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Digital Businesses Need to Rethink Their

NETWORK STRATEGIES

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 MANDATES NETWORK EVOLUTION

ZK Research defines digital transformation as the application of new technologies to create new business services and processes by leveraging the convergence of people, processes and networked things. Digital innovation involves companies transforming business operations to generate more revenue, lower costs and achieve unprecedented levels of efficiency to gain a sustainable competitive advantage in their markets.

Historically, achieving a position of market leadership was based on having the best products, the lowest prices or the smartest people. However, in the digital era, this is no longer the case. Today, sustained market leadership is predicated on an organization's ability to recognize shifts in the business landscape and adapt faster than the competition. Businesses that can respond to new market dynamics quickly will lead their industries; those that cannot will struggle to survive, and many will disappear completely.

The rapid changes in the market are yielding a harsh reality for today's business and IT leaders. Digitization has altered and will continue to change the landscape in every industry. Organizations must be willing to be highly agile and disrupt themselves before they are disrupted.

However, being an agile business has its challenges, as it requires a dynamic IT foundation. But organizations are becoming more distributed, making the network significantly more complex. Businesses that want to move faster and leverage the full potential of digital transformation must evolve not only their network, but also how it is managed.

The evolution to a digital organization will also affect the performance of applications. The more agile and distributed businesses become, the more difficult applications are to optimize. Technology leaders need to rethink their network strategies, particularly the wide-area network (WAN), to meet the new demands of digital environments.

Historically, the network has not been considered a strategic IT asset. But in the digital era, this way of thinking must change. At its most basic level, the network plays a critical role in connecting all of a business's important assets, enabling it to make the shift to a digital organization. However, the network is also what will enable IT resources to be orchestrated in real time as a live system. But it simply cannot fulfill this function while it is bound by hardware and hard-coded. The network must become more cloudlike, with the ability to easily deliver dynamic and rich digital services. This means shifting away from the old approaches that require management and configuration of individual boxes to an approach that is software-defined, based on policy and orchestration. It's time for the network to change.

SECTION II: UNDERSTANDING THE CHALLENGES OF TRADITIONAL NETWORKS

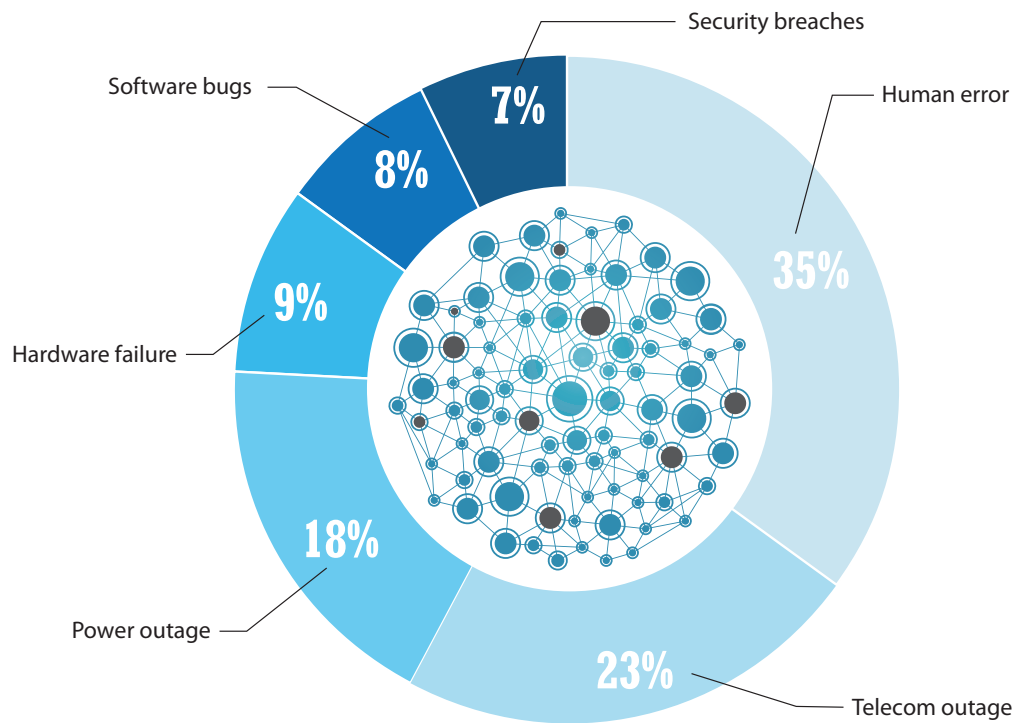
The WAN architecture that most businesses use was implemented decades ago for the delivery of client/server and best-effort internet traffic. Cloud, mobility, unified communications and the

Internet of Things (IoT) are now the fastest-growing application types, and they drive significantly different traffic patterns compared to a decade ago. The evolving business environment is putting new demands on the WAN that cannot be met with traditional architectures because of the following challenges:

Slow network operations: Legacy WANs are typically managed on a box-by-box basis, relying heavily on manual processes. This results in long lead times when making changes to network operations. The ZK Research 2016 Network Purchase Intention Study found that the average time taken to make network changes is more than four months, which is far too slow for digital organizations. Also, the manual, device-centric nature of network management makes any kind of real-time orchestration impossible.

Unnecessary network outages: The manual nature of the network configuration management process is one reason why human error is the largest cause of downtime ([Exhibit 1](#)). Today, 35% of downtime is attributed to human error, meaning businesses could significantly improve network availability by eliminating this cause.

Exhibit 1: Human Error Is the Main Cause of Network Downtime



ZK Research 2016 Network Purchase Intention Study

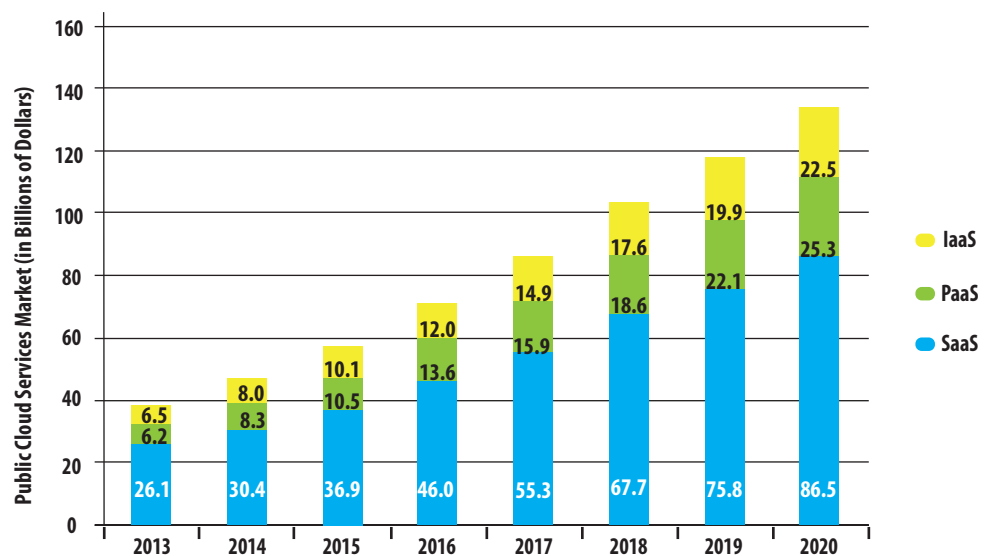
High-level engineers required to make even simple changes: Managing network infrastructure requires the involvement of highly skilled, technical engineers. Network engineers must understand how to configure from a command line interface (CLI) and be familiar with IP address schemes, media access control (MAC) addresses, access control lists (ACLs) and other network parameters. This is the primary reason why even the smallest network changes must be made by high-level engineers, which is a poor use of company resources.

Inefficient use of bandwidth: Most legacy networks use an “active–passive” architecture where the primary connection carries all the traffic, and the backup link only becomes active when the primary fails. With this model, organizations are paying for bandwidth that rarely gets used.

Changing traffic patterns: Historically, network traffic patterns were predictable and orderly, as the majority of traffic traveled from branch offices to the data center. Today, the following trends are causing WAN traffic to become more chaotic and unpredictable:

- o **Cloud applications and services:** The cloud uses the internet for transport, making it very difficult for businesses to monitor and control. From 2013 to 2020, the cloud will grow sixfold (Exhibit 2), at a CAGR of 18%, and this growth will drive massive amounts of business traffic toward cloud services.

Exhibit 2: Cloud Growth Is Changing the Enterprise WAN



ZK Research 2016 Global Cloud Forecast

Businesses are becoming more dynamic and distributed, shifting the network from a tactical resource to a strategic one that is able to create a competitive advantage.

- o **Video applications:** The use of both real-time and recorded video is exploding. The ZK Research 2016 Unified Communication Survey found that 83% of businesses now use video conferencing at least once per day. The ubiquity of video use, coupled with the continual increases in its fidelity, is driving an insatiable demand for bandwidth to each and every business location.
- o **Encrypted traffic:** In an effort to secure data, more network traffic is being encrypted. In fact, the ZK Research 2016 Security Survey found that 74% of internet traffic is now encrypted. And although encryption is a necessary part of an organization's security strategy, it makes traffic much more difficult to inspect and manage.
- o **Business use of broadband:** Just a few years ago, most organizations would not consider using broadband for business connectivity, as broadband was perceived to be unreliable and consumer grade. But during the past few years, many businesses have started using broadband, primarily as a way of dramatically cutting the cost of bandwidth. However, broadband does not provide the same level of reliability as more expensive, business-grade connectivity such as Multiprotocol Label Switching (MPLS). Also, the introduction of broadband can make the network more complex to manage. There is no single broadband supplier that can provide nationwide service, so businesses will likely need to use many different types of broadband connectivity, such as Ethernet, DSL or cable. An all-broadband or hybrid (MPLS and broadband) network can be very difficult to manage, as the capacity, throughput and experience will vary greatly from location to location.

Businesses are becoming more dynamic and distributed, shifting the network from a tactical resource to a strategic one that is able to create a competitive advantage. If organizations are to harness the power of digital transformation, it's time for the network to evolve. Resiliency, operational efficiency and agile orchestration capabilities are now table stakes and must be part of the network design. However, this can't be delivered with legacy networks. It's time for businesses to evolve to software-defined wide-area networks (SD-WANs).

SECTION III: SD-WANS ARE THE FOUNDATION FOR THE NEW ENTERPRISE NETWORKS

The technical definition of an SD-WAN is a WAN where the control and data planes have been decoupled, enabling the network to be managed centrally through software. From a business perspective, an SD-WAN is a network that can be defined by IT policies, which are defined by business objectives. Unlike a legacy WAN, where network operations are isolated from the organization's objectives, an SD-WAN is tightly coupled to business priorities. The IT policies can then automate the

The lack of agility caused by legacy networks is a primary problem solved by an SD-WAN.

configuration of changes or move traffic flows to ensure the network is meeting the needs of the business, making the network more agile.

The lack of agility caused by legacy networks is a primary problem solved by an SD-WAN. The network cannot be agile if each remote office has independent functions on discrete appliances that use only technical metrics to define the network capability. An SD-WAN enables functions to be delivered to the remote office without the complexity involved in having functions located and operated there.

With legacy WANs, the policies are determined by network parameters such as IP address, port or MAC address level. With SD-WANs, higher-level policies are defined by new terms, or primitives, which are more closely aligned to the natural language of business: “Application,” “User,” “Location,” “Performance Objective,” “Access Constraint.” For example, if a business policy requires a change in security policy, this can be configured centrally and pushed out to every device in the network simultaneously, obviating the need to log in and reconfigure every box. The ability to centralize control functions to orchestrate the management of the network will greatly simplify and speed up network operations.

Another advantage that SD-WANs have over traditional WANs is the efficiencies gained by leveraging a hybrid network configuration, where a mix of broadband and MPLS is used. A hybrid WAN is defined as having the following characteristics:

Transport-independent network: Legacy networks use expensive MPLS networks as a primary connection and then an equally expensive network as the backup link. A hybrid WAN can leverage any combination of different network connections including MPLS, broadband internet or some form of wireless networks. This not only significantly reduces costs, but also provides greater media redundancy; broadband and MPLS are often carried over different wires, while the wireless connections connect over the air.

Active-active architecture: The active-passive architecture of legacy networks uses bandwidth highly inefficiently. With a hybrid network, all connections are active, creating greater agility regarding how the traffic flows. For example, a business may decide that mission-critical traffic flows over the MPLS connection and all other traffic connects over an internet-based VPN. The active-active architecture enables businesses to implement intelligent path selection, flow symmetry and traffic isolation with granularity down to the individual session level within each application.

Optimized for the cloud-computing era: Legacy WANs are ineffective for the cloud, as all internet traffic goes through a single choke point and then is distributed over the WAN to the remote location. A hybrid WAN offers secure, direct internet access so that cloud and mobile applications can directly use the entire network more efficiently.

*The cost savings
from an SD-WAN
can be compelling.*

Enterprises that evolve to an SD-WAN will have a network with improved agility, reliability and security, so it will no longer be the choke point of a digital organization. Additionally, businesses will see the total cost of ownership with respect to the network significantly decrease. The ZK Research 2016 Network Purchase Intention Study found that SD-WANs can reduce network TCO by as much as 40% through a combination of lower-cost broadband and operational savings from automation and orchestration.

It's important to note that while the "low-hanging fruit" for an SD-WAN is the cost-savings element, that should be considered the starting point. Digital organizations that wish to leverage the network to gain a competitive advantage need to understand that there's more to a full SD-WAN solution than just running a hybrid or broadband WAN. Businesses that deploy an SD-WAN also need to consider operational efficiency, service orchestration, policy-based automation, the speed of delivering new services and other factors.

SECTION IV: CHARTING A PATH TO A SOFTWARE-DEFINED WAN

The cost savings from an SD-WAN can be compelling. But to maximize the value of the technology, companies must think more broadly. Digital companies need to use an SD-WAN to evolve the network and make it an agile resource that enables business transformation. To accomplish this, businesses should consider the following when shifting to an SD-WAN:

WAN optimization helps meet performance goals. Although broadband often offers superior pricing compared to private IP services such as MPLS, its performance can vary widely from one medium to another. Ethernet, cable and DSL all operate at different speeds, causing applications to perform inconsistently from medium to medium. Also, shared services, such as cable, can perform significantly faster during periods of low utilization versus later in the day, when consumers are using it for high-bandwidth services like streaming video. Another challenge with broadband is that latency can still be a problem; in fact, it is exaggerated because applications are now delivered over multiple types of networks. WAN optimization improves the performance of applications over the different flavors of broadband through techniques such as acceleration. This is especially important in the case of business-relevant software-as-a-service (SaaS) applications such as Office 365. With WAN optimization, broadband connections can offer performance that is on par with or better than MPLS. Rich media business-relevant applications being sent over MPLS can be compressed to further reduce MPLS costs.

Cloud computing must be integrated. One of the big motivations of moving to an SD-WAN is to provide direct connectivity to cloud applications. The SD-WAN solution should provide the following functionality to optimize cloud performance:

- o Secure connectivity
- o Cloud acceleration

SD-WANs can bring a whole new paradigm to network operations, as every service becomes a virtualized network function that makes the network a highly agile IT platform.

- o Support for inter-region and inter-cloud connectivity
- o Resilient connectivity
- o Centralized management and orchestration

Ideally, the solution would work with all the major cloud providers, but at a minimum should support Microsoft Azure and Amazon Web Services.

In-branch services must be included. In addition to connecting the branch, the SD-WAN solution should provide some in-branch services, particularly those that are related to connectivity. For example, segmentation can be used to create secure zones in the branch to separate guest access and employees. Also, WiFi is now a must-have in every location and needs to be a core component of an SD-WAN.

All of the above components of an SD-WAN provide incremental, yet significant, business value. However, what makes an SD-WAN truly transformative and a huge leap forward from traditional networks is its ability to manage the network through a single pane of glass. Network engineers can globally orchestrate network services based on business policies.

Orchestration capabilities facilitate faster deployment via pre-tested and pre-configured “shadow” appliances that enable infrastructure and network services to be deployed in a branch without the need of a local engineer. In fact, orchestration provides the ability to configure new policies centrally and then automates the process of pushing them out to every location simultaneously, just like any cloud app. The ZK Research 2016 Network Purchase Intention Study found that the average time taken to provision a new service across the entire network is four months, which is far too slow for the digital era. Orchestration can shrink this time to just a few minutes ([Exhibit 3](#)).

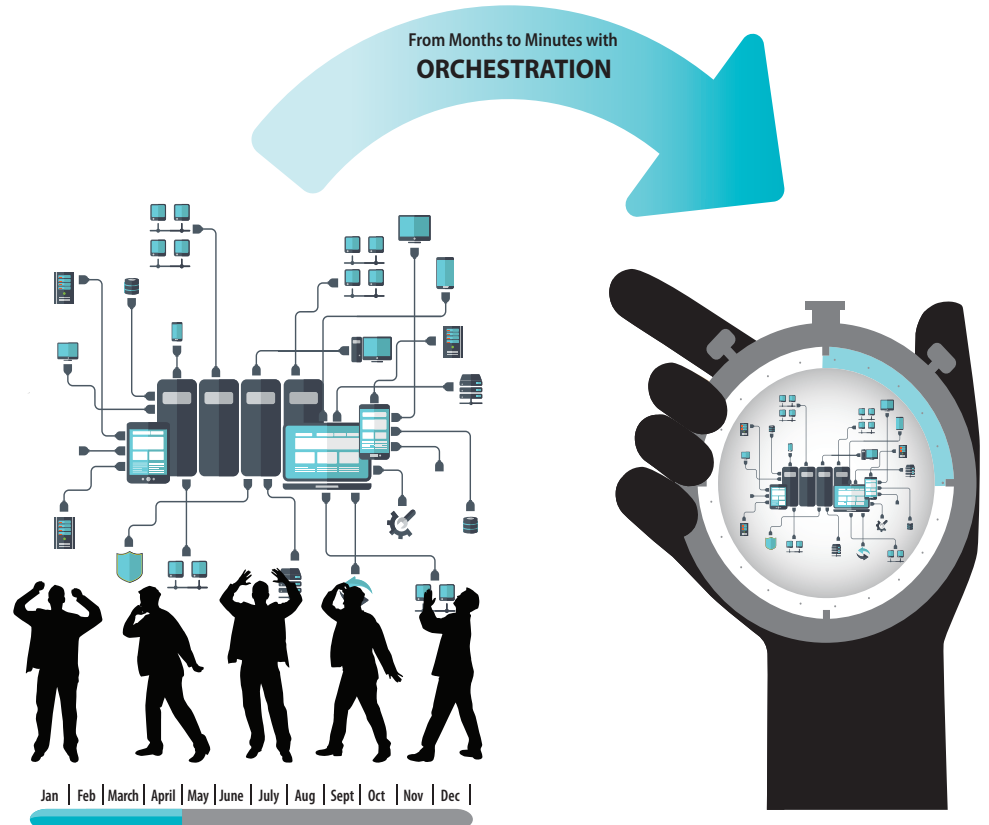
SD-WANs can bring a whole new paradigm to network operations, as every service—such as acceleration, path selection and security services—becomes a virtualized network function that makes the network a highly agile IT platform.

SECTION V: WHAT TO LOOK FOR IN AN SD-WAN SOLUTION PROVIDER

Businesses that want to transition to an SD-WAN have a choice of many solutions. ZK Research has identified the following key criteria to consider when making a decision ([Exhibit 4](#)):

Holistic software-defined branch: Businesses should look for a single solution that includes the management of SD-WAN and network optimization capabilities. This includes acceleration, path selection, hybrid WANs and unified management of the branch LAN and WiFi network endpoints.

Exhibit 3: Orchestration Can Reduce Time to Provision New Services



ZK Research, 2017

Exhibit 4: Key Criteria for Evaluating SD-WAN Solution Providers

What to Look for in an SD-WAN Solution Provider

- ✓ Holistic Software-Defined Branch
- ✓ Auto Discovery and Zero-Touch Provisioning
- ✓ Networking for Infrastructure as a Service
- ✓ Unified Performance and Visibility
- ✓ Enterprise-Grade Solution
- ✓ Flexible Purchasing Model
- ✓ Proven Platform
- ✓ Automatic Classification of Applications

ZK Research, 2017

Auto discovery and zero-touch provisioning: The solution should support a model where the devices can connect automatically when plugged in. The network engineer can then use a centralized console to automate and orchestrate the provisioning of new services.

Networking for infrastructure as a service (IaaS): The solution should provide an easy way to manage a unified connectivity fabric across on-premises and cloud IaaS environments.

Unified performance and visibility: An SD-WAN has many more moving parts than a legacy network. Without the proper management tools, the increased cost of running the network will outweigh the cost-saving benefits. A unified management system can mask the complexity of the network through end-to-end visibility that can speed up troubleshooting time and reduce downtime. Key features required are application and transaction insight, end-user experience monitoring and network intelligence.

Enterprise-grade solution: Every solution will perform in a test environment. However, many solutions often struggle when there is a significant load placed on the network. The vendor should have a solution that can scale to thousands of locations, supports resilient clustering and includes intelligent load balancing. Also, the product should not require the customer to remove existing routers, which can cause significant business disruption.

Flexible purchasing model: Conservative customers need the ability to start with WAN optimization and then evolve to an SD-WAN through a license key. This enables customers to reap the rewards of WAN optimization today, but then upgrade to an SD-WAN at a comfortable pace.

Proven platform: The vendor should be able to provide existing customers with large production deployments. The experience gained from these can be used to develop best practices for deployments.

Automatic classification of applications: The solution should have the ability to detect and automatically classify all of the standardized business applications. Support for at least 1,000 applications should be considered table stakes. Also, the solution should provide the ability to retain application-centricity for encrypted protocols.

SECTION VI: CONCLUSION AND RECOMMENDATIONS

The digital era has arrived, and the business landscape is changing faster than ever. Companies that embrace this change will have a chance to lead their industries, while those that do not risk falling behind and will struggle to survive. The key to being a digital organization is having

business agility, which requires an agile IT foundation. Tremendous evolutionary steps have been taken to improve the dynamism of applications and computing technologies, but the network has stood still. If businesses are to make the shift to being digital, it's now time for the wide-area network to evolve into an agile, software-defined resource.

Cloud computing, video and mobility are playing havoc with the current enterprise WAN, making it a single choke point that is holding back digital businesses. IT and business leaders must focus on evolving the WAN into a network that is software-defined to make it agile, dynamic, secure and application-aware.

Network organizations that lead this change will be better able to align network strategies to business strategies and help transition IT from a cost center to a business partner. Given that the transition to an application-aware SD-WAN is of the utmost importance today, ZK Research makes the following recommendations to IT and business leaders:

Make the transition to an SD-WAN a top priority. Some organizations have transitioned to a basic hybrid WAN, but this is not enough. A software-defined WAN includes network policies, a software-defined branch, cloud connectivity as well as branch LAN/WAN connectivity, with seamless integration of visibility and optimization capabilities—all orchestrated through a centralized, single pane of glass.

Compare vendors based on criteria unique to SD-WANs. In the past, technology vendors typically were compared using technical metrics such as the speed of the boxes and port density. SD-WAN vendors should be measured on factors critical to the success of an SD-WAN, including the following:

- o Application performance improvements
- o Speed of incident resolution
- o Reduction in operational expenses
- o Speed of configuration
- o Policy-based control versus command-line interface

Automate as much as possible. The shift to an SD-WAN requires new technologies and infrastructure, but process automation is also necessary. Automating configuration tasks allows the entire network to be reconfigured immediately, enabling businesses to capture new market opportunities faster.

Focus on delivering the best user experience. In this era of the mobilized, cloud-driven enterprise, the user experience has become a key differentiator. Organizations that provide a superior user experience will deliver better customer service and have more productive employees, and they will dominate their markets as an agile business.

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