



The Role of a High-performance WAN in the Enterprise Digital Transformation Journey

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INTRODUCTION

Businesses are undergoing digital transformation. Public and private cloud services, unified communications and collaboration solutions, network and application security, big data and analytics, mobility and Internet of Things (IoT) are some of the technology trends that are top-of-mind for IT decision-makers. However, most often, in the rush to adopt new technology trends they overlook an essential infrastructure foundation: the enterprise wide area network (WAN).

The WAN is critical because the digital future is location-agnostic and cloud-centric, requiring agile, secure and flexible network connectivity to support enterprise applications. The WAN is the underlying network architecture that enables and facilitates smooth functioning of every technology within your organization; if connectivity fails, then all applications fail, derailing your digital transformation investments.

In this paper, we examine three key WAN technologies you should implement as a foundation for your digital business. First, we present a detailed analysis of how your organization can benefit from reliable Ethernet technology. We also examine the role of the high-performance WAN in cloud connectivity and the impact of the software-defined WAN in your digital transformation journey.



LAYING THE FOUNDATION WITH ETHERNET-BASED WAN

As a network decision-maker, you have multiple choices when it comes to WAN technologies. Compared with traditional WAN technologies, Ethernet services offer some compelling benefits to run your critical business applications.

Increased Bandwidth Flexibility

Traditional time-division multiplexing (TDM)-based services offered no flexibility in terms of bandwidth scalability. For example, if a business needs bandwidth capacity beyond the 1.5 Mbps offered by T1 links, the next option is to either deploy additional T1 links or upgrade to a T3 link offering 45 Mbps speeds. Both options are expensive, and any unused bandwidth goes to waste. In contrast, switched Ethernet services offer much-needed flexibility to scale bandwidth capacity with greater granularity (for example, in 10 Mbps increments on a 1 Gbps port).

“ The ability to converge applications on a single port eliminates the complexity that comes with traditional networks in terms of deploying and managing separate links for each application. ”

Furthermore, because of their packet-based architecture, Ethernet services support service multiplexing, which means your organization can procure a single Ethernet port and carve out multiple Ethernet virtual circuits (EVC) to run various applications. For example, you can buy a single 100 Mbps port and create three EVCs on it—a 20 Mbps EVC for data, a 30 Mbps EVC for internet and a 50 Mbps EVC for voice/video. The ability to converge applications on a single port eliminates the complexity that comes with traditional networks in terms of deploying and managing separate links for each application.

Predictable Network and Application Performance

Ethernet services support traffic prioritization, making it possible for network administrators to achieve optimal end-to-end quality of service (QoS) for different types of traffic. The network performance guarantees are based on various class of service (CoS) options supported by Ethernet service providers. For example, you can ensure the highest level of CoS is utilized for your organization's VoIP or video traffic that is latency-sensitive and apply the lowest level of CoS for web browsing traffic.¹ Additionally, Ethernet services are standardized based on Metro Ethernet Forum (MEF) specifications, which means your organization is assured of consistent service delivery and management across global locations.

¹ Some Ethernet service providers offer a single, but the highest, CoS with their Ethernet services, which ensures the highest level of QoS for all types of traffic.

Superior WAN Management Features

Carrier Ethernet service is a completely private, Layer 2 WAN service that allows your network administrators to retain control over routing. This is distinctively different from other WAN solutions, where the service provider manages the routing and retains full control over the WAN. Leading Ethernet providers offer deep visibility into network and application performance through a self-service customer portal, enabling your network administrators to monitor and manage the WAN efficiently. The portal provides insights into network performance metrics (e.g., latency, jitter, packet loss, availability and frame loss), ability to log trouble tickets online (as opposed to calling customer support) and check status of requests. In a recent Frost & Sullivan WAN survey, 86% of the network decision-makers indicated “self-service portals with customer reporting tools” as a key service feature they look for while making Ethernet purchase decisions.

Private and Secure Cloud Connectivity

As businesses move to the cloud, they are challenged by inadequate network connectivity; in a recent Frost & Sullivan survey, 72% of IT decision-makers said network unreliability is a top constraint to their cloud strategy. For many businesses, inadequate network connectivity introduces risk to cloud deployments. Internet links are the dominant method of connectivity to the cloud today. While widely available and inexpensive to deploy, the internet offers best-effort links with no performance guarantees. As your enterprise applications increasingly migrate to the cloud, it is simply not enough to rely on a best-effort link. To ensure cloud-based enterprise applications are always available to your business users, it is critical for your organization to seek the performance and security of private networks to connect to the cloud. Private network services, such as Ethernet services, offer relief from the uncertainty of the public internet, assuring enterprises of secure, reliable transport to the cloud center.²



² Frost & Sullivan defines hybrid cloud as any combination of cloud, hosting and private data center resources that are managed and controlled as a single pool of resources to run a workload. In a hybrid cloud, workloads generally can operate seamlessly across environments; for example, applications may burst across environments or workload components may be hosted in different environments.

HIGH-PERFORMANCE WAN AS AN ENABLER FOR CLOUD CONNECTIVITY

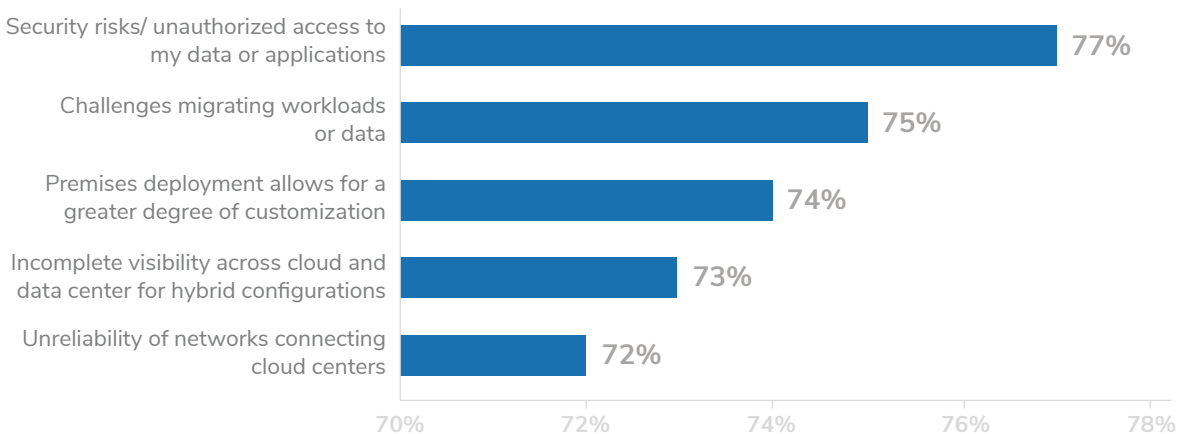
While best-effort internet links have been the primary choice for cloud connectivity due to their ubiquitous availability and lower costs, several factors are driving enterprises to turn to private, high-performance WAN connectivity to the cloud.

Support Hybrid and Multi-cloud Strategy

In our recent cloud survey, 80% of respondents agreed with the statement, “A cloud strategy is essential to remaining competitive in our industry,” indicating that the decision to deploy cloud-based technologies is likely to be made in the context of a broader strategic vision. As IT and line-of-business managers seek to optimize the use of technology to support business objectives, such as market responsiveness, customer satisfaction and market growth, the cloud offers a model and foundation for embracing technology services such as unified collaboration, big data and analytics, mobility and Internet of Things (IoT).

The 2019 Frost & Sullivan Cloud Survey results indicate that nearly 60% of businesses worldwide are using public cloud Infrastructure as a Service (IaaS), and 37% are currently using hybrid cloud. Businesses use an average of 4.5 deployment models for their workloads, including premises-based servers, managed services and cloud. They also use, on average, 2.2 public cloud providers. The use of multiple environments reflects a business’s decision to implement a flexible, hybrid, multi-cloud strategy. As your organization evaluates a hybrid cloud strategy, private network services such as Ethernet can provide reliable, optimized and secure connectivity to cloud-based applications seamlessly and efficiently for distributed stakeholders (employees, suppliers and partners).

Figure 1: Top-rated Business Restraints for Cloud



Source: Frost & Sullivan Cloud Survey

Address Concerns Regarding Security and Performance

Despite cloud adoption rates growing every year and hybrid cloud deployments becoming an integral part of enterprise IT strategy, concerns regarding data security and unauthorized access persist. Figure 1 shows the top reasons enterprises chose not to deploy a workload in the cloud, as indicated by 2019 cloud survey respondents.

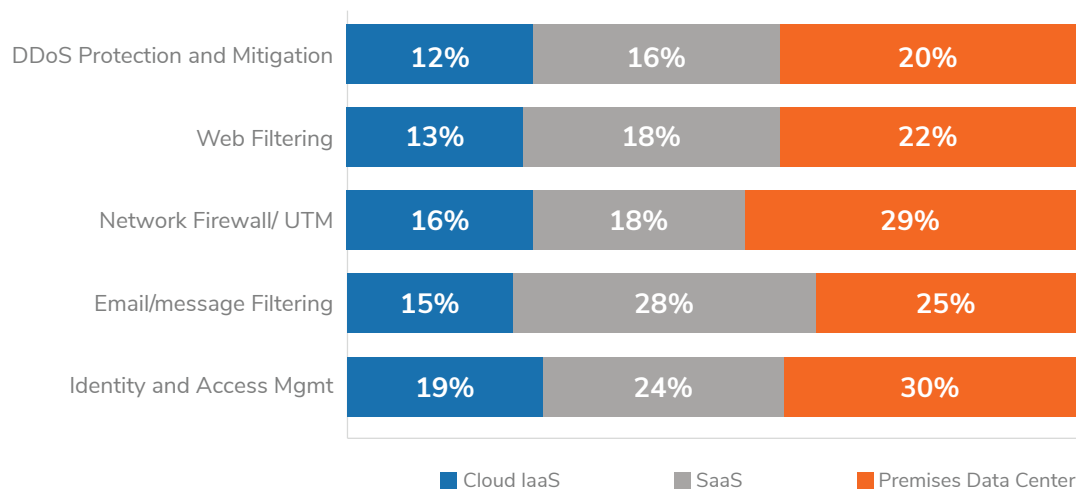
While cloud service providers are addressing data security concerns by incorporating core or optional security elements in their offerings, secure private connectivity such as Ethernet can help your organization take advantage of the security features already embedded in private WANs, minimizing the risks of distributed denial of service (DDoS) or other threats presented in the public internet.

In the same survey, 72% of the respondents indicated “unreliability of networks connecting cloud data centers” as a restraint to cloud adoption. Best-effort internet links to connect your users to the cloud are just not enough as hybrid cloud deployments become the norm. Internet links may not offer any performance guarantees and are prone to security risks, which can cripple your users’ ability to access key cloud-based applications. Hence, you need private and secure WAN connections that can deliver the reliability and performance your business is looking for while connecting to the cloud.

Embrace Cloud-based Security Services

Businesses are increasingly willing to deploy security software (like any other software) in a cloud environment. Figure 2 shows the primary deployment models for security applications. Between 12%-19% of respondents in our cloud survey deploy some form of security in an IaaS environment, with another 16%-24%, depending on functionality, utilizing Software as a Service (SaaS) applications. The relatively high use of “premises data centers” (20%-30%, depending on functionality) can be attributed to security appliances that have dominated the industry and continued concerns over application security in the cloud. Network and application security ranks as a top priority for enterprises surveyed by Frost & Sullivan. If your organization chooses to deploy security solutions in the cloud, private WAN connectivity services can ensure reliable and secure access to the cloud.

Figure 2: Primary Deployment Models for Security Applications



Source: Frost & Sullivan Cloud Survey

THE EMERGENCE OF SD-WAN AND ITS IMPACT ON YOUR ORGANIZATION'S DIGITAL TRANSFORMATION INITIATIVES

While cloud computing has provided much-needed agility and flexibility for enterprise IT deployments, the enterprise WAN has remained static for decades. SD-WAN technology changes that by bringing programmability to the WAN. The following are the key reasons why your organization should consider an SD-WAN solution.

Fast Deployment of Branch Sites

Deploying and managing branch sites can be time-consuming and complex for large distributed enterprises. A majority of businesses have a hybrid WAN in place today, wherein they may use private links (T1/T3, SONET, MPLS or Ethernet) to connect critical locations and internet-based VPNs to connect less-critical branch sites, generally to a headquarters location. However, the current hybrid WAN architecture is static in nature—any changes to the network could involve truck rolls and require a network engineer to make the changes, which is time-consuming and expensive. With SD-WAN, your company's branch sites can be up and running in hours as the SD-WAN equipment is a plug-and-play device that any non-technical, on-site personnel can configure. The site can quickly be brought online using a readily available wireless LTE broadband service while waiting for a network service provider to provision wired private network services (such as Ethernet or MPLS).

“ Real-time monitoring of network services ensures that any deviations from policy parameters defined by your network administrators related to availability (sufficient bandwidth) and reliability (latency, jitter and packet loss) are sensed before they affect end users and traffic is routed to a different network service.

Improved Application Performance

With SD-WAN solutions, transport routing changes occur in real time, as the software-based control plane is separate from the data plane. The software-based architecture control provides unprecedented control and flexibility to your network administrators to define network policies, centrally, and populate them to branch devices. The SD-WAN software abstracts, pools and assigns the underlying transport infrastructure to applications based on pre-defined policies. Real-time monitoring of network services ensures that any deviations from policy parameters defined by your network administrators related to availability (sufficient bandwidth) and reliability (latency, jitter and packet loss) are sensed before they affect end users and traffic is routed to a different network service.

Cost Savings

SD-WANs can save significant network costs by making use of cost-efficient public internet or wireless links with private networks. It is typical of businesses to use dual links with a primary and backup to ensure business continuity. Usually, the backup link is underutilized, even though businesses pay for it. With SD-WAN, your organization can use dual links (dual MPLS or dual internet, or MPLS or Ethernet with internet/wireless as backup) in active-active mode to better utilize available bandwidth and reduce WAN costs. For example, if you have an Ethernet primary link with an internet or wireless link as backup, bandwidth on both links is abstracted into the overlay network to ensure efficient use of underlying links.

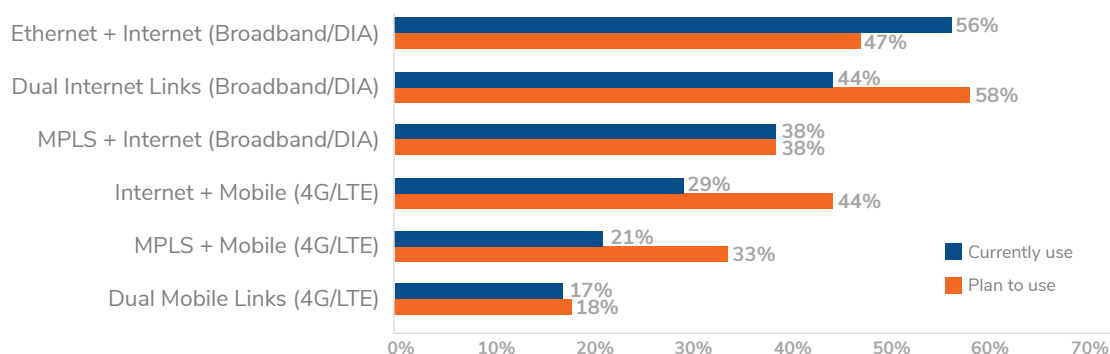
In addition, the ease of deployment and centralized control eliminates the need for a network engineer at every location, resulting in lower network management costs. The ability to centrally control and manage several edge devices can be immensely valuable to your network administrators and offer significant savings, especially if your organization has highly distributed branch sites.

Ethernet and SD-WAN

An SD-WAN solution reduces businesses' reliance on private-only WAN and enables hybrid WAN deployments that make the best use of public links (such as internet/wireless/satellite links that are affordable and widely available) and private links (MPLS/Ethernet links that are private and reliable). However, Frost & Sullivan SD-WAN survey results indicate that enterprises continue to value the role of private links in their SD-WAN deployments.

As shown in Figure 3, Ethernet and internet (56%) and dual internet links (44%) are the most widely used network services combinations deployed with SD-WAN. However, a significantly higher percentage of respondents that plan to deploy SD-WAN in the next 12-24 months indicate they "plan to use" dual internet links (58%), followed by Ethernet and internet (47%) and internet and mobile links (44%).

Figure 3: Network Service Choices With Current and Planned SD-WAN Deployment



Source: Frost & Sullivan Enterprise SD-WAN Survey

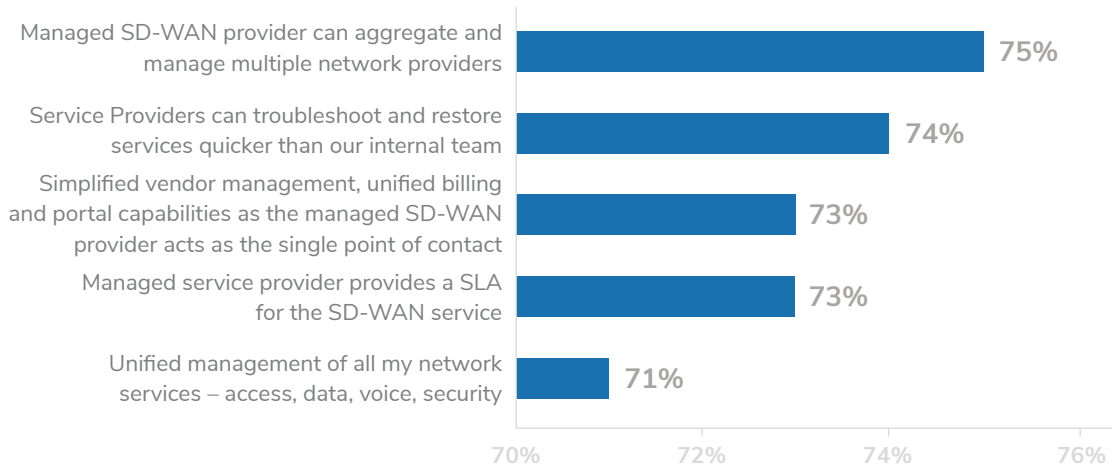
Frost & Sullivan believes that most enterprises will retain highly reliable and high-performance private links at some of their core sites (while replacing them with internet/mobile links at less mission-critical sites) and augment them with high-speed broadband links while embracing SD-WAN.

The Value of Managed SD-WAN

As your organization looks to deploy an SD-WAN, working with a managed SD-WAN provider can fast-track your journey. This is because WAN management is a complex process, and for effective operation and management of a distributed WAN, you need to have expert network managers on staff. The process can be daunting and time-consuming when it involves multiple transport and access providers from across the globe.

With managed SD-WAN service, the service provider installs and manages the edge devices, procures and manages access links from multiple network service providers (NSPs), and manages the day-to-day network management aspects of the solution. As depicted in Figure 4, IT decision-makers in our Enterprise SD-WAN Survey value the managed SD-WAN provider’s expertise to integrate disparate operations and management systems across various access providers and ability to present a unified view for enterprise network teams. In the same survey, over 50% of the respondents indicated their preference for buying a fully managed SD-WAN service.

Figure 4: Reasons Compelling Businesses to Buy Managed SD-WAN



Source: Frost & Sullivan Enterprise SD-WAN Survey

CONCLUSION

The importance of enterprise WAN in the digital era cannot be emphasized enough. As your organization embraces hybrid cloud and multi-cloud deployments, the WAN needs to be agile and deliver the performance and security demanded by distributed applications. High-performance WAN such as Ethernet services combined with SD-WAN technology can help future-proof your technology investments. Furthermore, working with a managed WAN provider that can support existing and new technology trends can fast-track your organization's digital transformation journey.

To learn more about Spectrum Enterprise managed WAN solutions, please visit: <https://enterprise.spectrum.com/services/network.html>.



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