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Cloud Market Trend Report

2021 SD-WAN Managed Services Survey

Top trends, feature needs, and integration trends in the software-defined wide-area network (SD-WAN) managed services market.

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Key Findings and Highlights

SD-WAN managed services are growing fast and gaining traction as an alternative to legacy network services. Futuriom's annual *SD-WAN Managed Services Survey* of 120 network and IT managers shows growing awareness of SD-WAN managed services (MS). **Through our survey work, primary research, and interviews, Futuriom has identified seven key trends in the SD-WAN MS market.** The trend overviews are covered in this highlights sections.

- **Trend #1: Demand for enterprise SD-WAN technology is growing.** In the survey, 82.5% of the enterprise end users (99 respondents) said their awareness of SD-WAN MS offerings is growing. A full 90.8% said that SD- WAN technology will grow as part of the strategy to replace alternatives such as leased lines.

- **Trend # 2: The expansion of Work from Anywhere (WFA) drives interest in security solutions.** COVID-19 has put more emphasis on finding more secure remote connectivity, said 88.3% of survey respondents (106). This has triggered a wave of new remote work solutions and partnerships.

- **Trend #3: Value-added services are important part of SD-WAN MS offerings.** Value-added services received the highest mean ranking of features needed. Next in line with the best scores were value-added bundles for SaaS and multi-cloud connectivity and self-service portals.

- **Trend #4: High Interest in customer portals and co-management.** When we asked survey respondents whether co-management and self-service customer portals were a key feature of the SD-WAN MS offering, 78.3% (94) replied "Yes."

- **Trend #5: Multi-cloud connectivity demand is growing.** The surge toward cloud applications highlights the need for networks to support multiple cloud providers or hybrid cloud operations.

- **Trend #6: There is strong demand to integrate SD-WAN with software-defined branch (SD-branch) and wireless.** Of those surveyed, 88.3% (106) said that SD-branch features for wireless and wired management are important in SD-WAN MS.

- **Trend #7: Futuriom sees integration with additional access methods for SD-WAN MS such as satellite.**

Companies discussed and/or profiled in this report: Aryaka, AT&T, British Telecom, Colt, Comcast, Deutsche Telekom/T-Systems, Fortinet, Hughes, Juniper, Lumen Technologies (formerly CenturyLink), Masergy, Nokia/ Nuage Networks, NTT, Orange, SES, Tata Communications, Telefonica, Telstra, Verizon, Vodafone, Windstream

(Note: This is not an exhaustive list of companies in this market, but one that reflects the leaders in the SD-WAN MS and supplier markets.)

Reducing Network Complexity With The AI-Driven WAN

How artificial intelligence for IT operations (AIOps) is changing the tech landscape.

SD-WAN	AI-DRIVEN WAN
All about resiliency and uptime	**All about user experience and productivity**
SD-WAN leverages low-cost broadband and connectivity with the cloud, but is becoming increasingly complex, with many enterprises essentially running networks of networks.	The AI-driven WAN focuses on optimizing and enhancing the user experience while simplifying operations.
Demands on business-critical networks – and the teams that run them – are growing rapidly, largely due to remote working, growing use of video, and the introduction of the IoT.	It correlates telemetry from the WAN about application and traffic to determine the cause of a bad user experience and can proactively remediate issues before impacting users.
Reactive support, rules-based or manual intervention (hunt-and-peck).	Predictive and proactive, adapting to topology and traffic patterns.
Pressured by growing volume: IoT, increasing video use, dispersed workforce.	Dynamically handles traffic to accommodate increase in demand.
25% of team time spent on remediation.	Team freed up to work on future-facing projects and driving value.
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1. Introduction

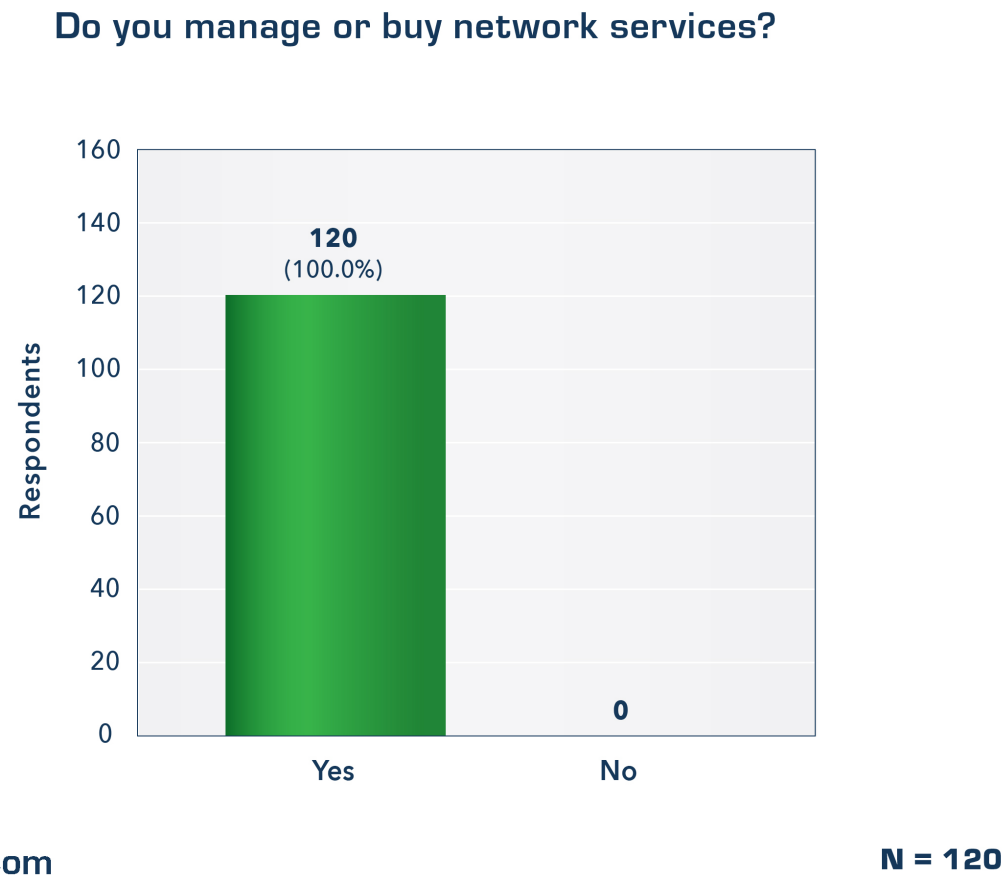
Software-defined wide-area networking (SD-WAN) technology has emerged as one of the fastest-growing markets for enterprise networking. Futuriom has been covering the market for more than five years, when SD-WAN was emerging in the venture-backed startup community as a new way to deliver enterprise networking services from the cloud. Not everybody wants to build SD-WANs themselves, however. Many enterprises are looking to purchase SD-WAN managed services (MS) that can provide different combinations of network underlay and overlay connectivity; SD-WAN tools and applications; as well as management software and value-added services such as security. Along with the growth of SD-WAN hardware and software platforms, SD-WAN managed services are also showing enormous growth, as enterprises look to streamline, improve, and secure their networking infrastructure.

SD-WAN can be delivered in a number of ways, but in general there are two approaches: Enterprises can engage with SD-WAN infrastructure and software vendors to adopt their technology themselves using a do-it-yourself (DIY) approach, or they can purchase SD-WAN services from a managed service provider – which could be an Internet provider; a multiple systems operator (MSO), such as a cable company; a managed service provider (MSP); or a traditional communications service provider (CSP). As SD-WAN technology has matured, however, hybrid approaches have emerged in managed service offerings. This report outlines the results of several months of research and a survey of 120 enterprise end users to uncover the key drivers and trends in SD-WAN MS.

SD-WAN MS is probably the most important trend to occur in the CSP and ISP market in decades, after the emergence of popular technologies such as carrier Ethernet and multi-protocol label switching (MPLS). Based on virtualized networking and cloud technologies, SD-WAN MS offers a unique opportunity for service providers to avoid commodification and "dumb pipe" syndrome. Because of the cloud-managed nature of SD-WAN, enterprises no longer see the network – whether it's LAN, WAN, or cloud — as something that must be built internally with specialized hardware. SD-WAN can be used to deliver a wide variety of software and services that can be accessed and managed from the cloud — including, but not limited to, integrated underlay/overlay technology, WAN optimization, multi-cloud connectivity, link balancing and backup, security services, and applications control and prioritization. CSPs, ISPs, or MSPs that miss this opportunity may miss another chance to deliver customer value-added services other than dumb pipes.

Futuriom research has shown that enterprises and end users see both economic and technical benefits of SD-WAN technology. In addition to improving the performance and management of WAN network and cloud connections, they can streamline operations by reducing 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 by using proprietary networking equipment.

To dive deeper into how the SD-WAN MS market is evolving, Futuriom conducted a survey of 120 enterprises to assess their goals and needs for adopting SD-WAN MS technology. The respondents were all filtered to ensure they had director-level or above titles in IT or network management. Additionally, we only accepted results from respondents who responded to a filter question asking if they acknowledged responsibility for network services, as shown below:



The survey covered these broad areas:

- Assess the demand for SD-WAN managed services.
- Identify key trends in adoption of SD-WAN managed services.
- Identify the key features and functionality sought by end users for SD-WAN managed services.

In this 2021 SD-WAN MS Survey, we aimed to drill down on the specifics of what is desired from an SD-WAN MS. This report summarizes the results of the survey and the primary research we have conducted over the past few months.

2. SD-WAN Managed Services Trends and Survey Results

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.

Our continued research with both SD-WAN service providers, technology vendors, and enterprise end users indicated that the SD-WAN market continues to expand and is maturing. Of the 100 enterprise users we surveyed in 2020, 91.5% said their awareness of the technology has grown in the last 12 months.

With this in mind, our 2021 SD-WAN MS Survey zeroed in on some of the key trends we found elsewhere in our research. These include the following:

- Enterprise end users are ramping up their use of SD-WAN and have a growing awareness of the technology when evaluating SD-WAN managed services.
- Interest in learning about the different approaches of co-managed, managed services, and DIY SD-WAN is growing – with a specific interest in hybrid services and co-managed offerings.
- End users have interest in a wide feature set for SD-WAN managed services, including co-management, self-service portals, multi-cloud connectivity options, and security applications and services. The survey sought to zero in on the most important features in demand.
- Enterprises continue to see the need for value-added services to manage their cloud application needs, such as applications management, multi-cloud connectivity, and security. The survey identifies some key services and features that need to be offered with SD-WAN managed services.

- Co-management capabilities such as Quality of Service (QoS), IP control, analytics, and monitoring are important considerations in both SD-WAN infrastructure and managed services.

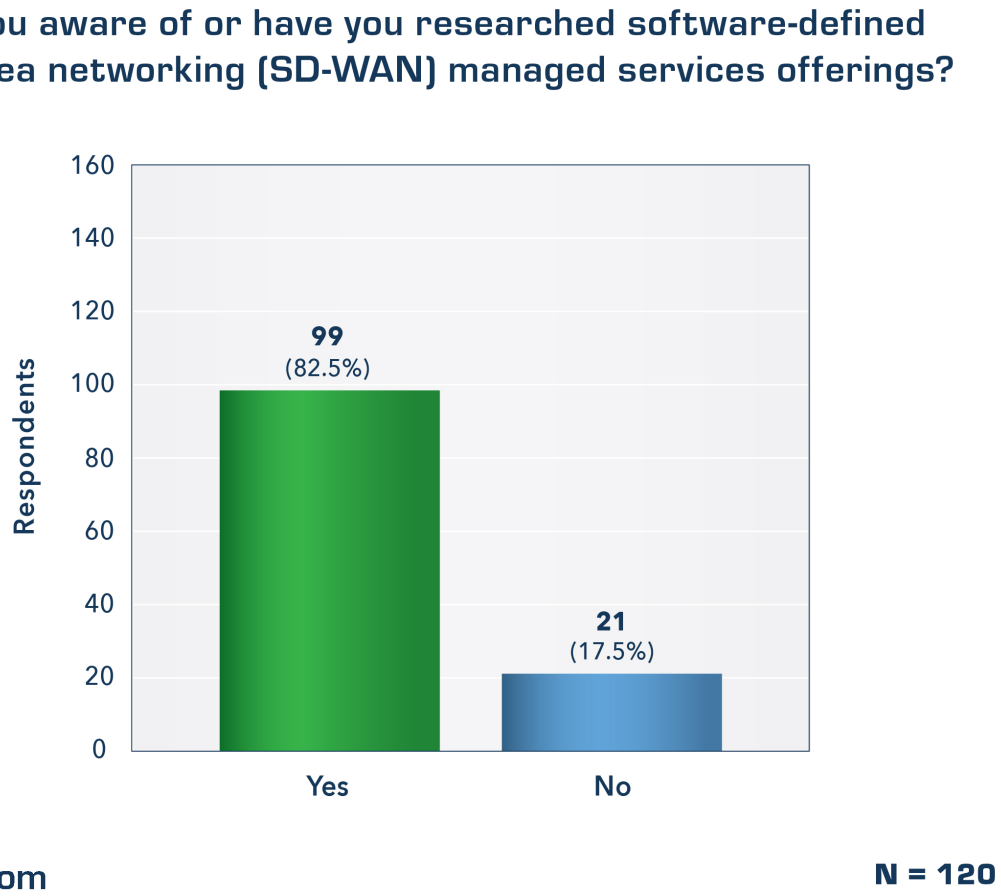
When we speak to the network managers and IT specialists using the technology, the theme we hear is that SD-WAN has made their lives easier. This year's survey reflects continued interest in both SD-WAN technology platforms as well as SD-WAN MS. In addition, end users show they are especially interested in the advanced features that can be provided with SD-WAN technology and services, including network visibility, application control, and advanced network security.

Additional trends reinforced by both industry developments and our survey show that a wide range of security capabilities, along with co-management and improved management/ orchestration and automation, are big draws for SD-WAN managed services and are likely to be key features of adoption.

So, let's dive into the details of specific trends as reflected in our survey.

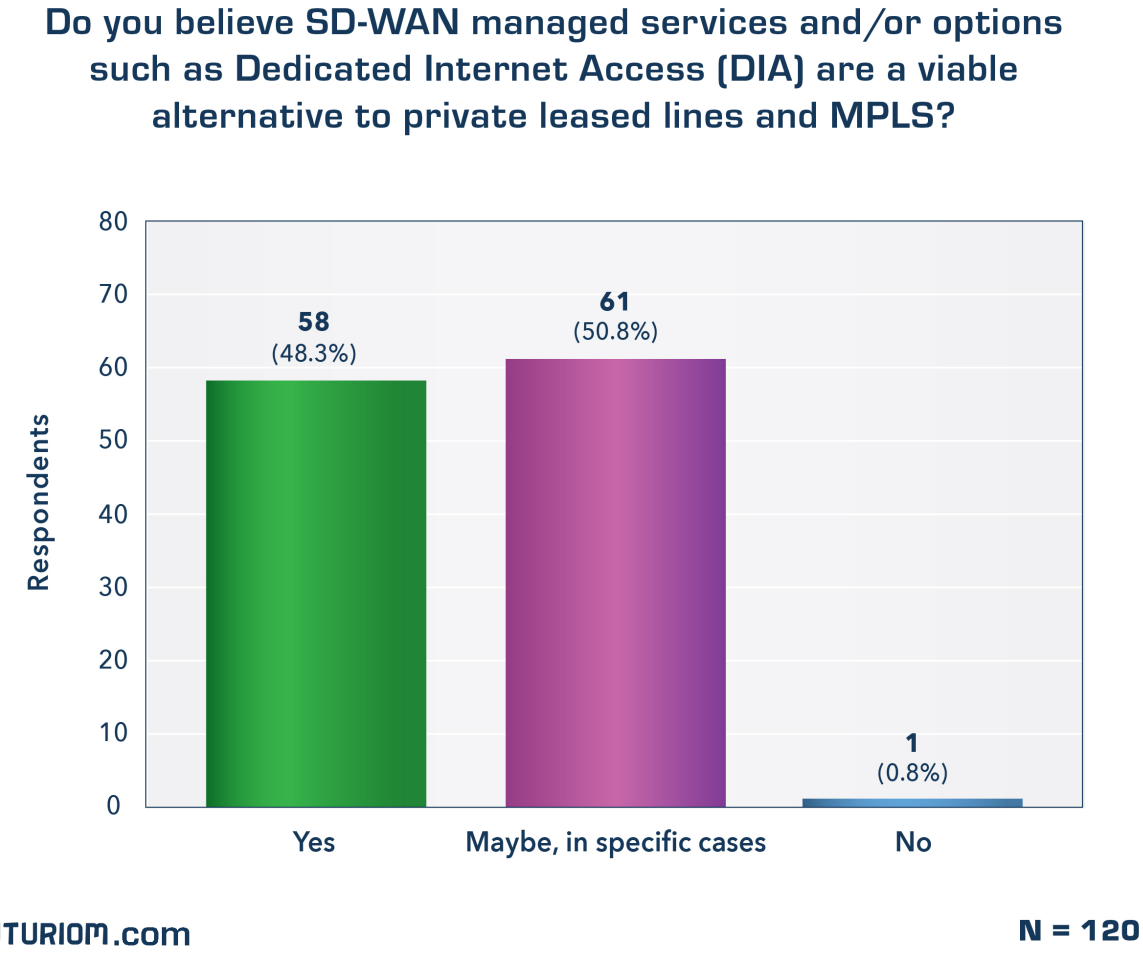
Trend #1: SD-WAN Awareness is Growing

Our survey confirmed continued awareness and growing interest in SD-WAN managed services. Of the 120 enterprise end users surveyed, 82.5% (99 respondents) said their awareness of SD-WAN managed services offerings is growing.



From our discussions with service providers and enterprise end users, including all our survey work in 2020, Futuriom believes there are three strong currents underlying the rising interest in SD-WAN managed services. First of all, enterprises are attracted to the idea of using SD-WAN as a cloud-based orchestration and management platform for all network services. In many cases, they want to use dedicated Internet access (DIA) services to augment their network efficiency and reach using broadband underlays.

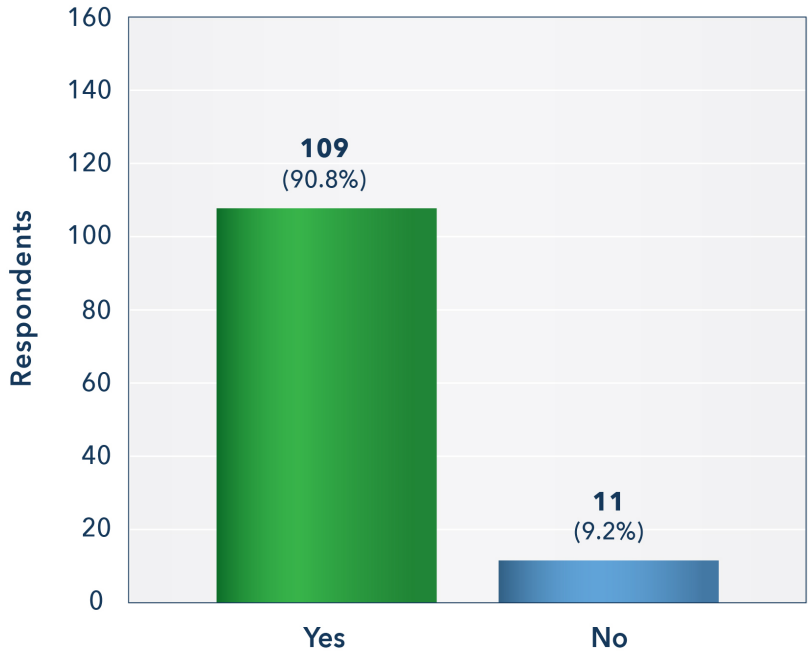
As the chart below shows, 48.3% of respondents (58) said they believe DIA is a viable alternative to private leased lines and MPLS, and 50.8% (61) said DIA was a viable alternative in specific cases. Less than 1% (1 respondent) said DIA was not a viable alternative. **Please note, leased lines cannot always be replaced with SD-WAN and underlay broadband connectivity must still be present.**



A second strong driver of interest is that end users are interested in the simplification or the "consumerization" of managing network connectivity that is possible with co-managed solutions or self-service portals. If managed services can provide staff with the tools to order, provision, and manage services using a cloud model, that is highly attractive. A third driver of the popularity of SD-WAN is using it as a platform to deliver additional cloud services — whether that be secure remote access, multi-cloud connectivity, or security services. We provide more details on these trends below.

Overall, these drivers are coming together to build more interest in using SD-WAN as a strategic platform for network connectivity, as the results below show. Of those surveyed, 90.8% (109) said that SD-WAN technology will grow as part of the strategy to replace leased lines.

Do you believe the use of SD-WAN technology will grow as part of your organization's strategy to find better alternatives to leased or private lines for network connectivity?



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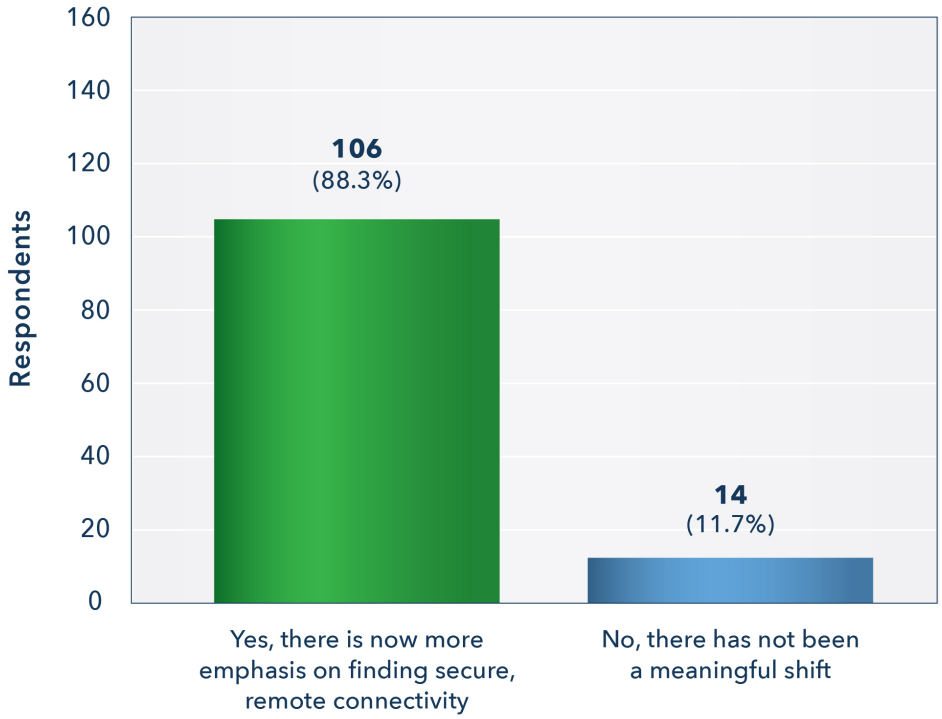
Trend #2: The "Year of Remote Work" Drives Security

The year 2020, was, of course, a very challenging time for everybody, as the COVID-19 pandemic had wide-ranging impacts on health, work, and society. In the enterprise work and security space, one of the key developments was the rapid rise in demand for cloud services and secure remote access.

When looking at the survey results, the impact of the COVID-19 pandemic is clear. Of those surveyed, 88.3% (106) said that it has had an effect on how they view managing networks for remote users.

Has the COVID-19 pandemic had an effect on how you view managing networks across on-premises versus remote users and the combination thereof?



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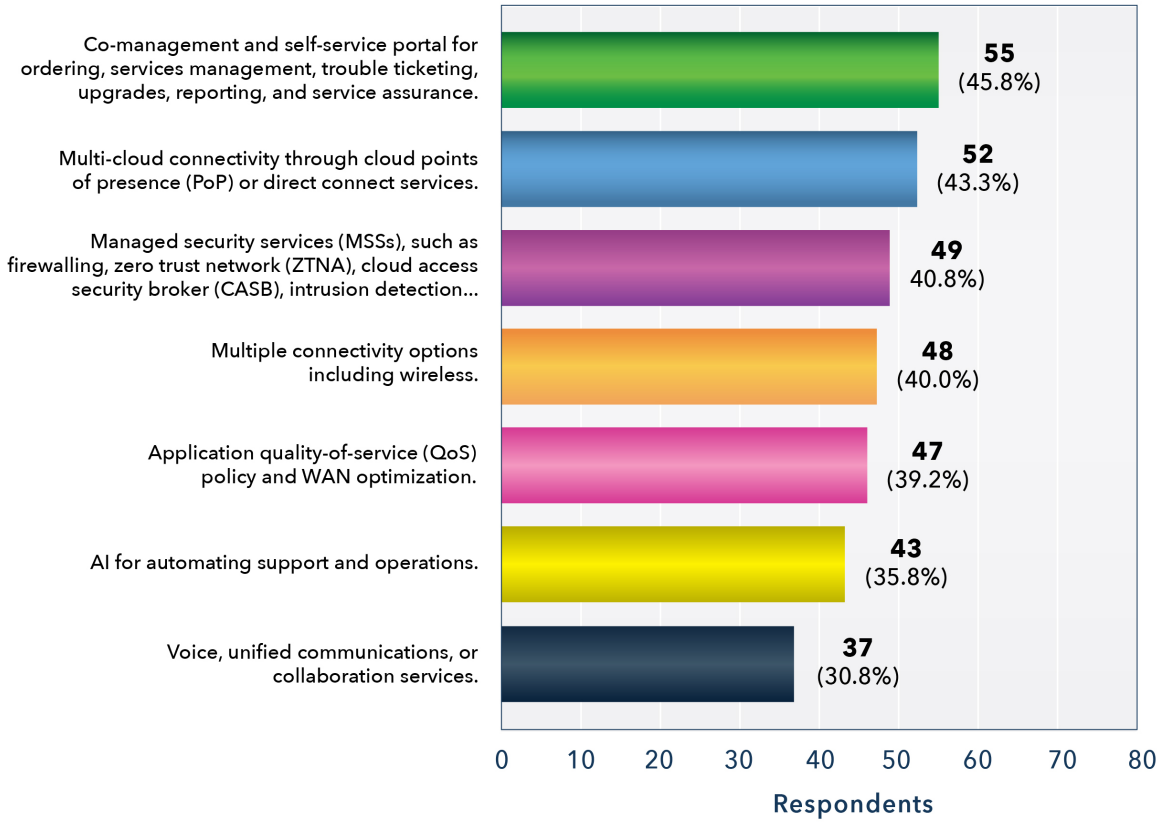
A wide range of service providers, technology vendors, and cloud security providers have launched new products to deliver solutions for the massive migration of the workforce to remote connectivity. This is also driving faster integration between previous standalone technologies, such as virtual private networks (VPNs) and firewalls — to be delivered as singular networking and security solutions. It only makes sense that as the workforce migrates to remote work, network and security managers need to gain more control of applications and security for these remote workers. SD-WAN MS is a great vehicle for unifying these goals. This trend is here to stay and will remain long after the pandemic subsides. (Hopefully, that will be soon).

One can take a look the stock prices of public security and remote work-focused companies such as Cloudflare (Nasdaq: NET) and Zscaler (NYSE: ZS) to understand the impact that COVID-19 has had on cloud-based security tools. These shares were up 249% and 332% in 2020, respectively, based on rising demand for remote cloud security technology.

Source: Google Finance based on closing prices January 15, 2021

Please choose the most important features you would like to see in an SD-WAN managed services offering.
(Choose all that apply)



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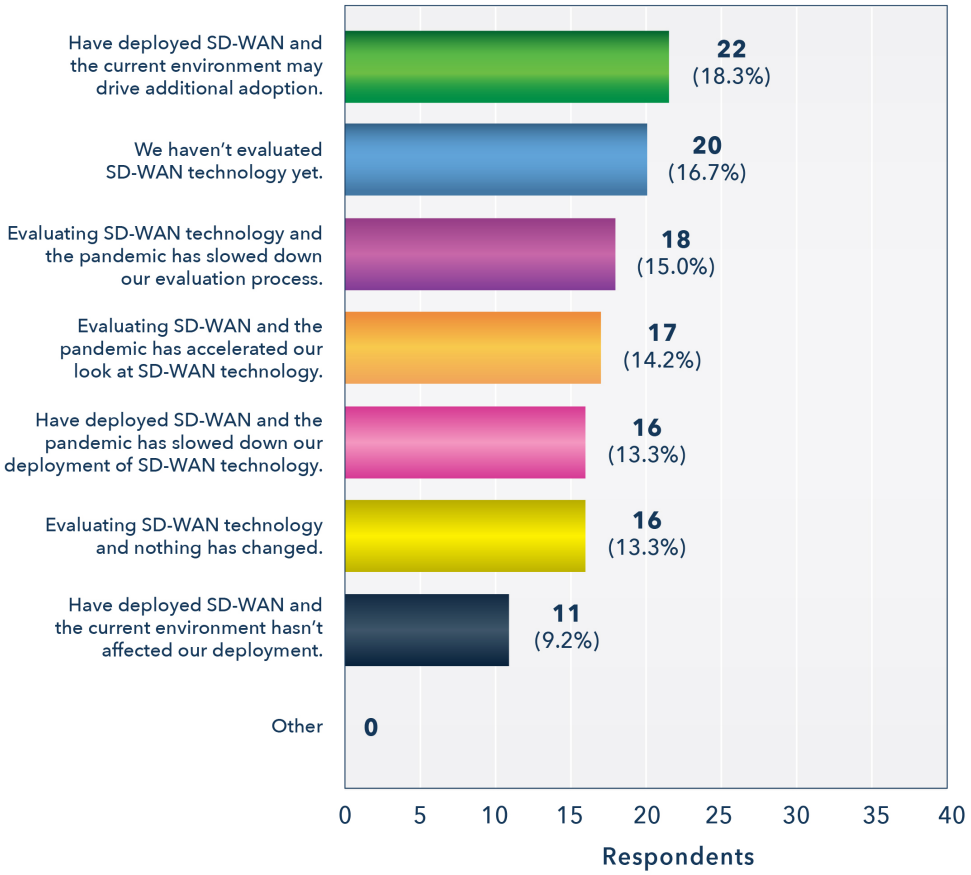
What about the impact that COVID-19 has had on deployment in general? This picture was more mixed, with complications including the physical disruptions to evaluations and deployments of technology due to the economic recession. Our survey looked at deployment trends, which can be seen below. The strongest responses show that the COVID-19 pandemic may be driving additional adoptions for security. For example, 18.3% of respondents (22) said the current environment may drive additional adoption of SD-WAN.

Please choose the best description of how the COVID-19 pandemic has had an effect on how you view SD-WAN technology - either DIY or managed services.



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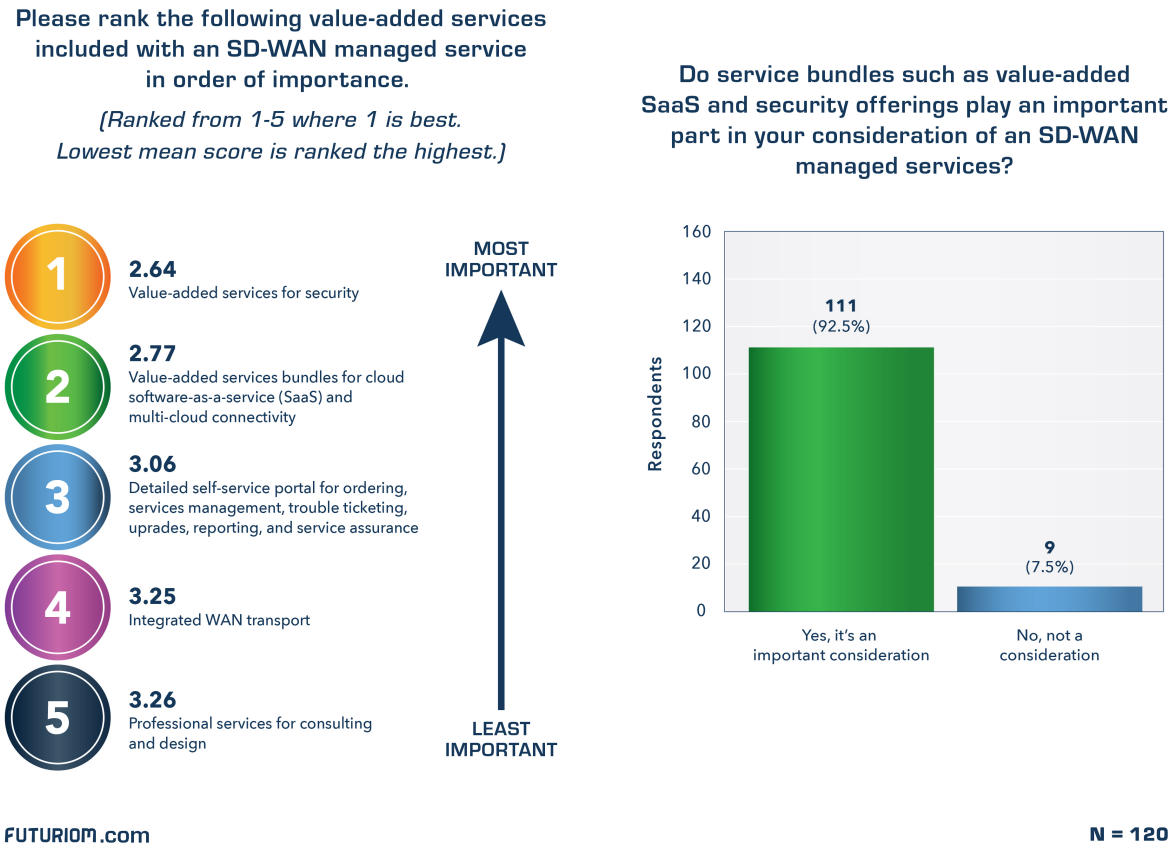
For those who haven't adopted SD-WAN, however, the picture is more mixed, with 15% (18) saying that the pandemic environment has slowed down adoption. The mixed results of this survey question reflect the complexity of the environment, which has many variables among end users, including the size of the organization and the firm's capabilities and resources for digital transformation.

Trend #3: Demand for Valued-Added Security and SaaS Offerings

As the demand for new cloud-oriented security tools rises, driven in part by the remote-work boom, it offers a new opportunity for service providers to offer value-added security services coupled with SD-WAN MS. There is a growing trend toward the combination of sophisticated security packages to accompany SD-WAN MS.

In our 2020 Secure Edge and SASE Report, we established that SD-WAN technology has become a platform for orchestrating and managing a variety of security services linked to the network. These include, among other features, tools such as distributed denial of service (DDoS) attack mitigation; advanced threat protection (ATP); endpoint security; and firewalling, including next-generation firewalls (NGFWs). In addition, SD-WAN platforms can tie into unique cloud security services such as cloud access security brokers (CASBs). These services represent a good opportunity for MSPs and CSPs to combine their network expertise and hosting with security services. In one example, Tata Communications focused on secure network transformation that combines both on-premises security and cloud-based managed security.

Service providers and cloud operators see this as a major opportunity to help solve the headaches of security. With hundreds of security tools on the market, many enterprise end users, especially small and medium businesses, don't have the time or resources to evaluate and integrate tools, so it makes sense that service providers can play this role. SD-WAN platforms can be used to consolidate and integrate security functions within the network. When survey respondents were asked to rate each service package by priority, value-added services received the highest mean ranking of 2.64 (respondents were asked to rank services from 1 to 5, with 1 being the highest ranking – meaning the lowest mean score has the highest priority). Next in line with the best scores were value-added bundles for SaaS and multi-cloud (2.77), and self-service portal (3.06).



This shows how SD-WAN is becoming a key mechanism for delivering security technology, whether it's as a value-added offering integrated directly into the services or as a third-party add-on. Nearly all the major SD-WAN providers we looked at provide integrated value-added security services, and many of the SD-WAN managed service providers are differentiating themselves with a wide range of security offerings. This will give service providers a path to new revenue streams. Over the past year, we have seen security grow in importance as a component of SD-WAN.

As also seen in the survey results above, 92.5% of respondents (111) said that value-added security and SaaS bundles play an important role in their selection of SD-WAN managed services.

Drilling down even further, it's important to look at the specific security services in demand. The chart below shows the top security functions in demand from end users. They were asked to rank each function from 1 to 5 (1 being highest). Lowest mean score means the function was ranked the highest. ATP came out on top with a mean rating of 4.20, followed by ZTNA (4.45), and then security rating service.

The pairing of security and SaaS has been a fertile area of partnership among SD-WAN technology suppliers, security technology suppliers, and MSPs and CSPs. In the SD-WAN space, companies such as Aryaka Networks, Cato Networks, Citrix, HPE (Silver Peak), VMware, and Versa Networks have been integrating security tools with their SD-WAN platforms to provide full-fledged solutions. 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.) Incumbent networking vendors such as Cisco, Juniper Networks, and Nuage Networks (Nokia) are taking their existing portfolios of security and networking analytics and using that to drive more functionality into SD-WAN.

Service providers such as Masergy and Comcast have been emphasizing their security integrations as selling points for SD-WAN MS. SD-WAN provides important cloud security orchestration functions for third-party cloud security offerings, such as popular services such as Zscaler, Palo Alto, or Fortinet, for example.

You can read up in more detail in Section 3 on a wide range of partnership evolving in the SD-WAN MS market.

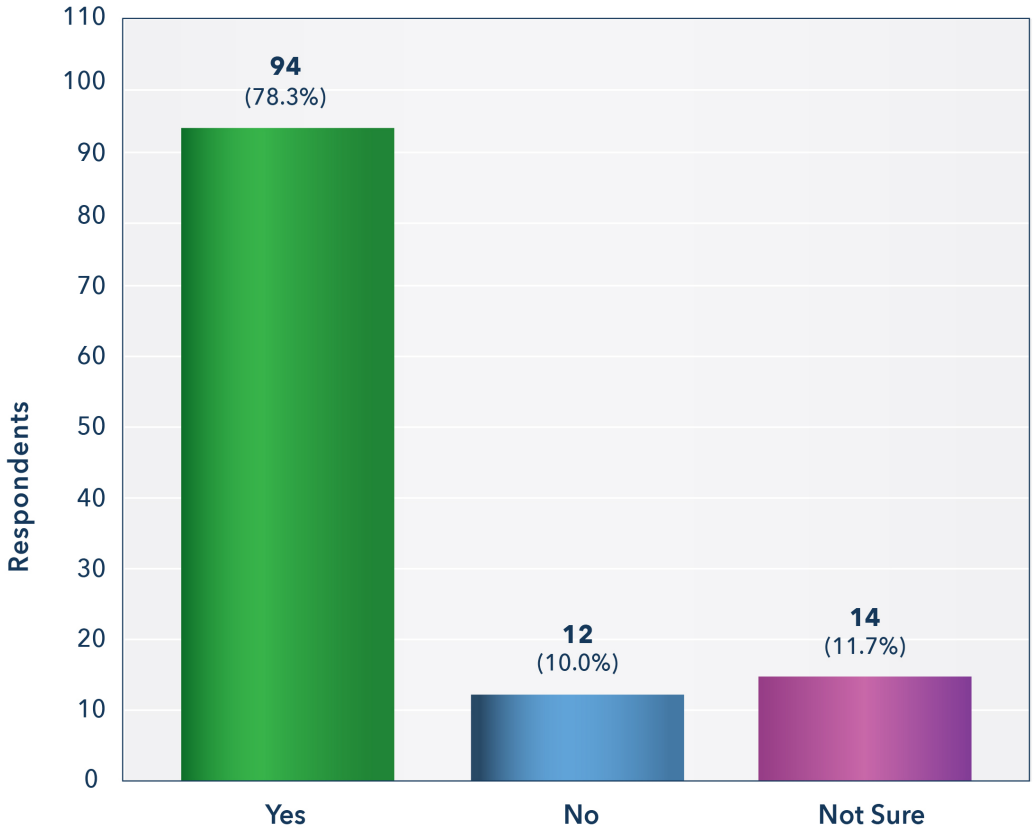
Trend #4: High Interest in Customer Portals and Co-Management

Customers that have been interviewed by Futuriom say that customer portals and co-management are attractive aspects of SD-WAN managed services, because it gives them more visibility and transparency in network operations. This is an area where SD-WAN MS will be quickly differentiated. The capability to offer dynamic customer portals and management interfaces complete with analytics will be key to winning SD-WAN services.

As demonstrated in the survey results above, customer-oriented service portals are growing in importance as part of SD-WAN managed services offerings. Customer portals can be given to the customer so that they can control features and configurations of their networks and applications, as well as gain access to analytics. In this manner, service providers can offer co-managed offerings, in which case they partner with the customer to manage the network and the customer has full visibility into the operations.

When we asked survey respondents whether co-management and self-service customer portals are key features of an SD-WAN managed services offering, 78.3% (94) replied “Yes.”

In considering an SD-WAN managed service, would you consider co-management and a fully featured subscriber portal offering a key feature of the services?



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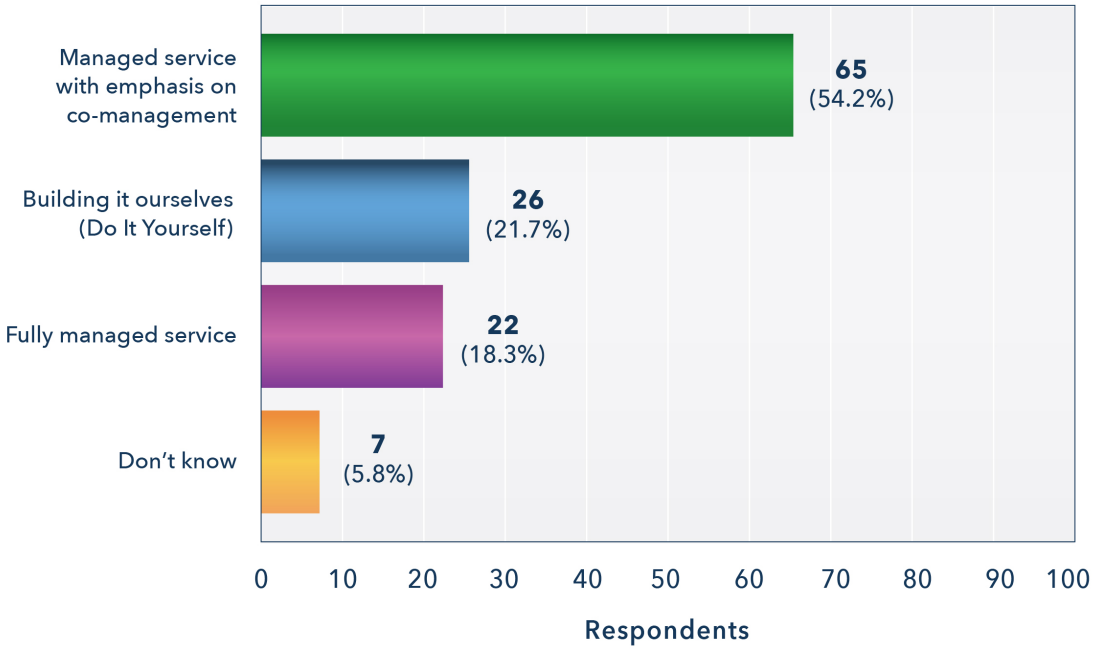
This reaffirms what we are hearing in the marketplace from service providers and enterprises as they seek dynamic, cloud-based services for controlling their networks and applications. It's part of the "Amazonification" of the enterprise IT services world.

In another survey question, when asked if potential customers had a preference for SD-WAN via DIY, managed services with co-management, or fully managed services, it appears that co-management is a strong trend, with 54.2% of respondents (65) selecting that approach.

If you were to evaluate SD-WAN technology (or have adopted it already), does your organization have a preference for building the SD-WAN or a managed service?



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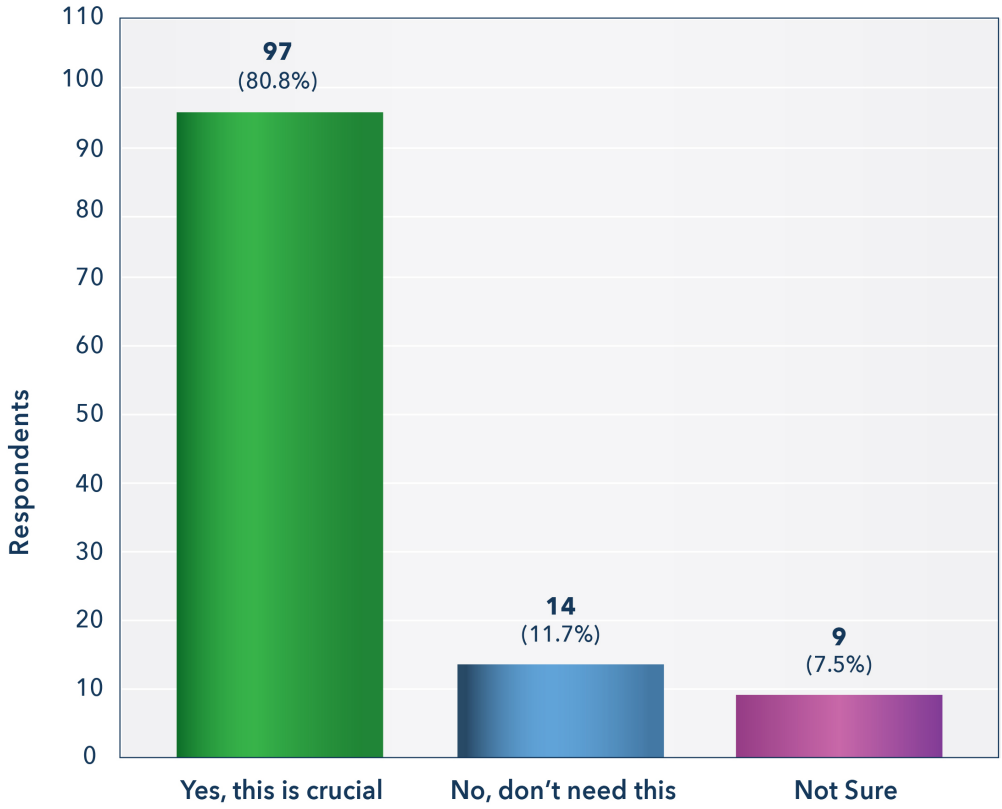
The bottom line is that enterprise end users want as much control as possible over their network, whether it's coming in the form of DIY or co-managed or fully managed services. They would also like to have specific control features. When we asked respondents if they would like control over functions such as port speeds, IP address, applications, and classes of services, 80.8% of respondents (97) said "Yes." Only 7.5% (9) replied "No."

As a network manager evaluating SD-WAN managed services, would you require granular network control features such as the capability to manage port speeds, IP addresses, applications, and classes of service?



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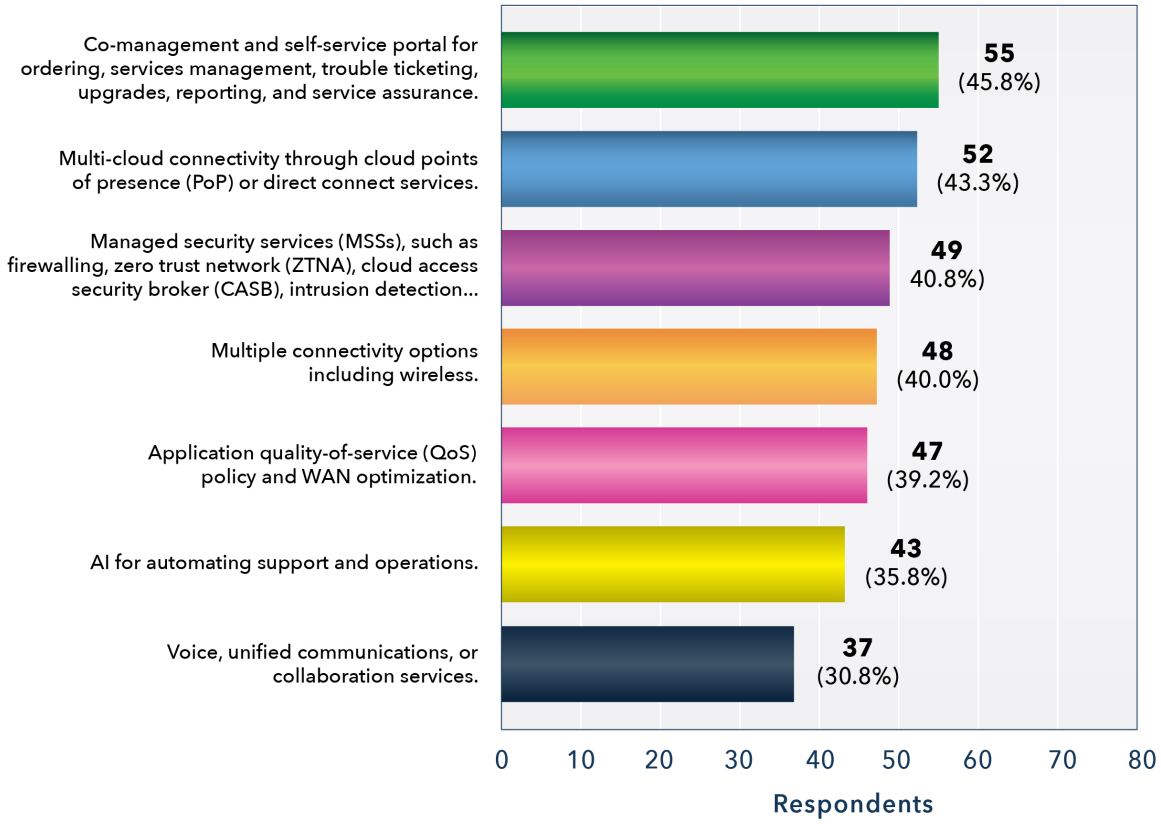
Using another angle to drill down into this need, we asked end users about specific features of SD-WAN managed services offerings and what they would like to see as part of the offering (multiple responses allowed). Co-management and self-service portal were the leading features named, with selection by 45.8% of respondents (55). Next in line came multi-cloud connectivity (43.3% - 52) , which we will cover in the following section, followed by managed security services (MSSs).

Please choose the most important features you would like to see in an SD-WAN managed services offering.
(Choose all that apply)



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Trend #5: Multi-Cloud Connectivity Demand Growing

The acceleration of cloud services and SaaS has changed traffic patterns in enterprise networks, sending more traffic out of the private network and leveraging cloud interconnection points at regional data centers and local PoPs. This past year's sudden surge of cloud applications has pointed to major networking needs to support multiple cloud providers or hybrid cloud operations. Major cloud providers have launched "direct connect" service offerings to help connect

SD-WAN with cloud services at PoPs and gateways. In 2020, this demand picked up steam, as enterprises sought to unify their network systems to adapt to multiple cloud offerings. SD-WAN infrastructure and service providers are extending cloud services using direct connection technologies such as AWS Direct Connect and Azure ExpressRoute and Virtual WAN. At the same time, a new crop of startups specializing in multi-cloud networking capabilities, which extend private networks into specific cloud constructs such as AWS, Azure, and Google Cloud, are striking partnerships with SD-WAN providers to extend the capabilities of SD-WAN into multi-cloud connectivity. Some of the recent examples of these partnerships include HPE's Silver Peak with Aviatrix and Pureport. Service providers are also integrating these cloud on-ramp services, as they are commonly known. For example, Tata Communications released the Managed Azure Virtual WAN to help enterprises adopt the service. (See Futuriom's Future of Multi-cloud Networking report for the full details on the multi-cloud networking market.) Over time, Futuriom sees SD-WAN platforms and multi-cloud networking capabilities further merging and integrating to give organizations one logical view of virtual, software-defined networks across multiple clouds. Because SD-WAN can be used to provision and manage virtual overlays, it makes sense that it can drive multi-cloud connectivity.

The 2021 SD-WAN Managed Services Survey has clearly highlighted this trend – with respondents embracing the need for multi-cloud. As seen above, 43.3% (52) of those surveyed said that multi-cloud connectivity through a network of PoPs was an important consideration in a SD-WAN MS offering.

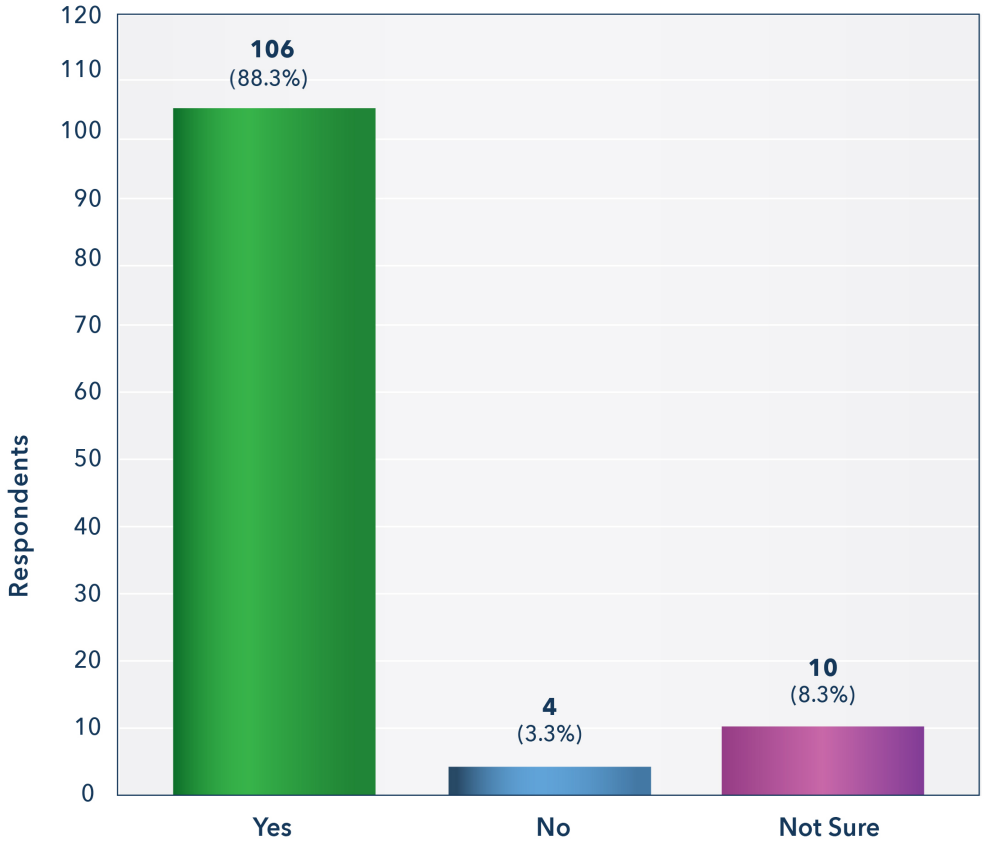
Trend #6: SD-Brand Convergence with SD-WAN

As indicated by our survey work, network and IT managers are seeking more flexibility in connecting branches with a software-driven model that enables network and IT managers to set up branch offices quickly.

The technology term software-defined branch (SD-branch), which is now used by the industry at large to describe any convergence of wired and wireless network technologies at the enterprise branch, is a growing theme. An example could be a global Fortune 500 company managing hundreds of branch offices for a bank, or a regional chain of gas stations looking for easy-to-manage WAN connectivity. Enterprises end users have shown a strong affinity for improving the ease-of-use and management of branch offices.

When we asked survey respondents if they believe that SD-branch features for wireless and wired management are important in SD-WAN managed services offerings, 88.3% (106) said "Yes." Only 3.3% (4) responded "No," and 8.3% (10) responded with "Not Sure."

In considering an SD-WAN managed services, are you more likely to select a solution that includes SD-branch features such as management for wired and wireless?



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Software-defined convergence of wireless and wireline functionality is becoming a standard feature of leading wireless platforms such as Cisco Meraki, HPE Aruba, Cradlepoint (now owned by Ericsson), Juniper Networks, and Ruckus Wireless (owned by CommScope). Juniper's AI-driven enterprise portfolio is focused on improving the software-defined operation of branch and WAN together, driven by MIST's artificial intelligence (AI) technology for operations. Leveraging the recently-acquired 128 Technology, Juniper's Session Smart SD-WAN enables Managed Service Providers to leverage the industry's only tunnel-free, session-based routing fabric optimized for maximizing application performance, network visibility and security. In addition, Fortinet Secure SD-WAN solution enables future-proofing with the ability to extend to

SD-Branch by consolidating LAN & WAN operations with broad wireless and switching portfolio with unified management platform. Additionally, Fortinet SD-WAN platforms offer integrated LTE & wireless options.

It's becoming clear that these two systems – enterprise branch and SD-WAN – will become increasingly integrated. There is no reason why a single SDN platform shouldn't control network and security functionality across the WAN, the branch, and the LAN. Wireless features such as LTE, WiFi, and 5G will become part of the standard branch connectivity options, as well as SD-WAN managed services. Many SD-WAN services offer LTE and 5G connectivity.

Trend #7: Satellite Services and SD-WAN

Satellite networks are experiencing a renaissance and can be used as an effective connection in SD-WANs to expand global coverage. Many SD-WAN providers see satellite links as key to edge compute setups, along with 5G and other access technologies. Likewise, satellite makers and service providers are working to improve the traditional issues of satellite networking, like cost and network performance. And everyone hopes the resulting high tide of demand for high-bandwidth applications like Internet of Things (IoT) analytics, machine learning, virtual reality, and autonomous vehicles will float all boats.

As an example, Microsoft has deals to support satellite networks from SES, Intelsat, and Viasat with Azure ExpressRoute. Those satellite vendors deal in Geostationary (GEO) and Medium Earth Orbit (MEO) satellites, which represent the majority of satellites in use today.
SES Networks has been adapting its large MEO and GEO satellite networks for SD-WAN connectivity. It recently unveiled its SD-WAN managed services strategy. SES is pitching tight integration between satellite networks and SD-WAN so that enterprise and government customers can buy "as a service" packages. Hughes Network Systems is one of the largest SD-WAN services operators focused on satellite connectivity, delivering broadband to businesses and consumers out of reach of terrestrial links. It has an SD-WAN suite that combines connectivity from cable, fiber, LTE, and satellite.

3. SD-WAN Services and Partnerships to Watch

There are many suppliers of SD-WAN technology solutions, SD-WAN managed services, secure access service edge (SASE), and security services. In many cases, these services are being integrated and offered through solutions packages involving partnerships.

Over time, Futuriom expects more of a trend toward the integration of value-added offerings, especially security portfolios. This includes managed services providers adopting new technology from both SD-WAN and security technology providers, as well as those providing SD-WAN solutions packages building and integrating additional technologies themselves.

From the perspective of MSPs and CSPs, many technology partnerships are at work. Futuriom took a detailed look at managed services. Based on the breadth and depth of offerings, the table below shows some of the leading CSP and MSP offerings to date.

SD-WAN Managed Services Leader	Notable Technology Partners	Strategic Approach
Aryaka	Amazon Web Services (AWS), Microsoft (Azure, Office365), Check Point Software, Cisco (Webex), Oracle Cloud, Google Cloud, Salesforce, 8x8, Zoom, RingCentral, Palo Alto Networks, Radware, Symantec, Zscaler	Aryaka Networks offers SmartSecure, which is designed to complement SmartConnect with managed SD-WAN security-as-a-service offerings. At the branch, a stateful L3/4 firewall within the Aryaka Network Access Point (ANAP) offers “north-south” control as well as “east-west” segmentation. Advanced NGFW and cloud-based security capabilities from best-of-breed security partners -including Check Point, Zscaler, and Palo Alto Networks- are also supported. The ANAP delivers built-in support for NFV and micro-segmentation as fundamental SASE-enablement building blocks.
AT&T	Cisco, VMware	AT&T offers a few flavors of managed services targeting application-aware dynamic routing and integration legacy networks including MPLS, LTE, and Internet. The various flavors include AT&T's own SD-WAN services based on its FlexWare platform as well as services using VMware's VeloCloud and Cisco.

British Telecom	Cisco, Fortinet, Nuage Networks, Infovista	BT offers several tiers of managed services that include services such as Layer 3 MPLS IP VPN, DIA, Layer 2 Ethernet VPN, and Ethernet private lines. It also facilitates direct connections to the major cloud service providers using technology platforms from its partners.
Colt	Versa Networks	Colt has been one of the more aggressive movers in the SD-WAN market and recent expanded its program with the launch of a new universal customer premises equipment (uCPE). Colt also provides a sophisticated self-service portal. It recently partnered with Versa to offer the Versa platform to customers.
Comcast	Comcast doesn not specifically disclose all of its SD-WAN vendors, but it has integrated technology Versa Networks and Fortinet.	Comcast offers two flavors of SD-WAN managed services — fully managed and standard, for those who want to manage their own network. It is integrated with the MSO's ActiveCore SDN platform. Services can include full network configuration, real-time ordering and updates, proactive monitoring and co-managed portal.
Deutsche Telekom/ T-Systems	Aryaka Networks, Juniper Networks, Silver Peak, Versa Networks	Deutsche Telekom (DT) in 2020 launched a new SD-WAN service in partnership with Versa Networks. The services includes integrated routing, application prioritization, security features, analytics, and monitoring for insight into data center and cloud traffic. T-Systems, a DT subsidiary also has a range of SD-WAN services using Aryaka Networks, Juniper, and Silver Peak SD-WAN platforms.
Hughes	Fortinet, VMware	Hughes provides the HughesON Managed SD-WAN portfolio for enterprise customers, which is an end-to-end turn-key managed services network that can leverage the Hughes global satellite network. Features include dynamic load sharing across multiple connections for better traffic flow, 24/7 WAN management, zero-touch configuration, and Web-based management.
Lumen Technology (formerly Centurylink)	Cisco, Versa	Lumen offers a variety of SD-WAN managed services with multiple connectivity options that it says reach 100 countries. Offerings include options for dedicated internet, broadband aggregation, and 4G LTE. It offers customers a choice between the Cisco and Versa platforms. Services can run from the cloud or on a uCPE.

Masergy	Fortinet, Silver Peak	Masergy has long specialized in managed WAN services for enterprise that it manages with its own platform know AIOps. In delivering SD-WAN and security services, the company has partnered with Fortinet and Silver Peak on SD-WAN and it recent bundled CASB services from Bitglass.
NTT	Cisco, Fortinet, Silver Peak	NTT offers a broad SD-WAN Service Portfolio with solutions available in 190 countries. Services include SD-WAN features such as application prioritization, firewalling, advanced security features including malware and IPS, integrated path routing, and hybrid SD-WAN services. The platform is also transport independent and can use Ethernet, Internet, broadband, fixed wireless and 4G/LTE, as well as connectivity to NTT's 75+ global Local Cloud Centers (LCCs)
Orange	Cisco, Fortinet, Juniper Networks, Nuage Networks (Nokia)	Orange and Orange Business Services works with several partners to deliver a variety of SD-WAN services that it calls Flexible SD-WAN. Features and services include enhanced application performance, simplified management, best-of-breed security, and native cloud connectivity.
SES	Versa Networks	SES Networks has been adapting its large MEO and GEO gear to SD-WAN. SES is pitching tight integration between satellite networks and SD-WAN so that enterprise and government customers can buy an "as a service" packages. SES has launched network orchestration with the Linux-specified Open Network Automation Platform, along with Microsoft Azure and Amdocs. Microsoft has adapted its Azure ExpressRoute software to work on private SES networks.
Tata Communications	Cisco, Versa Networks	Tata is one of the largest global providers of managed SD-WAN services, with the advantage of leveraging its own global internet backbone services, which reach 125 countries. Tata has a managed SD-WAN service based on Versa, Cisco, and its homegrown hybrid offering. It also provides hosted VNFs on uCPE devices and 30 NFV service nodes. Tata has more than 3,000 SD-WAN sites worldwide.

Telefonica	FlexiWAN, Nuage Networks	SD-WAN by Telefonica enables the remote management of global enterprise networks. It includes a fully managed and centralized solution. Late in 2020, the carrier started testing technology from flexiWAN on white-box customer premises equipment (CPE) for businesses that require throughputs ranging from 50 Mbit/s to 1 Gbit/s of encrypted traffic.
Telstra	Cisco, VMware	Telstra offers managed SD-WAN that it calls "Adaptive SD-WAN" which is transport agnostic and includes enhanced secure connectivity, application-aware routing, fixed wireless services, and central orchestration. Its primary partners are Cisco and VMware.
Verizon	Cisco, Silver Peak, Versa Networks	Verizon provides several flavors of SD-WAN using technology from several vendors. Recently, it has emphasized the co-management trend by launching a Co-Management Service that employs Intent-Based Networking (IBN) management platform to control policy changes
Vodafone	Cisco, Juniper Networks, VMware	As a major global CSP with services in Europe, Africa and the APAC region, Vodafone offers managed SD-WAN services from Juniper Networks, Cisco, and VMware from on-premises devices and hosts 16 SD-WAN gateways. Vodafone has touted automation and plans to use AI to enhance operational capabilities.
Windstream	VMware, Fortinet	Windstream is considered a leading provider of SD-WAN services and recently branched out to provide a wide variety of SASE technologies including virtual NGFW. Under its SD-WAN Concierge services, it also offers managed security and unified communications.

As you can see, this market is filled with partnerships and technology alliances. There are new solutions, partnerships, and products being announced almost every week. Futuriom took a detailed look at announcements over the past year to garner insight into trends outlined in this report.

Below is a list of some of the more important announcements we have seen reflecting the trends toward the integration of security, SASE, and SD-WAN managed services:

- Verizon announced an agreement to provide SD-WAN and security services to Walgreen's Boots Alliance (WBA). This will enable WBA to apply specific connection

policies to specific applications across all of its stores. Verizon stressed that this was important, as the relationship was moving to an “as-a-service” cloud model, rather than focused on capital spending.

- Masergy recently integrated cloud firewalls from Fortinet and CASB technology from Bitglass as part of its managed WAN services. In 2021, Masergy plans to offer a ZTNA service. It also provides a service known as shadow IT Discovery that identifies the risk levels of cloud applications that employees have accessed without IT's approval.

- Masergy announced SD-WAN Work from Anywhere, a series of solutions aimed at remote and work-from-home (WFH) users. Included in the release is SD-WAN Secure Home, available now, which uses a device from Fortinet to give home users firewall, routing, and edge connectivity to SD-WAN via their standard Internet service connections.

- Citrix Workspace and Google Cloud teamed on a new technology alliance designed to provide more secure access to cloud-based apps. It is based on Machine Creation Services (MCS) to provision virtual machines in Citrix Virtual Apps or Citrix Virtual Desktops. In addition, Citrix Workspace is oriented to providing secure connectivity to corporate and cloud apps.

- VMware announced Future Ready Workforce solutions to provide improved workforce experiences, end-to-end zero trust security controls, and simplified management. The Future Ready Workforce solutions combine VMware SASE, digital workspace, and endpoint security capabilities to help IT manage and optimize more secure access to any app, on any cloud, from any device.

- VMware recently expanded its partnership with Zscaler to combine VMware SD-WAN and Secure Access with Zscaler Internet Access under the SASE umbrella.

- Windstream Enterprise recently added a virtualized NGFW hosted on SD-WAN devices in conjunction with VMware’s VeloCloud SD-WAN service. The Virtual Network Function (VNF) includes a Payment Card Industry (PCI) security certification and provides application control, web content filtering, intrusion prevention system, and security information and event management (SIEM) for threat monitoring and log retention. In addition to VMware technology, Windstream also uses Fortinet firewall technology.

- Fortinet has been making a big SD-WAN push into service providers with integrated security services. Fortinet has also added recent partnerships with NTT West, Orange, GTT, NTT West, Softbank, and Telenor. In June of 2020 it announced that Spark NZ is deploying Fortinet's Secure SD-WAN service to 2,500 customer sites.

- The MEF has started a certification program for vendors seeking registration with its SD-WAN 3.0 standard. SD-WAN vendors that have been certified under the MEF's 3.0 program include Fortinet, Infovista, Nuage Networks, Versa Networks, and VMware. The MEF recently announced that it would also work to define SASE services.

- Tata Communications works with both Cisco and Versa to offer predictable routing, enterprise multi-cloud connectivity, and SD-WAN intelligent routing. The company offers several SD-WAN options, including fully managed and co-managed. It also offers managed Azure Virtual WAN to facilitate cloud connectivity.

- Comcast Business recently expanded its SD-WAN security features by partnering with Fortinet to integrate Fortinet's FortiGate-VM Next-Generation Firewall Virtual Appliance and Fortinet Security Fabric with its own ActiveCore software-defined networking platform, targeting security threats such as malware.

- Asavie, a leader in secure mobility and IoT connectivity services, last year announced a partnership with 128 Technology to integrate the Asavie SD Edge mobility service, providing enterprises with improved simplicity, increased security performance, and cost savings. Asavie also has a partnership with Nuage Networks to integrate with Nuage's SD-WAN 2.0.

- Aryaka Networks offers SmartSecure, which is designed to complement SmartConnect with managed SD-WAN security-as-a-service offerings. At the branch, an access firewall within the Aryaka Network Access Point (ANAP) offers "north-south" control as well as "east-west" segmentation. Advanced NGFW capabilities are supported with NFV. Additional capabilities are provided by Aryaka's security partners, including Check Point, Zscaler, and Palo Alto Networks. The ANAP also supports VRF-based micro-segmentation, enabling multi-tenancy.

- Versa Networks in 2020 launched Secure Access, a solution to deliver the leading Secure SD-WAN services and private connectivity for employees who are working from home or are remote. With this solution, employees can now securely connect to applications in

both the private and public clouds as part of Versa SASE services.

- Zscaler's Private Access (ZPA) provides users with fast and secure access to internally managed apps in the data center and public clouds.

- Juniper Networks and Vodafone recently announced a secure SD-WAN that maintains connectivity across seven Amazon Web Services (AWS) regions. Vodafone SD-WAN uses a multi-vendor network functions virtualization (NFV) architecture including next-generation network (NGN) Juniper Firewall/unified threat management (UTM) capabilities.

- Juniper Networks recently completed its acquisition of 128 Technology, which it is integrating into its AIDE portfolio. With Juniper Session Smart SD-WAN, Managed Service Providers leverage the industry's only tunnel-free, session-based routing fabric optimized for maximizing application performance, network visibility and security. Several Managed Service Providers have announced their plans to leverage Session Smart SD-WAN for their SD-WAN managed service including Granite Telecom, Momentum, and Softbank.

- A number of service providers as well as SD-WAN technology providers have jumped on the rising demand for more flexible, software-based VPN services, which are expected to blend into managed security services and become a standard offering with SD-WAN services. For example, Aryaka Networks recently added SmartSecure Private Access.

- NetFoundry offers ZTNA, part of a SASE framework that provides micro-segmented "NetFoundry AppWANs" that only provide network access to specific apps after they have been securely identified, authenticated, and authorized.

- Pulse Secure launched a new suite of secure access solutions for hybrid IT that provides organizations a simplified, modular, and integrated approach to modernize access productivity, management and Zero Trust Network Access (ZTNA).

- Infiot launched Cloud Services Fabric (CSF), a cloud networking service designed to provide remote users, sites, and IoT devices with secure and optimized connectivity to any cloud. The service delivers several key features for cloud networking, including ZTNA, multi-cloud connectivity, and edge compute.

- Elisity Inc., a San Jose, Calif.-based startup, has emerged from stealth, claiming a solution that combines zero-trust networking with software-defined perimeters. Called Elisity Cognitive Trust (ECT), the flagship creates a virtual fabric, or "e-mesh," based on a network's IP/MPLS infrastructure, which secures communications between users and all cloud or premises-based resources, local or remote.

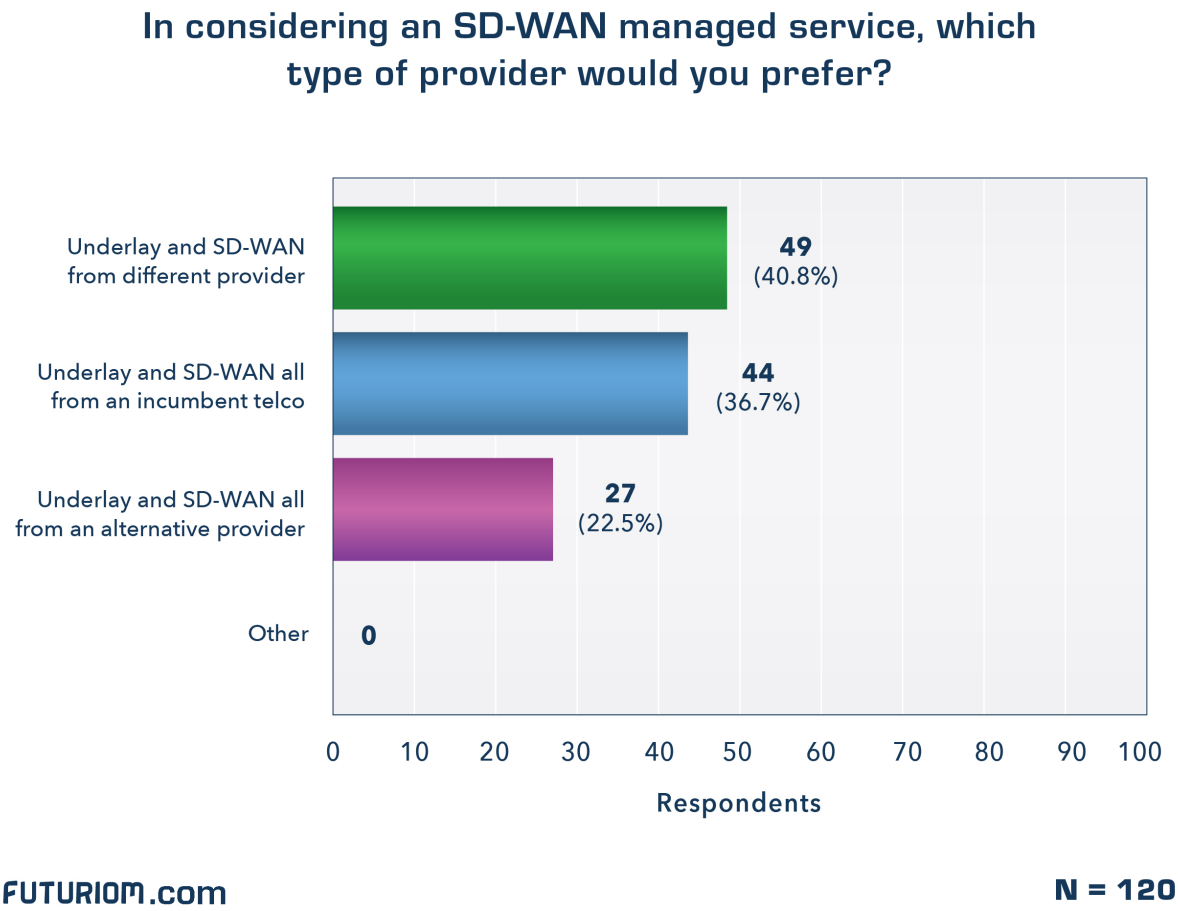
4. Conclusions: Trends to Drive Focus on Expanded Managed Services

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), according to our 2020 SD-WAN Infrastructure Growth Report. Speaking with market participants, the market may have paused slightly in the 1H of 2020 from restrictions imposed to mitigate the COVID-19 pandemic, but we believe this growth trajectory started to re-accelerate in the 2H of 2020 as SD-WAN's strategic position as an enterprise networking and cloud networking platform expands.

SD-WAN MS will be a key driver of SD-WAN deployments. Futuriom believes that MS will represent approximately 40-50% of the overall market, as they become an attractive way to purchase not just network connectivity and security, but additional value-added services such as multi-cloud connectivity or remote access, along with high-performance SaaS applications such as collaboration tools.

The COVID-19 pandemic has had a big impact on the SD-WAN market, raising awareness among enterprises of the need for a single, visible, and manageable network with secure remote-access features. Cloud-delivered SD-WAN and SD-WAN MS 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.

The survey asked enterprise end users how they would purchase SD-WAN and MSN, and it's clear they are open to different options. Enterprises typically purchase an underlying physical circuit, or underlay, and then decide which applications will be used over that circuit. However, as SDN technology reaches deeper into service provider networks, there are more opportunities to combine underlay and overlay, or even purchase fully integrated solutions that are provided by different partners and operators. Survey respondents are open to different



combinations, with 40.8% (49) saying they would prefer to purchase underlay and overlay from different providers and 36.7% (44) saying they would like both the underlay and overlay provided by an incumbent CSP or telco. Of those surveyed, 22.5% (27) said they would prefer to purchase the underlay and overlay from an alternative provider.

Going forward, Futuriom sees much diversity in the market, with a wide variety of SD-WAN and networking solutions being provided by incumbent CSPs and alternative providers alike. What's important in the SD-WAN MS market is that more powerful, integrated solutions are being offered with a wide combination of bandwidth connectivity, multi-cloud connectivity, security, and value-added services. This will be a boon for enterprises going forward, as they move toward software-defined networks for providing higher performance, control, and security over all their applications