IDC MARKET SPOTLIGHT

Network Transformation: The Next Frontier in the Enterprise Digital Transformation Journey

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We are in an age in which technology is a key enabler in helping enterprises radically reshape their future by transforming their offerings and business models, disrupting markets, and creating new opportunities for themselves. And this is at the heart of enterprise digital transformation (DX), facilitated by 3rd Platform technologies — cloud, mobility, social business and big data analytics — and further extended by innovation accelerators (IAs) that include Internet of things (IoT), robotics, 3D printing, and augmented/virtual/mixed reality. This enterprise transformation is an essential evolutionary step for success in the digital future, but is neither simple nor straightforward.

IDC believes that network transformation underpins an enterprise's DX journey, and if done right, it can act as a force multiplier for the rest of its transformation efforts. This IDC Market Spotlight helps enterprises explore the various facets of enterprise DX, understand how some of the latest advances in networking technology transform the capabilities of enterprise networks to support their DX initiatives, and formulate a network transformation plan that can best support their business goals and aspirations.

The Anatomy of Enterprise Digital Transformation

Digital technology-enabled transformation of enterprise decision-making and business operations is among the most dominant themes today. IDC estimates that by the end of 2017, more than two-thirds of top 2000 companies globally will have DX at the heart of their corporate strategy as they come to the realization that the traditional levers of business value creation will not deliver the next quantum of growth in a rapidly changing world. Understanding how digital transformation relates to the various dimensions of business can help enterprises navigate the attendant challenges to ensure the success of their DX initiatives.

Powering enterprise DX forward is the intense desire to create innovative and highly personalized customer experiences (customer experience transformation) that can fully leverage new and reimagined business models (business transformation), and an extremely high degree of operational optimization (operational transformation). And all of these transformative experiences are brought to fruition by a slew of 3rd Platform technologies and innovation accelerators (technology transformation). Figure 1 provides an illustration of how the various dimensions of enterprise DX come together to deliver key business objectives.

The Imperative for Enterprise Digital Transformation
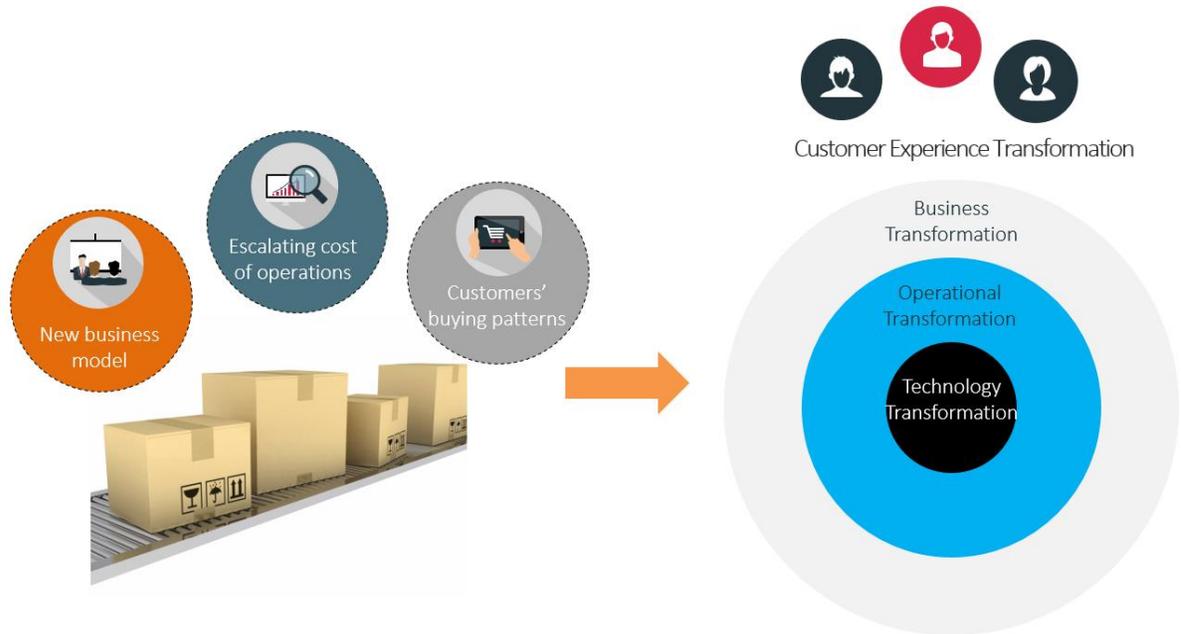
Source: IDC, 2017

Business Transformation

Technology is rapidly and irreversibly changing the way business is transacted globally — transforming business models, reshaping supply chains, and shortening business cycles. And this creates new and exciting opportunities for businesses that are prepared to embrace these changes by placing technology at the heart of their business strategy. In fact, this trend is already underway and playing out in the global arena. Enterprise spending on digital services has been the fastest growing segment in the services market over the last three years. IDC believes that in 2017, consulting engagements involving digital-related services will account for 75% of all the growth in the professional services segment, validating enterprise emphasis on business transformation through 3rd Platform technologies and innovation accelerators.

Operational Transformation

While the role of 3rd Platform technology in supporting external-facing business transformation for tomorrow generates most of the headlines, it plays an equally important role under an organization's hood. Hyper-automation through artificial intelligence and machine learning, cognitive enablement of business and IT operations, predictive self-healing and DevOps for continuous delivery are driving extraordinary gains in cost and performance efficiency. IDC estimates that machine learning and artificial intelligence in service automation will produce 30%-40% in cost savings and productivity improvements in operations management by 2020. These gains will be crucially important, allowing enterprises to devote valuable resources in the pursuit of business transformation.

Technology Transformation

Technologies such as cloud have fundamentally changed much more than just the way enterprises look at consuming and paying for technology services. The new everything-as-a-service, API-centric economy enables delivery of all manner of transformative technologies on tap that can be leveraged for rapid innovation, creation and delivery of differentiated customer experiences. IDC estimates that by 2019, 3rd Platform technologies and related services will drive nearly 75% of all technology spending, underscoring the importance of these transformative technologies to the future of business transformation.

Network Transformation: The Key to Crossing the Digital Chasm

As enterprises race to adopt 3rd Platform technologies and the emerging innovation accelerators in their quest for business transformation, there is a real danger that traditional enterprise networks can emerge as a critical bottleneck threatening the realization of the desired value from the adoption of transformative technologies and solutions.

This situation is exemplified by the traditional enterprise wide area network (WAN). The WAN has long been the mainstay of a distributed enterprise's connectivity needs. While the traditional WAN has admirably supported enterprise needs for a long time, we are now entering a period in which the WAN in the traditional hub-and-spoke model just can't scale rapidly, flexibly and cost-effectively to support quickly evolving connectivity needs of distributed enterprises.

Nowhere is this limitation more apparent than in the scenarios where different constituents of a geographically distributed enterprise wish to access a diversity of cloud-delivered services which can be most effectively accessed using local internet breakouts, underpinned by robust encryption technology. However, in the context of a traditional WAN setup, when a branch office needs to access a SaaS offering, the traffic usually needs to be backhauled to a centralized datacenter from where it can access a high performance connectivity link to the cloud. This circuitous routing through an enterprise's private network imposes unnecessary costs, squandering the promise of the cloud.

To forestall the possibility of traditional network paradigms thwarting ambitious enterprise plans for the digital economy, it is essential that enterprises treat the network not as an afterthought, but as a strategic asset that requires significant thought and investment. The future enterprise network needs to be responsive to and supportive of the evolution in the other parts of the technology stack. Enlightened planning, design, implementation, and management of networks to support enterprise DX needs will be paramount for future success, and this is precisely what the premise of software-defined networking (SDN) promises to deliver.

The Future of Networking is Software-defined

We are hurtling towards a future in which enterprise IT environment is increasingly software-defined. "Software-defined" refers to an ongoing trend toward the abstraction of infrastructure functionality into the software layer, allowing for greater control, dynamic orchestration, and optimized service delivery. Software-defined infrastructure (SDI) solutions render the IT environment in question hardware-agnostic, separating the applications and workloads from the underlying hardware.

The origins of SDI date back to hypervisor-based server virtualization that first abstracted the compute environment. The software-defined ecosystem subsequently expanded to include the storage layer, most notably with the first converged and hyper-converged systems. With network virtualization through network function virtualization (NFV) and software defined networking (SDN), we now have complete abstraction of the entire infrastructure stack.

Traditional networks typically comprise vendor-specific hardware, require manual configuration, and have fixed topologies. Within operational environments, workloads are restricted by physical network topologies limiting their placement and portability. The defining principle of SDN is the separation of the data plane (responsible for physical transportation of data) and the control plane (responsible for routing decisions and signaling), that have historically been integrated into each networking device. This abstraction of the control plane and decoupling it from the physical infrastructure allows for the programmatic creation and provisioning of the network environment, allowing for unprecedented network flexibility and workload manageability. This sets the stage for a fully virtualized, programmable and automated enterprise connectivity environment that mimics the cloud in its behavior and characteristics.

Bringing Software-defined Principles to the WAN

The enterprise WAN first emerged as an architectural option in response to the demand for secure, high-speed connectivity needs across geographically distributed enterprise operations. The WAN has traditionally been operationalized through high-performance, but expensive private networks sourced from communications service providers. As enterprises adopt an ever-increasing number of applications with stringent demands on quality and speed of connectivity (VOIP and real-time collaboration tools, for instance), these private networks rapidly get increasingly congested and prohibitively expensive. Increased use of cloud-delivered services adds additional cost and performance penalties as such traffic typically needs to be backhauled over the private network to the central datacenter from where the cloud services can be accessed. All of this quickly adds up to a situation that is neither scalable nor cost-effective.

Extending the principles of SDN to the enterprise WAN promises to bring all the associated benefits to the enterprise datacenter. This will greatly enhance the programmability, agility, scalability, manageability, degree of automation and cost-effectiveness of the enterprise network at large. SD-WAN is particularly relevant to enterprises that are looking to a hybrid architecture that spans the public cloud, service provider environments and the enterprise datacenter. While the traditional WAN was built and optimized for client-server applications usually housed in the corporate datacenter, this no longer holds true in today's technology environment where enterprises consume applications from a diversity of sources beyond the datacenter.

The SD-WAN works on the SDN premise of separating the data plane and the control plane, but by taking the premise to the edges of the enterprise, it magnifies the benefits manifold. The abstraction of the control plane enables the automated dynamic provisioning and use of any combination of public and private transport links depending business policies set for specific applications and traffic. Figure 2 illustrates the basic SD-WAN architecture.

Basic SD-WAN Architecture Model
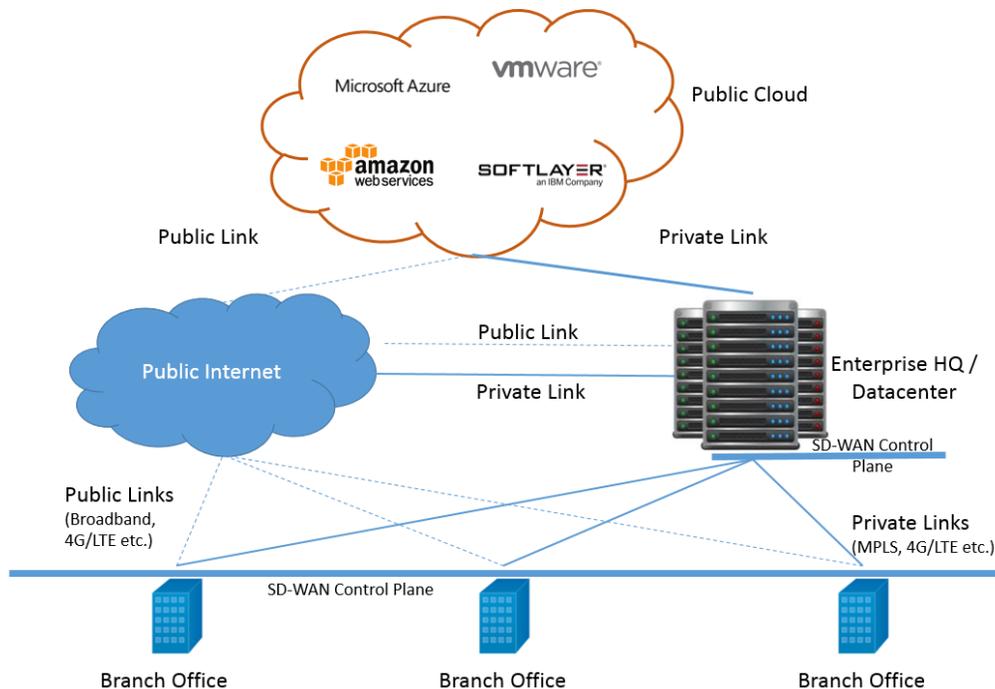
Source: IDC, 2017

The use of standards-based security protocols within an SD-WAN deployment removes the overhead of security management from the networking devices and moves it to the abstracted management layer. This dynamic programmability and security assurance enables branch offices to securely access cloud-delivered services directly over the public internet without needing to route through the enterprise private network back-channel. This dramatically improves the performance characteristics and cost-effectiveness of cloud services consumption at branches.

Among the biggest benefits of an SD-WAN deployment is the ability to centrally manage the entire enterprise network composed of a diversity of geographically dispersed networking devices. The single pane of glass management not only rationalizes the administrative effort involved in network management and utilization optimization, but also ensures that network policies can be dynamically and consistently applied across the entire network. Additionally, centralized management of the network allows for detailed monitoring and traffic analysis, both for network optimization and running network security related-analytics.

IDC estimates that the market for SD-WAN infrastructure and services will exceed US$6 billion by 2020, growing at a compounded annual growth rate (CAGR) of over 90% during that period. As with legacy WAN deployments, enterprise networking vendors, systems integrators and communications services providers will be key players in upcoming SD-WAN rollouts as well.

Cloud Networking for Tomorrow's IT Environment

Networking in the context of the cloud has almost exclusively been about enabling access to infrastructure and applications housed in the cloud. However, with the advent of SDN and the abstraction of a lot of networking functionality the cloud is also set to become an increasingly important

source to deliver enterprise networking services on demand — just like any other cloud delivered service.

There are three broad categories of cloud networking:

Cloud managed networking

With cloud managed networking, management and certain aspects of control, such as policy definition, are moved to the cloud but connectivity and packet mode functions such as routing, switching and security services often remain with on-premises hardware. The cloud-managed wireless LAN (WLAN) technology is an early example. Instead of manually configuring each individual WLAN access point, settings and updates can be centrally controlled in its cloud and pushed to each site. This standardizes and reduces the time required for deployment while troubleshooting can be resolved centrally.

Virtualized network function (VNF)

The software-defined architecture relies on the logical separation of the control and data planes of the networking devices within the enterprise. Similarly, VNF applies the same to networking functions, including routers, WAN accelerators and firewalls. VNF moves all core networking functions into the cloud and eliminates the need for most, if not all, purpose-built hardware by way of virtualized network service, allowing the functions to be delivered in a centralized manner as a service and reduces the time required to provision the service. This can help enterprises significantly reduce costs associated with purchase and installation of new equipment to upgrade their networking and network security capabilities.

Direct cloud connection

Extending from the corporate WAN, these networks leverage SDN to allow organizations to directly connect to their choice of clouds (both IaaS and SaaS) through a centralized portal, where its management can be coordinated. Network teams can also dynamically adjust their bandwidth on the portal according to their cloud workload needs to maximize the potential of their cloud. This allow enterprises to safely adopt public clouds for even mission critical applications and host sensitive information on them.

As the boundary between the enterprise and the cloud blurs, innovations such as SD-WAN and cloud networking will be crucial to enabling enterprises seamlessly traverse these boundaries to achieve their business objectives.

Essential Guidance: Charting Your Network Transformation Course

Challenges on the Road to Network Transformation

While the benefits of transforming the enterprise network to a software-defined network architecture are undisputed, the journey is not without its challenges. The most significant are:

- **Investment justification**: While building the business case for adoption of some technologies and related services is relatively easy to make, making a case for network transformation can be quite tough if it is not articulated comprehensively. Securing management buy-in for replacing expensive special-purpose networking gear with newer equipment (even if it is cheaper commodity hardware) for the unquantified promise of a "programmable and agile network" can be a difficult proposition. Instead, the investment should be justified as part of the organization's holistic digital transformation strategy.

- **Business disruption**: Network virtualization and transformation is often a multi-phase effort that often involves migrating to newer infrastructure and solutions that the IT team has limited familiarity with. During this phase, the possibility of business disruption through incomplete or incorrect implementation of functionality is quite high. The choice of a reliable and experienced service provider is essential to mitigate the business risks.

- **Interoperability with legacy infrastructure**: While the SD-WAN control plane should theoretically allow for incremental migration by permitting existing infrastructure from a traditional WAN to interoperate with the SD-WAN environment, practical implementation of this interoperability can be quite complex and prone to errors. Early-stage proof of concepts (POCs) should be implemented to identify these errors.

- **Lack of requisite skills**: An SDN environment demands a set of skills slightly different from those required for traditional network management. Familiarity with concepts of virtualization, software development and exposure to DevOps and automation tools such as Puppet, Chef and Ansible will be needed to optimize the benefits from the software-defined environment. Organizations should take this opportunity to train their relevant IT and network staff.

The Role of Professional Network/Communication Services Providers in Enterprise Network Transformation

Enterprises have a wide variety of options to choose from when it comes to network transformation initiatives aimed at deploying software-defined networking solutions, particularly SD-WAN. The competitive landscape for SD-WAN deployment spans traditional networking vendors, non-traditional WAN providers, WAN optimization vendors, SD-WAN startups and traditional networking and communications services providers. While every vendor brings to the table a unique value proposition, some characteristics inherent to the SD-WAN architecture model favor engagement with a qualified network/communications service provider.

- Most enterprises already engage with external network/communications providers for part or all of their traditional connectivity needs. This places the providers in a unique position of familiarity with both the enterprise's network architecture and their connectivity needs, allowing them to design an SD-WAN solution and implementation plan best suited to the customers' needs.

- The SD-WAN architecture lends itself particularly well to being delivered as a managed service. The single pane of glass manageability provided by the SD-WAN architecture is ideally suited for managed service providers who often provide network management as a shared service. This allows enterprises to have their network managed by qualified personnel using the best tools at possibly a lower cost than in-house resources.

- As the enterprise boundary gets nebulous with increased adoption of SDN and SD-WAN deployments, network security will become increasingly critical to securing enterprise data and business-critical assets. Most leading communications service providers have built sophisticated security services practices. Integrating network management and network security management under a competent CSP will allow enterprises to improve their security posture.

Choosing the Right Network Transformation Partner

Considering how critical network transformation is to the success of an enterprise's broader DX initiatives, choosing the right transformation partner is vitally important. IDC's *Network Transformation Services MaturityScape 1.0 (Doc# US41035316, Feb 2016)* provides detailed guidance on the stages, dimensions, outcomes and actions required by businesses to transform their network operations for success. Additionally, identified below are some key points to consider during the selection of a network transformation vendor:

- Network transformation initiatives, particularly SD-WAN deployments, are most relevant to enterprises whose technology roadmap has a well-defined plan towards flexible and scalable network architectures. And for most enterprises that have significant investments in legacy WAN architectures, this hybrid model will most likely mean subscribing to a hybrid network model that includes the traditional WAN (most likely MPLS-based) and the Internet. When evaluating vendors for SD-WAN deployments, enterprises need to ensure that the solution not only provides efficient access to cloud-delivered services, but is also able to optimally utilize the existing MPLS-based WAN links by providing seamless interoperability between diverse networks. The vendor must be able to bring to the table a proven implementation methodology, an experience-honed set of best practices, and a rich suite of management tools and utilities for operational simplification and usage optimization.

- Whether it is implementing SDN in a datacenter or an enterprise-wide SD-WAN deployment, a common difficulty enterprises have when embarking on network transformation initiatives is articulating the business benefits effectively. This in turn makes it harder to secure the required management support for the initiative. While increased infrastructure agility, greater automation and faster provisioning, ease of workload migration and better BC/DR readiness are all undeniable benefits of a virtualized network environment, ascribing a direct monetary value to the benefits realized is harder to do. When looking for a network transformation partner, enterprises need to look for a vendor that is not just technically qualified and is able to provide references of successful implementations, but is also able to provide a robust ROI justification through a detailed comparison of different cost elements — infrastructure capex, support/maintenance costs, staffing costs and rationalization of communications link expenses — between the existing and proposed solutions.

- A big advantage of network transformation through the principles of SDN is that it makes the network more programmable, automatable and manageable. However, this demands a set of skills that are quite different from traditional network management. For enterprises that either don't have the requisite skills or make a strategic decision to reorient the IT department to focus on other business transformation initiatives, outsourcing of the entire network management function (and associated security management) is now a viable option. If enterprises are looking at network transformation as a starting step towards further outsourcing network management functions, it is useful to take a holistic look at network transformation, managed network services and managed security services, and evaluate vendors on their ability to provide the full suite of services to realize better cost economics, vendor manageability and accountability for the full engagement.

Conclusion

DX and cloud have been two of the biggest themes for business over the last couple of years. In fact, the two themes are deeply symbiotic, with the cloud serving as a solid foundation for enterprise DX initiatives through the rest of the 3rd Platform technologies and innovation accelerators. The cloud has fundamentally changed the way enterprises view and consume technology, with elasticity, scalability, resilience, on-demand availability and payment-by-usage now standard expectations for all manner of technology-related services. However, the ability of cloud to support enterprise DX is contingent on the robustness of the enterprise's internal network and cloud connectivity. Traditional network models of fixed connectivity and contracts will not be sufficient to maximize the benefits that the cloud brings to businesses. For example, current enterprise WANs, architected for optimizing connectivity to a central datacenter, are not suited to a hybrid environment that spans all manner of connectivity links — public and private — for access to a diverse set of technology services from varied sources.

In order to realize the potential of cloud and achieve the state of digital transformation desired, the network has to become software defined. The SD-WAN enables a fully software-defined, programmable, easily manageable and automatable enterprise-wide network environment. It represents an ideal solution that can optimally utilize existing investments in network infrastructure, and allow for inclusion of a broad new set of interconnectivity options for both enterprise-internal traffic and cloud-connectivity from the edges of the enterprise.

The network transformation journey is as essential as it is treacherous, and it is here that professional network services providers can be of invaluable assistance bringing in the requisite experience, expertise and ecosystem to help enterprises realize their digital transformation ambitions.