WHITE PAPER

Communications Service Providers and Enterprise SD-WAN

Benchmarking Versa Secure SD-WAN* on Dell EMC* Servers

Layer 2-3 test performance of the Versa Secure SD-WAN solution on a Dell EMC Virtual Edge Platform (VEP) 4600 powered by Intel® Xeon® D-2100 processor demonstrates up to 6 Gbps[1] of throughput using a real-world mix of packet sizes for SD-WAN with embedded next-generation firewall and intrusion protection.

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Increased use of cloud computing and a need for better management of wide area networks (WANs) are driving the market for software-defined WAN (SD-WAN) solutions. Enterprises have a need for high performance WAN connectivity as well as data security services. It's important for enterprises and communications service providers (CommSPs) to know the maximum performance they can expect as they deploy these systems. Versa Networks,* an Intel® Network Builders ecosystem partner, joined with Dell EMC* and Intel to test the performance of its Versa Secure Cloud IP Platform* to show how its Versa Secure SD-WAN* solution can serve the needs of large branch offices and data center head end locations. The tests showed that the performance of the Versa solution running on the Dell EMC VEP4600, powered by a 16-core Intel® Xeon® D processor, topped 6 Gbps[1] for applications using real world IMIX data traffic patterns. Given that the WAN throughput requirements at medium-to-large branch offices range between 200 Mbps to several Gigabits per second,[2] this means fewer cores can be dedicated to the SD-WAN and other VNFs can use those resources for additional services.

Introduction to Versa Secure SD-WAN Solution

Versa Networks has developed a cloud-native multi-tenant software platform that delivers software-defined Layer 3 (routing) to Layer 7 (security) services with full programmability and automation. The Versa Secure Cloud IP software platform delivers SD-routing, SD-WAN, SD-Security and SD-Branch functions for the WAN edge.

The Versa Secure SD-WAN solution is composed of four deployed software components: Versa FlexVNF, Versa Director, Versa SD-WAN Controller and Versa Analytics to deliver SD-WAN with advanced security.*

Versa FlexVNF is the intelligent multi-service and multi-tenant edge software that delivers scalable, segmented, programmable and automated SD-Infrastructure (SD-Routing, SD-WAN, SD-Security and SD-Branch) at the branch. It provides both software-defined networking and security features in a single software package along with advanced contextual dynamic application traffic steering and service chaining. It is a single software platform that incorporates networking and security, including full-featured advanced routing, and universal customer premises equipment (uCPE) virtualization support. This provides a highly flexible branch services platform that can deliver both Versa native capabilities—including SD-WAN, next-generation firewall (NGFW), unified threat management (UTM), NG-IPS, secure web gateway (SWG), anti-virus, ransomware protection, and more—and the hosting third-party virtual network functions. Versa FlexVNF is centrally managed and provisioned by Versa Director and provides carrier-grade operational capabilities that include a distributed control and data plane fabric with built-in elasticity and capacity on-demand.

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Versa Director is a single point of centralized control and management for both connectivity and services. This platform simplifies the creation, automation, and delivery of services based on Versa FlexVNF. Versa Director provides the essential management and provisioning capabilities needed to deliver Versa's Secure Cloud IP platform FlexVNF network and security services. It simplifies and automates the creation, delivery, management, and operations of Versa networking, SD-WAN, and security services. It provides the single pane of glass management interface for configuration, policy creation and templates, service management, and real-time monitoring for Versa and third-party services.

Versa SD-WAN Controller is the network-wide controller with data security features that manage the distributed control-plane across the SD-WAN fabric. The Versa SD-WAN controller works in conjunction with Versa Director to propagate reachability, policies and connectivity services for the SD-WAN overlay, providing a control-plane entry point for all Versa FlexVNF SD-WAN branches.

Versa Analytics provides holistic big-data driven visibility, base-lining, correlation and predictive analysis for network, application usage and security events. It provides the contextual insights into application, user, device and location with advanced reporting and event correlation with 360-degree insights for networking and security. Versa Analytics analyzes and correlates data sent from both FlexVNFs and third-party VNFs to present critical data points as actionable analytics and reports. Its tight native integration with Versa Director ensures optimized storage, search, and performance.

The Versa Secure SD-WAN solution delivers complete networking and security services for branch offices and cloud/data center applications. The multi-tenant cloud-native networking, SD-WAN and advanced security software platform provides robust flexibility, elasticity with high-performance for secure WAN edge deployment use-cases.

Results of Performance Tests

Versa and Intel conducted performance testing on the Versa Secure SD-WAN solution using three Dell EMC Virtual Edge Platform (VEP) 4600 servers, with two servers acting as branch nodes and running Versa FlexVNF, and the third server acting as the Versa SD-WAN Controller. Versa Director was also used in the test (see Figure 1).

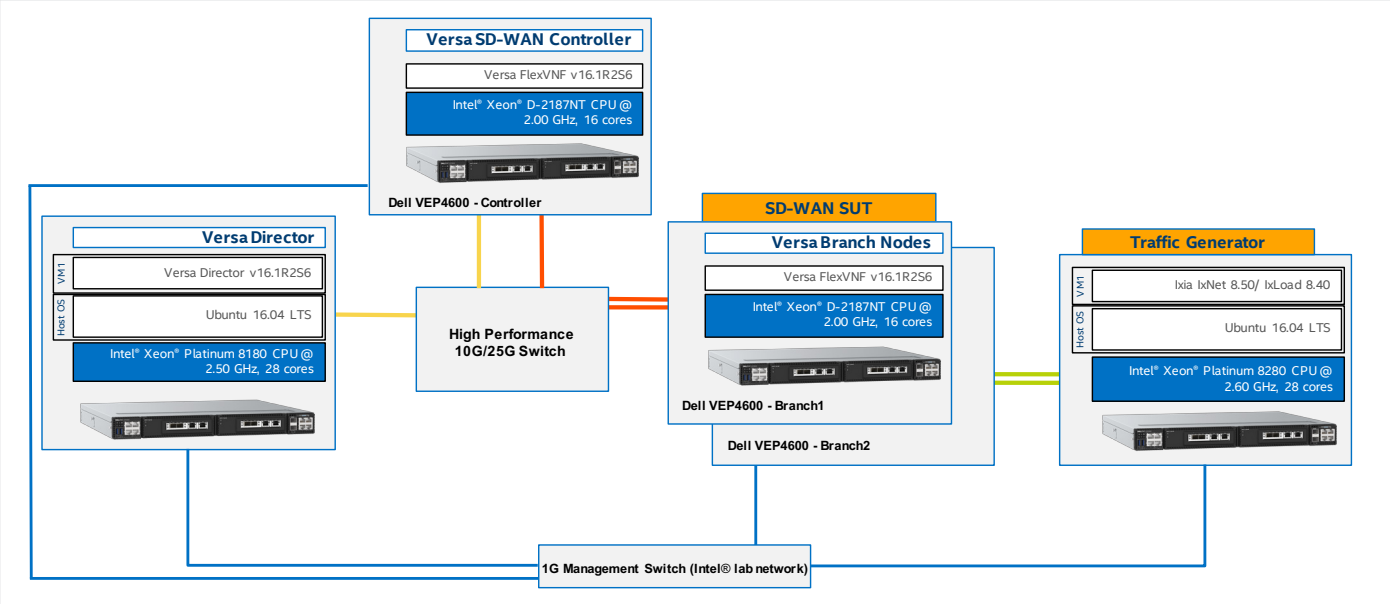

Figure 1. Test configuration involving two Versa branch nodes and a Versa Controller node.*

The Dell EMC VEP4600 server used in the tests is a uCPE networking platform from Dell EMC. The Dell EMC VEP4600 is purpose-built for next generation access deployments including hosting SD-WAN and other virtual network functions (VNFs) like routing, firewall, or deep-packet inspection. The 1-RU-high server offers hosted virtualized network functionality, with applicability for communications service provider (CommSP) edge applications and enterprise branch deployments.

The Dell EMC VEP4600 uses Intel Xeon D-2100 processor family, which brings the advanced intelligence of the Intel Xeon Scalable processor architecture into an optimized, dense, low-power system-on-a-chip (SoC) form factor for environments constrained by space and power. With between four and 18 cores, and up to 512 GB of addressable memory, Intel Xeon D-2100 systems-on-a-chip (SoCs) have an integrated Platform Controller Hub (PCH), integrated high-speed I/O, and up to four integrated 10 Gigabit Intel® Ethernet ports. They can run the same instruction set as more robust Intel Xeon Scalable processors to provide software consistency and scale from the data center to the edge.

To help with performance, Versa makes use of the Hyperscan platform software feature built into the Intel Xeon D-2100 processors. Hyperscan pre-filters packets for regularly defined patterns after they are decrypted and before they are processed by the CPU. This pre-filtering accelerates network processing, which contributes to improved security and fast throughput. Versa also utilizes the open source Data Plane Development Kit (DPDK), a series of libraries that accelerate packet processing workloads in virtual environments.

Test Cases

In this testing, performance was observed at layer 2-3 with Ixia IxNet* used to generate packets and measure performance. Figure 2 shows the measured layer-2 throughput of the Dell EMC VEP4600 running Versa Secure SD-WAN software deployed as bare metal. The system under test (SUT) was tested with SD-WAN only; SD-WAN with NGFW; and SD-WAN with NGFW, and NG-IPS. The average throughput was computed as the average of three test runs for each configuration of the packet size for each of the modules enabled in Versa Secure SD-WAN.

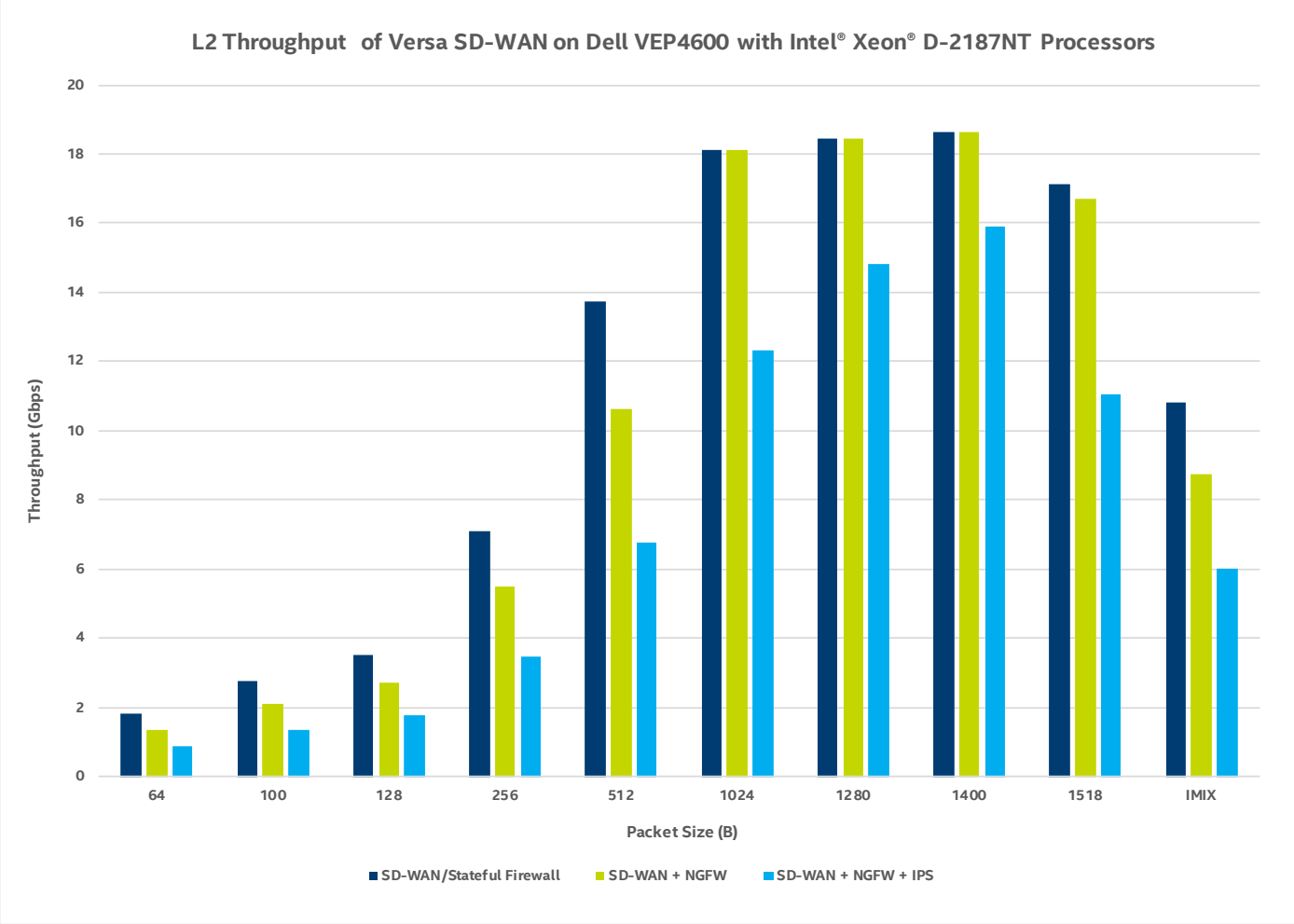

Figure 2. L2 throughput performance of Versa Secure SD-WAN on Dell EMC VEP4600 with Intel Xeon D-2187NT processors[1]

Test Results Analysis

As shown in Figure 2, WAN throughput reaches peak performance at 1,400-byte packets but is also high at the 1,024 byte and 1,280-byte packet sizes.[1] Since security at the edge is an essential feature for an SD-WAN, it's important to note that turning on stateful firewall security does not impact throughput rates at all at these large packet sizes.[1]

The IMIX test category demonstrated performance that is typical of internet traffic and is the best representation of what the system will see in a real-world setting. In these tests turning on the NGFW feature reduced the throughput by about 2 Gbps; a similar throughput reduction was seen when NG-IPS was turned on.[1]

Most enterprises and large branch offices will have subscribed network connectivity services to meet throughput requirements of between 200 Mbps and several Gigabits per second.[2] In these branch offices, the IMIX performance results show that the Versa Secure SD-WAN would provide ample throughput performance.[1] This performance level could also work for a data center head end deployment. The largest of these applications are retail related and they serve tens of thousands of small branch offices (25-50 employees). These applications would typically be served using 6 Gbps network connections, which means even the full NG-IPS feature set could be supported.[2]

Concurrent HTTP connections is another metric that was tested and that confirms the performance of the SUT (see Figure 3). This test demonstrated that the system can support 1.8 million connections in both SD-WAN mode and SD-WAN+NGFW mode. Even with the full suite of security features (NGFW+IPS), the system will support approximately 1 million sessions. These tests confirm the performance suitability of the system for large branch office or head end deployment.[1]

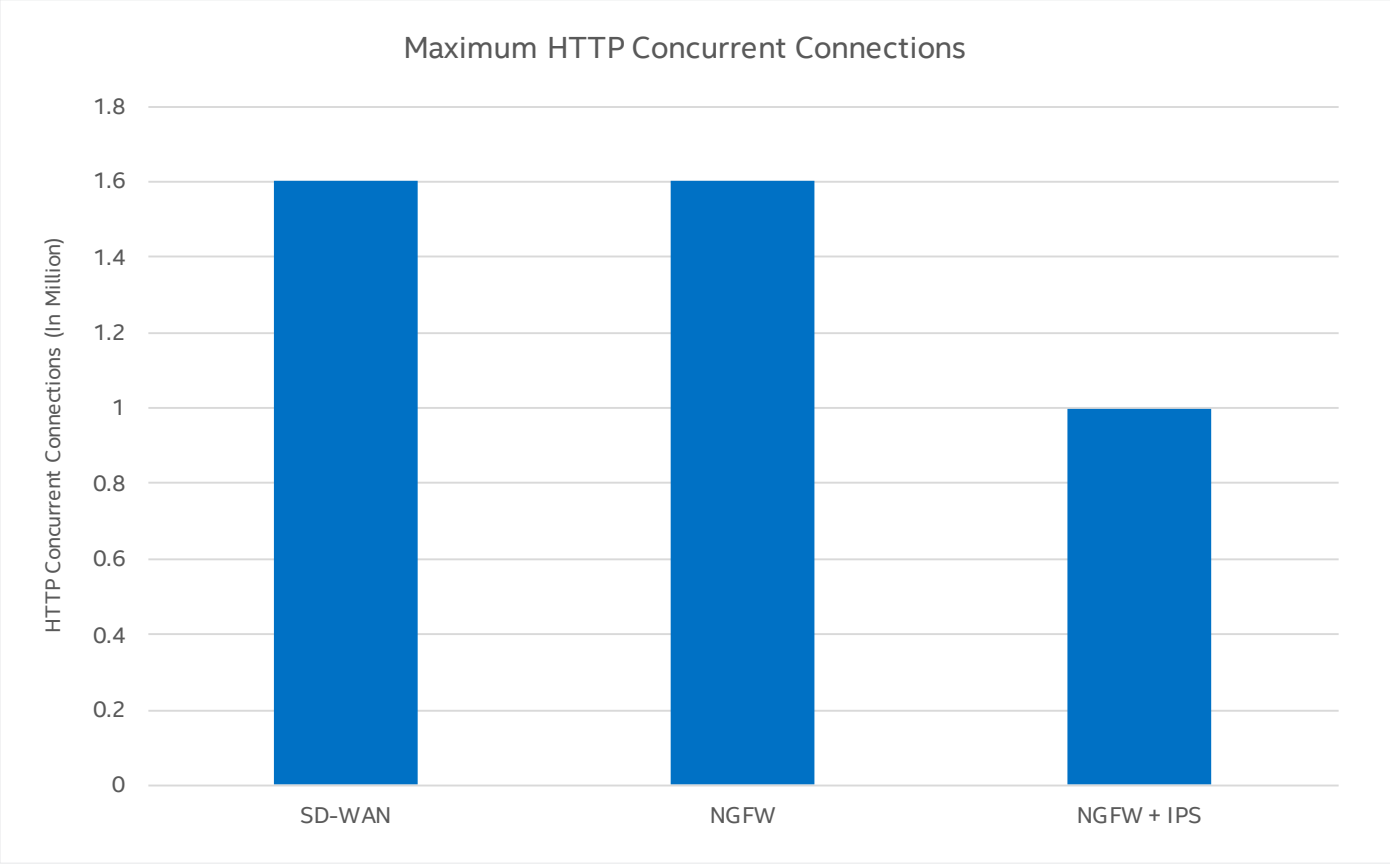

Figure 3. Maximum HTTP Concurrent Connections[1]

Summary

The Versa Secure SD-WAN solution is designed for enterprises and large branch office applications and the tests conducted with Intel, based on the Dell EMC VEP4600, confirmed that the system performance meets the needs of this use case.[1, 2] Even with advanced security features enabled, the system performance topped 6 Gbps, which opens up the possibility of dedicating fewer cores to the SD-WAN platform to provide compute power for other VNFs or using the solution in applications with higher user density, such as a data center head end.[1]

About Versa

Versa Networks is the innovator of Secure Cloud IP architecture, a next-generation software platform that delivers integrated cloud, networking and security services. Versa's solution, with a deep set of features and capabilities, enables enterprises to transition off of legacy WANs to achieve business agility, branch modernization and TCO advantages. The company has transacted over 150,000 software licenses through service providers, partners and enterprises globally. Versa Networks is privately held and funded by Sequoia Capital, Mayfield, Artis Ventures and Verizon Ventures. For more information, visit https://www.versa-networks.com or follow Versa Networks on Twitter @versanetworks.

About Dell EMC

Dell EMC, a part of Dell Technologies, enables organizations to modernize, automate and transform their data center using industry-leading converged infrastructure, servers, storage and data protection technologies. This provides a trusted foundation for businesses to transform IT, through the creation of a hybrid cloud, and transform their business through the creation of cloud-native applications and big data solutions. Dell EMC services customers across 180 countries – including 98 percent of the Fortune 500 – with the industry's most comprehensive and innovative portfolio from edge to core to cloud.

About Intel® Network Builders

Intel Network Builders is an ecosystem of infrastructure, software, and technology vendors coming together with communications service providers and end users to accelerate the adoption of solutions based on network functions virtualization (NFV) and software defined networking (SDN) in telecommunications and data center networks. The program offers technical support, matchmaking, and co-marketing opportunities to help facilitate joint collaboration through to the trial and deployment of NFV and SDN solutions. Learn more at http://networkbuilders.intel.com.

[1] Testing conducted by Intel as of March 31, 2019. Configurations: Servers used were Dell EMC VEP4600 based on 2.0 GHz Intel® Xeon® D-2187NT processors with 16 cores, 64GB of RAM, microcode: 02000043, an Intel Ethernet Connection X722 for 10GbE SFP+. Key software tested: Versa Flex VNF Software 16.1-R2 Build S6. BIOS Vendor/Version: American Megatrends 5.14.

[2] Branch office throughput figures are estimates based on Intel conversations with tier 1 CommSPs and with enterprises.