

PUBLIC-INTEREST FINDING FOR PROPRIETARY-MATERIAL USE

ROUTE:VAR

PROJECTNO:VARDESNO:VAR

COUNTY:VAR

PROJECTDescription: Programmatic Approval.

FHWA OVERSIGHT: YES

Proprietary MATERIAL:

Ethernet Routing Switches (ERS), and Ethernet Switching Virtual Services Platform (VSP):

ERS 3626GTS-PWR+, VSP 7200, and VSP 8400.

Manufactured by Extreme Networks.

1. Description of Need:

The ITS Technology Deployment Division of the Indiana Department of Transportation is seeking approval for the equipment essential to the creation and maintenance of the INDOT ITS network.

Routers and routing switches are designed to join multiple area networks. On the INDOT network they serve as in intermediate destinations for network traffic: receive TCP/IP packets, look inside each packet to identify the source and target IP address, and direct packets accordingly. Multitude of configurations allows designer select model/configuration guarantying various functionalities.

Submitted equipment is direct replacement for the previously used and currently approved equipment, manufactured by Extreme Networks.

Required functionalities include:

- Provide unique addressing in the network using Internet Protocol address.
- Provide protection from unwanted intrusions of unauthorized users (firewall)
- Provide separation of multiple networks in one physical location.
- Provide creation of required back-bone multi-layer redundancy with minimal hardware.
- Provide ability to use for communication wireless or fiber optic devices.
- Provide wide range of the bandwidth.
- Support for the Shortest Path Bridging Protocol for interconnections

2. Product History: These devices have been chosen at the inception of the system approximately 15 years ago and since are the main part of each core (back-bone and TMC), field core (relay sites), and remote component. Over 700 of ERS and routers combined are currently being used in Indiana. They demonstrate very high reliability (over 96% uptime) and maintainability. Desired product is currently listed on INDOT Approved Materials List for Traffic Signal and ITS Control Equipment under ITS Networking Equipment. Testing was conducted according the ITM No. 950-IOP

Product Availability: ERS, manufactured by Extreme Networks, is only product on the market, meeting all requirements. Although there are routing switches and routers on the market providing unique IP addressing, firewall protection, and separation of multiple networks, none of them is capable of interfacing with existing network. There were no attempts by the manufacturers to present their

products to be tested to **ITM No. 950-IOP**. Google search for Ethernet Router Switch or Router returns multiple devices, meeting some of the requirements, but not all.

3. Product Cost: There is no equipment on the market to make cost comparison. The next closest product is the SSA-G1018-0652 suite priced at \$15,298.99. However, this product will not communicate with the existing field and core hardware.

4. Project Compatibility: Desired product is the only product on the market that is compatible with existing ITS hardware. Application matrix below describes which model can be used for which application. The lowest cost ERS model is being selected for any particular project based on the technology needs.

Function	Model		
	VSP 7200	VSP 8400	ERS 3626GTS-PWR+
Ethernet Routing Switch			x
Ethernet Switching Virtual Services Platform	x	x	
Unique IP addressing	x	x	x
Fire Wall Protection	x	x	x
Modular	x	x	
Stackable			x
Managing of large networks, high capacity, and high complexity.	x	x	x
Managing of sub-midsize networks	x	x	x
Managing Wide Area Networks (WAN)	x	x	
Cost (Dependent on configuration)			
Applications	Rack data Center Solution	MDF/IDF Core switching/ routing	Remote Sites

5. Maintenance: Desired equipment is designed such a way, that most of maintenance functions: monitoring up/down time, restoring functionality, updating/upgrading - can be done remotely, which drives down maintenance cost. Training is available on line in Wiki Notes, accessible for tech personnel from any location in Indiana. Low failure rate (less than 3% including "acts of God") and short order turnaround time results in the minimal storage requirement.

6. Engineering Analysis: This application is programmatic by nature and unique not to a specific ITS project, but to the ITS architecture that is already in place. ERS and SR are essential components that allow communication between TMC and core and field hardware. The specifications are needed for synchronization with existing system and not unique to the specific project.

7. **Expanded Economic Analysis:** Due to the fact, that there is no equipment on the market to do comparison life cycle analysis, it may be stated that actual yearly maintenance cost is low. The average life cycle of the ERS is evaluated as 10 years. There are units currently in service installed in 2005. Annual replacement rate, including damage done by lightning, is negligible. Replacement of ERS and SR is predominantly driven by technology progress, rather than wear.

8. **Contractual or Performance Implications:** Use of desired items does not impose any restrictions on the use of other items on the contracts.

9. **Attach Supplemental Documentation:**

Attached are:

- a) INDOT ITS Architecture;
- b) ITM # 950-1OP ITS Ethernet Switches.

10. **Length of Time that Approval is Effective:** 10/2018 until 10/2021

Prepared By: Konstantin Veygman

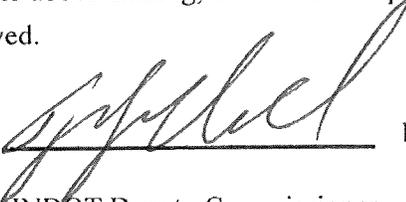
Field Engineer

INDOT-ITS Technology Deployment Division

Date: 10/05/2018

Based upon the above finding, the use of the proprietary material listed is in the public interest and is hereby approved.

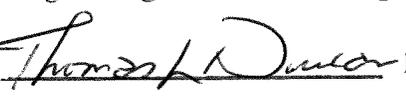
APPROVED:



Date: 10-11-18

INDOT Deputy Commissioner
Engineering Services and Design Support

APPROVED:



Date: 10/18/18

Federal Highway Administration

Highlights

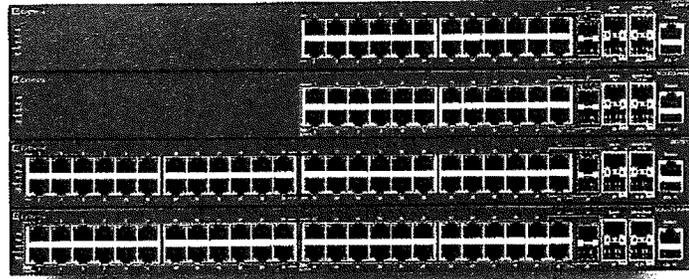
- High-performance Wiring Closet Switches
- Delivers Enabled Edge
- Static and Dynamic IP Routing
- - Non-blocking, wire-speed switching performance
- High-capacity Stackable Chassis architecture
- 24 or 48 ports of Gigabit Ethernet for Access connectivity
- 2 ports of 10 Gigabit Ethernet for Network Uplink connectivity
- 2 dual-use ports of 10 Gigabit for Stackable Chassis or Network Uplink connectivity
- Optional support for full-power PoE/PoE+

Benefits

- Ethernet Switches that are simple to operate
- Certified 1-Minute plug-and-play for IP Phones
- Auto Set-Up for Unified Communications
- Intelligent Stacking delivers Enterprise-class scalability
- Lifetime Warranty

Features and Capabilities

- Non-blocking, wire-speed
- Integrated design
- Feature-rich
- Extreme Stackable Chassis
- Extreme Fabric Attach
- Static and Dynamic IP Routing



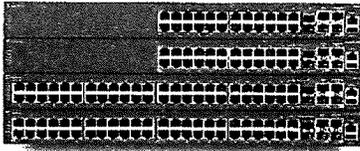
Ethernet Routing Switch 3600

Feature-rich Ethernet Switch platforms leveraging next-generation technology optimized for the Branch Office and smaller Wiring Closets. Extreme Networks Ethernet Routing Switch 3600 products sport the performance and agility to excel in conventional IP network deployments in addition to enabling the edge for Fabric-based solutions.

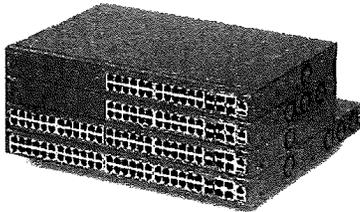
The new Ethernet Routing Switch 3600 products leverage the latest advances in network switching architecture design to maximize hardware performance and software capability. These products offer a significant evolutionary step for the entry-level Ethernet Routing Switch 3000 Series, particularly in terms of value and future-ready flexibility, and have been optimized for the Enabled Edge role.

The primary purpose of a network is to interconnect users with their applications, and the best networks do this reliably, efficiently, and with a high degree of agility. Extreme Networks' Fabric-based architecture empowers companies to extend the virtualized Ethernet Fabric beyond the Data Center, to the very edge of the network, delivering powerful integration of users, applications, and devices.

The new Ethernet Routing Switch 3600 (ERS 3600) products are an important part of this strategy, delivering Fabric Attach capabilities in a cost-effective form-factor. The ERS 3600 products can be deployed standalone, or configured as a Stackable Chassis system of up to eight units/400 ports, supported by up to 192Gbps of virtual backplane bandwidth.



ERS 3600 Stackable Chassis



Perspective View



ERS 3626GTS



ERS 3626GTS-PWR+



ERS 3650GTS



ERS 3650GTS-PWR+

Supporting modern Enterprise applications requires a flexible and highly reliable infrastructure, and the ERS 3600 products help deliver against this challenge. These are highly effective products, fit-for-purpose for conventional Routed IP connectivity requirements and future-ready for the evolving and emerging software-defined needs of tomorrow. Offering feature-rich support for both IP- and Fabric-based Edge networking gives businesses the flexibility to satisfy all common deployment scenarios, with the added advantage of an easy transitioning between the two.

Extreme Networks brings unique differentiation to the Branch Office and small-to-medium Wiring Closet role: with a flexible, non-blocking "Stackable Chassis" architecture. The proprietary Extreme Networks "Flexible Advanced Stacking Technology" (FAST) protocol – implemented over dedicated Quality-of-Service aware interfaces – enables a resilient, high-performance solution that leverages a shortest path algorithm to minimize transit hops in a multi-device configuration by providing active-active bi-directional traffic flows. The Extreme Networks Stackable Chassis technology can offer the same performance, resiliency, and ease of serviceability attributes of a traditional Chassis solution, but at a lower, pay-as-you-grow price point. Notable is the ability to swap-out an individual failed unit without the requirement to pre- or post-stage operating system software or configuration; providing equivalency to module replacement for a modular Chassis system.

The ERS 3600 products are purpose-built to support the demands of today's entry-level Wiring Closet with high-density, full-featured Gigabit Ethernet. It alleviates infrastructure complexity and reduces operational burden with a truly scalable and strategic architecture; it is designed to deliver a high-performance Enabled Edge solution that fully optimizes investments in next-generation application software.

Leveraging both next-generation hardware and software technology provides a solution that is ready to support both today's requirements and tomorrow's emerging needs. The ERS 3600 products enable businesses to future-proof with a highly software-definable network virtualization solution.

Product Overview

Broadly speaking, the Ethernet Routing Switch 3600 products provide a mix of Gigabit Ethernet ports for edge access and 10 Gigabit Ethernet ports for network uplinks. Model variants that support Power-over-Ethernet (PoE/PoE+) are also available, and all models feature a fixed, high-efficiency AC power supply. Two different port configurations are available: 26-port and 50-port models, each available in either a PoE or non-PoE format. The product range includes the following models:

- **ERS 3626GTS** - 24 x Gigabit RJ45 Access ports, including 2 x Combo Gigabit ports, plus 2 x 10 Gigabit SFP+ Uplink ports, and 2 x 10 Gigabit SFP+ dual-use Stack/Uplink ports
- **ERS 3626GTS-PWR+** - 24 x Gigabit RJ45 Access ports with PoE+, including 2 x Combo Gigabit ports, plus 2 x 10 Gigabit SFP+ Uplink ports, and 2 x 10 Gigabit SFP+ dual-use Stack/Uplink ports
- **ERS 3650GTS** - 48 x Gigabit RJ45 Access ports, including 2 x Combo Gigabit ports, plus 2 x 10 Gigabit SFP+ Uplink ports, and 2 x 10 Gigabit SFP+ dual-use Stack/Uplink ports
- **ERS 3650GTS-PWR+** - 48 x Gigabit RJ45 Access ports with PoE+, including 2 x Combo Gigabit ports, plus 2 x 10 Gigabit SFP+ Uplink ports, and 2 x 10 Gigabit SFP+ dual-use Stack/Uplink ports

The product's proven design leverages a sophisticated chipset from the industry's leading supplier, featuring high-performance switching and frame forwarding. The switching core is designed to deliver wire-speed capabilities, with a fully integrated ASIC architecture that facilitates hardware-assisted feature execution.

26-port models - ERS 3626GTS and ERS 3626GTS-PWR+ - feature 24 access ports of 1000BASE-T Gigabit Ethernet with RJ45 interfaces; these ports also support 10/100Mbps connectivity. Two of these ports are configured in combination with SFP sockets for flexible use as Gigabit uplinks. Two SFP+ interfaces provide 10 Gigabit network uplink connectivity. There are also two additional interfaces that can be used for either Stackable Chassis virtual backplane links or additional network uplinks.

50-port models - ERS 3650GTS and ERS 3650GTS-PWR+ - feature 48 access ports of 1000BASE-T Gigabit Ethernet with RJ45 interfaces; these ports also support 10/100Mbps connectivity. Again, two SFP+ interfaces provide 10 Gigabit network uplink connectivity. There are also two additional interfaces that can be used for either Stackable Chassis virtual backplane links or additional network uplinks.

The ERS 3600 models use of 10 Gigabit ports for Stackable Chassis connectivity delivers QoS-aware, high-speed connections that enable a resilient, high-performance hardware virtualization solution. This leverages a shortest path algorithm to minimize transit hops in a multi-device configuration and supporting active-active bi-directional traffic flows.

Power-over-Ethernet models - ERS 3626GTS-PWR+ and ERS 3650GTS-PWR+ - support full Standards-compliant IEEE 802.3af/802.3at PoE/PoE+ delivering up to 30W per port to power IP Phones, Wireless Access Points, networked IP CCTV Cameras, and other converged devices. A PoE power budget of 720W is available for the PWR+ models, delivering the following:

ERS 3626GTS-PWR+ - supporting all 24 access ports at up to 30W

ERS 3650GTS-PWR+ - supporting 24 access ports at up to 30W, or 48 ports at up to 15W, or a variable mix of the two

Benefits

The ERS 3600 products add significant flexibility to an Enterprise's networking capability. Deployed with other Extreme Networks or third party Ethernet Switch devices, the ERS 3600 products provide high-capacity, high-performance connectivity solution for Branch Office and small-to-medium Wiring Closet applications.

The ERS 3600 products deliver key Enterprise-class benefits, including:

Always-On - Stackable Chassis delivers a best-in-class high-availability solution, featuring hot-swappable unit replacement.

Convergence-Ready – support for PoE/PoE+, optimized for high-definition video surveillance, true plug-and-play capabilities for communications, collaboration, and engagement deployments, and advanced QoS capabilities.

Powerful – wire-speed performance, truly scalable virtual backplane capabilities, delivering up to 192Gbps of throughput to support large-scale deployments.

Highly Secure – Standards-based 802.1X Network Access Control can also be integrated with Extreme Networks's award-winning Identity Engines technology for centralized, policy-based authenticated network access.

Flexibility and Agility – best-in-class pay-as-you-grow scalability, versatile PoE/PoE+ support, and 1/10 Gigabit network uplinks.

Fabric-Enabled – supporting Extreme Networks's Fabric Attach technology to empower a seamless transition to an agile, software-defined virtualized networking solution.

Energy Efficient – focusing on end-to-end energy efficiency, dynamic Energy Saver further reduces power consumption for both the Ethernet Switch (ranging 8-17%) and IP Phones without impacting service availability.

System Compatibility

From an operating system software perspective, the ERS 3600 products are being introduced via the BOSS 6.0 release; therefore, this will be the minimum level of system software required to operate the Switches.

This release also delivers a number of major software enhancements:

- Extreme Networks Fabric Attach - delivering zero-touch Edge provisioning for unattended and IoT devices
- RIP v1/v2 Dynamic IP Routing
- DHCPv6 Guard
- Multicast Listener Discovery v1/v2 Snooping & Proxy
- IPv6 features, including First-Hop Security, Neighbor Discovery Inspection, Source Guard, and Router Advertisement Guard

Features and Capabilities

- Non-blocking, wire-speed switching architecture.
- Integrated design that is optimized for low latency and high Quality-of-Service (including QoS-aware Stackable Chassis interfaces).
- Feature-rich support for conventional VLAN, Multi-Link Trunking, Spanning Tree technologies.
- Extreme Networks Stackable Chassis technology supporting scalability up to 8 units/400 ports, and Auto-Unit Replacement for Software Image and Configuration.
- Extreme Networks Fabric Connect technology support for Fabric Attach.
- Static, Non-Local IP Routing, and RIP Dynamic IP Routing.

Warranty

- Lifetime Hardware Warranty, providing Next Business Day shipment of replacement hardware.
- Lifetime Software Warranty, providing access to Updates and Upgrades.
- Lifetime Basic Technical Support.
- 90-Day Post-Purchase Advanced Technical Support.

Software Licensing

- Base Software License, included with hardware purchase enables all software features.

Country of Origin

- China (PRC)

Specifications

General

- Physical Connectivity:
 - 1000BASE-T Access Ports (supporting both Half- and Full-Duplex)
 - 1000BASE-SFP Combo Network Uplink Ports
 - 10GBASE-SFP+ Network Uplink Ports
- Switching Fabric:
 - 128Gbps (Full-Duplex) for 26-port models
 - 188Gbps (Full-Duplex) for 50-port models
- Frame Forwarding:
 - 95Mpps for 26-port models
 - 130Mpps for 50-port models
- Nominal Latency: 3.5 microseconds for 64 Byte packets
- Nominal Jitter: 0.84 microseconds for 64 Byte packets
- Frame Length: 64 to 1518 Bytes (Untagged), 64 to 1522 Bytes (Tagged)
- Jumbo Frame: up to 9,216 Bytes (802.1Q Tagged)
- Stackable Chassis Throughput: 24Gbps (Full-Duplex) per Switch, up to 192Gbps

Layer 2

- MAC Address: up to 16,000
- Port-based VLANs: 256
- MSTP Instances: 8
- MLT/LACP Groups: 6
- Links per MLT/LACP Group: 4
- DHCP Snooping Entries: up to 512
- 802.1X Clients: 32 per Port
- LLDP Neighbors: up to 816

Layer 3 IPv4 Routing Services

- ARP Entries: up to 512
- Static ARP Entries: up to 256
- IP Interfaces: up to 64
- IP Routes: up to 256
- IP Static Routes: up to 32
- IP Route Policies: up to 64
- RIP Interfaces: up to 16
- RIP Routes: up to 256

Multicast

- IGMP Enabled VLANs: 256
- IP Multicast Groups: up to 248

QoS & Filtering

- QoS Precedences: 8
- QoS Filters per Switch: 256 per Precedence

Operations & Management

- Port Mirroring Instances: 1, Many-to-One supported
- RMON Entries per Port: 4 Groups
- Auto-MDIX Detection
- Enterprise Device Manager GUI, on-box & off-box

Support Transceivers

- 10GBASE-LRM SFP+ (AA1403017-E6), up to 220m over FDDI-grade MMF
- 10GBASE-SR/SW SFP+ (AA1403015-E6), up to 300m over MMF
- 10GBASE-LR/LW SFP+ (AA1403011-E6), up to 10km over SMF
- 10GBASE-ER/EW SFP+ (AA1403013-E6), up to 40km over SMF
- 10GBASE-ZR/ZW SFP+ (AA1403016-E6), up to 80km over SMF
- 10GBASE-CX (AA1403019-E6) Dual-Attach Cable, up to 3m over Twinax
- 10GBASE-CX (AA1403020-E6) Dual-Attach Cable, up to 5m over Twinax
- 10GBASE-CX (AA1403021-E6) Dual-Attach Cable, up to 10m over Twinax

Note

SFP+ sockets are also capable of supporting a wide range of 1 Gigabit Ethernet Transceivers; please refer to the product documentation for complete details.

For a complete listing of all specifications and compliance please refer to the product documentation.

Physical Specifications			
Height: 44 mm	Width: 440 mm	Depth: 280 mm, except 380mm for 3650GTS-PWR+	Weight: 3.5-6.3 kg

Power Specifications	
ERS 3626GTS	<ul style="list-style-type: none"> • Up to 24.78W, up to 0.24A, and up to 84.55BTU/hr @ 200-240VAC • Up to 24.60W, up to 0.42A, and up to 83.94BTU/hr @ 100-110VAC • 14.82W power consumption at idle, and 18.28W under typical traffic load
ERS 3626GTS-PWR+	<ul style="list-style-type: none"> • Up to 828.69W, up to 3.66A, and up to 360.61BTU/hr @ 200-240VAC • Up to 874.92W, up to 7.05A, and up to 518.35BTU/hr @ 100-110VAC • 26.66W power consumption at idle, and 30.17W under typical traffic load (excluding PoE draw)
ERS 3650GTS	<ul style="list-style-type: none"> • Up to 41.54W, up to 0.41A, and up to 141.73BTU/hr @ 200-240VAC • Up to 41.77W, up to 0.69A, and up to 142.52BTU/hr @ 100-110VAC • 27.89W power consumption at idle, and 35.50W under typical traffic load
ERS 3650GTS-PWR+	<ul style="list-style-type: none"> • Up to 858.16W, up to 3.79A, and up to 409.64BTU/hr @ 200-240VAC • Up to 903.51W, up to 8.21A, and up to 559.26BTU/hr @ 100-110VAC • 39.84W power consumption at idle, and 46.11W under typical traffic load (excluding PoE draw)

Environmental Specifications	
Operating Temperature:	0°C to 50°C (32°F to 122°F)
Storage Temperature:	-40°C to 70°C (-40°F to 158°F)
Operating Humidity:	0 to 95% maximum relative humidity, non-condensing
Storage Humidity:	10 to 95% maximum relative humidity, non-condensing
Operating Altitude:	0 to 3,048m (0 to 10,000ft) maximum Storage altitude: 0 to 12,192m (0 to 40,000ft) maximum
Acoustic Noise:	<ul style="list-style-type: none"> • Less than 47dba at 25°C • Less than 55dba at 50°C

Safety Agency Approvals

- IEC 60950 International CB Certification
- EN 60950-1 Europe Safety (CE): CB Scheme Certification with Member Deviations
- UL 60950-1 USA Safety
- CSA-C22.2, #60950-1 Canada Safety
- NOM Mexico Safety
- EN 60950-1 Japan Safety
- Anatel Brazilian Safety
- ACMA-RCM Australia Safety
- Customs Union/EAC Safety of Low-Voltage Equipment Certification
- CCC & MIIT China Safety
- CNS 14336-1 Taiwan BSMI Safety
- UL 1069 Hospital Signaling and Nurse Call Equipment (relevant to PWR units only)

Electromagnetic Emissions and Immunity

- CISPR 22 International EMC Emissions
- CIRPR 24 International EMC Immunity
- FCC part 15B, Class A USA EMC Emissions
- CES-003 Class A Canadian EMC Emissions
- VCCI Japan EMC Emissions
- EN 55022 Class A, CISPR 22 European EMC Emissions (CE)
- EN 55024, CISPR 24 including EN 61000-4-2, 4-3, 4-4, 4-5, 4-6, 4-8 & 4-11 European EMC Immunity (CE)
- ACMA-RCM Mark
- Australia EMC Emissions
- Anatel Brazilian EMC Certification
- Customs Union/EAC EMC Certification
- CCC & MIIT China EMC Certification
- KC mark: EMI & EMS Korean EMC Certification
- CNS 13438 Taiwan BSMI EMC

MTBF Values

- ERS 3626GTS - 336,851 hours (38.45 years)
- ERS 3626GTS-PWR+ - 136,469 hours (15.57 years)
- ERS 3650GTS - 346,169 hours (39.51 years)
- ERS 3650GTS-PWR+ - 140,827 hours (16.07 years)

Ordering Information

Part Code	Description
AL3600A05-E6	ERS 3626GTS 26-port Ethernet Switch, supporting 24 x 1000BASE-T, including 2 x 1000BASE-SFP Combo, 2 x 10GBASE-SFP+ Uplink ports, & 2 x 10GBASE-SFP+ dual-use Stack/Uplink ports. Includes Base Software License.
AL3600A15-E6	ERS 3626GTS-PWR+ 26-port Ethernet Switch, supporting 24 x 1000BASE-T PoE/PoE+, including 2 x 1000BASE-SFP Combo, 2 x 10GBASE-SFP+ Uplink ports, & 2 x 10GBASE-SFP+ dual-use Stack/Uplink ports. Includes Base Software License.
AL3600A06-E6	ERS 3650GTS 50-port Ethernet Switch, including 2 x 1000BASE-SFP Combo, 50-port Ethernet Switch, supporting 48 x 1000BASE-T, including 2 x 1000BASE-SFP Combo, 2 x 10GBASE-SFP+ Uplink ports, & 2 x 10GBASE-SFP+ dual-use Stack/Uplink ports. Includes Base Software License.
AL3600A16-E6	ERS 3650GTS-PWR+ 50-port Ethernet Switch, supporting 48 x 1000BASE-T PoE/PoE+, including 2 x 1000BASE-SFP Combo, 2 x 10GBASE-SFP+ Uplink ports, & 2 x 10GBASE-SFP+ dual-use Stack/Uplink ports. Includes Base Software License.
700512588	ERS 3600 Passive Stacking Cable 0.5m.
700512589	ERS 3600 Passive Stacking Cable 1.0m.

Note: Power cord is not included and must be ordered separately. For a list of available power cords, please refer to "Lifecycle Notification on ERS Power Cord Models" at: <http://bit.ly/2Gz2csk>

Additional Information

For further information about Extreme Networks Ethernet Switches, and the complete Extreme Networks Networking portfolio, please visit www.extremenetworks.com.



<http://www.extremenetworks.com/contact> / Phone +1-408-579-2800

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Highlights

- High-performance 10/40 Gigabit Ethernet Switch
- 48 ports of 10 Gigabit Ethernet connectivity
- 6 ports of 40 Gigabit Ethernet for flexible Uplink or Distributed Top-of-Rack connectivity
- Non-blocking, wire-speed switching architecture
- Integrated design that is optimized for low latency
- Efficient compact form-factor that reduces power and footprint consumption
- Supports both conventional Routed IP and/or Fabric-based networking deployments



ExtremeSwitching™ Virtual Services Platform 7200 Series

Overview

The Extreme Virtual Services Platform 7200 Series are space-efficient, high-performance Ethernet switches, delivering wire-speed 10 and 40 Gigabit Ethernet connectivity.

They are ideally suited to deliver high-speed Ethernet connectivity in a Top-of-Rack (ToR) role. Additionally, they provide a cost-effective 10 Gigabit Ethernet fan-out capability for existing Core Switch deployments, saving valuable ports and slots. Featuring dual, hot-swappable AC or DC power supplies and fans, the VSP 7200 is an important addition to a network manager's toolkit for creating always-on high-performance solutions.

The VSP 7200 series comes in 4 variants:

- 7254XSQ with 48 x 10 Gigabit SFP+ ports, plus 6 x 40 Gigabit QSFP+ ports
- 7254XSQ port-licensed model with 24 x 10 Gigabit SFP+ ports and 4 x 40GB QSFP+ ports initially enabled for operation
- 7254XTQ with 48 x 10BASE-T copper ports, plus 6 x 40 Gigabit QSFP+ ports
- 7254XTQ port-licensed model with 24 x 10GBASE-T ports and 4 x 40GB QSFP+ ports initially enabled for operation

VSP 7200 port-licensed models have the same physical configuration as non-port licensed models and can later be upgraded to the full port capacity of the unit – offering a flexible pay as you grow option for your deployment.

The VSP 7200 also offers both front-to-back and back-to-front airflow options providing flexibility to conform to a variety of hot-aisle/cold-aisle design requirements.

Extreme Distributed Top-of-Rack: Creating the Latency-Reduced Network

The VSP 7200 is an integral component of our Fabric Connect strategy for end-to-end Shortest Path Bridging-based virtualized network. We are able to leverage the Fabric Connect technology to flexibly mesh multiple VSP 7200s to deliver multi-hop, low-latency for deployment scenarios that call for massive scale-out.

Extreme has architected the Distributed ToR solution to scale up to many hundreds of Switches within a single domain, with the current implementation supporting up to 512 Switches networked as a single logic Fabric. This capability delivers scale of up to 24,576 wire-speed 10 Gigabit Ethernet ports, and up to 3,072 ports of 40 Gigabit, equating to a virtual backplane capacity of 122.88Tbps. An agile building-block approach delivers extreme flexibility, with no hard-and-fast topology constraints; blocks can be small or large, and individual Switches easily interconnected with extended-reach copper or fiber cabling.

Extreme Switch Cluster: Improving Resiliency, Enhancing Availability

Extreme Networks' Switch Cluster is a pioneering high-availability technology. Creating a single, unified, logical Core from two physically independent Switches—clustering them — ensures that no one single point-of-failure can disrupt dual/multi-homed connectivity.

The Switch Cluster technology is built using the Split Multi-Link Trunking protocol that is unique to our products, yet is fully interoperable with third party Switches, Servers, Appliances, and Routers.

Extreme's Switch Cluster technology delivers a level of network resiliency that also facilitates in-service maintenance. The deterministic nature of Switch Cluster empowers network operators to compartmentalize the network, making essential services even more resilient, and allowing for individual failures to be repaired in real-time, without service restoration work impacting on collateral components or applications.

Extreme Fabric Connect: Replacing Complexity with Capability

Traditionally, to provision new services or to change existing ones, engineers are required to touch every device in the service path, configuring every device to enable both the active and redundant links. The bigger the network the more complex and risky this becomes.

The Extreme Fabric Connect technology is based on an extended implementation of the Shortest Path Bridging (SPB) standards of IEEE 802.1aq and IETF RFC 6329, augmented with custom enhancements that deliver Enterprise-specific optimization. It offers the ability to create a simplified network that can dynamically virtualize elements to empower efficient provisioning and utilization of resources. This can reduce the strain on the network and IT personnel.

Fabric Connect has garnered a well-earned reputation for simplifying how networks are built and improving how they are run. Independent research¹ reports that Fabric Connect deployments feature up to 91% less implementation time, up to 66% change less wait time, and an 85% reduction in both configuration and troubleshooting times. Similarly, Fabric Connect delivers enhanced resiliency, with failover times more than 2,500x better, and outages caused by human error virtually eliminated.

Extreme Fabric Attach: The Missing Link for Service Automation

Extreme has developed Fabric Attach, a standards-based capability that facilitates the automatic attachment of end-point devices. Businesses can leverage Fabric Attach to dynamically deploy end-points.

Fabric Attach streamlines the deployment of networking devices, compute resources and Internet of Things (IoT) end-point devices delivering substantial operational benefits. End-point devices can be deployed in real-time, without the need for IT intervention and manual configuration.

Replacing static network device configuration with dynamic programming reduces overall complexity in the network and has a corresponding benefit in reducing the risk of outage.

¹ Dr Cherry Taylor, Fabric Connect Customer Experience Research Report, Dynamic Markets, 2015. This report details quantitative and qualitative research with IT professionals in companies that have implemented Extreme Networks this technology.

Extreme Fabric Extend: Taking Benefits to a Broader Audience

With Extreme's Fabric Extend technology, businesses can fully integrate remote locations with the Fabric Connect cloud. Fabric Extend enables Fabric Connect connectivity across IP-based topologies such as MPLS and Optical Ethernet. Fabric Extend is a versatile technology that can deliver VLAN and VRF extension, Layer 2 and Layer 3 Hub-and-Spoke networking, and site interconnect for dispersed Campus and Data Center locations.

Fabric Extend is supported natively on VSP 7200, 8200 and 8400 Series products, as well as on the VSP 4000 Series when deployed in combination with the Extreme Open Networking Adapter. It provides flexible and scalable Fabric Connect extension over both private and provider IP infrastructures.

Management

The Extreme Networks VSP 7200 Series can be managed in a variety of ways. Simple on-box management functions are delivered by a web-based GUI and a generic CLI is also available for manual configuration. For centralized management of multiple devices, the Extreme Management Center delivers a comprehensive unified management capability.

This powerful appliance-based solution offers the following functionality:

- **Single Pane-of-Glass** - A fully integrated suite of tools working together to provide a comprehensive, unified view of the network, streamlining workflows and reducing operational costs.
- **Discovery and Visualization** - Providing rich network and device discovery and visualization capabilities. Includes the ability to discover network-attached devices, including servers, storage servers, switches, routers, phones, virtual machines and their hosts, plus Extreme Aura applications.
- **Fault and Diagnostics** - Leverages information collected from the network to determine the most likely cause of network outages, and correlates events to determine affected devices and services.

- **Configuration and Orchestration** - Facilitates even the most complex of network configurations through simplified, intuitive wizards and easy-to-use templates. Configuration templates are created once, stored, and then conveniently applied in order to accelerate time-to-service and reduce the risk of human error.
- **Virtualization Management** - Provides insight into the complete lifecycle of virtual machines - activation, migration, and retirement - including the automatic provisioning of those companion networking services needed to parallel VM migrations.
- **Performance Management** - Delivers tools to monitor, analyze and report application behaviors and their bandwidth utilization trends. Collected data gives valuable insight into traffic patterns, application behaviors, and top talkers. Performance management tools enable capacity planning and change monitoring.

System Compatibility

From a software perspective, the VSP 7200 Series was introduced with the VOSS 4.2 software release; this is, therefore, the minimum level of software available to operate the Switch. The recent VOSS 7.1 release delivers the following enhancements:

- Application Telemetry
- VXLAN Hardware VTEP Configuration and Management using OVSDDB

Application Telemetry is a unique feature of ExtremeAnalytics that enables the ExtremeSwitching infrastructure to participate in the forwarding and analysis of network application flows. By combining packet flow information from the VSP switch along with deep packet inspection abilities of ExtremeAnalytics, it provides actionable insights into network and application performance. This all without the need for expensive sensors or collectors. With this release, an Application Telemetry agent on the VSP can now work in tandem with ExtremeAnalytics to deliver this granular visibility into application performance, users, locations and devices.

Lifetime Warranty

Extreme includes industry-leading warranty services for the VSP 7200 Series products. We provide complimentary next-business-day shipment of failed units for the full life of the product; next-business-day shipping to replace failed hardware worldwide. Extreme also offers complimentary

basic technical support: Level 1 the supported lifecycle of the product and up to Level 3 for the first 90 days after purchase; this includes support for the shipped software version, with an optional Software Release Service available to provide access to new feature releases. As per industry norm for hardware, 'Lifetime' is defined as the production lifecycle phase, plus 5 years post-discontinuation.

Summary

The Extreme Virtual Services Platform 7200 Series is purpose-built to support the dynamic Data Center and high-density 10 Gigabit Ethernet Top-of-Rack deployments of today. It helps alleviate infrastructure complexity and can reduce power consumption with a truly scalable and strategic architecture; it is designed to be the high-performance Top-of-Rack platform for the future.

Supporting mission-critical applications requires 24/365 always-on infrastructure, and the VSP 7200 delivers against this challenge. It is a highly strategic product that is fit-for-purpose for today's connectivity requirements and future-

ready for the evolving and emerging application-driven needs of tomorrow.

Extreme brings unique differentiation to the ToR role: with a flexible, non-blocking architecture, including wire-speed Server access connections and high-speed Distributed Top-of-Rack connections. The VSP 7200 is purpose-built to support today's dynamic Data Center operations and high-density, low-latency 10 Gigabit Ethernet Top-of-Rack deployments. It can alleviate infrastructure complexity and reduce power consumption with a truly scalable and strategic architecture; it is designed to deliver a high-performance Distributed Top-of-Rack solution that fully optimizes next-generation application virtualization investments.

Additional Information

For further information about the Extreme Virtual Services Platform 7200 Series please visit www.extremenetworks.com/products, and for the complete Extreme Networking portfolio, www.extremenetworks.com/networking.

VSP 7254XSQ

The Extreme Virtual Services Platform 7254XSQ Ethernet Switch provides a total of 54 ports, configured as 48 ports of 10 Gigabit Ethernet, presented as SFP+ sockets, and 6 ports of 40 Gigabit Ethernet, presented as QSFP+ sockets.

The innovative design leverages an advanced chipset, featuring 2.56Tbps of switching and 1,428Mpps of frame forwarding performance.

It should be noted that the 40 Gigabit Ethernet QSFP+ ports support Channelization and can therefore be individual sub-divided into four 10 Gigabit Ethernet channels. Additionally, the 10 Gigabit Ethernet SFP+ ports also support a wide range of 1 Gigabit Ethernet SFP Transceivers.²

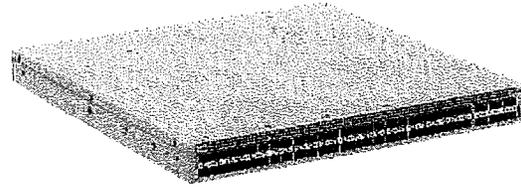
Benefits

The VSP 7254XSQ adds significant flexibility to the Extreme Networking portfolio, and is compatible, with and complementary to, with existing products and technologies. The VSP 7254XSQ, when deployed with other Extreme or third party Ethernet Switches devices, provides a very high-capacity, high-performance connectivity solution.

The VSP 7254XSQ can be deployed as a Leaf/Top-of-Rack Switch in Spine/Leaf networks. Alternatively, it can serve as a 10GB Campus aggregation switch or even as a 10GB campus core solution for smaller networks. VSP 7254XSQ port-license models also offer flexible deployment and growth options.

The VSP 7254XSQ natively supports the Extreme Fabric Connect technology; key benefits that this technology delivers include:

- Makes the need to configure network-wide VLANs obsolete.
- Replaces multiple sequential legacy protocols with this one single unified technology.
- Totally removes the risk of network loops.
- Delivers the Edge-only provisioning model which seamlessly integrates with orchestration and automation.
- Fully optimizes all links and all devices enabling businesses to get the most out of infrastructure investments.



Features and Capabilities

- Non-blocking, wire-speed switching architecture.
- Integrated design that is optimized for low latency.
- Flexible table architecture delivers MAC, ARP, and IP Routing scalability.
- Feature-rich support for conventional VLAN, Multi-Link Trunking, Spanning Tree technologies.
- Support for IP Routing techniques including Static, RIP, OSPF, eBGP, BGP+, ECMP, DvR/VRRP, PIM-SM/SSM, and VRF. Additionally, supports Static, RIPng, OSPFv3, BGPv6 Peering, ECMP, VRRP, and VRF for IPv6 deployments.
- Extreme Distributed Top-of-Rack technology scales up to 512 nodes: supporting up to 24,576 ports of 10 Gigabit and up to 3,076 ports of 40 Gigabit, and a virtual backbone of up to 122.88Tbps capacity.
- Extreme Networks Fabric Connect technology supports L2 Virtual Service Networks (VSNs), Layer 3 Virtual Service Networks, Inter-VSN Routing, IP Shortcut Routing, IP Multicast-over-Fabric Connect, Fabric Attached Server, Fabric Extend, Switched UNI, and Zero-Touch Fabric Connect.
- Extreme Switch Cluster technology supports Triangle and Square configurations, with both Layer 2 and Layer 3 functionality.
- Enhanced Security Mode options.

High Availability Power and Cooling

- Up to 2 field-replaceable, hot-swappable AC or DC internal Power Supplies
- 3 field-replaceable Fan Modules, with both Front-to-Back and Back-to-Front airflow options supported

² VSP 7254XSQ features a "PHYless" design. The pros of PHYless include lower latency and lower power consumption; crucial in the context of the Data Center Top-of-Rack. The contra is that MACsec is not supported and that certain Pluggable Transceivers are not supported; please refer to the product documentation for complete details and a listing of all specifications and compliance.

Warranty

- Lifetime Next Business Day shipment of replacement hardware
- Lifetime Basic Technical Support
- 90-Day Advanced Technical Support

Software Licensing

- Base Software License, included with hardware purchase, enables most features with the exception of those specifically noted and enabled by the Premier Software License.
- Premier Software License, an optional accessory, enables the following features: Layer 3 Virtual Service Networks, DvR, VXLAN Gateway, and >24 VRFs.
- Port License, an optional accessory, fully enables all 10 and 40 Gigabit Ethernet interfaces on those units originally purchased as Port-Licensed. This license is independent of, and can be used in conjunction with, the Premier Software License.

Country of Origin

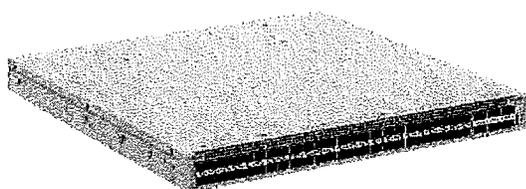
- China (PRC)
- Taiwan (for GSA models)

VSP 7254XTQ

The Extreme Virtual Services Platform 7254XTQ Ethernet Switch provides a total of 54 ports, configured as 48 ports of 10 Gigabit Ethernet, presented as RJ45 ports, and 6 ports of 40 Gigabit Ethernet, presented as QSFP+ sockets.

The innovative design leverages an advanced chipset, featuring 2.56Tbps of switching and 1,428Mpps of frame forwarding performance.

It should be noted that the 40 Gigabit Ethernet QSFP+ ports support Channelization and can therefore be individual sub-divided into four 10 Gigabit Ethernet channels. Additionally, the 10 Gigabit RJ45 ports also support 100/1000Mbps connectivity.



Benefits

The VSP 7254XTQ adds significant flexibility to the Extreme Networking portfolio, and is compatible, with and complementary to, with existing products and technologies, the VSP 7254XTQ, when deployed with other Extreme or third party Ethernet Switches devices, provides a very high-capacity, high-performance connectivity solution

The VSP 7254XTQ can be deployed as a Leaf/Top-of-Rack Switch in Spine/Leaf networks. Alternatively, it can serve as a 10GB Campus aggregation switch or even as a 10GB campus core solution for smaller networks. VSP 7254XTQ port-license models also offer flexible deployment and growth options.

The VSP 7254XTQ natively supports the Extreme Fabric Connect technology; key benefits that this technology delivers include:

- Makes the need to configure network-wide VLANs obsolete.
- Replaces multiple sequential legacy protocols with this one single unified technology.
- Totally removes the risk of network loops.
- Delivers the Edge-only provisioning model which seamlessly integrates with orchestration and automation.
- Fully optimizes all links and all devices enabling businesses to get the most out of infrastructure investments.

Features and Capabilities

- Non-blocking, wire-speed switching architecture.
- Integrated design that is optimized for low latency.
- Flexible table architecture delivers MAC, ARP, and IP Routing scalability.
- Feature-rich support for conventional VLAN, Multi-Link Trunking, Spanning Tree technologies.
- Support for IP Routing techniques including Static, RIP, OSPF, eBGP, BGP+, ECMP, DvR/VRRP, PIM-SM/SSM, and VRF. Additionally, supports Static, RIPng, OSPFv3, BGPv6 Peering, ECMP, VRRP, and VRF for IPv6 deployments.
- Extreme Distributed Top-of-Rack technology scales up to 512 nodes: supporting up to 24,576 ports of 10 Gigabit and up to 3,076 ports of 40 Gigabit, and a virtual backbone of up to 122.88Tbps capacity.
- Extreme Networks Fabric Connect technology supports L2 Virtual Service Networks (VSNs), Layer 3 Virtual Service Networks, Inter-VSN Routing, IP Shortcut Routing, IP Multicast-over-Fabric Connect, Fabric Attached Server, Fabric Extend, Switched UNI, and Zero-Touch Fabric Connect.
- Extreme Switch Cluster technology supports Triangle and Square configurations, with both Layer 2 and Layer 3 functionality.
- MACsec and Enhanced Security Mode options.

High Availability Power and Cooling

- Up to 2 field-replaceable, hot-swappable AC or DC internal Power Supplies
- 3 field-replaceable Fan Modules, with both Front-to-Back and Back-to-Front airflow options supported

Warranty

- Lifetime Next Business Day shipment of replacement hardware
- Lifetime Basic Technical Support
- 90-Day Advanced Technical Support

Software Licensing

- Base Software License, included with hardware purchase, enables most features with the exception of those specifically noted and enabled by the Premier Software License.
- Premier Software License, an optional accessory, enables the following features: Layer 3 Virtual Service Networks, DvR, VXLAN Gateway, >24 VRFs, and - where local regulations permit - MACsec³.
- Port License, an optional accessory, fully enables all 10 and 40 Gigabit Ethernet interfaces on those units originally purchased as Port-Licensed. This license is independent of, and can be used in conjunction with, the Premier Software License.

Country of Origin

- China (PRC)
- Taiwan (for GSA models)

³ MACsec is supported on the VSP 7254XTQ 10GBase-T ports only, not on 40Gb/s QSFP+ ports.

Standards Compliance

IEEE

- 802.1 Bridging (Networking) and Network Management
 - 802.1D MAC Bridges (a.k.a. Spanning Tree Protocol)
 - 802.1p Traffic Class Expediting and Dynamic Multicast Filtering
 - 802.1t 802.1D Maintenance
 - 802.1w Rapid Reconfiguration of Spanning Tree (RSTP)
 - 802.1Q Virtual Local Area Networking (VLAN)
 - 802.1Qbp Equal-Cost Multi-Path (Shortest Path Bridging)
 - 802.1Qcj Automatic Attachment to Provider Backbone Bridging (PBB) Services (Partial Support)
 - 802.1s Multiple Spanning Trees (MSTP)
 - 802.1v VLAN Classification by Protocol & Port
 - 802.1ag Connectivity Fault Management
 - 802.1ah Provider Backbone Bridges
 - 802.1aq Shortest Path Bridging (SPB) MAC-in-MAC
 - 802.1X Port-based Network Access Control
 - 802.1AB-2005 Station & Media Access Control Connectivity Discovery; aka LLDP (partial support)
 - 802.1AE Media Access Control Security
 - 802.1AX Link Aggregation
- 802.3 Ethernet
 - 802.3-1983 CSMA/CD Ethernet (ISO/IEC 8802-3)
 - 802.3i-1990 10Mb/s Operation, 10BASE-T Copper
 - 802.3u-1995 100Mb/s Operation, 100BASE-T Copper, with Auto-Negotiation
 - 802.3x-1997 Full Duplex Operation
 - 802.3z-1998 1000Mb/s Operation, implemented as 1000BASE-X
 - 802.3ab-1999 1000Mb/s Operation, 1000BASE-T Copper
 - 802.3ae-2002 10Gb/s Operation, implemented as 10GBASE-SFP+
 - 802.3an-2006 10Gb/s Operation, 10GBASE-T Copper
 - 802.3ba-2010 40Gb/s and 100Gb/s Operation
 - 802.3bm-2015 40Gb/s and 100Gb/s Operation, implemented as 40GBASE-QSFP+ & 100GBASE-QSFP28

IETF

- 768 UDP
- 783 TFTP
- 791 IP
- 792 ICMP
- 793 TCP
- 826 ARP
- 854 Telnet
- 894 Transmission of IP Datagrams over Ethernet Networks
- 896 Congestion Control in IP/TCP internetworks
- 906 Bootstrap Loading using TFTP
- 950 Internet Standard Subnetting Procedure
- 951 BOOTP: Relay Agent-only
- 959 FTP
- 1027 Using ARP to Implement Transparent Subnet Gateways
- 1058 RIP
- 1112 Host Extensions for IP Multicasting
- 1122 Requirements for Internet Hosts - Communication Layers
- 1155 Structure and Identification of Management Information for TCP/IP-based Internets
- 1156 MIB for Network Management of TCP/IP
- 1157 SNMP
- 1212 Concise MIB Definitions
- 1213 MIB for Network Management of TCP/ IP-based Internets: MIB-II
- 1215 Convention for Defining Traps for use with the SNMP
- 1256 ICMP Router Discovery
- 1258 BSD Rlogin
- 1271 Remote Network Monitoring MIB
- 1305 NTPv3
- 1321 MD5 Message-Digest Algorithm
- 1340 Assigned Numbers
- 1350 TFTPv2
- 1398 Ethernet MIB
- 1442 SMIPv2 of SNMPv2
- 1450 SNMPv2 MIB
- 1519 CIDR
- 1541 DHCP
- 1542 Clarifications and Extensions for BOOTP
- 1573 Evolution of the Interfaces Group of MIB-II
- 1587 OSPF NSSA Option
- 1591 DNS Client
- 1650 Definitions of Managed Objects for the Ethernet-like Interface Types
- 1657 Definitions of Managed Objects for BGP-4 using SMIPv2
- 1723 RIPv2 Carrying Additional Information
- 1812 Router Requirements
- 1850 OSPFv2 MIB
- 1866 HTMLv2
- 1907 SNMPv2 MIB
- 1930 Guidelines for creation, selection, and registration of an AS
- 1981 Path MTU Discovery for IPv6
- 2021 Remote Network Monitoring MIBv2 using SMIPv2
- 2068 HTTP
- 2080 RIPv6 for IPv6
- 2131 DHCP
- 2138 RADIUS Authentication
- 2139 RADIUS Accounting
- 2139 RADIUS Accounting
- 2236 IGMPv2 Snooping
- 2284 PPP Extensible Authentication Protocol
- 2328 OSPFv2
- 2362 PIM-SM
- 2404 HMAC-SHA-1-96 within ESP and AH⁶
- 2407 Internet IP Security Domain of Interpretation for ISAKMP⁶
- 2408 Internet Security Association and Key Management Protocol
- 2428 FTP Extensions for IPv6 and NAT
- 2452 TCP IPv6 MIB
- 2453 RIPv2
- 2454 UDP IPv6 MIB
- 2460 IPv6 Basic Specification
- 2463 ICMPv6
- 2464 Transmission of IPv6 Packets over Ethernet Networks
- 2466 MIB for IPv6: ICMPv6 Group
- 2474 Differentiated Services Field Definitions in IPv4 and IPv6 Headers

IETF Cont.

- 2475 Architecture for Differentiated Service
- 2541 DNS Security Operational Considerations
- 2545 BGP-4 Multiprotocol Extensions for IPv6 Inter-Domain Routing
- 2548 Microsoft Vendor-specific RADIUS Attributes
- 2572 Message Processing and Dispatching for SNMP
- 2573 SNMP Applications
- 2574 User-based Security Model for SNMPv3
- 2575 View-based Access Control Model for SNMP
- 2576 Coexistence between v1/v2/v3 of the Internet-standard Network Management Framework
- 2578 SMIPv2
- 2579 Textual Conventions for SMIPv2
- 2580 Conformance Statements for SMIPv2
- 2597 Assured Forwarding PHB Group
- 2598 Expedited Forwarding PHB OAM and RFCs
- 2616 HTTPv1.1
- 2710 MLD for IPv6
- 2716 PPP EAP TLS Authentication Protocol
- 2787 Definitions of Managed Objects for VRRP
- 2818 HTTP over TLS
- 2819 Remote Network Monitoring MIB
- 2863 Interfaces Group MIB
- 2865 RADIUS
- 2869 RADIUS Extensions (partial support)
- 2874 DNS Extensions for IPv6
- 2925 Definitions of Managed Objects for Remote Ping, Traceroute, and Lookup Operations
- 2933 GMP MIB
- 2934 PIM MIB for IPv4
- 2992 ECMP Algorithm
- 3046 DHCP Relay Agent Information Option 82
- 3162 RADIUS and IPv6
- 3246 Expedited Forwarding PHB
- 3315 DHCPv6
- 3339 Date & Time on The Internet: Timestamps
- 3376 IGMPv3
- 3411 Architecture for Describing SNMP Management Frameworks
- 3412 Message Processing and Dispatching for SNMP
- 3413 SNMP Applications
- 3414 USM for SNMPv3
- 3415 VACM for SNMP
- 3416 Protocol Operations v2 for SNMP
- 3417 Transport Mappings for SNMP
- 3418 MIB for SNMP
- 3484 Default Address Selection for IPv6
- 3513 IPv6 Addressing Architecture
- 3569 Overview of SSM
- 3513 IPv6 Addressing Architecture
- 3569 Overview of SSM
- 3579 RADIUS Support for EAP
- 3587 IPv6 Global Unicast Address Format
- 3596 DNS Extensions to support IPv6
- 3748 Extensible Authentication Protocol
- 3810 MLDv2 for IPv6: Host Mode-only
- 3879 Deprecating Site Local Addresses
- 4007 IPv6 Scoped Address Architecture
- 4022 TCP MIB
- 4087 IP Tunnel MIB
- 4113 UDP MIB
- 4133 Entity MIB Version 3 (partial support)
- 4193 Unique Local IPv6 Unicast Addresses
- 4213 Basic Transition Mechanisms for IPv6 Hosts and Routers
- 4250 SSH Assigned Numbers
- 4251 SSH Protocol Architecture
- 4252 SSH Authentication Protocol
- 4253 SSH Transport Layer Protocol
- 4254 SSH Connection Protocol
- 4255 DNS to Securely Publish SSH Key Fingerprints
- 4256 Generic Message Exchange Authentication for SSH
- 4291 IPv6 Addressing Architecture
- 4292 IP Forwarding Table MIB
- 4293 IP MIB
- 4301 Security Architecture for IP⁶
- 4302 IP Authentication Header⁶
- 4303 IP Encapsulating Security Payload⁶
- 4308 Cryptographic Suites for IPsec
- 4363 Definitions of Managed Objects for Bridges with Traffic Classes, Multicast Filtering and Virtual LAN Extensions (partial support)
- 4429 Optimistic DAD for IPv6 (partial support)
- 4443 ICMP for IPv6
- 4541 Considerations for IGMP & MLD Snooping Switches
- 4552 Authentication/Confidentiality for OSPFv3
- 4601 PIM-SM: Revised Protocol Specification
- 4607 Source-Specific Multicast for IP
- 4675 RADIUS Attributes for Virtual LAN and Priority Support (partial support)
- 4835 Cryptographic Algorithm Implementation Requirements for ESP and AH
- 4861 Neighbor Discovery for IPv6
- 4862 IPv6 Stateless Address Auto-Configuration
- 5095 Deprecation of Type 0 Routing Headers in IPv6
- 5176 Dynamic Authorization Extensions to RADIUS
- 5187 OSPFv3 Graceful Restart (Helper-mode)
- 5308 Routing IPv6 with IS-IS
- 5340 OSPF for IPv6
- 5424 The Syslog Protocol
- 5798 VRRPv3 for IPv4 and IPv6
- 5905 NTPv4: Protocol and Algorithms Specification
- 5997 Use of Status-Server Packets in RADIUS
- 6105 IPv6 Router Advertisement Guard
- 6329 IS-IS Extensions supporting Shortest Path
- 6933 Entity MIBv4 (partial support)
- 7358 VXLAN: A Framework for Overlaying Virtualized L2 Networks over L3 Networks (partial support)
- 7610 DHCPv6 Shield: Protecting against Rogue DHCPv6 Servers
- Internet-Draft IP/IPVPN services with IEEE 802.1aq SPB networks (draft-unbehagen-spb-ip-ipvpn-00)
- Internet-Draft SPB Deployment Considerations (draft-lapuh-spb-deployment-03)

⁶ Implemented to deliver IPsec capability for Control Plane traffic only.

Ordering Information

Part Code	Description
EC7200A1F-E6	VSP 7254XSQ 54-port Ethernet Switch, supporting 48 x 10GBASE-SFP+ & 6 x 40GBASE-QSFP+ ports. Includes single 460W AC Power Supply, Front-to-Back Airflow, and Base Software License. Slide Rack Mount Kit sold separately.
EC7200A1B-E6	VSP 7254XSQ 54-port Ethernet Switch, supporting 48 x 10GBASE-SFP+ & 6 x 40GBASE-QSFP+ ports. Includes single 460W AC Power Supply, Back-to-Front Airflow, and Base Software License. Slide Rack Mount Kit sold separately.
EC720001F-E6	VSP 7254XSQ 54-port Ethernet Switch, supporting 48 x 10GBASE-SFP+ & 6 x 40GBASE-QSFP+ ports. Includes single 800W DC Power Supply, Front-to-Back Airflow, and Base Software License. Slide Rack Mount Kit sold separately.
EC7200A3F-E6	VSP 7254XSQ Port-Licensed 54-port Ethernet Switch, initially supporting 24 x 10GBASE-SFP+ & 4 x 40GBASE-QSFP+ ports. Includes single 460W AC Power Supply, Front-to-Back Airflow, and Base Software License. Slide Rack Mount Kit sold separately.
EC7200A3B-E6	VSP 7254XSQ Port-Licensed 54-port Ethernet Switch, initially supporting 24 x 10GBASE-SFP+ & 4 x 40GBASE-QSFP+ ports. Includes single 460W AC Power Supply, Back-to-Front Airflow, and Base Software License. Slide Rack Mount Kit sold separately.
EC7200A2F-E6	VSP 7254XTQ 54-port Ethernet Switch, supporting 48 x 10GBASE-T & 6 x 40GBASE-QSFP+ ports. Includes single 800W AC Power Supply, Front-to-Back Airflow, and Base Software License. Slide Rack Mount Kit sold separately.
EC7200A2B-E6	VSP 7254XTQ 54-port Ethernet Switch, supporting 48 x 10GBASE-T & 6 x 40GBASE-QSFP+ ports. Includes single 800W AC Power Supply, Back-to-Front Airflow, and Base Software License. Slide Rack Mount Kit sold separately.
EC720002F-E6	VSP 7254XTQ 54-port Ethernet Switch, supporting 48 x 10GBASE-T & 6 x 40GBASE-QSFP+ ports. Includes single 800W DC Power Supply, Front-to-Back Airflow, and Base Software License. Slide Rack Mount Kit sold separately.
EC7200A4F-E6	VSP 7254XTQ Port-Licensed 54-port Ethernet Switch, initially supporting 24 x 10GBASE-T & 4 x 40GBASE-QSFP+ ports. Includes single 800W AC Power Supply, Front-to-Back Airflow, and Base Software License. Slide Rack Mount Kit sold separately.
EC7200A4B-E6	VSP 7254XTQ Port-Licensed 54-port Ethernet Switch, initially supporting 24 x 10GBASE-T & 4 x 40GBASE-QSFP+ ports. Includes single 800W AC Power Supply and, Back-to-Front Airflow, and Base Software License. Slide Rack Mount Kit sold separately.
Power Supplies	
EC7205A1F-E6	460W 100-240V AC Power Supply for VSP 7254XSQ, Front-to-Back Airflow.
EC7205A1B-E6	460W 100-240V AC Power Supply for VSP 7254XSQ, Back-to-Front Airflow.
EC7205A0F-E6	800W 100-240V AC Power Supply for VSP 7254XTQ, Front-to-Back Airflow.
EC7205A0B-E6	800W 100-240V AC Power Supply for VSP 7254XTQ, Back-to-Front Airflow.
EC8005001-E6	800W DC Power Supply for VSP 7200/8000, Front-to-Back Airflow.
Licenses	
380176	VSP 7200/8000 Premier License
380177	VSP 7200/8000 Premier License with MACsec. Note: This license is not applicable to the VSP 7254XSQ.
386914	Port License for VSP 7200. Optional license that enables all ports, for use on 1 Switch, and may be used independently or in combination with Premier Software License.
Accessories	
EC8011002-E6	Slide Rack Mount Kit (300-900mm).
EC7200BTF-E6	Spare/Replacement Fan Module for VSP 7200, Back-to-Front Airflow, 3 required per Switch.
EC7200FTB-E6	Spare/Replacement Fan Module for VSP 7200, Front-to-Back Airflow, 3 required per Switch.
AL2011020-E6	DB-9 Female to RJ-45 Console Connector (RED).
AL2011021-E6	DB-9 Male to RJ-45 Console Connector (BLUE).
AL2011022-E6	RJ-45/DB-9 Integrate Console Cable.
GSA Models	
EC720001F-E6GS	VSP 7254XSQ, GSA Version. Includes single 800W DC Power Supply, Front-to-Back Airflow, and Base Software License. Slide Rack Mount Kit sold separately
EC720002F-E6GS	VSP 7254XTQ, GSA Version. Includes single 800W DAC Power Supply, Front-to-Back Airflow, and Base Software License. Slide Rack Mount Kit sold separately
EC7200A1B-E6GS	VSP 7254XSQ, GSA Version. Includes single 460W AC Power Supply, Back-to-Front Airflow, and Base Software License. Slide Rack Mount Kit sold separately
EC7200A1F-E6GS	VSP 7254XSQ, GSA Version. Includes single 460W AC Power Supply, Front-to-Back Airflow, and Base Software License. Slide Rack Mount Kit sold separately
EC7200A2B-E6GS	VSP 7254XTQ, GSA Version. Includes single 460W AC Power Supply, Back-to-Front Airflow, and Base Software License. Slide Rack Mount Kit sold separately
EC7200A2F-E6GS	VSP 7254XTQ, GSA Version. Includes single 460W AC Power Supply, Front-to-Back Airflow, and Base Software License. Slide Rack Mount Kit sold separately

Notes of product ordering and hardware installation considerations:

- Power cord is not included and must be ordered separately for switches and power supplies. For a list of available power cords, please refer to "Lifecycle Notification on VSP Power Cord Models" at: <http://bit.ly/2q1YBgo>
- Extreme Networks recommends that Customers order a Slide Rack Mount Kit with every unit; the 300-900mm kit is designed to fit within most 4-post rack mount systems. Rack mounting with just two post ears would likely cause warping of the rack due to the weight of the unit and is therefore not recommended. Customers are advised to use mounting ears only in conjunction with a supporting shelf.
- A Console Cable is not shipped with the unit and, if required, must be ordered separately.
- All GSA part codes have Taiwan as their Country of Origin

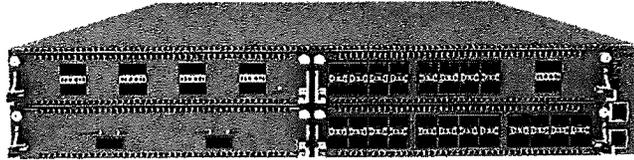


<http://www.extremenetworks.com/contact> / Phone +1-408-579-2800

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Highlights

- High-performance 10/40/100 Gigabit Ethernet Switch
- Flexible pay-as-you-grow semi-modular design
- Flexibly supports high-density 10 Gigabit, 40 Gigabit, 100 Gigabit, and Combination modules
- At home in both the Campus Core and as the Spine Switch in a Data Center Spine/Leaf Top-of-Rack deployment
- Efficient compact form-factor that reduces power and footprint consumption
- Supports both conventional Routed IP and/or Fabric-based network deployments
- Delivers high-end functionality, performance, and scalability while helping to avoid the traditional 'Chassis Tax'



Virtual Services Platform 8400

Flexible, Compact Form-Factor Ethernet Switch Designed to Deliver Sophisticated Functionality for Mid-Sized Enterprises

The VSP 8400 Series introduces the Compact Form-Factor Ethernet Switch to address the unique networking need of mid-sized enterprises. The Compact Form-Factor design transforms the cost/benefit proposition for the mid-sized core switch; delivering higher port density, better price/port, enhanced power efficiency, smaller physical footprint, and easy scalability. Essentially, it gives mid-sized enterprises a solution that fits their needs, while avoiding the 'Chassis Tax' associated with larger modular chassis options.

By tightly integrating the switching hardware with Extreme Networks' proven VSP Operating System, the VSP 8400 delivers a compelling package of enhanced functionality and robustness. It supports Extreme Networks' innovative Fabric Connect technology, as well as conventional IPv4 and IPv6 routing, to satisfy a range of deployment scenarios. This enables businesses to easily transition from inefficient legacy technologies to an agile solution that dramatically reduces operational overhead and total cost of ownership.

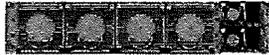
The VSP 8400 shares the same next-generation hardware and software technology as the existing VSP 8200 Series. This positions the product line to support both today's requirements and tomorrow's emerging needs.



VSP 8400 4-Slot Ethernet Switch



Front View



Rear View



8402CQ 100 Gigabit QSFP28 ES



8408QQ 40 Gigabit QSFP+ ESM



8418XSQ 10/40 Gigabit SFP+/QSFP+ ESM



8418XTQ 10/40 Gigabit SFP+/QSFP+ ESM



8424XS 10 Gigabit SFP+ ESM



8424XT 10 Gigabit RJ45 ESM



8424GS Gigabit SFP ESM



8424GT Gigabit RJ45 ESM

Product Overview

The VSP 8400 Ethernet Switch provides four front-panel slots that support the flexible deployment of high-density VSP 8400 Series Ethernet Switch Modules. By default, the VSP 8400 is a “zero port” system, with a Chassis that integrates the switching fabric and all associated control and management electronics. Ethernet interfaces are delivered by the addition of one or more field-replaceable and hot-swappable Ethernet Switch Modules (ESMs).

Extreme Networks has expanded the capability of the VSP 8400 Series with the introduction of the VSP 8404C 100G-capable Chassis. This variant features a new switching fabric that has been specifically optimized to support 100 Gigabit Ethernet and the companion 8402CQ 2-port 100 Gigabit Ethernet ESM. In every other respect, the new VSP 8404C Chassis is identical to the original VSP 8400: form, fit, and function; power and cooling, size and weight.

In this manner, the VSP 8400 provides a low-cost, pay-as-you-grow solution for mid-sized businesses that wish to retain a high degree of flexibility as they develop solutions for their networking requirements.

The VSP 8400 Series Ethernet Switch Modules are as follows:

- 8402CQ 2-port 100 Gigabit Ethernet QSFP28 ESM
- 8408QQ 8-port 40 Gigabit Ethernet QSFP+ ESM
- 8418XSQ 16-port 10 Gigabit Ethernet SFP+ and 2-port 40 Gigabit Ethernet QSFP+ Combo ESM
- 8418XTQ 16-port 10 Gigabit Ethernet RJ45 and 2-port 40 Gigabit Ethernet QSFP+ Combo ESM
- 8424XS 24-port 10 Gigabit Ethernet SFP+ ESM
- 8424XT 24-port 10 Gigabit Ethernet RJ45 ESM
- 8424GS 24-port Gigabit Ethernet SFP ESM
- 8424GT 24-port Gigabit Ethernet RJ45 ESM

It should also be noted:

- 8402CQ 100 Gigabit ESM is supported only in the VSP 8404C, not in the VSP 8400
- 40 Gigabit Ethernet QSFP+ ports support Channelization and can therefore be individual sub-divided into four 10 Gigabit Ethernet channels
- 10 Gigabit Ethernet SFP+ ports also support a wide range of 1 Gigabit Ethernet SFP Transceivers
- 10 Gigabit Ethernet RJ45 ports also support 100/1000Mbps connectivity
- Gigabit Ethernet SFP ports support a wide range of 1 Gigabit Ethernet SFP Transceivers
- Gigabit Ethernet RJ45 ports support 10/100/1000Mbps connectivity

Please refer to the product technical documentation for further details.

The innovative design leverages an advanced chipset, featuring 2.56Tbps of switching and 1,428Mpps of frame forwarding performance.

Benefits

Introducing the Compact Form-Factor concept, the VSP 8400 provides a very high-capacity, high-performance connectivity solution for mid-sized campus networks.

The VSP 8400 also natively supports the Extreme Networks Fabric Connect technology, whose benefits include:

- Makes the need to configure network-wide VLANs obsolete
- Replaces multiple legacy protocols with this one single unified technology
- Removes the risk of network loops
- Delivering an Edge-only provisioning model which seamlessly integrates with orchestration and automation
- Fully optimizing all links and all devices enabling businesses to get the most out of infrastructure investments

Traditionally, provisioning new network services requires engineers to touch every device in the service path, configuring each device to enable both the active and redundant links. The bigger the network the more complex and risky this becomes.

Leveraging Fabric Connect delivers fundamental change. Rather than the network appearing as a mass of individual devices it becomes a single cloud, so that engineers only need to touch the unique device that is providing service directly to the end-point. Fabric Connect instantly propagates all of the end-point's service attributes to every other node within the cloud.

System Compatibility

From a software perspective, the VSP 8400 Series was introduced with the VOSS 4.2 software release; this is, therefore, the minimum level of software available to operate the Switch. The recent VOSS 7.1 release delivers the following major enhancements:

- Application Telemetry
- VXLAN VTEP Hardware Configuration and Management using OVSDB

Application Telemetry

Application Telemetry is a unique feature of ExtremeAnalytics that enables the ExtremeSwitching infrastructure to participate in the forwarding and analysis of network application flows. By combining packet flow information from the VSP switch along with deep packet inspection abilities of ExtremeAnalytics, it provides actionable insights into network and application performance. This all without the need for expensive sensors or collectors. With this release, an Application Telemetry agent on the VSP can now work in tandem with ExtremeAnalytics to deliver this granular visibility into application performance, users, locations and devices.

Features and Capabilities

- Flexible support for up to 96 ports of 10 Gigabit Ethernet, 24 ports of 40 Gigabit Ethernet or up to 8 ports of 100 Gigabit Ethernet
- Hot-swappable Ethernet Switch Modules
- Non-blocking, wire-speed switching architecture
- Integrated design that is optimized for low latency
- Flexible table architecture delivers MAC, ARP, and IP Routing scalability
- Feature-rich support for conventional VLAN, Link Aggregation, Spanning Tree technologies
- Support for IP Routing techniques including Static, RIP, OSPF, eBGP, BGP+, ECMP, DvR/VRRP, PIM-SM/SSM, and VRF. Additionally, supports Static, RiPng, OSPFv3, BGPv6 Peering, ECMP, VRRP, and VRF for IPv6 deployments
- IPv6-optimized Hardware
- Extreme Networks Switch Cluster technology supports Triangle and Square configurations, with both Layer 2 and Layer 3 functionality
- Extreme Networks Fabric Connect technology supports L2 Virtual Service Networks (VSNs), Layer 3 Virtual Service Networks, Inter-VSN Routing, IP Shortcut Routing, IP Multicast-over-Fabric Connect and Fabric Connect-PIM Gateway, Fabric Attach Server and Client, Fabric Extend, and Zero-Touch Fabric Connect
- MACsec and Enhanced Security Mode options
- High Availability Power and Cooling
 - Up to 2 field-replaceable, hot-swappable AC or DC internal Power Supplies
 - 4 field-replaceable Fan Modules

Warranty

- 12-month hardware
- A complete range of support options are also available, either directly from Extreme Networks or indirectly from our Authorized Business Partner network

Software Licensing

- Base Software License, included with hardware purchase, enables most features with the exception of those specifically noted and enabled by the Premier Software License
- Premier Software License, an optional accessory, enables the following features: Layer 3 Virtual Service Networks, DvR, VXLAN Gateway, >24 VRFs, and—where local regulations permit—MACsec.

Country of Origin

- China (PRC)
- Taiwan (for GSA models)

Specifications

General

- Physical Connectivity:
 - Up to 8 x 100GBASE-QSFP28 Ports
 - Up to 24 x 40GBASE-QSFP+ Ports
 - Up to 96 x 10GBASE-SFP+ Ports
 - Up to 96 x 10GBASE-T Ports
 - Up to 96 x 100GBASE-SFP Ports
 - Up to 96 x 100GBASE-T Ports
- Channelization of 40 Gigabit ports
- Switch Fabric Architecture: 2.56Tbps Full-Duplex
- Frame forwarding rate: 1,428Mpps per Switch
- Jumbo Frame support: up to 9,600 Bytes (802.1Q Tagged)
- MACsec support for 10 Gigabit and Channelized 40 Gigabit ports

Layer 2

- MAC Address: 224,000
- Port-based VLANs: 4,059
- Private VLANs/E-Tree: 4,059
- MSTP Instances: 12
- MLT/LACP Groups: up to 96
- MLT Links per Group: 8
- LACP Links per Group: 8 Active
- Extreme Networks VLACP Instances: up to 96
- Extreme Networks SLPP Instances: 128

Layer 3 IPv4 Routing Services

- ARP Entries: 32,000
- Static ARP Entries: 2000 per VRF, 10,000 System-wide
- IP Interfaces: 506
- CLIP Interfaces: 64
- IP Routes: up to 15,488
- IP Static Routes: 1,000 per VRF, 5000 System-wide
- RIP Interfaces: 200
- RIP Routes: up to 15,488
- OSPF Interfaces: 500
- OSPF Routes: up to 15,488
- OSPF Areas: 12 per VRF, 80 System-wide
- BGP Peers: 12
- BGP Routes: up to 15,488
- ECMP Groups: 1,000
- ECMP Paths per Group: 8
- NLB Clusters: 200
- VRRP Interfaces: 252
- RSMLT Interfaces: 252
- IPv4 UDP Forwarding Entries: 512
- IPv4 DHCP Relay Forwarding Entries: 1024
- IP Route Policies: 500 per VRF, 5,000 system-wide
- VRF Instances: up to 256

Layer 3 IPv6 Routing Services

- Neighbors: 8,000
- Static Neighbors: 256
- IP Interfaces: 506
- CLIP Interfaces: 64
- IP Configured Tunnels: 506
- IP Routes: up to 7,488
- IP Static Routes: 1,000
- RIPng Interfaces: 48
- RIPng Routes: up to 7,488
- OSPFv3 Interfaces: 500
- OSPFv3 Routes: up to 7,488
- OSPFv3 Areas: 12 per VRF, 80 System-wide
- BGPv6 Peers: 24
- ECMP Groups: 1,000
- ECMP Paths per Group: 8
- VRRP Interfaces: 252
- RSMLT Interfaces: 252
- VRF Instances: up to 256

Specifications (cont.)

Multicast

- IGMP Interfaces: 4,059
- PIM Active Interfaces: 128
- MLD Interfaces: 4,059
- Static Multicast Routes: 4,000
- BCB IP Multicast S,G Streams: 16,000
- PIM-SSM Static Channels: 4,000
- IP Multicast Streams: 6,000
- IP Multicast Streams (Fabric Connect-PIM Gateway Nodes): 3,000
- Fabric Connect-PIM Gateway Controllers per Region: 5
- Fabric Connect-PIM Gateway Nodes per Region: 64
- Fabric Connect-PIM Gateway Interfaces per BEB Node: 64
- Fabric Connect-PIM Gateway Source Announcements: 6,000

Fabric Connect

- 802.1aq/RFC 6329 Shortest Path Bridging with Extreme Networks extensions
- MAC Address: 112,000
- NNI Interfaces/Adjacencies: up to 256
- BCB/BEB Nodes per Region: 800
- Transparent UNI Ports/Switch: 96
- BEB Nodes per VSN: 500
- L2 Virtual Service Networks: 4,059
- L3 Virtual Service Networks: up to 256
- IP Shortcut Routes: IPv4 15,488, and IPv6 7,488
- DvR Domains per Region: 16
- DvR-enabled L2 VSNs: up to 502
- DvR Controllers per Domain: 8
- DvR Leafs per Domain: 250
- DvR Interfaces: up to 502
- DvR Routes: up to 32,000
- L2 Multicast Virtual Service Networks: 2,000
- L3 Multicast Virtual Service Networks: 256
- VXLAN Gateway VTEP Destinations per Node: 500
- VXLAN Gateway VNI IDs per Node: 2,000
- Fabric Attach VLAN/VSN Assignments per Port: 94

QoS and Filtering

- ACL: 256 Ingress and 126 Egress
- IPv4 ACE: 766 Ingress and 252 Egress
- IPv4 ACE: 252 Ingress and 252 Egress
- IPv6 ACE: 256 Ingress
- L2-L4 Ingress Port Rate Limiters: up to 96
- Egress Port Shaper Granularity: 1Mbps to 40Gbps per Port

Operations and Management

- Mirrored Ports: up to 95
- sFlow: up to 3,000 samples per second
- Fabric RSPAN: up to 1,000 VSN IDs per Region

Supported Transceivers

100 Gigabit Ethernet

- 100GBASE-QSFP28 Passive Copper Direct Attach Cable - 1, 3m, 5m
- 100GBASE-SR4 QSFP28, up to 100m over MMF
- 100GBASE-CWDM QSFP28, up to 2km over SMF
- 100GBASE-LR4 QSFP28, up to 10km over SMF

40 Gigabit Ethernet

- 40GBASE-QSFP+ Passive Copper Direct Attach Cables - 0.5m, 1m, 3m, 5m
- 40GBASE-QSFP+ Passive Copper Break-Out Cables - 1m, 3m, 5m
- 40GBASE-QSFP+ Active Optical Break-Out Cable - 7m, 10m, 15m
- 40GBASE-QSFP+ Active Optical Direct Attach Cable - 10m
- 40GBASE-LM4 QSFP+, up to 80m over MMF
- 40GBASE-SR Bi-Directional QSFP+, up to 125m over MMF
- 40GBASE-SR4/4x10GBASE-SR QSFP+ up to 150m over MMF
- 40GBASE-LR4 QSFP+, up to 10km over SMF
- 40GBASE-LR4 Parallel Single-Mode QSFP+, up to 10km over SMF
- 40GBASE-ER4 QSFP+, up to 40km over SMF

Specifications (cont.)

Supported Transceivers (cont.)

10 Gigabit Ethernet

- 10GBASE-T, up to 100m over Cat 6a UTP/STP
- 10GBASE-CX, up to 10m over Twinax
- 10GBASE-LRM SFP+, up to 220m over MMF
- 10GBASE-SR/SW SFP+, up to 400m over MMF
- 10GBASE-LR/LW SFP+, up to 10km over SMF
- 10GBASE-BX10 SFP+, up to 10km over SMF
- 10GBASE-BX40 SFP+ Bi-Directional, up to 40km over SMF (must be used in pairs)
- 10GBASE-ER/EW SFP+, up to 40km over SMF
- 10GBASE-ER CDWM SFP+, up to 40km over SMF
- 10GBASE-ZR/ZW SFP+, up to 70km over SMF
- 10GBASE-ZR CDWM SFP+, up to 70km over SMF

Note: SFP+ sockets are also capable of supporting a wide range of 10 Gigabit Ethernet Transceivers; additionally, 10 Gigabit Ethernet RJ45 ports also support 100/1000Mbps connectivity. Extreme Networks also supports third party CDWM and DWDM Transceivers in "Forgiving Mode". Please refer to the product documentation for full details and a complete listing of all specifications and compliance.

Standards Compliance

IEEE

802.1 Bridging (Networking) and Network Management

- 802.1D MAC Bridges (a.k.a. Spanning Tree Protocol)
- 802.1p Traffic Class Expediting and Dynamic Multicast Filtering
- 802.1t 802.1D Maintenance
- 802.1w Rapid Reconfiguration of Spanning Tree (RSTP)
- 802.1Q Virtual Local Area Networking (VLAN)
- 802.1Qbp Equal-Cost Multi-Path (Shortest Path Bridging)
- 802.1Qcj Automatic Attachment to Provider Backbone Bridging (PBB) Services (Partial Support)
- 802.1s Multiple Spanning Trees (MSTP)
- 802.1v VLAN Classification by Protocol and Port
- 802.1ag Connectivity Fault Management
- 802.1ah Provider Backbone Bridges
- 802.1aq Shortest Path Bridging (SPB) MAC-in-MAC
- 802.1X Port-based Network Access Control
- 802.1AB-2005 Station and Media Access Control Connectivity Discovery; aka LLDP (partial support)
- 802.1AE Media Access Control Security
- 802.1AX Link Aggregation

802.3 Ethernet

- 802.3-1983 CSMA/CD Ethernet (ISO/IEC 8802-3)
- 802.3i-1990 10Mb/s Operation, 10BASE-T Copper
- 802.3u-1995 100Mb/s Operation, 100BASE-T Copper, with Auto Negotiation
- 802.3x-1997 Full Duplex Operation, including Flow Control
- 802.3z-1998 1000Mb/s Operation, implemented as 1000BASE-X
- 802.3ab-1999 1000Mb/s Operation, 1000BASE-T Copper
- 802.3ae-2002 10Gb/s Operation, implemented as 10GBASE-SFP+
- 802.3an-2006 10Gb/s Operation, 10GBASE-T Copper
- 802.3ba-2010 40Gb/s and 100Gb/s Operation

RFC

- 768 UDP
- 783 TFTP
- 791 IP
- 792 ICMP
- 793 TCP
- 826 ARP
- 854 Telnet
- 894 Transmission of IP Datagrams over Ethernet Networks
- 896 Congestion Control in IP/TCP internetworks
- 906 Bootstrap Loading using TFTP
- 950 Internet Standard Subnetting Procedure
- 951 BOOTP: Relay Agent-only
- 959 FTP
- 1027 Using ARP to Implement Transparent Subnet Gateways
- 1058 RIP
- 1112 Host Extensions for IP Multicasting
- 1122 Requirements for Internet Hosts - Communication Layers
- 1155 Structure and Identification of Management Information for TCP/IP-based Internets
- 1156 MIB for Network Management of TCP/IP
- 1157 SNMP
- 1212 Concise MIB Definitions
- 1213 MIB for Network Management of TCP/IP-based Internets: MIB-II
- 1215 Convention for Defining Traps for use with SNMP
- 1256 ICMP Router Discovery
- 1258 BSD Rlogin
- 1271 Remote Network Monitoring MIB
- 1305 NTPv3
- 1321 MD5 Message-Digest Algorithm

Specifications (cont.)

RFC (cont.)

- 1340 Assigned Numbers
- 1350 TFTPv2
- 1398 Ethernet MIB
- 1442 SMIPv2 of SNMPv2
- 1450 SNMPv2 MIB
- 1519 CIDR
- 1541 DHCP
- 1542 Clarifications and Extensions for BOOTP
- 1573 Evolution of the Interfaces Group of MIB-II
- 1587 OSPF NSSA Option
- 1591 DNS Client
- 1650 Definitions of Managed Objects for Ethernet-like Interface Types
- 1657 Definitions of Managed Objects for BGP-4 using SMIPv2
- 1723 RIPv2 Carrying Additional Information
- 1812 Router Requirements
- 1850 OSPFv2 MIB
- 1866 HTMLv2
- 1907 SNMPv2 MIB
- 1930 Guidelines for Creation, Selection, and Registration of an AS
- 1981 Path MTU Discovery for IPv6
- 2021 Remote Network Monitoring MIBv2 using SMIPv2
- 2068 HTTP
- 2080 RIPv2 for IPv6
- 2131 DHCP
- 2138 RADIUS Authentication
- 2139 RADIUS Accounting
- 2236 IGMPv2 Snooping
- 2284 PPP Extensible Authentication Protocol
- 2328 OSPFv2
- 2404 HMAC-SHA-1-96 within ESP and AH1
- 2407 Internet IP Security Domain of Interpretation for ISAKMP1
- 2408 Internet Security Association and Key Management Protocol1
- 2428 FTP Extensions for IPv6 and NAT
- 2452 TCP IPv6 MIB
- 2453 RIPv2
- 2454 UDP IPv6 MIB
- 2460 IPv6 Basic Specification
- 2463 ICMPv6
- 2464 Transmission of IPv6 Packets over Ethernet Networks
- 2466 MIB for IPv6: ICMPv6 Group
- 2474 Differentiated Services Field Definitions in IPv4 and IPv6 Headers
- 2475 Architecture for Differentiated Service
- 2541 DNS Security Operational Considerations
- 2545 BGP-4 Multiprotocol Extensions for IPv6 Inter-Domain Routing
- 2548 Microsoft Vendor-specific RADIUS Attributes
- 2572 Message Processing and Dispatching for SNMP
- 2573 SNMP Applications
- 2574 USM for SNMPv3
- 2575 VACM for SNMP
- 2576 Coexistence between v1/v2/v3 of the Internet-standard Network Management Framework
- 2578 SMIPv2
- 2579 Textual Conventions for SMIPv2
- 2580 Conformance Statements for SMIPv2
- 2597 Assured Forwarding PHB Group
- 2598 Expedited Forwarding PHB
- 2616 HTTPv1.1
- 2710 MLD for IPv6
- 2716 PPP EAP TLS Authentication Protocol
- 2787 Definitions of Managed Objects for VRRP
- 2818 HTTP over TLS
- 2819 Remote Network Monitoring MIB
- 2863 Interfaces Group MIB
- 2865 RADIUS
- 2869 RADIUS Extensions (partial support)
- 2874 DNS Extensions for IPv6
- 2925 Definitions of Managed Objects for Remote Ping, Traceroute, and Lookup Operations
- 2933 IGMP MIB
- 2934 PIM MIB for IPv4
- 2992 ECMP Algorithm
- 3046 DHCP Relay Agent Information Option 82
- 3162 RADIUS and IPv6
- 3246 Expedited Forwarding PHB
- 3315 DHCPv6
- 3339 Date and Time on The Internet: Timestamps
- 3376 IGMPv3
- 3411 Architecture for Describing SNMP Management Frameworks
- 3412 Message Processing and Dispatching for SNMP
- 3413 SNMP Applications
- 3414 USM for SNMPv3
- 3415 VACM for SNMP
- 3416 Protocol Operations v2 for SNMP
- 3417 Transport Mappings for SNMP
- 3418 MIB for SNMP

- 3484 Default Address Selection for IPv6
- 3513 IPv6 Addressing Architecture
- 3569 Overview of SSM
- 3579 RADIUS Support for EAP
- 3587 IPv6 Global Unicast Address Format
- 3596 DNS Extensions to support IPv6
- 3748 Extensible Authentication Protocol
- 3810 MLDv2 for IPv6
- 3879 Deprecating Site Local Addresses
- 4007 IPv6 Scoped Address Architecture
- 4022 TCP MIB
- 4087 IP Tunnel MIB
- 4113 UDP MIB
- 4133 Entity MIB Version 3 (partial support)
- 4193 Unique Local IPv6 Unicast Addresses
- 4213 Basic Transition Mechanisms for IPv6 Hosts and Routers
- 4250 SSH Assigned Numbers
- 4251 SSH Protocol Architecture
- 4252 SSH Authentication Protocol
- 4253 SSH Transport Layer Protocol
- 4254 SSH Connection Protocol
- 4255 DNS to Securely Publish SSH Key Fingerprints
- 4256 Generic Message Exchange Authentication for SSH
- 4291 IPv6 Addressing Architecture
- 4292 IP Forwarding Table MIB
- 4293 IP MIB
- 4301 Security Architecture for IP
- 4302 IP Authentication Header
- 4303 IP Encapsulating Security Payload
- 4308 Cryptographic Suites for IPsec
- 4363 Definitions of Managed Objects for Bridges with Traffic Classes, Multicast Filtering and VLAN Extensions (partial support)
- 4429 Optimistic DAD for IPv6 (partial support)
- 4443 ICMP for IPv6
- 4541 Considerations for IGMP and MLD Snooping Switches
- 4552 Authentication/Confidentiality for OSPFv3
- 4601 PIM-SM: Revised Protocol Specification
- 4607 Source-Specific Multicast for IP
- 4675 RADIUS Attributes for Virtual LAN and Priority Support (partial support)
- 4835 Cryptographic Algorithm Implementation Requirements for ESP and AH
- 4861 Neighbor Discovery for IPv6
- 4862 IPv6 Stateless Address Auto-Configuration
- 5095 Deprecation of Type 0 Routing Headers in IPv6
- 5176 Dynamic Authorization Extensions to RADIUS
- 5187 OSPFv3 Graceful Restart (Helper-mode)
- 5308 Routing IPv6 with IS-IS
- 5340 OSPF for IPv6
- 5424 The Syslog Protocol
- 5798 VRRPv3 for IPv4 and IPv6
- 5905 NTPv4: Protocol and Algorithms Specification
- 5997 Use of Status-Server Packets in RADIUS
- 6105 IPv6 Router Advertisement Guard
- 6329 IS-IS Extensions supporting IEEE 802.1aq SPB
- 6933 Entity MIBv4 (partial support)
- 7358 VXLAN: A Framework for Overlaying Virtualized L2 Networks over L3 Networks (partial support)
- 7610 DHCPv6 Shield: Protecting against Rogue DHCPv6 Servers
- Internet-Draft IP/IPVPN services with IEEE 802.1aq SPB networks (draft-unbehagen-spb-ip-ipvpn-00)
- Internet-Draft SPB Deployment Considerations (draft-lapuh-spb-deployment-03)

* Implemented to deliver IPsec capability for Control Plane traffic only.

Additional Information

For further information about the Extreme Networks Virtual Services Platform 8000 Series and for the complete Extreme Networks portfolio, www.extremenetworks.com.

Ordering Information

Part Code	Description
EC8400A02-E6	Virtual Services Platform 8404C 4-slot Ethernet Switch, 100G-capable, supporting up to 4 VSP 8400 Series Ethernet Switch Modules. Includes single 800W 100-240V AC Power Supply (no Power Cord), four Fan Modules, and Base Software License. Slide Rack Mount Kit sold separately.
EC8400002-E6	Virtual Services Platform 8404C 4-slot Ethernet Switch, 100G-capable, supporting up to 4 VSP 8400 Series Ethernet Switch Modules. Includes single 800W DC Power Supply, four Fan Modules, and Base Software License. Slide Rack Mount Kit sold separately.
EC8404009-E6	8402CQ 2-port 100GBASE-QSFP28 Ethernet Switch Module for the VSP 8400 Series. (Note: 8402CQ is supported only in the VSP 8404C Chassis, not in the VSP 8400)
EC8404003-E6	8408QQ 8-port 40GBASE-QSFP+ Ethernet Switch Module for VSP 8400. (Note: Ports 7 and 8 are reserved for future use).

Ordering Information

Part Code	Description
EC8404005-E6	8418XSQ 16-port 10GBASE-SFP+ and 2-port 40GBASE-QSFP+ Combo Ethernet Switch Module for VSP 8400 Series.
EC8404006-E6	8418XTQ 16-port 10GBASE-T and 2-port 40GBASE-QSFP+ Combo Ethernet Switch Module for VSP 8400 Series.
EC8404001-E6	8424XS 24-port 10GBASE-SFP+ Ethernet Switch Module for VSP 8400.
EC8404002-E6	8424XT 24-port 10GBASE-T Ethernet Switch Module for VSP 8400.
EC8404007-E6	8424GS 24-port 1000BASE-SFP Ethernet Switch Module for VSP 8400.
EC8404008-E6	8424GT 24-port 1000BASE-T Ethernet Switch Module for VSP 8400.
EC8005A01-E6	800W 100-240V AC Power Supply, for use with the VSP 8000 Series.
EC8005001-E6	800W DC Power Supply, for use with the VSP 7200/8000 Series.
380176	VSP 8000 Series Premier Software License: enables L3 VSN.
380177	VSP 8000 Series Premier Software License: enables L3 VSN and MACsec.
EC8011002-E6	VSP 8000 Slide Rack Mount Kit (300-900mm).
EC8011003-E6	VSP 8000 Chassis Power Supply Filler Panel.
EC8011004-E6	VSP 8000 Chassis Spare Fan Module.
AL2011020-E6	Extreme Networks DB-9 Female to RJ-45 Console Connector (RED).
AL2011021-E6	Extreme Networks DB-9 Male to RJ-45 Console Connector (BLUE).
AL2011022-E6	Extreme Networks RJ-45/DB-9 Integrate Console Cable.

GSA Ordering Table

Part Code	Description
EC8400A02-E6GS	Virtual Services Platform 8404C, GSA Version. Includes single 800W 100-240V AC Power Supply (no Power Cord), four Fan Modules, and Base Software License. Slide Rack Mount Kit sold separately
EC8404001-E6GS	8424XS 24-port 10GBASE-SFP+ Ethernet Switch Module for VSP 8400, GSA Version
EC8404002-E6GS	8424XT 24-port 10GBASE-T Ethernet Switch Module for VSP 8400, GSA Version
EC8404003-E6GS	8408QQ 8-port 40GBASE-QSFP+ Ethernet Switch Module for VSP 8400, GSA Version
EC8404005-E6GS	8418XSQ 16-port 10GBASE-SFP and 2-port 40GBASE-QSFP+ Combo Ethernet Switch Module for VSP 8400, GSA Version
EC8404006-E6GS	8418XTQ 16-port 10GBASE-T and 2-port 40GBASE-QSFP+ Combo Ethernet Switch Module for VSP 8400, GSA Version
EC8404007-E6GS	8424GS 24-Port 1000BASE-SFP Ethernet Switch Module for VSP 8400, GSA Version
EC8404008-E6GS	8424GT 24-port 1000BASE-T Ethernet Switch Module for VSP 8400, GSA Version
EC8404009-E6GS	8402CQ 2-port 100GBASE-QSFP28 Ethernet Switch Module for VSP 8400, GSA Version (Note: 8402CQ is supported only in the 8404C Chassis, not in the VSP 8400)

*All GSA order codes have Taiwan as the Country of Origin

Notes of product ordering and hardware installation considerations:

- Customers must separately order power cord corresponding to their regional (or country-specific) requirement. For a list of available power cords, please refer to "Lifecycle Notification on VSP Power Cord Models" at: <http://bit.ly/2q1YB99>
- Extreme Networks recommends that Customers purchase a second power supply unit, in order to provide highly available power.
- Extreme Networks recommends that Customers order a Slide Rack Mount Kit with every unit; the 300-900mm kit is designed to fit within most 4-post rack mount systems. Rack mounting with just two post ears would likely cause warping of the rack due to the weight of the unit and is therefore not recommended. Customers are advised to use mounting ears only in conjunction with a supporting shelf.
- A Console Cable is not shipped with the unit and, if required, must be ordered separately.



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