AVAYA

AVAYA VIRTUAL SERVICES PLATFORM 8600

The demands on IT have never been greater: do more, do it quicker, and reduce costs. The Virtual Services Platform 8600 Series is engineered from the ground up to deliver against a checklist of must-have capabilities. Innovative design re-imagines how the modular Ethernet Switch should be architected, but more importantly, it's been engineered to solve the most demanding challenges.

PRODUCT HIGHLIGHTS:

• Flexible multi-rate Gigabit Ethernet support: up to 48 ports of 100G, up to 128 ports of 40G, or up to 192 ports of 10G.

• High port density, reduced footprint

• Innovative design, reduced hardware requirements

• Future-ready architecture, pay-as-you-grow software licensing

• Leverages full-featured, tried and tested VSP Operating System Software

• Supports both conventional Routed IP and/or Fabric-based network deployments

• Pivot-ready product, creating a path for open and effective Service Chaining

Network infrastructure needs to be both agile and powerful and decade-old products aren't up to the job of delivering what's needed. One platform, multiple solutions: the new Virtual Services Platform 8600 Series is powerful enough to be at the heart of the Campus or Data Center, versatile enough to deliver multi-rate Ethernet ranging from 1 to 100 Gigabit, and compact enough to be deployed as an end- or middle-of-row. The network foundation, re-imagined with network operators in mind.

New times call for new thinking. You need truly cutting edge products to maximize the results of a modern network design. Port density, space utilization, and power consumption are all critical metrics that can make the difference between success and failure.

Clean-sheet designing means that the Virtual Services Platform 8600 Series redefines the category: a reduction in hardware requirements and a decoupling of software saves startup capital costs, minimizes size requirements, and decreases power consumption. Enjoy unprecedented deployment flexibility - leveraging class-leading 1/10/25/40/100 Gigabit Ethernet port density in an ultra-low profile form-factor. The Virtual Services Platform 8600 represents an architectural breakthrough that makes conventional approaches obsolete.

A breakthrough architecture frees you from over-capitalizing in excess hardware and one-size-fits-all software, delivers best-in-class high-availability, embedded evolutionary capabilities,

and lowers the barriers to entry. Reduced complexity improves your uptime and simplifies sparing, obsoleting the traditional centralized Supervisor and distributing control plane functionality directly to I/O Modules makes for a more robust and supportable solution.

Leveraging today's most efficient switching chipset designs means that the Virtual Services Platform 8600 Series (VSP 8600) provides more of the crucial 1/10/25/40/100 Gigabit Ethernet speeds that you need for agile service delivery. All this while consuming less precious real estate: at just 7RU, the product boasts an industry-leading ultra-low profile form-factor and a best-in-class Port/RU ratio.
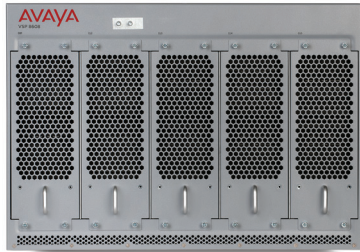
An innovative architecture empowers the VSP 8600 to deliver more of what you need - ports and performance - while consuming less of what's finite - money, space, time, and power. The good news does not stop there. The multi-terabit Switch Fabric capacity

VSP 8608 Chassis with 8 IOC Slots (with Switch Fabrics and Power Supplies Installed)

VSP 8608 - Rear View

8600SF Switch Fabric Module

8606CQ 6-Port 100 Gigabit IOC Module

8616QQ 16-Port 40 Gigabit IOC Module

8624XS 24-Port 10 Gigabit IOC Module

8624XT 24-Port 10 Gigabit IOC Module

enables a fully non-blocking switching architecture, ensuring that the product is ready to leverage the next round of technology advances. You benefit with simpler mid-life refreshes and a longer overall service life. The VSP 8600 delivers a platform that is both revolutionary and evolution-ready.

In another break with conventional thinking, the VSP 8600 gives you relief from the big upfront software costs that are part-and-parcel of traditional solutions. Decoupling software from the chassis empowers you to align costs with solution scale - delivering a unique model that minimizes costs. You benefit from a genuine pay-as-you-grow pricing model for enabling software, and mission-specific feature packs. If you want to start small, you only pay small: now that's refreshing thinking.

Perhaps most importantly, the VSP 8600 leverages Avaya's tried and tested VSP Operating System Software to deliver unparalleled levels of feature functionality and high-availability. A network that instills confidence and solidity is crucial for today's always-on organization: you need infrastructure that you can rely on to be there 24/7. Therefore, while the VSP 8600 hardware might be brand spanking new, leveraging the latest and greatest hardware, you'll benefit of more than decade's worth of evolutionary software development.

Product Positioning

The new VSP 8600 expands the arsenal with an order of magnitude increase in port-density and switching performance. These capabilities equip the new VSP 8600 for the key role of Core Switch of a large-scale Campus networks, or in the Data Center as the Spine Switch in a Spine/Leaf Top-of-Rack deployment, or as an End-/Middle-of-Row providing direct server termination. Supporting Avaya's innovative Fabric Connect and Switch Cluster technologies, in addition to

conventional IPv4 and IPv6 Routing, the VSP 8600 is an agile and versatile option that's suitable for a variety of deployment scenarios.

The VSP 8600 can be implemented singularly, benefitting from hitless failover high-availability that protects traffic flows in the event of any system-level failure. However, it's more typically deployed as a pair or in multiples of paired nodes. Thus implemented, the VSP 8600 delivers network-level always-on application resiliency and high-availability. When properly architected, the network is largely autonomous: network-wide application availability is protected from any single equipment, system, or node failure.

For large Campus deployments, the VSP 8600 would typically be matched with Wiring Closet products from either the Ethernet Routing Switch 5000 or 4000 Series ranges. Leveraging 10 Gigabit network uplinks ensures end-to-end performance, complementing the demanding capabilities of Gigabit-to-the-Desktop and Wave 2 Wireless LAN infrastructures.

Data Center implementations could leverage the high-capacity 40 and 100 Gigabit connections, with the VSP 8600 acting as the Spine that supports multiple 1/10 Gigabit Top-of-Rack Switches such as the Virtual Services Platform 7200 Series. Alternatively, the VSP 8600 could be deployed as either an End-of-Row or Middle-of-Row Switch, leveraging its high 10 Gigabit port density to provide direct server termination.

Avaya's unique network virtualization technologies enable real-time service deployment. As a product line, the VSP 8600 enables businesses to redirect their finite IT resources to important value-adding projects. The VSP 8600 provides business with a future-ready solution that leverages the Industry's most software-definable network virtualization technology.

Networking for the Software-Driven Age

As businesses undertake the digital transformation, the trends of cloud, mobility, and IoT converge. Organizations need to take a holistic approach to protecting critical systems and data, and important areas for attention are the ability to isolate traffic belonging to different applications, to reduce the network's exposure and attack profile, and to dynamically control connectivity to network assets.

In addition to all of the normal challenges and demands, businesses are also starting to experience IoT. This networking phenomenon sees unconventional embedded- system devices appearing, seemingly from nowhere, requiring connectivity. IoT is being positioned as the enabling technology for all manner of "Smart" initiatives.

The pervasive consumerization of technology is also driving IoT into businesses. What's crucial for success is the agility, scalability, and robustness of the underlying information technology infrastructure.

Securing the Everywhere-Perimeter: Deploying an IoT-ready Network

Securing the Everywhere-Perimeter is a program from Avaya that formalizes a series of capabilities that seek to address both traditional and emergent networking requirements with an innovative approach to protecting critical applications and confidential data.

The three key emerging challenges – implementing scalable segmentation, managing the double-edged nature of IP reachability, and securing edge attachment and configuration – are addressed by the three pillars of the Securing the Everywhere-Perimeter program:

- Hyper-Segmentation

- Native Stealth

- Automatic Elasticity

Security experts agree: the expanded use of network segmentation is an invaluable tool in thwarting cyber-attacks[1]. It is a recommendation that has obvious merit. Segmentation can severely limit lateral movement, thereby helping to protect essential applications and confidential data. Additionally, wide-spread use of segmentation complements traditional security technologies.

The world is on the verge of an unprecedented surge in networked connectivity. To successfully manage this evolution to hyper-connectivity, both in terms of efficiency of delivery and protection against cyber-attack, networks need a foundation that seamlessly integrates scalability, security, and automation.

Avaya SDN-Fx™ Architecture: Realizing Network Simplicity

Thanks to Avaya, it is possible to realize simplicity everywhere in your network. Avaya solutions deliver end-to-end simplicity, from the Data Center all the way through to the Network Edge. Embedding automation and integration delivers a more agile network. Applications, devices, and users view the network as a simple connectivity utility, one that automatically reconfigures itself when changes - either planned or unplanned - occur.

The Avaya SDN Fx™ Architecture makes it possible for the network to handle once-manual functions automatically, reducing the potential for error, and accelerating time-to-service. An automated core takes advantage of a single, network-wide Ethernet Fabric to remove the need for manual configuration at each network hop. This empowers the network to quickly respond to changing business requirements with precision and flexibility.

The Avaya SDN Fx™ architecture defines a solutions framework that enables customers to reap the benefits of network simplicity, reliability, and virtualization. It supports the deployment of SDN-enabled applications in a controlled manner as, where, and when business cases drive demand. SDN Fx™ demonstrates Avaya's continued focus on open source and standards, delivering extensible solutions that enable businesses to achieve more than the limited scope promoted by generic software-defined networking models.

With SDN Fx™, Avaya is delivering the industry's first holistic software-defined networking architecture. Solutions support the deployment of SDN applications in a controlled, business-driven manner, and enable customers to reap the benefits of network simplicity, reliability, and virtualization in hybrid and legacy environments. SDN Fx™ exemplifies Avaya's continued focus on delivering networking simplicity and efficiency, benefiting from a pragmatic foundation of openness and standards-compliance.

VSP Operating System Software

It's the Avaya VSP Operating System Software - VOSS - that really transforms our hardware platforms. Obviously, Avaya strives to deliver innovative and compelling products, but VOSS is the secret sauce that delivers the SDN Fx™ functionality and empowers the Securing the Everywhere Perimeter capabilities. Avaya strives to build a broad range of agile, market-leading hardware platforms – exemplified by the new VSP 8600 – that are fit-for-purposes in the various deployment scenarios typically found in the mainstream enterprise, but it is the unifying, enabling force of VOSS that truly sets our solutions apart from the field.

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[1] Rob Joyce, Chief of Tailored Access Operations, US National Security Agency: "Disrupting Nation State Hackers", USENIX Enigma, January 2016.

Using the Network to Help Drive Revenue-Enabling Innovation

With an Avaya Fabric Connect foundation, IT can dramatically revolutionize their ability to deliver agile services. By fundamentally changing the way that the network is built and operated, businesses can shift their focus from mundane, time-consuming maintenance to value-adding initiatives; re-directing precious skills to enhance the business's operational efficiency and competitive capability. The Avaya Fabric Connect technology provides companies with the opportunity to run the network at business speed.

Avaya has created a new way of deploying and running networks, one that fundamentally transitions from traditional "cost center" perception to that of "business enabler", increasing agility and enhance returns.

Market Dynamics was commissioned by Avaya to independently research what customers of Fabric Connect were experiencing after implementing solutions based on this technology[2]. The results are genuinely eye-catching and provide a dramatic contrast with the negative consequences of conventional networking, so emphatically highlighted by the earlier Network Agility Report[3].

Avaya Fabric Connect provides – on average – 11x faster time-to-implement. This is a direct outcome of the capability that Fabric Connect uniquely delivers; Edge-only provisioning, implemented in real-time. This can empower radical improvements to service agility. With no requirement for maintenance windows, the time that businesses wait to make a significant change in the network can be dramatically reduced. Instead of an average of about one month, changes can now typically be made the same day. Once the decision to make a change is taken, IT can simply get on and deliver service to the Business.

The wait time required before changes can be attempted is improved by 66%, and Fabric Connect can also enable a 7x improvement (or 85% reduction) in both configuration and troubleshooting times. Crucially, outages caused by human errors were eliminated.

Defending the Network from Threats, Internal & External

Avaya delivers businesses a smart alternative to the conventional, outdated techniques and technologies that are proving largely ineffective to digital-age threats. Solutions created using the Avaya SDN Fx™ Architecture leverage a next-generation network virtualization technology that natively compartmentalizes traffic.

Fabric Connect automatically partitions traffic, by community-of-interest, into virtual containers and maintains this separation end-to-end across the network. In addition to delivering highly efficient connectivity, this capability has the added benefit of denying unauthorized intruders the "panoramic view" and "node-hop" opportunities that borderless access affords. This can result in a step-change improvement for a business' overall security posture.

Fabric Connect is an enhanced implementation of the IEEE's next-generation network virtualization standard and is significantly more powerful than conventional approaches. Fabric Connect integrates our Enterprise-class access control solution – Identity Engines – and seamlessly complements multi-layered threat detection and protection technologies. The Avaya SDN Fx™ Architecture redefines responsible networking in an age when cyber-attack is an ever-present threat.

IoT Takes IT's Perennial Challenge to Another Level

Avaya has pioneered the concept of "network elasticity", and is uniquely positioned to deliver solutions that make this a reality. The Fabric Connect network stretches services to the Edge as-required and only for the duration of a specific application session. As applications terminate, or end-point devices disconnect, the now-redundant networking services retract from the Edge. This elasticity has two distinct benefits: it simplifies and expedites provisioning for the ever-increasing number of network devices, and it reduces a network's exposure and attack profile.

In the context of the IoT, end-point devices – often unattended – need to be deployed in real-time, without the requirement for IT intervention or manual configuration, but with a centralized, business-centric policy engine controlling connectivity. The award-winning Avaya Identity Engines is an ideal solution, providing enhanced user and/or device authentication and policy control.

With Avaya, there can be simplicity everywhere in your business network. The Avaya SDN Fx™ Architecture delivers end-to-end simplicity, from the Data Center all the way through to the Network Edge. Embedding automation and integration delivers a more agile network.

With the SDN Fx™ Architecture, an automated core takes advantage of a single, network-wide Ethernet Fabric to remove the need for manual configuration at each network hop. This empowers the network to quickly respond to changing business requirements with precision and flexibility.

[2] Dr Cherry Taylor, Fabric Connect Customer Experience Research Report, Dynamic Markets, 2015.

[3] Dr Cherry Taylor, Network Agility Research Report, Dynamic Markets, 2014.

Product Overview

The VSP 8600 is a modular chassis system, supporting a field-replaceable, hot-swappable capability on all system hardware components: Power Supplies, Fan Trays, Switch Fabric and Interface Modules. Ethernet connectivity is delivered by the addition of one or more Interface Modules, referred to as IOC Modules. The VSP 8600 runs the VSP Operating System Software.

The VSP 8608 Chassis features eight slots for IOC Modules, plus three central slots reserved for Switch Fabric Modules; all are accessible from the front of the chassis. These slots are all vertically-orientated and organized such that, left-to-right, Slots 1-4 and 5-8 are available for IOC Modules, with the three central slots are reserved for SF Modules. Up to three Switch Fabric Modules are supported in a load-sharing high-availability design. The VSP 8608 Chassis is very low-profile, given the capacity and density, occupying just seven RU of height in a standard 19" rack.

Normally, in a modular chassis design, there is a hardware component dedicated to the control plane functionality: often referred to as a Supervisor or Controller. However, with the VSP 8600, the control plane function has been decentralized and seamlessly integrated into the design of the IOC Modules themselves. This delivers an enhanced level of hardware efficiency and helps to reduce the overall system complexity, physical profile, and cost. All IOC Module variants support this role, although it's the two IOC Modules installed in Slots 1 and 2 that actively perform this task.

This architecture makes the VSP 8600 ready for the Avaya Pivot™ operation platform. All IOC Modules are equipped with a control processor, but with just the two installed in Slots 1 and 2 being active in delivering the Switch's control plane, there's potential to access this

otherwise dormant capacity. This presents a significant opportunity for Avaya Pivot. First-generation IOC Modules feature PowerPC processors, but the design is sufficiently modular so that future iterations could integrate x86 or ARM. This would make support for virtualized networking and security functions simpler and quicker-to-market, given that are most commonly compiled to run on x86-based architectures.

The front of the chassis also provides access for the Power Supply bays. Up to four independent load-sharing PSUs are supported, and both 3,000W AC or 2,500W DC models are available. It should be noted that while the system supports both AC and DC power, all PSUs must be of the same type; that is, either all AC or all DC. Typically, we'd expect to see the VSP 8600 operated in a N+1 PSU configuration, and therefore operators will order and install the required number of PSUs.

And, finally, five Fan Trays are installed into the rear of the chassis and deliver front-to-back cooling airflow. By default, the system will ship with all five Fan Modules installed, and spare units can be purchased to provide for on-site replacement to cover any failure eventualities.

The 8600SF Switch Fabric Module leverages an advanced merchant silicon chipset that delivers 7.2Tbps of aggregate throughput. The VSP 8608 supports up to three 8600SF Modules in a load-sharing, high-availability configuration, providing a raw system capacity of up to 21.6Tbps of aggregate throughput. At least one Switch Fabric Module is required for the VSP 8600 to operate, and depending upon the mix of IOC Modules installed, additional Switch Fabric Modules provide extra per-IOC slot switching capacity and/or resiliency. The first-generation IOC Modules can access up to 1,440Gbps of aggregate Switch Fabric capacity.

The VSP 8600 will, at launch, deliver high-density 10, 40, and 100 Gigabit Ethernet connectivity with flexible multi-rate capabilities. IOC Modules leverage the latest generation high-performance ASIC, delivering full network classification and pipelining functionalities. The VSP 8600 Series IOC Modules delivered at launch are as follows:

- 8606CQ 6-port 100 Gigabit Ethernet in QSFP28 format

- 8616QQ 16-port 40 Gigabit Ethernet in QSFP+ format

- 8624XS 24-port 10 Gigabit Ethernet in SFP+ format

- 8624XT 24-port 10 Gigabit Ethernet in RJ45 format

It should also be noted:

- 100 Gigabit Ethernet QSFP28 ports also support Channelization and can, therefore, be individually subdivided as 1x40Gbps, 4x25Gbps, or 4x10Gbps channels.

- 40 Gigabit Ethernet QSFP+ Ports 1-4 also support Channelization and can, therefore be individual sub-divided as 4x10Gbps 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.

Please refer to the product technical documentation for further details.

System Performance

Each 8600 Switch Fabric Module provides 7.2Tbps in terms of aggregate bandwidth, or 3.6Tbps of Full-Duplex bandwidth. This capacity is evenly distributed across the eight IOC Module slots. As each additional 8600SF Module is added to the system, additional per-IOC slot bandwidth is introduced, increasing the overall capacity and performance

levels. Therefore, a fully loaded system, with three 8600SF Modules installed, delivers a raw system capacity of aggregate 21.6Tbps (10.8Tbps Full Duplex). The first-generation IOC Modules can access 480Gbps aggregate (240Gbps FDX) of each of the installed Switch Fabric Modules, up to the maximum of 1.44Tbps (720Gbps FDX).

Benefits

The VSP 8600 adds significant flexibility to the Avaya Networking portfolio, and is compatible with, and complementary to, existing products and technologies. It is Avaya's next-generation, high-performance Chassis-based Modular Ethernet Switching platform. It is positioned as a highly scalable platform delivering a broad range of interface connectivity, and focused primarily for demanding Core/Spine Switch applications in the Campus and Data Center. To this end, the VSP 8600's architecture features deep packet buffers that accommodate bursty traffic and deliver lossless performance.

Avaya Networking has a long history of innovation in the Ethernet Switching industry. Our SynOptics, Bay Networks, and Nortel heritage, combined with our current activity, ensures that we have been at the center of virtually every significant networking development over the last three decades. The new VSP 8600 continues this proud tradition of innovation. It's a modular platform that delivers high capacity yet consumes minimal space, delivering leading port and bandwidth densities. It is a highly efficient platform that reduces system complexity by integrating control functionality with a broad range of interface options. The VSP 8600 features a flexible architecture that satisfies today's need for high-performance and high-availability, and seamlessly integrates capabilities that allow for an evolution that will keep the platform class-leading for many years.

The VSP 8600 makes use of the most advanced, efficient merchant silicon from the industry's leading innovator. This achieve faster time-to-market, greater economies of performance, and broader feature capability. The VSP 8608 Chassis is very low-profile, given the capacity and density, occupying just seven (7) RU of height in a standard 19" rack.

System Compatibility

From a software perspective, the VSP 8600 Series is introduced with the release of the VOSS 4.5 software version; this will therefore be the minimum level of software available to operate the Switch.

Product Details

Features & Capabilities

- Innovative design to address the challenges of today.

- Reduced hardware requirements minimizes capital outlay.

- Higher port density from a reduced footprint.

- Break-the-mold architecture that is future-ready.

- Pioneering pay-as-you-grow software licensing model.

- Leverages full-featured, tried and tested VOSS software.

- Flexible support for up to 48 ports of 100 Gigabit Ethernet, 128 ports of 40 Gigabit Ethernet, or 192 ports of 10 Gigabit Ethernet.

- Hot-swappable hardware.

- Feature-rich support for conventional VLAN, Link Aggregation, Spanning Tree technologies.

- Support for IP Routing techniques including Static, RIP, OSPF, eBGP, BGP+, ECMP, DvR[4], VRRP, PIM-SM/SSM, and VRF. Additionally, supports Static, RIPng, OSPFv3, ECMP, and VRRP for IPv6 deployments[4].

- IPv6-optimized Hardware, with IPv6 software support targeted for a follow-on release.

- Avaya Switch Cluster technology supports Triangle & Square configurations, with both Layer 2 and Layer 3 functionality.

- Avaya Fabric Connect technology supports L2 Virtual Service Networks (VSNs)[4], Layer 3 Virtual Service Networks[4], Inter-VSN Routing[4], IP Shortcut Routing[4], IP Multicast-over-Fabric Connect[4] and Fabric Connect-PIM Gateway[4], Fabric Attach Server[4] and Client[4], and Fabric Extend[4]. Note: At initial launch, Fabric Connect BCB features are available, with future support for BEB features. BCB Nodes transparently pass BEB services sourced by and destined for other Fabric Connect Nodes.

- MACsec and Enhanced Security Mode options.

High-Availability Power & Cooling

- Up to 4 field-replaceable, hot-swappable AC or DC internal Power Supplies.

- 5 field-replaceable Fan Trays.

Warranty

- 12-month hardware warranty.

- A complete range of support options are also available, either directly from Avaya or indirectly from our Authorized Business Partner network.

Software Licensing

- IOC Base Software License. The VSP 8600 implements a new licensing paradigm that introduces a pay-as-you-grow license approach to the most commonly used software features. For each installed IOC Module, customers will purchase a corresponding IOC Base Software License; this has the effect of

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[4] Software support delivered in a follow-on release.

dispensing with the large up-front costs associated with the conventional one-size-fits-all Chassis license.

• Layer 3 Virtualization Feature Pack. This is an optional, system-wide, mission-specific license that enables

advanced level of device- and network-level virtualization, and - where local regulations permit - MACsec. This Feature Packs enables: >16 BGP Peers, >24 Virtual Routing & Forwarding instances, Layer 3 Virtual Service Networks, and – where applicable – MACsec.

Country of Origin

• Taiwan (ROC). This ensures that the VSP 8600 Series is TAA-compliant.

VSP 8600 Specifications		
General		

• Physical Connectivity:
  - up to 48 ports of 100GBASE-QSFP28
  - up to 128 ports of 40GBASE-QSFP+
  - up to 192 ports of 10GBASE-SFP+ or 10GBASE-T
• Switch Fabric Capacity: 7.2Tbps per Switch Fabric Module, up to 21.6Tbps
	• Switching Capacity per IOC Module: up to 1.44Tbps
	• Channelization of 100 Gigabit ports - 1x40Gbps, 4x25Gbps[4], 4x10Gbps[4]
	• Channelization of 40 Gigabit ports - 4x10Gbp[4]
		• Frame forwarding rate: up to 952.32Mpps per Slot
		• Nominal Latency: <4.5μsec
		• Jumbo Frame support: up to 9,600 Bytes
		• (802.1Q Tagged)
		• MACsec Link Layer Encryption
		  - 10 Gigabit (SFP+ & RJ45[4])
		  - 100 Gigabit[4]

Layer 2		
• MAC Address: 256,000 • Port-based VLANs: 4,059 • Private VLANs/E-Tree: 4,059[4]	• MSTP Instances: 64 • MLT/LACP Groups: up to 192 • MLT Links per Group: 16	• Avaya VLACP Instances: up to 192 • Avaya SLPP Instances: 192
Layer 3 IPv4 Routing Services		
• ARP Entries: 64,000 • Static ARP Entries: 2000 per VRF, 10,000 per System • IP Interfaces: 4,000 • CLIP Interfaces: 64 • IP Routes: up to 256,000 • IP Static Routes: 2,000 per VRF, 10,000 per System • RIP Interfaces: 200	• OSPF Interfaces: 512 Active/2,000 Passive • OSPF Areas: 12 per VRF, 80 per System • BGP Peers: 256 • BGP RIB Routes: 1,500,000 (Control Plane only) • ECMP Unique Groups: 1,000 • ECMP Paths per Group: 8 • NLB Interfaces: 128 per VLAN, 256 per System	• VRRP Interfaces: 512 • RSMLT Interfaces: up to 4,000 over 512 SMLT • IPv4 UDP Forwarding Entries: 1,024 • IPv4 DHCP Relay Forwarding Entries: 1,024 • IP Route Policies: 500 per VRF and 5,000 per System • VRF Instances: 512
Layer 3 IPv6 Routing Services		
• Neighbors: 16,000[4] • Static Neighbors: 1000[4] • IP Interfaces: up to 4,000 (Shared with IPv4) [4] • CLIP Interfaces: up to 64 (Shared with IPv4)[4] • Configured Tunnels: 16[4]	• IP Routes: up to 64,000[4] • IP Static Routes: up to 10,000[4] • RIPng Interfaces: 64[4] • OSPFv3 Interfaces: 500[4] • OSPFv3 Areas: 12 per VRF, 80 per System[4]	• ECMP Groups: 1,000[4] • ECMP Paths per Group: 8[4] • VRRP Interfaces: 512[4] • RSMLT Interfaces: up to 4,000 over 512 SMLTs[4]
Multicast		
• IGMP Interfaces: 4,059 • PIM Interfaces: 512 Active/4,000 Passive • Multicast-over-Fabric Connect enabled VLANs: up to 2,000[4]	• Multicast Senders/Receivers: up to 6,000 • IP Multicast Groups per BCB: up to 50,000 • PIM Multicast Routes: up to 6,000	• Static Multicast Routes: up to 4,000 • PIM-SSM Static Channels: up to 4,000
Fabric Connect		
• 802.1aq/RFC 6329 Shortest Path Bridging with Avaya extensions • MAC Address: 256,000 • NNI Interfaces/Adjacencies: up to 192	• Equal Cost Trees: 2 • BCB/BEB Nodes per Region: 2,000 • L2 Virtual Service Networks: 4,059[4]	• L3 Virtual Service Networks: up to 512[4] • IP Shortcut Routes: up to 256,000 IPv4 and 64,000 IPv6[4]
QoS & Filtering		
• ACE: 2,000 Security & QoS per IOC	• L2-L4 Ingress Port Rate Limiters: up to 96	• Egress Port Shaper Granularity: 1Mbps per Port
Operations & Management		

• EDM On/Off-Box
• SNMP v1/2/3
• ACLI
• RADIUS, Community-based Users
• Terminal Access Controller Access-Control System, TACACS+
• Key Health Indicator (KHI)
• Logging (log to file and syslog)
• RMON
• Mirroring (port- and flow-based)
	• Telnet Server/Client
	• Trivial File Transfer Protocol (TFTP) Server/Client
	• File Transfer Protocol (FTP) Server/Client
	• Secure Shell (SSH) v1 & v2 Server/Client
	• Secure Copy (SCP)
	• Remote Shell (RSH) Server/Client
	• Remote Login (Rlogin) Server/Client
	• Domain Name Service (DNS) Client
	• Network Time Protocol (NTP)
		• SoNMP (Avaya Topology Discovery Protocol)
		• Avaya Virtual Link Aggregation Control Protocol (VLACP)
		• Avaya Simple Loop Prevention Protocol (SLPP)
		• IEEE 802.1ag Connectivity Fault Management
		  - L2 Ping
		  - TraceRoute
		  - TraceTree

VSP 8600 Specifications (cont.)

Supported Transceivers & Cables

100 Gigabit Ethernet
- 100GBASE-SR4 QSFP28, up to 100m over MMF (MPO)
- 100GBASE-LR4 QSFP28, up to 10km over SMF (Duplex LC)
- 100GBASE-QSFP28 Direct-Attach Cable, Passive Copper: 1.0m, 3.0m, 5.0m

- 100GBASE-QSFP28 Direct-Attach Cable, Active Optical: 10.0m
- 100GBASE-QSFP28/4x25GBASE-SFP28, Break-Out Cable, Passive Copper: 1.0m, 3.0m, 5.0m[4]
- 100GBASE-QSFP28/4x25GBASE-SFP28, Break-Out Cable, Active Optical: 10.0m[4]

- 100GBASE-QSFP28/4x10GBASE-SFP+, Break-Out Cable, Passive Copper: 1.0m, 3.0m, 5.0m[4]
- 100GBASE-QSFP28/4x10GBASE-SFP+, Break-Out Cable, Active Optical: 10.0m[4]

40 Gigabit Ethernet
- 40GBASE-SR4 QSFP+, up to 150m over MMF (MPO)
- 40GBASE-LM4 QSFP+, up to 160m over MMF (Duplex LC)
- 40GBASE-ESR4 QSFP+, up to 400m over MMF (MPO)[4]
- 40GBASE-LR4 QSFP+, up to 10km over SMF (Duplex LC)

- 40GBASE-PSM4 QSFP+, up to 10km over SMF (Duplex LC)[4]
- 40GBASE-ER4 QSFP+, up to 40km over SMF (Duplex LC)
- 40GBASE-QSFP+ Direct-Attach Cable, Passive Copper: 0.5m, 1.0m, 2.0m, 3.0m, 5.0m

- 40GBASE-QSFP+ Direct-Attach Cable, Active Optical: 10.0m
- 40GBASE-QSFP+/4x10GBASE-SFP+ Break-Out Cable, Passive Copper: 1.0m, 3.0m, 5.0m[4]
- 40GBASE-QSFP+/4x10GBASE-SFP+ Break-Out Cable, Active Optical: 10.0m[4]

10 Gigabit Ethernet
- 10GBASE-T SFP+, up to 30m over Cat 6a (RJ45)
- 10GBASE-LRM SFP+, up to 220m over FDDI-grade MMF/up to 300m over SMF (Duplex LC)
- 10GBASE-SR SFP+, up to 300m over MMF (Duplex LC)

- 10GBASE-LR/LW SFP+, up to 10km over SMF (Duplex LC)
- 10GBASE-BX SFP+ (paired), up to 10km over SMF (Duplex LC)
- 10GBASE-ER/EW SFP+, up to 40km over SMF (Duplex LC)

- 10GBASE-ZR/ZW SFP+, up to 80km on SMF (Duplex LC)
- 10GBASE-SFP+ Direct-Attach Cable, Active Copper: 3.0m, 5.0m, 7.0m, 10m

Note: Avaya also supports certain third-party Transceivers in "Forgiving Mode": please refer to the product documentation for full details and a complete listing of all specifications and compliance. SFP+ sockets are also capable of supporting a wide range of 1 Gigabit Ethernet Transceivers; additionally, 10 Gigabit Ethernet RJ45 ports also support 100/1000Mbps connectivity.

[4] Supported in a follow-on software release.

VSP 8600 Series Standards Compliance

IEEE

802.1 Bridging (Networking) & 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)
- 802.1s 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

- 802.1Qbp Equal-Cost Multi-Path (Shortest Path Bridging)
- 802.1X Port-based Network Access Control[4]
- 802.1AB-2005 Station & Media Access Control Connectivity Discovery; aka LLDP (partial support)[4]
- 802.1AE Media Access Control

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 (partial support)

- 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+

- 802.3ba-2010 40Gb/s and 100Gb/s
- 802.3an-2006 10Gb/s Operation, 10GBASE-T Copper
  Operation, implemented as
  - 40GBASE-QSFP+
  - 100GBASE-QSFP28

VSP 8600 Series Standards Compliance (cont.)

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 & 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
- 1340 Assigned Numbers
- 1350 TFTPv2
- 1398 Ethernet MIB
- 1442 SMIv2 of SNMPv2
- 1450 SNMPv2 MIB
- 1519 CIDR
- 1541 DHCP
- 1542 Clarifications & 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 SMIv2
- 1723 RIPv2 Carrying Additional Information
- 1812 Router Requirements
- 1850 OSPFv2 MIB
- 1866 HTMLv2
- 1907 SNMPv2 MIB
- 1930 Guidelines for Creation, Selection, & Registration of an AS
- 1981 Path MTU Discovery for IPv6
- 2021 Remote Network Monitoring MIBv2 using SMIv2
- 2068 HTTP
- 2080 RIPng 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 AH
- 2407 Internet IP Security Domain of Interpretation for ISAKMP[5]
- 2408 Internet Security Association & Key Management Protocol[5]
- 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 & 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 SMIv2
- 2579 Textual Conventions for SMIv2
- 2580 Conformance Statements for SMIv2
- 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
- 2874 DNS Extensions for IPv6
- 2925 Definitions of Managed Objects for Remote Ping, Traceroute, & Lookup Operations
- 2819 Remote Network Monitoring MIB
- 2863 Interfaces Group MIB
- 2865 RADIUS
- 2874 DNS Extensions for IPv6
- 2925 Definitions of Managed Objects for Remote Ping, Traceroute, & 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
- 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
- 4007 IPv6 Scoped Address Architecture
- 4022 TCP MIB
- 4087 IP Tunnel MIB
- 4113 UDP MIB
- 4133 Entity MIB Version 3 (partial support)
- 4213 Basic Transition Mechanisms for IPv6 Hosts & 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[5]
- 4302 IP Authentication Header[5]
- 4303 IP Encapsulating Security Payload[5]
- 4308 Cryptographic Suites for IPsec
- 4363 Definitions of Managed Objects for Bridges with Traffic Classes, Multicast Filtering & VLAN Extensions
- 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
- 4835 Cryptographic Algorithm Implementation Requirements for ESP & AH
- 4861 Neighbor Discovery for IPv6
- 4862 IPv6 Stateless Address Auto-Configuration
- 5095 Deprecation of Type 0 Routing Headers in IPv6
- 5187 OSPFv3 Graceful Restart (Helper-mode)
- 5308 Routing IPv6 with IS-IS
- 5340 OSPF for IPv6
- 5798 VRRPv3 for IPv4 & IPv6
- 6105 IPv6 Router Advertisement Guard
- 6329 IS-IS Extensions supporting IEEE 802.1aq SPB
- 7358 VXLAN: A Framework for Overlaying Virtualized L2 Networks over L3 Networks (partial support)[4]
- 7610 DHCPv6 Shield: Protecting against Rogue DHCPv6 Servers

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[5] Implemented to deliver IPsec capability for Control Plane traffic only.

Additional Information

For further information about Avaya Ethernet Switches, and the complete Avaya Networking portfolio, please visit **www.avaya.com**.

About Avaya

Avaya is a leading, global provider of customer and team engagement solutions and services available in a variety of flexible on-premise and cloud deployment options. Avaya's fabric-based networking solutions help simplify and accelerate the deployment of business critical applications and services. For more information, please visit www.avaya.com**.**

Ordering Information	
Part Code	**Description**
Chassis	
EC8602001-E6	VSP 8608 Chassis with eight (8) IOC Module Slots, complete with five (5) Fan Modules, Rack Mount, & Cable Guide.
SF & IOC Modules	
EC8604001-E6	8600SF Switch Fabric Module.
EC8604002-E6	8624XS 24-Port 10 Gigabit Ethernet SFP+ Input Output Controller Module.
EC8604003-E6	8624XT 24-Port 10 Gigabit Ethernet RJ45 Input Output Controller Module.
EC8604004-E6	8616QQ 16-Port 40 Gigabit Ethernet QSFP+ Input Output Controller Module.
EC8604005-E6	8606CQ 6-Port 100 Gigabit Ethernet QSFP28 Input Output Controller Module.
Accessories	
EC8605A01-E6	3,000W 100-240V AC Power Supply for use with the VSP 8600 Series.
EC8605A02-E6	2,500W DC Power Supply for use with the VSP 8600 Series.
EC8611001-E6	Spare Fan Module for use with the VSP 8600 Series.
EC8611002-E6	Module Filler Panel for use with the VSP 8600 Series.
EC8611003-E6	Power Supply Filler Panel for use with the VSP 8600 Series.
EC8611004-E6	Rack Mount for the VSP 8600 Series.
EC8611005-E6	Cable Guide for the VSP 8600 Series.
EC8611006-E6	Power Supply Bay Cover Panel for use with the VSP 8600 Series.
Software Licenses	
392259	VSP 8600 IOC Base Software License; One (1) required per VSP 8600 IOC Module.
392670	VSP 8600 Layer 3 Virtualization Feature Pack Software License; One (1) required per VSP 8600 Chassis.
392671	VSP 8600 Layer 3 Virtualization & MACsec Feature Pack Software License; One (1) required per VSP 8600 Chassis.
Power Cords	
AA0020076-E6	AC Power Cord 20A/125V NEMA 5-20, North America.
AA0020077-E6	AC Power Cord 15A/250V NEMA 6-15, North America.
AA0020078-E6	AC Power Cord 16A/250V CEE7/7, Continental Europe.
AA0020079-E6	AC Power Cord 16A/250V CEI 23-50 S17, Italy.
AA0020080-E6	AC Power Cord 16A/250V SI 32, Israel.
AA0020081-E6	AC Power Cord 15A/250V BS-546, India / South Africa.
AA0020082-E6	AC Power Cord 16A/230V 3-Pin IEC60309, International.
AA0020083-E6	AC Power Cord 20A/250V NEMA L6-20 Twist Lock, North America.
AA0020084-E6	AC Power Cord 15A/250V AS 3112, Australia.
AA0020085-E6	AC Power Cord 13A/230V BS 1362, UK and Ireland.
AA0020086-E6	AC Power Cord 16A/250V GB 11918-86, Greater China.
AA0020087-E6	AC Power Cord 15A/250V NEMA L6-15 Twist Lock, North America.
AA0020102-E6	AC Power Cord IEC C19 TO NBR 14136 (IEC 60906-1) Brazil (2.5m 16A/250V).
AA0020112-E6	DC Power Cord for use with EC8602001-E6 2,500W DC Power Supply.
Chassis Bundles	
EC8602002-E6	VSP 8600 AC Chassis Bundle, complete with: • VSP 8608 Chassis with eight (8) IOC Module Slots, complete with five (5) Fan Modules, Rack Mount, & Cable Guide. • 4 x 3,000W 100-240V AC Power Supply for use with the VSP 8600 Series. • 3 x 8600SF Switch Fabric Modules.
EC8602003-E6	VSP 8600 DC Chassis Bundle, complete with: • VSP 8608 Chassis with eight (8) IOC Module Slots, complete with five (5) Fan Modules, Rack Mount, & Cable Guide. • 4 x 2,500W DC Power Supply for use with the VSP 8600 Series. • 3 x 8600SF Switch Fabric Modules.

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