



ExtremeXOS Release Notes

Software Version ExtremeXOS 22.4.1-Patch1-2



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Table of Contents

Preface	4
Conventions.....	4
Providing Feedback to Us.....	5
Getting Help.....	5
Related Publications.....	6
Chapter 1: Overview	7
Upgrading ExtremeXOS.....	7
New and Corrected Features in ExtremeXOS 22.4.....	8
Updating the Programmable Logic Firmware on the Summit X440-G2 and ExtremeSwitching X620 Series Switches.....	17
End of Support for Non-persistent Adj-Rib-Out (ARO).....	18
Multiple Spanning Tree Protocol (MSTP) Enabled by Default.....	18
Vulnerability Notice.....	18
Direct Attach Feature No Longer Requires Separate License.....	21
Summit X460-G2 Series Switches Have Advanced Edge License.....	21
VLAN Option Formatting in Commands.....	21
Circuit Emulation Service (CES) No Longer Supported.....	21
OpenFlow and SSH Included in ExtremeXOS Base Image.....	21
ExtremeXOS SSH Server Upgraded with OpenSSH v6.5.....	22
CLI Command Output Format of Ports Lists.....	22
Extreme Hardware/Software Compatibility and Recommendation Matrices.....	22
Compatibility with Extreme Management Center (Formerly NetSight).....	22
Supported MIBs.....	22
Tested Third-Party Products.....	23
Extreme Switch Security Assessment.....	24
Service Notifications.....	24
Chapter 2: Limits	25
Chapter 3: Open Issues, Known Behaviors, and Resolved Issues	63
Open Issues.....	63
Known Behaviors.....	64
Resolved Issues in ExtremeXOS 22.4.1-Patch1-2.....	65
Resolved Issues in ExtremeXOS 22.4.....	66
Chapter 4: ExtremeXOS Document Corrections	73
Cut-Through Forwarding Mode.....	73

Preface

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.
	New	This command or section is new for this release.

Table 2: Text Conventions

Convention	Description
Screen displays	This typeface indicates command syntax, or represents information as it appears on the screen.
The words enter and type	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.”
[Key] names	Key names are written with brackets, such as [Return] or [Esc] . If you must press two or more keys simultaneously, the key names are linked with a plus sign (+). Example: Press [Ctrl]+[Alt]+[Del]
<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 <http://documentation.extremenetworks.com>). 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™ or Summit®, 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

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 about this document, please contact us using our short [online feedback form](#). You can also email us directly at internalinfodev@extremenetworks.com.

Getting Help

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

- **GTAC (Global Technical Assistance Center) for Immediate Support**
 - **Phone:** 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
 - **Email:** support@extremenetworks.com. To expedite your message, enter the product name or model number in the subject line.
- **Extreme Portal** — Search the GTAC knowledgebase, manage support cases and service contracts, download software, and obtain product licensing, training, and certifications.
- **The Hub** — A forum for Extreme 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.

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

Related Publications

ExtremeXOS Publications

- *ACL Solutions Guide*
- *ExtremeXOS 22.4 Command Reference Guide*
- *ExtremeXOS 22.4 EMS Messages Catalog*
- *ExtremeXOS 22.4 Feature License Requirements*
- *ExtremeXOS 22.4 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

Upgrading ExtremeXOS

New and Corrected Features in ExtremeXOS 22.4.

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

End of Support for Non-persistent Adj-Rib-Out (ARO)

Multiple Spanning Tree Protocol (MSTP) Enabled by Default

Vulnerability Notice

Direct Attach Feature No Longer Requires Separate License

Summit X460-G2 Series Switches Have Advanced Edge License

VLAN Option Formatting in Commands

Circuit Emulation Service (CES) No Longer Supported

OpenFlow and SSH Included in ExtremeXOS Base Image

ExtremeXOS SSH Server Upgraded with OpenSSH v6.5

CLI Command Output Format of Ports Lists

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 22.4.1-Patch1-2, which resolves software deficiencies.

Upgrading ExtremeXOS

While ExtremeXOS 22.4.1-Patch1-2 supports all features on all applicable platforms as indicated in these release notes, upgrading to ExtremeXOS 22.4.1-Patch1-2 from releases earlier than 22.2 may involve performance trade-offs of some feature on certain platforms. For information about feature- and platform-specific issues, see [Open Issues](#) on page 63 and [Known Behaviors](#) on page 64. For information about recommended releases for specific platforms, see <http://www.extremenetworks.com/extreme-hardwaresoftware-compatibility-recommendation-matrices/software-release-recommendations/>.

For instructions about upgrading ExtremeXOS software, see "Software Upgrade and Boot Options" in the [ExtremeXOS 22.4 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.

New and Corrected Features in ExtremeXOS 22.4.

This section lists the new and corrected features supported in the 22.4 software:

Extreme Loop Recovery Protocol (ELRP) with Virtual Extensible LANs (VXLAN)

Starting with ExtremeXOS 22.4, Extreme Loop Recovery Protocol (ELRP) is supported on Virtual Extensible LANs (VXLANs).

VXLAN is an encapsulation mechanism. A VXLAN header is added to an L2 frame and encapsulated in a UDP/IP packet. Transit nodes see only an ordinary IP packet.

Supported Platforms

Summit X770, X670-G2, and ExtremeSwitching X870, X690 series switches.

New CLI Commands

```
enable virtual-network remote-endpoint vxlan [ipaddress ipaddress {vr
vr_name} | all]
```

```
disable virtual-network remote-endpoint vxlan [ipaddress ipaddress {vr
vr_name} | all]
```

Changed CLI Commands

Changes are underlined.

```
run elrp {vlan}vlan_name ports [ports | all | none] {remote-endpoints vxlan
all} {interval interval {seconds | milliseconds} } {retry count}
```

```
configure elrp-client one-shot {vlan}vlan_name ports [ports | all | none]
{remote-endpoints vxlan all} {interval interval {seconds | milliseconds} }
{retry count} {log | print | print-and-log}
```

```
configure elrp-client periodic {vlan} vlan_name ports [ports | all |
none] {remote-endpoints vxlan all} {interval interval {seconds |
milliseconds} } {log | log-and-trap | trap} {disable-port {egress |
ingress} {duration {seconds} | permanent } }
```

```
configure elrp-client disable-ports [exclude | include] [ports | eaps-
ring-ports | remote-endpoints vxlan]
```

The following show commands now display remote endpoint information:

```
show virtual-network {vn_name} remote-endpoint vxlan {vni vni} {ipaddress
ipaddress {vr vr_name}}
```

```
show elrp
```

```
show elrp disabled-ports
```


Mirroring to Remote IP Addresses

This new feature enables hardware mirroring of Ethernet frames to a specified remote IPv4 address, which can reside zero or more router hops away. This is useful for ExtremeAnalytics sFlow+ Collector or other forms of remote network analysis or monitoring.

Supported Platforms

Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X440-G2, X870, X620, X690 series switches.

New CLI Commands

```
enable mirror {mirror_name} to remote-ip remote_ip_address {{vr} vr_name}
{from [source_ip_address | auto-source-ip]} {ping-check [on | off]}
```

Changed CLI Commands

Changes are underlined.

```
configure mirror mirror_name {to [port port | port-list port_list |
loopback port port ] | remote-ip remote_ip_address {{vr} vr_name} {from
[source_ip address | auto-source-ip]} {ping-check [on | off]}} {remote-tag
rtag | port none}
```

```
create mirror mirror_name {to [port port | port-list port_list loopback-
port port] {remote-tag rtag} | remote-ip remote_ip_address {{vr} vr_name}
{from [source_ip address | auto-source-ip]} {ping-check [on | off]}}
{description mirror-desc}
```

The following show command is changed to display mirroring to remote IP addresses information:

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

Increase in DHCP Server Limit for DHCP Relay

The limit for the maximum number of DHCP servers per VLAN and per VR (virtual router) that can be configured for DHCP Relay is increased from 4 to 8 (see [Table 3](#) on page 25).

Supported Platforms

Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X440-G2, X870, X620, X690 series switches.

Configure a Front Panel Port VLAN IP Address as Management Address

This enhancement allows you to configure a specified VLAN's IP address as the management address to be advertised by Link Layer Discovery Protocol (LLDP) and Cisco Discovery Protocol (CDP).

If the Management VLAN IP address is not configured, LLDP advertises the system MAC address as the management address in their management TLV, which makes the network device not accessible. If the Management VLAN IP address is not configured, you can now specify any user-defined VLAN's IP address or front panel port VLAN's IP address as the management address for LLDP and CDP protocols.

Supported Platforms

Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X440-G2, X870, X620, X690 series switches.

New CLI Commands

```
configure lldp management-address [[[{vlan} vlan_name | vlan vlan_id]
{primary-ip | secondary-ip secondary_ip_address}] | mac-address]
```

```
configure cdp management-address [{vlan} vlan_name | vlan vlan_id]
{primary-ip | secondary-ip secondary_ip_address}]
```

Changed CLI Commands

The following show commands are changed to show the management IP address:

```
show lldp neighbors detailed
```

```
show cdp neighbor detail
```

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

```
show cdp
```

Proxy Address Resolution Protocol (ARP) Support for Reachable Routes in the Network

This feature allows you to configure whether the switch replies to Address Resolution Protocol (ARP) requests on a specified VLAN by proxy ARP if the route to the IP address is reachable, or only if proxy ARP entries have been created.

Supported Platforms

Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X440-G2, X870, X620, X690 series switches.

Limitations

- No support of SNMP.
- For this feature the statistics of ARP send “Out Response” is incremented.

New CLI Commands

```
configure iparp add proxy [ipNetmask | ip_addr {mask}] {vr vr_name} {mac
| vrrp} {always}
```

Changed CLI Commands

The following show command is changed to show the proxy ARP for reachable routes information:

```
show vlan {virtual-router vr-name}
```

Extreme Loop Recognition Protocol (ELRP) Millisecond Interval Support

Extreme Loop Recognition Protocol (ELRP) now allows you to send PDUs in millisecond intervals.

Supported Platforms

Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X440-G2, X870, X620, X690 series switches.

Changed CLI Commands

Changes are underlined.

```
run elrp {vlan}vlan_name ports [ports | all | none] {remote-endpoints vxlan
all} {interval interval {seconds | milliseconds} } {retry count}
```

```
configure elrp-client one-shot {vlan}vlan_name ports [ports | all | none]
{remote-endpoints vxlan all} {interval interval {seconds | milliseconds}}
{retry count} {log | print | print-and-log}
```

```
configure elrp-client periodic {vlan} vlan_name ports [ports | all |
none] {remote-endpoints vxlan all} {interval interval {seconds |
milliseconds}} {log | log-and-trap | trap} {disable-port {egress | ingress}
{duration {seconds} | permanent}}
```

Network Login over Multi-switch Link Aggregation Groups (MLAG)

Starting with ExtremeXOS 22.4, NetLogin MAC-based authentication and 802.1X authentication are supported in policy mode (NetLogin web-based authentication is not supported) over Multi-switch Link Aggregation Groups (MLAG) ports. If an MLAG peer goes down, supplicants remain authenticated on the other MLAG peers and continue to send data traffic thereby providing redundancy.

After successful authentication, Netlogin passes the necessary information to the policy module (such as the port, MAC address, policy profile, and authentication result) for further processing, such as movement of the port to VLAN and insertion of MAC address in the FDB.

Supported Platforms

Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X440-G2, X870, X620, X690 series switches.

Limitations

- Web-based authentication is not supported.
- Supported in policy mode only.

Enhanced SNMP Failure Codes

Previously, ExtremeXOS could only return a limited set of values to indicate success or failure of the requested set/get operation, which is returned to the SNMP client as "commitFailed(14)".

ExtremeXOS is now able to return a larger range of values to accommodate the following possible SNMP codes:

- noResponse(-1)
- noError(0)
- tooBig(1)
- noSuchName(2)
- badValue(3)
- readOnly(4)
- genErr(5)
- noAccess(6)
- wrongType(7)
- wrongLength(8)
- wrongEncoding(9)
- wrongValue(10)
- noCreation(11)
- inconsistentValue(12)
- resourceUnavailable(13)
- commitFailed(14)
- undoFailed(15)
- authorizationError(16)
- notWritable(17)
- inconsistentName(18)

Supported Platforms

Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X440-G2, X870, X620, X690 series switches.

Cloning Application

The script `clone.py`, which has been available since ExtremeXOS 22.2, now allows you to clone one switch's setup to another switch in the following scenarios:

- Within a stack (`synchronize {slot slotid}`)
- Standalone to standalone (duplicating a reference switch)
- Standalone to stack (adding a switch to a stack)
- Standalone to USB (available since ExtremeXOS 22.2)

The `clone.py` script copies the following:

- All content under:
 - `/boot`
 - `/exos`
 - `/alt/boot`
 - `/alt/exos`
 - (optionally) `/usr/local/cfg`
- Specific NVRAM contents:
 - Boot selector
 - CLI banner

- Failsafe username,password, and action
- SSH key

Supported Platforms

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

Limitations

- Requires ExtremeXOS 22.4 or later.
- Cloning to a standalone switch using a stacking master as the source does not make the standalone switch a stacking master. The configuration cloned from a stacking master to the standalone switch is ignored by ExtremeXOS.
- ONIE to non-ONIE or non-ONIE to ONIE cloning cannot be performed.

Newer ExtremeSwitching series switches (X870 and X690) use the Open Network Install Environment (ONIE) bootloader. All other Summit and ExtremeSwitching series switches do not use ONIE.

- Clone application does not connect through VR-USER.
- Synchronize cannot be done for mixed stacking. All nodes in the stack must be the same platform.
- If the clone master is started and stopped, the dirty bit is set.

Network Login Supports User Virtual Routers

ExtremeXOS 22.4 now supports Network Login on virtual routers (VRs) other than VR-Default in policy mode for static and dynamic VLANs. This allows NetLogin-enabled ports to be made members of multiple destination VLANs that are part of various user VRs.

Supported Platforms

Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X440-G2, X870, X690 series switches.

Limitations

- Only supported in policy mode.
- System-wide, only one NetLogin VLAN can be configured and this VLAN can be part of any user VR.

Fabric Attach

The Fabric Attach feature allows attachment of non-SPB (Shortest Path Bridging) stations to an SPB network through a Fabric Attach server.

Fabric Attach uses the IEEE802.1ab Link Layer Discovery Protocol (LLDP) extensions to automatically attach network devices to individual services in a IEEE 802.1aq Shortest Path Bridging (SPB) network. These network devices typically do not support SPB, MAC-in-MAC (802.1ah) or Network Services Identifier (NSI)/Individual Service Identifier (ISID) usage, and therefore cannot easily take advantage of the Fabric infrastructure without manual configuration of VLAN attachments to NSIs or ISIDs in multiple

locations. Fabric Attach deals with this issue by facilitating automated network device discovery and the automatic configuration and teardown of NSI/ISID to VLAN associations at the edge of the network.

Fabric Attach supports the following:

- Single LAG between any two devices
- Fabric Attach client and proxy behavior
- Connection to a single Fabric Attach server
- One-to-one mapping between a VLAN and an NSI or ISID
- Stacking
- RADIUS authentication

Supported Platforms

Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X440-G2, X870, X620, X690 series switches.

Limitations

Mappings of VLANs to NSIs/ISIDs is limited to 94. See [Limits](#) on page 25.

Fabric Attach does not support the following:

- MIBs
- MLAGs
- Fabric Attach TLV authentication
- Fabric Attach standalone proxy
- Fabric Attach server

New CLI Commands

```
configure [{vlan} vlan_name |vlan vlan_id] add [nsi nsi | isid isid]
configure [{vlan} vlan_name |vlan vlan_id] delete [nsi nsi | isid isid]
show [{vlan} vlan_name | vlan {vlan_id}] fabric attach mappings
show fabric attach neighbors
```

Changed CLI Commands

The following command is changed to show Fabric Attach mapping information:

```
show tech-support {all | area} {detail} {logto [file]}
```

ONEPolicy Maximum Authenticated Users Increased, New Policy Profiles and Profile Modifier Feature Added

For ExtremeXOS 22.4, the maximum number of authenticated users for ONEPolicy is increased as shown in the following table.

ONEPolicy Authenticated Users — maximum authenticated users with TCI overwrite disabled. Note: The maximum values assume 75% utilization of VLAN-XLATE hash table.	Summit X450-G2, X770	6,144
	Summit 460-G2, X670-G2, and ExtremeSwitching X870	12,288
	ExtremeSwitching X690	24,576
	ExtremeSwitching X440-G2, X620	1,536
	Stacking	1,536–65,534

For all ExtremeXOS limits, see [Limits](#) on page 25.

ExtremeXOS 22.4 also adds two new resource profiles:

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

For more information about these resource profiles, see the *Platform Rule Allocation* section in Chapter *ONEPolicy* of the *ExtremeXOS 22.4 User Guide*.

ExtremeXOS 22.4 also now provides a profile modifier feature that allows you to return resources back to ACL from the specified profile (see the **profile-modifier** option in the following changed commands).

Supported Platforms

Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X440-G2, X870, X620, X690 series switches.

Changed CLI Commands

Changes are underlined.

```
configure policy resource-profile [default | less-acl [more-ipv4 | more-  
ipv4-no-ipv6 | more-ipv4-no-mac-no-ipv6] | 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}]}
```

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

Ability to Change Existing LAG's Algorithm

This feature allows you to modify the distribution algorithm of an existing LAG.

Previously, the load sharing algorithm could be configured only during LAG creation, so if you needed to fix issues with LAG distribution that could be addressed by changing the algorithm, you had to remove the LAG, and then re-create it with the desired algorithm.

Supported Platforms

Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X440-G2, X870, X620, X690 series switches.

New CLI Commands

```
configure sharing master_port algorithm [address-based [L2 | L3 | L3_L4 |
custom] | port-based]
```

Entity MIB (RFC-4133), Extreme Enterasys Entity Sensor MIB, and Enterasys Syslog MIB Support Added

ExtremeXOS 22.4 supports the following MIBs:

- Entity MIB (RFC-4133)—The entityPhysicalGroup contains a single table, entityPhysicalTable, to identify physical system components.
- Extreme Enterasys Entity Sensor MIB—The Extreme Enterasys Entity Sensor MIB's extremeEntityTempSfpSensorExtEntry contains objects for representing per transceiver sensor information that extends the information provided in the Entity Sensor MIB Extensions' entPhySensorTable of the SFP/QSFP.
- Enterasys Syslog MIB—support of etsysSyslogServer objects within Enterasys Syslog Client MIB.

Supported Platforms

Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X440-G2, X870, X620, X690 series switches.

Representational State Transfer (REST) API Using RESTCONF

The ExtremeXOS implementation of Representational State Transfer (REST) uses RESTCONF as defined in *RFC 8040*.

RFC 8040 imposes a structure on REST APIs so that they are implemented in the same manner across any device. This style of REST API is called RESTCONF. This allows network management systems and applications communicating with devices to not have to use different APIs for each device type. RESTCONF dictates a standard definition allowing communication with a wide variety of devices using the same API.

Supported Platforms

Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X440-G2, X870, X620, X690 series switches.

Multi-Switch Link Aggregation Group (MLAG) Linkup Isolation

Under certain circumstances, a temporary (less than a second) loop condition exists when an MLAG port becomes operational, but before the remote Multi-Switch Link Aggregation Group (MLAG) peer installs the ISC blocking filter. MLAG linkup isolation addresses this condition by preventing any flood traffic (broadcast, unknown, unicast, etc.) received on a just operational MLAG port from being forwarded to ISC ports until the remote MLAG peer installs the ISC blocking filter.

Supported Platforms

Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X440-G2, X870, X620, X690 series switches.

New CLI Commands

```
configure mlag ports link-up-isolation [on | off]
```

Auto-Move Untagged VLAN Ports Command Default Behavior Changed

The command `configure vlan untagged-ports auto-move` now has **inform** as the default behavior.

This command allows you to globally set that untagged ports can be moved directly from untagged VLANs to either different untagged VLANs or tagged VLANs. The **inform** option specifies that you can automatically move an untagged port on a VLAN, but you are informed when such a move occurs. The previous default behavior was **off**.

Supported Platforms

Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X440-G2, X870, X620, X690 series switches.

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 22.4 Command Reference Guide](#).

End of Support for Non-persistent Adj-Rib-Out (ARO)

Starting with ExtremeXOS 22.3, support for non-persistent Adj-Rib-Out (ARO) is removed.

Previously, the ExtremeXOS default was “disabled,” meaning AROs were non-persistent, and you could use commands to change this default setting. Effective for ExtremeXOS 22.3, the internal setting for AROs is now persistent, and the following commands are deprecated that were used to control this setting:

- `enable bgp adj-rib-out`
- `disable bgp adj-rib-out`

The output of the `show bgp` command will continue to display the adj-rib-out setting; however, it will always show “enabled” as set by default.

Multiple Spanning Tree Protocol (MSTP) Enabled by Default

Starting with ExtremeXOS 22.2, as part of safe defaults mode, Multiple Spanning Tree Protocol (MSTP) is enabled by default.

When you set up your switch for the first time, you set the safe defaults mode (disables Telnet, STP, and SNMP; and configures other aspects of the switch for enhanced security).

You enter safe defaults mode after you connect to the console port of the switch, or after you run `unconfigure switch {all}` or `configure safe-default-script`. When you enter safe defaults mode, the following prompt appears reminding you that MSTP is enabled by default, which you can disable if desired:

```
This switch currently has some management methods enabled for convenience reasons.
Please answer these questions about the security settings you would like to use.
You may quit and accept the default settings by entering 'q' at any time.
```

```
!!!! NOTE: Spanning Tree default changed in ExtremeXOS 22.2 !!!!
```

```
Multiple Spanning Tree Protocol (MSTP) is enabled by default to prevent
broadcast storms
```

```
Would you like to disable MSTP? [y/N/q]:
```

Vulnerability Notice

The following section lists potential vulnerabilities and their impact to ExtremeXOS 22.4.1-Patch1-2.

Thanks to the research team at IDW Security (<http://www.idw.pt/>) for identifying and reporting these issues to Extreme Networks.

Escape from exsh Restricted Shell (CVE-2017-14331)

This issue is documented in CR xos0069140, which is fixed in ExtremeXOS 22.3.1-Patch1-4 (see [Resolved Issues in ExtremeXOS 22.4](#) on page 66).



Important

You must enable FIPS for this fix to take effect.

Impact	Escape from exsh restricted shell
Attack Vector	local
CVS base score	5.1 (CVSS:3.0/AV:L/AC:L/PR:H/UI:N/S:U/C:H/I:L/A:N)
Description	An authenticated user with admin privileges can spawn an interactive shell on the system.
Detail	A user with admin privileges on the switch can invoke an interactive shell with access to the underlying operating system.

Information Disclosure (CVE-2017-14327)

This issue is documented in CR xos0069140, which is fixed in ExtremeXOS 22.3-1-Patch1-4 (see [Resolved Issues in ExtremeXOS 22.4](#) on page 66).



Important

You must enable FIPS for this fix to take effect.

Impact	Information disclosure
Attack Vector	local
CVS base score	5.1 (CVSS:3.0/AV:L/AC:L/PR:H/UI:N/S:U/C:H/I:L/A:N)
Description	An authenticated user with admin privileges can get read access for any file on the filesystem.
Detail	By obtaining an interactive shell with admin privileges as defined in CVE-2017-14331 (preceding), you can access system files owned by root and without world read-access.

Privilege Escalation (root interactive shell) (CVE-2017-14329)

This issue is documented in CR xos0069140, which is fixed in ExtremeXOS 22.3-1-Patch1-4 (see [Resolved Issues in ExtremeXOS 22.4](#) on page 66).



Important

You must enable FIPS for this fix to take effect.

Impact	Privilege escalation (root interactive shell)
Attack Vector	local
CVS base score	6.7 (CVSS:3.0/AV:L/AC:L/PR:H/UI:N/S:U/C:H/I:H/A:H)
Description	An authenticated user with admin privileges can get an interactive root shell on the switch.
Detail	By exploiting both CVE-2017-1427 and CVE-2017-14331, you can escalate to root by spawning a new exsh shell in debug mode and invoking an interactive shell with root privileges.

Privilege Escalation (root interactive shell) (CVE-2017-14330)

This issue is documented in CR xos0069140, which is fixed in ExtremeXOS 22.3-1-Patch1-4 (see [Resolved Issues in ExtremeXOS 22.4](#) on page 66).



Important

You must enable FIPS for this fix to take effect.

Impact	Privilege escalation (root interactive shell)
Attack Vector	local
CVSS base score	6.7 (CVSS:3.0/AV:L/AC:L/PR:H/UI:N/S:U/C:H/I:H/A:H)
Description	An authenticated user with admin privileges can get an interactive root shell on the platform.
Detail	You can get an interactive root shell on the switch by creating a process that runs with elevated privileges.

Denial-of-Service (CVE-2017-14328)

This issue is documented in CR xos0069140, which is fixed in ExtremeXOS 22.3-1-Patch1-4 (see [Resolved Issues in ExtremeXOS 22.4](#) on page 66).

Impact	Denial-of-service
Attack Vector	remote
CVSS base score	7.5 (CVSS:3.0/AV:N/AC:L/PR:N/UI:N/S:U/C:N/I:N/A:H)
Description	A remote user can force the switch to reboot by sending a single, specially crafted packet to the web server.

Session Hijacking (CVE-2017-14332)

This issue is documented in CR xos0069140, which is fixed in ExtremeXOS 22.3-1-Patch1-4 (see [Resolved Issues in ExtremeXOS 22.4](#) on page 66).

Impact	Session hijacking
Attack Vector	remote
CVSS base score	9.6 (CVSS:3.0/AV:N/AC:L/PR:N/UI:R/S:C/C:H/I:H/A:H)
Description	A remote user can hijack a session on the switch web server.
Detail	A remote user can hijack a session on the switch web server by using non-trivial methods to determine the SessionIDs used in authentication.

SSL 64-bit Block Size Cipher Suites Supported (SWEET32)

We do not believe that ExtremeXOS 22.4.1-Patch1-2 is significantly vulnerable to the “SSL 64-bit Block Size Cipher Suites Supported” (SWEET32) security risk.

SSL: ExtremeXOS uses the tthttpd webserver that is not vulnerable to this type of attack because tthttpd does not support persistent SSL connections, which is a requirement of the exploit.

SSH: SSH is potentially more vulnerable depending on the ciphers used. However, ExtremeXOS allows you to mitigate this vulnerability by configuring the advertised ciphers.

For more information about the SWEET32 threat, see:

<https://sweet32.info>

<https://www.openssl.org/blog/blog/2016/08/24/sweet32/>

Direct Attach Feature No Longer Requires Separate License

The Direct Attach feature, which previously was licensed separately as a feature pack, is now available in the Edge license. No additional license is required to use this feature.

The Direct Attach feature, which is based on the IEEE version of VEPA, eliminates the virtual switch layer, simplifying the network and improving performance. Direct Attach enables data center simplification by reducing network tiers from four or five tiers to just two or three tiers, depending on the size of the data center.

For more information about licenses, see the [ExtremeXOS 22.4 Feature License Requirements](#).

Summit X460-G2 Series Switches Have Advanced Edge License

Starting with ExtremeXOS 22.1, Summit X460-G2 series switches have the Advanced Edge License as their default base license level.

For more information about licenses, see [ExtremeXOS 22.4 Feature License Requirements](#).

VLAN Option Formatting in Commands

For commands with a **vlan_list** option, the input into this option must not contain spaces.

Example

The `enable stpd auto-bind` command VLAN ID input should be entered as:

```
enable stpd s0 auto-bind vlan 10,20-30
```

Not:

```
enable stpd s0 auto-bind vlan 10, 20-30
```

Circuit Emulation Service (CES) No Longer Supported

Starting with ExtremeXOS 21.1, Circuit emulation service (CES) is no longer supported.

OpenFlow and SSH Included in ExtremeXOS Base Image

OpenFlow and SSH are now included in the ExtremeXOS base image starting with ExtremeXOS 21.1. A separate XMOD file is no longer required.

ExtremeXOS SSH Server Upgraded with OpenSSH v6.5

ExtremeXOS 16.1 and earlier versions generated DSA-2048 keys using `ssh-keygen` provided by the SSH-Toolkit library. Starting with ExtremeXOS 21.1, ExtremeXOS generates more secure RSA-2048 keys due to switching to using the OpenSSH library, which does not support DSA-2048.

When upgrading to ExtremeXOS 21.1 and later, SSH keys generated by earlier ExtremeXOS versions (16.1 and earlier) are compatible and do *not* need to be re-generated.



Note

If a switch is downgraded from ExtremeXOS 21.1 or later to previous releases, with RSA key saved, the key becomes invalid.

CLI Command Output Format of Ports Lists

For ExtremeXOS 16.1 and later, the output of CLI commands showing ports lists does not display spaces between commas.

For example: “3:1,7:13” instead of “3:1, 7:13”

Extreme Hardware/Software Compatibility and Recommendation Matrices

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: <http://documentation.extremenetworks.com>

Compatibility with Extreme Management Center (Formerly NetSight)

ExtremeXOS 22.4.1-Patch1-2 is compatible with Extreme Management Center (formerly NetSight) version 8.0.3 and later.

Supported MIBs

The Extreme Networks MIBs are located at <http://www.extremenetworks.com/support/policies/mibs/>.

You need to provide your serial number or agreement number, and then 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 22.4 User Guide*.

Tested Third-Party Products

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

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

To receive proactive service notification about newly released software or technical service communications (for example, field notices, product change notices, etc.), please register at: www.extremenetworks.com/support/service-notification-form

2 Limits

This chapter summarizes the supported limits in ExtremeXOS 22.4.1-Patch1-2.

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

- Edge ([Table 3](#) on page 25)
- Advanced Edge ([Table 4](#) on page 51)
- Core ([Table 5](#) on page 57)

For more information about licenses, see [ExtremeXOS 22.4 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.

Supported Limits for Edge License

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

Table 3: Supported Limits for Edge License

Metric	Product	Limit
AAA (local)—maximum number of admin and local user accounts.	All platforms	8
Access lists (meters)—maximum number of meters.	ExtremeSwitching X620, X440-G2	1,024 ingress 256 egress
	Summit X770, X670-G2, X450-G2, X460-G2	1,024 ingress 512 egress
	ExtremeSwitching X870, X690	2,048 ingress 512 egress

Table 3: Supported Limits for Edge License (continued)

Metric	Product	Limit
Access lists (policies) —suggested maximum number of lines in a single policy file.	All platforms	300,000
Access lists (policies) —maximum number of rules in a single policy file. ^a	Summit X460-G2, X450-G2, X770, 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	8,192 ingress 1,024 egress
Access lists (policies) —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, X770, ExtremeSwitching X870, X690	1,024 ingress only
	ExtremeSwitching X620, X440-G2	512 ingress only
Access lists (slices) —number of ACL slices.	Summit X460-G2, X450-G2	16 ingress 4 egress
	Summit X770, X670-G2, ExtremeSwitching X690	12 ingress 4 egress
	ExtremeSwitching X440-G2, X620	8 ingress 4 egress
	ExtremeSwitching X870	4 ingress 4 egress
Access lists (slices) —number of ACL slices in first stage (VFP).	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	4 ingress only
ACL Per Port Meters —number of meters supported per port.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	16
ACL port ranges	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	32
Meters Packets-Per-Second Capable	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	Yes
AVB (audio video bridging) —maximum number of active streams.	Summit X450-G2, X460-G2, X770, and ExtremeSwitching X620, X440-G2	1,024
	Summit X670-G2	4,096
	ExtremeSwitching X690, X870	N/A

Table 3: Supported Limits for Edge License (continued)

Metric	Product	Limit
BFD sessions (Software Mode) —maximum number of BFD sessions.	Summit X460-G2, X670-G2, X450-G2, X770, ExtremeSwitching X440-G2, X620, X870, X690 (default timers—1 sec)	512
	Summit X460-G2, X670-G2, X450-G2, X770, ExtremeSwitching X440-G2, X620, X870, X690 (minimal timers—100 msec)	10 ^c
BFD IPv4 sessions (Hardware Assisted) —maximum number of IPv4 BFD sessions.	Summit X460-G2, ExtremeSwitching X870, X690	900 (PTP not enabled) 425 (PTP enabled) 256 (with 3 ms transmit interval)
BFD IPv6 sessions (Hardware Assisted) —maximum number of IPv6 BFD sessions.	Summit X460-G2, ExtremeSwitching X870, X690	425 (PTP not enabled)
BOOTP/DHCP relay —maximum number of BOOTP or DHCP servers per virtual router.	Summit X460-G2, X670-G2, X770, X450-G2, and ExtremeSwitching X440-G2, X620, X870, X690	8
BOOTP/DHCP relay —maximum number of BOOTP or DHCP servers per VLAN.	Summit X460-G2, X670-G2, X770, X450-G2, and ExtremeSwitching X440-G2, X620, X870, X690	8
BOOTP/DHCP relay —maximum number of DHCPv4/v6 relay agents	Summit X460-G2, X670-G2, X770, X450-G2, and ExtremeSwitching X440-G2, X620, X870, X690	4,000
Connectivity fault management (CFM) —maximum number of CFM domains. Note: With Advanced Edge license or higher.	Summit X460-G2, X670-G2, X770, X450-G2, and ExtremeSwitching X440-G2, X620, X870, X690	8
CFM —maximum number of CFM associations. Note: With Advanced Edge license or higher.	Summit X460-G2, X670-G2, X770, X450-G2, and ExtremeSwitching X440-G2, X620, X870, X690	256
CFM —maximum number of CFM up end points. Note: With Advanced Edge license or higher.	Summit X460-G2, X670-G2, X770, X450-G2, and ExtremeSwitching X440-G2, X620, X870, X690	32

Table 3: Supported Limits for Edge License (continued)

Metric	Product	Limit
<p>CFM—maximum number of CFM down end points.</p> <p>Note: With Advanced Edge license or higher.</p>	<p>Summit X670-G2, X770, X450-G2, and ExtremeSwitching X440-G2, X620, X870, X690</p> <p>Summit X460-G2</p>	<p>32</p> <p>256 (non-load shared ports) 32 (load shared ports)</p>
<p>CFM—maximum number of CFM remote end points per up/down end point.</p> <p>Note: With Advanced Edge license or higher.</p>	Summit X460-G2, X670-G2, X770, X450-G2, and ExtremeSwitching X440-G2, X620, X870, X690	2,000
<p>CFM—maximum number of dot1ag ports.</p> <p>Note: With Advanced Edge license or higher.</p>	Summit X460-G2, X670-G2, X770, X450-G2, and ExtremeSwitching X440-G2, X620, X870, X690	128
<p>CFM—maximum number of CFM segments.</p> <p>Note: With Advanced Edge license or higher.</p>	Summit X460-G2, X670-G2, X770, X450-G2, and ExtremeSwitching X440-G2, X620, X870, X690	1,000
<p>CFM—maximum number of MIPs.</p> <p>Note: With Advanced Edge license or higher.</p>	Summit X460-G2, X670-G2, X770, X450-G2, and ExtremeSwitching X620, X440-G2, X870, X690	256
<p>CLEAR-Flow—total number of rules supported. The ACL rules plus CLEAR-Flow rules must be less than the total number of supported ACLs.</p>	Summit X460-G2, X770, X670-G2, X450-G2	4,094
	ExtremeSwitching X440-G2, X620	1,024
	ExtremeSwitching X870	3,072
	ExtremeSwitching X690	8,192
<p>Data Center Bridging eXchange (DCBX) protocol Type Length Value (TLVs)—maximum number of DCBX application TLVs.</p>	Summit X460-G2, X670-G2, X770, X450-G2, and ExtremeSwitching X440-G2, X620, X870, X690	8
<p>DHCPv6 Prefix Delegation Snooping—Maximum number of DHCPv6 prefix delegation snooped entries.</p>	Summit X460-G2, X670-G2, X770, X450-G2, and ExtremeSwitching X620, X440-G2, X870, X690	<p>256 (with Underlying Protocol Ripng)</p> <p>128 (with Underlying protocol OSPFv3)</p> <p>1,024 (with static routes)</p>

Table 3: Supported Limits for Edge License (continued)

Metric	Product	Limit
DHCP snooping entries —maximum number of DHCP snooping entries.	Summit X460-G2, X670-G2, X770, X450-G2, and ExtremeSwitching X620, X440-G2, X870, X690	2,048
Dynamic ACLs —maximum number of ACLs processed per second. Note: Limits are load dependent.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690 with 50 DACLs with 500 DACLs	10 5
EAPS domains —maximum number of EAPS domains. Note: An EAPS ring that is being spatially reused cannot have more than four configured EAPS domains. Note: You can increase the number of domains by upgrading to the Advanced Edge license (see Table 4 on page 51).	Summit X670-G2, X450-G2, X460-G2, X770, and ExtremeSwitching X440-G2, X620, X870, X690	4
EAPSV1 protected VLANs —maximum number of protected VLANs.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2 ExtremeSwitching X870, X690	1,000 2,000
ERPS domains —maximum number of ERPS domains with or without CFM configured.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	4
ERPSV1 protected VLANs —maximum number of protected VLANs.	ExtremeSwitching X870, X690 Summit X450-G2, X460-G2, X670-G2, X770, ExtremeSwitching X620, X440-G2	2,000 1,000
ERPSV2 protected VLANs —maximum number of protected VLANs.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X870, X690 Summit X770, ExtremeSwitching X620, X440-G2	2,000 500
ELSM (vlan-ports) —maximum number of VLAN ports.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X870, X690 ExtremeSwitching X440-G2	5,000 4,000

Table 3: Supported Limits for Edge License (continued)

Metric	Product	Limit
Forwarding rate —maximum L3 software forwarding rate.	ExtremeSwitching X870, X690	34,000 pps
	Summit X450-G2	18,000 pps
	Summit X460-G2	19,000 pps
	ExtremeSwitching X440-G2	10,000 pps
	ExtremeSwitching X620	13,000 pps
	Summit X770-32q	8,000 pps
	Summit X670-G2	14,000 pps
FDB (unicast blackhole entries) —maximum number of unicast blackhole FDB entries.	Summit X460-G2	49,152 ^f
	Summit X770, X670-G2	294,912 ^f
	Summit X450-G2	34,816 ^f
	ExtremeSwitching X620, X440-G2	16,384 ^f
	ExtremeSwitching X870	139,264 ^f
	ExtremeSwitching X690	278,528 ^f
FDB (multicast blackhole entries) —maximum number of multicast blackhole FDB entries.	Summit X460-G2, X450-G2, and ExtremeSwitching X440-G2, X620	1,024
	Summit X770, X670-G2, ExtremeSwitching X870, X690	4,096
FDB (maximum L2 entries) —maximum number of MAC addresses.	Summit X460-G2	98,300 ^g
	Summit X770, X670-G2	294,912 ^g
	Summit X450-G2	68,000 ^g
	ExtremeSwitching X620, X440-G2	16,384
	ExtremeSwitching X870	139,264 ^g
	ExtremeSwitching X690	278,528 ^g
FDB (Maximum L2 entries) —maximum number of multicast FDB entries.	Summit X770, X670-G2, ExtremeSwitching X870, X690	4,096
	Summit X450-G2, X460-G2, and ExtremeSwitching X620, X440-G2	1,024
Identity management —maximum number of Blacklist entries.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	512
Identity management —maximum number of Whitelist entries.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	512
Identity management —maximum number of roles that can be created.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	64
Identity management —maximum role hierarchy depth allowed.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	5

Table 3: Supported Limits for Edge License (continued)

Metric	Product	Limit
Identity management —maximum number of attribute value pairs in a role match criteria.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	16
Identity management —maximum of child roles for a role.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	8
Identity management —maximum number of policies/dynamic ACLs that can be configured per role.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	8
Identity management —maximum number of LDAP servers that can be configured.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	8
Identity management —maximum number of Kerberos servers that can be configured.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	20
Identity management —maximum database memory-size.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	512
Identity management —recommended number of identities per switch. Note: 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, X770, and ExtremeSwitching X620, X440-G2, X870, X690	100
Identity management —recommended number of ACL entries per identity. Note: Number of ACLs per identity based on system ACL limitation.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	20
Identity management —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, X770, and ExtremeSwitching X620, X440-G2, X870, X690	500
IGMP snooping per VLAN filters —maximum number of VLANs supported in per-VLAN IGMP snooping mode.	Summit X460-G2, ExtremeSwitching X870	1,500
	Summit X450-G2	2,048
	Summit X770, X670-G2	2,000
	ExtremeSwitching X620, X440-G2	1,000
	ExtremeSwitching X690	4,000

Table 3: Supported Limits for Edge License (continued)

Metric	Product	Limit
IGMPv1/v2 SSM-map entries —maximum number of IGMPv1/v2 SSM mapping entries.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	500
IGMPv1/v2 SSM-map entries —maximum number of sources per group in IGMPv1/v2 SSM mapping entries.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	50
IGMPv2 subscriber —maximum number of IGMPv2 subscribers per port. ⁿ	Summit X770, X670-G2, X460-G2, X450-G2 ExtremeSwitching X440-G2, X620 ExtremeSwitching X870, X690	4,000 3,500 6,000
IGMPv2 subscriber —maximum number of IGMPv2 subscribers per switch. ⁿ	Summit X770, X670-G2 Summit X460-G2, X450-G2 ExtremeSwitching X620, X440-G2 ExtremeSwitching X870, X690	30,000 20,000 17,500 45,000
IGMPv3 maximum source per group —maximum number of source addresses per group.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	250
IGMPv3 subscriber —maximum number of IGMPv3 subscribers per port. ⁿ	Summit X770, X670-G2, X460-G2, X450-G2 ExtremeSwitching X440-G2, X620 ExtremeSwitching X870, X690	4,000 3,500 6,000
IGMPv3 subscriber —maximum number of IGMPv3 subscribers per switch. ⁿ	Summit X460-G2, X450-G2 Summit X770, X670-G2 ExtremeSwitching X620, X440-G2 ExtremeSwitching X870, X690	20,000 30,000 17,500 45,000
IP ARP entries in software —maximum number of IP ARP entries in software. Note: May be limited by hardware capacity of FDB (maximum L2 entries).	Summit X670-G2, X770 Summit X460-G2 Summit X450-G2 ExtremeSwitching X440-G2, X620 ExtremeSwitching X870 ExtremeSwitching X690	131,072 (up to) ^h 57,344 (up to) ^h 47,000 (up to) ^h 20,480 94,206 (up to) ^h 157,694 (up to) ^h

Table 3: Supported Limits for Edge License (continued)

Metric	Product	Limit
IPv4 ARP entries in hardware with minimum LPM routes—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) ^h
	Summit X460-G2	50,000 (up to) ^h
	Summit X770, X670-G2	108,000 (up to) ^h
	Summit X450-G2	39,000 (up to) ^h
	ExtremeSwitching X620	1,500
	ExtremeSwitching X440-G2	1,000
IPv4 ARP entries in hardware with maximum LPM routes—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) ^h
	Summit X460-G2	43,000 (up to) ^h
	Summit X770, X670-G2	98,000 (up to) ^h
	Summit X450-G2	29,000 (up to) ^h
	ExtremeSwitching X620	1,500
	ExtremeSwitching X440-G2	1,000
IP flow information export (IPFIX)—number of simultaneous flows.	Summit X460-G2	2,048 ingress 2,048 egress
	Summit X450-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	N/A
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) ^h
	Summit X460-G2	73,000 ^h
	Summit X770, X670-G2	176,000 (up to) ^h
	Summit X450-G2	61,000 (up to) ^h
	ExtremeSwitching X440-G2, X620	3,500
	ExtremeSwitching X690	216,000 (up to) ^h
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	131,000
	Summit X770	100,000
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, X770, ExtremeSwitching X690, X870	131,000 ^a
	ExtremeSwitching X620, X440-G2	480

Table 3: Supported Limits for Edge License (continued)

Metric	Product	Limit
IPv6 6in4 tunnel—maximum number of IPv6 6in4 tunnels.	Summit X450-G2, X460-G2, X670-G2, X770, ExtremeSwitching X870, X690	255
	ExtremeSwitching X440-G2, X620	N/A
IPv6 6to4 tunnel—maximum number of IPv6 6to4 tunnels.	Summit X450-G2, X460-G2, X670-G2, X770, ExtremeSwitching X870, X690	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, X770, and ExtremeSwitching X620, X440-G2, X870, X690	255
IPv6 addresses on a switch—maximum number of IPv6 addresses on a switch.	Summit X770, X670-G2, X460-G2, X450-G2, ExtremeSwitching X870, X690	2,048
	ExtremeSwitching X620, X440-G2	510
IPv6 host entries in hardware—maximum number of IPv6 neighbor entries in hardware.	Summit X770, X670-G2	36,750 ^h
	Summit X460-G2	22,000 ^h
	Summit X450-G2	12,000 ^h
	ExtremeSwitching X440-G2	1,000
	ExtremeSwitching X620	1,500
IPv6 routes in software—maximum number of IPv6 routes in software, including static routes and routes from all routing protocols.	ExtremeSwitching X870, X690	32,000 ^h
	Summit X450-G2, X460-G2, and ExtremeSwitching X620, X440-G2	25,000
	Summit X670-G2, ExtremeSwitching X690, X870	65,000 ^q
IPv6 routes (LPM entries in hardware)—maximum number of IPv6 routes in hardware.	Summit X770	100,000
	Summit X460-G2	6,000
	Summit X450-G2	8,000
	Summit X670-G2, X770, ExtremeSwitching X690, X870	65,000 ^q
IPv6 routes with a mask greater than 64 bits in hardware—maximum number of such IPv6 LPM routes in hardware.	ExtremeSwitching X620, X440-G2	240
	ExtremeSwitching X870	256
	ExtremeSwitching X440-G2, X620	1,024
	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X690	2,048
IPv6 route sharing in hardware—route mask lengths for which ECMP is supported in hardware.	Summit X460-G2, X670-G2, X770, X450-G2, and ExtremeSwitching X620, X870, X690	0–64 *
	ExtremeSwitching X440-G2	Not supported
Note: * >64 single path only		

Table 3: Supported Limits for Edge License (continued)

Metric	Product	Limit
IP router interfaces —maximum number of VLANs performing IPv4 and/or IPv6 routing. Excludes sub-VLANs.	Summit X460-G2, X770, X670-G2, X450-G2, ExtremeSwitching X870, X690	2,048
	ExtremeSwitching X620, X440-G2	510
IP multicast static routes —maximum number of permanent multicast IP routes.	Summit X460-G2, X670-G2, X450-G2, X770, ExtremeSwitching X870, X690	1,024
IP unicast static routes —maximum number of permanent IP unicast routes.	Summit X460-G2, X670-G2, X450-G2, X770, ExtremeSwitching X870, X690	1,024
	ExtremeSwitching X620, X440-G2	480
IP route sharing (maximum gateways) —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, X770, and ExtremeSwitching X620, X870, X690	2, 4, 8, 16, 32, or 64
	ExtremeSwitching X440-G2	N/A

Table 3: 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, X770, ExtremeSwitching X870, X690	
	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 X440-G2		N/A
IP multinetting (secondary IP addresses) —maximum number of secondary IP addresses per VLAN.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	255
Jumbo frames —maximum size supported for jumbo frames, including the CRC.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	9,216
L2 VPN: VCCV (pseudowire Virtual Circuit Connectivity Verification) VPNs per switch —maximum number of VCCV enabled VPLS VPNs.	Summit X460-G2, X670-G2, X770, ExtremeSwitching X870, X690	16
	Summit X450-G2, and ExtremeSwitching X620, X440-G2	N/A
L2 VPN: VPLS MAC addresses —maximum number of MAC addresses learned by a switch.	Summit X770	128,000
	Summit X670-G2, ExtremeSwitching X690	140,000
	Summit X460-G2	55,000
	ExtremeSwitching X870	65,000
	Summit X450-G2, and ExtremeSwitching X620, X440-G2	N/A

Table 3: Supported Limits for Edge License (continued)

Metric	Product	Limit
L2 VPN: VPLS VPNs — maximum number of VPLS virtual private networks per switch.	Summit X460-G2, X770, X670-G2, ExtremeSwitching X870, X690	1,023
	Summit X450-G2, and ExtremeSwitching X620, X440-G2	N/A
L2 VPN: VPLS peers — maximum number of VPLS peers per VPLS instance.	Summit X770, X670-G2, X460-G2, ExtremeSwitching X870, X690	64
	Summit X450-G2, and ExtremeSwitching X620, X440-G2	N/A
L2 VPN: LDP pseudowires — maximum number of pseudowires per switch.	Summit X770, X670-G2, X460-G2, and ExtremeSwitching X870, X690	7,000
	Summit X450-G2, and ExtremeSwitching X620, X440-G2	N/A
L2 VPN: static pseudowires — maximum number of static pseudowires per switch.	Summit X670-G2, X460-G2, X770, ExtremeSwitching X870, X690	7,000
	Summit X450-G2, and ExtremeSwitching X620, X440-G2	N/A
L2 VPN: Virtual Private Wire Service (VPWS) VPNs — maximum number of virtual private networks per switch.	Summit X770	4,000
	Summit X670-G2, ExtremeSwitching X870, X690	4,090
	Summit X460-G2	1,023
	Summit X450-G2, and ExtremeSwitching X620, X440-G2	N/A
Layer-2 IPMC forwarding caches —(IGMP/MLD/PIM snooping) in mac-vlan mode. Note: <ul style="list-style-type: none"> The internal lookup table configuration used is "I2-and-I3". IPv6 and IPv4 L2 IPMC scaling is the same for this mode. Layer-2 IPMC forwarding cache limits—(IGMP/MLD/PIM snooping) in mixed-mode are same. 	Summit X770, 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	67,000

Table 3: Supported Limits for Edge License (continued)

Metric	Product	Limit
Layer-3 IPv4 Multicast —maximum number of <S,G,V> entries installed in the hardware (IP multicast compression enabled). Note: <ul style="list-style-type: none"> Limit value same for MVR senders, PIM Snooping entries, PIM SSM cache, IGMP senders, PIM cache. The internal lookup table configuration used is "more l3-and-ipmc". Assumes source-group-vlan mode as look up key. Layer 3 IPMC cache limit in mixed mode also has the same value. 	Summit X460-G2	26,000
	Summit X450-G2	21,000
	Summit X770, X670-G2	77,500
	ExtremeSwitching X620, X440-G2	1,500
	ExtremeSwitching X870	52,000
	ExtremeSwitching X690	93,000
Layer-3 IPv6 Multicast —maximum number of <S,G,V> entries installed in the hardware (IP multicast compression enabled). Note: <ul style="list-style-type: none"> Limit value same for MLD sender per switch, PIM IPv6 cache. The internal lookup table configuration used is "more l3-and-ipmc". Assumes source-group-vlan mode as look up key. 	Summit X770, 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	48,000
Load sharing —maximum number of load sharing groups. Note: 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, X770, and ExtremeSwitching X620, X440-G2, X870, X690	128

Table 3: Supported Limits for Edge License (continued)

Metric	Product	Limit
Load sharing —maximum number of ports per load-sharing group.	For standalone and stacked: ExtremeSwitching X620, X440-G2	8
	For standalone: Summit X770, X670-G2, X460-G2, X450-G2, ExtremeSwitching X870, X690	32
	For stacked: Summit X770, X670-G2, X460-G2, X450-G2, X670-G2, and ExtremeSwitching X870, X690	64
Logged messages —maximum number of messages logged locally on the system.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	20,000
MAC-based security —maximum number of MAC-based security policies.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	1,024
MAC Locking —Maximum number of MAC locking stations that can be learned on a port.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	64 (static MAC locking stations) 600 (first arrival MAC locking stations)
Meters —maximum number of meters supported.	Summit X460-G2, X450-G2, X670-G2, X770, ExtremeSwitching X440-G2, X620, X870, X690	2,048
Maximum mirroring instances	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X870, X690 Note: 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 the you to use a total of four slots, while there are no more then 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 Note: For stacks containing X620 or X440-G2, maximum supported egress mirror instances is 1.	1 (egress)
Mirroring (filters) —maximum number of mirroring filters. Note: This is the number of filters across all the active mirroring instances.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	128

Table 3: Supported Limits for Edge License (continued)

Metric	Product	Limit
Mirroring, one-to-many (filters) —maximum number of one-to-many mirroring filters. Note: This is the number of filters across all the active mirroring instances	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	128
Mirroring, one-to-many (monitor port) —maximum number of one-to-many monitor ports.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	16
MLAG ports —maximum number of MLAG ports allowed.	Summit X670-G2, ExtremeSwitching X690 ExtremeSwitching X440-G2, Summit X450-G2 Summit X460-G2 Summit X770 ExtremeSwitching X620 ExtremeSwitching X870	71 51 53 103 15 127
MLAG peers —maximum number of MLAG peers allowed.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	2
MPLS RSVP-TE interfaces —maximum number of interfaces.	Summit X460-G2, X670-G2, X770, ExtremeSwitching X870, X690 Summit X450-G2, and ExtremeSwitching X440-G2, X620	32 N/A
MPLS RSVP-TE ingress LSPs —maximum number of ingress LSPs.	Summit X460-G2, X670-G2, X770, ExtremeSwitching X870, X690 Summit X450-G2, and ExtremeSwitching X440-G2, X620	2,000 N/A
MPLS RSVP-TE egress LSPs —maximum number of egress LSPs.	Summit X460-G2, X670-G2, X770, ExtremeSwitching X870, X690 Summit X450-G2, and ExtremeSwitching X440-G2, X620	2,000 N/A
MPLS RSVP-TE transit LSPs —maximum number of transit LSPs.	Summit X460-G2, X670-G2, X770 ExtremeSwitching X870, X690 Summit X450-G2, and ExtremeSwitching X440-G2, X620	2,000 4,000 N/A
MPLS RSVP-TE paths —maximum number of paths.	Summit X460-G2, X770 Summit X670-G2, ExtremeSwitching X870, X690 Summit X450-G2, and ExtremeSwitching X440-G2, X620	1,000 2,000 N/A
MPLS RSVP-TE profiles —maximum number of profiles.	Summit X460-G2, X770 Summit X670-G2, ExtremeSwitching X870, X690 Summit X450-G2, and ExtremeSwitching X440-G2, X620	1,000 2,000 N/A

Table 3: Supported Limits for Edge License (continued)

Metric	Product	Limit
MPLS RSVP-TE EROs— maximum number of EROs per path.	Summit X460-G2, X670-G2, X770, ExtremeSwitching X870, X690	64
	Summit X450-G2, and ExtremeSwitching X440-G2, X620	N/A
MPLS LDP peers—maximum number of MPLS LDP peers per switch.	Summit X770	64
	Summit X670-G2, X460-G2, ExtremeSwitching X870, X690	128
	Summit X450-G2, and ExtremeSwitching X440-G2, X620	N/A
MPLS LDP adjacencies— maximum number of MPLS LDP adjacencies per switch.	Summit X460-G2	50
	Summit X770, X670-G2, ExtremeSwitching X870, X690	64
	Summit X450-G2, and ExtremeSwitching X440-G2, X620	N/A
MPLS LDP ingress LSPs— maximum number of MPLS LSPs that can originate from a switch.	Summit X770, X670-G2, X460-G2, ExtremeSwitching X870, X690	2,048
	Summit X450-G2, and ExtremeSwitching X440-G2, X620	N/A
MPLS LDP-enabled interfaces —maximum number of MPLS LDP configured interfaces per switch.	Summit X770	64
	Summit X670-G2, X460-G2, ExtremeSwitching X870, X690	128
	Summit X450-G2, and ExtremeSwitching X440-G2, X620	N/A
MPLS LDP transit LSPs— maximum number of MPLS transit LSPs per switch.	Summit X770, X670-G2, X460-G2, ExtremeSwitching X870, X690	4,000
	Summit X450-G2, and ExtremeSwitching X440-G2, X620	N/A
MPLS LDP egress LSPs— maximum number of MPLS egress LSPs that can terminate on a switch.	Summit X670-G2, X460-G2, X770, ExtremeSwitching X870, X690	4,000
	Summit X450-G2, and ExtremeSwitching X440-G2, X620	N/A
MPLS static egress LSPs— maximum number of static egress LSPs.	Summit X460-G2	7,116
	Summit X770, ExtremeSwitching X870, X690	8,000
	Summit X670-G2	15,308
	Summit X450-G2, and ExtremeSwitching X440-G2, X620	N/A
MPLS static ingress LSPs— maximum number of static ingress LSPs.	Summit X460-G2, ExtremeSwitching X870, X690	4,000
	Summit X770, X670-G2	2,048
	Summit X450-G2, and ExtremeSwitching X440-G2, X620	N/A
MPLS static transit LSPs— maximum number of static transit LSPs	Summit X770, X670-G2, X460-G2, ExtremeSwitching X870, X690	4,000
	Summit X450-G2, and ExtremeSwitching X440-G2, X620	N/A
Multicast listener discovery (MLD) snooping per-VLAN filters—maximum number of VLANs supported in per-VLAN MLD snooping mode.	Summit X460-G2, X770, X670-G2, ExtremeSwitching X870	1,200
	Summit X450-G2	512
	ExtremeSwitching X620, X440-G2	600
	ExtremeSwitching X690	1,500

Table 3: Supported Limits for Edge License (continued)

Metric	Product	Limit
Multicast listener discovery (MLD)v1 subscribers —maximum number of MLDv1 subscribers per port. ⁿ	Summit X770, X670-G2, X450-G2, X460-G2	4,000
	ExtremeSwitching X620, X440-G2	3,500
	ExtremeSwitching X870, X690	6,000
Multicast listener discovery (MLD)v1 subscribers —maximum number of MLDv1 subscribers per switch. ⁿ	Summit X460-G2, X450-G2, ExtremeSwitching X620, X440-G2	10,000
	Summit X770, X670-G2	30,000
	ExtremeSwitching X870, X690	45,000
Multicast listener discovery (MLD)v2 subscribers —maximum number of MLDv2 subscribers per port. ⁿ	Summit X770, X670-G2, X460-G2, X450-G2	4,000
	ExtremeSwitching X620, X440-G2	3,500
	ExtremeSwitching X870, X690	6,000
Multicast listener discovery (MLD)v2 subscribers —maximum number of MLDv2 subscribers per switch. ⁿ	Summit X770, X670-G2	30,000
	Summit X460-G2, X450-G2, ExtremeSwitching X620, X440-G2	10,000
	ExtremeSwitching X870, X690	45,000
Multicast listener discovery (MLD)v2 maximum source per group —maximum number of source addresses per group.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	200
Multicast listener discovery (MLD) SSM-map entries —maximum number of MLD SSM mapping entries.	Summit X450-G2, X460-G2, X670-G2, X770, ExtremeSwitching X870, X690	500
	ExtremeSwitching X440-G2, X620	50
Multicast listener discovery (MLD) SSM-MAP entries —maximum number of sources per group in MLD SSM mapping entries.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	50
Network Login —maximum number of clients being authenticated on MAC-based VLAN enabled ports.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	1,024
Network Login —maximum number of clients being authenticated with policy mode enabled with TCI overwrite enabled.	Summit X450-G2, X460-G2	1,024
	Summit X670-G2, X770, ExtremeSwitching X870, X690	512
	ExtremeSwitching X620, X440-G2	256
Network Login —maximum number of dynamic VLANs.	Summit X460-G2, X450-G2, X670-G2, X770, ExtremeSwitching X870, X690	2,000
	ExtremeSwitching X440-G2, X620	1,024
Network Login VLAN VSAs —maximum number of VLANs a client can be authenticated on at any given time.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	10

Table 3: Supported Limits for Edge License (continued)

Metric	Product	Limit
Network Service Identifiers (NSI)/VLAN mappings —maximum number of VLANs to NSI mappings.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	94
Node Alias —maximum number of entries per slot.	Summit X450-G2, X460-G2, X670-G2, X770 and ExtremeSwitching X620, X440-G2, X870, X690	8,192
ONEPolicy Roles/Profiles —maximum number of policy roles/profiles.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	63
ONEPolicy Rules per Role/Profile —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, X770, 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 X690	IPv4 Rules: 512 IPv6 Rules: 512 MAC Rules: 512 L2 Rules: 440
ONEPolicy Authenticated Users per Switch —maximum number of authenticated users per port only with TCI-Overwrite enabled.	Summit X450-G2, X460-G2, and ExtremeSwitching X690	1,024
	Summit X670-G2, X770, ExtremeSwitching X870	512
	ExtremeSwitching X620, X440-G2	256
	Stacking	Depends on the stack nodes.
ONEPolicy Authenticated Users per Switch —maximum number of authenticated users per switch with TCI-Overwrite disabled. Note: The maximum values assume 75% utilization of VLAN-XLATE hash table.	ExtremeSwitching X690	24,576
	Summit X670-G2, X460-G2, ExtremeSwitching X870	12,288
	Summit X770, X450-G2	6,144
	ExtremeSwitching X620, X440-G2	1,536
	Stacking	1,536–65,534

Table 3: Supported Limits for Edge License (continued)

Metric	Product	Limit
ONEPolicy Authenticated Users per Port per Switch —maximum number of authenticated users per port per switch with TCI overwrite disabled. Note: The maximum values assume 75% utilization of VLAN-XLATE hash table.	Summit X450-G2, X770	6,144
	Summit 460-G2, X670-G2, and ExtremeSwitching X870	12,288
	ExtremeSwitching X690	24,576
	ExtremeSwitching X440-G2, X620	1,536
ONEPolicy Authenticated Users per Port per Switch —maximum number of authenticated users per port with only with TCI-Overwrite enabled.	Summit X450-G2, X460-G2	1,024
	Summit X670-G2, X770, ExtremeSwitching X870, X690	512
	ExtremeSwitching X620, X440-G2	256
ONEPolicy Permit/Deny Traffic Classification Rules Types —total maximum number of unique permit/deny traffic classification rules types (system/stack).	Summit X450-G2, X460-G2, X670-G2, X770, ExtremeSwitching X870	952
	ExtremeSwitching X620, X440-G2	440
	ExtremeSwitching X690	1,976
ONEPolicy Permit/Deny Traffic Classification Rules Types —maximum number of unique MAC permit/deny traffic classification rules types (macsource/macdest).	Summit X450-G2, X460-G2, X670-G2, X770, ExtremeSwitching X870	256
	ExtremeSwitching X620, X440-G2	N/A
	ExtremeSwitching X690	512
ONEPolicy Permit/Deny Traffic Classification Rules Types —maximum number of unique IPv6 permit/deny traffic classification rules types (ipv6dest).	Summit X450-G2, X460-G2, X670-G2, X770, ExtremeSwitching X870	256
	ExtremeSwitching X620, X440-G2	N/A
	ExtremeSwitching X690	512
ONEPolicy Permit/Deny Traffic Classification Rules Types —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, X770, ExtremeSwitching X620, X440-G2, X870	256
	ExtremeSwitching X690	512

Table 3: Supported Limits for Edge License (continued)

Metric	Product	Limit
ONEPolicy Permit/Deny Traffic Classification Rules Types —maximum number of unique Layer 2 permit/deny traffic classification rules (ethertype/port).	Summit X450-G2, X460-G2, X670-G2, X770, ExtremeSwitching X870	184
	ExtremeSwitching X620, X440-G2	184
	ExtremeSwitching X690	440
Policy-based routing (PBR) redundancy —maximum number of flow-redirects.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	256°
Policy-based routing (PBR) redundancy —maximum number of next hops per each flow-direct.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	32°
Private VLANs —maximum number of subscribers. Assumes a minimum of one port per network and subscriber VLAN.	Summit X770	103
	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	
Private VLANs —maximum number of private VLANs with an IP address on the network VLAN. Note: 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 X770, X670-G2, X460-G2, ExtremeSwitching X870, X690	1,024
	Summit X450-G2	510
	ExtremeSwitching X440-G2	255
	ExtremeSwitching X620	510
Private VLANs —maximum number of private VLANs in an L2-only environment.	Summit X770, X670-G2, X460-G2, ExtremeSwitching X870, X690	1,280
	Summit X450-G2	597
	ExtremeSwitching X440-G2, X620	255
PTP/1588v2 Clock Ports	Summit X770, X460-G2, X670-G2	32 for boundary clock 1 for ordinary clock
	ExtremeSwitching X440-G2, X620, X870, X690	N/A

Table 3: Supported Limits for Edge License (continued)

Metric	Product	Limit
PTP/1588v2 Clock Instances	Summit X770, X670-G2, X460-G2	2 combinations: <ul style="list-style-type: none"> • Transparent clock + ordinary clock • Transparent clock + boundary clock
	ExtremeSwitching X440-G2, X620, X870, X690	N/A
PTP/1588v2 Unicast Static Slaves	Summit X770, X670-G2, X460-G2	40 entries per clock port
	ExtremeSwitching X440-G2, X620, X870, X690	N/A
PTP/1588v2 Unicast Static Masters	Summit X770, X670-G2, X460-G2	10 entries per clock type
	ExtremeSwitching X440-G2, X620, X870, X690	N/A
Route policies—suggested maximum number of lines in a route policy file.	Summit X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	10,000
RIP Learned Routes—maximum number of RIP routes supported without aggregation.	Summit X770, X670-G2, X460-G2, and ExtremeSwitching X440-G2, X620, X870, X690	10,000
RIP interfaces on a single router—recommended maximum number of RIP routed interfaces on a switch.	Summit X670-G2, X460-G2, X770, X450-G2, ExtremeSwitching X870, X690	256
	ExtremeSwitching X440-G2, X620	128
RIPng learned routes—maximum number of RIPng routes.	Summit X670-G2, X460-G2, X770, X450-G2, X870, X690	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, X770, X670-G2, X460-G2, and ExtremeSwitching X620, X870, X690	64
	ExtremeSwitching X440-G2	32

Table 3: Supported Limits for Edge License (continued)

Metric	Product	Limit
Spanning Tree PVST+— maximum number of port mode PVST domains. Note: 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 X770, X670-G2, and ExtremeSwitching X620	256
	Summit X460-G2, X450-G2, and ExtremeSwitching X440-G2	128
	ExtremeSwitching X870, X690	384
Spanning Tree— maximum number of multiple spanning tree instances (MSTI) domains.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X870, X690	64
	ExtremeSwitching X440-G2	32
Spanning Tree— maximum number of VLANs per MSTI. Note: Maximum number of 10 active ports per VLAN when all 500 VLANs are in one MSTI.	Summit X770, X670-G2	500
	Summit X460-G2, X450-G2, ExtremeSwitching X620, X870, X690	600
	ExtremeSwitching X440-G2	256
Spanning Tree— maximum number of VLANs on all MSTP instances.	Summit X770, X670-G2, X460-G2, X450-G2, ExtremeSwitching X620, X870, X690	1,024
	ExtremeSwitching X440-G2	512
Spanning Tree (802.1d domains)— maximum number of 802.1d domains per port.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	1
Spanning Tree (number of ports)— maximum number of ports including all Spanning Tree domains.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X870, X690	4,096
	ExtremeSwitching X440-G2	2,048
Spanning Tree (maximum VLANs)— maximum number of STP-protected VLANs (dot1d and dot1w).	Summit X770, X670-G2, X460-G2, X450-G2, and ExtremeSwitching X620, X870, X690	1,024
	ExtremeSwitching X440-G2	500
SSH (number of sessions)— maximum number of simultaneous SSH sessions.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	8

Table 3: Supported Limits for Edge License (continued)

Metric	Product	Limit
Static MAC multicast FDB entries —maximum number of permanent multicast MAC entries configured into the FDB.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	1,024
Syslog servers —maximum number of simultaneous Syslog servers that are supported.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	16
Syslog targets —maximum number of configurable Syslog targets.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	16
Telnet (number of sessions) —maximum number of simultaneous Telnet sessions.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	8
Virtual routers —maximum number of user-created virtual routers that can be created on a switch.	Summit X460-G2, X670-G2, X770, X450-G2, ExtremeSwitching X870, X690 ExtremeSwitching X440-G2, X620	63 N/A
Virtual router forwarding (VRFs) —maximum number of VRFs that can be created on a switch. Note: * Subject to other system limitations.	Summit X460-G2, X670-G2, X770, X450-G2, ExtremeSwitching X870, X690 ExtremeSwitching X440-G2, X620	960 * N/A
Virtual router protocols per VR —maximum number of routing protocols per VR.	Summit X460-G2, X670-G2, X770, X450-G2, ExtremeSwitching X870, X690 ExtremeSwitching X440-G2, X620	8 N/A
Virtual router protocols per switch —maximum number of VR protocols per switch.	Summit X460-G2, X670-G2, X770, X450-G2, ExtremeSwitching X870, X690 ExtremeSwitching X440-G2, X620	64 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, X770, and ExtremeSwitching X620, X440-G2, X870, X690	1,000
VLANs —includes all VLANs. Note: 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, X770, and ExtremeSwitching X620, X440-G2, X870, X690	4,094

Table 3: Supported Limits for Edge License (continued)

Metric	Product	Limit
VLANs (Layer 2) —maximum number of Layer 2 VLANs.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	4,094
VLANs (Layer 3) —maximum number of VLANs performing IPv4 and/or IPv6 routing. Excludes sub-VLANs.	Summit X460-G2, X770, X670-G2, X450-G2, ExtremeSwitching X870, X690	2,048
	ExtremeSwitching X440-G2, X620	510
VLANs (maximum active port-based) —maximum active ports per VLAN when 4,094 VLANs are configured with default license.	Summit X670-G2, ExtremeSwitching X870, X690	32
	ExtremeSwitching X440-G2	28
	Summit X460-G2, X770	26
	ExtremeSwitching X620	16
	Summit X450-G2	29
	Summit X460-G2	24
VLANs (maximum active protocol-sensitive filters) —number of simultaneously active protocol filters in the switch.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	16
VLAN translation —maximum number of translation VLANs. Assumes a minimum of one port per translation and member VLAN.	Summit X770	103
	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
VLAN translation —maximum number of translation VLAN pairs with an IP address on the translation VLAN. Note: This limit is dependent on the maximum number of translation VLAN pairs in an L2-only environment if the configuration has tagged and translated ports.	Summit X770, X670-G2, ExtremeSwitching X870, X690	1,024
	Summit X450-G2	512
	ExtremeSwitching X620	510
	ExtremeSwitching X440-G2	255
VLAN translation —maximum number of translation VLAN pairs in an L2-only environment.	Summit X450-G2, X770, X670-G2, X460-G2, ExtremeSwitching X870, X690	2,046
	ExtremeSwitching X440-G2, X620	255

Table 3: Supported Limits for Edge License (continued)

Metric	Product	Limit
XML requests —maximum number of XML requests per second. Note: Limits are dependent on load and type of XML request. These values are dynamic ACL data requests.	Summit X460-G2, X670-G2, X770, X450-G2, and ExtremeSwitching X440-G2, X620, X870, X690	10 with 100 DACLs
XNV authentication —maximum number of VMs that can be processed (combination of local and network VMs).	Summit X460-G2, X670-G2, X770, ExtremeSwitching X870, X690	2,048
	Summit X450-G2, and ExtremeSwitching X440-G2, X620	1,024
XNV database entries —maximum number of VM database entries (combination of local and network VMs).	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	16,000
XNV database entries —maximum number of VPP database entries (combination of local and network VPPs).	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	2,048
XNV dynamic VLAN —Maximum number of dynamic VLANs created (from VPPs / local VMs).	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	2,048
XNV local VPPs —maximum number of XNV local VPPs.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	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, X770, and ExtremeSwitching X620, X440-G2, X870, X690	8 ingress 4 egress
XNV network VPPs —maximum number of XNV network VPPs. ^p	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	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 4: Supported Limits for Advanced Edge License

Metric	Product	Limit
EAPS domains —maximum number of EAPS domains. Note: An EAPS ring that is being spatially reused cannot have more than four configured EAPS domains.	ExtremeSwitching X870, X690	128
	Summit X670-G2, X450-G2, X460-G2, X770	64
	ExtremeSwitching X440-G2, X620	32
EAPsv2 protected VLANs —maximum number of protected VLANs.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X440-G2, X620	500
	ExtremeSwitching X870, X690	2,000
ERPS domains —maximum number of ERPS domains without CFM configured.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	32
ERPS domains —maximum number of ERPS domains with CFM configured.	Summit X450-G2, X670-G2, X770, and ExtremeSwitching X620, X870, X690	16
	Summit X460-G2	32
ERPSv1 protected VLANs —maximum number of protected VLANs.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X870, X690	2,000
	Summit X770, ExtremeSwitching X620, X440-G2	1,000
ERPSv2 protected VLANs —maximum number of protected VLANs.	Summit X450-G2, X460-G2, X670-G2, and ExtremeSwitching X870, X690	2,000
	Summit X770, ExtremeSwitching X620, X440-G2	500
ESRP groups —maximum number of ESRP groups	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X440-G2, X620, X870, X690	32
ESRP domains —maximum number of ESRP domains.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	64
ESRP VLANs —maximum number of ESRP VLANs.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	1,000
ESRP (maximum ping tracks) —maximum number of ping tracks per VLAN.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	8
ESRP (IP route tracks) —maximum IP route tracks per VLAN.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	8
ESRP (VLAN tracks) —maximum number of VLAN tracks per VLAN.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	1

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

Metric	Product	Limit
OSPFv2/v3 ECMP—maximum number of equal cost multipath OSPFv2 and OSPFv3.	Summit X460-G2, X670-G2, X770, X450-G2, ExtremeSwitching X870, X690	64
	ExtremeSwitching X620	4
	ExtremeSwitching X440-G2	N/A
OSPFv2 areas—as an ABR, how many OSPF areas are supported within the same switch.	Summit X460-G2, X670-G2, X770, ExtremeSwitching X870, X690	8
	Summit X450-G2, ExtremeSwitching X440-G2, X620	4
OSPFv2 external routes—recommended maximum number of external routes contained in an OSPF LSDB.	ExtremeSwitching X870, X690	10,000
	Summit X770, X670-G2, X460-G2	5,000
	Summit X450-G2, ExtremeSwitching X440-G2, X620	2,400
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	4,000
	Summit X670-G2, X460-G2, X770	2,000
	Summit X450-G2, and ExtremeSwitching X440-G2, X620	1,000
OSPFv2 interfaces—recommended maximum number of OSPF interfaces on a switch (active interfaces only).	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	4
OSPFv2 links—maximum number of links in the router LSA.	Summit X460-G2, X670-G2, ExtremeSwitching X870, X690	400
	Summit X450-G2, and ExtremeSwitching X620, X440-G2	4
	Summit X770	419
OSPFv2 neighbors—maximum number of supported OSPF adjacencies.	Summit X450-G2, X770, X670-G2, X460-G2, and ExtremeSwitching X440-G2, X620, X870, X690	4
OSPFv2 routers in a single area—recommended maximum number of routers in a single OSPF area.	ExtremeSwitching X870, X690	100
	Summit X770, 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, X770, ExtremeSwitching X870, X690	32
	Summit X450-G2, and ExtremeSwitching X440-G2, X620	4

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

Metric	Product	Limit
OSPFv3 areas—as an ABR, the maximum number of supported OSPFv3 areas.	ExtremeSwitching X870, X690	100
	Summit X460-G2, X670-G2, X770	16
	Summit X450-G2, ExtremeSwitching X440-G2, X620	4
OSPFv3 external routes—recommended maximum number of external routes.	Summit X770, X670-G2, X460-G2, ExtremeSwitching X870, X690	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	4,000
	Summit X770, X670-G2, X460-G2	3,000
	Summit X450-G2, ExtremeSwitching X440-G2, X620	500
OSPFv3 interfaces—maximum number of OSPFv3 interfaces.	Summit X770, X670-G2, X460-G2, X450-G2, ExtremeSwitching X870, X690, X440-G2, X620	4
OSPFv3 neighbors—maximum number of OSPFv3 neighbors.	Summit X450-G2, X770, X670-G2, X460-G2, ExtremeSwitching X870, X690, X440-G2, X620	4
OSPFv3 virtual links—maximum number of OSPFv3 virtual links supported.	Summit X770, X670-G2, X460-G2, ExtremeSwitching X870, X690	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 X770, X670-G2, ExtremeSwitching X870, X690	8
	Summit X450-G2	N/A
OVSDB Managed Switches—Maximum number of OVSDB-managed switches.	Summit X770, X670-G2, ExtremeSwitching X870, X690	1
	Summit X450-G2	N/A
PIM IPv4 (maximum interfaces)—maximum number of PIM active interfaces.	Summit X460-G2, X670-G2, X770, X450-G2, ExtremeSwitching X870, X440-G2, X620, X690	4
PIM IPv4 Limits—maximum number of multicast groups per dynamic rendezvous point.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	180
PIM IPv4 Limits—maximum number of multicast groups per static rendezvous point.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	3,000 (depends on policy file limits)
PIM IPv4 Limits—maximum number of multicast sources per group.	Summit X460-G2, X670-G2, X770, X450-G2, ExtremeSwitching X870, X690	5,000
	ExtremeSwitching X440-G2, X620	1,500

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

Metric	Product	Limit
PIM IPv4 Limits —maximum number of dynamic rendezvous points per multicast group.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	145
PIM IPv4 Limits —static rendezvous points.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	32
PIM IPv6 (maximum interfaces) —maximum number of PIM active interfaces.	Summit X460-G2, X670-G2, X770, X450-G2, ExtremeSwitching X870, X440-G2, X620, X690	4
PIM IPv6 Limits —maximum number of multicast sources per group.	Summit X460-G2, X670-G2, X770, ExtremeSwitching X870, X690	2,500
	Summit X450-G2	2,000
	ExtremeSwitching X440-G2, X620	550
PIM IPv6 Limits —maximum number of multicast groups per dynamic rendezvous point.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	70
PIM IPv6 Limits —maximum number of multicast groups per static rendezvous point.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	3,000 (depends on policy file limits)
PIM IPv6 Limits —maximum number of dynamic rendezvous points per multicast group.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	64
PIM IPv6 Limits —maximum number of secondary address per interface.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	70
PIM IPv6 Limits —static rendezvous points.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	32
Port-specific VLAN tags —maximum number of port-specific VLAN tags.	Summit X460-G2, X670-G2, X770, ExtremeSwitching X870, X690	1,023
	Summit X450-G2, and ExtremeSwitching X440-G2, X620	N/A
Port-specific VLAN tags —maximum number of port-specific VLAN tag ports.	Summit X770, X670-G2	6,400
	Summit X460-G2, ExtremeSwitching X870, X690	4,000
	Summit X450-G2, and ExtremeSwitching X440-G2, X620	N/A

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

Metric	Product	Limit
VRRP (v2/v3-IPv4) (maximum instances) —maximum number of VRRP instances for a single switch, with Advanced Edge license or higher. Note: These limits are applicable for Fabric Routing configuration also. Note: Number of groups configured should not exceed the number of individual VRs supported (that is, in normal mode) for that platform type.	Normal Mode (as individual VRs): Summit X770, X670-G2, X460-G2, X450-G2, and ExtremeSwitching X870, X690 ExtremeSwitching X440-G2, X620	511 128
	Scaled Mode (with groups): Summit X770, X670-G2, X460-G2, X450-G2, and ExtremeSwitching X870, X690 ExtremeSwitching X440-G2, X620	2,048 128
	Normal Mode (as individual VRs): Summit X770, X670-G2, X460-G2, X450-G2, and ExtremeSwitching X870, X690 ExtremeSwitching X440-G2, X620	511 128
	Scaled Mode (with groups): Summit X770, X670-G2, X460-G2, X450-G2, and ExtremeSwitching X870, X690 ExtremeSwitching X440-G2, X620	2,048 128
VRRP (v3-IPv6) (maximum instances) —maximum number of VRRP instances for a single switch, with Advanced Edge license or higher. (VRRP-VRRPv3-IPv6) Note: These limits are applicable for Fabric Routing configuration also. Note: Number of groups configured should not exceed the number of individual VRs supported (that is, in normal mode) for that platform type.	Normal Mode (as individual VRs): Summit X770, X670-G2, X460-G2, X450-G2, and ExtremeSwitching X870, X690 ExtremeSwitching X440-G2, X620	511 128
	Scaled Mode (with groups): Summit X770, X670-G2, X460-G2, X450-G2, and ExtremeSwitching X870, X690 ExtremeSwitching X440-G2, X620	2,048 128
VRRP (v2/v3-IPv4/IPv6) (maximum VRID) —maximum number of unique VRID numbers per switch.	Summit X770, X670-G2, X460-G2, X450-G2 and ExtremeSwitching X440-G2, X620, X870, X690 Note: With Advanced Edge license or higher	255
VRRP (v2/v3-IPv4/IPv6) (maximum VRIDs per VLAN) —maximum number of VRIDs per VLAN.	Summit X770, X670-G2, X460-G2, X450-G2 and ExtremeSwitching X440-G2, X620, X870, X690 Note: With Advanced Edge license or higher	255
VRRP (v2/v3-IPv4/IPv6) (maximum ping tracks) —maximum number of ping tracks per VLAN.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690 Note: With Advanced Edge license or higher	8

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

Metric	Product	Limit
VRRP (maximum ping tracks) —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, X770, and ExtremeSwitching X620, X440-G2, X870, X690	8 (20 centisecond or 1 second hello interval)
VRRP (v3-IPv6) (maximum ping tracks) —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, X770, and ExtremeSwitching X620, X440-G2, X870, X690	8 (20 centisecond or 1 second hello interval)
VRRP (v2/v3-IPv4/IPv6) (maximum iproute tracks) —maximum number of IP route tracks per VLAN.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	8
VRRP (v2/v3-IPv4/IPv6) —maximum number of VLAN tracks per VLAN.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X620, X440-G2, X870, X690	8
VXLAN —maximum virtual networks. Note: Every VPLS instance/PSTag VLAN reduces this limit by 1. 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, X770, and ExtremeSwitching X870, X690 Summit X460-G2, X450-G2, and ExtremeSwitching X440-G2, X620	2,048–4,000 N/A
VXLAN —maximum tenant VLANs plus port combinations Note: Every (VPLS/PSTag VLAN) + port reduces the limit by 1.	Summit X670-G2, X770, and ExtremeSwitching X870, X690 Summit X460-G2, X450-G2, and ExtremeSwitching X440-G2, X620	4,096 N/A
VXLAN —maximum static MAC to IP bindings. Note: Every FDB entry configured reduces this limit by 1.	Summit X670-G2, X770, and ExtremeSwitching X870, X690 Summit X460-G2, X450-G2, and ExtremeSwitching X440-G2, X620	64,000 N/A
VXLAN —maximum RTEP IP addresses	Summit X670-G2, X770, and ExtremeSwitching X870, X690 Summit X460-G2, X450-G2, and ExtremeSwitching X440-G2, X620	512 N/A
VXLAN —maximum virtual networks with dynamic learning and OSPF extensions for VXLAN	Summit X670-G2, X770, and ExtremeSwitching X870, X690 Summit X460-G2, X450-G2, and ExtremeSwitching X440-G2, X620	4,000 N/A

Supported Limits for Core License

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

Table 5: Supported Limits for Core License

Metric	Product	Limit
BGP (aggregates)—maximum number of BGP aggregates.	Summit X460-G2, X670-G2, X770, ExtremeSwitching X870, X690	256
	Summit X450-G2	204
BGP (networks)—maximum number of BGP networks.	Summit X460-G2, X670-G2, X770, ExtremeSwitching X870, X690	1,024
	Summit X450-G2	820
BGP (peers)—maximum number of BGP peers. Note: With default keepalive and hold timers.	Summit X460-G2, X670-G2, X770, ExtremeSwitching X870, X690	128
	Summit X450-G2	100
BGP (peer groups)—maximum number of BGP peer groups.	Summit X460-G2, X670-G2, X770, ExtremeSwitching X870, X690	64
	Summit X450-G2	50
BGP (policy entries)—maximum number of BGP policy entries per route policy.	Summit X460-G2, X670-G2, X770, ExtremeSwitching X870, X690	256
	Summit X450-G2	204
BGP (policy statements)—maximum number of BGP policy statements per route policy.	Summit X460-G2, X670-G2, X770, ExtremeSwitching X870, X690	1,024
	Summit X450-G2	820
BGP multicast address-family routes —maximum number of multicast address-family routes.	Summit X460-G2, X670-G2, X770, and ExtremeSwitching X870, X690	25,000
	Summit X450-G2	20,000
BGP (unicast address-family routes) —maximum number of unicast address-family routes.	Summit X460-G2, X670-G2, X770, ExtremeSwitching X870, X690 (at default)	25,000
	ExtremeSwitching X870, X690 (with ALPM enabled)	100,000
	Summit X450-G2	20,000
BGP (non-unique routes)—maximum number of non-unique BGP routes.	Summit X460-G2, X670-G2, X770, ExtremeSwitching X870, X690	25,000
	Summit X450-G2	20,000
BGP ECMP—maximum number of equal cost multipath for BGP and BGPv6.	Summit X460-G2, X670-G2, X770, ExtremeSwitching X870, X690	2, 4, 8, 16, 32, or 64
	Summit X450-G2	64

Table 5: Supported Limits for Core License (continued)

Metric	Product	Limit
BGPv6 (unicast address-family routes) —maximum number of unicast address family routes.	Summit X460-G2	6,000
	Summit X670-G2, X770	8,000
	ExtremeSwitching X870, X690	10,000
	ExtremeSwitching X870, X690 (with ALPM enabled)	100,000
	Summit X450-G2	4,800
BGPv6 (non-unique routes) —maximum number of non-unique BGP routes.	Summit X460-G2	18,000
	Summit X670-G2, X770, ExtremeSwitching X870, X690	24,000
	Summit X450-G2	14,000
GRE Tunnels —maximum number of GRE tunnels.	Summit X460-G2, X670-G2, X770, X450-G2, and ExtremeSwitching X870, X690	255
	ExtremeSwitching X620, X440G2	N/A
IS-IS adjacencies —maximum number of supported IS-IS adjacencies.	Summit X460-G2, X670-G2, X770, and ExtremeSwitching X870, X690	128
	Summit X450-G2	N/A
IS-IS ECMP —maximum number of equal cost multipath for IS-IS.	Summit X460-G2, X670-G2, X770, and ExtremeSwitching X870, X690	2, 4, or 8
	Summit X450-G2	N/A
IS-IS interfaces —maximum number of interfaces that can support IS-IS.	Summit X460-G2, X670-G2, X770, and ExtremeSwitching X870, X690	255
	Summit X450-G2	N/A
IS-IS routers in an area —recommended maximum number of IS-IS routers in an area.	Summit X460-G2, X670-G2, X770, and ExtremeSwitching X870, X690	256
	Summit X450-G2	N/A
IS-IS route origination —recommended maximum number of routes that can be originated by an IS-IS node.	Summit X460-G2, X670-G2, X770, and ExtremeSwitching X870, X690	20,000
	Summit X450-G2	N/A
IS-IS IPv4 L1 routes in an L1 router —recommended maximum number of IS-IS Level 1 routes in a Level 1 IS-IS router.	Summit X460-G2, X670-G2, X770, and ExtremeSwitching X870, X690	25,000
	Summit X450-G2	N/A
IS-IS IPv4 L2 routes —recommended maximum number of IS-IS Level 2 routes.	Summit X460-G2, X670-G2, X770, and ExtremeSwitching X870, X690	25,000
	Summit X450-G2	N/A
IS-IS IPv4 L1 routes in an L1/L2 router —recommended maximum number of IS-IS Level 1 routes in an L1/L2 IS-IS router.	Summit X460-G2, X670-G2, X770, and ExtremeSwitching X870, X690	20,000
	Summit X450-G2	N/A

Table 5: Supported Limits for Core License (continued)

Metric	Product	Limit
IS-IS IPv6 L1 routes in an L1 router —recommended maximum number of IS-IS Level 1 routes in a Level 1 IS-IS router.	Summit X460-G2, X670-G2, X770, and ExtremeSwitching X870, X690	10,000
	Summit X450-G2	N/A
IS-IS IPv6 L2 routes —recommended maximum number of IS-IS Level 2 routes.	Summit X460-G2, X670-G2, X770, and ExtremeSwitching X870, X690	10,000
	Summit X450-G2	N/A
IS-IS IPv6 L1 routes in an L1/L2 router —recommended maximum number of IS-IS Level 1 routes in a L1/L2 router.	Summit X460-G2, X670-G2, X770, and ExtremeSwitching X870, X690	10,000
	Summit X450-G2	N/A
IS-IS IPv4/IPv6 L1 routes in an L1 router —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, X770, and ExtremeSwitching X870, X690	20,000
	Summit X450-G2	N/A
IS-IS IPv4/IPv6 L2 routes in an L2 router —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, X770, and ExtremeSwitching X870, X690	20,000
	Summit X450-G2	N/A
IS-IS IPv4/IPv6 L1 routes in an L1/L2 router —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, X770, and ExtremeSwitching X870, X690	20,000
	Summit X450-G2	N/A
MSDP active peers —maximum number of active MSDP peers.	Summit X450-G2, X770, X670-G2, X460-G2, ExtremeSwitching X870, X690	64
MSDP SA cache entries —maximum number of entries in SA cache.	Summit X670-G2, X770, ExtremeSwitching X690	14,000
	Summit X460-G2	10,000
	ExtremeSwitching X870	11,000
	Summit X450-G2	8,000
MSDP maximum mesh groups —maximum number of MSDP mesh groups.	Summit X450-G2, X770, X670-G2, X460-G2, ExtremeSwitching X870, X690	16
OSPFv2/v3 ECMP —maximum number of equal cost multipath OSPFv2 and OSPFv3.	Summit X460-G2, X670-G2, X770, X450-G2, ExtremeSwitching X870, X690	64

Table 5: Supported Limits for Core License (continued)

Metric	Product	Limit
OSPFv2 areas —as an ABR, how many OSPF areas are supported within the same switch.	Summit X450-G2, X460-G2, X670-G2, X770, ExtremeSwitching X870, X690	8
OSPFv2 external routes —recommended maximum number of external routes contained in an OSPF LSDB.	ExtremeSwitching X870, X690	10,000
	Summit X770, 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	4,000
	Summit X670-G2, X460-G2, X770	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, X770, ExtremeSwitching X870, X690	400
	Summit X450-G2	320
OSPFv2 links —maximum number of links in the router LSA.	Summit X460-G2, X670-G2, ExtremeSwitching X870, X690	400
	Summit X770	419
	Summit X450-G2	320
OSPFv2 neighbors —maximum number of supported OSPF adjacencies.	Summit X770, X670-G2, X460-G2, ExtremeSwitching X870, X690	128
	Summit X450-G2	96
OSPFv2 routers in a single area —recommended maximum number of routers in a single OSPF area.	ExtremeSwitching X870, X690	100
	Summit X770, X670-G2, X460-G2	50
	Summit X450-G2	40
OSPFv2 virtual links —maximum number of supported OSPF virtual links.	Summit X460-G2, X670-G2, X770, ExtremeSwitching X870, X690	32
	Summit X450-G2	25
OSPFv3 areas —as an ABR, the maximum number of supported OSPFv3 areas.	ExtremeSwitching X870, X690	100
	Summit X460-G2, X670-G2, X770	16
	Summit X450-G2	12
OSPFv3 external routes —recommended maximum number of external routes.	Summit X770, X670-G2, X460-G2, ExtremeSwitching X870, X690	10,000
	Summit X450-G2	7,500
OSPFv3 inter- or intra-area routes —recommended maximum number of inter- or intra-area routes.	ExtremeSwitching X870, X690	4,000
	Summit X770, X670-G2, X460-G2	3,000
	Summit X450-G2	500

Table 5: Supported Limits for Core License (continued)

Metric	Product	Limit
OSPFv3 interfaces—maximum number of OSPFv3 interfaces.	Summit X770	128
	Summit X670-G2, X460-G2, ExtremeSwitching X870, X690	256
	Summit X450-G2	192
OSPFv3 neighbors—maximum number of OSPFv3 neighbors.	Summit X770, X670-G2, X460-G2, ExtremeSwitching X870, X690	64
	Summit X450-G2	48
OSPFv3 virtual links—maximum number of OSPFv3 virtual links supported.	Summit X770, X670-G2, X460-G2, ExtremeSwitching X870, X690	16
	Summit X450-G2	12
PIM IPv4 (maximum interfaces)—maximum number of PIM active interfaces.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X870, X690	512
PIM IPv4 Limits—maximum number of multicast groups per dynamic rendezvous point.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X870, X690	180
PIM IPv4 Limits—maximum number of multicast groups per static rendezvous point.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X870, X690	3,000 (depends on policy file limits)
PIM IPv4 Limits—maximum number of multicast sources per group.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X870, X690	5,000
PIM IPv4 Limits—maximum number of dynamic rendezvous points per multicast group.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X870, X690	145
PIM IPv4 Limits—static rendezvous points.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X870, X690	32
PIM IPv6 (maximum interfaces)—maximum number of PIM active interfaces.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X870, X690	512
PIM IPv6 Limits—maximum number of multicast sources per group.	Summit X460-G2, X670-G2, X770, and ExtremeSwitching X870, X690	2,500
	Summit X450-G2,	2,000
PIM IPv6 Limits—maximum number of multicast groups per dynamic rendezvous point.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X870, X690	70
PIM IPv6 Limits—maximum number of multicast groups per static rendezvous point.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X870, X690	3,000 (depends on policy file limits)
PIM IPv6 Limits—maximum number of dynamic rendezvous points per multicast group.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X870, X690	64

Table 5: Supported Limits for Core License (continued)

Metric	Product	Limit
PIM IPv6 Limits—maximum number of secondary address per interface.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X870, X690	70
PIM IPv6 Limits—static rendezvous points.	Summit X450-G2, X460-G2, X670-G2, X770, and ExtremeSwitching X870, X690	32

^a The table shows the total available.

^c When there are BFD sessions with minimal timer, sessions with default timer should not be used.

^f Effective capacity varies based on actual MAC addresses and VLAN IDs used and hash algorithm selected.

^g Based on "configure forwarding internal-tables more I2".

^h Based on "configure forwarding internal-tables more I3-and-ipmc".

^j The limit depends on setting configured with configure iproute reserved-entries.

^m 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.

ⁿ If IGMP and MLD are simultaneously configured on the switch, the number of effective subscribers supported would be appropriately lessened.

^o The total of all PBR next hops on all flow redirects should not exceed 4,096.

^p The number of XNV authentications supported based on system ACL limitations.

^q Based on "configure forwarding internal-tables more routes".

3 Open Issues, Known Behaviors, and Resolved Issues

Open Issues
Known Behaviors
Resolved Issues in ExtremeXOS 22.4.1-Patch1-2
Resolved Issues in ExtremeXOS 22.4

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 22.4.1-Patch1-2.

Table 6: Open Issues, Platform-Specific, and Feature Change Requests (CRs)

CR Number	Description
General	
xos0070137	On ExtremeSwitching X690 and X870 series switches in ALPM mode, after adding and deleting a default route, Layer-3 packets whose routes do not fit within the ALPM hardware capacity are dropped instead of CPU-forwarded. Workaround: Either use a default route, or keep the number of routes within the supported limits.
xos0069554	On ExtremeSwitching X620 series switches, copper combo port link flaps when SFP+ is inserted in the corresponding fiber combo port. On ExtremeSwitching X440-G2 and Summit X460-G2 series switches, copper combo port link flaps when SFP is removed from the corresponding fiber combo port.
xos0069566	On an ExtremeSwitching X870/X690 mixed stack, ports 91-96 on any X870 node should not be used. There are many possible incorrect behaviors possible if ports 91-96 are used on any X870 node in such a stack. Among the known behaviors are L2 Unicast flows received on X690 nodes being unable to reach destinations attached to ports 91-96 on X870 nodes and packet duplication of non-Unicast flows on multiple link aggregation member ports when ports 91-96 on an X870 node are configured as members of a link aggregation group.
SummitStack	
xos0069017	On SummitStacks with at least one Summit X770 series switch and with a BGP configuration, stack slot remains in "RT synced" state when stack is rebooted.
ExtremeSwitching X870 Series Switches	
xos0068901	On ExtremeSwitching X870 series switches, if both ingress and egress sampling is enabled, then sFlow sample count is lower than expected.

Table 6: Open Issues, Platform-Specific, and Feature Change Requests (CRs) (continued)

CR Number	Description
ExtremeSwitching X690 Series Switches	
xos0068848	IPv6 L3 Unicast packets destined to front-panel port 30 are slowpath forwarded instead of hardware forwarded if port 30 is not a member of a load share group. Workaround: Create a load share group containing only port 30 using <code>enable sharing 30 grouping 30</code> .
Fabric Attach	
xos0069879	Dynamic Fabric Attach mappings created with LLDP do not time out of Fabric Attach proxy. If a Fabric Attach mapping is created on proxy1 (static or dynamic), proxy 2 creates mapping dynamically (LLDP), and then sends the TLV to the server. If the mapping is then removed from proxy1, the dynamic mapping is never removed from the proxy2.
REST API	
app0000270	POST support not available for YANG:openconfig_system.
app0000271	PATCH support not available for YANG:openconfig_system.
app0000272	DELETE support not available for YANG:openconfig_system.
app0000262	PATCH support not available for YANG openconfig_interfaces. When attempted, 500 Error occurs.
xos0069105	"restconf" and "ping" crash when DNS is enabled.
Security	
xos0067219	With certificate signing request (CSR), even when private key and certificate match, HTTP access is not granted.
xos0070151	Profile changes made through Change of Authorization (CoA) are applied to the authenticator, but not to remote peer using NetLogin and MLAG, so that the peer entry remains in the old profile. Workaround: Use SNMP instead of CoA with Captive Portal feature.

Known Behaviors

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

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

CR Number	Description
ExtremeSwitching X440-G2 Series Switches	
xos0069482	On ExtremeSwitching X440-G2 series switches, while using BASE-T optics, changing the default auto-negotiation setting causes link issues.
ExtremeSwitching X690 Series Switches	

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

CR Number	Description
xos0070154	On Summit X690 series switches, the connector type appears as "Unknown" for FINISAR vendor, 1000T optic with part number "FCLF-8521-3".
General	
xos0068889	Configuring management VLAN in CDP is not reflected in <code>show configuration edp</code> output. Workaround: Use the command <code>cdp neighbor detail</code> to confirm configuration.
ELRP	
xos0069250	After deleting a port disabled by ELRP from a VLAN, the port is disabled forever. Workaround: Enable the port manually.
SSH	
xos0069435	The SSH rekey interval cannot exceed the SSH idle timeout interval. If the SSH rekey interval is greater than the idle timeout interval, rekey does not occur and the SSH session is terminated after reaching the rekey interval. Workaround: Configure the SSH idle timeout to be less than the SSH rekey time interval.
xos0063288	SSH sessions from Putty to a switch do not timeout based on the SSHv2 idle timeout value set with the <code>configure ssh2 idletimeout</code> command if the value is greater than the "Max Minutes before rekey" value configured in Putty settings. Workaround: Set an idle timeout using the <code>configure idletimeout minutes</code> command (enabled by default for 20 minutes) on the switch, or set the SSHv2 idle timeout value using the <code>configure ssh2 idletimeout</code> command on the switch, or set the rekey interval in the Putty client accordingly.
VXLAN	
xos0068839	Enabling IP-forwarding on an a VXLAN-based VLAN interface should also have fabric enabled. Multicast routing with PIM-DM does not function with fabric-based VXLAN, which relies on the BUM replication method already in place.

Resolved Issues in ExtremeXOS 22.4.1-Patch1-2

The following issues were resolved in ExtremeXOS 22.4.1-Patch1-2. ExtremeXOS 22.4.1-Patch1-2 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, and ExtremeXOS 22.4. For information about those fixes, see the release notes for the specific release.

Table 8: Resolved Issues, Platform-Specific, and Feature Change Requests (CRs) in 22.4.1-Patch1-2

CR Number	Description
General	
xos0070546	If the configured web-redirect server IP address has a zero octet, all octets after the zero octet appear as zero as well in the redirect packet. For example, 10.10.0.10 appears as 10.10.0.0 on the client.
xos0070547	If a policy profile has web-redirect configured with tci-overwrite set to disabled, web redirects do not work.
xos0070635	Switch configurations made through Extreme Management Center or SNMP do not persist through a reboot.
xos0070716	Traffic is not forwarded when configuring two-stage ACL with action modifier add-vlan-id as VLAN filter.

Resolved Issues in ExtremeXOS 22.4

The following issues were resolved in ExtremeXOS 22.4. ExtremeXOS 22.4 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, and ExtremeXOS 22.3. 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 22.4

CR Number	Description
General	
xos0054568	ESVT fails to function with jumbo-sized loopback frames. The "show esvt traffic-test" output indicates the test completed successfully, but no frame counts are indicated.
xos0062785	Need a mechanism to avoid configuring static route gateway and local IP as the same.
xos0065833	Deleting user account causes ExtremeXOS to end unexpectedly with the message: "Process aaa pid 2251 died with signal 5".
xos0066935	Files are not deleted in standby nodes after removing files in master node which was created through "save" operation.
xos0066960	Setting a rate limit value, and then resetting back to default, does not return traffic back to 100% throughput. Traffic stops completely instead.
xos0067067	Need the ability to change a LAG's algorithm after LAG creation.
xos0067587	When running show tech-support command with user-created VRs, show configuration command does not display full configuration.

Table 9: Resolved Issues, Platform-Specific, and Feature Change Requests (CRs) in 22.4 (continued)

CR Number	Description
xos0067726	BOOTPRelay currently supports up to 4 servers per VR and 4 servers per VLAN. Need to increase support to up to 8 servers.
xos0067745	On ExtremeSwitching X690 and X870 series switches, "Rx Pkts Count" does not increment as shown in the command <code>show port statistics</code> when the L2 frame has EtherType as "none".
xos0068304	External PSU status appears as "failed" in "show power" command output even though it is not present.
xos0068323	In ExtremeXOS Python scripting, the argument sent to the command <code>Exsh.clicmd</code> is replicated 24 times.
xos0068810	SNMP walk on <code>entPhysicalClass</code> returns <code>Other(1)</code> instead of <code>Fan(7)</code> for fan trays.
xos0068888	When the command <code>show tech-support all detail</code> is executed after running <code>enable cli-config-logging</code> , messages beginning with "serial unknown" appear in the log. This issue also occurs when executed from a Telnet session.
xos0068902	On ExtremeSwitching X440-G2, X620, Summit X46-0G2 series switches, and SummitStack, <code>configure port preferred medium copper</code> on a disabled combo port makes its peer end active.
xos0069058	LACP packets are sent with VLAN tag 0 from backup node on a SummitStack.
xos0069070	The process <code>BCMASync</code> stops processing with scaled route/ARP entries in hash table.
xos0069094	Unable to run the command <code>unconfigure switch all</code> on ExtremeXOS virtual machines.
xos0069114	The <code>show configuration</code> command output displays additional word "minutes" under "aaa" module when lockout-time-period is configured.
xos0069150	In the output of the <code>show vlan</code> command, ports can have both "!" and "*" flags set if the port is a share group port.
xos0069196	Inconsistent port learning flag appears in HAL with PVLAN and MLAG configuration.
xos0069206	After Enabling NTP on a VLAN, if the VLAN name is changed, the change is not reflected in <code>show ntp</code> .
xos0069210	Unable to create private VLAN with 32-character name if the first 31 characters match an existing private VLAN name.
xos0069450	Unable to filter link up/down log events based on port number.
xos0069580	The command <code>show configuration bfd</code> shows <code>enable bfd vlan</code> even though it is not explicitly enabled.
xos0069604	The process <code>rtmgr</code> ends unexpectedly with signal 11 after running "disable/enable ospf" in peer switch.
xos0069622	Process <code>devmgr</code> signal 11 crash occurs when executing <code>debug cfmgr</code> command.
xos0069691	EXOS-VM displays <code>coreDumpWrite failed</code> error during bootup.
xos0069808	Kernel crash occurs when processing a IGMP packet with an invalid IP header length.
xos0069823	The output of the <code>show fan</code> command reports 0 RPM for other stack node's fans intermittently.

Table 9: Resolved Issues, Platform-Specific, and Feature Change Requests (CRs) in 22.4 (continued)

CR Number	Description
xos0066721	The command <code>configure vlan untagged-ports auto-move</code> needs to have inform as the default.
SummitStack	
xos0057915	A SummitStack booted from factory default configuration (particularly after <code>unconfigure switch all</code> with no default or autoexec scripts) has the backup node with ports configured.
xos0058419	After rebooting a stack, error messages similar to the following appear for ports belonging to LAGs: <code>Erro:cm.sys.actionErr> Slot-2: Error while loading "ports": Speed change is not allowed on port 2:6 as it is a trunk member port.</code>
xos0067001	With IPv4 bi-directional traffic forwarded, rebooting the backup node causes the switch to stop responding and the message "Process epm pid 1393 died with signal 6" appears.
xos0068388	Unable to query objects in the <code>extremeStackMemberTable</code> and <code>extremeStackingPortTable</code> .
xos0068759	On Summit X460-G2 stacks, with IPv4 Unicast traffic, the backup node remains in the "present" state after rebooting.
xos0069761	Telneting to another slot does not work if the current logon user name has 6 or more greater characters.
xos0070043	In SummitStacks, backup nodes are frequently rebooted during SNMP updates.
ExtremeSwitching X440-G2 Series Switches	
xos0062256	When auto-polarity is turned off, link comes up for straight cable rather than crossover connection.
xos0068490	On ExtremeSwitching X440G2-48P/48t switches, cable diagnostic script (<code>cablediag.py</code>) does not work.
xos0068737	PTPv2 packets are duplicated and egress at twice the incoming rate after enabling GTP on the ingress ports.
ExtremeSwitching X690 Series Switches	
xos0067675	EEE does not work on ExtremeSwitching X690-48t switches.
xos0067933	On ExtremeSwitching X690 series switches, the following behavior occurs when setting autonegotiation: <ul style="list-style-type: none"> • If you enable autonegotiation on a single port without specifying the advertised speed, the port is set to only advertise at 40Gb. • If you enable autonegotiation on multiple ports without specifying the advertised speed, the second port listed is only set to advertise at 40Gb, so the ports come up at 40Gb. • If you enable autonegotiation and specify the port speed, the port advertises both 40Gb and 100Gb.
xos0068870	BX40-D) transceivers, <code>show port configuration</code> display a media type of "NONE".

Table 9: Resolved Issues, Platform-Specific, and Feature Change Requests (CRs) in 22.4 (continued)

CR Number	Description
xos0068871	When using the OE Solutions RBT12SVX-IT4 (MGBIC-BX120-U) and RBT12SVX-IT5 (MGBIC-BX120-D) transceivers, media type appears as "NONE" when issuing the <code>show port configuration</code> command.
xos0068971	On ExtremeSwitching X690 series switches, port 72 configured for 25G does not link up with autonegotiation turned on.
ExtremeSwitching X620 Series Switches	
xos0068344	On ExtremeSwitching X620 series switches, fiber combo ports do not come up when the preferred medium copper link is down.
xos0068874	On ExtremeSwitching X620 series switches, when using optic "SPG-DR-LX-IDFC-EX" from Source Photonics if auto-negotiation is turned "on" there is a traffic issue.
xos0069916	For ExtremeSwitching X620-10x, switches, frequent link flaps occur on 1m passive copper cable when connected with an Intel NIC card.
Summit X670-G2 Series Switches	
xos0068353	For Summit X670-G2 series switches acting as a VRRP master, SSH session is not established for some prefixes after upgrading to ExtremeXOS 22.2.
Summit X770 Series Switches	
xos0068553	The ARP learning rate on the Summit X770 series switches has decreased starting with ExtremeXOS 22.2 due to code infrastructure changes.
xos0069068	On Summit X770 and X670-G2 series switches with IPv4 forwarding enabled and more than 32 ARPs, IPv4 unicast traffic destined to IPv4 addresses residing on port number 64 or higher may be dropped.
xos0069487	HAL process ends unexpectedly with signal 6 when switch boots up with PTP configurations.
ExtremeSwitching X870 Series Switches	
xos0069072	On ExtremeSwitching X870 series switches, traffic ingressing ISC ports get forwarded on MLAG ports if ports are between 91-96.
Summit X460-G2 Series Switches	
xos0069051	After 65,000 new FDB entries are learned, subsequent entries are continuously added and deleted.
xos0069998	
ACL	
xos0048459	The following notification do not appear for all platforms while refreshing the policy. <Noti:ACL.Policy.TotChanges> Policy:smart refresh:tmp_3198. Total number of changes 1.
xos0069576	Memory leak occurs in Policy process when flapping the interface.
BGP	
xos0067757	After disabling BGP, and then executing <i>disable bgp neighbor all</i>, switch becomes unresponsive.
Identity Management	

Table 9: Resolved Issues, Platform-Specific, and Feature Change Requests (CRs) in 22.4 (continued)

CR Number	Description
xos0066783	Using IDMgr, UPM, and Policy combination makes client not reachable until IDMgr settles down.
MLAG	
xos0066886	Continuously, restarting MLAG ports causes brief loops.
MPLS	
xos0059159	An error message (EMS) is required when H-VPLS is down due to no pseudowire status support.
xos0068785	L2PT packets fail to switch over to backup path during failover.
xos0069696	Traffic is not forwarded in VPLS tunnel after disable/enable sharing on VMAN CEP ports.
xos0069800	After ESRP failover L2VPN session remain in signaling state with ESRP VPLS redundancy enabled.
NetLogin	
xos0065868	With scaled NetLogin entries in policy mode, with convergence endpoint enabled, executing any show commands causes switch to stop responding.
Optics	
xos0057140	Transceiver information for 40G Q+SR4 optic module shows invalid power and threshold values.
xos0067434	On ExtremeSwitching X440-G2 and X620 series switches, link flaps occur when inserting/removing the following optics: AFBR-709SMZ-EX1, AFCT-739SMZ-EX1, FTLX8574D3BCL-EX.
xos0067489	Link flaps occur when optic is removed, and then re-inserted, and after reboots.
xos0069737	The thresholds and status values shown in the command <code>show ports transceiver information detail</code> are not calculated properly for ExtremeSwitching X690 and X870 series switches.
xos0069888	Transceiver DDMI threshold, status, and measurement values on the ExtremeSwitching X870 and X690 series switches are incorrectly calculated.
xos0069657	When using 100FX with phy optic in ExtremeSwitching X620 series switches, false linkups occur after reboot.
OSPF	
xos0066618	With OSPF enabled, the full length of long policy names do not appear in the output of <code>show policy</code> .
xos0068292	OSPF is not establishing session after deleting the policy and rebooting.
Policy	
xos0066415	When configuring the maximum limit of 512 for FDB entries, if 600 MAC addresses are sent all the 600 MAC addresses are getting learned though the total users authenticated is only 512 in <code>show netlogin</code> . Also, after disabling policy, the rules are not unconfigured properly.
xos0068687	Multicast traffic sent to host randomly stops after enabling OnePolicy with PVID 4095.

Table 9: Resolved Issues, Platform-Specific, and Feature Change Requests (CRs) in 22.4 (continued)

CR Number	Description
xos0070546	If the configured web-redirect server IP address has a zero octet, all octets after the zero octet appear as zero as well in the redirect packet. For example, 10.10.0.10 appears as 10.10.0.0 on the client.
Security	
xos0067280	Uploading a file using SFTP creates a read-only file on the switch.
xos0069140	The following are ExtremeXOS vulnerabilities due to scripting allowed when in FIPS mode: Note: You must enable FIPS for this fix to take effect. <ul style="list-style-type: none"> • Escape from EXSH restricted shell (CVE-2017-14331) • Information disclosure (CVE-2017-14327) • Privilege Escalation (root interactive shell) (CVE-2017-14329) • Privilege Escalation (root interactive shell) (CVE-2017-14330) The following are additional ExtremeXOS vulnerabilities: <ul style="list-style-type: none"> • Denial-of-service (CVE-2017-14328). • Session hijacking (CVE-2017-14332).
xos0069180	Cannot configure some IP security features after removing and adding ports from VLANs.
xos0069418	Policy, Python, and script files cannot be overwritten using SFTP in WinSCP client.
xos0070303	In the <i>ExtremeXOS 22.4 User Guide</i> , a note regarding MAC lockdown with Dot1x needs to be added. MAC lockdown feature does not work on static FDB entries.
SNMP	
xos0061552	The ExtremeXOS SNMP client was adapted to work with Ridgeline, which had issues dealing with partial getbulk responses, so that you could either operate in standards-compliant mode or Ridgeline-compatible mode.
xos0062882	Whole MIB compilation gets stuck at EXTREME-V2-TRAP MIB.
xos0064666	ExtremeXOS can only return a limited set of values to indicate success or failure of the requested set/get operation, which is returned to the SNMP client as "commitFailed(14)".
xos0068767	Trap receiver configuration is not saved in ExtremeXOS when configured from Extreme Management Center.
xos0069715	Dynamically assigned IP addresses do not appear when an SNMP walk is done on OID 1.3.6.1.2.1.4.20 (IPAddrTable).
xos0069716	The IPAddrTable If index entry contains the Index value corresponding to the Rt-interface, and not to the corresponding VLAN interface.
SSH	
xos0069061	Exsshd process ends unexpectedly with signal 11 during stack failover.
xos0069329	Disabling the MAC cipher "3des" with command <code>configure ssh2 disable cipher 3des</code> appears as <code>configure ssh2 disable cipher 3des-cbc</code> in output of <code>show configuration exsshd</code> command.

Table 9: Resolved Issues, Platform-Specific, and Feature Change Requests (CRs) in 22.4 (continued)

CR Number	Description
xos0069424	The output of the command <code>show ssh2 private-key</code> actually shows the private key, which could be a security threat.
xos0069476	A custom user cannot SSH into the switch if agent forwarding is enabled.
STP	
xos0066518	LLDP packets are reflected back to the sender without echo kill in PVLAN.
xos0067824	STP BPDUs are continuously sent after enabling and disabling MSTP on an STP port.
xos0068911	After enabling STP auto-bind on a VLAN, removing all ports from the VLAN, and then adding them back, displays STP tag as "(none)" in the <code>show ports information detail</code> command.
xos0069755	Disabling an edge port incorrectly triggers a topology change.
xos0069318	When an ingress port is part of both tagged and untagged VLANs that are participating in MSTP, the BPDU is not processed.
VRRP	
xos0067270	VRRP flap occurs with CPU congestion.

4 ExtremeXOS Document Corrections

Cut-Through Forwarding Mode

This chapter lists corrections to the *ExtremeXOS 22.4 User Guide* and *ExtremeXOS 22.4 Command Reference Guide*.

Cut-Through Forwarding Mode

In the *ExtremeXOS User Guide* under the Chapter *Configuring Slots and Ports on a Switch > Configuring Ports on a Switch > Configuring Switching Mode—Cut-Through Switching* and in the *ExtremeXOS Command Reference* under the `configure forwarding switching-mode` command.

xos0070817

Add the following information:

Cut-through forwarding mode is supported only on the 40G ports of the Summit X770, X670-G2, and ExtremeSwitching X870, X690 series switches; and the 100G ports of the ExtremeSwitching X870 and X690 series switches.