



# AVAYA

Engage The Power of We™

## Avaya Virtual Services Platform 7200 Series

A line of high-performance Top-of-Rack Ethernet Switches developed by Avaya to leverage the very latest generation of highly advanced chipsets. Combining with the Avaya's operating system software to deliver the 'Avaya advantage': a networking solution that is cost-effective, fully featured, flexible, and simple to operate.

The Avaya Virtual Services Platform 7200 Series continues the unique and innovative 'Distributed Top-of-Rack' capability pioneered by the original VSP 7000 Series: minimizing server-to-server latency to maximize application performance. Distributed Top-of-Rack delivers multi-hop low-latency, supporting advanced Fabric-based services, and enabling a one-touch, Edge-only provisioning model. Leveraging this application performance advantage, businesses can help reduce time-to-decision, and streamline deployment and operational costs.

Most enterprises are looking at ways to reduce cost and improve time-to-service, and most are looking for ways to improve the operational efficiency of the Data Center. Wouldn't it be nice if you could deploy a new application across multiple Data Centers in an instant? Wouldn't it be nice if you could give IT the ability to simply say "yes" when there is a new application or service that needs to be deployed? Server virtualization within the Data Center is now taken for granted, with some industry observers declaring that 'Cloud Computing' will become a reality for most enterprises. Applications and compute resources are set to become simple commodities. Experience has proved one thing; the Data Center of the future cannot be built on the technology of the past. Generalist products, outmoded techniques, and legacy

designs cannot be re-packaged as 'Data Center-ready'. The industry will take the best and leave the rest. Ethernet is readily available, cost-effective, extensible, and – as the 40 and 100 Gigabit developments prove – scalable. However many existing deployment methodologies and techniques are no longer an option.

Avaya Networking provides an overarching strategy designed to improve network uptime, delivering the infrastructure that creates the seamless private cloud and virtually eliminates user-error network outages. We are reducing time-to-service by enabling with simple one-touch provisioning, and we are improving Data Center efficiency by tightly integrating applications and network virtualization.

VSP Operating System Software 5.0 delivers the following major enhancements:

- Avaya Fabric Connect enhancements, including Fabric Attach Server, Fabric Extend, & Switched UNI
- IPv6 enhancements, including BGP+, OSPFv3, OSPF Graceful Restart, RIPng, & First-Hop Security

## Introducing the VSP 7200 Series

The Avaya Virtual Services Platform 7200 Series is a space-efficient platform built around a next-generation chipset, delivering the wire-speed 10 and 40 Gigabit Ethernet connectivity necessary to satisfy today's requirements.

The VSP 7200 Series features seamless integration between the Industry's leading hardware and Avaya's proven VSP Operating System, delivering an enhanced level of functionality and robustness.

Leveraging Avaya's unique virtualization technologies, businesses can benefit from real-time service agility, avoiding the delays associated with conventional design, and the outages introduced in trying to maintain them. The highly efficient design revolutionizes the cost/benefit proposition for the Data Center Top-of-Rack Switch role; delivering high port density, better price/port, a lower entry price point, better power efficiency, it features reduced maintenance, a smaller physical footprint, and it scales easily.

### Innovative Capabilities matched to Class-leading Hardware

The Virtual Services Platform 7200 Series (VSP 7200) is ideally suited to deliver today's critical need for flexible, high-speed Ethernet connectivity in the high-performance Data Center Top-of-Rack (ToR) role. Additionally it provides a cost-effective 10 Gigabit Ethernet fan-out capability for existing Core Switch deployments, saving valuable ports and slots. Featuring a hardened physical architecture of 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 includes two variants. The 7254XSQ features forty-eight 10 Gigabit SFP+ sockets that support a wide variety of 1Gbps and 10Gbps Ethernet pluggable transceivers, plus six 40 Gigabit QSFP+ ports for high-speed network connectivity. The 72545XTQ model features forty-eight ports of fixed 10GBASE-T support, presented as RJ45 connectors, in addition to six 40 Gigabit network connections.

The design of the VSP 7200 is sympathetic to the evolving requirements for precisely planned environmental implementations. It offers both front-to-back and back-to-front airflow options for the field-replaceable fans modules and power supplies; this gives the flexibility to conform to a variety of hot-aisle/cold-aisle design requirements.

## Avaya Distributed Top-of-Rack: Creating the Latency-Reduced Network

The experience gained developing successive generations of our Stackable Chassis product lines has enabled Avaya to deliver the 'Distributed Top-of-Rack' technology with its dedicated Data Center Spine/Leaf Switches. This creates a virtual backplane that optimizes local traffic flows, using dedicated high-speed interconnections to forward packets on the shortest path between source and destination. This sort of efficiency is particularly important in a Data Center environment, creating a flatter, latency-optimized network that encompasses multiple racks of highly virtualized servers.

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.

Avaya 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.

## Avaya Switch Cluster: Improving Resiliency, Enhancing Availability

development of the Switch Cluster 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. This is the very essence of end-to-end always-on availability. Deploying Switch Cluster technology in the Core delivers high-availability for the Edge of the network, supporting the Campus Wiring Closet, Servers, Routers, or other networking devices in the Core/Data Center.

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. This delivers a series of benefits that provide real value; while it may be possible to simulate certain individual elements, no competitive offering can rival the combined capabilities, particularly in terms of simplicity and efficiency.

Switch Cluster delivers an interoperable solution that extends beyond simply Switches. This means that high-availability is not limited to only the switching network (the Switches themselves and their direct links), but to the total network; importantly also extended to attached Servers, Appliances, and WAN Routers, etc. Competing offers are based on interactions purely within the Switch domain, and crucially do not extend to the application hosts themselves. Most rival offerings are based on variations of the Spanning Tree Protocol (STP); however, support for this is limited to Switches alone and is not commonly supported by other devices. By excluding Servers from the active resiliency technology, these solutions cannot extend high-availability to the applications. The Switch Cluster technology is independent of STP and extends to support any device that utilizes Link Aggregation, a technology that is both basic and ubiquitous. Devices that attach to the Switch Cluster create a virtual connection using multiple physical links, this provides resiliency together with additional capacity.

Delivering availability and facilitating in-service maintenance and optimized performance are well-known features of Switch Cluster technology.

Enabling sub-second failover and recovery remains extremely important, perhaps never more important, however it is not necessarily a feature that remains unique. Enhancements to STP – namely rapid reconfiguration – can be aggressively configured to deliver similar levels of failover performance. However, all flavors of STP remain tied to the concept of detecting and acting upon changes to the network topology. This makes a network extremely sensitive to the reliability and availability of particular devices (Root Bridges, etc.). Avaya's Switch Cluster technology is built around the concept of mirrored devices and virtualized capabilities. Switch Cluster technology is so effective that the loss of an entire Switch – for planned maintenance or through failure – can be accommodated without any loss of overall application availability.

Switch Cluster technology can be implemented in the classic – physically connected – manner, but in an evolution of the technology, also with a 'Virtual IST'. This is an enhancement of the Inter-Switch Trunk functionality; it leverages a virtualized connection between the Cluster members, rather than via the traditional physical link. This delivers greater flexibility, optimizes utilization of high-value backbone connections, and forms the basis of further developments that will include scalability of a Cluster beyond two members, and the ability to mix-and-match device types within a Cluster.

Virtual IST (vIST) delivers a dependable scalability capability and de-risks purchasing decisions; the Core can provide both always-on high-availability and flexible pay-as-you-grow efficiencies.

## End-to-End

Adding Fabric Attach and Fabric Extend to Avaya Fabric Connect delivers a genuine end-to-end service delivery network. Virtualization and automation are abstracted from transport, enabling service agility and business efficiency.

Avaya'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.

## Avaya 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 Avaya 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 Avaya 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.

Leveraging Fabric Connect technology to virtualize the network enables a profound change. Rather than the network appearing as a mass of individual devices, it becomes an opaque cloud, so that engineers only need to touch the single unique device that is providing service directly to the end-point. Fabric Connect technology automatically and instantly propagates all service attributes to every other node within the cloud, delivering end-to-end connectivity.

Creating a fault-tolerant, powerful, and self-aware end-to-end Fabric, this technology creates a solution where service provisioning occurs only at the perimeter. The advantage is immediate and pronounced; administrative effort is reduced, errors can be avoided, and time-to-service is vastly enhanced. The beauty of the underlying technology is that it masks devices, links, and protocols and delivers what is logically an extended Ethernet LAN that provides connectivity for multiple end-points. That's the simple concept, and it is achieved in an interesting and quite unique way. Fabric Connect leverages a dynamic link-state routing protocol called Intermediate System-to-Intermediate System (IS-IS) and uses standardized extensions to share topology, reachability, and device information between every node in the domain. With nodes holding their own self-determined view of the network, including the optimal path to any destination, a fully distributed and dynamically maintained solution is created.

Fabric Connect technology has the added advantage of separating and segmenting traffic to unique service constructs. This delivers 'stealth networking' solutions that help with compliance for business processes such as those that require special handling for credit card payments (PCI) or the protection of healthcare data (HIPAA).

Network segmentation means that each service is uniquely encapsulated and carried independently of every other service. Leveraging a single unified protocol, with integrated IP Routing and IP Multicast capabilities, enables Fabric Connect to deliver the

Industry's premier solution for simplified, scalable, and resilient IP Multicast-based applications. The Edge-only provisioning model also delivers significant advances in how the network interacts with virtual machine mobility. Layer 2 VLANs can be easily and seamlessly extended throughout the Core or Data Center whether that is a single site or multi-site. Traffic flows are automatically load-balanced and more protected across all available links.

In the Data Center context, Fabric Connect combines with both Avaya and third party orchestration solutions to fully synchronize the provisioning of the networking requirements of workload mobility within and between locations. Dynamically moving or extending virtualized computing resources, without adding complexity, is a key value point of Fabric Connect. Fabric Connect offers a robust and resilient alternative to today's existing offerings. It delivers innovative services and solutions while maintaining Ethernet's key value propositions of simplicity and cost-effectiveness. Fabric Connect delivers new capabilities in the crucial areas of simplicity, scalability, performance, reliability, and service orchestration and abstraction.

Fabric Connect devices support a number of different User-Network-Interface (UNI) types to provide agile deployment capabilities:

- VLAN UNI (C-VLAN) – a node-specific VLAN ID maps to a L2 Virtual Service Network (VSN). All physical ports on that node associated with this VLAN are therefore associated with the service.

- Flex UNI has the following sub-types:
  - Switched UNI – a combination of VLAN ID and a Port maps to a L2 VSN. With this UNI type, VLAN IDs can be re-used on other ports and therefore mapped to different VSNs.
  - Transparent Port UNI – a physical port maps to a L2 VSN. All traffic through that port, 802.1Q tagged or untagged, ingress and egress is mapped to the VSN.
- E-Tree UNI – Private VLANs extend beyond one node to form a network-wide E-Tree service infrastructure. An E-Tree UNI is a L2 VSN where broadcast traffic flows from Hub sites to Spokes sites, from Spokes to Hubs, but not between Spoke sites. E-Tree Hubs can be formed with any VLAN UNI, while E-Tree Spokes must be configured as Private VLAN UNIs.
- L3 VSN UNI – a node-specific VRF maps to an L3 VSN, and the control plane exchanges the L3 routes with all nodes belonging to the same VSN. All VRFs in a network sharing the same L3 VSN, effectively forming an L3 VPN. L3 VSNs can be configured to simultaneously support both IP Unicast and IP Multicast.

Transitioning to an autonomic virtualized network delivers crucial advantages. It means that businesses<sup>1</sup> no longer need to configure the Core of the network for every service change; service is only configured at the Edge of the network. This has dramatic impacts for the entire change paradigm.

Fabric Connect has garnered a well-earned reputation for simplifying how networks are built and improving how they are run. Independent research

commissioned by Avaya<sup>1</sup> 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.

## Avaya Fabric Attach: The Missing Link for Service Automation

Service automation is the Holy Grail for IT. Creating solutions that enable business systems and processes to spin-up, move, or be decommissioned in real-time transitions IT from roadblock to facilitator. Avaya has developed technology to address automation of the critical “last yard”, where end-points devices meet the virtualized network.

The Avaya Fabric Connect technology delivers a number of key networking benefits. The independent Fabric Connect Customer Experience Research that Avaya commissioned demonstrates dramatic improvements in areas: implementation, configuration, and troubleshooting times, recovery, and error-induced outages are all improved. Fabric Connect is able to deliver these benefits by leveraging the power on the underlying Shortest Path Bridging protocol. This, amongst other characteristics, enables services to be defined only at the network edge, mitigating the traditional requirement for link-by-link, device-by-device configuration change. It is this legacy requirement that typically slows service deployment and introduces undesirable risk.

However, a challenge remains. That of delivering an automated attachment capability to an increasing large and diverse base of users and end-point devices, in what is a highly virtualized networking scenario. Any solution must be flexible, open, and complement the desire – in some cases, the mandatory requirement – to maximize the isolation of different traffic flows and minimize the unnecessary exposure of sensitive or mission-critical networks.

It is important, at this point, to be more specific about the challenge. The concept of implementing at least some level of automated attachment is not new. Vendors have independently developed MAC- and RADIUS-based solutions, and the industry has collaborated on open solutions such as the 802.1X Extensible Authentication Protocol. More recently, the 802.1AB Link Layer Discovery Protocol with media extensions assists with the deployment of VoIP/unified communication applications.

However, those approaches rely on the increasingly flawed assumption that the network edge has already been provisioned with access to all network segments (typically implemented as virtual LANs, VLANs). This may have made perfect sense when the network was essentially just a single “data” network, and when a single “voice” network was later added.

In response to this challenge, Avaya has developed Fabric Attach, a standards-based capability that facilitates the automatic attachment (“Auto-Attach” in standards verbiage) of end-point devices. Businesses can leverage Fabric

<sup>1</sup> Dr Cherry Taylor, Fabric Connect Customer Experience Research Report, Dynamic Markets, 2015. This report was commissioned by Avaya and details quantitative and qualitative research with IT professionals in companies that have implemented Avaya this technology.

Attach to dynamically deploy end-points, temporarily extending unique networking services to the edge as required. Auto-attached end-point devices connect to the appropriate network resources: this would typically be a Fabric Connect Virtual Service Network (VSN), or it could be a conventional VLAN. The Fabric Attach capability delivers the “Enabled Edge”, a foundational tenet of the Avaya SDN Fx architecture.

Fabric Attach is designed to streamline the deployment of generic IT end-point devices, networking devices, compute resources, and business-centric Internet of Things (IoT) end-point devices. In its simplest form, Fabric Attach facilitates the assignment of these devices to the correct network segment, where necessary extending segment presence to the edge node only for the duration of active, valid sessions. Fabric Attach can also deliver enhanced service differentiation through the implementation of granular business-driven policy.

Fabric Attach works by creating a “gateway” automation function between conventional end-point devices and the network. Typically, the network will be a Fabric Connect private cloud, although the standardized nature of Fabric Attach means that it is equally relevant to conventional 802.1Q VLAN-based networks. The 802.1AB Link Layer Discovery Protocol is utilized to pass signalling between Fabric Attach components, meaning that it is highly flexible, extensible, and portable. Fabric Attach has been submitted to the IETF for consideration as a standard<sup>2</sup>, and in collaboration with Wind River, Avaya has contributed

Fabric Attach to the Open vSwitch open source development project<sup>3</sup>.

The focus for facilitating auto-attach is at the network edge, where end-point devices first connect and are most visible. This where a Fabric Attach Client (FA Client) agent would reside, being software code that can be implemented in a number of flexible ways. The FA Client could take the following forms:

- In an Avaya Ethernet Access Switch, detecting conventional end-points devices – generic PCs, IP Phones, Printers, IP Cameras, etc – and extending customized network service connectivity and attributes
- In an Avaya Wireless LAN Access Point, facilitating simplified hands-free deployment, service delivery, and device connectivity
- In an Avaya IP Phone, automating service turn-up and portability
- Leveraging the Avaya-Wind River collaboration: any Open vSwitch-based device system, including Xen, KVM, and VirtualBox Hypervisors, and the new Avaya Open Networking Adapter product line
- Leveraging the IETF submission: any end-point or networking device operating a compliant implementation; this could include third party Switches or any Ethernet-enabled networking device

Individual FA Clients may require specific networking services – particular VSN IDs, VLAN IDs, etc – or they can simply make a generic request, and rely upon centralized policy for assignment. For example, IP Phones will be assigned to the default “Voice VLAN”, whereas IP Cameras – recognized by virtue of their hardware addressing – would be assigned to the

“Video Security VLAN”. Further, a Virtual Machine could request application-specific network assignment during the spin-up process. Fabric Attach compliments the existing techniques for device recognition, authorization, and authentication – i.e. MAC- and/or RADIUS-based, 802.1X, and 802.1AB – and leverages these to integrate with network provisioning and policy enforcement.

The FA Client communicates, using LLDP extensions, with a Fabric Attach Server (FA Server), either directly or via a Fabric Attach Proxy (FA Proxy). The FA Proxies are conventional Networking Switches, deployed as and when the topology requires, that pass auto-attach requests from FA Clients through to the FA Server. It is also feasible that a Switch acting as an FA Proxy will simultaneously be acting as an FA Client. This would be the case when the Switch is providing FA Client functionality for directly attached end-point devices (e.g. PCs and IP Phones), and also acting as a proxy for an attached FA Client (e.g. an Avaya Wireless LAN AP). The FA Proxy and FA Client agent functionalities easily coexist to provide for maximum deployment flexibility.

The FA Server is a Networking Switch, but is distinguished from the FA Proxy insofar as it is the boundary between the Fabric Connect private cloud and the conventional Ethernet Access network. The FA Server, being a Fabric Connect node, has full network and service awareness and can dynamically extend networking services – again, via the FA Proxy when dictated by topology – to the FA Client and any attached end-point devices. Putting it another way, end-

<sup>2</sup> Paul Unbehagen, et al, Auto-Attach using LLDP with IEEE 802.1aq SPBM Networks (IETF, July 2014).

<sup>3</sup> Avaya Goes “Hands-Free” for vSwitch Network Services Configuration with Wind River (Avaya, September 2014)

point devices are connected to the broader network by the FA Client obtaining service extensions from the FA Server; providing the mapping of conventional VLANs to Fabric Connect VSNs. VOSS 5.0 introduces the FA Server capability to the VSP 7200 Series product line; additionally, it is also now supported on the VSP 8000 Series and VSP 4000 Series products.

The Fabric Attach process dynamically and automatically extends networking services from the FA Server to both FA Clients and end-points devices hosted by FA Clients. It gives an “elastic” nature to the network, stretching services to the edge only as required and only for the required duration. As and when end-point devices closedown or disconnect, redundant networking services retract from the edge; this has the added benefit of reducing exposure and the attack profile.

And important value-added element to this solution is the Avaya Identity Engines policy server. Fabric Attach can deliver basic connectivity automation without Identity Engines, however the solution is significantly enhanced by Identity Engines delivering advanced authentication services for users and end-devices. Identity Engines enables more granular control of networking services, over-and-above VSN/VLAN assignment. Leveraging per-user and/or per-device authentication enables custom networking services to be dynamically created and applied on-demand.

There is also a variation on the typical deployment: here Fabric Attach is used in a purely conventional VLAN-based network, and no FA Server (i.e. Fabric Connect node/network) exists. In this scenario, the FA Proxy Switch operates in “standalone” mode, and addresses FA Client requests for VLAN IDs. Identity Engines can also be applied to this model, providing enhanced user and/or device authentication and policy control. This variant of Fabric Attach delivers an auto-attach capability even to those businesses that are yet to implement Fabric Connect.

Fabric Attach delivers substantial operational benefits. End-point devices can be deployed in real-time, without the need for IT intervention and manual configuration, with a centralized policy engine defining and policing device auto-attach in compliance with business policy. 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.

### **Avaya Fabric Extend: Taking Benefits to a Broader Audience**

For many adopters, Fabric Connect has delivered an almost ideal networking solution.

Ideal that is, except perhaps for the fact that Shortest Path Bridging, the standard upon which Fabric Connect has been developed, is designed around the concept of physical Ethernet. Being limited to Ethernet-based networking topologies means, for example, that businesses have been unable to extend services-based connectivity end-to-end, across their



**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.**

wide-area networks. Technically, this limitation is due to a dependence for the “establishment” of NNI links – network-to-network interface links – over which IS-IS adjacencies are formed and services defined and delivered. This means that the extent of Ethernet availability has defined an arbitrary boundary for the Fabric Connect network virtualization cloud.

This situation has represented something of a constraint for those businesses that want to fully integrate remote sites into their private cloud. There could be driven by a need to distribute support for IP Multicast-based applications throughout the entire company, or quickly roll-out IPv6 but the infrastructure is not fully ready. There are times when there’s a requirement to offer an extended multi-tenant/segmentation capability, or perhaps the issue is as simple as wanting to surgically deploy Fabric Connect in a mixed-vendor environment. Whatever the specific requirement, there’s lots of reason why Routed IP connectivity alone isn’t a complete-enough solution and why businesses would benefit from being able to extend their Fabric Connect cloud.

Now, with Avaya’s development of its Fabric Extend technology, businesses can fully integrate remote locations with the Fabric Connect cloud. Fabric Extend enables configure NNI interfaces to be logically defined, and through VXLAN encapsulation, seamlessly tunnel Shortest Path Bridging 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 perpetuates Fabric Connect’s well-earned reputation for simplifying the network. Continuing this theme, the Avaya Fabric Orchestrator management platform incorporates a new Tunnel Manager utility that automatically configures the bi-directional tunnels required to integrate new nodes into Fabric Extend domains. Tunnel Manager delivers an intuitive, graphical capability to deploy both any-to-any and hub-and-spoke configurations; additionally, a command-line option remains if manual setup is preferred.

In terms of product support, VOSS 5.0 introduces Fabric Extend on three Ethernet Switch platforms: natively on the VSP 7200 Series and VSP 8000 Series products, and also the VSP 4000 Series when deployed in combination with the Avaya Open Networking Adaptor.

Avaya’s new Fabric Extend technology provides a flexible and scalable solution to enable network-wide extension over private and provider IP infrastructures for the very significant benefits that Fabric Connect is delivering businesses today.

## Management

The Avaya VSP 7200 Series can be managed in a variety of ways. Simple on-box management functions are delivered by a web-based GUI called Enterprise Device Manager (EDM), and a generic CLI is also available for manual configuration. For centralized management of multiple devices, the Fabric Orchestrator software platform delivers a comprehensive unified management capability. Additionally, Fabric Orchestrator provides the platform upon which emerging SDN capabilities will be progressively delivered.

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 Avaya 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.
- Integrated SDN capabilities – Crucially, Fabric Orchestrator is built with a clear eye towards the future. The platform provides an integration point for Open Daylight-based SDN Controller plugins, third party tools and controllers accessible through north-bound REST interfaces, and OpenStack ML2 drivers that enable network orchestration in conjunction with storage and compute resources.

### SDN that redefines Networking

Software-Defined Networking is certainly topical, however much of the talk is still about finding the real-world business need for what is essentially a technology side step. Avaya takes a pragmatic view and delivers solutions aimed fairly and squarely at simplifying and automating tasks that are currently complex and manual; worrying less what the technology is labeled, and more about what it delivers.

A case in point is the new Avaya Fabric Attach technology. An adjunct to Avaya Fabric Connect, this innovation allows businesses to extend network virtualization directly into the Data Center Top-of-Rack and fully automates the provisioning of virtualized services. This is particularly relevant for the mass of virtual machine instances that are commonly deployed - and periodically migrated - in modern Data Centers.

This is a perfect example of how networking is being redefined through the seamless integration of a pervasive services-orientated virtual network and policy-based access management techniques. The VSP 7200 Series is designed to deliver the Fabric Attach Client and/or Server Switch functionality, interfacing end-point devices or conventional Switches with the Fabric Connect cloud.

### Lifetime warranty

Avaya 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. Avaya 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 Avaya 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.

Avaya 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 Avaya Virtual Services Platform 7200 Series please visit [www.avaya.com/products](http://www.avaya.com/products), and for the complete Avaya Networking portfolio,

[www.avaya.com/networking](http://www.avaya.com/networking).

## VSP 7254XSQ

The Avaya 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 the most advanced chipset from the Industry's leading supplier, featuring 2.56Tbps of switching and 1,428Mpps of frame forwarding performance. The chipset is designed to deliver Terabit-scale, wire-speed capabilities, with a fully integrated 10/40/100 Gigabit ASIC architecture that facilitates multiple design opportunities. Latency has been optimized, with a 40% advance over current best examples. New intelligent buffer technology self-tunes thresholds for excellent burst absorption, offering a 5x efficiency gain over existing static designs. A flexible, Unified Forwarding Table allows for future in-field optimization, with up to four mission profiles supported. This chipset also includes embedded support for a range of enabling technologies such as DCB, SPB, VXLAN, PIM, FCoE, and NAT/PAT.

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.

### Benefits

The VSP 7254XSQ adds significant flexibility to the Avaya Networking portfolio, and is compatible, with and complementary to, with existing products and technologies. A new product, leveraging the Compact Form-Factor design concept, the VSP 7254XSQ, when deployed with other Avaya or third party Ethernet Switches devices, provides very

high-capacity, high-performance connectivity solution for Data Center networks. The VSP 7254XSQ 's focus is primarily as the Leaf/ Top-of-Rack Switch in Data Center Spine/Leaf deployments.

The VSP 7254XSQ natively supports the Avaya 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 & 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
- IPv4 and IPv6 Routing includes support for Static, RIP/RIPng, OSPF/OSPFv3, eBGP, BGP+, ECMP, VRRP, PIM-SM, and VRF
- Avaya 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



VSP 7254XSQ 54-port Switch



Front Panel



Rear View

- Avaya Fabric Connect technology supports Layer 2 Virtual Service Networks, Layer 3 Virtual Service Networks, Inter-VSN Routing, IP Shortcut Routing, IP Multicast-over-Fabric Connect, Fabric Attach Server, Fabric Extend, Switched UNI
- Avaya Switch Cluster technology supports Triangle & Square configurations, with both Layer 2 and Layer 3 functionality

### High Availability Power & 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 as enabled by the Premier Software License.
- Premier Software License, an optional accessory, enables the following features: Layer 3 Virtual Service Networks.

### Country of Origin

- China (PRC)

## VSP 7254XTQ

The Avaya 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 the most advanced chipset from the Industry's leading supplier, featuring 2.56Tbps of switching and 1,428Mpps of frame forwarding performance. The chipset is designed to deliver Terabit-scale, wire-speed capabilities, with a fully integrated 10/40/100 Gigabit ASIC architecture that facilitates multiple design opportunities. Latency has been optimized, with a 40% advance over current best examples. New intelligent buffer technology self-tunes thresholds for excellent burst absorption, offering a 5x efficiency gain over existing static designs. A flexible, Unified Forwarding Table allows for future in-field optimization, with up to four mission profiles supported. This chipset also includes embedded support for a range of enabling technologies such as DCB, SPB, VXLAN, PIM, FCoE, and NAT/PAT.

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 Avaya Networking portfolio, and is compatible, with and complementary to, with existing products and technologies. A new product, leveraging the Compact Form-Factor design concept, the VSP 7254XTQ, when deployed with other Avaya or third party Ethernet Switches devices, provides very high-capacity, high-performance connectivity solution for Data Center

networks. The VSP 7254XTQ's focus is primarily as the Leaf/Top-of-Rack Switch in Data Center Spine/Leaf deployments.

The VSP 7254XTQ natively supports the Avaya 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 & 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
- IPv4 and IPv6 Routing includes support for Static, RIP/RIPng, OSPF/OSPFv3, eBGP, BGP+, ECMP, VRRP, PIM-SM, and VRF
- Avaya 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
- Avaya Fabric Connect technology supports Layer 2 Virtual Service Networks, Layer 3 Virtual Service Networks, Inter-VSN Routing, IP Shortcut Routing, IP Multicast-over-Fabric Connect, Fabric Attach Server, Fabric Extend, Switched UNI



VSP 7254XTQ 54-port Switch



Front Panel



Rear View

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

### High Availability Power & 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 as enabled by the Premier Software License.
- Premier Software License, an optional accessory, enables the following features: Layer 3 Virtual Service Networks and - where local regulations permit - MACsec<sup>4</sup>.

### Country of Origin

- China (PRC)

<sup>4</sup>MACsec is currently supported on the VSP 7254XTQ 10Gb/s SFP+ ports only, not on 40Gb/s QSFP+ ports. MACsec is currently not supported on the VSP 7254XSQ.

# VSP 7200 Series Standards Compliance

The VSP Operating System Software (VOSS) 5.0 release for the VSP 7200 Series delivers compliance with the following IEEE and IETF Standards.

## 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)
- 802.1s 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

- 802.1Qbp Equal-Cost Multi-Path (Shortest Path Bridging)
- 802.1X Port-Based Network Access Control
- 802.1AE Media Access Control Security
- 802.1AX Link Aggregation

### 802.3 Ethernet

- 802.3-1983 CSMA/CD Ethernet (ISO/IEC 8802-3)
- 802.3u 100BASE-TX Fast Ethernet 100Mbit/s with Auto-Negotiation
- 802.3x Full Duplex and Flow Control
- 802.3z 1000BASE-X Gigabit Ethernet over Fiber

- 802.3ab 1000BASE-T Gigabit Ethernet over Twisted Pair
- 802.3ae 10 Gigabit Ethernet over Fiber: 10GBASE-SR, 10GBASE-LR, 10GBASE-ER, 10GBASE-SW, 10GBASE-LW, 10GBASE-EW

- 802.3an 10GBASE-T 10 Gigabit Ethernet over Twisted Pair
- 802.3ba 40 Gigabit and 100 Gigabit Ethernet over Copper and Fiber: 40 Gigabit, implemented as 40BASE-QSFP+

## 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 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 the 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, and 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
- 2362 PIM-SM
- 2404 HMAC-SHA-1-96 within ESP and AH<sup>1</sup>
- 2407 Internet IP Security Domain of Interpretation for ISAKMP<sup>1</sup>
- 2408 Internet Security Association and Key Management Protocol<sup>1</sup>
- 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 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 SMIv2
- 2579 Textual Conventions for SMIv2
- 2580 Conformance Statements for SMIv2
- 2597 Assured Forwarding PHB Group
- 2598 Expedited Forwarding PHB OA&M RFCs
- 2616 HTTPv1.1
- 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
- 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
- 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
- 3768 VRRP; plus draft-ietf-vrrp-ipv6-spec-08
- 3810 MLDv2 for IPv6: Host Mode-only
- 4007 IPv6 Scoped Address Architecture
- 4022 TCP MIB
- 4087 IP Tunnel MIB
- 4113 UDP MIB
- 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<sup>1</sup>
- 4302 IP Authentication Header<sup>1</sup>
- 4303 IP Encapsulating Security Payload<sup>1</sup>
- 4308 Cryptographic Suites for IPsec
- 4363 Definitions of Managed Objects for Bridges with Traffic Classes, Multicast Filtering and Virtual LAN Extensions
- 4443 ICMP for IPv6
- 4552 Authentication/Confidentiality for OSPFv3
- 4835 Cryptographic Algorithm Implementation Requirements for ESP & AH<sup>1</sup>
- 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<sup>2</sup>
- 6105 IPv6 Router Advertisement Guard
- 6329 IS-IS Extensions supporting Shortest Path Bridging QoS RFCs
- 7610 DHCPv6 Shield: Protecting against Rogue DHCPv6 Servers

## Additional Information

For further information about the Avaya Virtual Services Platform 8000 Series please visit [www.avaya.com/products](http://www.avaya.com/products), and for the complete Avaya Networking portfolio, [www.avaya.com/networking](http://www.avaya.com/networking).

## 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](http://www.avaya.com).

