WAN Transformation: Real-world Experience and Advice From IT Leaders

IT leaders describe their efforts to modernize the enterprise network and make it more adaptive for quantifiable business outcomes.

These are a few of the benefits cited by senior IT managers and executives when asked how a software-defined, or adaptive networking platform provides value to their companies.

“The further we go with software-defined, [the more] agility [we get],” said the CIO of a $1 billion financial services company. “It definitely gives you better insight into what’s going on in the network, at the edge, and through the applications.”

To understand what’s driving the need to modernize the network infrastructure and become more adaptive and responsive, IDG conducted 10 one-on-one, in-depth interviews in late December 2018 and early January 2019.

In these discussions, the respondents talked about how they have taken different approaches—including a software-defined network (SDN), network functions virtualization (NFV), a software-defined wide-area network (SD-WAN), WAN optimization, network security monitoring, or a combination of these—according to what best suited their business needs and IT environments. This paper distills their experiences, including the benefits and challenges of each adaptive networking technology.

SDN and NFV

Four of the 10 interviewees have deployed SDN and NFV.

Initial business drivers included the need to increase agility, reduce costs, drive business growth, and improve security. And so far, they have achieved a majority of these preliminary goals.

For example, the senior cloud operations manager for a contact center software provider said, “Having virtualized all the network components provided us agility and flexibility across our network in terms of being able to deliver fast and to scale up quickly.”

This IT leader’s KPIs include:

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<th>Agility</th>
<th>Speed</th>
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<tr>
<td>Managed circuits in 1–2 days versus 30 days</td>
<td>Improved network speed by 20%</td>
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<tr>
<td>Reduced costs</td>
<td>Performance</td>
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<tr>
<td>Saved at least 30% by eliminating hardware</td>
<td>Achieved 10%–15% better performance and 5% reduction in latency</td>
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Peer-to-Peer Guidance

IDG respondents who have deployed SD-WAN, WAN optimization, or network security monitoring—or a mix—have offered suggestions for their peers who are exploring these adaptive networking technologies.

- “Make sure that you're monitoring your network before you implement SD-WAN. Then understand at that point what’s the root cause of your issue. Do a thorough study of what’s going on right now. Then you can decide if SD-WAN is really going to be your solution or if it's only going to be for certain use cases for certain sites.” — Biotech company VP of IT operations

- “Reach out to companies [that] have previously installed these products, and see how the installation went, as well as whether they were happy. Did they get the information they were looking for at the end of the implementation?” — Financial services CIO and VP

- “Recognize that it's going to be a complex project. There are certainly a lot of benefits to be gained, but it's not an easy road. Understand that you've got the potential for unexpected outages and that you should do as much exploration through the tools that are provided with the security solutions as you can.” — Healthcare enterprise IT architect

- “I would suggest that companies speak to the vendors and have them give you names of people and companies who have done this and [will] share their experiences. It’s key just to sort of calm your nerves. That makes all the difference in the world when you hear a customer, rather than the vendor, tell you that they did it and it works as advertised.” — Manufacturing director of IT

- “Meet with two or three of the vendors. Don't narrow your search down too quickly. Consider not only technology but also service provider companies that would deliver the service on a subscription basis. Then also look at it with the hosting companies. Talk to them about whether they have a service offering for software-defined networking that you can take advantage of.” — Manufacturing CISO/operations director
The CISO/operations director of a $2 billion manufacturing company summed up the SDN/NFV advantages: “We are so happy with the anticipated benefits—the stability of the environment and the functionality of it. Sometimes when you read the marketing literature and hear about the number of nines availability, you question it. Well, this actually happened!”

In terms of challenges, participants reported the usual hurdles inherent with most technology implementations, such as logistical and administrative obstacles as well as having to weed through vendor solutions to determine the best route. The senior cloud operations manager dealt with some complexity resulting from straddling old and new networks—or, as he put it, having to “coexist in hybrid mode.”

In addition, his company—like others in the IDG research—grappled with a lack of in-house IT talent: “We started this project without an adequate skill set in our networking engineering [team], and we had to expand and hire contractors to help us with this project.”

**SD-WAN**

An SD-WAN is a common starting place in the move toward the adaptive network; it has been deployed by eight of the 10 respondents. Use cases included end-to-end encryption, supporting an omnichannel digital strategy, the Internet of Things (IoT), video and data transfer from remote sites, and hybrid cloud workloads, among others.

“SD-WAN tremendously improved our speed to market,” said the CIO of a $1 billion financial services company. Opening a bank branch previously took six months, due to network connectivity for voice or data. “We can now pop up an office within four weeks.”

**Unexpected benefit:** “The degree of visibility of our new network surprised us. We knew we would achieve better results, but the way we can identify the bottlenecks and have a complete picture and real-time information of where we have problems ... really impressed us.”
In addition, respondents cited improvements to the total cost of ownership (TCO), security, and performance. For example, the VP at a biotech company reported wins in all three of these areas:

**Network performance**
- 95% decrease in jitter
- 89% decrease in latency

**Issue resolution**
- 50% reduction in average time to manage an incident

**Customer satisfaction**
- 25% improvement in quality of communications applications used by customers

**Unexpected benefit:** “Cybersecurity. If I look at our largest causes of network downtime, at least 10% in the past was due to data security breaches. So far, over the last year, we literally haven’t had any.”
Although respondents noted some technical challenges with deployments—such as integration complexities and segmenting network traffic—overwhelmingly they shared obstacles due to lack of in-house expertise and the need to educate the business and IT.

Getting people aligned was a challenge, said the CIO of a financial services company. As he noted, staff members were saying, “You’re always changing things!” This was from my guys, not the business. The business couldn’t care less.”

Another CIO had the flip-side experience: having to demonstrate the value of SD-WAN to the business. “It took a while for them to understand that this technology could actually bring them the results they had initially hoped for,” he said.

In both cases, these challenges can be overcome by working with the right managed services provider (MSP). Look for partners that can support end-to-end infrastructure and connectivity management. Providers that own and operate underlying network elements can support the business with core infrastructure hosting, capacity management, release certification, and upgrades—along with coordinated delivery, integration, and management of connectivity. This eases network transformation and enables the enterprise to grow at its own pace.

**WAN Optimization**

Nine out of the 10 IDG interviewees had chosen to deploy WAN optimization technologies. Each had a different use case—be it to complement SD-WAN, more easily transfer and access data, or support emerging technology implementations such as blockchain and IoT.
Just as numerous as the use cases were the expectations and achievements (see Figure 1).

For some companies, the business drove the decision to implement. For example, the CIO and vice president of a $1 billion investment bank said, “We needed to reduce the latency between requests from the business side to the off-premises data. Also, the ability to act on big data analytics became increasingly important.”

Initially, the bank used a cloud provider for the analytics and storage, but it was struggling with latency and accessibility. The CIO said that responses to indexing requests were taking too long to retrieve—sometimes up to an hour for a response because of queuing issues. “WAN optimization really enhanced that process, and we were able to get responses in less than minutes.”

For other organizations, IT had a heavy role in the deployment decision. “Our network topology drove us to WAN optimization,” said a national healthcare organization’s enterprise IT architect. “It’s a matter of collaboration internally, being able to access data wherever it happens to reside.”

In addition, he cited the need to increasingly shift to the cloud, avoid complexity, and increase security performance.

**Figure 1. WAN Optimization Expectations and Outcomes**

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<tr>
<th>BUSINESS DRIVERS</th>
<th>ACCOMPLISHMENTS</th>
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<tr>
<td>Drive business growth</td>
<td><strong>10-fold increase</strong> in transaction volume for customer-facing platform</td>
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<tr>
<td>Accelerate business innovation</td>
<td>Analytics request queues went from hours to <strong>less than a minute</strong></td>
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<tr>
<td>Shorten time to market</td>
<td>Application response time went from 10–20 seconds to <strong>milliseconds</strong></td>
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<tr>
<td>Reduce costs</td>
<td><strong>More than 50%</strong> on a sustainable basis</td>
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<tr>
<td>Better end user experience</td>
<td><strong>900% faster</strong> download speeds</td>
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<tr>
<th>IT OUTCOME EXPECTATIONS</th>
<th>ACCOMPLISHMENTS</th>
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<tr>
<td><strong>Total cost of ownership</strong></td>
<td><strong>50% savings in bandwidth</strong></td>
</tr>
<tr>
<td><strong>Network speed</strong></td>
<td><strong>80% performance improvements</strong></td>
</tr>
<tr>
<td><strong>Availability</strong></td>
<td><strong>Consistent</strong> five 9s in uptime</td>
</tr>
<tr>
<td><strong>Reliability</strong></td>
<td><strong>10% improvement in packet loss</strong></td>
</tr>
<tr>
<td><strong>Efficiency</strong></td>
<td><strong>7.5% in bandwidth-to-performance improvement</strong></td>
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<tr>
<td><strong>Productivity</strong></td>
<td><strong>Huge reduction</strong> in IT support requests</td>
</tr>
<tr>
<td><strong>Data duplication for disaster recovery</strong></td>
<td>Gained <strong>real-time</strong> replication</td>
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Although the WAN optimization was still early in its implementation, the IT architect said that so far, things had “worked as advertised. I would say I’ve heard little glimmers that things are moving faster. User perception certainly makes a difference."

For the most part, respondents said that WAN optimization deployments went well. However, there were some challenges:

- **Regulations and compliance.** “The biggest challenge is going through the proper certifications from the security perspective, making sure that all of your encryption is properly terminated. It’s just [those] minutiae of governance and oversight. It required more due diligence.” — VP of a financial services company

- **Needing outside help.** One company reported complexity in appliance configuration, another cited costly implementation issues, and yet another is still struggling with the learning curve to bring each application on board. In each of these cases, they’ve turned to professional services to assist with configuration, integration, and implementation.

**Network Security Monitoring**

As companies have shifted into multicloud or hybrid cloud environments, network security monitoring (NSM) has gained traction as a method for better detecting and analyzing potential intrusions. Six of the IDG interviewees said they have deployed this technology to address various aspects of security, such as access control, monitoring, and data protection.

“We had gear that was not capable of doing any sort of security monitoring or security implementation,” said an enterprise IT architect of a healthcare organization. “We wanted to move into things like segmentation, network access control, and things of that nature ... for patient confidentiality and other regulatory reasons.”

Although specific KPIs were difficult to pinpoint, the NSM adopters cited other evidence of success:

- “The defense is certainly better. We can show specific situations where bad actors were attempting to get into the network and were unable to.” — Healthcare enterprise IT architect

- “We did penetration tests with an outside firm trying to get into our network from various points inside and outside of our network, and they were not able to get in.” — CISO of a manufacturing company

- “We can see attempted attacks that we may not have been able to see previously. That gives us some sense of security.” — CIO and VP of a financial services firm

As deployments have progressed, several challenges have bubbled up. For example, the healthcare enterprise IT architect said, “It’s really been the complexity of our setup. We’ve been so careful to not break anything that it’s been extremely slow to get to a point where there’s any sort of meaningful security.”

Another unforeseen challenge has been the sheer volume of data that NSM technology provides. “The logs that come out of these applications are so granular,” said the financial services CIO and VP. “The challenge is interpreting the information to make actionable responses.” His company has subsequently purchased a solution that provides improved data insights.
With all these different strategies and experiences, it can be difficult to know what makes sense for your own organization. For some words of advice from the IDG respondents, see the “Peer-to-Peer Guidance” box.

That said, there is no one right or wrong approach to modernizing the network infrastructure to make it more adaptive and flexible. As seen in the examples above of different use cases, business drivers, and IT expectations, the strategy depends on the enterprise’s operational objectives as well as its existing IT environment.

No matter the approach, the right managed services provider will have experience with network transformation at all levels. Enterprises should seek an MSP that can manage end-to-end connectivity while simplifying implementation, integration, and day-to-day management. The end goals should be greater IT organization visibility, control, and security of its network infrastructure.

“See where you want to go, and you will find technologies that will enable you to go there,” advised the VP of a financial services company. “Once you understand your own profile and road map, then you can start analyzing the options on the market.”

For more information, visit centurylink.com/adaptivenetworking.

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**About CenturyLink**

CenturyLink supports one of the largest Internet networks in the world and is one of the most interconnected data center providers—whether private or public. The company has peering relationships that deliver deep, unrestricted market reach, shortening the distance between the adaptive networking customer and CenturyLink network backbone access in various markets throughout the U.S. as well as the rest of the world.

“We believe fundamentally that if the customer is on the CenturyLink network, we can provide a better performance experience in terms of latency, reduced packet loss, and various other different performance attributes,” says Dave Cooper, vice president, Global Network Architecture at CenturyLink. “We also provide an exceptional customer experience when it comes to support for the network, the infrastructure, and the end-to-end experience.

“Our ability to offer adaptive networking, coupled with our network breadth and the need for a hyperinterconnected cloud ecosystem is where we provide significant value to our enterprise customers,” he says.

For more information, visit centurylink.com/adaptivenetworking.
How to Adopt a Disruptive Network Technology with Minimal Disruption

Emerging network technologies such as SDN, SD-WAN, and intent-based networking promise to improve service and streamline operations.

By John Edwards, Network World | FEBRUARY 27, 2019

Disruptive network technologies are great—at least until they threaten to disrupt essential everyday network services and activities. That’s when it’s time to consider how innovations such as SDN, SD-WAN, intent-based networking (IBN) and network functions virtualization (NFV) can be transitioned into place without losing a beat.

"To be disruptive, some disruption is often involved," says John Smith, CTO and co-founder of LiveAction, a network performance software provider. "The best way to limit this is to use proven technology versus something brand new—you never want to be the test case."

Smith suggests limiting risk by following a crawl, walk and run approach. "Define the use case and solve it while initially limiting the risk exposure to a discrete set of end users for proof of concept testing," he says. "It's always good to ensure that the business case will drive the need for the disruptive networking technology—it helps justify the action."

What to Expect From SD-WANs in 2019

SD-WAN matures, moving out of the early-adopter phase and into the mainstream. That means big changes ahead for the market.

By Zeus Kerravala, Network World | DECEMBER 14, 2018

In network circles, there may be no hotter topic right now than software-defined WAN (SD-WAN). Given WAN technology stood still for the better part of three decades, this makes sense, as most companies have a WAN that's long overdue for a refresh and architectural update — and SD-WANs make this a reality.

SD-WANs are definitely moving out of the early-adopter phase and into mainstream adoption. And anytime a technology does this, the market changes. Below are the primary ways SD-WANs will change in 2019.

Less focus on cost savings

The initial wave of SD-WANs was sold with the promise of slashing network costs by replacing MPLS with broadband. If a business is willing to ditch all of its MPLS, and that's a big if, and replace it wholly with broadband, it will save money on transport. However, it will likely need to add some optimization technologies to account for the unpredictability of broadband.
Is an SD-WAN Managed Service Right for You?

For enterprises considering an SD-WAN solution, one of the key choices will be who will implement and manage it.
By Mark Sheard and Jack Deal, Network World | DECEMBER 06, 2018

For enterprises considering an SD-WAN solution, one of the key choices will be who will implement and manage it. For some enterprises this is a relatively straightforward decision; for others the choice may require more deliberation. In either case, best-practice sourcing dictates that this decision be made up front – to achieve exceptional results, the sourcing strategy, approach and execution following must be tailored to the desired self-managed or fully-managed solution.

A Digital-first Enterprise Needs SD-WAN

As enterprises shift into the age of digital transformation, SD-WAN is increasingly seen as the next generation of networking solutions.
By Kelly Ahuja, Contributor, Network World | JUNE 07, 2018

Since the advent of the internet and IP, networking technology has not seen a seismic shift of this magnitude that is occurring in Enterprise networks today. As organizations move from on-premises application hosting to a cloud-based approach, they are inundated with the inherent challenges of legacy network solutions. The conventional network architectures in most of today’s enterprises were not built to handle the workloads of a cloud-first organization. Moreover, the increasing usage of broadband to connect to multi-cloud-based applications have escalated concerns around application performance, agility, and network security.

Software-defined WAN (SD-WAN) has gained immense traction among CIOs lately. Gartner forecasts that SD-WAN will grow at a 59% compound annual growth rate through 2021 to become a $1.3 billion market. This is because there are a myriad of payoffs of moving to SD-WAN: Primarily, SD-WAN enables easier access to cloud and SaaS based applications for geographically distributed branch offices and a mobile work force. Here are but just a few other important benefits that SD-WAN brings to digital-first organizations:

Enhanced application experience
As organizations expand their cloud and SaaS portfolio, branch locations and remote workers increasingly depend on the internet as the preferred path to cloud-based applications. However, the public internet is a congested and latency-riddled highway. The internet, by itself, is unable to prioritize network traffic, meaning non-work-related internet usage could be consuming the bandwidth necessary for mission critical applications like web-based ERP/CRM or salesforce services.
How to Buy SD-WAN Technology: Key Questions to Consider When Selecting a Supplier

Finding the best SD-WAN fit starts with evaluating branch WAN bandwidth and application requirements.
By Lee Doyle, Principal Analyst, Network World | DECEMBER 03, 2018

Software-defined WAN traffic is exploding, and so is the number of technology providers competing for enterprise SD-WAN customers. Here are some key issues to consider as IT pros investigate SD-WAN deployment options and weigh the importance of features such as application prioritization, multicloud support and integrated network security.

SD-WAN technologies and services are designed to combine multiple physical WAN links into one logical network and provide traffic prioritization to accelerate application performance. Using network abstraction, SD-WAN improves the economics of branch connectivity by enabling organizations to leverage inexpensive circuits, such as the Internet, to address growing bandwidth requirements. SD-WAN is relatively easy to deploy and manage as it maps new services — application prioritization, security, management — on top of existing physical networks.

When evaluating SD-WAN options (there are currently more than 30 providers of SD-WAN technologies and services), it’s important to focus on the business value the technology can bring to an organization. For starters, organizations should review their current and near future requirement for connecting employees (and customers) in remote branch offices to mission-critical applications that reside either in a central data center or in the cloud.

SD-Branch: What It Is and Why You’ll Need It

Branch offices are filling up with specialized networking appliances, but SD-Branch promises to reduce the clutter and save money.
By Lee Doyle, Principal Analyst, Network World | JANUARY 23, 2018

SD-WAN deployments show the power of software-defined networking and virtualization to improve bandwidth efficiency and deliver application performance, and now this software-centric approach is being applied to the unique requirements of branch offices.

Known as SD-Branch, this next step in the evolution of branch technology can be defined as a single hardware platform that supports SD-WAN, routing, integrated security and LAN/Wi-Fi functions that can all be managed centrally.

Why SD-Branch?
The most compelling argument for SD-Branch is operational agility. IT organizations can rapidly deploy and provision a network branch-in-a-box solution for new locations. Via a centralized management console, they can control and adjust all branch network and security functions.