



10 Networking Priorities for Digital Transformation

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Introduction: Digitization Is a Business Imperative

Digital transformation isn't a technology or a product. Rather, it's a philosophy for using digital assets to change the way an organization runs. It involves realigning technology and modifying business processes to better engage employees, customers and other constituents of the extended enterprise. Digital transformation significantly improves the performance and reach of an enterprise and has become a top priority for IT and business leaders across the globe.

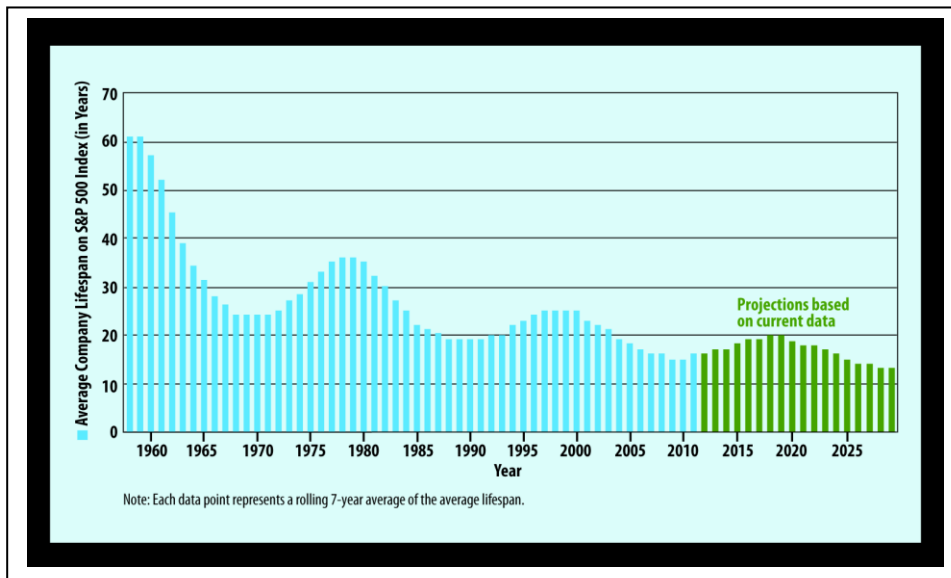
Digitization is reshaping the business landscape at an unprecedented rate. The disruption of established businesses used to take decades, but natively digital organizations such as Uber, Google and Amazon have disrupted their respective markets in fewer than 10 years. Digital transformation is creating new winners and losers faster than ever before. Exhibit 1 shows that in 1960, on average, businesses remained on the S&P 500 Index for 50 to 60 years; by 1980, the rate of change was cut in half. Based on these trends, by 2025, businesses are forecast to stay on the index for an average of only 12 years. Leveraging this economic data, ZK Research predicts that 75% of the index will turn over in the next 10 years. New market leaders will emerge, and established organizations will struggle to survive.

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Exhibit 1: Digital Transformation Accelerates Business Churn



Source: Innosight, Richard N. Foster, Standard & Poor's

Influence and insight through social media

ZK Research has interviewed approximately 100 organizations that are aggressively pursuing a digital transformation strategy at varying rates and with different levels of success. Aggressive businesses are transforming the whole organization, while other, more conservative ones are only making small, incremental changes. Based on several one-on-one interviews with business and IT leaders, ZK Research draws one significant conclusion: The most successful companies marry strong corporate leadership with digital initiatives and establish a high level of digitization. The more digital an organization is, the more likely it is to pull away from its peers and be a leader in its industry. A proof point of this comes from the book *Leading Digital: Turning Technology into Business Transformation* by George Westerman, Didier Bonnet and Andrew McAfee, which found that organizations that master digital transformation are 26% more profitable.

Businesses that choose to embrace digitization will realize a number of business benefits, including the following:

- **Capturing new market opportunities:** Digitization enables organizations to move much faster than ever before. When new market opportunities arise, a highly digital organization can catch the transition faster than the competition.
- **Improved customer experience:** Digitization enhances all aspects of the customer journey and can personalize the experience. This improved experience is a key to winning, retaining and growing customers—which is crucial to the long-term success of businesses in this highly competitive era.
- **Streamlined business operations:** Digitization can streamline processes by removing human latency through automation. Streamlined operations reduce operational costs and enable the staff to be more efficient.
- **Extending the reach of the company:** Digital technology enables businesses to manage and exploit all forms of digital channels and touch points. Organizations can use these new channels to reach more customers in more places around the globe.

The key theme for digital transformation is speed, as businesses must be able to operate faster than ever. Becoming a digital organization must be a top initiative for every business and IT leader today, as the long-term success of the business depends on it.

Digital initiatives are led by technology; however, a significant number of CEOs perceive technology as a key vulnerability for their organizations. The 18th Annual Global CEO Survey conducted by PwC in 2015 found that 58% of CEOs expressed anxiety about not being able to change their technology fast enough to keep up with the competition. ZK Research estimates that in 2015, businesses spent \$12 billion on technology to increase the level of IT agility and evolve into a digital organization. However, the network has yet to evolve. If organizations are to harness the potential of digitization, it's time to evolve the network.

Section II: The Network's Growing Relevance for Digital Transformation

For a company to evolve to a digital organization, IT and business leaders must form a tight partnership. Digitization is possible today because several technologies have matured and have come together at the same time, creating a “perfect storm” scenario:

- **Mobile devices:** Client evolution has exploded over the past half-decade. What was once deemed impossible to do on a mobile device is now the norm. Web browsing, voice over IP, video conferencing and streaming media are common today on mobile devices because of the evolution of smartphones, tablets and web-optimized laptops.
- **Cloud computing:** IT managers have been experimenting with cloud computing for a number of years. Today, enough best practices exist to allow enterprises to shift a significant portion of their IT infrastructure to cloud services or to build internal cloud infrastructure.
- **Analytics and big data platforms:** Digital organizations create terabytes of data, which can be gathered, prepped and analyzed to uncover new business insights. Historically, the big data platforms that used to handle the analytics were very expensive, and only the largest of organizations could deploy them. Today, big data platforms have become more diverse, so companies of all sizes can take advantage of them.
- **Internet of Things (IoT):** IoT is the networking of physical devices, vehicles, sensors, operational technology (OT) and other objects combined with business process change, data collection and analytics. IoT has the power to streamline

process through automation, discover new routes to market and significantly reduce costs. ZK Research estimates that IoT will lead to more than 50 billion additional connected devices by 2025.

One other component of digital transformation that is often overlooked is the network. All of the technology trends listed above are network centric, meaning the network plays a critical role in the success of these initiatives (Exhibit 2).

Unfortunately, few organizations have linked digital transformation to their network. ZK Research has interviewed businesses that have implemented or plan to implement a digital strategy, and the majority have not created a plan to integrate the network into their business strategies.

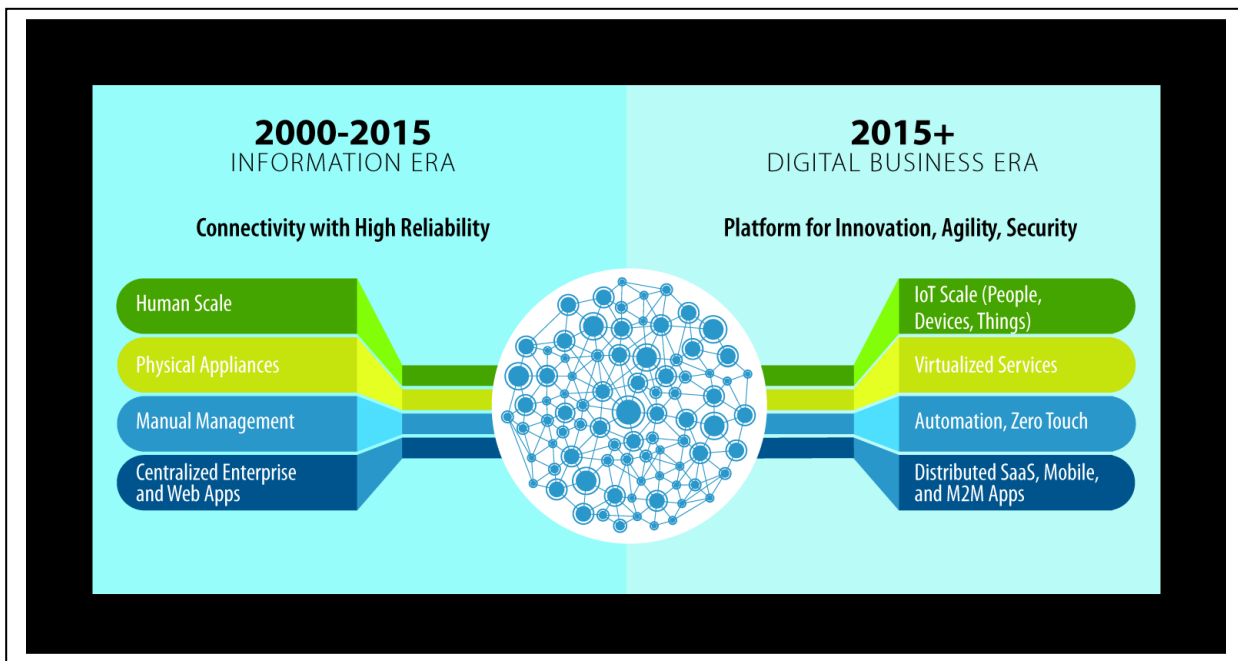
The network plays a significant role in an organization's digital plans by providing the following:

- **Connectivity:** Computing has evolved from being client/server focused to being network centric. The network is a pervasive resource that enables any device to connect to any other device. Metcalf's Law states that the value of a

network is proportional to the square of the number of its connected endpoints. The number of connected endpoints is poised to explode, meaning the value of the network is growing in value exponentially.

- **Security:** Historically, securing the endpoints and a single ingress/egress point has protected the IT infrastructure. In an environment where mobility, cloud and IoT are the norm, the number of attack surfaces has grown by a factor of 10, minimizing the effectiveness of traditional security. According to the ZK Research 2015 Security Survey, large enterprises now face 106 malware hits every hour. Security must no longer solely protect the network. The only scalable way to protect a digital enterprise is by expanding security outside of the network to also protect the perimeter and the internal environment.
- **Automation:** In the digital era, a successful business moves quickly. The ZK Research 2015 Network Management Study found that it takes businesses an average of four months to implement network changes, which is far too slow for the digital era. IT processes can be automated via the network by orchestrating changes as they occur in the application environment.

Exhibit 2: Digital Transformation Is Dependent on Network Evolution



Source: ZK Research, 2016

- **Business insights:** The network sees every connection between every endpoint and can provide a wealth of information to the business. For example, the network provides granular contextual information to a retailer about who a shopper is, where he or she is located and what preferences the person might have. The retailer can use these details to gain new insights and provide the customer with a highly personalized shopping experience.

Investing in the network must be a top priority for IT and business leaders. However, the network needs to be evaluated using criteria relevant to the digital era.

Section III: New Network Principles for Digital Organizations

In most organizations, the network architecture currently in place is outdated and was designed for an era when the majority of network traffic was “best effort” in nature. Traditional networks must now evolve because they have the following limitations with respect to supporting a digital organization:

- **Little to no automation capabilities:** Traditional networks have almost no ability to automate network operations tasks. The provisioning of new services and the implementation of configuration changes are typically done manually on a box-by-box basis, creating long lead times for any kind of change to be made. In the digital era, a network engineer’s time is extremely valuable and should be spent working on strategic initiatives.
- **Inconsistent features across the network:** Another downside of manually implementing network changes is that the process of validating new services or capabilities across multiple network devices is slow and time consuming. Often, features across the network are inconsistently deployed over time, creating unnecessary security risks and poor application performance.
- **High operational expenses:** The growth of networks and connected endpoints has made network management increasingly complicated. ZK Research estimates that the operational costs involved in running a network today are three times what they were a decade ago.
- **Security challenges:** Securing a legacy network is typically accomplished by layering on additional physical appliances to add the new functionality

required. This overlay approach, which is built on multiple appliances, can further increase the complexity of the network.

- **Difficulty in optimizing the user experience:** Optimizing application traffic is not a simple task. Network managers often attempt to do so by adjusting quality-of-service (QoS) settings or changing other network parameters. This tweaking of the network is usually done “ad hoc” when users complain about problems, leading to human error—which is the largest cause of network outages today, according to the ZK Research 2015 Network Purchase Intention Study (Exhibit 3). Improving the quality of experience for applications requires having deep visibility into application behavior, identifying optimal paths and then automating ongoing changes to QoS settings and other factors.

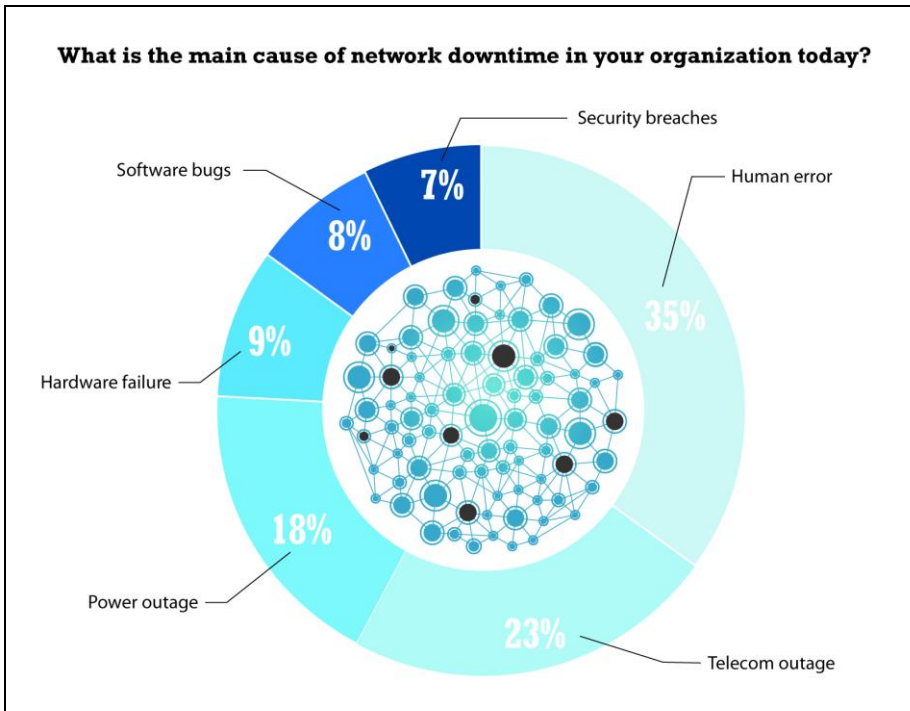
All of the challenges listed above have led to network complexity being at an all-time high. Businesses that want to become digital organizations must evolve their network and make it much simpler to deploy and operate.

Top 10 Networking Priorities for IT

To ensure their network is capable of being a platform for digitization, businesses must adopt the following 10 networking priorities (Exhibit 4):

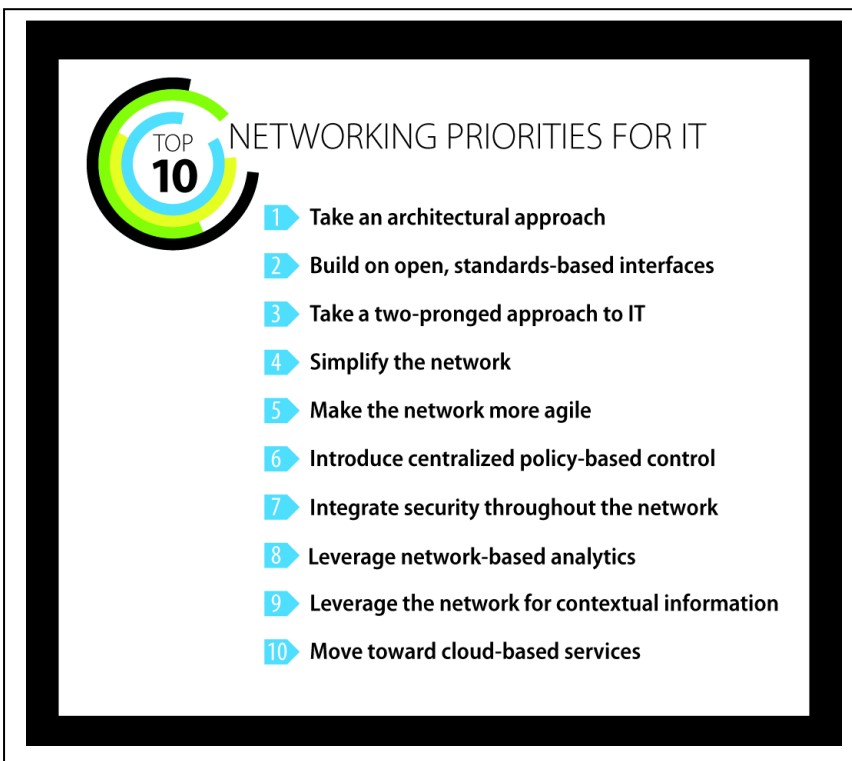
1. **Take an architectural approach.** Most networks are deployed one device at a time and are managed that way. This approach is slow and time consuming. An architectural approach considers the network as a whole and ensures it can be adapted quickly to future business changes and technological advances, which is crucial in the digital era—when network modifications must be made swiftly across the network. The network architecture should be distributed throughout the enterprise and span the campus, branch, access edge and data center.
2. **Build on open, standards-based interfaces.** Digital transformation requires a large ecosystem of solution providers. A network built on closed, proprietary technologies may not be able to interoperate with all the necessary technology vendors. A standards-based, open solution guarantees the broadest range of choice for customers to support the new capabilities needed by the business.

Exhibit 3: Human Error Causes Unnecessary Downtime



Source: ZK Research 2015 Network Purchase Intention Study

Exhibit 4: Top 10 Networking Priorities for IT



Source: ZK Research, 2016

3. **Take a two-pronged approach to IT.** Typically, organizations have a singular focus on IT. The organization must develop a two-pronged approach that involves simplifying network support for current business operations, while also enabling new digital capabilities based on new, innovative technology with minimal risk.
4. **Simplify the network.** As noted earlier in this paper, the network has steadily grown in complexity over the past decade, making it very difficult to manage and scale. Businesses should focus on simplifying design, deployment and operations network-wide through abstraction, virtualization and standards-based interfaces.
5. **Make the network more agile.** A network built on single-purpose hardware devices is static and inflexible. Networks must evolve and incorporate virtualization and containerization to become dynamic and agile—and therefore capable of enabling new functions and services quickly and consistently across all types of devices.
6. **Introduce centralized policy-based control.** The increased automation of network operations over time will reduce the administrative burden on IT and free up resources to focus on business-enabling capabilities. Centralized policy control provides a framework to ensure the automation enforces business intent.
7. **Integrate security throughout the network.** Traditional security is deployed as an overlay to the network. This architecture was sufficient when businesses had a well-defined perimeter but is now too slow, and it provides inconsistent protection across the organization. Digitization, mobility, cloud and IoT create a perimeterless organization. Because the network connects all digital assets, embedding security into it is significantly more effective than the overlay approach.
8. **Leverage network-based analytics.** Combining data gathered from the network with analytics can deliver real-time and predictive insights into users, applications and the network for the business and IT, uncovering new business-enabling data, potential problems and possible security threats.
9. **Leverage the network for contextual information.** By using contextual information such as presence status and location, organizations will be able to build personalized digital services that can identify a user and customize the information he or she receives.

10. **Move toward cloud-based services.**

Digitization requires new ways of running the network. Shifting to a cloud-based approach to delivering services such as policy management, security and analytics can increase the agility of a network, while making it more scalable and agile. Also, cloud services are easy to consume and to adapt to new business models.

Section IV: Cisco's Architectural Approach to Enabling Digital Transformation

A digital organization requires a robust, dynamic and agile network as its foundation. It's critical that businesses choose a vendor that has built its network products specifically for the digital era. Cisco has a long history of helping companies navigate through market transitions, and this shift is no different. Cisco's Digital Network Architecture (DNA) enables digitization by focusing on helping IT empower business leaders to accelerate this shift.

Cisco's DNA is open and software based, and it delivers innovative services as part of a new network-wide architectural framework that spans the core, WAN, access edge, branch and security. This new architecture has been built with the following customer considerations in mind:

1. **Investment protection:** It provides a clear migration path by building on existing infrastructure as and where appropriate, including the use of platform-independent software, virtualization and consistency of features across devices.
2. **Minimized adoption risk:** Through Cisco ONE Software, customers can adopt new features via ongoing innovation license portability and flexibility deployment models. In addition, well-document validated designs are integrated into the provisioning and management tools to ensure deployment success.
3. **Open ecosystem:** Cisco is expanding the ecosystem with its DevNet program to help customers quickly take advantage of new technology innovations.
4. **Simplified IT operations:** Cisco APIC-EM abstracts the management and configuration of the network into a centralized management layer. APIC-EM is built to communicate with the application layer through APIs. Using APIC-EM, organizations can use business policies to automate operational tasks.

5. **Training and support:** Cisco provides extensive partner and customer training through certifications for network engineers to meet the evolving needs of a digital-ready network.

Cisco's Digital Network Architecture is built on the principles of virtualization, automation, analytics and cloud—which are all designed to dramatically simplify the network and speed up IT productivity at lower operational costs. Details on each principle are provided below:

- **Principle #1: Virtualize the network.** Virtualization provides service elasticity for Cisco or third-party network functions everywhere via simplified orchestration, resulting in faster service delivery, higher resource utilization and lower operational costs. Virtualization also gives customers the freedom to run on a variety of platforms. Examples are a network function virtualization hypervisor, a programmable and extensible operating system, a model-driven application program interface (API), application hosting and enterprise network functions virtualization.
- **Principle #2: Automate everything that leverages controllers.** Controllers provide network abstraction with model-driven APIs. They also deliver a consistent policy framework that allows IT to focus on business intent and automate provisioning, which speeds up application and service rollout while reducing risk. Examples are the APIC-EM Controller and the REST API for a third-party ecosystem.
- **Principle #3: Expose contextual analytics across the network.** The network contains data that cannot be captured from any other source and can benefit both business and IT operations. Today, Cisco exposes user, application and threat data with open APIs. Over time, customers can expect to have great access to network insights to help drive business decisions.
- **Principle #4: Build applications and services for cloud consumption.** Cloud-based services provide on-demand scale and new consumption models, and they support a broad partner ecosystem, providing IT with faster service innovation and easier adoption. Cisco is the leader in cloud-managed networking. It provides network services for hybrid cloud deployments and continues to extend more advanced services to the cloud. Examples are CMX Presence Analytics, guest onboarding and Plug and Play cloud integration.

As the first step toward fulfilling the Digital Network Architecture vision, Cisco has announced several new digital services, including the following:

- **Enterprise Network Functions Virtualization (NFV):** This feature allows network services to be decoupled from the underlying hardware platform by providing Enterprise NFV Infrastructure Software, virtualized network functions and orchestration tools. Customers can deploy Cisco or third-party services either on Cisco purpose-built appliances or on UCS E-Series or UCS C-Series servers using the Cisco Enterprise Service Automation application.
- **Cisco Network Plug and Play (PnP):** The PnP application provides a simple, secure and integrated solution for enterprise network customers to automate new branch or campus rollouts. The solution provides a unified approach to provisioning enterprise networks composed of Cisco routers and switches as well as automating secure key management using a public key infrastructure (PKI). The PnP app supports all Integrated Services Routers (ISRs), Catalyst Switches and access points (APs) in the Cisco enterprise product portfolio.
- **Cisco Intelligent WAN (IWAN):** The Cisco IWAN application on APIC-EM is Cisco's software-defined WAN (SD-WAN) offering based on simple and intuitive policy definition of an application's relevance to the business. The IWAN app delivers massively simplified automation and orchestration of Cisco IWAN deployments using a browser-based graphical user interface (GUI). The evolution to an SD-WAN can increase network agility but also save enterprises a significant amount of money. According to ZK Research, the savings from moving to an SD-WAN is \$8,820 per month, and it would be even higher with an all-Internet WAN (Exhibit 5).
- **Easy QoS:** This feature leverages the controller to dynamically update QoS consistently across the network in just milliseconds, allowing IT to deliver a differentiated application experience. An example is the Nectar integration with Cisco Unified Communications Manager and Microsoft Lync, where APIC updates QoS, providing service assurance for highly sensitive voice and video traffic, and automatically resets it to the previous configuration once the call or video ends.
- **Network as a Security Sensor and Enforcer:** This capability is enabled with StealthWatch technology from Cisco's acquisition of Lancope, working in conjunction with the Cisco Identity Services Engine. By embedding security across

Exhibit 5: Cisco Hybrid WAN vs. MPLS Deployment

NUMBER OF SITES	AVERAGE MPLS COST/ MONTH	AVERAGE INTERNET COST/ MONTH	
50	\$975	\$485	
		Monthly	Annual
Total Cost per Branch for Dual MPLS for 50 Locations		\$97,500	\$1,170,000
Total Cost for Dual Internet Connections in 25 Locations, and 1 MPLS and 1 Internet Connection in 25 Locations		\$60,750	\$729,000
Total Savings with IWAN		\$36,750	\$441,000
Total Savings per Site		\$735	\$8,820

Source: ZK Research, 2016

the wired and wireless network and clients, the network can detect threats faster to better protect business assets. The network as a sensor capability can be provisioned across the end-to-end network, from the end client to the cloud. The integration with TrustSec on devices allows the network to enforce policies and quarantine issues.

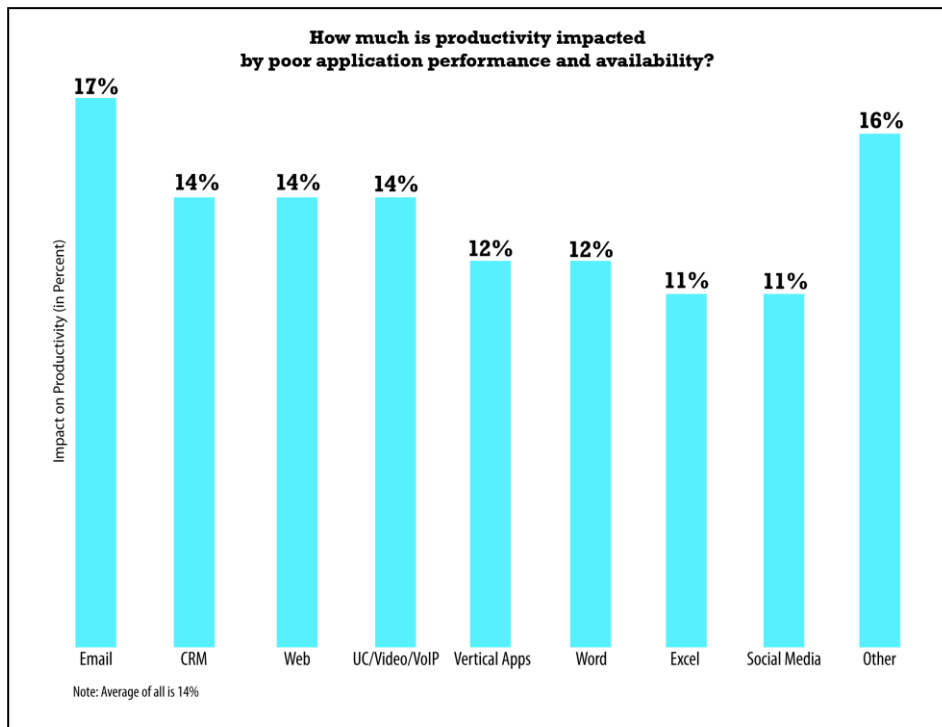
- **Cisco Connected Mobile Experiences (CMX) Cloud:** This service provides customers with CMX presence analytics and connected services delivered through a cloud consumption model. It can be used to enable small to medium-sized businesses to access CMX capabilities much faster and at a much lower cost, providing reduced investment risk while delivering rich location information.

Section V: Benefits of Adopting Cisco's Architectural Approach

For IT leaders, the Cisco approach provides a promising, low-risk method to build a network that can support their organization's digital journey. The benefits include the following:

- **Business service oriented:** Cisco's architecture is aligned with business needs, policies and priorities. This enables the IT department to support the organization quickly as business requirements change.
- **Network agility and scalability:** Policy-based automation enables IT to roll out and manage services that meet business needs across hundreds of sites. For example, the IWAN app drives workflow changes from 900 command-line tasks through 10 GUI clicks, delivering 85% faster network service provisioning. In addition, through virtualized Cisco and third-party services, IT delivers a more dynamic network that can easily provision, expand and reallocate services quickly across different hardware platforms.
- **Lower total cost of ownership:** Service automation features such as Plug and Play significantly reduce the operational overhead for provisioning and managing the network. With traditional networks, operational costs account for 45% of the TCO to run a network. ZK Research estimates that automation can cut this number by more than 50%.
- **Reduced risks:** Embedding security throughout the network provides pervasive security across the company. Also, if a breach does occur, the network will act like a sensor to quickly find the threat and will quarantine it to minimize damage.
- **Improved worker productivity:** End-to-end quality of service will improve the user experience and, in turn, raise productivity. The ZK Research 2015 Network Purchase Intention Study found that workers are an average of 14% less productive

Exhibit 6: Poor Application Performance Directly Impacts Worker Productivity



Source: ZK Research 2015 Network Purchase Intention Study

because of poor application performance (Exhibit 6). Cisco's approach to service assurance can deliver a double-digit improvement in productivity just by making the applications organizations already use run optimally.

- **Foundation for the Internet of Things:** The Internet of Things will prompt an explosion in connected devices. Cisco's Digital Network Architecture was designed to create a highly scalable network that can provide the necessary connectivity, segmentation, security and insights for a successful IoT deployment.
- **Better resource utilization:** Through big data analytics and contextual insights, IT and business leaders can better understand network patterns and their impact on users, applications and infrastructure. Consequently, IT can shift to a predictive management model to better plan for bandwidth and other service demands. The data can also be used to provide business insights on topics such as staffing, effectiveness of promotions and workplace efficiency.
- **Investment protection:** Through the software-based packaging of Cisco ONE Software with license portability, Cisco provides a significant value compared to à la carte pricing.

- **Evolution of the network engineer's role:** As the network evolves to a more software-centric model, network engineers must pick up new skill sets that enable them to take advantage of the programmability of the network. Cisco is evolving its training and certification programs to help provide those new required skill sets.
- **Enabling the ecosystem:** Cisco's Digital Network Architecture encourages the creation of vibrant and innovative technology, partners and a services ecosystem that can take advantage of its open platform approach. The Cisco DevNet program provides tools that help partners and customers use Cisco APIs to build value on top of the Cisco DNA platform.

Section VI: Conclusion and Recommendations

The digital era has arrived, and it's reshaping businesses faster than ever before. Competitive advantage in the digital economy is about speed. Successful organizations are agile and can adapt to business changes faster than the competition.

Virtualization, the cloud, mobility and IoT enable compute and application agility—but in most organizations, the network remains as inflexible and

static as ever. The long lead times required to change the network should be considered the silent killer of a business, as the true cost of staying with a traditional network is missed business opportunities. The deployment of an agile network capable of supporting a digital business must be a top priority for business and IT leaders. To help companies with this initiative, ZK Research recommends the following:

- **Embrace digitization.** Past success is no guarantee of future success. A digital business has the ability to constantly adapt to new market opportunities. It's time for all businesses—both large and small—to embrace the digital era and become an IT-led organization. Companies that do this will be more profitable, will have higher levels of customer loyalty and will leapfrog their competition.
- **Leverage the network for digital success.** Because the network touches all things digital, IT is now network centric. Therefore, the network should be considered a strategic platform for business change. The network plays an important role in connecting people, applications and devices to each other but can also deliver unique business insights. Also, the network can provide robust security to protect the organization, its employees and its customers.
- **Take an architectural approach to the network.** Building and managing a network on a device-by-device basis may have been sufficient in an era when “best effort” applications were the norm. But today, for most organizations, the network *is* the business, and it must operate at the speed of the business. An architectural approach ensures that the end-to-end network performs well, is secure and agile, and can optimize business applications—but also has the lowest possible total cost of ownership.