

2015 State-of-the-WAN Report

The Software-Defined WAN Emerges

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Introduction

The wide area network (WAN) is a critically important topic for number of reasons including:

- The latency, jitter and packet loss that is associated with the WAN often cause the performance of applications to degrade;
- The WAN can be a major source of security vulnerabilities;
- Unlike most of the components of IT, the price/performance of WAN services doesn't obey Moore's Law;
- The outage of a WAN link often causes one or more sites to be offline;
- The lead time either to install a new WAN link or to increase the capacity of an existing WAN link can be quite lengthy.

A discussion of wide area networking is extremely timely because after a long period with little if any fundamental innovation, the WAN is now the focus of considerable innovation. As a result, for the first time in a decade network organizations have an opportunity to make a significant upgrade to their WAN architecture and design.

The goal of this e-book is to provide research-based insight into the current state of the WAN. Towards that end, this e-book examines topics such as:

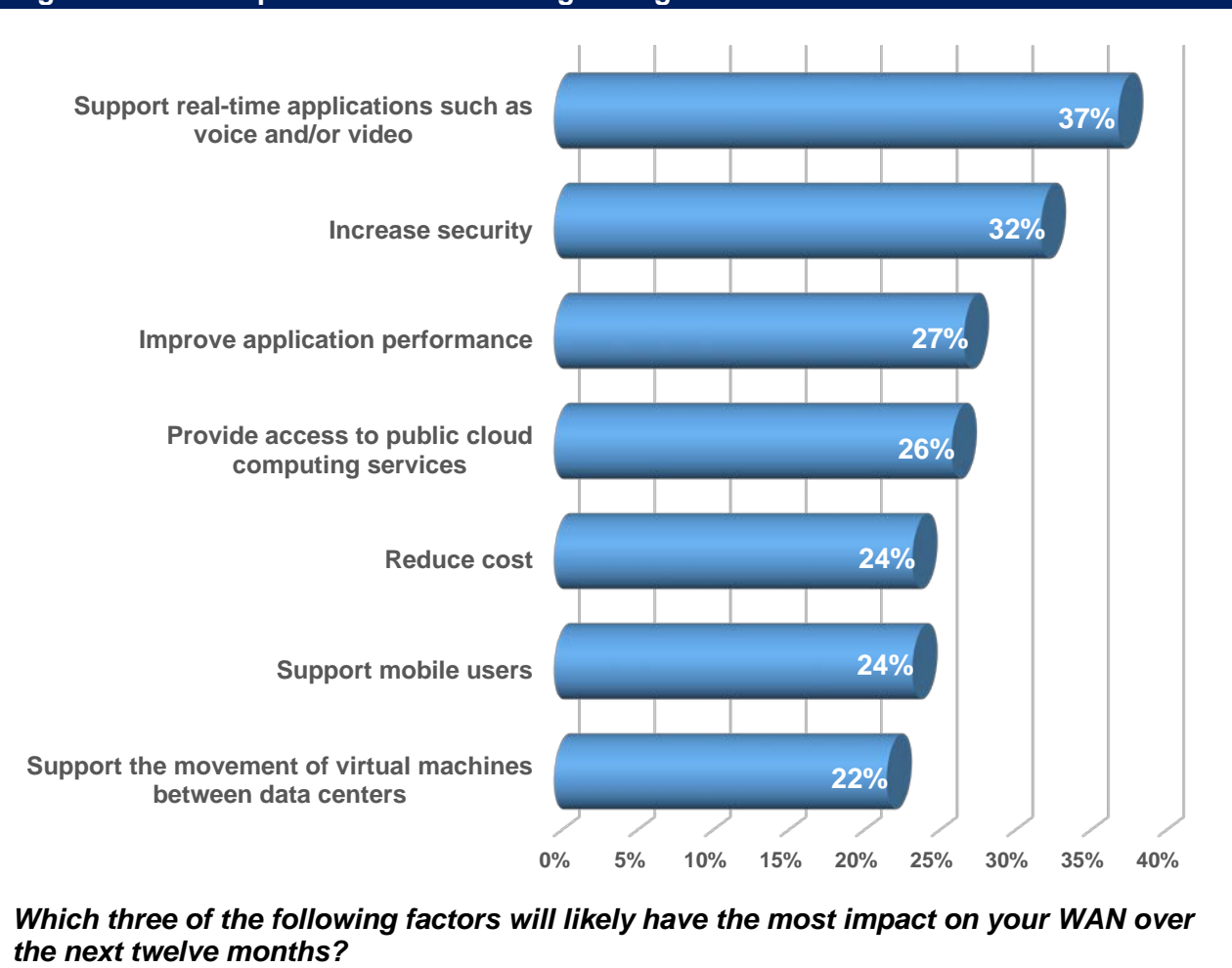
- What factors are driving change in the WAN?
- How are WAN budgets changing?
- How are network organizations approaching WAN design?
- How receptive are network organizations to new vendors of WAN functions?
- What are the driving or inhibiting factors in implementing a Software-Defined WAN (SD-WAN)?

This e-book is part of a two-part series that is focused on the WAN. The second e-book, [The 2015 Guide to WAN Architecture and Design](#), describes a hypothetical company that has a traditional approach to WAN design. It then presents alternative scenarios directly from the e-book's sponsors that describe how the company should evolve its WAN.

What are the Factors Driving Change in the WAN?

The factors that are driving change in the WAN reflect a more thorough integration of “All Things IT” from simply supporting traditional applications. Two factors are particularly important. Supporting real-time services comes in as the top driver, and, based on both this and additional surveys, it seems that video is a major part of this. Increasing security is the second strongest driver for change. And, not surprisingly, improving application performance remains extremely important.

Figure 1: Most Important Factors Driving Change in the WAN



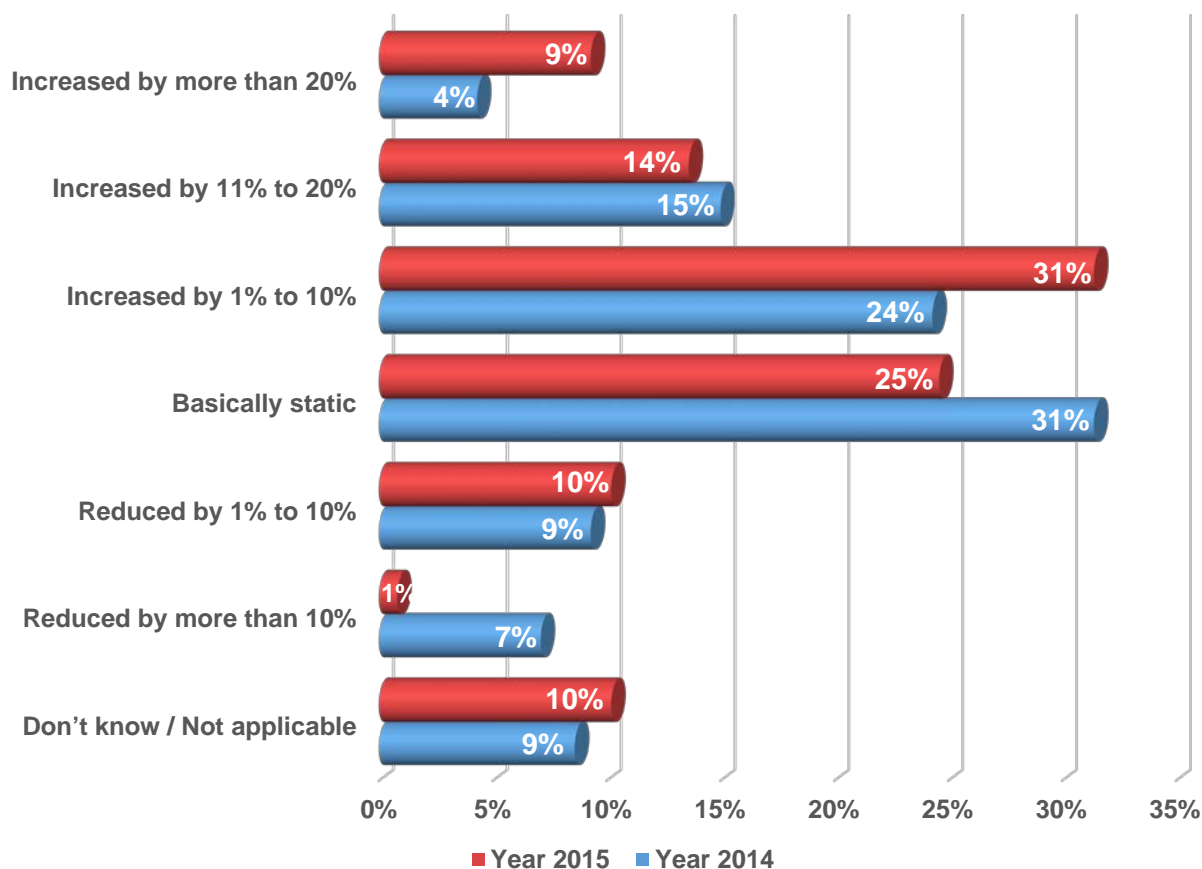
When compared to the factors that were driving change in the WAN a year ago, both the need to support real-time applications and the need to provide more security experienced a significant increase.

Reducing costs is seen as being slightly less important than found in a similar survey last year, as will be further borne out by the indications of budget changes.

How are WAN Budgets Changing?

The world is looking bright for WAN budgets for 2015. As compared with levels reported in our [2014 survey](#), there are significant increases particularly in those who report increases of more than 20% and increases of up to 20%, while the reductions of more than 10% are significantly lower.

Figure 2: Anticipated WAN Budget Increase

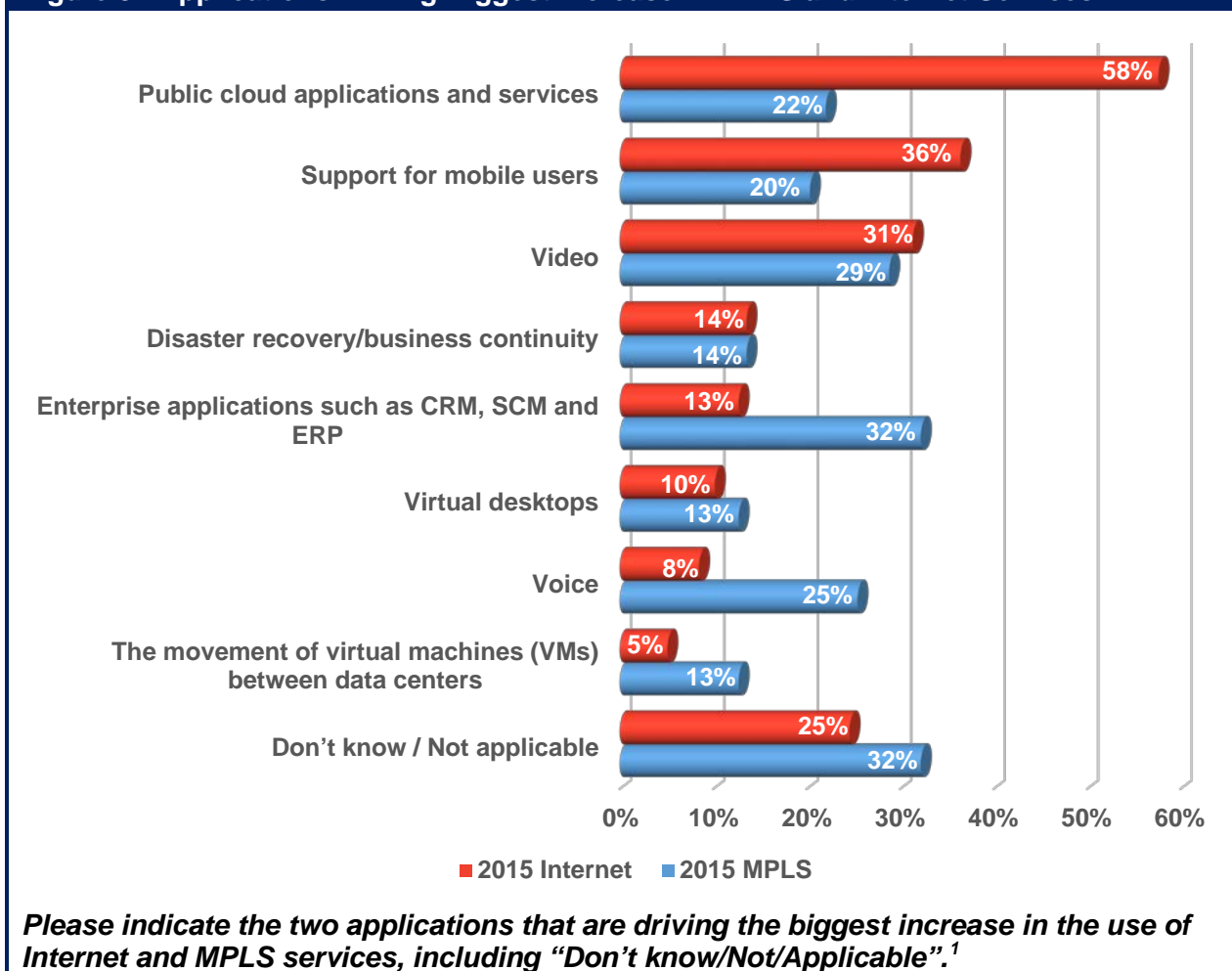


How do you expect that your budget for all WAN services will change over the next year?

What are the Primary Drivers for Increasing Internet and MPLS Service Use?

The two dominant WAN services today are Internet-based services and MPLS services. The responses to a question asking which two applications are driving the biggest increase in the use of these services are shown below.

Figure 3: Applications Driving Biggest Increase in MPLS and Internet Services



¹ There is a relatively large percentage of "Don't know / Not applicable" responses. There are two reasons that a respondent may choose this. In one case, they simply don't know. In the second case, it might truly be "Not applicable." This would especially be the case if an organization were totally dependent on Internet-based networking and did not use MPLS.

The survey instrument was designed such that the respondents were required to enter two responses for each (so the total of all percentages is 200%). If the question was not applicable, the individual checked this option twice, thereby somewhat inflating the percentage. This would also be inflated in the event that there was only one major driver, although the individual could have checked the same driver twice.

While a lot of the results are self-explanatory, there are some results that deserve special attention. First, the dominance of Internet services for access to public cloud applications and services is a given. The extent to which these services are a driver for MPLS seems to be a little surprising given the relatively small number of providers that accept MPLS access. That said, if the company backhauls its Internet traffic on its MPLS network, more Internet traffic means more MPLS traffic. From this perspective, the amount of MPLS traffic makes a lot of sense.

On the other hand, since the “enterprise application” would, by inference, likely be located at data centers within the enterprise, this being a driver for MPLS makes sense. In particular, these applications are a stronger driver for MPLS than for Internet-based services due to the inherently higher Quality of Service [QoS] and security that accompanies MPLS and these applications require.

The extent to which voice and video are drivers for MPLS is essentially the same as last year. It is our take that voice and video are drivers for MPLS for intra-company voice and video since MPLS provides excellent QoS.

Voice and video as drivers for increased Internet usage is a different story. Voice over the Internet is a relatively weak driver for *increased* usage is probably due to this already being a well-established technology. At the same time, there is a quite significant increase – a whopping 11% - from last year in terms of video being a major driver for *increased* traffic. This is viewed as being due to an increase in company-to-company video, which is not easily accomplished via MPLS. Also, we are in the midst of the emergence of technologies that make intercompany video much more attractive, from applications like Skype for Business (formerly known as Lync Enterprise Voice) to technologies like WebRTC.

The Status of Internet Backhaul

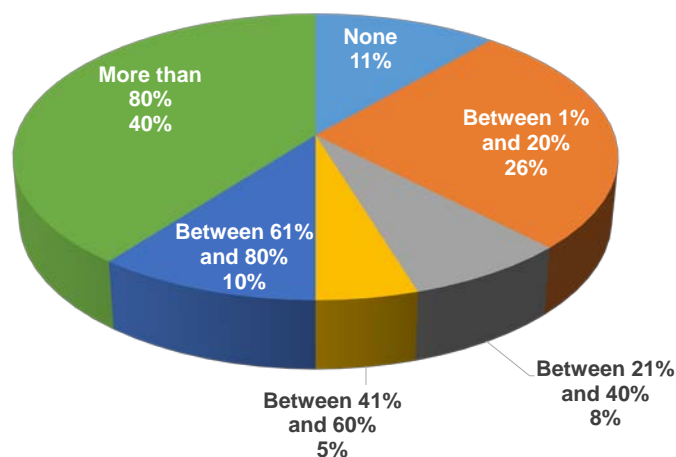
Over the past couple of decades, providing for appropriate Internet access, especially for widely distributed organizations, has been a conundrum. In addition to Internet-only access (which some companies use) and MPLS-only access (which is never the case), there are two obvious solutions for combining the two. On the one hand, each site might have dual WAN connections – one to the Internet and one to the corporate net, presumably via MPLS. On the other hand, all traffic could be backhauled to the corporate data center and then go to the Internet (or not) depending on the traffic type and application.

Each approach has its advantages. Benefits of backhauling to the corporate data center include integrated management for the entire network, simplifying security, and the ability to consolidate traffic so that all traffic is conglomerated into one or more very fast connections. However, this solution requires that all Internet traffic has to transit the expensive MPLS network. This adds both cost and delay. At the same time, direct connection to the Internet provides a both a backup and probably slightly more responsive connection.

The survey results show that there is a quite polar approach to how Internet traffic is handled. Of course, there are some organizations that do absolutely no backhaul. These are likely SMBs that have very few sites and are likely to use the Internet for their primary networking functions. Additionally, 26% of respondents indicated that they do limited backhauling, bringing to total of none or limited to over one third of the organizations.

At the other end of the spectrum fully half do significant backhauling, with 40% indicating that they backhaul more than 80% of their traffic.

Figure 4: Internet Traffic Backhauled to Data Center



How much of your Internet traffic that originates in your branch offices do you currently backhaul to a data center before handing it off to the Internet?

Backhauling Internet traffic is becoming an increasingly important topic. As shown in **Figure 1** and **Figure 4**, providing access to public cloud computing is one of the primary factors that are driving change in the WAN and, by a wide margin, providing access to public cloud applications and services is the primary driver of increased Internet access. As discussed in [The 2015 Guide to WAN Architecture and Design](#), one of the characteristics of many of the SD-WAN solutions that are currently available is that they provide for a more efficient way to access public cloud providers without sacrificing security and control.

How Much Interest is there in Implementing SDN in the WAN?

The [2015 Guide to SDN and NFV](#) reported on the results of a survey that was administered in late 2014. The respondents to this survey were asked to indicate the factors that were driving their company's interest in SDN. The two factors that were indicated the most were:

- Better utilize network resources;
- Perform traffic engineering with an end-to-end view of the network.

While better utilizing network resources is a benefit of implementing SDN in either the LAN or the WAN, performing traffic engineering with an end-to-end view of the network is primarily a benefit of implementing SDN in the WAN.

The respondents to this survey further demonstrated their interest in implementing SDN in the WAN when they indicated how broadly they expected their campus, WAN and data center networks would be based on SDN three years from now. Their responses show that IT organizations believe that three years from now that SDN deployment in data centers will be highly pervasive and that there will also be significant SDN deployment both in the WAN and in campus networks.

Table 1: Anticipated SDN Deployment

	Campus Networks	WAN	Data Center Networks
Exclusively based on SDN	1%	2%	6%
Mostly SDN	10%	6%	20%
Hybrid, with SDN and traditional coexisting about equally	34%	36%	50%
Mostly traditional	29%	31%	10%
Exclusively traditional	13%	13%	4%
Don't know	12%	12%	10%

What is a Software-Defined WAN?

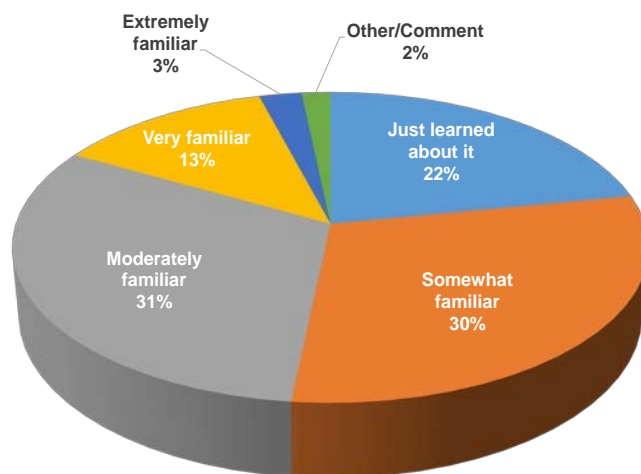
As is the case with any software defined network, a Software-Defined WAN (SD-WAN) centralizes the control function into a SDN controller. The controller abstracts the user's private network services from the underlying IP network and enables the operation of the user's private network services via centralized policy. The controller also enables the automation of management tasks such as configuration and provisioning.

Leveraging the underlying WAN platforms, which may include physical or virtual routers, the controller sets up virtual overlays that are both transport- and technology-agnostic. Under the direction of the controller, the WAN platforms implement functions such as QoS, path selection, optimization and security, often using dynamic multi-pathing over multiple WAN links.

A SD-WAN may be implemented by an enterprise IT organization or by a network service provider. In the former case, the users of the SD-WAN are primarily the company's employees. In the latter case, the users are the companies which subscribe to the SD-WAN service.

Over half of the survey respondents indicated that they either just learned about a SD-WAN from the definition that was in the survey instrument or they were just somewhat familiar with the concept. This lack of familiarity isn't surprising given that a SD-WAN is an emerging concept. It does, however, highlight the need for more education on this topic.

Figure 5: Familiarity with SD-WAN



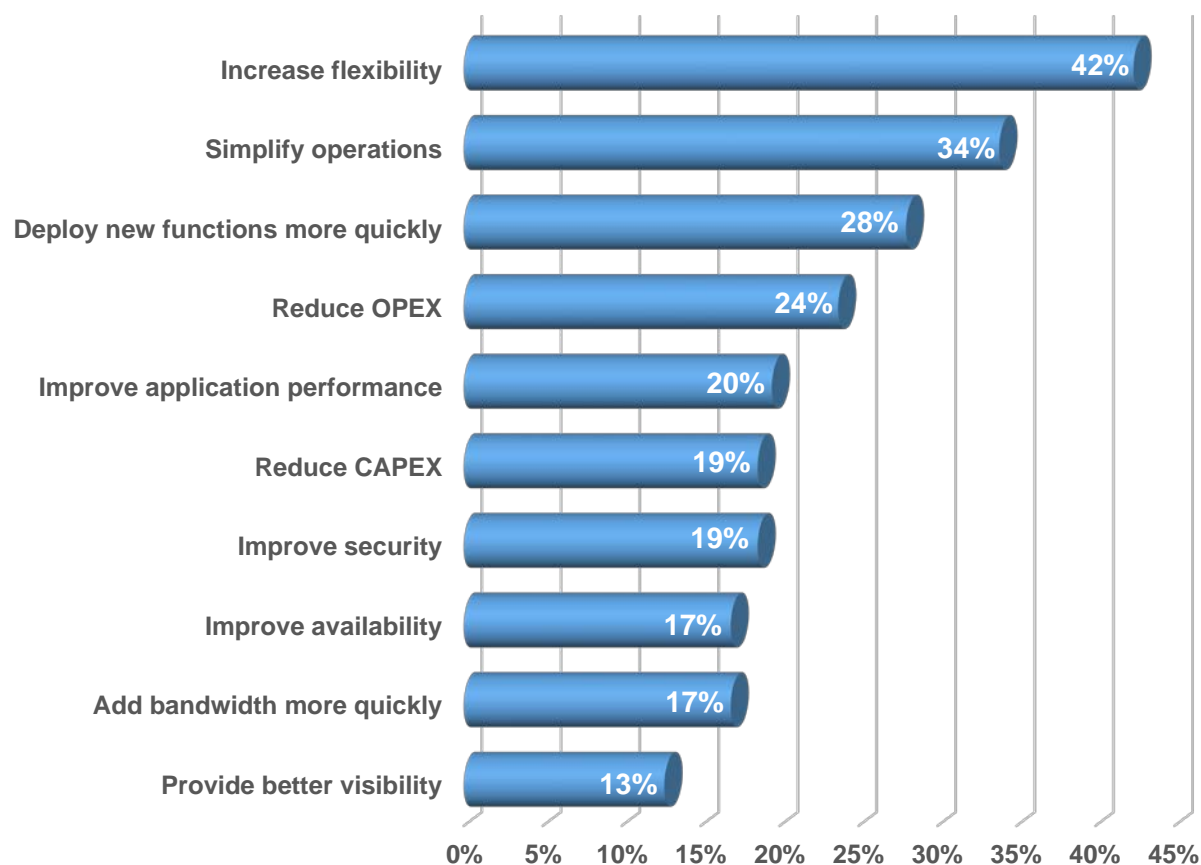
How familiar are you with the concept of a Software-Defined WAN (SD-WAN)?

What are the Drivers of SD-WAN Adoption?

The top three drivers of SD-WAN deployment are:

- Increase flexibility
- Simplify operations
- Deploy new functions more quickly

Figure 6: Drivers for SD-WAN Implementation



What are the primary advantages that would drive your company to implement an SD-WAN?

There is no question that each of these drivers is important. However, each of these drivers is considered to be a soft savings which means that it can be difficult to show direct tangible benefits. For example, nobody would argue that it isn't a good thing to be able to deploy new network functions more quickly, but what are the associated business benefits? Does it increase revenue? Does it reduce the company's bottom line cost or reduce customer churn?

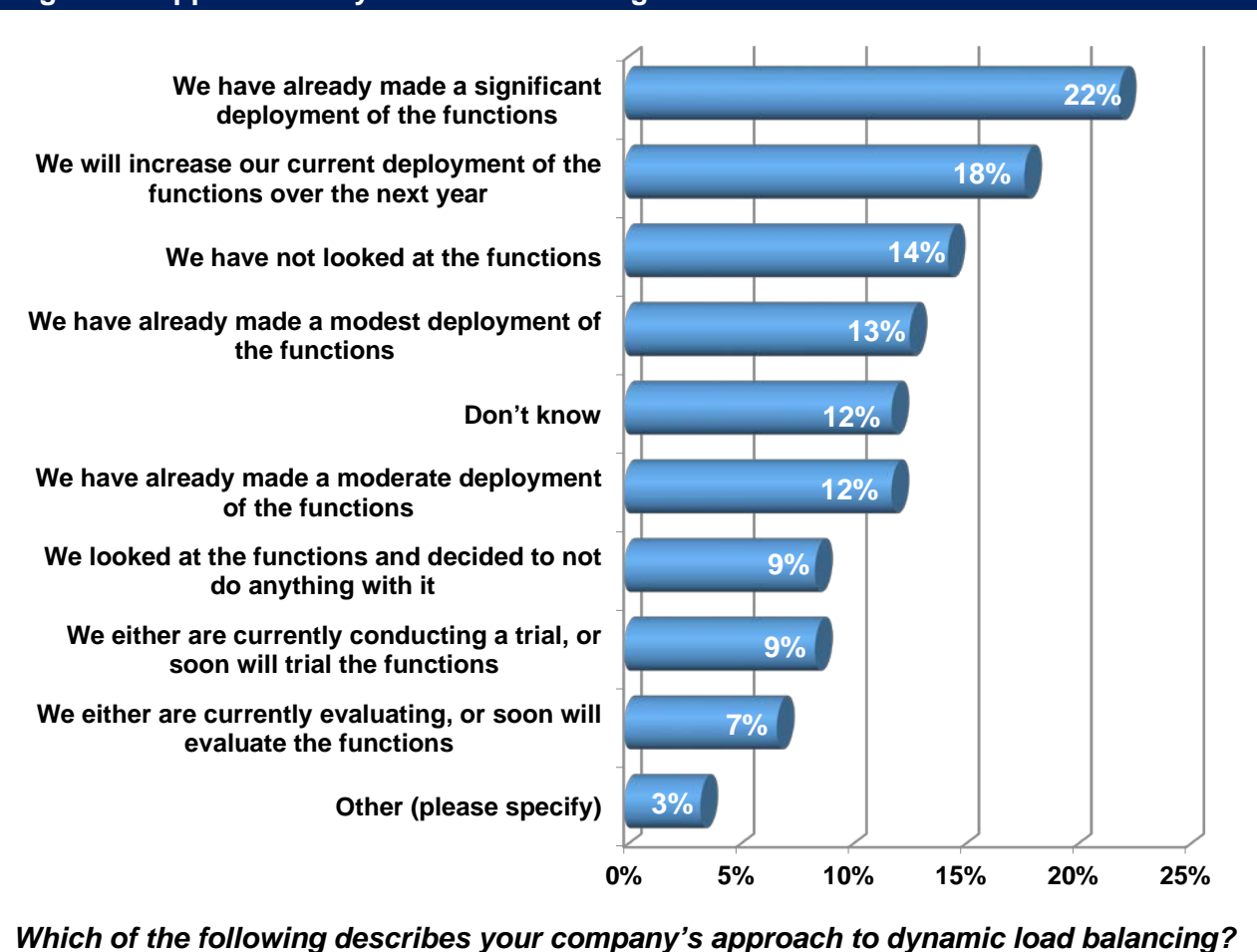
It is interesting and somewhat surprising that reducing OPEX was fourth on the list. While it can be difficult to build a business case for an investment in the WAN based on soft savings, it is relatively easy to build such a business case if there are hard cost savings. One of the key promises of an SD-WAN is that it will either reduce the amount of money that a company spends with their service providers or reduce how much that spend increases. The potential hard cost savings that result from implementing an SD-WAN is an important topic for vendors and network organizations to explore. Even if these hard savings don't justify a company making an investment in the SD-WAN, the combination of hard and soft savings might.

Do Network Organizations Care About Dynamic Multi-Pathing?

As mentioned, dynamic multi-pathing is often a component of an SD-WAN. One approach to leveraging this function is to dynamically load balance traffic over both MPLS and Internet links with the goal of reducing the capacity, and hence the cost, of the MPLS links while replacing the reduced MPLS bandwidth with relatively inexpensive Internet bandwidth. An alternative approach is to use this function to cap the current MPLS capacity and on a going-forward basis only add relatively inexpensive Internet bandwidth.

When asked about their use of dynamic multi-pathing, the most common answer was that network organizations have already made a significant deployment of this function. The second most common answer was that they would increase their current deployment over the next year.

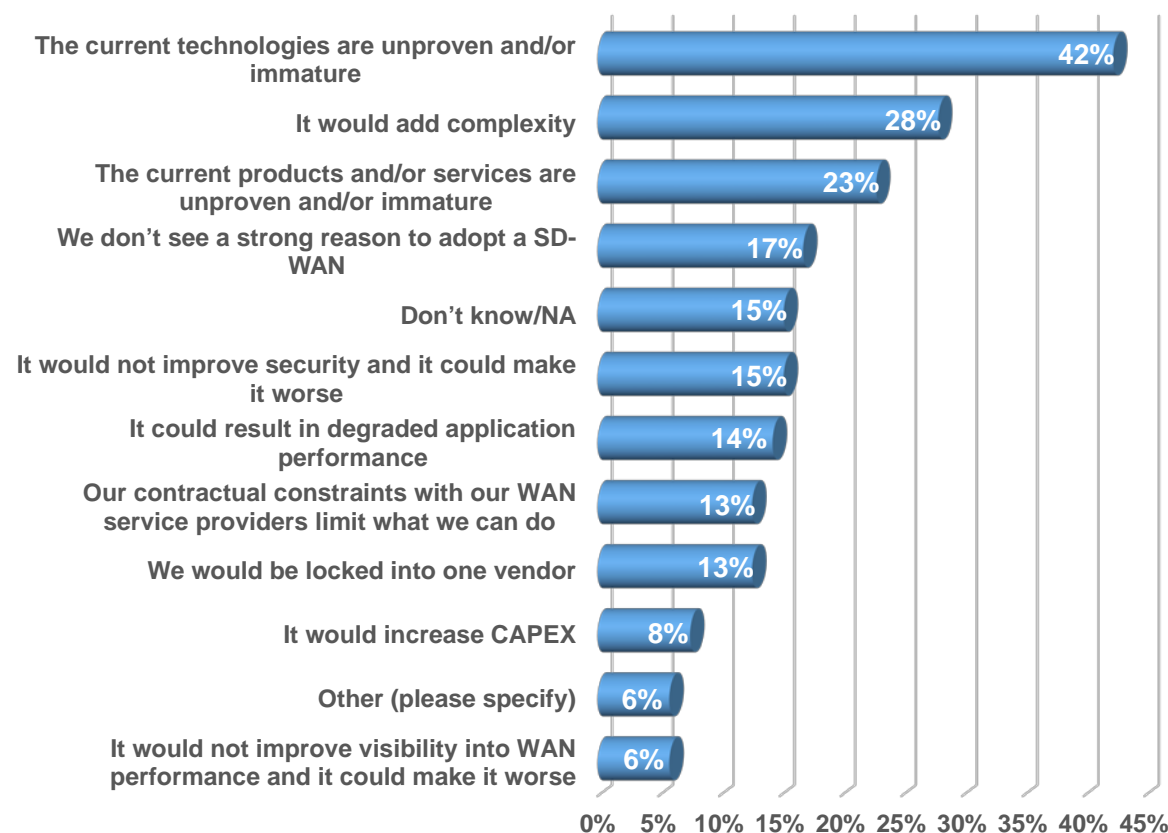
Figure 7: Approach to Dynamic Multi-Pathing



What are the Inhibitors to SD-WAN Deployment?

The top inhibitor to SD-WAN deployment is the unproven and/or immature nature of the current technologies, products and services. This inhibitor will dissipate over time as the enabling technologies mature and vendors and service providers evolve their products and services. The fact that this survey data indicates that complexity is an inhibitor to SD-WAN deployment is in line with survey data presented in other sources. That survey data shows that network organizations are concerned with the complexity associated with any implementation of SDN. Hopefully as technologies, services and products mature, vendors and service providers will ensure that complexity is no longer an issue.

Figure 8: Inhibitors to implementing an SD-WAN



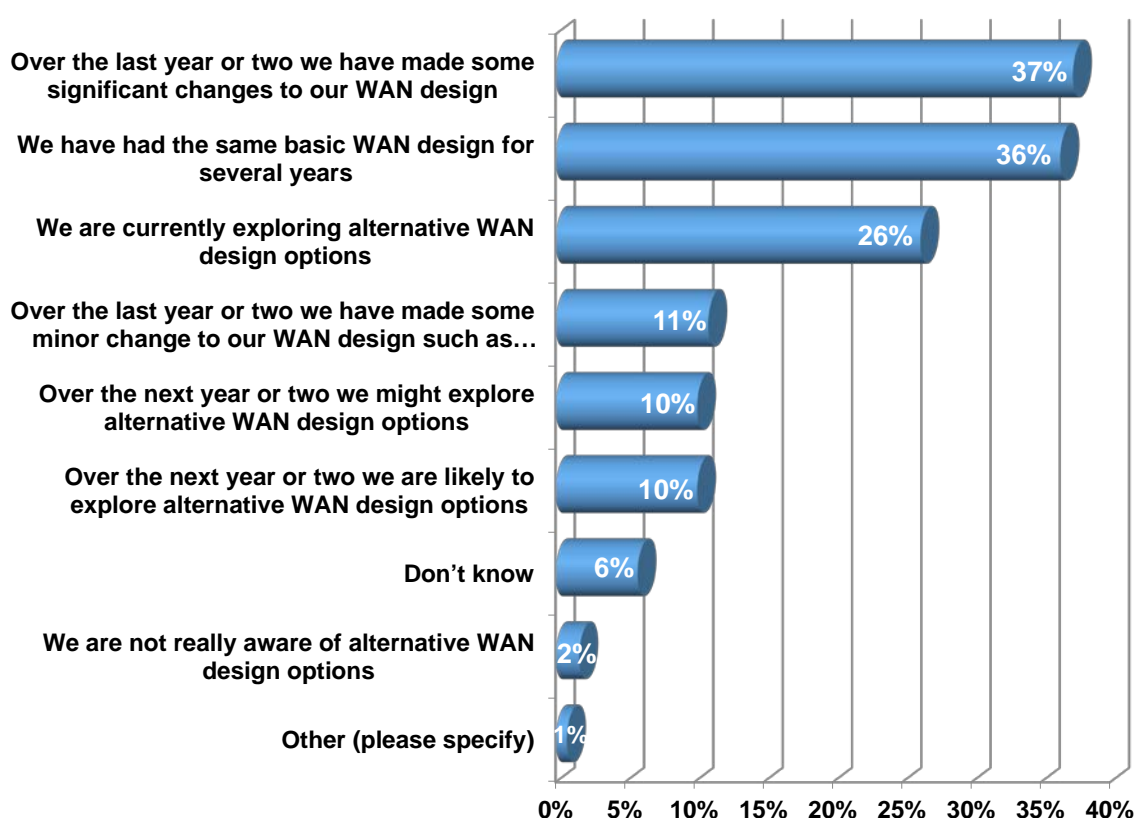
What are the primary concerns that would inhibit your organization's implementing an SD-WAN?

The fact that network organizations don't see a strong reason to adopt a SD-WAN is in line with the previous discussion that network organizations see that the top three drivers of SD-WAN are soft savings and that it can be difficult to make a compelling business case based on soft savings. As previously mentioned, it is relatively easy to make a compelling business case if there are hard savings and vendors need to help network organizations create these business cases.

How are Network Organizations Approaching WAN Design?

When it comes to WAN design, network organizations tend to fall into two very different camps. Over a third of network organizations belong to the camp that have had the same basic WAN design for several years. Over a third of network organizations also belong to the other camp in which they have made some significant changes to their WAN design over the last year or two. In addition, independent of which camp they belong to, network organizations have a very strong interest in exploring alternative WAN design options.

Figure 9: Approach to WAN Design

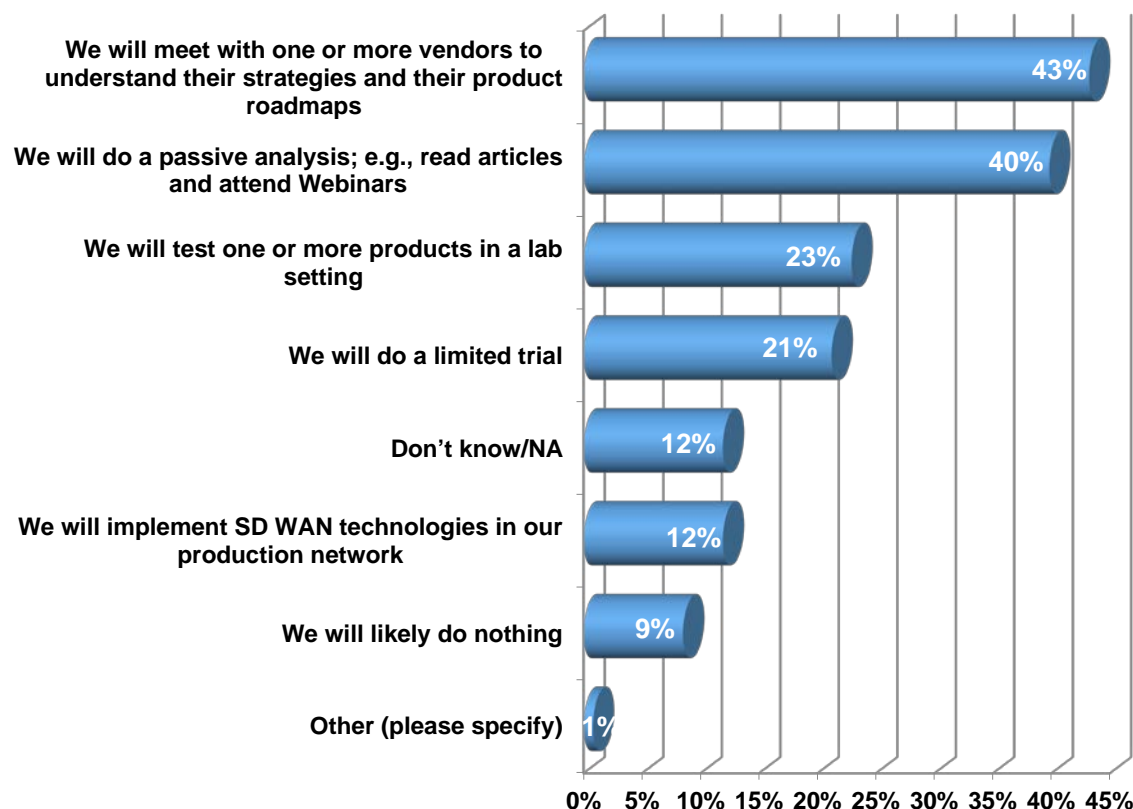


Which of the following describes your network organization's approach to WAN design?

How are Network Organizations Approaching SD-WANs?

The fact that over the next two years that a third of network organizations intend to either implement SD-WAN technologies in their production network or do a limited trial of those technologies demonstrates the breadth of interest in SD-WANs. In addition, the bulk of network organizations intend to do a passive analysis (i.e., reading articles and attending Webinars) and/or work with vendors to understand their strategies and their product roadmaps. The extent of this interest presents a great opportunity for network organizations to pressure vendors to create templates for a compelling business case that can be used to justify an investment in SD-WAN technologies.

Figure 10: SD-WAN Evaluation and Implementation Plans



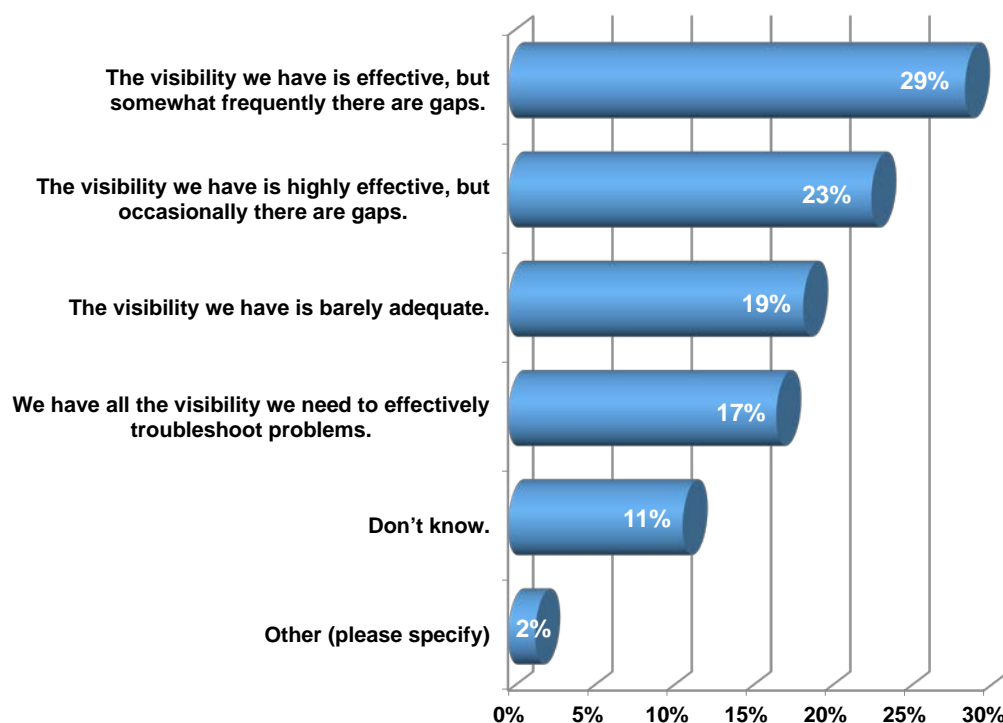
Which of the following describes the approach that your company will take to SD-WANs over the next two years?

Do Network Organizations have the Visibility They Need?

The marketplace is crowded with tools and services that are positioned as being able to provide network organizations with all of the visibility into their WAN that they need for troubleshooting problems related to network and/or application performance degradation. However, whether it is the deficiencies of those tools or the troubleshooting processes used by network organizations, less than one out of five network organizations has all of the visibility that they need to effectively troubleshoot problems. In addition, roughly half of network organizations report that visibility into their WAN that either has frequent gaps or that is barely adequate.

The current rather dismal state of WAN visibility combined with the growing interest in SD-WANs creates an opportunity and a challenge for network organizations. The opportunity is that by implementing an SD-WAN, network organizations might be able to increase their visibility into the WAN. The challenge is that network organizations need to ensure that as they explore SD-WAN alternatives they evaluate the visibility provided by each of those alternatives.

Figure 11: WAN Troubleshooting Visibility



How would you rate the visibility that your network organization has into your WAN for troubleshooting problems related to network and/or application performance degradation?

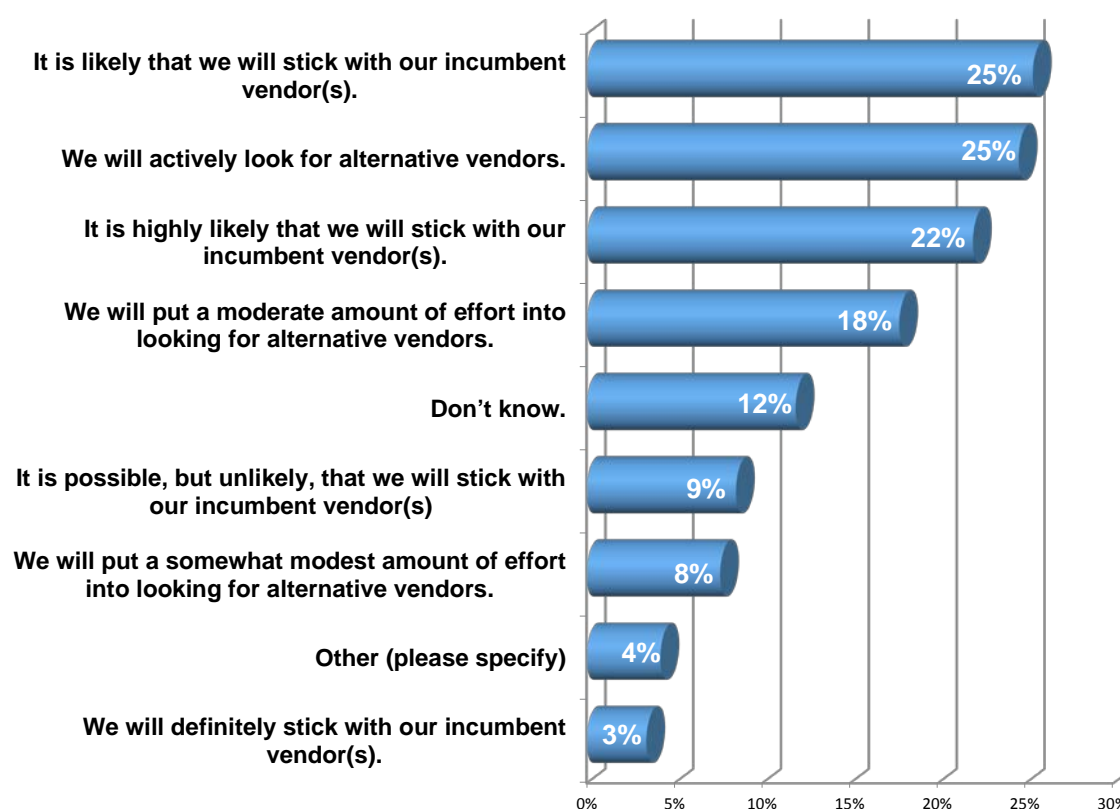
Will Network Organizations Stay with their Current Vendors?

SD-WANs represent a fundamental transformation in terms of how network organizations implement a WAN. As is the case with any fundamental transformation in the IT industry, some vendors will gain and some will lose market share.

Over the next two years, as network organizations redesign their WANs, a quarter of them either will or likely will stick with their current providers of L4 – L7 functions such as firewalls and WAN optimization controllers. By contrast, a quarter of network organizations will actively look for alternative providers.

Given the previously discussed inhibitors to the adoption of a SD-WAN, two keys to success for any vendor in this space are to reduce the complexity of their product and/or service and to demonstrate how their product and/or service results in significant cost savings.

Figure 12: Interest in Looking for New Vendors



If your network organization were to redesign its WAN over the next year or two, which of the following describes how you will approach the selection of vendors who provide value added functions, such as WAN optimization controllers or firewalls, on top of basic transmission services?

Summary of Key Findings

In the preceding pages, we took an in-depth look at each of the survey questions. The findings show:

- The primary factors driving change in the WAN are support for real-time applications, increasing security, and improving applications performance.
- WAN budgets are looking brighter than they were a year ago.
- The primary drivers for increasing Internet service use are public cloud applications and service, plus the support for mobile users and video support. By contrast, the most significant driver to MPLS was for support of intra-enterprise applications including data applications plus voice and video.
- The use of Internet backhaul is becoming critically important and more effective support of Internet traffic is potentially a major advantage of using Software-Defined WAN (SD-WAN) services.
- There is significant interest in the use of SDN in the WAN, even though this is a relatively new concept.
- The general perception is that the major drivers for SD-WAN implementation are “soft” savings including increasing flexibility, simplifying operations, and deploying new functions more quickly. However, network organizations should also look at the potential “hard” savings of reducing OPEX.
- The major inhibitors to SD-WAN implementation are the state of maturity of current products and services and a perception of added complexity.
- Multi-pathing is a significant component of SD-WANs, and most organizations have already made a significant deployment or will increase of this function.
- While many organizations have had the same WAN design for several years, about two-thirds of the organizations have made significant design changes or are exploring alternative designs.
- The majority of organizations are exploring or planning to explore SD-WAN alternatives.
- Very few organizations feel that they have all the visibility they need for troubleshooting problems related to network and/or application performance.
- The question of sticking with incumbent vendors is up in the air. While most are likely or very likely that they will stick with their incumbent vendors, many will evaluate others options.

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Jim Metzler has a broad background in the IT industry. This includes being a software engineer, an engineering manager for high-speed data services for a major network service provider, a product manager for network hardware, a network manager at two Fortune 500 companies, and the principal of a consulting organization. In addition, he has created software tools for designing customer networks for a major network service provider and directed and performed market research at a major industry analyst firm. Jim's current interests include cloud networking and application delivery.

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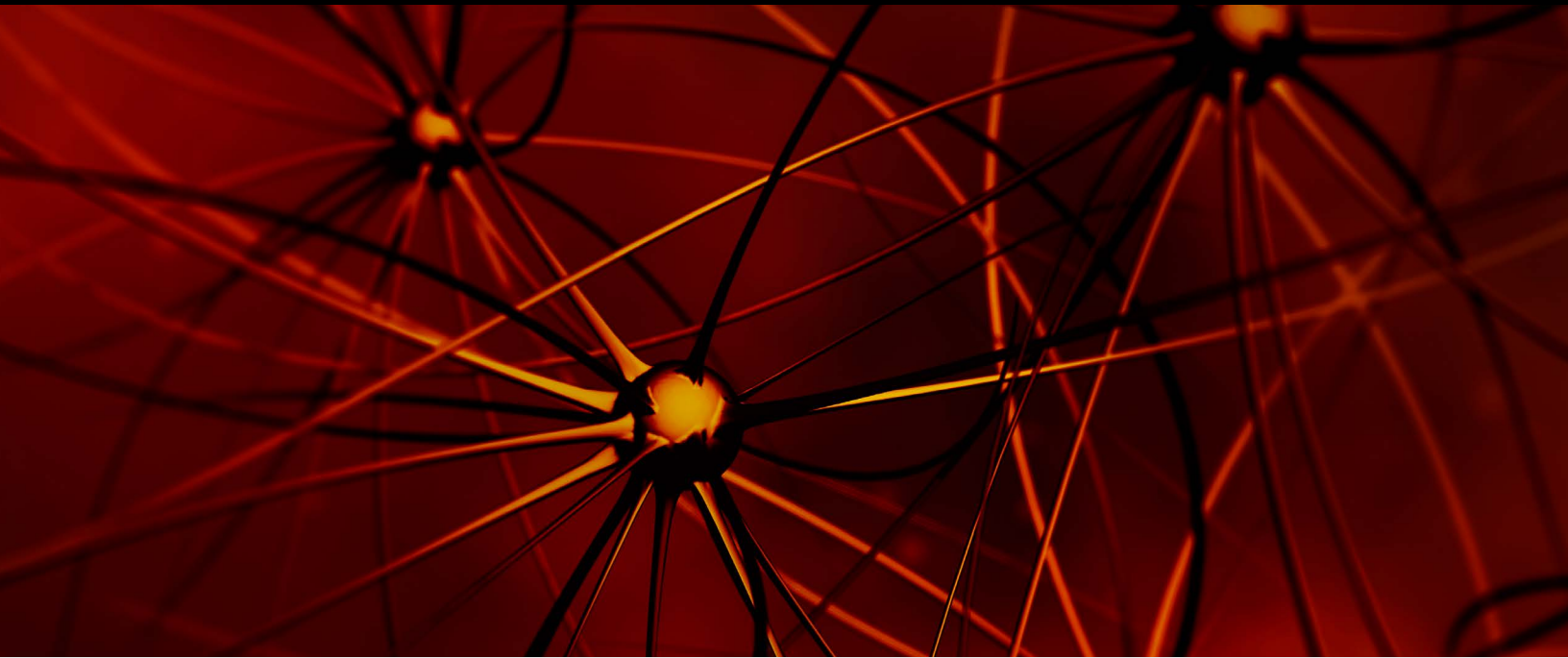
The background of the entire advertisement is a dark blue field filled with a complex, glowing network of light blue dots and lines, resembling a fiber-optic or data network map. The lines radiate from various points, creating a sense of dynamic connectivity and data flow.

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The Cloud Network Unbound

Virtualized and automated networking across datacenters and branch offices

Cloud computing is changing the way enterprises access and consume data. To remain competitive, businesses know they must be able to react quickly to market changes. The cloud addresses their need for speed, agility and responsiveness. Unfortunately, today's data communications networks aren't keeping pace. In fact, they're struggling to deliver consistent, on-demand connectivity and things are only going to get more challenging. Fortunately, Nuage Networks has a solution.

Nuage Networks leverages Software Defined Networking (SDN) to unleash the power of the cloud, giving enterprises the freedom and flexibility to:

- Connect sites, workgroups and applications faster, more securely and more cost effectively
- React to change easily
- Respond to growth seamlessly

Nuage Networks makes the network as responsive as your business needs it to be — from the datacenter to remote locations.

Our solutions close the gap between the network and cloud-based consumption models, creating an infrastructure in which network resources are as readily consumable as compute and storage resources. Our approach enables enterprises to transform the way they build and use their networks, which has a profound effect inside and across multiple datacenters and across the wide area network.

Imagine the possibilities when network resources are easily consumable. A Nuage Networks datacenter network is as dynamic, automated and virtualized as the server infrastructure, and supports the needs of applications with instantaneous network connectivity.

Take advantage of a fully virtualized services platform

Cloud-based datacenters have unshackled the IT environment, making it possible for applications to request additional compute and storage on an as-needed basis. Extending the reach of virtualized network services from the datacenter to remote locations further enhances the enterprise's ability to respond to business imperatives at cloud speed. Peak demands can be provisioned "just in time", which lowers operational costs and makes it possible to share compute resources across applications. Geography is taken out of the equation.

Nuage Networks SDN solutions enable you to react to changes in your datacenter or at branch locations with speed, agility, and flexibility. Our solutions seamlessly connect your datacenters and the wide area network, so networking across the whole environment is fluid and responsive to changing business conditions.

By improving efficiency, resiliency and security, our products enable networks to be built and operated at any scale — from a single rack to Fortune 500 scale.

Our SDN solutions work closely together and deployment is flexible, so you can focus on the area most in need of help.

Responsive datacenter networking

Build robust and highly scalable networking infrastructures with the **Nuage Networks Virtualized Services Platform (VSP)**. These new infrastructures will let you instantaneously deliver compute, storage and networking resources securely to thousands of user groups.

Virtual private networking on your terms

The **Nuage Networks Virtualized Network Services (VNS)** enables you to respond faster and with greater agility to changes in your wide area network environment. A self-serve portal allows enterprise end users to self-manage moves, adds and changes, significantly reducing the time and effort required to manage the wide area network.

Nuage Networks SDN solutions are specifically designed to:

Simplify operations for rapid service instantiation	Address changing business requirements with flexible, adaptable services	Support massive scalability and hybrid models with secure, open infrastructure
<ul style="list-style-type: none">■ Define network service requirements in clear, IT-friendly language■ Bring services up using automated, policy-based instantiation of network connectivity■ Dramatically reduce time to service and limit potential for errors	<ul style="list-style-type: none">■ Adapt datacenters and private networks dynamically■ Detect newly created and updated virtual machines within the datacenter and respond automatically by adapting network services according to established policies, instantly making available new applications to all users regardless of location	<ul style="list-style-type: none">■ Benefit from distributed, policy-based approach that allows multiple virtualization platforms to interoperate over a single network■ Optimize the datacenter network and private network by separating service definition from service instantiation

Nuage Networks SDN solution components

Nuage Networks VSP is the first network virtualization platform to address modern datacenter requirements for multi-tenancy, full-featured routing and security at scale. It is a software solution that transforms the physical network into a simple to manage, rack-once and wire-once, vendor-independent IP backplane. As a result, network resources within and across datacenters can be treated as an elastic resource pool of capacity that can be consumed and repurposed on demand.

Nuage Networks VSP integrates seamlessly with wide area business VPN services. It is also particularly effective when deployed with Nuage Networks VNS for a cloud-optimize network that spans the datacenter right out to your remote locations.

NU•ÂHJ: FROM FRENCH, MEANING "CLOUD"

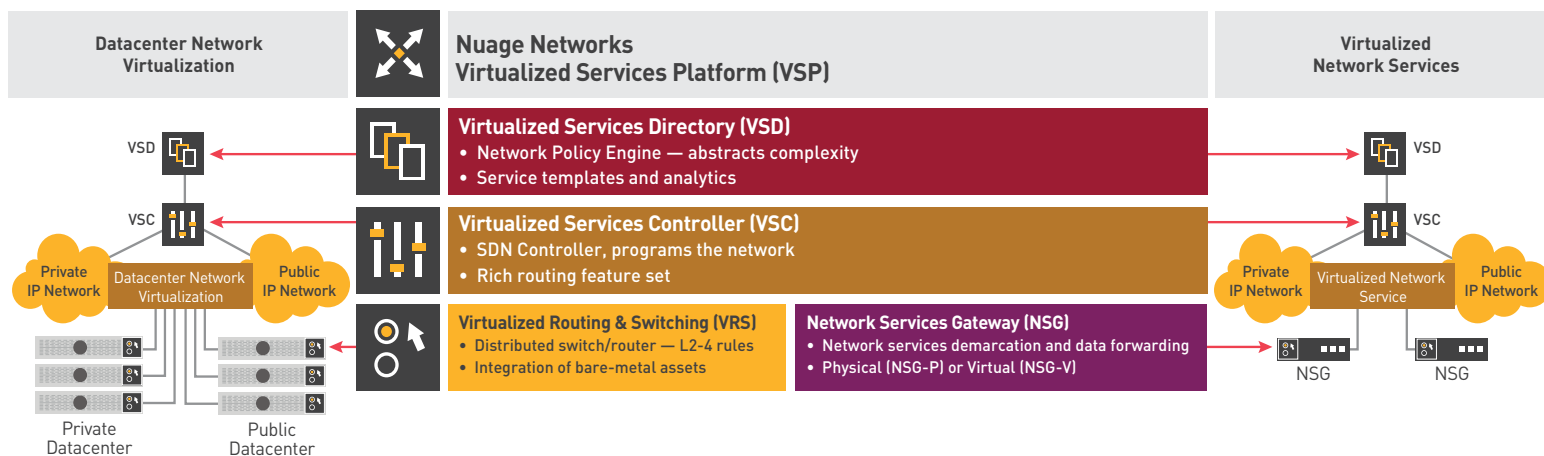
The cloud can be more than what it is. In fact, it needs to be. When we founded Nuage Networks, it was with the idea that it's time for the cloud to come of age. From the beginning we recognized the unique challenges that cloud service providers and large enterprises face delivering and managing large, multi-tenant clouds. While the virtualization of compute and storage has evolved quickly, the network simply has not kept up. The result is that today your cloud is being held back. And so is your business.

When we started Nuage Networks, it was with the mission that we could empower our customers to finally deliver on the true promise of the cloud. We envision a world in which IT and IP are no longer in conflict, but rather work in concert to propel your business and elevate the cloud for every one of your customers. We see a world where innovation isn't hampered by infrastructure, and network resources are as effortlessly consumable as compute and storage.

To make this vision a reality, Nuage Networks brings a unique combination of ground breaking technologies and unmatched networking expertise. This enables us to create solutions that do more than provide incremental improvement. It allows us to introduce radically new thinking and pick up where others have left off, delivering a massively scalable SDN solution that ensures the datacenter and wide area network are able to respond instantly to demand and are boundary-less.

Our mission is to help you harness the full value of the cloud.

Nuage Networks SDN Portfolio



Smarter Networks Propel Smarter Business

Network-as-a-Service is built on SDN and intelligent orchestration, enabling you to get more out of your existing resources without sacrificing quality or security.

BY JEFF DOYLE

Real-time communications are essential to any business, from basic voice to high-definition videoconferencing. Economics have long driven the migration of these services to the IP “cloud,” but, more and more, traditional IP networks are forcing businesses to sacrifice quality of user experience in order to keep capital and operational costs under control. Instead of “throwing bandwidth at the problem,” we need a new, comprehensive approach for supporting real-time communications over IP that allows us to get the most out of existing network resources.

Network-as-a-Service (NaaS) is the solution. The advantages of other “as-a-Service” models, such as Infrastructure-as-a-Service (IaaS) and Software-as-a-Service (SaaS), have been appreciated for some time: Virtualized compute, storage and application resources coupled with intelligent orchestration provide service agility and efficient utility-based cost structures. NaaS takes the same approach to networks by virtualizing physical network resources and then coupling to an orchestration layer that can adapt the network to application demands on the fly.

Software Defined Networking (SDN) is the foundation of NaaS, representing the physical network as an abstract model and then providing a unified, programmable interface to an intelligent orchestration layer. The orchestration layer then acts as an arbiter between the needs of real-time applications and the realities of available network resources.

Google has applied this model for several years. Through intelligent monitoring and control of its inter-data center networks, it has safely driven utilization close to 100%. Comparing this to traditional rules that limit network utilization to around 50%, the rewards are clear.

A Perfect Storm

Sonus CTO Kevin Riley explains the dilemma businesses face with legacy networks: “It’s no longer economically feasible to just arbitrarily

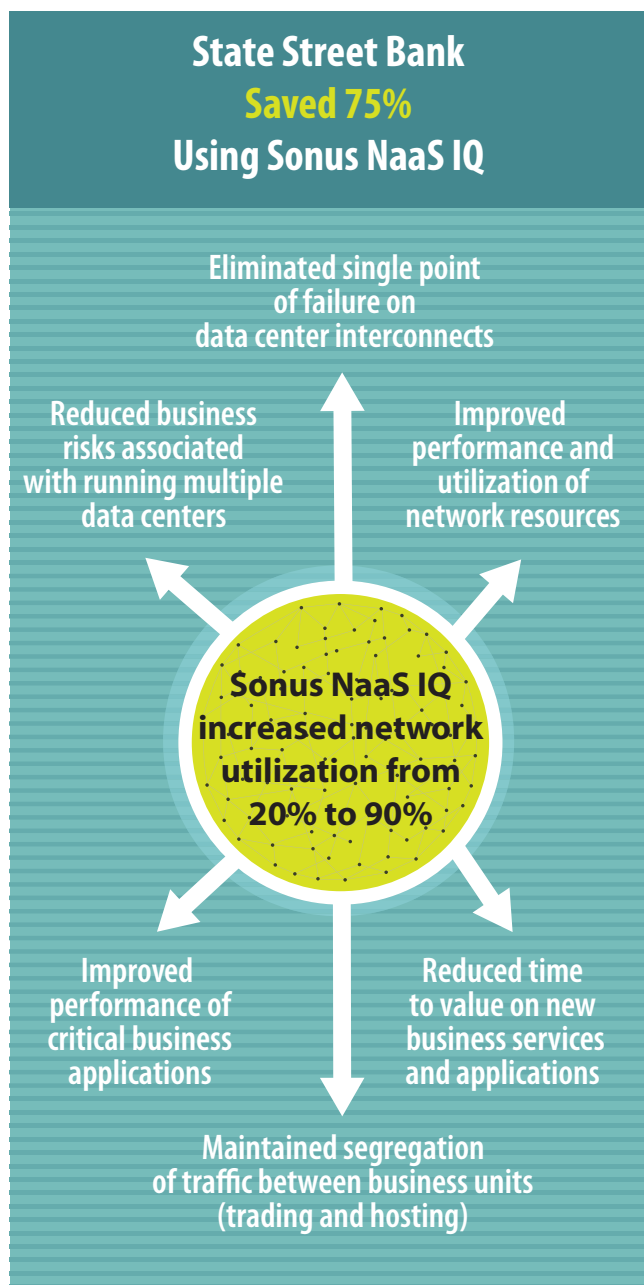
keep adding bandwidth to your network, because the multiplier is too high. For example, if an enterprise has 100 people, a CIO might multiply those 100 people by the cost of a phone call and arrive at a pretty modest number. But if you multiply 100 people by the worst-case needs of a unified communication session, you wind up with a very large number. It starts to become prohibitive.”

Addressing the growing complexity of real-time communications by adding more spectrum, more fiber and more nodes creates what Riley calls a perfect storm of inflated costs and poor return on investment. Expensive physical plants are underutilized, inflexible and difficult to manage.

CIOs must seek technologies that allow them to manage their networks more intelligently and dynamically, defining end-to-end policies that align transport with applications to deliver a high quality of experience within tight operational budgets.

Smarter Networks, Smarter Business

SDN is only a part of the NaaS solution. It provides the abstraction and the programmable interface, but not the intelligence. “It’s like a fancy new car—but without the driver,” says Riley. The orchestration layer sits between the programmable interface and the applications, brokering the demands of the application with the resources of the network. Riley compares the combination to a road system:



SDN's network abstraction is a map of the roadways, indicating the various options for getting from point A to point B, and how fast you can travel on each. Sonus' NaaS IQ Platform is analogous to toll booths around the periphery of the system, evaluating incoming traffic loads and prioritizing admission.

"The application, such as an audio call or a fully immersive video session, starts up with a certain SLA. The orchestration layer understands the needs of the application and translates that into programmable network actions in real time," Riley explains.

The benefits can be extraordinary:


- **Improved Quality of Experience (QoE):** Real-time applications get the resources they need as they need them, which translates directly into a better user perception.
- **Reduced capital expenditure:** You're getting more out of your existing network investment and facing less new build-out. One Sonus customer, State Street Bank, increased its network utilization from 20% to 90%, with no reduction in the quality of experience.
- **Reduced operational expenditure:** SDN's programmable interface puts an end to the days of touching multiple points of the network to manually configure new services. Automation results in fast, reliable and consistent provisioning and management through a single interface.
- **Increased network agility:** New services are rolled out on demand. The result is not only operational savings, but also the capability to adapt to new applications in minutes rather than weeks, sharply improving business responsiveness.
- **Increased network visibility:** SDN allows you to create fine-grained models of application and user behavior. This in turn not only enables better policy and admission control, it provides an inherent level of security. Anomalous behaviors can be identified, analyzed and policed.

Sonus' NaaS IQ is an integration strategy, deploying points of intelligent, secure control around your existing network where it matters to you and to your customers. Your network becomes a part of familiar, proven and efficient cloud-based service and deployment models, and the increased network intelligence enables new levels of business intelligence. ■



"It's no longer economically feasible to just arbitrarily keep adding bandwidth to your network, because the multiplier is too high."

—KEVIN RILEY
SONUS CTO



WHEN NETWORKS GET SMARTER, YOUR BUSINESS GETS SMARTER.

If you're looking to increase the intelligence and security of your network, start with Sonus. Sonus' network control solution enables you to manage your network resources in a dynamic, intelligent way. Define end-to-end policies for business critical applications while providing business continuity. Optimize your network utilization while delivering a high quality of experience.

To learn more about how Sonus can help intelligently orchestrate your network of tomorrow, visit us online at sonus.net or call us at 1-855-GO-SONUS

