Market Guide for Software-Defined WAN

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Analyst(s):

Bjarne Munch, Sorell Slaymaker, Andrew Lerner, Neil Rickard

Summary

We evaluate the emerging SD-WAN market as well as a selection of representative vendors with commercially available SD-WAN solutions. Network managers and architects can use this research to create a shortlist of vendors to engage with when seeking an SD-WAN solution.

Overview

Key Findings

- Enterprises are seeking branch office WAN solutions that can lower capital investments as well as simplify operations.

- The software-defined WAN (SD-WAN) market is evolving quickly with multiple vendors entering the market, including large networking vendors, focused WAN specialists and venture-funded startups.

- SD-WAN solutions from the vendors in this research can simplify the operation of WANs, but all lack various feature, such as a broad range of hardware platforms.
Recommendations

- Enterprises should take advantage of increased vendor and price competition over the next 12 to 24 months to negotiate pricing.
- Enterprises should look beyond their traditionally preferred vendors and evaluate solutions from emerging vendors to fully take advantage of innovations.
- SD-WAN should be implemented as part of a comprehensive WAN architecture, which should include network service chaining both on-site and in the cloud.

Strategic Planning Assumption

By the end of 2019, 30% of enterprises will use SD-WAN products in all their branches, up from less than 1% today.

Market Definition

This document was revised on 14 December 2015. The document you are viewing is the corrected version. For more information, see the Corrections page on gartner.com.

As outlined in "Technology Overview for SD-WAN," SD-WAN solutions employ centrally managed WAN edge devices placed in branch offices that establish logical connections with other branch edge devices across a physical WAN. These logical connections create secure paths across multiple WAN connections and carriers, such as hybrid Internet and multiprotocol label switching (MPLS) architectures.

SD-WAN Operating Requirements

Gartner's SD-WAN definition requires that vendors meet four key requirements:

1. SD-WAN solutions provide a lightweight replacement for traditional WAN routers, and are agnostic to WAN transport technologies (that is, they support MPLS, Internet, Long Term Evolution [LTE], etc.).

2. Based on business and/or application policies, SD-WAN solutions allow for load sharing of traffic across multiple WAN connections in an efficient and dynamic fashion.

3. SD-WAN solutions dramatically simplify the complexity associated with management, configuration and orchestration of WANs.
4. SD-WAN solutions must provide secure VPNs, and have the ability to integrate additional network services and offload Internet-destined traffic closer to the edge of the network.

**Market Direction**

Enterprise WAN solutions and architectures have changed significantly over the last decade, from basic hub-and-spoke topologies based on services such as leased lines or frame relay/asynchronous transfer mode to fully meshed MPLS-based WAN services, and now to hybrid WAN solutions typically based on Internet and MPLS services. These hybrid Internet-MPLS WAN services were originally introduced into the enterprise WAN to reduce WAN expense (often for resiliency only). However, three emerging factors — new application requirements, the increased use of Internet and the adoption of public cloud services — are driving demand to fully utilize Internet and MPLS connections simultaneously, as one integrated WAN (see "Hybrid Will Be the New Normal for Next Generation Enterprise WAN" and Note 1).

**Traditional WANs: Death by Point Solution**

The consequence of the evolution to a hybrid WAN is that branch office WAN has evolved dramatically — from merely employing a WAN router 10 years ago to now also including various types of appliances such as firewalls, intrusion prevention, Internet Protocol (IP) VPN concentrators, WAN path controllers and WAN optimization controllers. Network managers now find branch office network solutions are increasingly complex and inflexible, as well as costly, to deploy and manage. In addition, it is equally complex and difficult to obtain visibility into application performance across the hybrid WAN, and to ensure that applications receive appropriate prioritization and are forwarded over an appropriate WAN path.

**SD-WAN: Old Technology, New Bundling**

Interestingly, many of the concepts underpinning SD-WAN (such as encryption, path control, overlay networks and subscription-based pricing) are not new. However, SD-WAN essentially wraps these technologies together, and presents them to enterprises as a new integrated offering.

The SD-WAN concept is only just emerging, with few vendors offering solutions that fully embrace the concept, and enterprises are only in very early stages of piloting or
implementing smaller production deployments. However, the benefits to the enterprise are significant and, because of this, we expect a rapid evolution in these products.

At this stage of market development, the key target market is the enterprise that manages its WAN in-house, because SD-WAN solutions can significantly reduce the operational burden of deploying and managing WAN solutions. However, to improve the lead times and flexibility of their managed WAN services, some network service providers are beginning to take advantage of SD-WAN technologies as well (see Note 2).

Although SD-WAN solutions are not designed specifically on software-defined networking technologies, there are similarities in the architecture (see "Software-Defined Networking: A Taxonomy"). Both solution types employ a central controller, and we expect that, over the next five years, these data center and WAN controllers will interwork directly with each other, as well as with a common orchestration system. This will facilitate end-to-end network solutions from applications to the end user in a manner not possible today, such as on-demand-network and self-service strategies that benefit from end-to-end orchestration.

Because of the compelling benefits of the technology and interest from enterprises and network service providers, we expect a rapidly growing number of vendors to enter this market — vendors that offer enterprise branch office network or security, and vendors that have historically offered products for network service provider consumption. This also means that enterprise network managers must plan around a market that will experience both vendor expansion and contraction for least the next five years, and that will reach mainstream maturity within two years.

We expect that network service providers will take advantage of such end-to-end orchestration and self-service as they roll out network function virtualization (NFV). Carriers are planning to virtualize most network functions, such as routing, security, IP VPN, WAN optimization, etc., that can be placed in the branch office, at the edge of the carrier WAN or in the data center. For network planners, this means providers will be able to offer very flexible managed WAN services. It also means that the branch office only needs basic SD-WAN functions, while most other functions can reside in the network service provider’s network.
Market Analysis

From a technology perspective, the SD-WAN concept is simple: Enterprise WAN edge devices forward traffic to other edge devices across a multiservice and/or multiprovider WAN, via centralized control, to enable network managers to configure application-based policy forwarding and security rules across performance-graded WAN paths.

For enterprises seeking a lean branch office setup, these emerging SD-WAN solutions are relatively easy to deploy in a gradual manner. Due to SD-WAN's strong benefits, Gartner believes that by the end of 2019, 30% of enterprises will use SD-WAN technology in all their branches, up from less than 1% today.

This is a fast-evolving technology, and while we do not officially track it as a unique market segment, we anticipate total end-user spending on SD-WAN solutions will be in the range of $25 million to $50 million in 2016, and that it will double in 2017.

While we expect to see SD-WAN solutions move into mainstream enterprises before 2018, vendor solutions must mature in several key areas. Solutions need greater comprehensive functional support, broader support of edge devices, integration with both WAN services and cloud services, and proven scalability in larger-scale deployments (i.e., more than just a few hundred sites up to 1,000-plus on a global scale).

While the key requirements noted in the Market Definition section are a good starting point to evaluate vendor solutions, we are seeing vendors adopt solution and functional attributes within several areas, as listed in the Appendix. Currently in the market, we see inconsistent vendor support of several WAN capabilities, including:

- Routing support is highly inconsistent, with some vendors supporting both LAN-and WAN-side dynamic routing, and virtual routing and forwarding (VRF) — some only on the WAN side, some only static routing, while other vendors support no routing at all.
- Automated IP address discovery and address table creation is still only supported by less than half the vendors.
- Only a few vendors support legacy WAN interfaces such as T1/E1.
- Support of multiple form factors is provided, including x86 platforms and virtualized platforms.
- Full application discovery is available, including separating out voice, video and data within a WebRTC collaboration application.
- Reporting and visualization capabilities are offered.
- There is a breadth of algorithms to load-balance across multiple pipes effectively.
- The scalability of the number of sites, VPN tunnels and throughput capacity of edge devices.
- Not all vendors support integration with orchestration systems.
- Not all vendors support northbound REST APIs.

**Deployment Requirements**

In addition to the greater functionality embedded in SD-WAN solutions, we also expect the evolution of vendors' architectural options. Today, the basic architectural model consists of a central controller and edge devices distributed to branch offices and data centers, which enables functionality to be moved from the branch office to the controller. This architecture is likely to evolve to multicontroller models and open APIs to integrate the controller with higher-level orchestration systems.

**Controller.** The controller supports central policy management that enables networkwide policy definitions, as well as networkwide traffic visibility. It should be possible to deploy these controllers within the enterprise's own network, or externally in a hosted facility. As we start seeing large and very distributed solutions deployed, we will also need to see options for scalable and highly resilient controller architectures. This aspect has not been truly tested by the market yet, as all existing vendor deployments are too small and too geographically contained to challenge their solution scalability. Most current deployments are less than a 100 sites (with only two vendors having deployments of 1,000-plus sites) and are mainly within North America.

**Edge Device.** This is an area where all vendors need to refine or augment their edge solutions. We see a wide span in deployment models spanning from x86 off-the-shelf platforms, fully integrated appliances, integrated appliances with virtualization capabilities, wide-area-located gateway services, etc. However, all vendors have a limited portfolio of devices, and the devices they support are generally confined in their capabilities. As they evolve, we expect that:
Vendors will support a wide range of devices, from very small thin devices with only basic functionality for smaller branch offices to large thick devices supporting a wide range of functionality for larger branch offices and data centers.

Devices will embed virtualization (for flexible functional deployment scenarios) within the edge device. This needs to be tied to the carriers' NFV plans.

Devices will support WAN service termination so that carriers can deploy these edge devices as part of their managed WAN services.

Devices must support external cloud connectivity functionality and mobile device connectivity.

Devices must seamlessly support connectivity between SD-WAN and non-SD-WAN sites.

While our survey of vendor solutions shows that all vendors still need to refine their solutions, our vendor interactions also show that all vendors have planned roadmaps for offering more mature solutions within the next two years.

Representative Vendors

The vendors listed in this Market Guide do not imply an exhaustive list. This section is intended to provide more understanding of the market and its offerings.

This section describes a representative number of vendors that Gartner believes all currently meet our basic operating requirements for SD-WAN:

1. SD-WAN solutions provide a lightweight replacement for traditional WAN routers, and are agnostic to WAN transport (that is, support MPLS, Internet, LTE, etc.).

2. Based on business and/or application policies, SD-WAN solutions allow for load sharing of traffic across multiple WAN connections in an efficient and dynamic fashion.

3. SD-WAN solutions dramatically simplify the complexity associated with management, configuration and orchestration of WANs.

4. SD-WAN solutions must provide secure VPNs, and have the ability to integrate additional network services and offload Internet-destined traffic closer to the edge of the network.
Cisco

Cisco is a U.S.-based public company with headquarters in San Jose, California. Cisco has been the longtime revenue leader in enterprise branch routing and it brought its next-generation WAN architecture (called Intelligent WAN [IWAN]) to the market in 2013. In addition to IWAN, we have also seen Cisco position Meraki in competitive scenarios as an SD-WAN alternative.

Currently, Cisco’s IWAN is its flagship offering, with its own orchestration engine, called Application Policy Infrastructure Controller Enterprise Module (APIC-EM), within the IWAN App, which renders IWAN compliant with Gartner’s definition of SD-WAN. IWAN can also be combined with Glue Networks’ advanced orchestration software (which is included on Cisco’s price list) to meet all four SD-WAN operating requirements.

Cisco IWAN is available via ISR G2 and ISR 4000 series routers, and consist of a number of individual functions such as integrated compute, Performance Routing (PfR v.3) path selection, Next-Generation Network-Based Application Recognition (NBAR2), quality of service (QoS), WAN optimization, NetFlow and Dynamic Multipoint VPN (DMVPN). The security features include an integrated public-key infrastructure (PKI) server in order to easily provision DMVPN within an IWAN, and the ability to track user identities and endpoints by exchanging information with the Cisco Identity Services Engine (ISE). Cisco provides several options for centralized management and orchestration of its solution, including PRIME, APIC-EM with IWAN App or advanced orchestration via Glue Networks.

While IWAN based on the ISR 4000 series and APIC-EM is currently Cisco’s flagship SD-WAN offering, we anticipate additional SD-WAN offerings from Cisco as part of its virtualization strategy and support of NFV for carrier-based managed service offerings.

Consider IWAN for large and/or bandwidth-constrained branches, and those that require integrated computing, voice or WAN optimization resources.

Citrix

Citrix is a well-known IT vendor based in Santa Clara, California, with over $3 billion in revenue in 2014 that sells primarily indirectly (via channels) with a global presence. The vendor has had a WAN optimization product (CloudBridge) for several years, and has traditionally focused primarily on accelerating Citrix applications. The vendor was the No. 4 WAN optimization player when measured by revenue in 2014.
Citrix is expanding adoption of its WAN solutions beyond just existing Citrix customers, and added a Virtual WAN product in 2Q15 to its existing CloudBridge portfolio. Virtual WAN is an overlay architecture that currently meets Gartner's basic operating requirements for SD-WAN. However, while Virtual WAN can be used to replace a router in Ethernet-connected locations, we estimate that most Virtual WAN deployments are in conjunction with existing branch customer premises equipment (CPE).

The vendor has a wide range of Virtual WAN branch appliances that start under $3,000, are in hardware or software form factors, and support basic security filtering and zero-touch provisioning. The Virtual WAN solution supports dynamic traffic forwarding capabilities, suitable for more time-sensitive deployments such as real-time voice or rapid failover. Citrix does not currently provide management via a cloud-based service, although we anticipate it will by year-end 2016. We estimate there are less than 25 paying customers for the Virtual WAN solution as of November 2015.

Organizations looking for WAN optimization or dynamic path selection capabilities should consider this vendor, especially when Citrix applications are also present.

CloudGenix

CloudGenix, based in Santa Clara, California, began shipping its SD-WAN solution in May 2015. As of September 2015, CloudGenix has over 25 enterprises that are piloting its SD-WAN solution. With over 70 employees, many from Cisco and other traditional WAN suppliers, CloudGenix is an emerging player in the SD-WAN market.

CloudGenix offers its branch ION 3000, which scales to approximately 500 Mbps of encrypted traffic and supports a number of 1GbE copper ports and optional LTE interfaces. The platform is designed for in-path deployments and comes bundled with in-line fail to wire modules. The data center ION 7000 scales to approximately 5 Gbps of encrypted throughput, is designed for off-path deployments, and has many 1GbE or 10GbE ports.

CloudGenix's solution supports active-active hybrid WANs, and enables the WAN to be "programmed" via APIs in the CloudGenix controller. CloudGenix provides automatic discovery and configuration of endpoints, as well as secure key management. Another strength is in application performance metric-based controls. The system measures application performance for each individual cloud, enterprise and media application directly (app transaction time, mean opinion score and codec) on each path, and uses
these application performance stats for path selection and other control decisions, at application-level granularity.

Enterprises that have sophisticated application control requirements, such as a combination of cloud, SaaS and data center applications, should consider this vendor for SD-WAN, while ensuring channel partners' geographical capabilities and experience.

**FatPipe Networks**

*FatPipe Networks*, headquartered in Salt Lake City, Utah, has been in operation since 1989. The vendor originally specialized in WAN link bonding, load balancing and path selection, but has evolved its solution into a hybrid WAN-focused SD-WAN solution under the product name Symphony.

As a privately owned company, FatPipe does not report revenue, but states that it has more than 10,000 devices installed across the world for various types of midmarket WAN solutions.

FatPipe Orchestrator is the central controller for policy management, path setup and management. It can be deployed as a single-tenant controller or multitenant, enabling it to support carrier deployments as well as single-tenant enterprise deployments. It can be clustered for high availability and scalability. The FatPipe Enterprise View is a "single pane of glass" to manage and monitor all FatPipe devices in the network, including aggregate alarms and path performance reports, and the FatPipe edge device.

The FatPipe edge device is available in four physical form factor options for edge hardware, as well a full-featured virtual appliance. The devices support good WAN path functionality, IP VPN, firewall and WAN optimization. The edge device cannot host other virtual network functions, but it does support service chaining.

Midmarket enterprises seeking an SD-WAN solution with strong WAN path capabilities and WAN optimization should consider FatPipe Networks.

**Nuage Networks**

*Nuage Networks*, headquartered in Mountain View, California, is an Alcatel-Lucent venture focused on software-defined networking (SDN) solutions. The SD-WAN solution is based on the vendor's Virtualized Services Platform, which enables deployment of virtualized network services across multiple network domains. The initial use case was for SDN in the data center and launched in April 2013. The second use case is an
enterprise SD-WAN solution (Virtualized Network Services [VNS]) launched in November 2014, with a focus on operationalizing the enterprise WAN by making it easy to install, deploy, operate and monitor via a centralized policy engine.

Although Nuage's SD-WAN solution has only been available since November 2014, it has multiple pilots among enterprises across North America, Europe and the Asia/Pacific region. However, the base functionality (policy engine and SDN controllers) has been sold to over 25 commercial data center deployments.

The SD-WAN solution consists of three key components: the Virtualized Services Directory (VSD) for centralized policy management, analytics and network functions store; the Virtualized Services Controller (VSC) establishing a control plane for path setup and management; and the Network Services Gateway (NSG), which provides the network endpoints. The VSD is based on a multitenant architecture, enabling it to support carrier deployments as well as single-tenant enterprise deployments. Both VSD and VSC can be clustered for high availability and scalability.

The NSG supports a software platform hosting virtual functions, such as switching, routing, traffic steering, QoS, firewall, network address translation (NAT), IPsec, etc. It supports three deployment options: a branch appliance (7850 NSG), and a software image that can be loaded on a bare metal x86 server or virtual machine.

Large enterprises seeking an SD-WAN solution with a very high degree of branch office network flexibility, as well as the ability to integrate network service delivery end to end, should consider Nuage Networks.

**Ocedo**

Ocedo is a Germany-based company that was founded in early 2013 with the purpose of creating a software-defined branch office network solution.

Although Ocedo launched in December 2014, it has several dozen paying and pilot customers among both enterprises and carriers, as well as channel partners in Europe and the Asia/Pacific region.

The solution consists of a centrally deployed controller (the Ocedo Connect Cloud Console) and Ocedo’s own gateways, switches and Wi-Fi access points. The vendor’s support for embedded security, firewalls and access points switches simplifies and consolidates overall management of branch equipment, and is a key differentiator versus other SD-WAN players. The offering can be delivered as a cloud-managed
network solution via the multitenant capabilities of the Ocedo Connect Cloud Console hosted by Ocedo. The console can also be deployed in-house as an enterprise-managed solution, and can be clustered for high availability and scalability. All configurations are done via the central console using abstract concepts such as users, applications, sites and zones. Ocedo is also available via Amazon Web Services (AWS).

The branch gateway appliances self-discover the console for autoconfiguration with zero manual configuration required on-site. The gateways support broad SD-WAN functionality, including firewall filtering by application, IP reputation, region and website category. The gateway is available in two physical appliances: a high-end data center or midsize branch and small branch, with the small version supporting wired WAN and 3G. For high-end data center deployments, a virtualized appliance can be deployed on a selection of hypervisors with both Level 2 and Level 3 service chaining. Virtualized service hosting is not supported.

Large distributed organizations with Ethernet-connected branches in the Asia/Pacific region and the EMEA should consider this vendor for SD-WAN, particularly if they are looking for embedded security, consolidated switching and access point management, or for AWS hosting.

**Silver Peak**

Silver Peak is a privately held and well-established WAN optimization vendor based in Santa Clara, California, with over a decade of experience in enterprise WANs. The vendor sells indirectly through value-added resellers (VARs) and has over 2,000 combined customers for its WAN optimization and storage replication products. Silver Peak launched its SD-WAN Unity EdgeConnect platform in June 2015.

Silver Peak’s solution is designed to scale to 2,000 branches (per overlay), and requires devices on both the branch and data center sides. The vendor’s branch device (EdgeConnect) comes in both hardware and software form factors, and is available in leading cloud provider service catalogs. EdgeConnect supports Ethernet interfaces (but not legacy T1/E1), basic firewalling, 256-bit VPN capability and is priced on a monthly basis (starting at $199 list). Unity Orchestrator, included with EdgeConnect, provides zero-touch provisioning and centralized visibility and management, and is available to run as a virtual machine. Additional compression/deduplication and acceleration capabilities are delivered by the vendor's Unity Boost feature, which is optional.
A key vendor differentiator is the ability to monitor leading SaaS applications and dynamically feed that information back into the enterprise WAN to ensure optimal routing. While the vendor’s WAN optimization and storage replication products are widely deployed, we estimate that it has between 50 and 100 paying SD-WAN customers. Enterprises with Ethernet-connected branches seeking an SD-WAN solution with the option for strong WAN optimization should consider Silver Peak.

**Talari**

*Talari*, based in San Jose, California, was founded in 2008 as a hybrid WAN vendor that has evolved its solution into the SD-WAN market. With over 200 customers across 3,200 sites in 35 countries, Talari was an early pioneer and has established its presence in this emerging market.

Talari has multiple appliances, starting with the Talari Appliance T510 with a list price of $3,995 for the branch office with 40 Mbps of throughput, up to the Talari Appliance T5200 with a list price of $109,000 and support for 10 Gpbs. The software may all be run on a virtualized server or in AWS.

Talari is on the fourth generation of its products. One key strength is its tagging of packets, so that even network-encrypted packets can be tracked packet by packet, load balancing across multiple links and ensuring that packets are delivered in sequence. Critical packets, such as real-time voice traffic, can also be duplicated to ensure high performance over best-effort networks. Packet flows can be controlled both on the ingress and egress to the network, ensuring that bursts in network traffic do not impact critical applications.

Talari Aware offers a centralized policy administration and management interface, including reporting; however, Talari plans to add APIs for third-party control and reporting by the end of 2016. Talari is also working on developing a solution to offer a security stack for enterprises wishing to connect directly to the Internet on the edge of the enterprise WAN. Although Talari has been in the market for seven years, it is still growing its channel partner base and working to increase brand recognition.

Global enterprises seeking an experienced hybrid WAN solution with an SD-WAN strategy should consider Talari.
VeloCloud

VeloCloud is a new and emerging SD-WAN vendor based in Mountain View, California, and its SD-WAN solution has been generally available since June 2014. The vendor sells primarily via its channel of VARs, managed service providers (MSPs) and service providers. VeloCloud provides an overlay architecture that is agnostic to WAN transport.

The architecture consists of branch edge devices and cloud gateways. Branch traffic goes to other branches or data center edges, via gateways, or directly to the Internet, depending on both destination and business policy. Cloud gateways allow VeloCloud to extend directly into leading SaaS and infrastructure as a service (IaaS) providers, and offer additional Layers 4 through 7 network services (such as cloud firewall, WAN optimization or secure Web gateway).

The vendor's solution is offered primarily on a subscription model (i.e., rent the hardware), and can be delivered as a physical or software appliance. The solution provides firewall, VPN, Layer 3 routing, dynamic multipath steering and deep application recognition capabilities, and supports Ethernet, T1/E1, and 3G/4G/LTE connectivity. Interestingly, VeloCloud and Cisco have partnered to deliver VeloCloud's software running on a Cisco ISR. Multitenant data plane, management and orchestration of components are offered as software or as a cloud-based service.

As a new and emerging vendor, VeloCloud has growing market traction compared with other emerging vendors. It has achieved early successes within midmarket to large organizations looking to reduce WAN costs by migrating from MPLS to multiple broadband Ethernet connections, typically displacing traditional incumbent WAN optimization controller and router solutions along the way. We estimate that this vendor has between 50 and 100 paying customers as of November 2015, primarily composed of organizations in North America.

Midmarket and large enterprises with distributed branch offices that need on-premises devices as well as flexible connectivity to cloud services at operating expenditure pricing should consider VeloCloud. However, enterprises should ensure that latency-sensitive applications are hosted within 25 ms (which usually equates to 1,500 to 2,000 km) of a VeloCloud gateway.
Versa Networks

Versa Networks is a new startup based in Santa Clara, California. It has been operating in stealth mode since 2012 and launched in November 2015. The vendor’s focus is to create a software platform that enables enterprises and carriers to transform branch office networks by virtualizing network functions and with centralized management and automation.

Versa Networks is backed by venture capital firms including Sequoia and Mayfield, as well as Verizon, and has received more than $40 million in funding. However, as the product has only just become commercially available, Versa currently has few commercial customers.

The multitenancy Versa SD-WAN solution is composed of the Versa SD-WAN Controller, Versa Director (VNF Manager), Versa Analytics, Versa FlexVNF CPEs at the branch sites and an optional Staging-Server for zero-touch provisioning. Versa has developed a range of virtualized network functions such as routing, NAT, VPN, and Next-Gen Firewall that can be deployed together as a very flexible SD-WAN solution. Versa FlexVNF also allows third-party virtual network functions, such as WAN optimization, to be deployed and configured in a service chain.

While the key focus for Versa has been to create a fully virtualized solution that is hardware-agnostic, the branch office CPE is also available in four sizes of physical appliances. All system components can be deployed in fully redundant and scalable configurations. The controller can interwork with third-party SDN controllers, and the Versa Director provides northbound APIs for third-party orchestration systems.

Enterprises seeking an SD-WAN solution with a high degree of integrated branch office network functionality should consider Versa Networks.

Viptela

Viptela is a new and emerging pure-play SD-WAN vendor based in San Jose, California, and was named a Gartner Cool Vendor in 2015. Viptela provides a multitenancy overlay architecture that is agnostic to WAN transport, and meets all four of Gartner’s basic SD-WAN operating requirements. Viptela Secure Extensible Network (SEN) solution architecture is made up of three components: a controller (vSmart), a management system (vManage) and a branch device (vEdge router). The vEdge branch device can be consumed either as hardware or, by early 2016, as software on commodity x86
platforms, and the controller can be consumed as a hosted service or virtual appliance. In addition, the company has also partnered with Zscaler to help deliver secure direct Internet access for branches.

As a new and emerging vendor, Viptela has early market adoption and we estimate that it has approximately 25 paying customers, the largest being retail and financial. However, the vendor is garnering interest and adoption in very large enterprises and in partnerships with service providers, including Verizon and Singtel. To date, Viptela has had success in branch environments where secure segmentation and multitenancy were key drivers. It currently lacks the capability to support legacy WAN interfaces, including T1/E1.

Enterprises with a large number of Ethernet-connected branches should consider this vendor for SD-WAN, particularly if intrabranch segmentation or multitenancy is desired.

Other Vendors

The vendors listed in this Market Guide do not imply an exhaustive list. This section is intended to provide more understanding of the market and its offerings.

This section describes notable vendors with solutions that do not currently comply with all the defined SD-WAN criteria, but that Gartner believes have evolving solutions that may comply by year-end 2016.

InfoVista (Ipanema Technologies)

Ipanema Technologies was founded in 1999 and acquired by InfoVista in April 2015. Ipanema has a strong vision and strategy for application performance control in a hybrid WAN with highly distributed endpoints, such as internal data centers, branch offices, external cloud services, and remote and mobile users.

The Ipanema WAN Optimization and hybrid WAN solution has been deployed in more than 1,300 global enterprise WANs spanning small to very large global networks. They have several global channel partners, including several carriers.

The solution consists of two key components: the central management system, called SALSA (Scalable Application-Level Service Architecture), and network endpoints. SALSA provides a Web interface for all management aspects of the solution, such as global system provisioning and activation, alarm and event reporting, and dashboards and reporting on application usage and performance. Ipanema supports a wide range of
network endpoints, offering the nano|engine for very small offices and the high-end ip|engine, both of which are available as physical and virtual appliances. Ipanema supports one of the strongest traffic management solutions on the market, with solid support for hybrid WANs; however, today, it does not support any type of dynamic routing or NAT functionality, and cannot replace the WAN router. Ipanema plans to support dynamic routing and NAT by the first half of 2017.

Consider Ipanema for all hybrid WAN scenarios, particularly when WAN optimization and sophisticated application-based performance management are important.

**Riverbed**

Riverbed is a well-established networking and application performance company based in San Francisco, California, with over 27,000 customers, many of which use the vendor for WAN optimization. Riverbed is the leading WAN optimization vendor when measured by revenue, with approximately 50% market share. It has deep expertise and experience in complicated enterprise WAN environments, including hybrid WANs, along with a history of innovation in the WAN optimization market.

Today, the vendor clearly meets three of Gartner's four basic operating requirements for SD-WAN, but SteelHead does not support routing functionality and cannot replace customer edge routers (see Note 3). However, the vendor has publicly announced plans to provide this capability in 2016, via its Project Tiger initiative.

Riverbed solves many of today's WAN challenges with its existing SteelHead, SteelCentral and SteelFusion product lines, which provide WAN optimization, application visibility, path control, IP storage acceleration and VPN functionality. In addition, the vendor supports acceleration for leading SaaS applications, including Office 365, Salesforce, Box, ServiceNow and SAP. Riverbed's branch devices can run as a physical or software appliance, with pricing starting at $1,995 for a low-end hardware appliance.

We anticipate that Riverbed's future SD-WAN offering (Project Tiger) will leverage much of the SteelHead product capability that exists today — and will add routing functionality. Organizations that don't currently require routing functionality on their branch devices should consider Riverbed, particularly if they are interested in solutions to address problems relating to bandwidth, latency or traffic visibility for on-site, SaaS or IaaS deployments.
Sonus

Sonus was established in 1997 in Westford, Massachusetts, and has been a well-known player in the session border controller space since the early stages of SBC deployments in 2002. In January 2015, Sonus acquired the assets of Treq Labs, which had an SDN controller solution that Sonus is evolving into an SD-WAN solution. However, the solution does not currently meet all of Gartner's four requirements, as it does not support any routing functionality or service chaining.

The product name was recently changed to VellOS, formally known as Network-as-a-Service (NaaS) IQ. Release 8.0 is in general availability as of October 2015. Sonus has 10 existing customers and around 20 more active pilots underway.

VellOS Release 8.0 is focused on enhancements to the Network Controller Platform (NCP), and is a robust solution built around an open-source kernel with four unique algorithms for: (1) path computation; (2) topology discovery; (3) publish/subscribe service; and (4) network resource manager. This offers a highly granular policy-driven application awareness, application uptime (resiliency) and a secure solution for controlling WAN traffic between sites. In the future, Sonus is looking to leverage its SBC products and provide APIs that enable dynamic session management to prioritize real-time voice and video sessions, and to communicate this to the underlying network.

Enterprises seeking WAN application and path control between very large sites with large network pipes should consider Sonus.

Market Recommendations

Enterprises should employ SD-WAN solutions for their branch offices to simplify the complexity of their branch office WANs. However, as these solutions are only just emerging, there is limited vendor choice and user experience, and enterprises should therefore start by conducting small trials or limited production deployments.

Enterprises should plan for SD-WAN solutions to be available in a variety of deployment options, ranging from thin devices with their greatest functional computation performed in the cloud to thinner devices with on-site computation (for scenarios in which there are strong on-site security needs or where strong end-to-end application optimization is needed).

Enterprises using managed WAN services should select those that incorporate SD-WAN solutions.
Appendix

We expect vendors to evolve their solutions along a roadmap that will incorporate the key solution and functional attributes listed in Table 1, which means that network planners can use this as a good starting point for evaluating vendor solutions.

Table 1. Key Solution and Functional Attributes

<table>
<thead>
<tr>
<th>Key Solution Attributes</th>
<th>Key Functional Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Control</td>
<td>Configuration parameters are application-centric and/or business-centric, and can be created/applied/changed by personnel that are not well-versed in networking technologies.</td>
</tr>
<tr>
<td></td>
<td>All networkwide configuration is done via controller.</td>
</tr>
<tr>
<td></td>
<td>Application forwarding policies are defined via controller.</td>
</tr>
<tr>
<td></td>
<td>Must support networkwide device and network visibility.</td>
</tr>
<tr>
<td></td>
<td>Must support business and application-oriented graphical management interfaces.</td>
</tr>
<tr>
<td>Zero-Touch Install</td>
<td>The solution must support zero-touch provisioning for new branches, which entails on-site branch personnel having to make physical (i.e., cabling) changes only and administrators not having to make configuration changes to bring new branches online.</td>
</tr>
<tr>
<td></td>
<td>Edge devices register with controller automatically.</td>
</tr>
<tr>
<td></td>
<td>Edge devices automatically discover IP addressing on both LAN and WAN, and pass on to controller for automated address table compilation.</td>
</tr>
<tr>
<td></td>
<td>Forwarding tables are computed by controller and downloaded to edge devices for autonomous operation.</td>
</tr>
<tr>
<td>Key Solution Attributes</td>
<td>Key Functional Attributes</td>
</tr>
<tr>
<td>-------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>Routing</td>
<td>Should support both LAN and WAN side routing.</td>
</tr>
<tr>
<td></td>
<td>Should be able to interact with provider routing across multiple WAN services.</td>
</tr>
<tr>
<td></td>
<td>Should support VRF.</td>
</tr>
<tr>
<td>WAN Path Control</td>
<td>Each edge device can have paths established to every other edge device, across multiple different WAN services.</td>
</tr>
<tr>
<td></td>
<td>Edge devices must be able to identify and classify applications, including application-encrypted traffic.</td>
</tr>
<tr>
<td></td>
<td>Edge devices can forward traffic via specific WAN paths depending on predefined application policies and performance needs.</td>
</tr>
<tr>
<td></td>
<td>Edge devices must be able to load-balance traffic across multiple WAN paths based on load-balancing algorithms.</td>
</tr>
<tr>
<td></td>
<td>Edge devices can both passively and actively monitor path performance, and adjust application forwarding accordingly.</td>
</tr>
<tr>
<td>Network Services</td>
<td>It must be possible to insert services in any WAN path in a service chain, such as WAN optimization controllers, firewalls, secure Web gateways, etc.</td>
</tr>
<tr>
<td></td>
<td>It should be possible to deploy virtualized network services in the edge device.</td>
</tr>
<tr>
<td>WAN Connectivity</td>
<td>Edge devices must support multiple WAN interfaces and must have the capability to physically terminate carrier services.</td>
</tr>
<tr>
<td></td>
<td>Must support direct Internet access (i.e., IPsec and basic security).</td>
</tr>
</tbody>
</table>
### Table 1. Key Solution and Functional Attributes

<table>
<thead>
<tr>
<th>Key Solution Attributes</th>
<th>Key Functional Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>WAN Reporting</td>
<td>Control, collect and aggregate traffic statistics for all WAN paths.</td>
</tr>
<tr>
<td></td>
<td>Traffic statistics include path utilization, application-specific utilization and path performance.</td>
</tr>
<tr>
<td></td>
<td>Must support device health monitoring.</td>
</tr>
<tr>
<td></td>
<td>Must support graphical reporting interfaces with drill-down options.</td>
</tr>
<tr>
<td>WAN Analytics</td>
<td>Controller must store traffic and performance information to assist with trouble analysis and traffic forecasting.</td>
</tr>
</tbody>
</table>

*Source: Gartner (December 2015)*

## Evidence


2. Riverbed platform future discussion on Vimeo.

## Note 1

### Cloud Service Uptake Will Grow

Seventy-five percent of organizations use public cloud services today, and 78% plan to increase their investment in cloud services in the next three years. Ninety-one percent of organizations across all industries plan to use external providers to help with cloud adoption (see "Forecast Analysis: Public Cloud Services, Worldwide, 2Q15 Update"). This is driving further evolutionary change and complexity into enterprise WANs.
Note 2
Carriers Will Increasingly Offer Managed SD-WAN Solutions

We have already seen a few carriers such as Verizon, Singtel, Swisscom and StarHub offer SD-WAN as the basis for their managed WAN services. The driver is partly to offer faster rollout times, but also to increase their application networking focus as well as to provide improved customer self-service capabilities.

Note 3
Riverbed

Gartner rarely observes implementations where SteelHead replaces a router, and we estimate that more than 99% of Riverbed’s deployed WAN optimization controller appliances are used in conjunction with a separate CPE device. Riverbed appliances do not currently support dynamic routing protocols, but the vendor has this functionality on a roadmap for 2016.
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