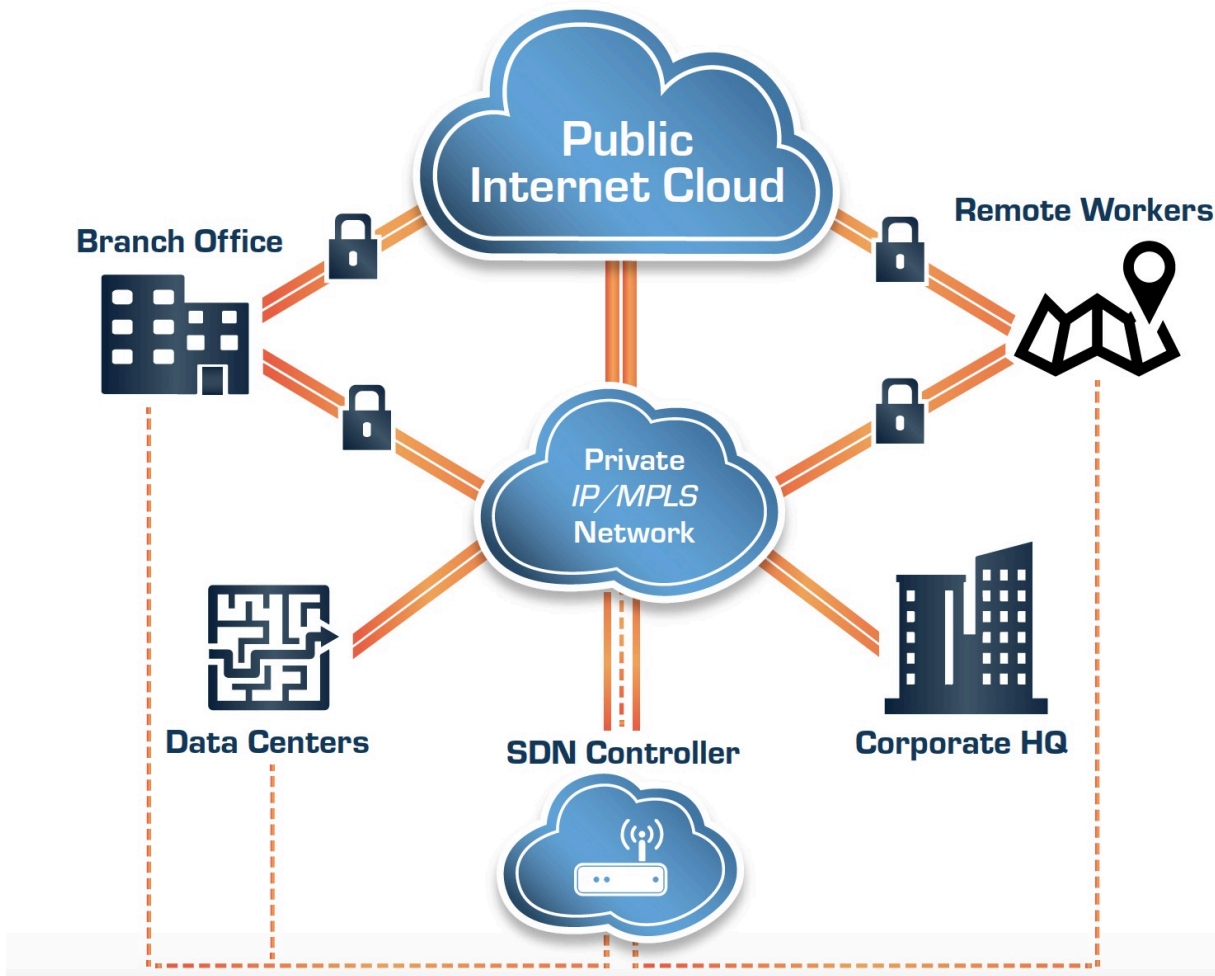


SD-WAN Growth Report June 2020



Sponsored by **aryaka**

Highlights:

- **Momentum in the SD-WAN market continues.** Despite a slight slowdown in the 1H due to pandemic-related supply chain and sales challenges, the market is likely to accelerate in 2H 2020 and into 2021 as the features of SD-WAN serve growing cloud demand.
- **Futuriom expects the SD-WAN tools and software market to accelerate to a growth rate of 34% CAGR to reach \$2.0 billion in 2020, \$2.85 billion in 2021, and \$4.6 billion by 2023.** The acceleration will be spurred by demand for more agile, high-performance, and secure connections to cloud applications.
- **The top four benefits of SD-WAN adoption include improved security, better management/agility, bandwidth optimization/cost savings, and faster cloud applications performance.** These benefits were picked in our Futuriom 2020 SD-WAN Infrastructure Survey of 100 enterprise end users, which also indicated broadening use cases and adoption in the market.
- **Awareness of SD-WAN is growing as the market matures.** In the Futuriom 2020 survey, 92% of respondents said they are evaluating SD-WAN services and/or software.
- **The Work from Home (WFH) trend is giving the SD-WAN market a boost.** SD-WAN integrates virtual private networking (VPN) functionality for both remote workers and enterprises branches, which is a key feature demand.
- **Companies to Watch in the SD-WAN market, according to Futuriom:** Aryaka Networks, Barracuda Networks, Bigleaf Networks, Cato Networks, Cisco Systems (Viptela), Citrix Systems, CloudGenix (Palo Alto Networks), FatPipe Networks, Fortinet, HPE (Aruba), Nuage Networks (Nokia), Silver Peak, Versa Networks, and VMware (VeloCloud).
- **As predicted in 2019, M&A and consolidation has continued and is likely to continue.** The acquisition leaves fewer players on the dance floor. Aryaka, Cato Networks, FatPipe, Silver Peak, and Versa Networks are all strong candidates for M&A or IPO. (Last year, CloudGenix was on this list – Palo Alto Networks announced earlier this year that it's acquiring the startup.)
- **Companies featured in this report:** Adaptiv Networks, Aryaka Networks, Bigleaf Networks, Cisco Systems (Viptela), Cato Networks, Citrix Systems, CloudGenix (Palo Alto Networks), HPE, FatPipe Networks, Fortinet, Juniper Networks, Nuage Networks (Nokia), Riverbed, Silver Peak, Versa Networks, VMware (VeloCloud).



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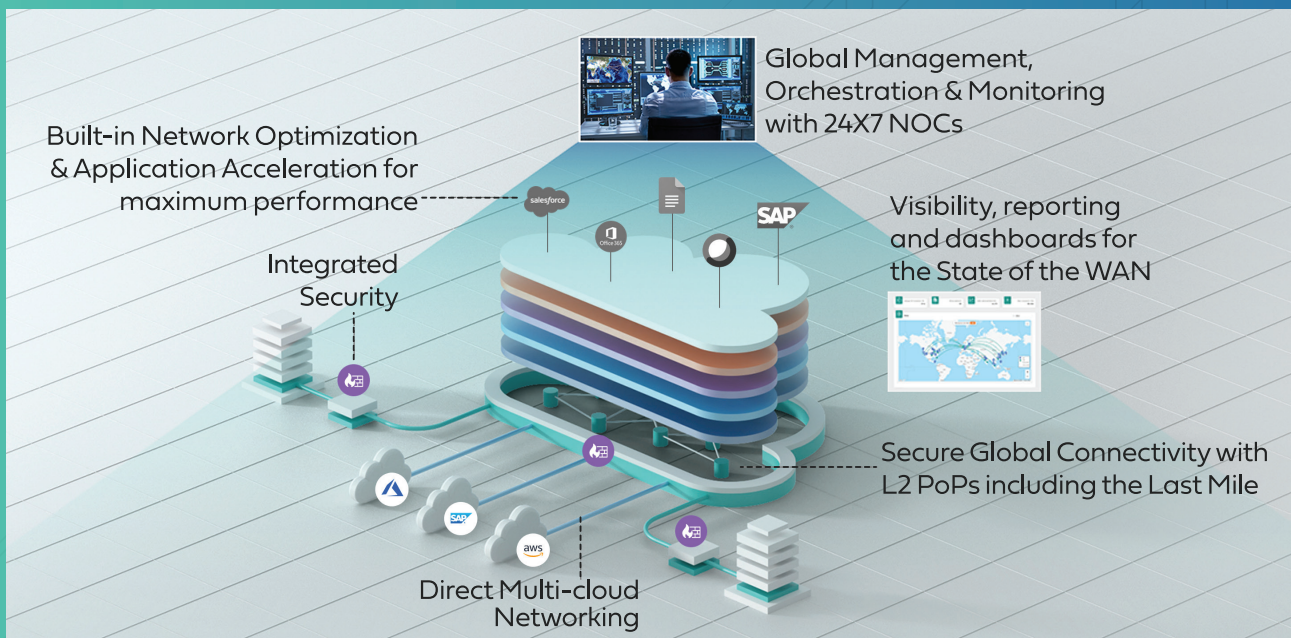
Application
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Operational Simplicity
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Why Aryaka?

- ✓ Leading TCO - OpEx Only
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- ✓ Private Core, Internet, MPLS
- ✓ Gartner Visionary and Customer Choice - Only Managed SD-WAN Provider in the WAN Edge MQ
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The Cloud-First
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Gartner Peer
Insights 'Voice of
the Customer'
WAN Edge
Infrastructure,
April, 2020.

1. Intro: Year 2020 - The Year of Change

It's the fourth year of the annual Futuriom Software-defined Wide-area networking (SD-WAN) Infrastructure Growth report -- and an interesting year it's been. As the world grapples with the business and technology challenges of the response to COVID-19 pandemic, cloud technology and cybersecurity have come to the fore. The evolution of the health crisis and its economic impact have had an effect on the SD-WAN market, as the companies involved adjust their product and business approaches to respond to the changing conditions of the world.

Cloud-delivered SD-WAN is a growing technology domain that enables enterprises and organizations to set up and manage secure WAN connections using cloud software deployment and management approaches. It has an increasing role to speed up and secure cloud connectivity and has become a dominant growth area for enterprise communications services. Enterprises are buying SD-WAN to reduce the complexity in configuring branch-office devices, routing schemes, and network addresses. With SD-WAN, many of these functions can be abstracted into the cloud and managed by the service provider or an enterprise manager using a cloud interface, rather than using proprietary networking equipment.

For many years, Futuriom has correctly predicted high growth in the SD-WAN market, with an approximated 34% annual growth rate for SD-WAN platform services, as measured by the compound annual growth rate (CAGR) of hardware sales and software annual recurring revenue (ARR). Speaking with market participants, the market may have paused slightly in the 1H of this year from restrictions imposed to mitigate the COVID-19 pandemic, but we believe this growth trajectory will start re-accelerating in the 2H of 2020 as SD-WAN's strategic position as an enterprise networking and cloud networking platform expands.

The new Work From Home (WFH) push, which has become broad-based across global organizations, is also having a lasting impact on businesses worldwide, creating new demand for advanced SD-WAN branch solutions, including those directed at the home market.

In addition to the market impact of the COVID-19 pandemic, Futuriom believes several technology trends will drive additional innovation and evolution in the SD-WAN market. Enterprise IT departments need more efficient ways to build networks that connect multiple clouds, driving the creation of a multi-cloud networking (MCN) market. As SD-WAN platforms continue adding direct cloud connectivity to their feature sets, it's likely that the next phase of their development will be aimed toward enabling MCN. And on the security front, SD-WAN platforms are becoming important tools for orchestrating and managing both endpoint and cloud security products -- a trend that will grow in importance.

The bottom line is that the current business environment is driving IT and networking departments to look at more efficient ways to deliver secure and efficient cloud connectivity, a challenge that SD-WAN technology solves. As a result, SD-WAN is likely to be key to managing networking, cloud connectivity, and security for the foreseeable future.

This report outlines the latest expectations of how we see the SD-WAN marketing evolving based on extensive survey data and customer interviews. In addition to speaking with 2-3 end users per week in the enterprise networking and security market, Futuriom conducted a survey of 100 professionals in the networking and cybersecurity markets. All of the respondents were qualified as director-level and above professionals with networking, security, and IT roles.

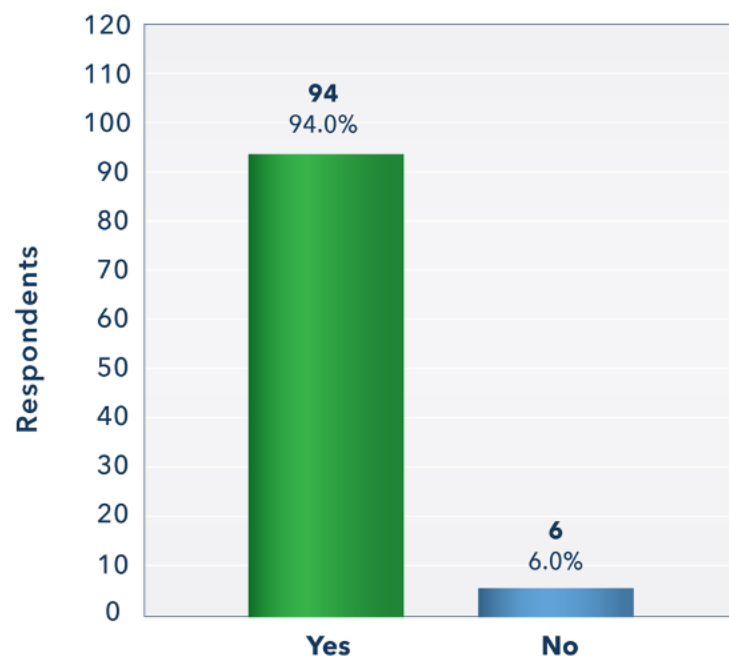
We also collected input from more than 15 vendors to get a sense of revenue growth and market development. This report presents the analysis of that data and our interviews with market participants.

2. Market Drivers: Key Benefits of SD-WAN

The SD-WAN market has been one of the bright spots for networking technology over the past decade, bringing a unique set of capabilities to solve the real-world headaches of IT managers, network managers, and security specialists.

It's clear that SD-WAN technology has gone mainstream and is maturing. Of the 100 enterprise users we surveyed, 91.5% said their awareness of the technology has grown in the last 12 months. Of those surveyed, 94% were aware of SD-WAN technology.

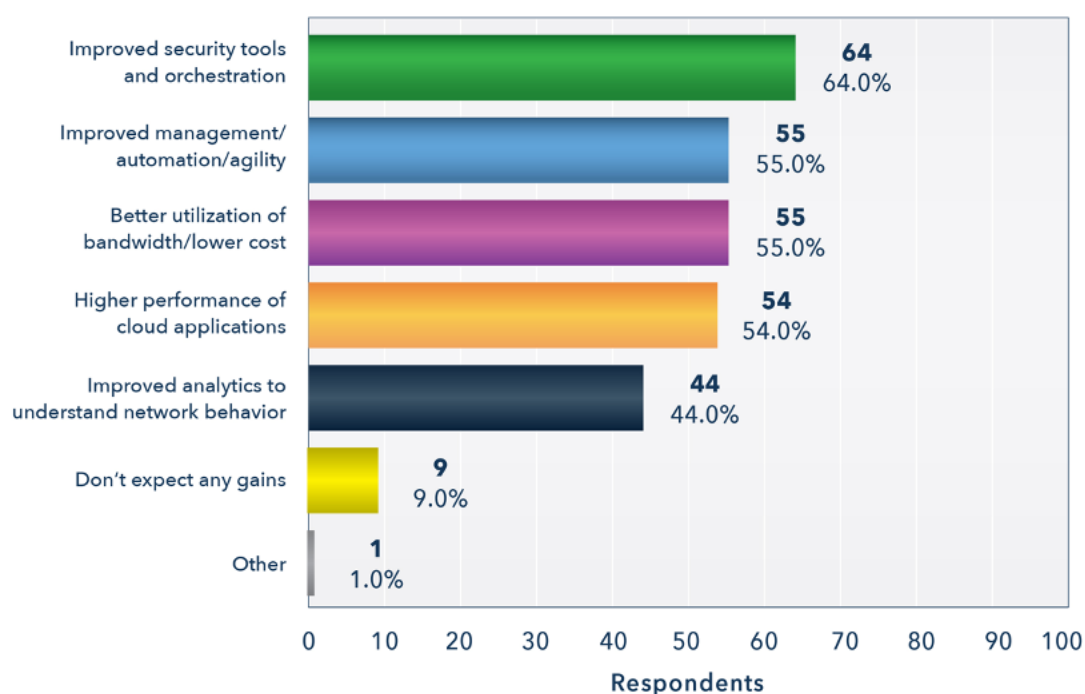
Are you familiar with software-defined wide-area networking technology (SD-WAN)?



When we speak to the network managers and IT specialists using the technology, the theme we hear is that SD-WAN has made their lives easier. This year's SD-WAN Survey highlighted improved security capabilities, better bandwidth management, improved cloud applications performance, improved management/orchestration and automation, and improved analytics to understand what's happening on the network.

Below are the results of the survey of 100 end users when they were asked to choose the primary benefit of SD-WAN technology. We go over each category in more detail below.

What would you expect to be the primary benefit of SD-WAN software or services for your networking operations?
(multiple responses allowed)



FUTURIOM | 2020 SD-WAN Infrastructure Survey

Total respondents = 100

Security and Security Services (Including SASE)

Because SD-WAN tools have traditionally focused on enterprise branches and endpoints, the SD-WAN is a natural place to orchestrate cloud security services. This has led to the argument that SD-WAN is evolving into a new cloud-security architecture, which Gartner has now famously named Secure Access Service Edge (SASE). What SASE really means is that the SD-WAN service edge is becoming the control point for cloud security functions.

When we asked survey respondents about the primary benefits of SD-WAN, "Improved security tools and orchestration" was on top of the list for 64% of respondents (multiple responses were allowed). All of the major SD-WAN suppliers are moving in this direction.

For example, SD-WAN startups such as Silver Peak and Versa Networks have been building next-generation firewall (NGFW) and security tools into their SD-WAN platforms. Cato Networks has a fully featured cloud security stack. Firewall vendors such as Fortinet and Palo Alto Networks have been building out SD-WAN capabilities and merging those with their firewall offerings. (In the case of Palo Alto Networks, that meant buying CloudGenix.) Traditional networking vendors such as Cisco, Juniper Networks, and Nuage Networks (Nokia) are melding their networking analytics functionality and network virtualization with security.

Cloud virtualization vendors Citrix and VMware also have their own SD-WAN security strategies, which include integrating security and networking functions into their cloud products. In the case of VMware, its VeloCloud SD-WAN product is being integrated with its NSX networking solution, using micro-segmentation and analytics as a security tool to create secure end-to-end overlay from the branch to the data center or the cloud. Citrix has recently integrated a comprehensive edge security stack and has native SASE capabilities in its portfolio including secure access, WAN Optimization, Zero Trust Network Access, and Remote Browser Isolation.

Aryaka Networks, which like Cato Networks operates its own transport network, provides orchestration of a wide range of security services with its SD-WAN service.

Most of the SD-WAN vendors enable better cloud security orchestration with the most common cloud security and next-generation firewall (NGFW) products from suppliers such as Checkpoint, Zscaler, and Palo Alto.

The bottom line: Security is a big part of where SD-WAN is at. Managers don't just want to set up and manage networks -- they want to make sure they are secure.

Orchestration and Management

The second top benefit chosen by end users in our survey this year was "Improved management/automation/agility," which 55 of 100 respondents selected.

One of the main roles of SD-WAN technology is to abstract out the complexity of underlying networking hardware and software, making it easier to configure and automate. Businesses want to simplify the process and roll out network services faster.

SD-WAN enables end users to set up, manage, and automatically deploy many sites using efficient cloud interfaces or portals. Many end users see these more elegant management interfaces of SD-WAN as an improvement over legacy hardware-driven approaches, which often require manual configuration and command-line interfaces. SD-WAN also requires less expertise (e.g., engineers certified on certain platforms), which reduces operational costs.

End-users that we interview also regularly cite the need for a more efficient means of managing customer premises equipment (CPE) – including eliminating or replacing individual hardware platforms altogether with more standardized SD-WAN devices that can be based on commercial off-the-shelf hardware.

Lowered Cost of Bandwidth

In its early days, one of the first uses cases of SD-WAN was to lower the cost of bandwidth by leveraging Internet or IP transit services to replace more expensive private leased lines and MPLS. Today, SD-WAN still is thought of as a cheaper and more modern MPLS alternative.

In our end-user survey, 55 of 100 respondents said one of the primary benefits of SD-WAN is "better utilization of bandwidth and lower cost."

It should be noted that end users interviewed are rarely replacing all of their MPLS, though they cite reduced bandwidth costs as a key reason for using SD-WAN. Most organizations we talk to are just selectively trimming down MPLS or consolidating circuits and using broadband or IP transit where it makes more sense.

For example, if an enterprise application is hosted in a private data center that is connected with an effective MPLS link, it may not make sense to replace that. But if a number of users are accessing cloud applications directly from the branch, it no longer makes sense to backhaul the traffic to the private data center over MPLS before sending it over the Internet. Breaking out Internet and cloud traffic to the branch optimizes how bandwidth is allocated to branch networks.

Emerging SD-WAN technologies can reduce costs and increase flexibility for end users whether MPLS is deployed or not.

By adding application acceleration, traffic prioritization, and secure encryption, SD-WAN can often meet many enterprise WAN requirements using IP transit or broadband at a lower cost than traditional leased line or MPLS circuits. SD-WAN connections can also be used to bond network access lines or switch between several access networks depending on availability and usage.

High-Performance Cloud

SD-WAN solutions help optimize access to cloud applications by monitoring traffic and routing higher-priority business applications ahead of leisure services such as Netflix and YouTube. Fifty-four survey respondents (or 54%) said that "higher performance of cloud applications" was a primary benefit of SD-WAN.

Additionally, many WAN services can peer directly with cloud services to offer a "fast lane" to business applications. These techniques can be used to "offload" enterprise WAN backhaul, routing cloud traffic directly to the source using a combination of broadband technologies. This will also have the effect of challenging the traditional Application Delivery Controllers (ADCs), which optimize the performance of data centers with load balancing and other application optimization functions as part of a discrete hardware device. In addition, some SD-WAN vendors are working with cloud vendors to set up specialized cloud gateways and points of presence (POPs) in cloud datacenters to provide more direct access to cloud applications.

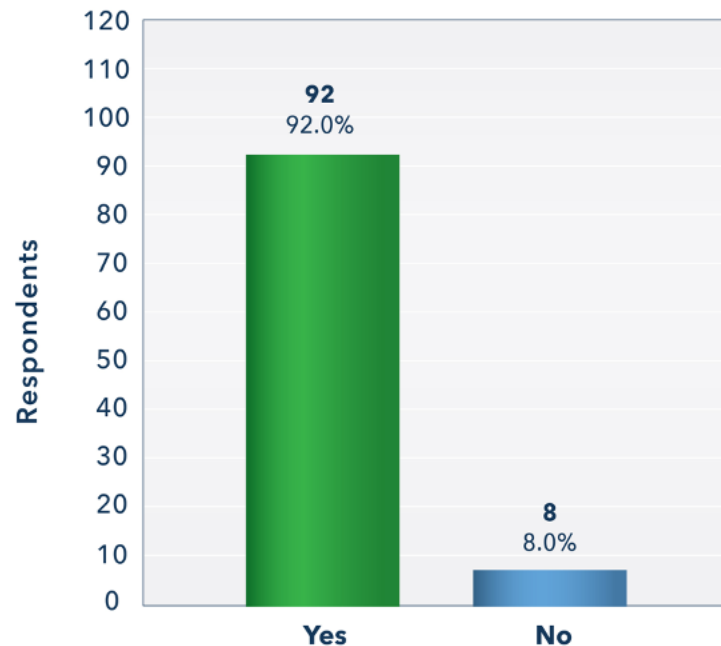
3. Market Forecast: Boosting Our Projections

This will be the fourth year of our SD-WAN Growth forecast, and so far we have been on the mark. In 2017, we forecast \$900 million in revenue in 2019 and \$1.3 billion in revenue in 2020, proving conservative. When research firms such as Dell'Oro and IHS later issued forecasts (at least a year later), they were similar to ours. In our 2019 report, we updated that forecast to \$2 billion for 2020, correctly predicting the acceleration in the market. For example, two competing technology research firms recently said 2019 was the “breakout” year in SD-WAN, putting actual revenues near \$1 billion, very close to our forecast.

What will fuel this growth? As mentioned earlier, there is broad awareness of SD-WAN technology, and that appears to be growing, with the vast majority of enterprise IT professionals familiar with the basics of the technology.

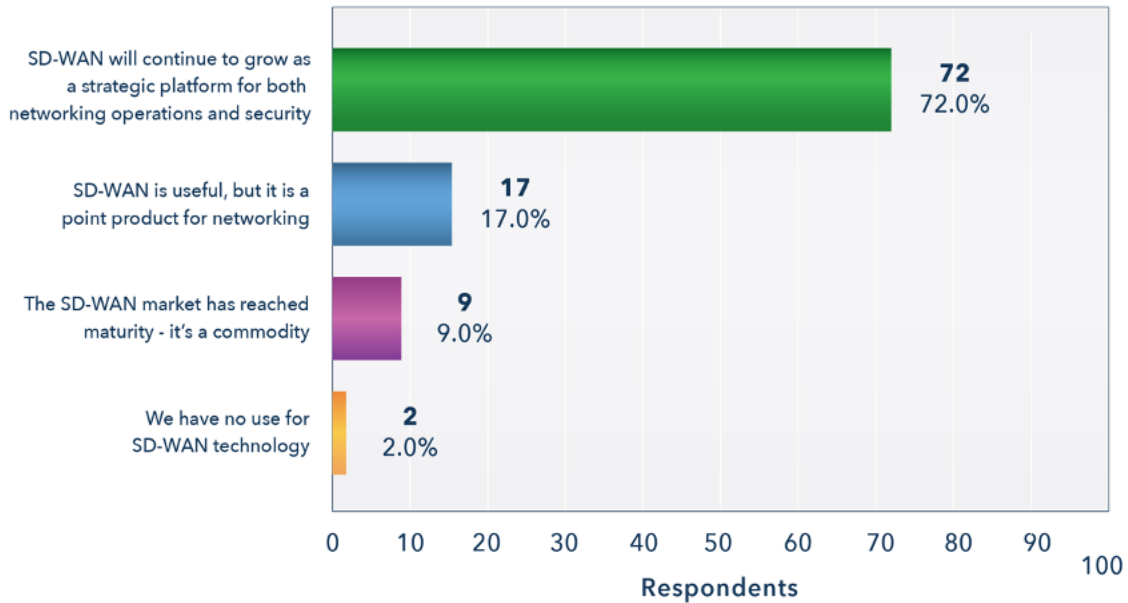
More importantly, the buying cycle is active. A large majority of survey respondents — 92% — said they are using and/or evaluating SD-WAN technology, as seen in the chart below.

Are you currently using and/or evaluating SD-WAN services, software, or equipment in order to streamline networking operations?



A majority of the respondents also expect the market to grow steadily – 72 respondents of 100 said they expect it to grow as a strategic platform for both network operations and security over the next 3-5 years.

How would you categorize your expectation of the evolution of the SD-WAN market over the next 3-5 years?

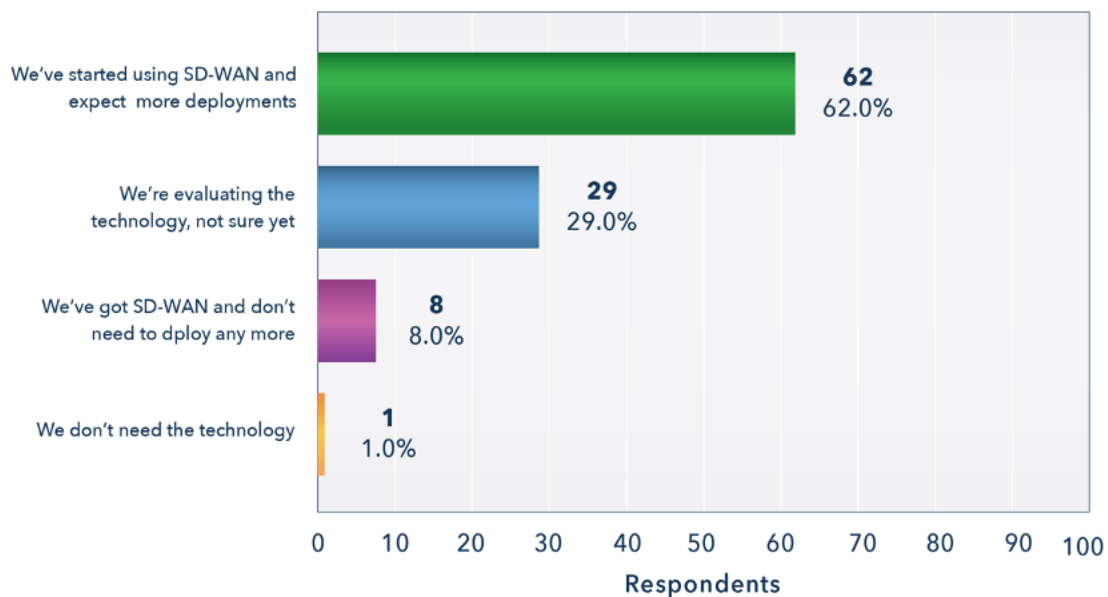


FUTURIOM | 2020 SD-WAN Infrastructure Survey

Total respondents = **100**

When asked what end users expect in the near future, 62% of respondents said they have started using it and expect to buy more, and 29% are evaluating it. Only 1 respondent said they don't need the technology.

Describe your approach to SD-WAN services and software over the next 2-5 years:



FUTURIOM | 2020 SD-WAN Infrastructure Survey

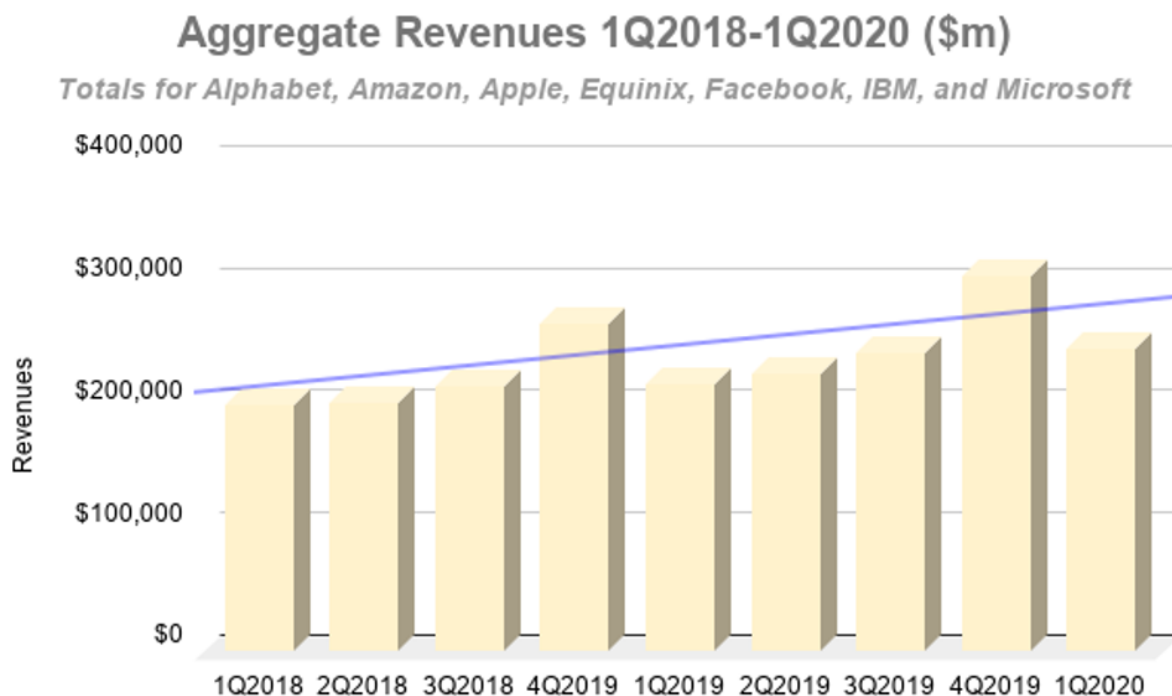
Total respondents = **100**

Most impressively, it looks like everybody is ready to spend money on SD-WAN technology 93 respondents (93%) said they expect their company's dollar volume of investment in SD-WAN to increase over the next 12-24 months.

The key tailwind for SD-WAN is the persistent demand for cloud and security products from large enterprise buyers. For most public cloud providers we track, revenues in the first quarter of 2020 rose. Although there is not a direct correlation between public cloud revenues and SD-WAN revenues, it is generally reflective of an environment in which enterprises are moving most of their IT services – including networking – to cloud infrastructure, a category that we believe SD-WAN belongs to.

The rise of WFH as well as an expansion of security investment also will drive the SD-WAN market. The chart below showing the growth of cloud revenue is not directly correlated with SD-WAN use, but it is clear that with public cloud use driving the need for more efficient networks overall, the robust growth in cloud services will continue to drive demand for SD-WAN services, which help optimize connections to cloud applications in a cost-effective way.

One question everybody has: How is the current recessionary environment, triggered by the actions taken by governments worldwide to slow the spread of COVID-19, affected market adoption?



On one hand, the trend toward WFH and the need for better cloud security has spurred interest in the market. But the recession and precautionary lockdowns have also hindered some businesses, resulting in lowered enterprise IT spending and making it challenging for sales forces or engineers to physically visit customers.

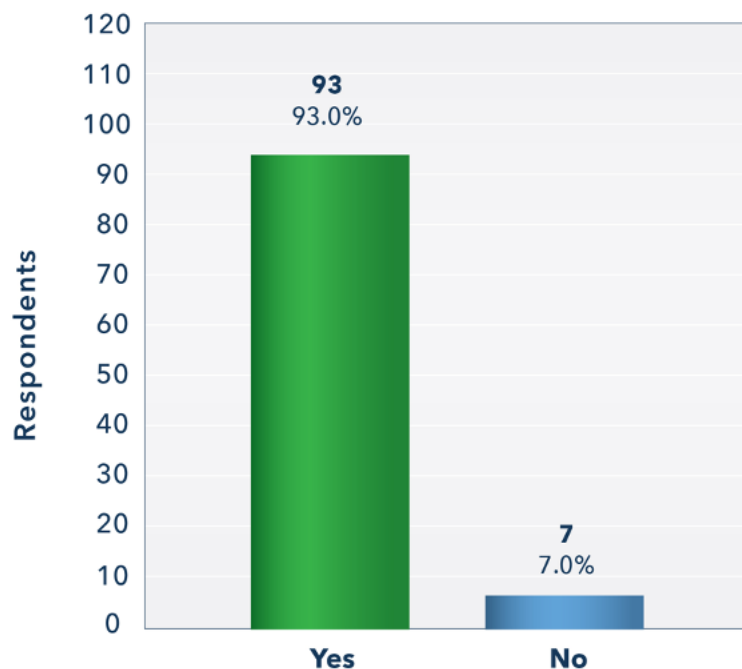
In the end, the two currents appear to be balancing each other out, which may have curtailed growth in the first half of 2020 but our research, including interviews with SD-WAN suppliers as well as customers, indicated there were pockets of stalled growth in SD-WAN projects, but nearly all of these delays were attributed to disruption in the supply chain or physical sales and installation process due to COVID-19 restrictions, rather than being driven by slacking demand.

Market leaders indicate to us that this has resulted in pent-up demand for installation which will re-accelerate in earnest in the 2H of 2020.

"We haven't had anybody decide they won't move forward with the SD-WAN purchase," said David Hughes, the CEO of Silver Peak. "They may want to reduce human intervention. That's a driver for the cloud. It puts a heightened spotlight on digital transformation. It's a big driver for SD-WAN. If you look forward 2-3 years everything is accelerated. What you are seeing is some of the pipeline delayed month by month. Trying to understand what the delay is and how long, that's quite hard. It's also hard to understand COVID."

When we surveyed the enterprise end users, this strength was reflected in the market: Ninety-three percent of those surveyed expect their company's dollar volume of SD-WAN purchases to increase over the next 12-24 months.

Do you expect your company's dollar volume of SD-WAN purchase to increase over the next 12-24 months?



FUTURIOM | 2020 SD-WAN Infrastructure Survey

Total respondents = **100**

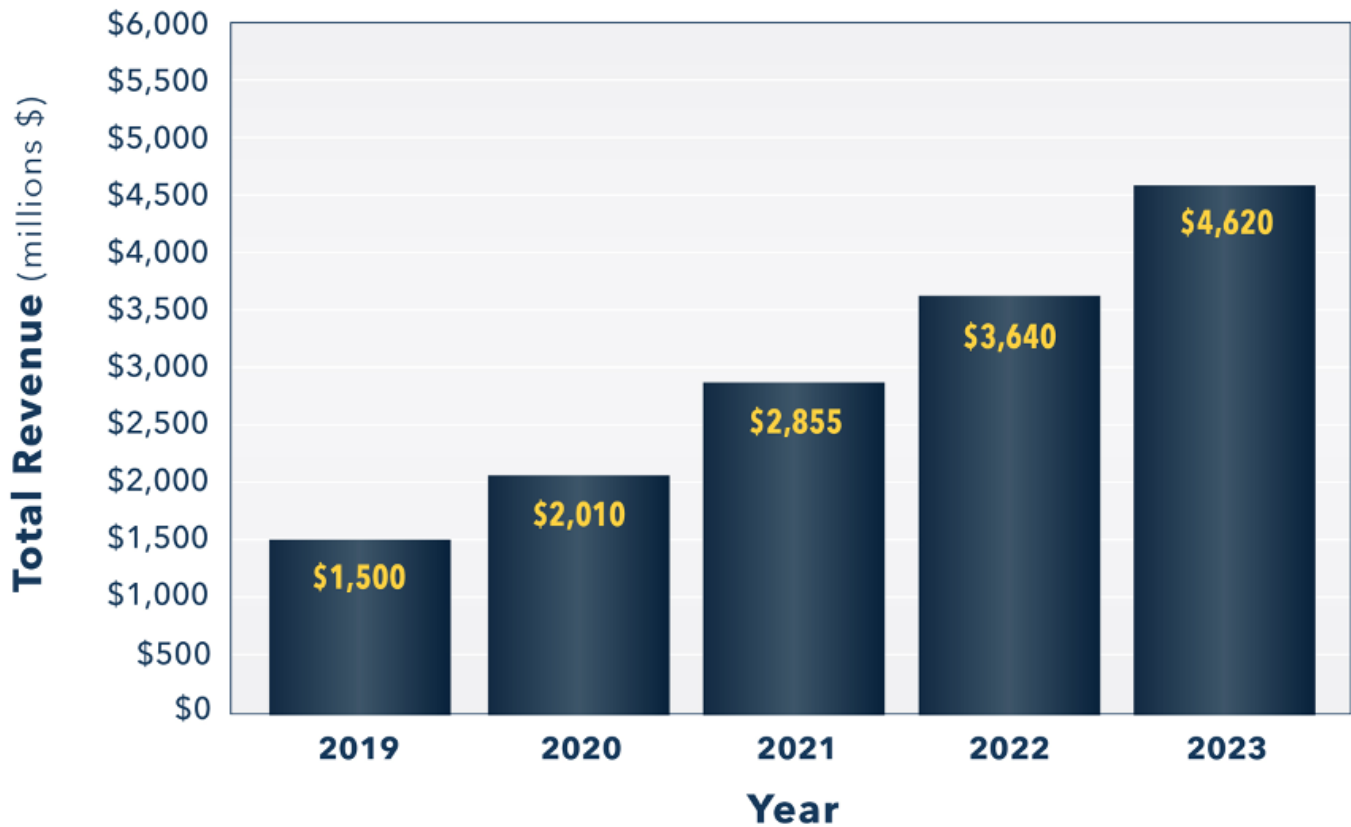
When we rebuilt our revenue forecast for 2020 and beyond, we had to take changing conditions into account. In the long term, trends such as WFH and cloud acceleration are likely to provide additional growth in the SD-WAN market. There is now additional interest in connecting to multiple cloud networks and automating security on enterprise networks, both functions that SD-WAN can help with.

Our new revenue forecast for SD-WAN hardware and software can be seen below. Please note this includes hardware that accompanies SD-WAN software or services, though many of the SD-WAN companies we surveyed have different ways of structuring pricing and sales. In our experience, the bulk of revenue (75%-80%) is sold as a monthly software or services charge, as SD-WAN companies are targeting the annual recurring revenue business model. But some companies, such as Cisco, do not always clearly break out SD-WAN revenue from other software licenses (such as routing software), so apples-to-apples comparisons are difficult. This is why Futuriom focuses on forecasting overall industry growth, rather than trying to distinguish market share among individual vendors – which we believe is impossible.

We are increasing our forecast for four-year revenue growth to 37%, slightly above the 34% from last year, based on our assessment of the market. This model was built with input from at least ten vendors giving us specific revenue guidance, in addition to the qualitative work that we did talking to end users and gathering information from the end-user survey. While 2020 may be a “pause year” in which growth slows slightly, we see it reaccelerating in 2021 and 2022 as we move toward a pervasive cloud world in the global enterprise.

For example, we had total SD-WAN revenue at \$2B in 2020 and \$2.5B in 2021 with respective annual growth rates (from the previous year) of 33% and 20%. Now we are projecting \$2B in 2020 and \$2.8B, which would represent annual growth rates of 33% and 43%. We are projecting revenue growth to continue at a CAGR (four-year rate) of 34% until 2023, when the SD-WAN market hits \$4.6B.

Total SD-WAN Revenue 2019-2023 (millions \$)



| | | | | | |
|--|----------------------|----------------------|----------------------|----------------------|----------------------|
| Total SD-WAN Infrastructure Revenue (millions \$) | 2019: \$1,500 | 2020: \$2,010 | 2021: \$2,855 | 2022: \$3,640 | 2023: \$4,620 |
| Annual Growth Rate (from prior year) | 2019: 50% | 2020: 33% | 2021: 43% | 2022: 27% | 2023: 27% |
| Total CAGR (2019-2023) | 34% | | | | |

4. Trends to Watch in 2020 and Beyond

Where is SD-WAN going in 2020? We see it integrating more deeply with public cloud contracts and services, serving as a platform for the orchestration and hosting of security services (SASE), and growing in its role as a strategic platform for managing enterprise networks.

These trends may not converge in any single product. SD-WAN technology covers a lot of ground, which may be why the market is filled with so many competitors. Many SD-WAN technology players are pivoting to represent strengths in specific areas in order to expand their addressable market. In the past few months, news announcements have highlighted this trend. Following are some examples of what we have seen lately.

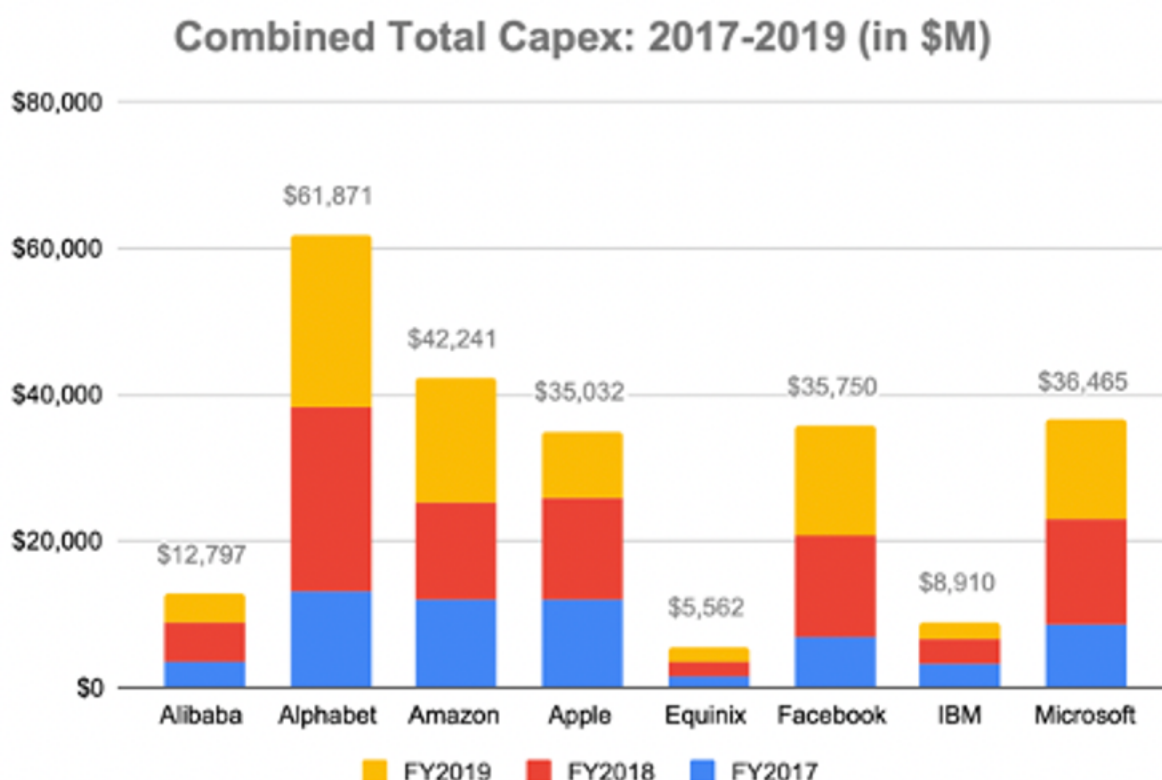
Cloud SD-WAN Goes POP

One of the strongest trends in SD-WAN is integration with major cloud providers to build interconnection and virtual networking functionality at specific points of presence. These POPs are becoming more important to the cloud action, as co-location providers such as Equinix and Digital Realty build out physical cloud locations closer to the customers.

The major cloud providers are also building out their infrastructure, with major presences at co-located regional POPs, to enable faster access to their clouds. For example, Microsoft has its own WAN infrastructure, called Azure Virtual WAN, which makes it easier for SD-WAN providers and enterprises to connect across the cloud. Amazon is beefing up its presence in its own Regions strategy – providing more interconnection points and software POPs. Google provides Virtual Private Cloud interconnects in an expanding footprint.

AWS has increased its cloud connectivity via integration technologies such as AWS Transit Gateway, which lets customers connect their Amazon Virtual Private Clouds (VPCs) with enterprise connection points. Some of the vendors already supporting AWS VPCs include HPE's Aruba, Aviatrix, Cisco, Citrix, Nuage Networks, Silver Peak, and Versa.

The efforts of cloud titans to extend their environments for greater SD-WAN access is evident in the growth of capital spending over the last three years, as reported in Futuriom's Cloud Tracker Report, June 2020.



Many of the SD-WAN players are taking advantage of these POPs and virtual connection points to enable customers to instantly build far-reaching virtual WANs that connect directly with cloud services. It's clear that integrating SD-WAN technology, which manages connections to enterprise hubs and branches, with public cloud gateways will be a powerful concept going forward.

Here are some more examples of SD-WAN integration with public clouds: Silver Peak recently announced one-click automation to public cloud workloads that are hosted in Microsoft Azure infrastructure-as-a-service (IaaS) instances. Cisco and Google recently announced the Cisco SD-WAN Cloud Hub with Google Cloud, which provides tighter integrations between Cisco and Google Cloud. VMware and Microsoft offer a joint solution to improve connectivity with Azure Virtual WAN from branch office and remote locations. VMware SD-WAN by VeloCloud enables customers to create virtual cloud network architecture that connects all of the locations to Azure. Citrix has been focusing on integrating its SD-WAN with Microsoft Office 365 to automatically and efficiently steer traffic to the nearest Office 365 point of entry. Nuage is helping emBritish Telecom (BT) integrate into Azure's vWAN via regional vHUBs

SD-WAN providers continue to work on better integrations with the leading public cloud platforms. Microsoft provides a list of partners that include 12 major SD-WAN providers, all of which are covered in this report. Microsoft has also started an Office 365 certification program.

So far, three SD-WAN vendors have been certified as meeting standards for enhancing delivery of Office 365 performance: Citrix, NTT, and Silver Peak. Futuriom expects all the major SD-WAN players to jump onboard this train, as Office 365 is a large market and Microsoft is building a massive cloud infrastructure.

Expect to see similar certification programs in areas such as unified communications as-a-service (UCaaS), which business voice and data network provider Windstream says comprises 30% to 40% of its SD-WAN implementations. In another example, Utah-based SD-WAN provider FatPipe has been focusing on UCaaS, recently reporting high-performance measurements when FatPipe's platform is integrated with services from cloud provider RingCentral.

SD-WAN Gets SASEy

Gartner has gotten a lot mileage naming the trend of SD-WAN and cloud security convergence, which it calls SASE. This concept gained momentum in 2020. SASE defines a sub-trend in SD-WAN, which is integrating SD-WAN with cloud-based security applications.

Some of the SD-WAN vendors are pushing SASE especially hard. For example, Cato Networks is positioned as one of the leaders for delivering security solutions directly from the cloud, recently laying claim to being the first SD-WAN vendor to integrate SIEM (security information and event management) capabilities into its cloud-based SD-WAN platform. Versa Networks has also been very aggressive in pushing its own security stack that can run from both the cloud and on its edge SD-WAN device, which follows the SASE theme. And VMware VeloCloud has been pushing the SASE theme with its cloud gateway approach to delivering security. VeloCloud has a long list of cloud-security partners, including Zscaler, Checkpoint and Netskope.

SD-WAN for the Multi-Cloud Movement

If you put two trends together – more POPs and more SASE – you have the outline for the future of IT networking infrastructure. Cloud architects will soon be using SD-WAN to connect to multiple cloud platforms, and with the use of API gateways and POP interfaces, there will be opportunities to provide connectivity across multiple clouds.

In one example, Versa Networks in early December announced that it now supports ingress routing in Amazon virtual private clouds, an important step toward multi-cloud networking integration. Nokia's Nuage Networks division, which has a strong position in data-center virtualization with its Virtualized Service Platform (VSP), recently announced it is using its SD-WAN 2.0 platform to deliver multi-cloud connectivity with OmniClouds, a cloud provider that will help connect multiple public clouds for customers in the Middle East and Africa. Aryaka Networks' SmartServices provides a managed multi-networking service for public clouds and software-as-a-service providers, including Microsoft, AWS, Oracle, and Google.

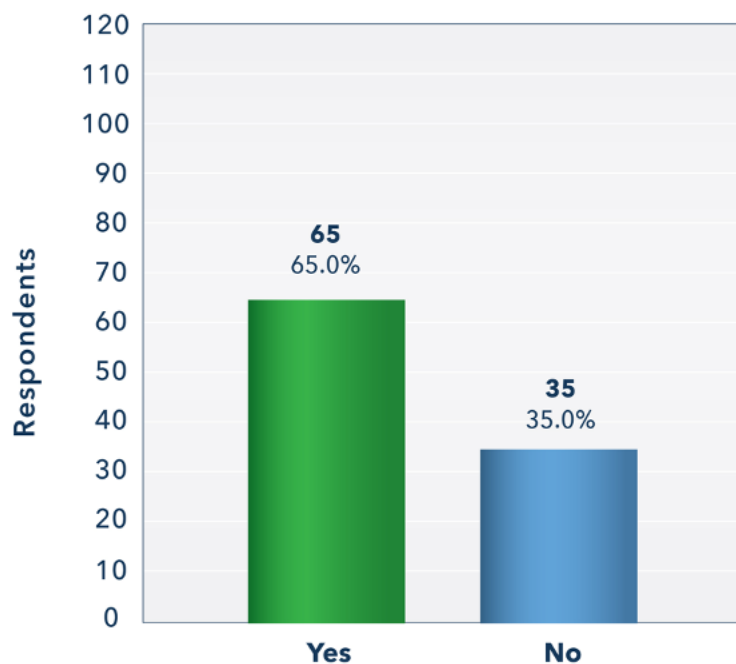
There is also a new crop of multi-cloud networking technology providers -- such as Arrcus, Aviatrix, and PacketFabric -- that are working on the more complex aspects of routing and connecting networks across multiple clouds -- and it's not hard to see these markets cross-fertilizing in the future. For example, Aviatrix and Silver Peak have announced an SD-WAN integration partnership.

The trend is pretty clear: Enterprises are increasingly looking to leverage the investments of the major cloud providers, essentially outsourcing their IT infrastructure. They need networks that can be more easily connected, managed, and secured across multiple cloud networks. This trend will grow as they connect more SaaS applications and build multi- and hybrid-cloud architectures in distributed environments. An agile and manageable virtual network is needed to connect all these elements, and SD-WAN will play a major role.

Standardization and the MEF

One thing that's interesting about the SD-WAN market is that it consists of almost entirely proprietary products with very little standardization. It's interesting that this was identified as a barrier to market development in our survey (see below).

Is the lack of standards in the SD-WAN market a barrier to market growth?



This year, communications industry group MEF announced the first MEF-certified vendors, which so far has included Fortinet, Nuage Networks, Versa Networks, and Infovista. The certification process, administered by Spirent Communications, makes sure that vendors adhere to a list of the MEF's SD-WAN Service Attributes and Services (MEF 70).

The full details of the [MEF 70 can be found here on the MEF website](#). Among other things, MEF 70 defines:

- Service attributes that describe the externally visible behavior of an SD-WAN service as experienced by the subscriber.
- Rules associated with how traffic is handled.
- Key technical concepts and definitions like an SD-WAN UNI, the SD-WAN Edge, SD-WAN Tunnel Virtual Connections, SD-WAN Virtual Connection End Points, and Underlay Connectivity Services.

5. The Competition: Strategies & Alliances

During the past six months there have been a lot of interesting moves in the SD-WAN market as the number of competitors grows, the offerings increase in breadth, and the market traction increases. It's also interesting that there are several different groups of SD-WAN providers coming from different heritage. Let's take a look at these groups.

Networking Incumbents

Two of the leaders in the enterprise routing market, Cisco and Nokia, are also considered leaders in the SD-WAN market. Cisco got there through acquisition (Viptela), while Nokia got there through internal development in its Nuage Networks virtualization division. These incumbents have several advantages, including opportunities to serve their large customer bases by upgrading existing router software with SD-WAN management and providing integration with policy-based networking and software-defined networking (SDN). In the case of Cisco, this means its Applications Centric Infrastructure (ACI), and for Nuage, VSP.

Also, Cisco has been actively marketing and selling its 4000 ISR series, coupled with Viptela, for SD-WAN, while Nuage Networks has a line of open CPE that can also run Nokia's routing software, Service Routing Operating System (SROS).

Two other large networking and cloud technology incumbents to watch include HPE, which has developed its own internal SD-WAN software than is being integrated with its Aruba wireless devices, and Juniper Networks, which can enable either Juniper SRX routers or an SD-WAN CPE using its Contrail orchestration software. However, both HPE and Juniper were somewhat late to market and are behind Cisco and Nuage in terms of customer shipments and revenue, according to our channel surveys and industry sources.

Virtualization Goliaths

Two virtualization giants, VMware and Citrix, are involved in the SD-WAN space. VMware got into the SD-WAN game in 2017 with the purchase of VeloCloud, which is looking savvier over time. Not only has VMware integrated VeloCloud's SD-WAN branch hardware and software with its NSX data-center network virtualization software, but it's now also focused on integrating security features such as micro-segmentation and the endpoint security technology from its Carbon Black acquisition. We recently spoke to a large VeloCloud customer (which requested anonymity) that is deploying thousands of VeloCloud endpoints to serve employees in a WFH capacity. By integrating with NSX and its virtualization software as well as the recently purchased Carbon Black security portfolio, VMware now boasts an end-to-end secure solution that solves many branch networking and security challenges. VMware is majority owned by Dell, which bundles VeloCloud SD-WAN software with Dell hardware and sells through its channel.

Citrix is also uniquely positioned to integrate a wide variety of networking and security features with SD-WAN, including a unified solution for ZTNA through its Workspace virtual environment.

By melding a combination of network optimization, virtualization, and security, Citrix also presents a strong case to use SD-WAN as an end-to-end networking overlay in a virtualized environment -- a strong play for larger companies. Citrix also benefits from strong and long relationship with Microsoft for tighter integration with Microsoft.

Citrix also offer choice of security integration with Zscaler, Palo Alto networks, Checkpoint and iBoss. Citrix SD-WAN offers a service called Cloud Direct that provides a private overlay network that's peered directly to 1000s of clouds and SaaS provider.

This Citrix service enables QoS-enforced, enterprise-grade access to cloud services for more predictable service reliability, resiliency and an improved user experience for the first and middle miles.

Firewall Players Get in the Game

Firewall Security vendors Fortinet and Palo Alto Networks have recognized the opportunity of SD-WAN and have made big investments.

Fortinet added SD-WAN functionality to its firewalls in 2016 and has aggressively included the technology with many of its security offerings. It is pursuing a SASE strategy by integrating SD-WAN and NGFW capabilities to help organizations reduce costs, enhance application experience, simplify operations, and enable high security posture. Palo Alto recently acquired SD-WAN startup CloudGenix, which was enjoying a resurgence as the market accelerated. One only needs to look at Fortinet's stock price to see what the market thinks of the potential of coupling SD-WAN with its own firewall technology, based on its proprietary applications specific integrated circuits (ASICs).

It's a marriage of convenience, as firewall security technology and SD-WAN look destined to be an integrated market over time. Barracuda Networks, which markets the Firewall F-Series, is yet another firewall supplier that has also recently added SD-WAN features.

Market Summary > Fortinet Inc

NASDAQ: FTNT

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136.73 USD **+0.82 (0.60%)** ↑

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After hours 136.83 **+0.097 (0.071%)**



The NAAS Approach

Aryaka Networks and Cato Networks are unique in the SD-WAN market in that they are a few of the SD-WAN startups using a full network-as-a-service (NAAS) approach. That means they build their own transport network (in the case of Aryaka) or IP transit network (in the case of Cato). Aryaka started with a focus on global connectivity for multinational companies, and Aryaka still likes to say its facilities are within 30 milliseconds of 95% of the world's businesses.

Under recently new CEO Matt Carter, Aryaka has beefed up its suite of security solutions and embedded its Aryaka Network Access Point (ANAP) CPE devices with management, security, analytics, network optimization, and multi-cloud features. Aryaka also partners with security players such as Palo Alto Networks, Zscaler, and Symantec on bundled security packages.

Cato Network has recently jumped on Gartner's SASE train, highlighting its fully featured cloud security solution, which can handle ATP, endpoint security, and DDoS mitigation. This makes sense given the background of Shlomo Kramer, Cato's founder, who was also a founder of security company Check Point as well as Imperva. Cato has been steadily increasing its network POPs (recently more than 40) as well as security functions and self-healing networking functionality.

Strong Startup Market

The SD-WAN market has been strong for startups, with already three major acquisitions (Cisco/Viptela, VMware/VeloCloud, and Palo Alto/CloudGenix). There's going to be more, as there are still several strong independent startups flourishing in the market.

Silver Peak and Versa Networks probably have the most revenue of the remaining independent SD-WAN providers, according to our surveys. Both are at triple-digit millions in annual revenue run rate and are well positioned to grow as independent companies if they choose not to go the M&A path.

Silver Peak and Versa have different approaches to security. Versa has developed its own native security suite that can be deployed either from the cloud or at the CPE, including NGFW, malware protection, URL and content filtering, IPS and anti-virus, DDoS and VPN/next-generation VPN. Versa also recently announced Versa Secure Access, targeted at the red-hot WFH market, highlighting the functionality of SD-WAN as an enterprise and remote VPN. Silver Peak provides a stateful zone-based firewall and partners with security vendors for security, both in premise and cloud-delivered. Two of Silver Peak's partners include Check Point and Zscaler to integrate "best-of-breed" security solutions for customers. End users have regularly spoke to us favorably of Silver Peak's ease-of-use and orchestration features, which enables them to deploy hundreds of sites in a short period of time (weeks). Citrix offers a home worker and micro-branch small form factor platform that offers integrated dual LTE or LTE alongside broadband.

Other startups to watch include Utah-based FatPipe Networks, which like Silver Peak evolved out of the WAN optimization market but now has a fully featured SD-WAN product and a strong partnership with Avaya to deploy SD-WAN for improved experiences in the UCaaS market. Portland, Ore.-based Bigleaf Networks is a newer SD-WAN startup focusing on small and medium business (SMB). Bigleaf got \$21 million in funding in 2019, and management says the startup has tripled its recurring revenue and employees since 2018.

The Others

Beyond the dozen or so SD-WAN companies we have mentioned already, there are dozens more, which we would put in the second tier. Riverbed, known as a strong WAN optimization (“WAN-Opt”) vendor, was slower than rival Silver Peak to pivot away from the slowing WAN-Opt market to an SD-WAN product. It recently turned to partnering with Versa to build out SD-WAN functionality, which is an interesting partnership that could leverage Riverbed's strong channel and customer base.

Adaptiv Networks, formerly TELoIP, has a foothold in the Canadian retail market. Its hardware and software are designed to give retailers or SMBs a secure overlay using the Internet via gateways and encryption. Infovista markets the Ipanema SD-WAN to focus on what it calls Quality of Experience (QoE), involving service-level agreements and application flows.

Even More Others

What’s beyond that second tier? Yet more SD-WAN companies – perhaps some gems that we have overlooked. Some analyst and research firms report that there are more than 40 SD-WAN vendors in the marketplace. To be truthful, we only track about 20 -- and as the market matures and starts to consolidate it's a reasonable conclusion that not all 40 will survive. But if you think there are other great SD-WAN startups we have missed, be sure and let us know.

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