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MANAGED SD-WAN

Delivers a Better Experience for Highly Distributed Organizations

WHITE PAPER

Prepared by

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ABOUT THE AUTHOR

Zeus Kerravala is the founder and principal analyst with ZK Research. Kerravala provides tactical advice and strategic guidance to help his clients in both the current business climate and the long term. He delivers research and insight to the following constituents: end-user IT and network managers; vendors of IT hardware, software and services; and members of the financial community looking to invest in the companies that he covers.

INTRODUCTION: DIGITAL TRANSFORMATION REQUIRES NETWORK TRANSFORMATION

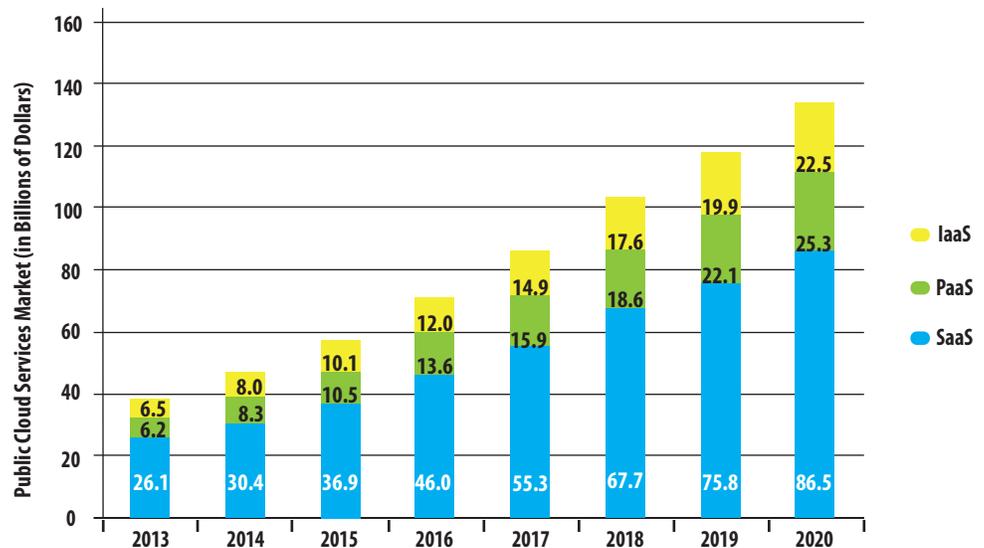
Digitization is reshaping the business landscape across every industry faster than ever before. Organizations that have embraced digitization have quickly become leaders in their respective markets, while those that have not done so find themselves falling behind. ZK Research studies have discovered that digital organizations are 64% more profitable than companies that have not embraced this shift. For this reason, digitization is a top initiative for IT and business leaders.

Like other major shifts before it, the evolution to digital requires new technologies. The last major business transition—the internet era—was fueled by the convergence of low-cost PC computing, the Windows operating system, the creation of the browser and the rise of home broadband.

The digital era will be led by several emerging technologies such as cloud computing, mobility, the Internet of Things (IoT), big data and unified communications. All of these building blocks may seem like unrelated technologies, but they do have a single point of commonality—they are all network centric, meaning the network plays a key role in the success of deployment. For example, cloud services are exploding ([Exhibit 1](#)), but users require a high-quality network to have a good cloud experience.

Businesses have been aggressively transforming their underlying infrastructure to meet the needs of a digital business, but the one area that has yet to evolve is the wide-area network (WAN). Evolving the WAN must now be a top priority for IT and business leaders, as digital success requires a network that is agile, secure and scalable.

Exhibit 1: Cloud Services Are on the Rise



ZK Research 2016 Global Cloud Forecast

Network agility is no longer a “nice to have” but a “need to have.”

SECTION II: SD-WAN IS THE RIGHT NETWORK FOR THE DIGITAL ERA

The current network architecture used to build WANs has been in place for well over 30 years. The traditional “hub and spoke” design was built for the efficient delivery of client/server computing and best-effort internet traffic. During that era, data that moved from the data center to the branches constituted the majority of network traffic. Today, however, cloud, mobile computing and multimedia traffic are the fastest-growing application types, and they drive much different traffic patterns compared to the older compute platforms. The evolving business climate is putting new demands on the WAN that cannot be met because of the following challenges:

Difficulty in reaching the cloud: For distributed organizations, providing efficient cloud access is extremely challenging. Traditional network architectures add a significant amount of latency as internet traffic is passed down a WAN link, possibly through a regional hub, to a main hub and then back again.

Poor use of bandwidth: The redundancy of WAN links is based on an active–passive model, whereby the backup connection only becomes active when the primary link fails. This means businesses are paying for up to twice the amount of bandwidth that they are actually using.

Security and performance are overlay technologies: Securing and optimizing legacy networks is accomplished by layering on additional devices. Having multiple devices creates several overlays, which further increases WAN complexity.

Lack of network agility: The ZK Research 2016 Network Purchase Intention Study revealed that the average time taken to implement a network change is more than six months in large enterprises. Most change-management processes are manual in nature and often require a physical visit as well as the involvement of a highly paid, high-level network engineer.

Network agility is no longer a “nice to have” but a “need to have,” as it’s critical to business success. Organizations must shed their legacy thinking regarding network design and deploy a network that offers a higher level of network agility and security.

A software-defined WAN (SD-WAN) brings the network into the digital era. This highly agile network is defined by business and IT policies through software. The policies are then used to automate the configuration changes, move traffic flows or enact other changes to ensure the network constantly meets the needs of the organization.

In a legacy network, the data-forwarding functions and control plane are resident in each box. This is why configuration changes are often done on a device-by-device basis. With an SD-WAN, the control layer is abstracted above the infrastructure layer. Because the control has been decoupled from the physical layer and runs centrally in software, services can be virtualized and delivered from

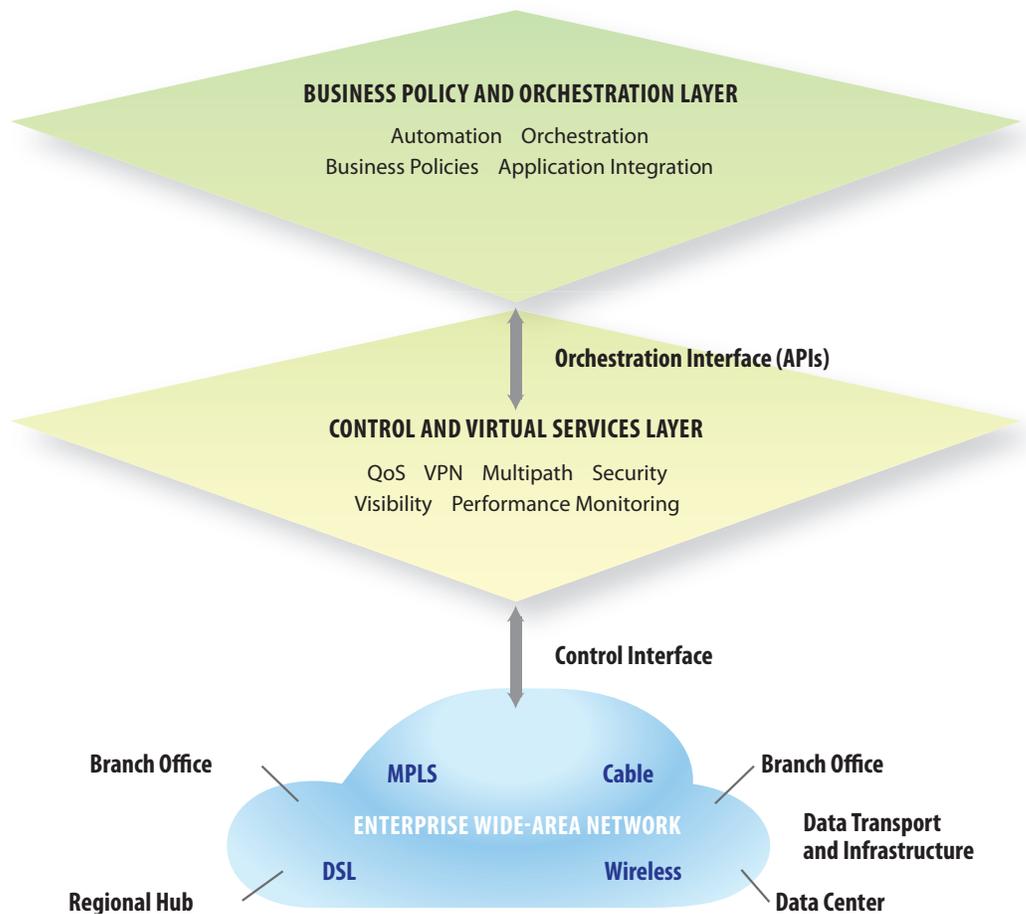
the cloud to any point on the network almost instantly. Above this control, or service delivery, layer resides the service orchestration layer. Here, business applications and policies determine network changes ([Exhibit 2](#)). These changes are communicated to the service layer, enabling administrative tasks to be fully automated.

An SD-WAN has the following key characteristics that make it ideal for today’s business environment:

Built on broadband, which offers significant cost benefits over private IP network services such as MPLS

Enables critical business applications to run over internet connections, which dramatically lowers costs

Exhibit 2: SD-WANs Are Driven by Business Policy



ZK Research, 2017

SD-WANs are highly flexible and offer organizations many choices for deploying and securing the network.

Uses multiple active paths to load balance or prioritize traffic

Implements dynamic meshing that is fully automated by business policy

Optimized for cloud computing, enabling a superior user experience

Delivers integrated application optimization

Provides zero-touch, thin provisioning, removing the requirement for engineers to be on site

The rise of the SD-WAN presents the most significant shift in networking in the past several decades. SD-WANs are highly flexible and offer organizations many choices for deploying and securing the network. A successful SD-WAN deployment is dependent on choosing the right architecture for the business.

SECTION III: HIGHLY DISTRIBUTED ENTERPRISES WILL FACE DEPLOYMENT CHALLENGES WITH SD-WAN

SD-WANs have strong appeal across companies of all sizes. However, deploying an SD-WAN in a highly distributed organization with hundreds of branch offices is significantly more complex than for small or midsized businesses.

One of the fundamental changes from a traditional WAN to an SD-WAN is the use of broadband connections instead of MPLS circuits. Smaller organizations can connect all of their offices with one or two broadband providers, while large organizations may have to use a dozen or more for complete coverage. Also, the same type of broadband may not be available in all areas. Large distributed organizations are burdened with the task of managing a mix of different types of broadband such as DSL, cable, cellular wireless and satellite as well as managing multiple service plans, which could reach into the dozens.

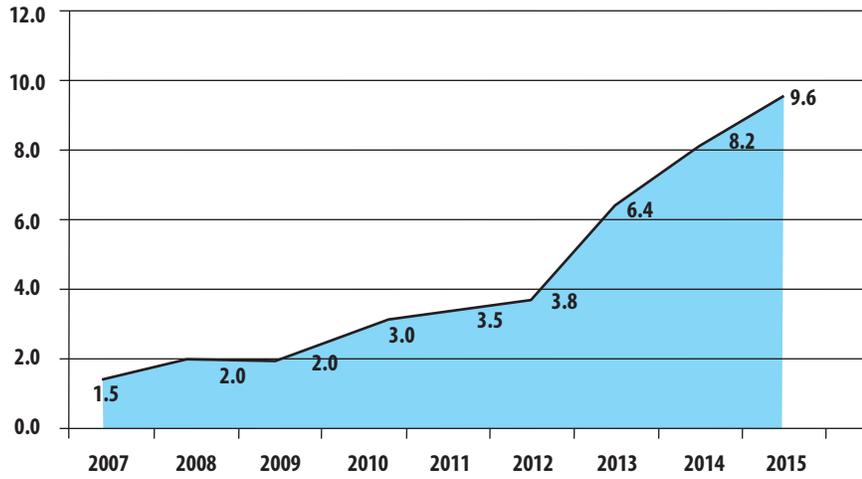
Another challenge unique to large, distributed organizations is the need to support a wide range of service plans that can impact the performance and consistency of applications. This can include upload versus download speeds, quality of service (QoS) and other policies.

For large organizations, overcoming these challenges is critically important in today's digital world as bandwidth needs continue to increase. [Exhibit 3](#) shows data from a study conducted by Hughes Network Systems of its customers with large, distributed networks, illustrating that network speed requirements grew more than sixfold from 2007 to 2015. Creating a dynamic network based on multiple broadband types can be a very complex process, even for the most technically astute organizations.

Exhibit 3: Bandwidth Needs Continue to Explode

Growth in Ordered Throughput

(Download in Mbps)



Median speeds requested by Hughes customers (as of year-end 2015)

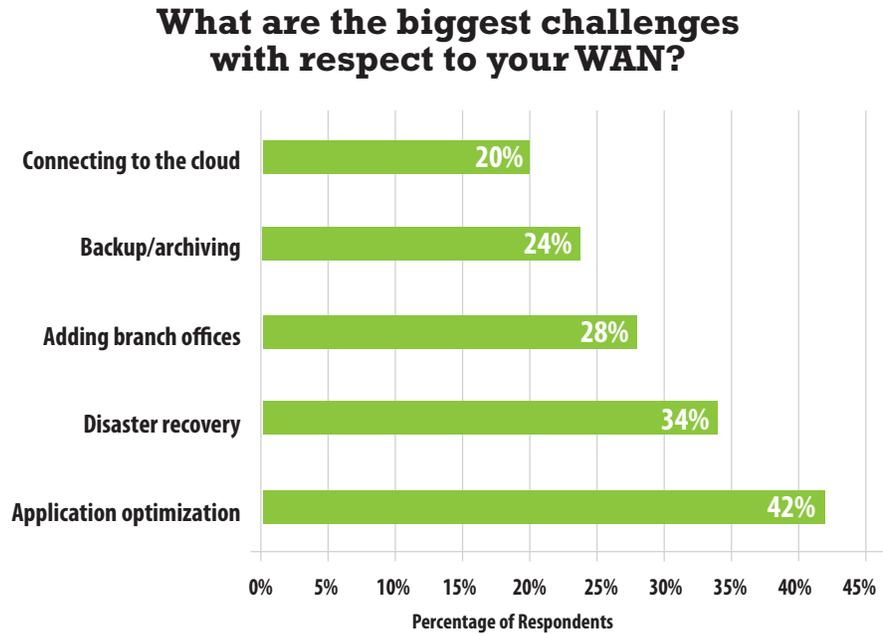
Hughes Network Systems

Another unique issue for large, distributed organizations is deploying the infrastructure in branch offices. Although most SD-WAN solutions promise to be “zero touch,” strong engineering skills are required. Large enterprises often underestimate the time and knowledge needed to integrate the legacy network with the SD-WAN overlay, as setting up application policies that work across the network can be highly complicated. The process of deploying an SD-WAN involves a proof of concept, validation in a lab, and then testing and implementation in production locations—meaning a significant amount of work must be done before the zero-touch infrastructure can be installed. One example of this is getting the SD-WAN routing to interoperate with the existing branch schema to support the routing capabilities of the overlay network. Once the network is installed, there is typically a period of tweaking and tuning that can last a month or more.

One last layer of complexity for large, distributed organizations is ensuring high-quality application performance. Each network type (e.g., DSL, Ethernet, satellite) has different characteristics and bandwidth limits, making it difficult to have applications perform consistently in every location. In fact, optimizing the application experience is the biggest challenge with respect to the WAN, according to the ZK Research 2016 Network Purchase Intention Study ([Exhibit 4](#)), underscoring the difficulty in solving this problem.

Highly distributed organizations need a solution that can deliver all the benefits of an SD-WAN without the complexity associated with managing large-scale deployments. A managed SD-WAN service can deliver this for companies of all sizes.

Exhibit 4: Application Optimization Is the Top WAN Challenge



ZK Research 2016 Network Purchase Intention Study

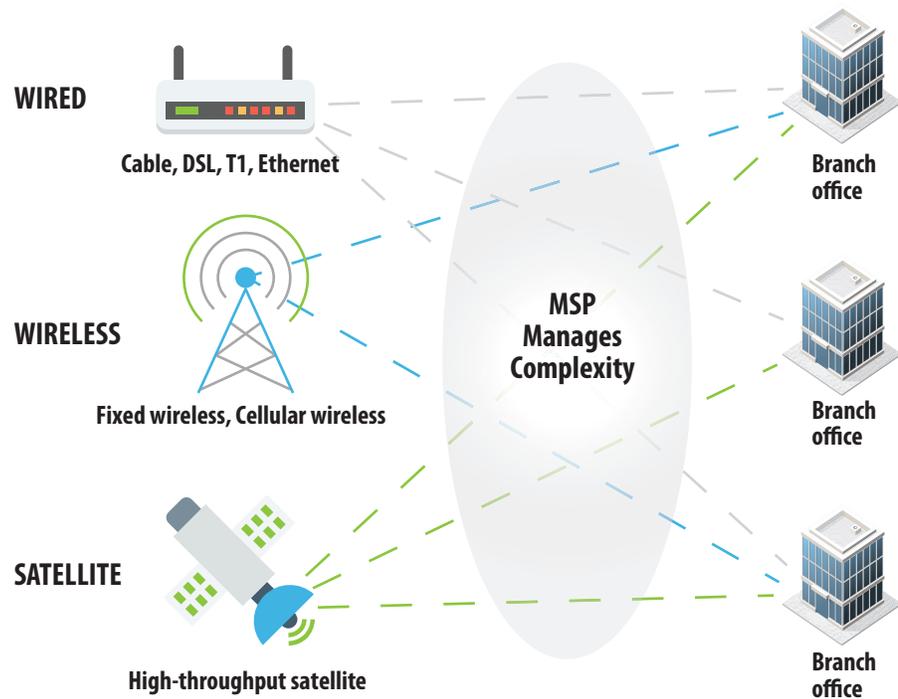
SECTION IV: MANAGED SERVICES ENABLE SCALABLE SD-WANS

A managed service provider (MSP) delivers IT-related services and manages and assumes responsibility for a defined set of services to businesses. With SD-WANs, a complete MSP would offer end-to-end management of the wide-area network, which includes the infrastructure and transport services. This can greatly simplify the job of network operations and enable staff to focus on tasks that are core to the organization. Rather than managing broadband contracts or tweaking or tuning the network settings, network engineers can focus on digital initiatives such as planning where the business can expand or planning the next network upgrade.

One of the most significant benefits will come from reducing the time it takes to manage the large number of network operators that highly distributed organizations need to connect all of their locations (Exhibit 5). Although there are only a handful of different network transport options, each type of service can have dozens of choices. For example, a nationwide business may have to deal with Verizon, AT&T, CenturyLink, Frontier, Comcast, Time Warner and more for just wireline connectivity. Adding to the complexity is the fact that all locations will require secondary connections as a backup, and some may even choose a third.

The MSP can help businesses choose the best network transport as well as the best provider on a per-site basis. This ensures both the spending and the performance are optimized for what the business needs. The key to a successful relationship with an MSP is ensuring it offers all the services

Exhibit 5: Managed Services Simplify Network Operations



ZK Research, 2017

required to run the entire network. Below are the key criteria to consider when choosing a managed service provider:

Strong security capabilities: The number of high-profile breaches continues to grow every year, and branches are often the focal point for hackers because they do not have the same level of security as company headquarters or data centers. The MSP should use state-of-the-art security technology complemented with strong security skills.

Management of all types of WAN transport services: When it comes to network transport, there is no “best” solution, as each branch has different requirements. The MSP should offer the following as part of its portfolio:

- o T1 connections
- o DSL
- o Cable
- o Ethernet
- o Cellular wireless
- o Fixed wireless
- o High-throughput satellite

The portal is the customer “lens” into the MSP.

Application optimization features: These will ensure excellent performance of all types of applications over broadband connections. The MSP should integrate the following technologies into its service:

- o Quality of service to control bandwidth and optimize real-time applications such as voice and video
- o Compression to increase the virtual capacity to branch sites and optimize non-real-time applications such as email
- o Application classification to improve cloud application performance

Dynamic path selection: This feature effectively bonds multiple broadband connections together to create a single, larger virtual connection. This is one of the keys to delivering performance over broadband that is on par with or better than traditional IP services such as MPLS.

Integrated service delivery processes across the life cycle: The MSP needs to take responsibility of network operations across the entire life cycle, including design and test, proof-of-concept validation, installation, configuration, operations, field services, customer care and centralized billing.

Management of the internal network: The MSP should offer services that manage the wired LAN and wireless access points for WiFi access. It's important to note that managing the LAN requires both internal and external services. For example, the WiFi network should support guest networks with a customized splash page for login. Also, the MSP should provide customer service directly to the end users who are utilizing the network.

Robust user portal: The portal is the customer “lens” into the MSP. It should offer both a web-based and a mobile version that lets customers view the following:

- o Site installation
- o Maintenance tracking
- o Network operations
- o Installation specifications, reports and technical documentation
- o Network monitoring of all transport types and services
- o Proactive alerts and trouble ticketing
- o Fault and performance management
- o Utilization and capacity planning

Granular problem-resolution capabilities: The MSP can offer a range of problem-resolution levels to complement what is found on the portal, such as proactive remediation when circuits

are down or degraded. This isn't the norm with respect to MSPs but can greatly reduce un-planned downtime and improve application performance.

Nationwide technicians: While many networking tasks can be done remotely, there is still a requirement for local “feet on the street.” For example, local engineers are required for broadband termination, complex installations, service cutovers, validation of installation and other issues that require a physical presence. Branches rarely have the time or staff to deal with these issues, so the MSP must have nationwide engineers who can.

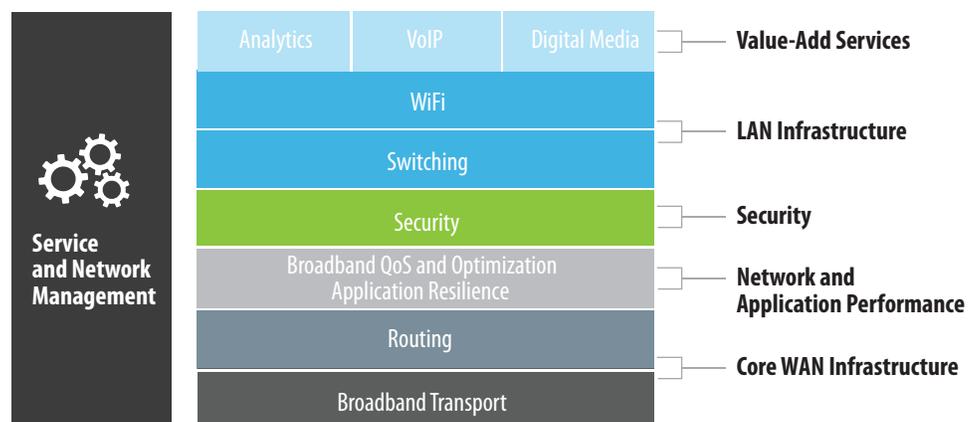
Other value-added services: The network operations are the “basics.” It's important that the MSP offer several value-added services such as VoIP services, analytics and digital media.

All of the above services are what ZK Research considers integral to an MSP being able to call itself a “full stack” provider (Exhibit 6). The right MSP will enable a large distributed organization to aggressively transition to an SD-WAN while minimizing the typical risks.

SECTION V: CONCLUSION AND RECOMMENDATIONS

The digital era has arrived, and it's transformed almost every part of IT. If businesses are to maximize their investments in digital technologies such as IoT, cloud and mobility, it's time for them to transform the network. In particular, the architecture and technologies used to build a wide-area network haven't changed in more than 30 years, which is holding back digital businesses.

Exhibit 6: The Full Stack for an MSP



ZK Research, 2017

A software-defined WAN brings a higher level of agility to the network, enabling it to keep pace with business demands. Also, broadband performance has increased to the point where, when combined with the right network technologies, it is a viable replacement for legacy services such as MPLS. In fact, when multiple broadband connections are used, broadband can deliver performance that is equivalent to or better than that of MPLS.

However, for large, highly distributed organizations, the complexity of running dozens or more broadband connections composed of many distinct transport types, combined with the challenges of managing the network and security infrastructure, can be overwhelming and minimize the TCO benefits of an SD-WAN. Companies that are looking to leverage the benefits of an SD-WAN and focus on their core competencies while minimizing the risk of deployment should consider a managed SD-WAN service. To help businesses get started along this path, ZK Research makes the following recommendations:

Choose a managed SD-WAN provider that is transport and carrier agnostic. Many MSPs want to keep customers on their own network instead of providing them with the best possible options. An MSP that is transport and carrier agnostic will have the broadest range of transport services available.

Ensure the MSP offers a full-stack solution. Although the WAN should be the focus, the MSP should complement it with security, LAN, guest, and network and application performance services.

Evaluate MSPs on the quality of their portal. The portal is the customer lens into the MSP. A poor portal effectively renders the customer blind to how the network is performing and when problems will be resolved. Therefore, businesses should spend significant time ensuring the portal meets all of their customers' needs.

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