*New CLI Commands*

```
configure {vlan} vlan_name router-discovery {ipv6} vrrp-lla-only on_off
```

*Changed CLI Commands*

The following command now shows the status of how router advertisements are sent:

```
show router-discovery {ipv6} {vlan vlan_name}
```

## Multiprotocol Label Switching (MPLS) Supported on ExtremeSwitching X590 Series Switches

Multiprotocol Label Switching (MPLS) is now supported on ExtremeSwitching X590 series switches.

For information about models, see [ExtremeSwitching X590 Series Switches](#) on page 29.

MPLS functionality requires the MPLS Feature Pack license. For more information about this license, see the [ExtremeXOS 30.2 Feature License Requirements](#).

*Supported Platforms*

Summit X460-G2, X670-G2, and ExtremeSwitching X465, X590, X690, X870 series switches.

*Changed CLI Commands*

The following commands are now supported on the ExtremeSwitching X590 series switches:

```
configure vr vr_name [add | delete] protocol [ospf | ospfv3 | rip |
ripng | bgp | isis | pim | mpls]
```

```
configure vr vr-name delete protocol protocol-name
```

All variants of the command `configure mpls`.

All variants of the command `unconfigure mpls`.

All variants of the command `enable mpls`.

All variants of the command `disable mpls`.

All variants of the command `delete mpls`.

All variants of the command `create mpls`.

All variants of the command `show mpls`.

All variants of the command `clear counters mpls`.

```
configure l2vpn [vpls vpls_name | vpws vpws_name] peer ipaddress [add |
delete] mpls lsp lsp_name
```

## Use Slot:Port Notation on Standalone Switches

You can now configure a standalone system as a slotted system, which allows for commands that had slot arguments to be visible and take in a valid slot number of "1", along with any port arguments specified in slot:port notation. In turn, any command output would specify slot information and ports displayed in slot:port notation.

The CLI prompt for the switch changes to show that you have changed it to slot:port notation. For example:

```
Slot-1 X460G2-24t-10G4.1
```

*Supported Platforms*

Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X440-G2, X465, X590, X620, X690, X870 series switches.

*New CLI Commands*

```
configure system ports notation [slot:port | port]
```

*Changed CLI Commands*

The following show command now shows the current and configured system port notation:

```
show management
```

## New Command to Prevent Extended Edge Automatic Configuration from Running

ExtremeXOS now provides a command to prevent Extended Edge automatic configuration (Zero Touch Provisioning (ZTP)) from running.

Automatic configuration occurs when: an unconfigured controlling bridge (CB) (new, out of the shipping box, or manually unconfigured) is rebooted with attached bridge port extenders (BPEs).

### *Supported Platforms*

Summit X670-G2 and ExtremeSwitching X465, X690, X590 series switches.

### *New CLI Commands*

```
terminate vpex ztp
```

### *Changed CLI Commands*

The following show command now shows ZTP status:

```
show vpex
```

## Ability to Adjust Bootup Time

For ExtremeXOS 30.2, there are two menu timeout periods that you can adjust to impact the bootup time:

- BIOS autoboot timeout
- Boot menu timeout

### *Supported Platforms*

ExtremeSwitching X465, X590, X690, and X870 series switches.

### *New CLI Commands*

```
configure switch boot-menu delay [default | seconds]
```

```
show switch boot-menu
```

## TLV Added for Interoperability between SLX and ExtremeXOS BGP Auto-peering Feature

ExtremeXOS 30.2 introduces support for BGP Config TLV. This TLV allows SLX switches to communicate with the ExtremeXOS BGP Auto-peering feature.

### *Supported Platforms*

Summit X670-G2, and ExtremeSwitching X465, X590, X690, and X870 series switches.

### *Changed CLI Commands*

The following show command now displays BGP Config TLV information:

```
show lldp {port [all | port_list]} neighbors {detailed}
```

## New Hardware Supported in ExtremeXOS 30.2

This section lists the new hardware supported in ExtremeXOS 30.2.



### Important

You may need to update the firmware on ExtremeSwitching X465 series switches. See [Firmware Update Needed for ExtremeSwitching X465 Series Switches](#) on page 30.

## ExtremeSwitching X465 Series Switches

Model	Description
ExtremeSwitching X465-24W switch	24 10/100/1000Mb FDX/HDX MACsec capable ports with 802.3bt type 4 PoE (90W) includes fan modules, 1 VIM5 slot, 2 PSU slots, rack mount kit, ExtremeXOS Advanced Edge License
ExtremeSwitching X465-48T switch	48 10/100/1000Mb FDX/HDX MACsec capable ports includes fan modules, 1 VIM5 slot, 2 PSU slots, rack mount kit, ExtremeXOS Advanced Edge License
ExtremeSwitching X465-48P switch	48 10/100/1000Mb FDX/HDX MACsec capable ports with 802.3at PoE (30W) includes fan modules, 1 VIM5 slot, 2 PSU slots, rack mount kit, ExtremeXOS Advanced Edge License
ExtremeSwitching X465-48W switch	48 10/100/1000Mb FDX/HDX MACsec capable ports 802.3bt Type4 PoE (90W) includes fan modules, 1 VIM5 slot, 2 PSU slots, rack mount kit, ExtremeXOS Advanced Edge License
ExtremeSwitching X465-24MU switch	24 100Mb/1/2.5/5Gb ports with 802.3bt Type3 PoE (60W) includes fan modules, 1 VIM5 slot, 2 PSU slots, rack mount kit, ExtremeXOS Advanced Edge License
ExtremeSwitching X465-24MU-24W switch	24 100Mb/1/2.5/5Gb 802.3bt Type3 PoE (60W) capable ports and 24 10/100/1000Mb FDX/HDX MACsec 802.3bt Type4 PoE (90W) capable ports includes fan modules, 1 VIM5 slot, 2 PSU slots, rack mount kit, ExtremeXOS Advanced Edge License
VIM5-4X module	Four 10GbE (SFP+) ports
VIM5-4XE module	Four 10GbE (SFP+) ports LRM, MACsec capable
VIM5-2Y module	Two 25GbE (SFP28) ports
VIM5-4Y module	Four 25GbE (SFP28) ports
VIM5-4YE module	Four 25GbE (SFP28) ports MACsec capable
VIM5-2Q module	Two 40GbE (QSFP) ports

## ExtremeSwitching X590 Series Switches

The ExtremeSwitching X590 series switches are re-introduced in ExtremeXOS 30.2 with MPLS capability (see [Multiprotocol Label Switching \(MPLS\) Supported on ExtremeSwitching X590 Series Switches](#) on page 26). ExtremeSwitching X590 series switches were not supported in ExtremeXOS 30.1:

- X590-24x-1q-2c

24 1Gb/10Gb SFP+ ports, 1 × 10Gb/40Gb QSFP+ port, 2 × 10Gb/25Gb/40Gb/50Gb/100Gb capable QSFP28 ports, 2 unpopulated power supplies slots, 4 unpopulated fan module slots, ExtremeXOS Advanced Edge License

- X590-24t-1q-2c

24 100Mb/1Gb/10GBASE-T ports, 1 × 10Gb/40Gb QSFP+ port, 2 × 10Gb/25Gb/40Gb/50Gb/100Gb capable QSFP28 ports, 2 unpopulated power supplies slots, 4 unpopulated fan module slots, ExtremeXOS Advanced Edge License



#### Note

The 40G port is available in stacking mode only, and is in the NP state when ExtremeSwitching X590 series switches are used as standalone switches or as controlling bridges in an Extended Edge Switching topology.

## Firmware Update Needed for ExtremeSwitching X465 Series Switches

If you have purchased an ExtremeSwitching X465 series switch, it may need to have the firmware updated. To determine if you need to update the switch, do one of the following:

- Check the log by using the command `show log match firmware` and look for the following EMS message:

```
<Warn:HAL.Card.Warning> Switch CPLD firmware is out of date, do 'install firmware' to update.
<Warn:HAL.Card.Warning> Switch FPGA firmware is out of date, do 'install firmware' to update.
```

- View the firmware version on the switch by using the command `show version detail`:

```
# show version detail
Switch      : 800906-00-02 1907F-10042 Rev 02 IMG: 30.2.0.34
             FPGA: 1.1.34 CPLD: 1.1.13 VPLD: 1.1.12

Image       : ExtremeXOS version 30.2.0.34 by release-manager
             on Wed Mar 27 20:36:16 EDT 2019
Diagnostics : 1.1.6
Certified Version : EXOS Linux 4.14.107, FIPS fips-ecp-2.0.16

Build Tools Version : exos-x32-sdk-2.5.1.1.3
```

The current versions should be FPGA 1.1.38 and CPLD 1.1.16. If you have a VIM installed, the current version is VPLD1.1.12, and there is no update required.

If the firmware is out of date, run the `install firmware {force} {slot slot-number}` command to update the firmware. Running the update can take three to four minutes. Reboot the switch after updating it to activate the firmware.

## Extreme Loop Recovery Protocol (ELRP) MAC Address Change

The Extreme Loop Recovery Protocol (ELRP) source MAC address has changed from "00:e0:2b:00:00:01" to "0e:Switch-MAC" starting with ExtremeXOS 22.5.

## Changed Ping Behavior

Due to upgrading ExtremeXOS 30.1 and later versions to 4.14 Linux kernel, ping success to local IP addresses does not depend on link-layer status.

Earlier releases of ExtremeXOS had customized Linux behavior that meant that pinging a local VLAN interface would fail when the local interface was down. However, in ExtremeXOS 30.2, pinging a local VLAN interface that is down will result in a successful ping.

Virtual Router Redundancy Protocol (VRRP) and Multi-switch Link Aggregation Group (MLAG) can be impacted by this change if locally configured IP addresses are used to determine network reachability. For details, see the `ping` command.

## Updating the Programmable Logic Firmware on the Summit X440-G2 and ExtremeSwitching X620 Series Switches

You can update the programmable logic firmware components (FPGA and PLD) on the ExtremeSwitching X440-G2 and X620 series switches. Starting with ExtremeXOS 22.3, a firmware update was made available for the ExtremeSwitching X440-G2 and X620 series switches that provides the following enhancements:

- Enhanced robustness of interface-to-system LEDs and power supply status signals
- Added support for "Repeated Start" mechanism to improve interface to a subset of optics that require it
- Additional power monitoring (ExtremeSwitching X620 only)

However, because of manufacturing cut-in times, some switches may have older firmware. If the switch requires an update, the following messages appear during system start-up:

```
<Warn:HAL.Card.Warning> Switch PLD1 firmware is out of date, do 'install firmware' to
update.
<Warn:HAL.Card.Warning> Switch FPGA firmware is out of date, do 'install firmware' to
update.
```

To view the current firmware versions, use the command `show version detail`. The following shows sample output from this command with the firmware version in bold:

```
# show version detail
Switch      : 800624-00-01 1516G-01246 Rev 1.0 BootROM: 1.0.1.7   IMG: 22.3.0.35
             FPGA: 1.1.42.0 PLD1: 1.0.10.0
... .
```

The new firmware versions included in ExtremeXOS 22.3 and later are FPGA 1.1.44.0 and PLD 2.0.14.0.

Use the `install firmware` command to update the firmware. Running this command requires a reboot of the switch, which can be performed at any time after the command has completed. For more information about this command, see the [ExtremeXOS 30.2 Command Reference Guide](#).

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## Extreme Hardware/Software Compatibility and Recommendation Matrices

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The *Extreme Hardware/Software Compatibility and Recommendation Matrices* provide information about the minimum version of ExtremeXOS software required to support switches, as well as pluggable transceivers and cables.

This guide also provides information about which optics are supported on which hardware platforms, and the minimum software version required.

The latest version of this and other ExtremeXOS guides are at: [www.extremenetworks.com/documentation/](http://www.extremenetworks.com/documentation/)

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## Compatibility with Extreme Management Center (Formerly NetSight)

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ExtremeXOS 30.2 is compatible with the version of Extreme Management Center as shown in this table: [http://emc.extremenetworks.com/content/common/releasenotes/extended\\_firmware\\_support.htm](http://emc.extremenetworks.com/content/common/releasenotes/extended_firmware_support.htm)

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## Supported MIBs

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The Extreme Networks MIBs are located at [www.extremenetworks.com/support/policies/mibs/](http://www.extremenetworks.com/support/policies/mibs/).

When you provide your serial number or agreement number, the MIBs are available under each release.

For detailed information on which MIBs and SNMP traps are supported, see the *Extreme Networks Proprietary MIBs* and *MIB Support Details* sections in the *ExtremeXOS 30.2 User Guide*.

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## Tested Third-Party Products

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This section lists the third-party products tested for ExtremeXOS 30.2.

### Tested RADIUS Servers

The following RADIUS servers are fully tested:

- Microsoft—Internet Authentication Server
- Meetinghouse
- FreeRADIUS

### Tested Third-Party Clients

The following third-party clients are fully tested:

- Windows 7
- Windows Vista
- Linux (IPv4 and IPv6)
- Windows XP (IPv4)



## PoE Capable VoIP Phones

The following PoE capable VoIP phones are fully tested:

- Avaya 4620
- Avaya 4620SW IP telephone
- Avaya 9620
- Avaya 4602
- Avaya 9630
- Avaya 4621SW
- Avaya 4610
- Avaya 1616
- Avaya one-X
- Cisco 7970
- Cisco 7910
- Cisco 7960
- ShoreTel ShorePhone IP 212k
- ShoreTel ShorePhone IP 560
- ShoreTel ShorePhone IP 560g
- ShoreTel ShorePhone IP 8000
- ShoreTel ShorePhone IP BB 24
- Siemens OptiPoint 410 standard-2
- Siemens OpenStage 20
- Siemens OpenStage 40
- Siemens OpenStage 60
- Siemens OpenStage 80

## Extreme Switch Security Assessment

### DoS Attack Assessment

Tools used to assess DoS attack vulnerability:

- Network Mapper (NMAP)

### ICMP Attack Assessment

Tools used to assess ICMP attack vulnerability:

- SSPing
- Twinge
- Nuke
- WinFreeze

### Port Scan Assessment

Tools used to assess port scan assessment:

- Nessus

## Service Notifications

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To receive proactive service notifications about newly released software or technical service communications (for example, field notices, product change notices, etc.), register at:

[www.extremenetworks.com/support/service-notification-form](http://www.extremenetworks.com/support/service-notification-form)

# 2 Limits

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This chapter summarizes the supported limits in ExtremeXOS 30.2.

The limits data is grouped by license level that contains the associated features:

- [Supported Limits for Edge License](#) on page 35
- [Supported Limits for Advanced Edge License](#) on page 61
- [Supported Limits for Core License](#) on page 68

For more information about licenses, see [ExtremeXOS 30.2 Feature License Requirements](#).

The following tables summarize tested metrics for a variety of features, as measured in a per-system basis unless otherwise noted. These limits may change, but represent the current status. The contents of this table supersede any values mentioned in the ExtremeXOS books.

The scaling and performance information shown in the following tables is provided for the purpose of assisting with network design. It is recommended that network architects and administrators design and manage networks with an appropriate level of network scaling “head room.” The scaling and performance figures provided have been verified using specific network topologies using limited switch configurations. There is no guarantee that the scaling and performance figures shown are applicable to all network topologies and switch configurations and are provided as a realistic estimation only. If you experience scaling and performance characteristics that you feel are sufficiently below what has been documented, contact Extreme Networks technical support for additional assistance.

The route limits shown in the following tables for IPv4 and IPv6 routing protocols are software limits only. The actual hardware limits may be higher or lower than the software limits, based on platform. The hardware limits for specific platforms are specified as “IPv4/IPv6 routes (LPM entries in hardware)” in the following tables.

In the Extended Edge Switching architecture, Layer-2, Layer-3, and multicast packet forwarding and filtering operations take place on the controlling bridge. The controlling bridge switch and attached BPEs (V400 Virtual Port Extenders) constitute a single, extended switch system. Therefore, the Extended Edge Switching system assumes the scale and limits from the specific controlling bridge model (for example, Summit X670-G2 series switches) in use. For applicable limits, see the following tables for the controlling bridge you are using.

## Supported Limits for Edge License

The following table shows supported limits for features in the Edge License.

**Table 4: Supported Limits for Edge License**

Metric	Product	Limit
<b>AAA (local)</b> —maximum number of admin and local user accounts.	All platforms	16
<b>Access lists (meters)</b> —maximum number of meters.	ExtremeSwitching X620, X440-G2	1,024 ingress 256 egress
	Summit X670-G2, X450-G2, X460-G2	1,024 ingress 512 egress
	ExtremeSwitching X870, X690, X590, X465	2,048 ingress 512 egress
<b>Access lists (policies)</b> —suggested maximum number of lines in a single policy file.	All platforms	300,000
<b>Access lists (policies)</b> —maximum number of rules in a single policy file. <sup>a</sup>	Summit X460-G2, X450-G2, X670-G2	4,096 ingress 1,024 egress
	ExtremeSwitching X620, X440-G2	2,048 ingress 512 egress
	ExtremeSwitching X870	3,072 ingress 1,024 egress
	ExtremeSwitching X690, X590, X465	8,192 ingress 1,024 egress
<b>Access lists (policies)</b> —maximum number of rules in a single policy file in first stage (VFP).	Summit X450-G2, X460-G2	2,048 ingress only
	Summit X670-G2, ExtremeSwitching X870, X690	1,024 ingress only
	ExtremeSwitching X620, X440-G2	512 ingress only
	ExtremeSwitching X590, X465	2,048 ingress only
<b>Access lists (slices)</b> —number of ACL slices.	Summit X460-G2, X450-G2	16 ingress 4 egress
	Summit X670-G2, ExtremeSwitching X690, X590, X465	12 ingress 4 egress
	ExtremeSwitching X440-G2, X620	8 ingress 4 egress
	ExtremeSwitching X870	4 ingress 4 egress
<b>Access lists (slices)</b> —number of ACL slices in first stage (VFP).	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X465, X620, X440-G2, X870, X690, X590	4 ingress only
<b>ACL Per Port Meters</b> —number of meters supported per port.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	16
<b>ACL port ranges</b>	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	32

**Table 4: Supported Limits for Edge License (continued)**

Metric	Product	Limit
<b>Meters Packets-Per-Second Capable</b>	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	Yes
<b>AVB (audio video bridging)</b> —maximum number of active streams.	Summit X450-G2, X460-G2, and ExtremeSwitching X620, X440-G2	1,024
	Summit X670-G2	4,096
	ExtremeSwitching X590, X690, X870	N/A
<b>BFD sessions (Software Mode)</b> —maximum number of BFD sessions.	Summit X460-G2, X670-G2, X450-G2, ExtremeSwitching X440-G2, X620, X870, X690, X590, X465 (default timers—1 sec)	512
	Summit X460-G2, X670-G2, X450-G2, ExtremeSwitching X440-G2, X620, X870, X690, X590, X465 (minimal timers—100 msec)	10 <sup>c</sup>
<b>BFD IPv4 sessions (Hardware Assisted)</b> —maximum number of IPv4 BFD sessions.	Summit X460-G2, ExtremeSwitching X870, X690, X590, X465	900 (PTP not enabled) 425 (PTP enabled) 256 (with 3 ms transmit interval)
<b>BFD IPv6 sessions (Hardware Assisted)</b> —maximum number of IPv6 BFD sessions.	Summit X460-G2, ExtremeSwitching X870, X690, X590, X465	425 (PTP not enabled)
<b>BOOTP/DHCP relay</b> —maximum number of BOOTP or DHCP servers per virtual router.	Summit X460-G2, X670-G2, X450-G2, and ExtremeSwitching X440-G2, X465, X620, X870, X690, X590	8
<b>BOOTP/DHCP relay</b> —maximum number of BOOTP or DHCP servers per VLAN.	Summit X460-G2, X670-G2, X450-G2, and ExtremeSwitching X440-G2, X465, X620, X870, X690, X590	8
<b>BOOTP/DHCP relay</b> —maximum number of DHCPv4/v6 relay agents	Summit X460-G2, X670-G2, X450-G2, and ExtremeSwitching X440-G2, X465, X620, X870, X690, X590	4,000
<b>Connectivity fault management (CFM)</b> —maximum number of CFM domains.  <b>Note:</b> With Advanced Edge license or higher.	Summit X460-G2, X670-G2, X450-G2, and ExtremeSwitching X440-G2, X620, X870, X690, X590, X465	8
<b>CFM</b> —maximum number of CFM associations.  <b>Note:</b> With Advanced Edge license or higher.	Summit X460-G2, X670-G2, X450-G2, and ExtremeSwitching X440-G2, X620, X870, X690, X590, X465	256

**Table 4: Supported Limits for Edge License (continued)**

Metric	Product	Limit
<b>CFM</b> —maximum number of CFM up end points.  <b>Note:</b> With Advanced Edge license or higher.	Summit X460-G2, X670-G2, X450-G2, and ExtremeSwitching X440-G2, X620, X870, X690, X590, X465	32
<b>CFM</b> —maximum number of CFM down end points.  <b>Note:</b> With Advanced Edge license or higher.	Summit X670-G2, X450-G2, and ExtremeSwitching X440-G2, X620, X870, X690, X590, X465  Summit X460-G2	32  256 (non-load shared ports) 32 (load shared ports)
<b>CFM</b> —maximum number of CFM remote end points per up/down end point.  <b>Note:</b> With Advanced Edge license or higher.	Summit X460-G2, X670-G2, X450-G2, and ExtremeSwitching X440-G2, X620, X870, X690, X590, X465	2,000
<b>CFM</b> —maximum number of dot1ag ports.  <b>Note:</b> With Advanced Edge license or higher.	Summit X460-G2, X670-G2, X450-G2, and ExtremeSwitching X440-G2, X620, X870, X690, X590, X465	128
<b>CFM</b> —maximum number of CFM segments.  <b>Note:</b> With Advanced Edge license or higher.	Summit X460-G2, X670-G2, X450-G2, and ExtremeSwitching X440-G2, X620, X870, X690, X590, X465	1,000
<b>CFM</b> —maximum number of MIPs.  <b>Note:</b> With Advanced Edge license or higher.	Summit X460-G2, X670-G2, X450-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	256
<b>CLEAR-Flow</b> —total number of rules supported. The ACL rules plus CLEAR-Flow rules must be less than the total number of supported ACLs.	Summit X460-G2, X670-G2, X450-G2 ExtremeSwitching X440-G2, X620 ExtremeSwitching X870 ExtremeSwitching X690, X590, X465	4,094 1,024 3,072 8,192
<b>Data Center Bridging eXchange (DCBX) protocol Type Length Value (TLVs)</b> —maximum number of DCBX application TLVs.	Summit X460-G2, X670-G2, X450-G2, and ExtremeSwitching X440-G2, X620, X870, X690, X590, X465	8

**Table 4: Supported Limits for Edge License (continued)**

Metric	Product	Limit
<b>DHCPv6 Prefix Delegation Snooping</b> —Maximum number of DHCPv6 prefix delegation snooped entries.	Summit X460-G2, X670-G2, X450-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	256 (with Underlying Protocol Ripng) 128 (with Underlying protocol OSPFv3) 1,024 (with static routes)
<b>DHCP snooping entries</b> —maximum number of DHCP snooping entries.	Summit X460-G2, X670-G2, X450-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	2,048
<b>Dynamic ACLs</b> —maximum number of ACLs processed per second.  <b>Note:</b> Limits are load dependent.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465  with 50 DACLS with 500 DACLS	10 5
<b>EAPS domains</b> —maximum number of EAPS domains.  <b>Note:</b> An EAPS ring that is being spatially reused cannot have more than four configured EAPS domains.  <b>Note:</b> You can increase the number of domains by upgrading to the Advanced Edge license.	Summit X670-G2, X450-G2, X460-G2, and ExtremeSwitching X440-G2, X620, X870, X690, X590, X465	4
<b>EAPSV1 protected VLANs</b> —maximum number of protected VLANs.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2	1,000
	ExtremeSwitching X870, X690, X590, X465	2,000
<b>ERPS domains</b> —maximum number of ERPS domains with or without CFM configured.  <b>Note:</b> You can increase the number of domains by upgrading to the Advanced Edge license.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	4
<b>ERPSV1 protected VLANs</b> —maximum number of protected VLANs.	ExtremeSwitching X870, X690, X590, X465	2,000
	Summit X450-G2, X460-G2, X670-G2, ExtremeSwitching X620, X440-G2	1,000
<b>ERPSv2 protected VLANs</b> —maximum number of protected VLANs.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X870, X690, X590, X465	2,000
	ExtremeSwitching X620, X440-G2	500

**Table 4: Supported Limits for Edge License (continued)**

Metric	Product	Limit
<b>ELSM (vlan-ports)</b> —maximum number of VLAN ports.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X870, X690, X590, X465	5,000
	ExtremeSwitching X440-G2	4,000
<b>Extended Edge Switching maximum BPEs</b> —maximum number of attached bridge port extenders (BPEs).	Summit X670-G2, ExtremeSwitching X690, X590, X465	48
<b>Extended Edge Switching maximum cascade ports</b> —maximum number of upstream ports on bridge port extenders (BPEs).	Summit X670-G2, ExtremeSwitching X690, X590, X465	2 on V400-24 models 4 on V400-48 models
<b>Extended Edge Switching maximum tiers</b> —maximum number of cascade levels (tiers) of bridge port extenders (BPEs).	Summit X670-G2, ExtremeSwitching X465, X690, X590	4
<b>Extended Edge Switching VLAN+ port memberships</b> —maximum number of VLAN+ (extended) port memberships.	Summit X670-G2, ExtremeSwitching X690, X590, X465	12,000 in hash mode (default) 131,000 in port-group mode
<b>Forwarding rate</b> —maximum L3 software forwarding rate.	ExtremeSwitching X690, X590, X465	30,000 pps
	ExtremeSwitching X870	32,000 pps
	Summit X450-G2	16,000 pps
	Summit X460-G2	17,000 pps
	ExtremeSwitching X620	10,000 pps
	Summit X670-G2	15,000 pps
	ExtremeSwitching X440-G2	9,000 pps
<b>FDB (unicast blackhole entries)</b> —maximum number of unicast blackhole FDB entries.	Summit X460-G2	49,152 <sup>f</sup>
	Summit X670-G2	294,912 <sup>f</sup>
	Summit X450-G2	34,816 <sup>f</sup>
	ExtremeSwitching X620, X440-G2	16,384 <sup>f</sup>
	ExtremeSwitching X870	139,264 <sup>f</sup>
	ExtremeSwitching X690, X590, X465	278,528 <sup>f</sup>
<b>FDB (multicast blackhole entries)</b> —maximum number of multicast blackhole FDB entries.	Summit X460-G2, X450-G2, and ExtremeSwitching X440-G2, X620	1,024
	Summit X670-G2, ExtremeSwitching X870, X690, X590, X465	4,096



**Table 4: Supported Limits for Edge License (continued)**

Metric	Product	Limit
<b>FDB (maximum L2 entries)</b> —maximum number of MAC addresses.	Summit X460-G2	98,300 <sup>9</sup>
	Summit X670-G2	294,912 <sup>9</sup>
	Summit X450-G2	68,000 <sup>9</sup>
	ExtremeSwitching X620, X440-G2	16,384
	ExtremeSwitching X870	139,264 <sup>9</sup>
	ExtremeSwitching X690, X590, X465	278,528 <sup>9</sup>
<b>FDB (Maximum L2 entries)</b> —maximum number of multicast FDB entries.	Summit X670-G2, ExtremeSwitching X870, X690, X590, X465	4,096
	Summit X450-G2, X460-G2, and ExtremeSwitching X620, X440-G2	1,024
<b>Identity management</b> —maximum number of Blacklist entries.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	512
<b>Identity management</b> —maximum number of Whitelist entries.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	512
<b>Identity management</b> —maximum number of roles that can be created.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	64
<b>Identity management</b> —maximum role hierarchy depth allowed.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	5
<b>Identity management</b> —maximum number of attribute value pairs in a role match criteria.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	16
<b>Identity management</b> —maximum of child roles for a role.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	8
<b>Identity management</b> —maximum number of policies/dynamic ACLs that can be configured per role.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	8
<b>Identity management</b> —maximum number of LDAP servers that can be configured.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	8
<b>Identity management</b> —maximum number of Kerberos servers that can be configured.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	20
<b>Identity management</b> —maximum database memory size.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	512

**Table 4: Supported Limits for Edge License (continued)**

Metric	Product	Limit
<b>Identity management</b> —recommended number of identities per switch.  <b>Note:</b> Number of identities per switch is for a default identity management database size (512 Kbytes) across all platforms.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	100
<b>Identity management</b> —recommended number of ACL entries per identity.  <b>Note:</b> Number of ACLs per identity based on system ACL limitation.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	20
<b>Identity management</b> —maximum number of dynamic ACL entries configured as an individual dynamic rule, or as an ACL entry in a policy file.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	500
<b>IGMP snooping per VLAN filters</b> —maximum number of VLANs supported in per-VLAN IGMP snooping mode.	Summit X460-G2, ExtremeSwitching X870	1,500
	Summit X450-G2	2,048
	Summit X670-G2	2,000
	ExtremeSwitching X620, X440-G2	1,000
	ExtremeSwitching X690, X590, X465	4,000
<b>IGMPv1/v2 SSM-map entries</b> —maximum number of IGMPv1/v2 SSM mapping entries.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	500
<b>IGMPv1/v2 SSM-map entries</b> —maximum number of sources per group in IGMPv1/v2 SSM mapping entries.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	50
<b>IGMPv2 subscriber</b> —maximum number of IGMPv2 subscribers per port. <sup>n</sup>	Summit X670-G2, X460-G2, X450-G2	4,000
	ExtremeSwitching X440-G2, X620	3,500
	ExtremeSwitching X870, X690, X590, X465	4,000
<b>IGMPv2 subscriber</b> —maximum number of IGMPv2 subscribers per switch. <sup>n</sup>	Summit X670-G2	30,000
	Summit X460-G2, X450-G2	20,000
	ExtremeSwitching X620, X440-G2	17,500
	ExtremeSwitching X465, X870, X690, X590	45,000
<b>IGMPv3 maximum source per group</b> —maximum number of source addresses per group.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	250
<b>IGMPv3 subscriber</b> —maximum number of IGMPv3 subscribers per port. <sup>n</sup>	Summit X670-G2, X460-G2, X450-G2	4,000
	ExtremeSwitching X440-G2, X620	3,500
	ExtremeSwitching X870, X690, X590, X465	4,000

**Table 4: Supported Limits for Edge License (continued)**

Metric	Product	Limit
<b>IGMPv3 subscriber</b> —maximum number of IGMPv3 subscribers per switch. <sup>n</sup>	Summit X460-G2, X450-G2	20,000
	Summit X670-G2	30,000
	ExtremeSwitching X620, X440-G2	17,500
	ExtremeSwitching X870, X690, X590, X465	45,000
<b>IP ARP entries in software</b> —maximum number of IP ARP entries in software.  <b>Note:</b> May be limited by hardware capacity of FDB (maximum L2 entries).	Summit X670-G2	131,072 (up to) <sup>h</sup>
	Summit X460-G2	57,344 (up to) <sup>h</sup>
	Summit X450-G2	47,000 (up to) <sup>h</sup>
	ExtremeSwitching X440-G2, X620	20,480
	ExtremeSwitching X870	94,206 (up to) <sup>h</sup>
	ExtremeSwitching X690, X590, X465	157,694 (up to) <sup>h</sup>
<b>IPv4 ARP entries in hardware with minimum LPM routes</b> —maximum recommended number of IPv4 ARP entries in hardware, with minimum LPM routes present. Assumes number of IP route reserved entries is 100 or less.	ExtremeSwitching X870	74,000 (up to) <sup>h</sup>
	Summit X460-G2	50,000 (up to) <sup>h</sup>
	Summit X670-G2	108,000 (up to) <sup>h</sup>
	Summit X450-G2	39,000 (up to) <sup>h</sup>
	ExtremeSwitching X620	1,500
	ExtremeSwitching X440-G2	1,000
	ExtremeSwitching X690, X590, X465	119,000 (up to) <sup>h</sup>
<b>IPv4 ARP entries in hardware with maximum LPM routes</b> —maximum recommended number of IPv4 ARP entries in hardware, with maximum LPM routes present. Assumes number of IP route reserved entries is “maximum.”	ExtremeSwitching X870	64,000 (up to) <sup>h</sup>
	Summit X460-G2	43,000 (up to) <sup>h</sup>
	Summit X670-G2	98,000 (up to) <sup>h</sup>
	Summit X450-G2	29,000 (up to) <sup>h</sup>
	ExtremeSwitching X620	1,500
	ExtremeSwitching X440-G2	1,000
	ExtremeSwitching X690, X590, X465	109,000 (up to) <sup>h</sup>
<b>IP flow information export (IPFIX)</b> —number of simultaneous flows.	Summit X460-G2	2,048 ingress 2,048 egress
	Summit X450-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	N/A

**Table 4: Supported Limits for Edge License (continued)**

Metric	Product	Limit
IPv4 remote hosts in hardware with zero LPM routes—maximum recommended number of IPv4 remote hosts (hosts reachable through a gateway) in hardware when LPM routing is not used. Assumes number of IP route reserved entries is 0, and number of IPv4 ARP entries present is 100 or less.	ExtremeSwitching X870	120,000 (up to) <sup>h</sup>
	Summit X460-G2	73,000 <sup>h</sup>
	Summit X670-G2	176,000 (up to) <sup>h</sup>
	Summit X450-G2	61,000 (up to) <sup>h</sup>
	ExtremeSwitching X440-G2, X620	3,500
	ExtremeSwitching X690, X590, X465	216,000 (up to) <sup>h</sup>
IPv4 routes—maximum number of IPv4 routes in software (combination of unicast and multicast routes), including static and from all routing protocols.	Summit X460-G2, X450-G2, X440-G2, X620	25,000
	Summit X670-G2, ExtremeSwitching X690, X870, X590, X465	131,000
IPv4 routes (LPM entries in hardware) — number of IPv4 routes in hardware.	Summit X460-G2	12,000
	Summit X450-G2	16,000
	Summit X670-G2, ExtremeSwitching X690, X870, X590, X465	131,000 <sup>a</sup>
	ExtremeSwitching X620, X440-G2	480
IPv6 6in4 tunnel—maximum number of IPv6 6in4 tunnels.	Summit X450-G2, X460-G2, X670-G2, ExtremeSwitching X870, X690, X590, X465	255
	ExtremeSwitching X440-G2, X620	N/A
IPv6 6to4 tunnel—maximum number of IPv6 6to4 tunnels.	Summit X450-G2, X460-G2, X670-G2, ExtremeSwitching X870, X690, X590, X465	1 (per virtual router)
	ExtremeSwitching X440-G2, X620	N/A
IPv6 addresses on an interface—maximum number of IPv6 addresses on an interface.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	255
IPv6 addresses on a switch—maximum number of IPv6 addresses on a switch.	Summit X670-G2, X460-G2, X450-G2, ExtremeSwitching X870, X690, X590, X465	2,048
	ExtremeSwitching X620, X440-G2	510
IPv6 host entries in hardware—maximum number of IPv6 neighbor entries in hardware.	Summit X670-G2	36,750 <sup>h</sup>
	Summit X460-G2	22,000 <sup>h</sup>
	Summit X450-G2	12,000 <sup>h</sup>
	ExtremeSwitching X440-G2	1,000
	ExtremeSwitching X620	1,500
	ExtremeSwitching X690, X590, X465	24,500 <sup>h</sup>
	ExtremeSwitching X870	22,000 <sup>h</sup>

**Table 4: Supported Limits for Edge License (continued)**

Metric	Product	Limit
<b>IPv6 routes in software</b> —maximum number of IPv6 routes in software, including static routes and routes from all routing protocols.	Summit X450-G2, X460-G2, and ExtremeSwitching X620, X440-G2	25,000
	Summit X670-G2, ExtremeSwitching X690, X870, X590, X465	65,000 <sup>q</sup>
<b>IPv6 routes (LPM entries in hardware)</b> —maximum number of IPv6 routes in hardware.	Summit X460-G2	6,000
	Summit X450-G2	8,000
	Summit X670-G2, ExtremeSwitching X690, X870, X590, X465	65,000 <sup>q</sup>
	ExtremeSwitching X620, X440-G2,	240
<b>IPv6 routes with a mask greater than 64 bits in hardware</b> —maximum number of such IPv6 LPM routes in hardware.	Summit X670-G2, ExtremeSwitching X690, X870, X590, X465	8,192 <sup>r</sup>
	ExtremeSwitching X440-G2, X620	1,024
	Summit X450-G2, X460-G2	2,048
<b>IPv6 route sharing in hardware</b> —route mask lengths for which ECMP is supported in hardware.	Summit X460-G2, X450-G2, and ExtremeSwitching X620	0–64 >64 single path only
	Summit X670-G2, and ExtremeSwitching X690, X870, X590, X465	0–128 <sup>r</sup>
	ExtremeSwitching X440-G2	Not supported
<b>IP router interfaces</b> —maximum number of VLANs performing IPv4 and/or IPv6 routing. Excludes sub-VLANs.	Summit X460-G2, X670-G2, X450-G2, ExtremeSwitching X870, X690, X590, X465	2,048
	ExtremeSwitching X620, X440-G2	510
<b>IP multicast static routes</b> —maximum number of permanent multicast IP routes.	Summit X460-G2, X670-G2, X450-G2, ExtremeSwitching X870, X690, X590, X465	1,024
<b>IP unicast static routes</b> —maximum number of permanent IP unicast routes.	Summit X460-G2, X670-G2, X450-G2, ExtremeSwitching X870, X690, X590, X465	1,024
	ExtremeSwitching X620, X440-G2	480
<b>IP route sharing (maximum gateways)</b> —Configurable maximum number of gateways used by equal cost multipath OSPF, BGP, IS-IS, static routes, or L2VPNs. Static routes, OSPF, and BGP are limited to 64 ECMP gateways per destination, while IS-IS is limited to 8. L2VPNs are limited to 16 LSPs per pseudowire on platforms that support 32 gateways, and 64 LSPs per pseudowire on platforms that support 64 gateways.	Summit X460-G2, X670-G2, X450-G2, and ExtremeSwitching X620, X870, X690, X590, X465	2, 4, 8, 16, 32, or 64
	ExtremeSwitching X440-G2	N/A

**Table 4: Supported Limits for Edge License (continued)**

Metric	Product	Limit
IP route sharing (total combinations of gateway sets)—maximum number of combinations of sets of adjacent gateways used by multipath OSPF, BGP, IS-IS, or static routes.	Summit X670-G2	
	if maximum gateways is 2	1,022
	if maximum gateways is 4	1,022
	if maximum gateways is 8	1,022
	if maximum gateways is 16 (default)	1,022
	if maximum gateways is 32	510
	if maximum gateways is 64	254
	Summit X460-G2, X450-G2	
	if maximum gateways is 2	1,022
	if maximum gateways is 4	1,022
	if maximum gateways is 8	510
	if maximum gateways is 16 (default)	254
	if maximum gateways is 32	126
	if maximum gateways is 64	62
	ExtremeSwitching X620	
	if maximum gateways is 2	126
	if maximum gateways is 4	126
	if maximum gateways is 8	126
	if maximum gateways is 16 (default)	126
	if maximum gateways is 32	62
	if maximum gateways is 64	30
	ExtremeSwitching X690, X590, X465	
	if maximum gateways is 2	4,094
	if maximum gateways is 4	4,094
	if maximum gateways is 8	2,046
	if maximum gateways is 16 (default)	1,022
	if maximum gateways is 32	510
	if maximum gateways is 64	254
	<b>Note:</b> The values here represent the maximum attainable ECMP groups of which, due to the RIOT feature, half are reserved for overlay and half for underlay routing. For more information about RIOT, see the <a href="#">ExtremeXOS 30.2 User Guide</a> .	
	ExtremeSwitching X870	
	if maximum gateways is 2	2,046
	if maximum gateways is 4	2,046
	if maximum gateways is 8	2,046
	if maximum gateways is 16 (default)	1,022
	if maximum gateways is 32	510
	if maximum gateways is 64	254
	ExtremeSwitching X440-G2	N/A

**Table 4: Supported Limits for Edge License (continued)**

Metric	Product	Limit
<b>IP multinetting (secondary IP addresses)</b> —maximum number of secondary IP addresses per VLAN.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	255
<b>Jumbo frames</b> —maximum size supported for jumbo frames, including the CRC.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	9,216
<b>L2 VPN: VCCV (pseudowire Virtual Circuit Connectivity Verification) VPNs per switch</b> —maximum number of VCCV enabled VPLS VPNs.	Summit X460-G2, X670-G2, ExtremeSwitching X870, X690, X590, X465	16
	Summit X450-G2, and ExtremeSwitching X620, X440-G2	N/A
<b>L2 VPN: VPLS MAC addresses</b> —maximum number of MAC addresses learned by a switch.	Summit X670-G2, ExtremeSwitching X690, X590, X465	140,000
	Summit X460-G2	55,000
	ExtremeSwitching X870	65,000
	Summit X450-G2, and ExtremeSwitching X620, X440-G2	N/A
<b>L2 VPN: VPLS VPNs</b> —maximum number of VPLS virtual private networks per switch.	Summit X460-G2, X670-G2, ExtremeSwitching X870, X690, X590, X465	1,023
	Summit X450-G2, and ExtremeSwitching X620, X440-G2	N/A
<b>L2 VPN: VPLS peers</b> —maximum number of VPLS peers per VPLS instance.	Summit X670-G2, X460-G2, ExtremeSwitching X870, X690, X590, X465	64
	Summit X450-G2, and ExtremeSwitching X620, X440-G2	N/A
<b>L2 VPN: LDP pseudowires</b> —maximum number of pseudowires per switch.	Summit X670-G2, X460-G2, and ExtremeSwitching X870, X690, X590, X465	7,000
	Summit X450-G2, and ExtremeSwitching X620, X440-G2	N/A
<b>L2 VPN: static pseudowires</b> —maximum number of static pseudowires per switch.	Summit X670-G2, X460-G2, ExtremeSwitching X870, X690, X590, X465	7,000
	Summit X450-G2, and ExtremeSwitching X620, X440-G2	N/A
<b>L2 VPN: Virtual Private Wire Service (VPWS) VPNs</b> —maximum number of virtual private networks per switch.	Summit X670-G2, ExtremeSwitching X870, X690, X590, X465	4,090
	Summit X460-G2	1,023
	Summit X450-G2, and ExtremeSwitching X620, X440-G2	N/A

**Table 4: Supported Limits for Edge License (continued)**

Metric	Product	Limit
<b>Layer-2 IPMC forwarding caches—</b> (IGMP/MLD/PIM snooping) in mac-vlan mode.  <b>Note:</b> <ul style="list-style-type: none"> <li>The internal lookup table configuration used is "I2-and-I3".</li> <li>IPv6 and IPv4 L2 IPMC scaling is the same for this mode.</li> <li>Layer-2 IPMC forwarding cache limits—(IGMP/MLD/PIM snooping) in mixed-mode are same.</li> </ul>	Summit X670-G2	73,000
	Summit X460-G2	24,000
	Summit X450-G2	14,000
	ExtremeSwitching X620, X440-G2	5,000
	ExtremeSwitching X870	36,000
	ExtremeSwitching X690, X590, X465	67,000
<b>Layer-3 IPv4 Multicast—</b> maximum number of <S,G,V> entries installed in the hardware (IP multicast compression enabled).  <b>Note:</b> <ul style="list-style-type: none"> <li>Limit value same for MVR senders, PIM Snooping entries. PIM SSM cache, IGMP senders, PIM cache.</li> <li>The internal lookup table configuration used is "more I3-and-ipmc".</li> <li>Assumes source-group-vlan mode as look up key.</li> <li>Layer 3 IPMC cache limit in mixed mode also has the same value.</li> </ul>	Summit X460-G2	26,000
	Summit X450-G2	21,000
	Summit X670-G2	77,500
	ExtremeSwitching X620, X440-G2	1,500
	ExtremeSwitching X870	52,000
	ExtremeSwitching X690, X590, X465	93,000
<b>Layer-3 IPv6 Multicast—</b> maximum number of <S,G,V> entries installed in the hardware (IP multicast compression enabled).  <b>Note:</b> <ul style="list-style-type: none"> <li>Limit value same for MLD sender per switch, PIM IPv6 cache.</li> <li>The internal lookup table configuration used is "more I3-and-ipmc".</li> <li>Assumes source-group-vlan mode as look up key.</li> </ul>	Summit X670-G2	30,000
	Summit X460-G2	14,000
	Summit X450-G2	10,000
	ExtremeSwitching X620, X440-G2	700
	ExtremeSwitching X870	18,000
	ExtremeSwitching X690, X590, X465	48,000



**Table 4: Supported Limits for Edge License (continued)**

Metric	Product	Limit
<b>Load sharing</b> —maximum number of load sharing groups.  <b>Note:</b> The actual number of load-sharing groups that can be configured is limited by the number of physical ports present in the switch or SummitStack.	Summit X450-G2, X460-G2, X670-G2, , and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	128
<b>Load sharing</b> —maximum number of ports per load-sharing group.	For standalone and stacked: ExtremeSwitching X620, X440-G2  For standalone: Summit X670-G2, X460-G2, X450-G2, ExtremeSwitching X870, X690, X590, X465  For stacked: Summit X670-G2, X460-G2, X450-G2, X670-G2, and ExtremeSwitching X870, X690, X590, X465	8  32  64
<b>Logged messages</b> —maximum number of messages logged locally on the system.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	20,000
<b>MAC-based security</b> —maximum number of MAC-based security policies.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	1,024
<b>MAC Locking</b> —Maximum number of MAC locking stations that can be learned on a port.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	64 (static MAC locking stations) 600 (first arrival MAC locking stations)
<b>Meters</b> —maximum number of meters supported.	Summit X460-G2, X450-G2, X670-G2, ExtremeSwitching X440-G2, X620, X870, X690, X590 , X465	2,048

**Table 4: Supported Limits for Edge License (continued)**

Metric	Product	Limit
Maximum mirroring instances	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X870, X690, X590, X465  <b>Note:</b> Only two or four mirroring instances will be active at a time, depending on the mirroring filter added to it. There are four hardware resource slots. Each single instance uses one such slot, while each ingress plus egress instance uses two slots. So this allows you to use a total of four slots, while there are no more than two egress instances. The maximum possible combination for mirroring instances:  1 4 ingress 2 3 ingress + 1 egress 3 2 ingress + 2 egress 4 2 (ingress + egress) 5 1 (ingress + egress) + 2 ingress 6 1 (ingress + egress) + 1 egress + 1 ingress	16 (including default mirroring instance)
	ExtremeSwitching X620, X440-G2  <b>Note:</b> For stacks containing X620 or X440-G2, maximum supported egress mirror instances is 1.	1 (egress)
<b>Mirroring (filters)</b> —maximum number of mirroring filters.  <b>Note:</b> This is the number of filters across all the active mirroring instances.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	128
<b>Mirroring, one-to-many (filters)</b> —maximum number of one-to-many mirroring filters.  <b>Note:</b> This is the number of filters across all the active mirroring instances.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	128
<b>Mirroring, one-to-many (monitor port)</b> —maximum number of one-to-many monitor ports.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	16
<b>MLAG ports</b> —maximum number of MLAG ports allowed.	Summit X670-G2, ExtremeSwitching X690	71
	ExtremeSwitching X440-G2, Summit X450-G2	51
	Summit X460-G2	53
	ExtremeSwitching X620	15
	ExtremeSwitching X870	127
	ExtremeSwitching X590, X465	35

**Table 4: Supported Limits for Edge License (continued)**

Metric	Product	Limit
<b>MLAG peers</b> —maximum number of MLAG peers allowed.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	2
<b>MPLS RSVP-TE interfaces</b> —maximum number of interfaces.	Summit X460-G2, X670-G2, ExtremeSwitching X590, X465, X870	32
	Summit X450-G2, and ExtremeSwitching X440-G2, X620	N/A
<b>MPLS RSVP-TE ingress LSPs</b> —maximum number of ingress LSPs.	Summit X460-G2, X670-G2, ExtremeSwitching X870, X590, X690, X465	2,000
	Summit X450-G2, and ExtremeSwitching X440-G2, X620 X590, X465	N/A
<b>MPLS RSVP-TE egress LSPs</b> —maximum number of egress LSPs.	Summit X460-G2, X670-G2, ExtremeSwitching X870, X690 X590,, X465	2,000
	Summit X450-G2, and ExtremeSwitching X440-G2, X620	N/A
<b>MPLS RSVP-TE transit LSPs</b> —maximum number of transit LSPs.	Summit X460-G2, X670-G2	2,000
	ExtremeSwitching X870, X690 X590,, X465	4,000
	Summit X450-G2, and ExtremeSwitching X440-G2, X620	N/A
<b>MPLS RSVP-TE paths</b> —maximum number of paths.	Summit X460-G2	1,000
	Summit X670-G2, ExtremeSwitching X870, X690 X590,, X465	2,000
	Summit X450-G2, and ExtremeSwitching X440-G2, X620	N/A
<b>MPLS RSVP-TE profiles</b> —maximum number of profiles.	Summit X460-G2	1,000
	Summit X670-G2, ExtremeSwitching X870, X690 X590,, X465	2,000
	Summit X450-G2, and ExtremeSwitching X440-G2, X620	N/A
<b>MPLS RSVP-TE EROs</b> —maximum number of EROs per path.	Summit X460-G2, X670-G2, ExtremeSwitching X870, X690 X590,, X465	64
	Summit X450-G2, and ExtremeSwitching X440-G2, X620	N/A
<b>MPLS LDP peers</b> —maximum number of MPLS LDP peers per switch.	Summit X670-G2, X460-G2, ExtremeSwitching X870, X690 X590,, X465	128
	Summit X450-G2, and ExtremeSwitching X440-G2, X620	N/A

**Table 4: Supported Limits for Edge License (continued)**

Metric	Product	Limit
<b>MPLS LDP adjacencies</b> —maximum number of MPLS LDP adjacencies per switch.	Summit X460-G2	50
	Summit X670-G2, ExtremeSwitching X870, X690 X590,, X465	64
	Summit X450-G2, and ExtremeSwitching X440-G2, X620	N/A
<b>MPLS LDP ingress LSPs</b> —maximum number of MPLS LSPs that can originate from a switch.	Summit X670-G2, X460-G2, ExtremeSwitching X870, X690 X590,, X465	2,048
	Summit X450-G2, and ExtremeSwitching X440-G2, X620	N/A
<b>MPLS LDP-enabled interfaces</b> —maximum number of MPLS LDP configured interfaces per switch.	Summit X670-G2, X460-G2, ExtremeSwitching X870, X690 X590,, X465	128
	Summit X450-G2, and ExtremeSwitching X440-G2, X620	N/A
<b>MPLS LDP transit LSPs</b> —maximum number of MPLS transit LSPs per switch.	Summit X670-G2, X460-G2, ExtremeSwitching X870, X690 X590,, X465	4,000
	Summit X450-G2, and ExtremeSwitching X440-G2, X620	N/A
<b>MPLS LDP egress LSPs</b> —maximum number of MPLS egress LSPs that can terminate on a switch.	Summit X670-G2, X460-G2, ExtremeSwitching X870, X690 X590,, X465	4,000
	Summit X450-G2, and ExtremeSwitching X440-G2, X620	N/A
<b>MPLS static egress LSPs</b> —maximum number of static egress LSPs.	Summit X460-G2	7,116
	ExtremeSwitching X870, X690, X590,, X465, Summit X670-G2	8,000
	Summit X450-G2, and ExtremeSwitching X440-G2, X620	N/A
<b>MPLS static ingress LSPs</b> —maximum number of static ingress LSPs.	Summit X460-G2, ExtremeSwitching X870, X690 X590,, X465	4,000
	Summit X670-G2	2,048
	Summit X450-G2, and ExtremeSwitching X440-G2, X620	N/A
<b>MPLS static transit LSPs</b> —maximum number of static transit LSPs	Summit X670-G2, X460-G2, ExtremeSwitching X870, X690 X590,, X465	4,000
	Summit X450-G2, and ExtremeSwitching X440-G2, X620	N/A
<b>Multicast listener discovery (MLD) snooping per-VLAN filters</b> —maximum number of VLANs supported in per-VLAN MLD snooping mode.	Summit X460-G2, X670-G2, ExtremeSwitching X870	1,200
	Summit X450-G2	512
	ExtremeSwitching X620, X440-G2	600
	ExtremeSwitching X690, X590, X465	1,500

**Table 4: Supported Limits for Edge License (continued)**

Metric	Product	Limit
<b>Multicast listener discovery (MLD)v1 subscribers</b> —maximum number of MLDv1 subscribers per port. <sup>n</sup>	Summit X670-G2, X450-G2, X460-G2	4,000
	ExtremeSwitching X620, X440-G2	3,500
	ExtremeSwitching X870, X690, X590, X465	4,000
<b>Multicast listener discovery (MLD)v1 subscribers</b> —maximum number of MLDv1 subscribers per switch. <sup>n</sup>	Summit X460-G2, X450-G2, ExtremeSwitching X620, X440-G2	10,000
	Summit X670-G2	30,000
	ExtremeSwitching X870, X690, X590, X465	45,000
<b>Multicast listener discovery (MLD)v2 subscribers</b> —maximum number of MLDv2 subscribers per port. <sup>n</sup>	Summit X670-G2, X460-G2, X450-G2	4,000
	ExtremeSwitching X620, X440-G2	3,500
	ExtremeSwitching X870, X690, X590, X465	4,000
<b>Multicast listener discovery (MLD)v2 subscribers</b> —maximum number of MLDv2 subscribers per switch. <sup>n</sup>	Summit X670-G2	30,000
	Summit X460-G2, X450-G2, ExtremeSwitching X620, X440-G2	10,000
	ExtremeSwitching X870, X690, X590, X465	45,000
<b>Multicast listener discovery (MLD)v2 maximum source per group</b> —maximum number of source addresses per group.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	200
<b>Multicast listener discovery (MLD) SSM-map entries</b> —maximum number of MLD SSM mapping entries.	Summit X450-G2, X460-G2, X670-G2, ExtremeSwitching X870, X690, X590, X465	500
	ExtremeSwitching X440-G2, X620	50
<b>Multicast listener discovery (MLD) SSM-MAP entries</b> —maximum number of sources per group in MLD SSM mapping entries.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	50
<b>Network Login</b> —maximum number of clients being authenticated on MAC-based VLAN enabled ports.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	1,024
<b>Network Login</b> —maximum number of clients being authenticated with policy mode enabled with TCI overwrite enabled.	Summit X450-G2, X460-G2, ExtremeSwitching X590, X465	1,024
	Summit X670-G2, ExtremeSwitching X870, X690	512
	ExtremeSwitching X620, X440-G2	256
<b>Network Login</b> —maximum number of dynamic VLANs.	Summit X460-G2, X450-G2, X670-G2, ExtremeSwitching X870, X690, X590, X465	2,000
	ExtremeSwitching X440-G2, X620	1,024
<b>Network Login VLAN VSAs</b> —maximum number of VLANs a client can be authenticated on at any given time.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	10

**Table 4: Supported Limits for Edge License (continued)**

Metric	Product	Limit
<b>Network Service Identifiers (NSI)/VLAN mappings</b> —maximum number of VLANs to NSI mappings.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	94
<b>Node Alias</b> —maximum number of entries per slot.	Summit X450-G2, X460-G2, X670-G2 and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	8,192
<b>ONEPolicy Roles/Profiles</b> —maximum number of policy roles/profiles.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	63
<b>ONEPolicy Rules per Role/Profile</b> —maximum number of rules per role/policy.	Summit X450-G2, X460-G2	IPv6 rules: 256 IPv4 rules: 256 L2 Rules: 184 MAC Rules: 256
	Summit X670-G2, ExtremeSwitching X870	IPv6 Rules: 256 L2 Rules: 184 MAC Rules: 256 IPv4 Rules: 256
	ExtremeSwitching X620, X440-G2	IPv6 and Mac Rules: 0 Ipv4 Rules: 256 (per switch) L2 Rules: 184 (per switch)
	ExtremeSwitching X465, X690, X590	IPv4 Rules: 512 IPv6 Rules: 512 MAC Rules: 512 L2 Rules: 440
<b>ONEPolicy Authenticated Users per Switch</b> —maximum number of authenticated users per port only with TCI-Overwrite enabled.	Summit X450-G2, X460-G2, and ExtremeSwitching X590, X465	1,024
	Summit X670-G2, ExtremeSwitching X690, X870	512
	ExtremeSwitching X620, X440-G2	256
	Stacking	Depends on the stack nodes.
<b>ONEPolicy Authenticated Users per Switch</b> —maximum number of authenticated users per switch with TCI-Overwrite disabled.	ExtremeSwitching X690, X590, X465	24,576
	Summit X670-G2, X460-G2, ExtremeSwitching X870	12,288
	Summit X450-G2	6,144
	ExtremeSwitching X620, X440-G2	1,536
<b>Note:</b> The maximum values assume 75% utilization of VLAN-XLATE hash table.	Stacking	1,536–65,534

**Table 4: Supported Limits for Edge License (continued)**

Metric	Product	Limit
<b>ONEPolicy Authenticated Users per Port per Switch</b> — maximum number of authenticated users per port per switch with TCI overwrite disabled.  <b>Note:</b> The maximum values assume 75% utilization of VLAN-XLATE hash table.	Summit X450-G2	6,144
	Summit 460-G2, X670-G2, and ExtremeSwitching X870	12,288
	ExtremeSwitching X690, X590, X465	24,576
	ExtremeSwitching X440-G2, X620	1,536
<b>ONEPolicy Authenticated Users per Port per Switch</b> — maximum number of authenticated users per port with only with TCI-Overwrite enabled.	Summit X450-G2, X460-G2, ExtremeSwitching X590, X465	1,024
	Summit X670-G2, ExtremeSwitching X870, X690	512
	ExtremeSwitching X620, X440-G2	256
<b>ONEPolicy Permit/Deny Traffic Classification Rules Types</b> —total maximum number of unique permit/deny traffic classification rules types (system/stack).	Summit X450-G2, X460-G2, X670-G2, ExtremeSwitching X870	952
	ExtremeSwitching X620, X440-G2	440
	ExtremeSwitching X690, X590, X465	1,976
<b>ONEPolicy Permit/Deny Traffic Classification Rules Types</b> —maximum number of unique MAC permit/deny traffic classification rules types (macsource/macdest).	Summit X450-G2, X460-G2, X670-G2, ExtremeSwitching X870	256
	ExtremeSwitching X620, X440-G2	N/A
	ExtremeSwitching X690, X590, X465	512
<b>ONEPolicy Permit/Deny Traffic Classification Rules Types</b> —maximum number of unique IPv6 permit/deny traffic classification rules types (ipv6dest).	Summit X450-G2, X460-G2, X670-G2, ExtremeSwitching X870	256
	ExtremeSwitching X620, X440-G2	N/A
	ExtremeSwitching X690, X590, X465	512
<b>ONEPolicy Permit/Deny Traffic Classification Rules Types</b> —maximum number of unique IPv4 permit/deny traffic classification rules (typesipsource / ipdest / ipfrag / udpsourceportIP / udpdestportIP / tcpsourceportIP / tcpdestportIP / ipttl / iptos / iptype).	Summit X450-G2, X460-G2, X670-G2, ExtremeSwitching X620, X440-G2, X870	256
	ExtremeSwitching X690, X590, X465	512
<b>ONEPolicy Permit/Deny Traffic Classification Rules Types</b> —maximum number of unique Layer 2 permit/deny traffic classification rules (ethertype/port).	Summit X450-G2, X460-G2, X670-G2, ExtremeSwitching X870	184
	ExtremeSwitching X620, X440-G2	184
	ExtremeSwitching X690, X590, X465	440
<b>Policy-based routing (PBR) redundancy</b> —maximum number of flow-redirects.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	256°
<b>Policy-based routing (PBR) redundancy</b> —maximum number of next hops per each flow-direct.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	32°

**Table 4: Supported Limits for Edge License (continued)**

Metric	Product	Limit
<b>Private VLANs</b> —maximum number of subscribers. Assumes a minimum of one port per network and subscriber VLAN.	Summit X670-G2	63
	Summit X460-G2	53
	Summit X450-G2	51
	ExtremeSwitching X440-G2	47
	ExtremeSwitching X620	15
	ExtremeSwitching X870	127
	ExtremeSwitching X690	71
	ExtremeSwitching X590, X465	31
<b>Private VLANs</b> —maximum number of private VLANs with an IP address on the network VLAN.  <b>Note:</b> This limit is dependent on the maximum number of private VLANs in an L2-only environment if the configuration has tagged and translated ports.	Summit X670-G2, X460-G2, ExtremeSwitching X870, X690, X590, X465	1,024
	Summit X450-G2	510
	ExtremeSwitching X440-G2	255
	ExtremeSwitching X620	510
<b>Private VLANs</b> —maximum number of private VLANs in an L2-only environment.	Summit X670-G2, X460-G2, ExtremeSwitching X870, X690, X590, X465	1,280
	Summit X450-G2	597
	ExtremeSwitching X440-G2, X620	255
<b>PTP/1588v2 Clock Ports</b>	Summit X460-G2, X670-G2	32 for boundary clock 1 for ordinary clock
	ExtremeSwitching X440-G2, X465, X620, X870, X690, X590	N/A
<b>PTP/1588v2 Clock Instances</b>	Summit X670-G2, X460-G2	2 combinations: <ul style="list-style-type: none"> <li>Transparent clock + ordinary clock</li> <li>Transparent clock + boundary clock</li> </ul>
	ExtremeSwitching X440-G2, X465, X620, X870, X690, X590	N/A



**Table 4: Supported Limits for Edge License (continued)**

Metric	Product	Limit
PTP/1588v2 Unicast Static Slaves	Summit X670-G2, X460-G2	40 entries per clock port
	ExtremeSwitching X440-G2, X465, X620, X870, X690, X590	N/A
PTP/1588v2 Unicast Static Masters	Summit X670-G2, X460-G2	10 entries per clock type
	ExtremeSwitching X440-G2, X465, X620, X870, X690, X590	N/A
Route policies—suggested maximum number of lines in a route policy file.	Summit X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	10,000
RIP Learned Routes—maximum number of RIP routes supported without aggregation.	Summit X670-G2, X460-G2, and ExtremeSwitching X440-G2, X620, X870, X690, X590 , X465	10,000
RIP interfaces on a single router—recommended maximum number of RIP routed interfaces on a switch.	Summit X670-G2, X460-G2, X450-G2, ExtremeSwitching X870, X690, X590 , X465	256
	ExtremeSwitching X440-G2, X620	128
RIPng learned routes—maximum number of RIPng routes.	Summit X670-G2, X460-G2, X450-G2, X870, X690, X590 , X465	3,000
	ExtremeSwitching X440-G2, X620	N/A
Spanning Tree (maximum STPDs)—maximum number of Spanning Tree Domains on port mode EMISTP.	Summit X450-G2, X670-G2, X460-G2, and ExtremeSwitching X620, X870, X690, X590 , X465	64
	ExtremeSwitching X440-G2	32
Spanning Tree PVST+—maximum number of port mode PVST domains.  <b>Note:</b> For all platforms, the maximum number of active ports per PVST domain depends on the maximum number of spanning tree ports supported on given platform. For example, Summit X670-G2 supports 256 PVST domains (maximum), and 4,096 STP ports (maximum), so the maximum number of active ports per PVST domain would be 16 ports (4,096 ÷ 256).	Summit X670-G2, and ExtremeSwitching X620	256
	Summit X460-G2, X450-G2, and ExtremeSwitching X440-G2	128
	ExtremeSwitching X870, X690, X590 , X465	384
Spanning Tree—maximum number of multiple spanning tree instances (MSTI) domains.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X870, X690, X590 , X465	64
	ExtremeSwitching X440-G2	32

**Table 4: Supported Limits for Edge License (continued)**

Metric	Product	Limit
<b>Spanning Tree</b> —maximum number of VLANs per MSTI.  <b>Note:</b> Maximum number of 10 active ports per VLAN when all 500 VLANs are in one MSTI.	Summit X670-G2	500
	Summit X460-G2, X450-G2, ExtremeSwitching X620, X870, X690, X590 , X465	600
	ExtremeSwitching X440-G2	256
<b>Spanning Tree</b> —maximum number of VLANs on all MSTP instances.	Summit X670-G2, X460-G2, X450-G2, ExtremeSwitching X620, X870, X690, X590 , X465	1,024
	ExtremeSwitching X440-G2	512
<b>Spanning Tree (802.1d domains)</b> —maximum number of 802.1d domains per port.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590 , X465	1
<b>Spanning Tree (number of ports)</b> —maximum number of ports including all Spanning Tree domains.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X870, X690, X590, X465	4,096
	ExtremeSwitching X440-G2	2,048
<b>Spanning Tree (maximum VLANs)</b> —maximum number of STP-protected VLANs (dot1d and dot1w).	Summit X670-G2, X460-G2, X450-G2, and ExtremeSwitching X620, X870, X690, X590, X465	1,024
	ExtremeSwitching X440-G2	600
<b>SSH (number of sessions)</b> —maximum number of simultaneous SSH sessions.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	8
<b>Static MAC multicast FDB entries</b> —maximum number of permanent multicast MAC entries configured into the FDB.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	1,024
<b>Syslog servers</b> —maximum number of simultaneous Syslog servers that are supported.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	16
<b>Syslog targets</b> —maximum number of configurable Syslog targets.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	16
<b>Telnet (number of sessions)</b> —maximum number of simultaneous Telnet sessions.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590 , X465	8
<b>Virtual routers</b> —maximum number of user-created virtual routers that can be created on a switch.	Summit X460-G2, X670-G2, X450-G2, ExtremeSwitching X870, X690, X590 , X465	63
	ExtremeSwitching X440-G2, X620	16 (local-only VRs)
<b>Virtual router forwarding (VRFs)</b> —maximum number of VRFs that can be created on a switch.  <b>Note:</b> * Subject to other system limitations.	Summit X460-G2, X670-G2, X450-G2, ExtremeSwitching X870, X690, X590 , X465	960 *
	ExtremeSwitching X440-G2, X620	16 (local-only VRFs)

**Table 4: Supported Limits for Edge License (continued)**

Metric	Product	Limit
Virtual router protocols per VR—maximum number of routing protocols per VR.	Summit X460-G2, X670-G2, X450-G2, ExtremeSwitching X870, X690, X590 , X465	8
	ExtremeSwitching X440-G2, X620	N/A
Virtual router protocols per switch—maximum number of VR protocols per switch.	Summit X460-G2, X670-G2, X450-G2, ExtremeSwitching X870, X690, X590 , X465	64
	ExtremeSwitching X440-G2, X620	N/A
VLAN aggregation—maximum number of port-VLAN combinations on any one superVLAN and all of its subVLANs.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590 , X465	1,000
<b>VLANs</b> —includes all VLANs. <b>Note:</b> ExtremeXOS supports only 4,092 user-configurable VLANs. (VLAN 1 is the default VLAN, and 4,095 is the management VLAN, and you may not configure them.)	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590 , X465	4,094
<b>VLANs (Layer 2)</b> —maximum number of Layer 2 VLANs.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590 , X465	4,094
<b>VLANs (Layer 3)</b> —maximum number of VLANs performing IPv4 and/or IPv6 routing. Excludes sub-VLANs.	Summit X460-G2, X670-G2, X450-G2, ExtremeSwitching X870, X690, X590, X465	2,048
	ExtremeSwitching X440-G2, X620	510
<b>VLANs (maximum active port-based)</b> —maximum active ports per VLAN when 4,094 VLANs are configured with default license.	Summit X670-G2, ExtremeSwitching X870, X690, X590 , X465	32
	ExtremeSwitching X440-G2	28
	Summit X460-G2	26
	ExtremeSwitching X620	16
	Summit X450-G2	29
	Summit X460-G2	24
<b>VLANs (maximum active protocol-sensitive filters)</b> —number of simultaneously active protocol filters in the switch.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590 , X465	16

**Table 4: Supported Limits for Edge License (continued)**

Metric	Product	Limit
<b>VLAN translation</b> —maximum number of translation VLANs. Assumes a minimum of one port per translation and member VLAN.	Summit X670-G2	63
	Summit X460-G2	53
	Summit X450-G2	51
	ExtremeSwitching X620	15
	ExtremeSwitching X440-G2	47
	ExtremeSwitching X870	127
	ExtremeSwitching X690	71
	ExtremeSwitching X590, X465	31
<b>VLAN translation</b> —maximum number of translation VLAN pairs with an IP address on the translation VLAN.  <b>Note:</b> This limit is dependent on the maximum number of translation VLAN pairs in an L2-only environment if the configuration includes tagged and translated ports.	Summit X670-G2, ExtremeSwitching X465, X870, X690, X590	1,024
	Summit X450-G2	512
	ExtremeSwitching X620	510
	ExtremeSwitching X440-G2	255
<b>VLAN translation</b> —maximum number of translation VLAN pairs in an L2-only environment.	Summit X450-G2, X670-G2, X460-G2, ExtremeSwitching X870, X690, X590, X465	2,046
	ExtremeSwitching X440-G2, X620	255
<b>XML requests</b> —maximum number of XML requests per second.  <b>Note:</b> Limits are dependent on load and type of XML request. These values are dynamic ACL data requests.	Summit X460-G2, X670-G2, X450-G2, and ExtremeSwitching X440-G2, X620, X870, X690, X590, X465	10 with 100 DACLs
<b>XNV authentication</b> —maximum number of VMs that can be processed (combination of local and network VMs).	Summit X460-G2, X670-G2, ExtremeSwitching X870, X690, X590, X465	2,048
	Summit X450-G2, and ExtremeSwitching X440-G2, X620	1,024
<b>XNV database entries</b> —maximum number of VM database entries (combination of local and network VMs).	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	16,000
<b>XNV database entries</b> —maximum number of VPP database entries (combination of local and network VPPs).	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	2,048
<b>XNV dynamic VLAN</b> —Maximum number of dynamic VLANs created (from VPPs /local VMs).	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	2,048

**Table 4: Supported Limits for Edge License (continued)**

Metric	Product	Limit
XNV local VPPs—maximum number of XNV local VPPs.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	2,048 ingress 512 egress
XNV policies/dynamic ACLs—maximum number of policies/dynamic ACLs that can be configured per VPP.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	8 ingress 4 egress
XNV network VPPs—maximum number of XNV network VPPs. <sup>P</sup>	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	2,048 ingress 512 egress

## Supported Limits for Advanced Edge License

The following table shows supported limits for features in the Advanced Edge License.

**Table 5: Supported Limits for Advanced Edge License**

Metric	Product	Limit
BGP auto-peering—maximum number of auto-peering nodes and VTEPs.	Summit X670-G2, ExtremeSwitching X690, X870, X590, X465	64
BGP auto-peering attached IPv4 hosts—maximum number of attached IPv4 hosts.	Summit X670-G2 ExtremeSwitching X870, X690, X590, X465	16,000 64,000
BGP auto-peering attached IPv6 hosts—maximum number of attached IPv6 hosts.	Summit X670-G2 ExtremeSwitching X870, X690, X590, X465	254 8,000
BGP auto-peering ECMP—maximum number equal cost multipath for auto-peering.  <b>Note:</b> * Subject to the limitation imposed by the number of physical ports on a switch.	Summit X670-G2, ExtremeSwitching X690, X870, X590, X465	16*
BGP auto-peering maximum IPv4 prefixes with ECMP—Maximum number of IPv4 Network prefixes with ECMP.	Summit X670-G2, ExtremeSwitching X690, X870, X590, X465	64,000
BGP auto-peering maximum IPv6 prefixes with ECMP—Maximum number of IPv6 Network prefixes with ECMP.	Summit X670-G2, ExtremeSwitching X690, X870, X590, X465	8,000
BGP auto-peering MLAG peers—maximum MLAG peers per AutoBGP node.	Summit X670-G2, ExtremeSwitching X690, X870, X590, X465	1

**Table 5: Supported Limits for Advanced Edge License (continued)**

Metric	Product	Limit
<b>BGP auto-peering VRFs</b> —maximum number of VRFs.	Summit X670-G2, ExtremeSwitching X690, X870, X590, X465	64
<b>BGP auto-peering EVPN instances</b> —maximum EVPN instances.	Summit X670-G2, ExtremeSwitching X690, X870, X590, X465	1,024
<b>EAPS domains</b> —maximum number of EAPS domains.  <b>Note:</b> An EAPS ring that is being spatially reused cannot have more than four configured EAPS domains.	ExtremeSwitching X870, X690, X590, X465	128
	Summit X670-G2, X450-G2, X460-G2	64
	ExtremeSwitching X440-G2, X620	32
<b>EAPSV2 protected VLANs</b> —maximum number of protected VLANs.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X440-G2, X620	500
	ExtremeSwitching X870, X690, X590, X465	2,000
<b>ERPS domains</b> —maximum number of ERPS domains without CFM configured.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	32
<b>ERPS domains</b> —maximum number of ERPS domains with CFM configured.	Summit X450-G2, X670-G2, and ExtremeSwitching X620, X870, X690, X590, X465	16
	Summit X460-G2	32
<b>ERPSv1 protected VLANs</b> —maximum number of protected VLANs.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X870, X690, X590, X465	2,000
	ExtremeSwitching X620, X440-G2	1,000
<b>ERPSv2 protected VLANs</b> —maximum number of protected VLANs.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X870, X690, X590, X465	2,000
	ExtremeSwitching X620, X440-G2	500
<b>ESRP groups</b> —maximum number of ESRP groups	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X440-G2, X620, X870, X690, X590, X465	32
<b>ESRP domains</b> —maximum number of ESRP domains.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	64
<b>ESRP L2 VLANs</b> —maximum number of ESRP VLANs without an IP address configured.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	1,000
<b>ESRP L3 VLANs</b> —maximum number of ESRP VLANs with an IP address configured.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	511

**Table 5: Supported Limits for Advanced Edge License (continued)**

Metric	Product	Limit
<b>ESRP (maximum ping tracks)</b> —maximum number of ping tracks per VLAN.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	8
<b>ESRP (IP route tracks)</b> —maximum IP route tracks per VLAN.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	8
<b>ESRP (VLAN tracks)</b> —maximum number of VLAN tracks per VLAN.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	1
<b>OSPFv2/v3 ECMP</b> —maximum number of equal cost multipath OSPFv2 and OSPFv3.	Summit X460-G2, X670-G2, X450-G2, ExtremeSwitching X870, X690, X590, X465	64
	ExtremeSwitching X620	4
	ExtremeSwitching X440-G2	N/A
<b>OSPFv2 areas</b> —as an ABR, how many OSPF areas are supported within the same switch.	Summit X460-G2, X670-G2, ExtremeSwitching X870, X690, X590, X465	8
	Summit X450-G2, ExtremeSwitching X440-G2, X620	4
<b>OSPFv2 external routes</b> —recommended maximum number of external routes contained in an OSPF LSDB.	ExtremeSwitching X870, X690, X590, X465	10,000
	Summit X670-G2, X460-G2	5,000
	Summit X450-G2, ExtremeSwitching X440-G2, X620	2,400
<b>OSPFv2 inter- or intra-area routes</b> —recommended maximum number of inter- or intra-area routes contained in an OSPF LSDB with one ABR in OSPF domain.	ExtremeSwitching X870, X690, X590, X465	4,000
	Summit X670-G2, X460-G2	2,000
	Summit X450-G2, and ExtremeSwitching X440-G2, X620	1,000
<b>OSPFv2 interfaces</b> —recommended maximum number of OSPF interfaces on a switch (active interfaces only).	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	4
<b>OSPFv2 links</b> —maximum number of links in the router LSA.	Summit X460-G2, X670-G2, ExtremeSwitching X870, X690, X590, X465	400
	Summit X450-G2, and ExtremeSwitching X620, X440-G2	4
<b>OSPFv2 neighbors</b> —maximum number of supported OSPF adjacencies.	Summit X450-G2, X670-G2, X460-G2, and ExtremeSwitching X440-G2, X620, X870, X690, X590, X465	4

**Table 5: Supported Limits for Advanced Edge License (continued)**

Metric	Product	Limit
OSPFv2 routers in a single area—recommended maximum number of routers in a single OSPF area.	ExtremeSwitching X870, X690, X590, X465	100
	Summit X670-G2, X460-G2	50
	Summit X450-G2, ExtremeSwitching X440-G2, X620	4
OSPFv2 virtual links—maximum number of supported OSPF virtual links.	Summit X460-G2, X670-G2, ExtremeSwitching X870, X690, X590, X465	32
	Summit X450-G2, and ExtremeSwitching X440-G2, X620	4
OSPFv3 areas—as an ABR, the maximum number of supported OSPFv3 areas.	ExtremeSwitching X870, X690, X590, X465	100
	Summit X460-G2, X670-G2	16
	Summit X450-G2, ExtremeSwitching X440-G2, X620	4
OSPFv3 external routes—recommended maximum number of external routes.	Summit X670-G2, X460-G2, ExtremeSwitching X870, X690, X590, X465	10,000
	Summit X450-G2, ExtremeSwitching X440-G2, X620	1,200
OSPFv3 inter- or intra-area routes—recommended maximum number of inter- or intra-area routes.	ExtremeSwitching X870, X690, X590, X465	4,000
	Summit X670-G2, X460-G2	3,000
	Summit X450-G2, ExtremeSwitching X440-G2, X620	500
OSPFv3 interfaces—maximum number of OSPFv3 interfaces (active interfaces only).	Summit X670-G2, X460-G2, X450-G2, ExtremeSwitching X870, X690, X440-G2, X620, X590, X465	4
OSPFv3 neighbors—maximum number of OSPFv3 neighbors.	Summit X450-G2, X670-G2, X460-G2, ExtremeSwitching X870, X690, X440-G2, X620, X590, X465	4
OSPFv3 virtual links—maximum number of OSPFv3 virtual links supported.	Summit X670-G2, X460-G2, ExtremeSwitching X870, X690, X590, X465	16
	Summit X450-G2, ExtremeSwitching X440-G2, X620	4
OVSDB Manager Connections—Maximum number of connections to managers that can be configured (either of TCP, PTCP, SSL, or PSSSL).	Summit X670-G2, ExtremeSwitching X870, X690, X590, X465	8
	Summit X450-G2	N/A
OVSDB Managed Switches—Maximum number of OVSDB-managed switches.	Summit X670-G2, ExtremeSwitching X870, X690, X590, X465	1
	Summit X450-G2	N/A



**Table 5: Supported Limits for Advanced Edge License (continued)**

Metric	Product	Limit
<b>PIM IPv4 (maximum interfaces)</b> —maximum number of PIM active interfaces.	Summit X460-G2, X670-G2, X450-G2, ExtremeSwitching X870, X440-G2, X620, X690, X590, X465	4
<b>PIM IPv4 Limits</b> —maximum number of multicast groups per dynamic rendezvous point.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	180
<b>PIM IPv4 Limits</b> —maximum number of multicast groups per static rendezvous point.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	3,000 (depends on policy file limits)
<b>PIM IPv4 Limits</b> —maximum number of multicast sources per group.	Summit X460-G2, X670-G2, X450-G2, ExtremeSwitching X870, X690, X590, X465	5,000
	ExtremeSwitching X440-G2, X620	1,500
<b>PIM IPv4 Limits</b> —maximum number of dynamic rendezvous points per multicast group.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	145
<b>PIM IPv4 Limits</b> —static rendezvous points.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	32
<b>PIM IPv6 (maximum interfaces)</b> —maximum number of PIM active interfaces.	Summit X460-G2, X670-G2, X450-G2, ExtremeSwitching X870, X440-G2, X620, X690, X590, X465	4
<b>PIM IPv6 Limits</b> —maximum number of multicast sources per group.	Summit X460-G2, X670-G2, ExtremeSwitching X870, X690, X590, X465	1,750
	Summit X450-G2	1,500
	ExtremeSwitching X440-G2, X620	550
<b>PIM IPv6 Limits</b> —maximum number of multicast groups per dynamic rendezvous point.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	70
<b>PIM IPv6 Limits</b> —maximum number of multicast groups per static rendezvous point.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	3,000 (depends on policy file limits)
<b>PIM IPv6 Limits</b> —maximum number of dynamic rendezvous points per multicast group.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	64
<b>PIM IPv6 Limits</b> —maximum number of secondary addresses per interface.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	70
<b>PIM IPv6 Limits</b> —static rendezvous points.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	32

**Table 5: Supported Limits for Advanced Edge License (continued)**

Metric	Product	Limit
<b>Port-specific VLAN tags</b> —maximum number of port-specific VLAN tags.	Summit X460-G2, X670-G2, ExtremeSwitching X870, X690, X590, X465	1,023
	Summit X450-G2, and ExtremeSwitching X440-G2, X620	N/A
<b>Port-specific VLAN tags</b> —maximum number of port-specific VLAN tag ports.	Summit X460-G2, X670-G2, and ExtremeSwitching X870, X690, X590, X465	4,000
	Summit X450-G2, and ExtremeSwitching X440-G2, X620	N/A
<b>VRRP (v2/v3-IPv4) (maximum instances)</b> —maximum number of VRRP instances for a single switch, with Advanced Edge license or higher.  <b>Note:</b> These limits are applicable for Fabric Routing configuration also.  <b>Note:</b> Number of groups configured should not exceed the number of individual VRs supported (that is, in normal mode) for that platform type.	<b>Normal Mode (as individual VRs):</b>	
	Summit X670-G2, X460-G2, X450-G2, and ExtremeSwitching X870, X690, X590, X465	511
	ExtremeSwitching X440-G2, X620	128
	<b>Scaled Mode (with groups):</b>	
<b>VRRP (v3-IPv6) (maximum instances)</b> —maximum number of VRRP instances for a single switch, with Advanced Edge license or higher. (VRRP-VRRPv3-IPv6)  <b>Note:</b> These limits are applicable for Fabric Routing configuration also.  <b>Note:</b> Number of groups configured should not exceed the number of individual VRs supported (that is, in normal mode) for that platform type.	Summit X670-G2, X460-G2, X450-G2, and ExtremeSwitching X870, X690, X590, X465	2,048
	ExtremeSwitching X440-G2, X620	128
	<b>Scaled Mode (with groups):</b>	
	Summit X670-G2, X460-G2, X450-G2, and ExtremeSwitching X870, X690, X590, X465	2,048
<b>VRRP (v2/v3-IPv4/IPv6) (maximum VRID)</b> —maximum number of unique VRID numbers per switch.	ExtremeSwitching X440-G2, X620	128
	Summit X670-G2, X460-G2, X450-G2 and ExtremeSwitching X440-G2, X620, X870, X690, X590, X465	255
	<b>Note:</b> With Advanced Edge license or higher.	

**Table 5: Supported Limits for Advanced Edge License (continued)**

Metric	Product	Limit
<b>VRRP (v2/v3-IPv4/IPv6) (maximum VRIDs per VLAN)</b> —maximum number of VRIDs per VLAN.	Summit X670-G2, X460-G2, X450-G2 and ExtremeSwitching X440-G2, X620, X870, X690, X590, X465  <b>Note:</b> With Advanced Edge license or higher.	255
<b>VRRP (v2/v3-IPv4/IPv6) (maximum ping tracks)</b> —maximum number of ping tracks per VLAN.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465  <b>Note:</b> With Advanced Edge license or higher.	8
<b>VRRP (maximum ping tracks)</b> —maximum number of ping tracks per VRRP Instance under 128 VRRP instances, with Advanced Edge license or higher.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	8 (20 centisecond or 1 second hello interval)
<b>VRRP (v3-IPv6) (maximum ping tracks)</b> —maximum number of ping tracks per VRRP Instance under 128 VRRP instances, with Advanced Edge license or higher.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	8 (20 centisecond or 1 second hello interval)
<b>VRRP (v2/v3-IPv4/IPv6) (maximum iproute tracks)</b> —maximum number of IP route tracks per VLAN.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	8
<b>VRRP (v2/v3-IPv4/IPv6)</b> —maximum number of VLAN tracks per VLAN.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X620, X440-G2, X870, X690, X590, X465	8
<b>VXLAN</b> —maximum virtual networks.  <b>Note:</b> Every VPLS instance/PSTag VLAN reduces this limit by 1.  <b>Note:</b> Assumption is all BUM (broadcast/unknown-unicast/multicast) FDB entries are pointing to the same set of RTEPs when all VNETs use explicit flooding. Depends on whether all VNETs use standard or explicit and the number of tenant VLAN ports.	Summit X670-G2, and ExtremeSwitching X870, X690, X590, X465  Summit X460-G2, X450-G2, and ExtremeSwitching X440-G2, X620	2,048-4,000  N/A
<b>VXLAN</b> —maximum tenant VLANs plus port combinations  <b>Note:</b> Every (VPLS/PSTag VLAN) + port reduces the limit by 1.	Summit X670-G2, and ExtremeSwitching X870, X690, X590, X465  Summit X460-G2, X450-G2, and ExtremeSwitching X440-G2, X620	4,096  N/A

**Table 5: Supported Limits for Advanced Edge License (continued)**

Metric	Product	Limit
<b>VXLAN</b> —maximum static MAC to IP bindings.  <b>Note:</b> Every FDB entry configured reduces this limit by 1.	Summit X670-G2, and ExtremeSwitching X870, X690, X590, X465	64,000
	Summit X460-G2, X450-G2, and ExtremeSwitching X440-G2, X620	N/A
<b>VXLAN</b> —maximum RTEP IP addresses	Summit X670-G2, and ExtremeSwitching X870, X690, X590, X465	512
	Summit X460-G2, X450-G2, and ExtremeSwitching X440-G2, X620	N/A
<b>VXLAN</b> —maximum virtual networks with dynamic learning and OSPF extensions for VXLAN	Summit X670-G2, and ExtremeSwitching X870, X690, X590, X465	4,000
	Summit X460-G2, X450-G2, and ExtremeSwitching X440-G2, X620	N/A

## Supported Limits for Core License

The following table shows supported limits for features in the Core License.

**Table 6: Supported Limits for Core License**

Metric	Product	Limit
<b>BGP (aggregates)</b> —maximum number of BGP aggregates.	Summit X460-G2, X670-G2, ExtremeSwitching X870, X690, X590, X465	256
	Summit X450-G2	204
<b>BGP (networks)</b> —maximum number of BGP networks.	Summit X460-G2, X670-G2, ExtremeSwitching X870, X690, X590, X465	1,024
	Summit X450-G2	820
<b>BGP (peers)</b> —maximum number of BGP peers.  <b>Note:</b> With default keepalive and hold timers.	Summit X460-G2, X670-G2, ExtremeSwitching X870	128
	ExtremeSwitching X690, X590, X465	300
	Summit X450-G2	100
<b>BGP (peer groups)</b> —maximum number of BGP peer groups.	Summit X460-G2, X670-G2, ExtremeSwitching X870, X690, X590, X465	64
	Summit X450-G2	50

**Table 6: Supported Limits for Core License (continued)**

Metric	Product	Limit
<b>BGP (policy entries)</b> —maximum number of BGP policy entries per route policy.	Summit X460-G2, X670-G2, ExtremeSwitching X870, X690, X590, X465	256
	Summit X450-G2	204
<b>BGP (policy statements)</b> —maximum number of BGP policy statements per route policy.	Summit X460-G2, X670-G2, ExtremeSwitching X870, X690, X590, X465	1,024
	Summit X450-G2	820
<b>BGP multicast address-family routes</b> —maximum number of multicast address-family routes.	Summit X460-G2, X670-G2, and ExtremeSwitching X870, X690, X590, X465	25,000
	Summit X450-G2	20,000
<b>BGP (unicast address-family routes)</b> —maximum number of unicast address-family routes.	Summit X460-G2, X670-G2, ExtremeSwitching X870, X690, X590, X465 (at default)	25,000
	ExtremeSwitching X870, X690, X590, X465 (with ALPM enabled)	100,000
	Summit X450-G2	20,000
<b>BGP (non-unique routes)</b> —maximum number of non-unique BGP routes.	Summit X460-G2, X670-G2, ExtremeSwitching X870, X690, X590, X465	25,000
	Summit X450-G2	20,000
<b>BGP ECMP</b> —maximum number of equal cost paths per multipath for BGP and BGPv6.	Summit X460-G2, X670-G2, ExtremeSwitching X870, X690, X590, X465	2, 4, 8, 16, 32, or 64
	Summit X450-G2	64
<b>BGPv6 (unicast address-family routes)</b> —maximum number of unicast address family routes.	Summit X460-G2	6,000
	Summit X670-G2	8,000
	ExtremeSwitching X870, X690, X590, X465	10,000
	ExtremeSwitching X870, X690 (with ALPM enabled)	100,000
	Summit X450-G2	4,800
<b>BGPv6 (non-unique routes)</b> —maximum number of non-unique BGP routes.	Summit X460-G2	18,000
	Summit X670-G2, ExtremeSwitching X870, X690, X590, X465	24,000
	Summit X450-G2	14,000
<b>EVPN EVI instances</b> —maximum number of EVI instances.	Summit X670-G2, ExtremeSwitching X870, X690, X590, X465	1,024
<b>EVPN LAGs</b> —maximum number of LAGs.	Summit X670-G2, ExtremeSwitching X870, X690, X590, X465	128

**Table 6: Supported Limits for Core License (continued)**

Metric	Product	Limit
<b>GRE Tunnels</b> —maximum number of GRE tunnels.	Summit X460-G2, X670-G2, X450-G2, and ExtremeSwitching X870, X690, X590, X465	255
	ExtremeSwitching X620, X440G2	N/A
<b>IS-IS adjacencies</b> —maximum number of supported IS-IS adjacencies.	Summit X460-G2, X670-G2, and ExtremeSwitching X870, X690, X590, X465	128
	Summit X450-G2	N/A
<b>IS-IS ECMP</b> —maximum number of equal cost paths per multipath for IS-IS.	Summit X460-G2, X670-G2, and ExtremeSwitching X870, X690, X590, X465	2, 4, or 8
	Summit X450-G2	N/A
<b>IS-IS interfaces</b> —maximum number of interfaces that can support IS-IS.	Summit X460-G2, X670-G2, and ExtremeSwitching X870, X690, X590, X465	255
	Summit X450-G2	N/A
<b>IS-IS routers in an area</b> —recommended maximum number of IS-IS routers in an area.	Summit X460-G2, X670-G2, and ExtremeSwitching X870, X690, X590, X465	256
	Summit X450-G2	N/A
<b>IS-IS route origination</b> —recommended maximum number of routes that can be originated by an IS-IS node.	Summit X460-G2, X670-G2, and ExtremeSwitching X870, X690, X590, X465	20,000
	Summit X450-G2	N/A
<b>IS-IS IPv4 L1 routes in an L1 router</b> —recommended maximum number of IS-IS Level 1 routes in a Level 1 IS-IS router.	Summit X460-G2, X670-G2, and ExtremeSwitching X870, X690, X590, X465	25,000
	Summit X450-G2	N/A
<b>IS-IS IPv4 L2 routes</b> —recommended maximum number of IS-IS Level 2 routes.	Summit X460-G2, X670-G2, and ExtremeSwitching X870, X690, X590, X465	25,000
	Summit X450-G2	N/A
<b>IS-IS IPv4 L1 routes in an L1/L2 router</b> —recommended maximum number of IS-IS Level 1 routes in an L1/L2 IS-IS router.	Summit X460-G2, X670-G2, and ExtremeSwitching X870, X690, X590, X465	20,000
	Summit X450-G2	N/A
<b>IS-IS IPv6 L1 routes in an L1 router</b> —recommended maximum number of IS-IS Level 1 routes in a Level 1 IS-IS router.	Summit X460-G2, X670-G2, and ExtremeSwitching X870, X690, X590, X465	10,000
	Summit X450-G2	N/A

**Table 6: Supported Limits for Core License (continued)**

Metric	Product	Limit
<b>IS-IS IPv6 L2 routes</b> —recommended maximum number of IS-IS Level 2 routes.	Summit X460-G2, X670-G2, and ExtremeSwitching X870, X690, X590, X465	10,000
	Summit X450-G2	N/A
<b>IS-IS IPv6 L1 routes in an L1/L2 router</b> —recommended maximum number of IS-IS Level 1 routes in a L1/L2 router.	Summit X460-G2, X670-G2, and ExtremeSwitching X870, X690, X590, X465	10,000
	Summit X450-G2	N/A
<b>IS-IS IPv4/IPv6 L1 routes in an L1 router</b> —recommended maximum number of IS-IS Level 1 routes in a Level 1 IS-IS router. The numbers documented are based on 50% IPv4 routes and 50% IPv6 routes.	Summit X460-G2, X670-G2, and ExtremeSwitching X870, X690, X590, X465	20,000
	Summit X450-G2	N/A
<b>IS-IS IPv4/IPv6 L2 routes in an L2 router</b> —recommended maximum number of IS-IS Level 2 routes in a Level 2 IS-IS router. The numbers documented are based on 50% IPv4 routes and 50% IPv6 routes.	Summit X460-G2, X670-G2, and ExtremeSwitching X870, X690, X590, X465	20,000
	Summit X450-G2	N/A
<b>IS-IS IPv4/IPv6 L1 routes in an L1/L2 router</b> —recommended maximum number of IS-IS Level 1 routes in a Level 1/Level2 IS-IS router. The numbers documented are based on 50% IPv4 routes and 50% IPv6 routes.	Summit X460-G2, X670-G2, and ExtremeSwitching X870, X690, X590, X465	20,000
	Summit X450-G2	N/A
<b>MSDP active peers</b> —maximum number of active MSDP peers.	Summit X450-G2, X670-G2, X460-G2, ExtremeSwitching X870, X690, X590, X465	64
<b>MSDP SA cache entries</b> —maximum number of entries in SA cache.	Summit X670-G2, ExtremeSwitching X690, X590, X465	14,000
	Summit X460-G2	10,000
	ExtremeSwitching X870	11,000
	Summit X450-G2	8,000
<b>MSDP maximum mesh groups</b> —maximum number of MSDP mesh groups.	Summit X450-G2, X670-G2, X460-G2, ExtremeSwitching X870, X690, X590, X465	16
<b>OSPFv2/v3 ECMP</b> —maximum number of equal cost multipath OSPFv2 and OSPFv3.	Summit X460-G2, X670-G2, X450-G2, ExtremeSwitching X870, X690, X590, X465	64
<b>OSPFv2 areas</b> —as an ABR, how many OSPF areas are supported within the same switch.	Summit X450-G2, X460-G2, X670-G2, ExtremeSwitching X870, X690, X590, X465	8

**Table 6: Supported Limits for Core License (continued)**

Metric	Product	Limit
OSPFv2 external routes—recommended maximum number of external routes contained in an OSPF LSDB.	ExtremeSwitching X870, X690, X590, X465	10,000
	Summit X670-G2, X460-G2	5,000
	Summit X450-G2	4,000
OSPFv2 inter- or intra-area routes—recommended maximum number of inter- or intra-area routes contained in an OSPF LSDB with one ABR in OSPF domain.	ExtremeSwitching X870, X690, X590, X465	4,000
	Summit X670-G2, X460-G2	2,000
	Summit X450-G2	1,600
OSPFv2 interfaces—recommended maximum number of OSPF interfaces on a switch (active interfaces only).	Summit X460-G2, X670-G2, ExtremeSwitching X870, X690, X590, X465	400
	Summit X450-G2	320
OSPFv2 links—maximum number of links in the router LSA.	Summit X460-G2, X670-G2, ExtremeSwitching X870, X690, X590, X465	400
	Summit X450-G2	320
OSPFv2 neighbors—maximum number of supported OSPF adjacencies.	Summit X670-G2, X460-G2, ExtremeSwitching X870, X690, X590, X465	128
	Summit X450-G2	96
OSPFv2 routers in a single area—recommended maximum number of routers in a single OSPF area.	ExtremeSwitching X870, X690, X590, X465	100
	Summit X670-G2, X460-G2	50
	Summit X450-G2	40
OSPFv2 virtual links—maximum number of supported OSPF virtual links.	Summit X460-G2, X670-G2, ExtremeSwitching X870, X690, X590, X465	32
	Summit X450-G2	25
OSPFv3 areas—as an ABR, the maximum number of supported OSPFv3 areas.	ExtremeSwitching X870, X690, X590, X465	100
	Summit X460-G2, X670-G2	16
	Summit X450-G2	12
OSPFv3 external routes—recommended maximum number of external routes.	Summit X670-G2, X460-G2, ExtremeSwitching X870, X690, X590, X465	10,000
	Summit X450-G2	7,500



**Table 6: Supported Limits for Core License (continued)**

Metric	Product	Limit
<b>OSPFv3 inter- or intra-area routes</b> —recommended maximum number of inter- or intra-area routes.	ExtremeSwitching X870, X690, X590, X465	4,000
	Summit X670-G2, X460-G2	3,000
	Summit X450-G2	500
<b>OSPFv3 interfaces</b> —maximum number of OSPFv3 interfaces (active interfaces only).	Summit X670-G2, X460-G2, ExtremeSwitching X870, X690, X590, X465	256
	Summit X450-G2	192
<b>OSPFv3 neighbors</b> —maximum number of OSPFv3 neighbors.	Summit X670-G2, X460-G2, ExtremeSwitching X870, X690, X590, X465	64
	Summit X450-G2	48
<b>OSPFv3 virtual links</b> —maximum number of OSPFv3 virtual links supported.	Summit X670-G2, X460-G2, ExtremeSwitching X870, X690, X590, X465	16
	Summit X450-G2	12
<b>PIM IPv4 (maximum interfaces)</b> —maximum number of PIM active interfaces.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X870, X690, X590, X465	255
<b>PIM IPv4 Limits</b> —maximum number of multicast groups per dynamic rendezvous point.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X870, X690, X590, X465	180
<b>PIM IPv4 Limits</b> —maximum number of multicast groups per static rendezvous point.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X870, X690, X590, X465	3,000 (depends on policy file limits)
<b>PIM IPv4 Limits</b> —maximum number of multicast sources per group.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X870, X690, X590, X465	5,000
<b>PIM IPv4 Limits</b> —maximum number of dynamic rendezvous points per multicast group.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X870, X690, X590, X465	145
<b>PIM IPv4 Limits</b> —static rendezvous points.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X870, X690, X590, X465	32
<b>PIM IPv6 (maximum interfaces)</b> —maximum number of PIM active interfaces.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X870, X690, X590, X465	255
<b>PIM IPv6 Limits</b> —maximum number of multicast sources per group.	Summit X460-G2, X670-G2, and ExtremeSwitching X870, X690, X590, X465	1,750
	Summit X450-G2,	1,500

**Table 6: Supported Limits for Core License (continued)**

Metric	Product	Limit
<b>PIM IPv6 Limits</b> —maximum number of multicast groups per dynamic rendezvous point.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X870, X690, X590 , X465	70
<b>PIM IPv6 Limits</b> —maximum number of multicast groups per static rendezvous point.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X870, X690, X590, X465	3,000 (depends on policy file limits)
<b>PIM IPv6 Limits</b> —maximum number of dynamic rendezvous points per multicast group.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X870, X690, X590 , X465	64
<b>PIM IPv6 Limits</b> —maximum number of secondary addresses per interface.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X870, X690, X590 , X465	70
<b>PIM IPv6 Limits</b> —static rendezvous points.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X870, X690, X590 , X465	32

- <sup>a</sup> The table shows the total available. When installing ACL rules bound to a set of ports, rules are replicated for each port if there are ACL counters and counter compression is not enabled, or if the ports are Extended Edge Switching extended ports.
- <sup>c</sup> When there are BFD sessions with minimal timer, sessions with default timer should not be used.
- <sup>f</sup> Effective capacity varies based on actual MAC addresses and VLAN IDs used and hash algorithm selected.
- <sup>g</sup> Based on "configure forwarding internal-tables more I2".
- <sup>h</sup> Based on "configure forwarding internal-tables more I3-and-ipmc".
- <sup>j</sup> The limit depends on setting configured with configure iproute reserved-entries.
- <sup>m</sup> The IPv4 and IPv6 multicast entries share the same hardware tables, so the effective number of IPv6 multicast entries depends on the number of IPv4 multicast entries present and vice versa.
- <sup>n</sup> If IGMP and MLD are simultaneously configured on the switch, the number of effective subscribers supported are lessened accordingly.
- <sup>o</sup> The total of all PBR next hops on all flow redirects should not exceed 4,096.
- <sup>p</sup> The number of XNV authentications supported based on system ACL limitations.
- <sup>q</sup> Based on "configure forwarding internal-tables more routes".
- <sup>r</sup> Based on `configure forwarding internal-tables more routes ipv6-mask-length 128`.

# 3 Open Issues, Known Behaviors, and Resolved Issues

## Open Issues Known Behaviors Resolved Issues in ExtremeXOS 30.2

This chapter lists open software issues, limitations in ExtremeXOS system architecture (known issues), and resolved issues in ExtremeXOS.

### Open Issues

The following are new open issues for supported features found in ExtremeXOS 30.2.

**Table 7: Open Issues, Platform-Specific, and Feature Change Requests (CRs)**

CR Number	Description
<b>General</b>	
xos0073899	LACP sharing enabled port are added to link aggregator even though port speeds are different.
xos0074117	When a network is unreachable, ICMPv6 destination unreachable packets are not returned and IPv6 "InNoRoutes", ICMPv6 "DestUnreaches" Out counters are not incremented as shown in the <code>show ipstats ipv6 vlan</code> command.
xos0075000	<p>In an unconfigured stack, if port partitioning commands are present in the <code>default.xsf</code> file, port links may not come when the unconfigured stack boots up.</p> <p><b>Workaround:</b> Save and reboot of the configuration will bring up the links on the ports.</p>
<b>ExtremeSwitching X465 Series Switches</b>	
xos0073943	On ExtremeSwitching X465 series switches, EEE feature is not working on multi-rate ports.
xos0074386	With VIM5-4XE and VIM5-4YE modules, after rebooting the peer switch, false linkup for 10G links occur.
xos0074362	<p>Disabling, and then enabling, the optics on VIM5-4X/E modules does not bring up the link on one end. The issue occurs intermittently.</p> <p><b>Workaround:</b> Disable, and then enable, the ports on the peer switch.</p>
xos0074868	For ExtremeSwitching X465 with VIM5-4YE-1 modules, high convergence times occur for EAPS, ERPS, and BFD features.
xos0074580	Total bootup time for ExtremeSwitching X465 multi-rate models is greater than 50 seconds.

**Table 7: Open Issues, Platform-Specific, and Feature Change Requests (CRs) (continued)**

CR Number	Description
xos0075001	When a slot on a X465 stack with 25G VIM is unconfigured, the ports come up in 40G mode and error are logged.
<b>ExtremeSwitching X870 Series Switches</b>	
xos0074647	On ExtremeSwitching X870 series switches, there is false linkup when reinserting Qx2Q cables.
<b>Summit X670-G2 Series Switches</b>	
xos0074728	For Summit X670-G2 stacks, if any of the 40G ports on back-up or standby nodes are configured for 4x10G port partition, upgrading to ExtremeXOS 30.2 is not recommended.
<b>Extended Edge Switching</b>	
xos0074639	<p>With multiple bridge port extenders (BPEs) attached to a partitioned port, starting Extended Edge Switching full automation by running either the <code>unconfigure switch</code> or <code>unconfigure switch all</code> command removes the partitioned port configuration, and thus full automation is not triggered, and the Extended Edge Switching topology is not created.</p> <p><b>Workaround:</b> Do not attach BPEs to partitioned ports, or use partial automation or manual configuration to create the Extended Edge Switching topology.</p>
xos0073946	On Extended Edge Switching controlling bridge (CB) switches, the <code>show inline-power stats</code> command takes longer than usual to display the output, and sometimes it returns "Timeout occurred while retrieving information from hardware." messages.

## Known Behaviors

The following are limitations in ExtremeXOS system architecture that have yet to be resolved.

**Table 8: Known Issues, Platform-Specific, and Feature Change Requests (CRs)**

CR Number	Description
<b>General</b>	
xos0073994	The command <code>show l2stats</code> does not work for management port and VLAN starting with 22.x release.
xos0074090	<p>If IPv6-in-IPv4 tunnel is configured with link local address, an IPv6 ping across the tunnel does not work. This occurs, because if an alternative is not specified, the address of the outgoing interface (tunnel) is used.</p> <p><b>Workaround:</b> Specify the global address with the <b>from</b> option in ping command (for example: <code>ping 2001:2::1 from 2001:1::1</code>).</p>
<b>ACLs</b>	

**Table 8: Known Issues, Platform-Specific, and Feature Change Requests (CRs) (continued)**

CR Number	Description
xos0074168	If you have ACLs applied to partitioned ports, and then dynamically un-partition the ports, then you must manually unconfigure the ports that have just been lost due to consolidation.
<b>EVPN</b>	
xos0073469	OSPF VXLAN extensions should not be enabled on a router with BGP peering session with the L2VPN-EVPN capability enabled.
xos0073523	Setting EVI to none or zero does not unconfigure VNI (and could cause unwanted traffic flows). VNET should be unconfigured with <code>configure virtual-network vni vxlan vni none</code> .
<b>ExtremeSwitching X465 Series Switches</b>	
xos0074172	For ExtremeSwitching X465-24W, X465-48W switches, on 90W ports when the difference between budgeted power and used power is less than 50W, APs that draw less than 10W power are not powered on.  <b>Workaround:</b> Reduce the operator-limit (max power threshold).

## Resolved Issues in ExtremeXOS 30.2

The following issues were resolved in ExtremeXOS 30.2. ExtremeXOS 30.2 includes all fixes up to and including ExtremeXOS 11.6.5.3, and earlier, ExtremeXOS 12.0.5, ExtremeXOS 12.1.7, ExtremeXOS 12.2.2-patch1-12, ExtremeXOS 12.3.6, ExtremeXOS 12.4.5, ExtremeXOS 12.5.5, ExtremeXOS 12.6.3, ExtremeXOS 12.6.5, ExtremeXOS 12.7.1, ExtremeXOS 15.1.5, ExtremeXOS 15.2.4, ExtremeXOS 15.3.3, ExtremeXOS 15.4.1, ExtremeXOS 15.5.1, ExtremeXOS 15.5.2, ExtremeXOS 15.6.1, ExtremeXOS 15.6.2, ExtremeXOS 15.7.1, ExtremeXOS 16.1, ExtremeXOS 16.1.2, ExtremeXOS 16.1.3, ExtremeXOS 21.1, ExtremeXOS 22.1, ExtremeXOS 22.2, ExtremeXOS 22.3, ExtremeXOS 22.4, ExtremeXOS 22.5, ExtremeXOS 22.6, and ExtremeXOS 30.1. For information about those fixes, see the release notes for the specific release.

**Table 9: Resolved Issues, Platform-Specific, and Feature Change Requests (CRs) in 30.2**

CR Number	Description
<b>General</b>	
xos0072176	DNS resolves on wrong VR.
xos0072332	VLANs appear in different, as opposed to alphabetically by name, order in the output from <code>show configuration</code> command.
xos0072343	Switch model names are inconsistent between commands, SNMP, and documentation.

**Table 9: Resolved Issues, Platform-Specific, and Feature Change Requests (CRs) in 30.2 (continued)**

CR Number	Description
xos0073425	On Summit X670-G2 stacks, with LTEP IP unconfigured, disabling, and then enabling LLDP ports produces the following error:  <pre>&lt;Error:HAL.VXLAN.VLANNotFnd&gt; Slot-2: Vlan with instance 1000008 is not found. 06:07:40.66 &lt;Error:HAL.VXLAN.VLANNotFnd&gt; Slot-2: Vlan with instance 1000008 is not found.</pre>
xos0073804	The process rtmgr ends unexpectedly with signal 11 after changing the gateway of L3VPN routes.
xos0074303	NTP restricted list configuration is not reflected in the output of the "show configuration" command causing configuration to be lost on reboot, and NTP restrict entry not being removed when deleted.
xos0074338	After PIM-SM failover, the second convergence occurs, resulting in minor traffic loss.
xos0074308	Image download fails if the URL size limit is greater than 128 characters.
xos0074672	Unable to connect a new switch to the ExtremeCloud due to a SSL certificate exchange error.
xos0074898	MAC address is not updated properly in the hardware after stack failover.
<b>ExtremeSwitching X590 Series Switches</b>	
xos0074378	The process PoE stops responding on the controlling bridge (CB) when polling the PoE configuration periodically from ExtremeManagement (cloud connector).
<b>ExtremeSwitching X690 Series Switches</b>	
xos0072871	When 2,000 interfaces are created on a switch and continuous IPv4 traffic is sent through all the interfaces, a few FDB entries may not be re-learned, if the following commands are executed twice without waiting for all the entries to be re-learned : <ul style="list-style-type: none"> <li>restart <b>port</b> <i>port-number</i></li> <li>disable <b>port</b> <i>port-number</i></li> </ul>
xos0072875	After enabling sharing on a port that does not support 100G, an error appears after executing <b>configure ports all partition 1x100G</b> .
xos0073818	Packets originating in a switch fail to egress after removing the ports from service VLAN.
xos0074345	DNS proxy should only bind to loopback address.
xos0074374	ExtremeXOS does not support port VLAN monitoring on PSTAG ports.
xos0074587	EHOP table is leaking when port flaps on the switch.
<b>ExtremeSwitching X870 Series Switches</b>	
xos0073880	In policy, redirect-port-list action modifier does not work properly for LAG ports.
<b>ACL</b>	
xos0074344	ACL process signal 5 appears when changing active l2pt profile on ports.
<b>ARP</b>	

**Table 9: Resolved Issues, Platform-Specific, and Feature Change Requests (CRs) in 30.2 (continued)**

CR Number	Description
xos0071708	Refresh option for clear iparp and clear neighbor-discovery commands does not work correctly. All entries are cleared.
xos0073372	For ExtremeSwitching X465, X590, X690, and X870 series switches, ARP learning time, with greater than 17,000 entries and random IPs, is increased in ExtremeXOS 30.1 compared to 22.5.
<b>FDB</b>	
xos0073139	When user-configured ACLs are applied on limit learning ports, packets are leaked.
<b>MAC Security</b>	
xos0073404	When the remote MAC Security (MACsec) connection transmits the MKPDUs for the MACsec protocol (usually 1 every 2 seconds) the ports with an LRM/MACsec Adapter count these in the "Rx No Tag Pkts" under the <code>show macsec port port_num detail</code> output. Though these packets are untagged, they are received on the uncontrolled port for the MACsec protocol and should not increment this controlled port drop counter. This issue is specific to MACsec-enabled ports with an LRM/MACsec Adapter only.
xos0073434	For MAC Security (MACsec)-enabled ports on an Summit X460G-2hc (ports 25–48) with include-sci enabled, if you receive MACsec encrypted packets with a bad SCI tag, the counter "Not Valid Pkts" is incremented instead of "Rx No SCI Pkts" under the <code>show macsec port port_num detail</code> output. Note that ports attached to an LRM/MACsec Adapter handle this properly.
xos0074419	If you set the MACsec replay-protect parameter to something other than the default value (enabled, 0 packet window) and you execute the MACsec initialize command, the MACsec HW reverts to the default value (even though CLI continues to show the non-default value as configured). Note that the default setting (enabled, 0 packet window) is the most secure setting. Therefore this defect will never make a MACsec connection less secure.
xos0074848	On SummitStacks, with or without MACsec configured, the following error may occur after reboot: <pre>&lt;Error:cm.sys.LoadApplCfgObjFail&gt; "macsec" application failed to load "configureMka" configuration object: Error configuring actor priority</pre>
xos0074490	On Summit X440-G2 or X620 series switches, with MACsec enabled on a port with LRM/MACsec adapter attached, brief traffic loss may occur when secure association key (SAK) is periodically refreshed.
<b>MLAG</b>	
xos0074039	After disabling, and then enabling the ports, traffic from one MLAG port is not egressing by the other MLAG port.
<b>MPLS</b>	
xos0069690	VPLS LSP counters are not working after multiple disabling, and then enabling of RSVP-TE LSPs.
<b>OSPFv2</b>	
xos0073995	Interop request: Need to avoid bringing down OSPF neighborship when neighbor is restarted gracefully.

**Table 9: Resolved Issues, Platform-Specific, and Feature Change Requests (CRs) in 30.2 (continued)**

CR Number	Description
<b>SNMP</b>	
xos0074058	SNMPwalk to fetch user-created VRs neighbor-discovery always returns vr-Default information.
<b>Security</b>	
xos0073997	On ExtremeSwitching X590 and X690 series switches, the Auth-Client type in RADIUS accounting packets is incorrect.
xos0074435	Netlogin Dot1x authentication fails if port has already been moved to authentication failure VLAN, and VLAN VSA for Dot1x authentication is not supplied in the RADIUS accept packet.
xos0074493	The process IDMgr ends unexpectedly with signal 11 when client logon and port flap occur at the same time, and if the client entry is already present multiple times in the IDMgr table.
xos0074567	NetLogin authenticated clients are cleared due to admin reset when MAC move occurs.
xos0074765	DHCP stops processing and relaying the DHCP Packets.
<b>STP</b>	
xos0074195	Continuous DM error messages are logged if MLAG and STP are configured on stacks containing ONIE series switches (X870, X690).