

eBOOK

THE NETWORK OF THE FUTURE IS HERE.

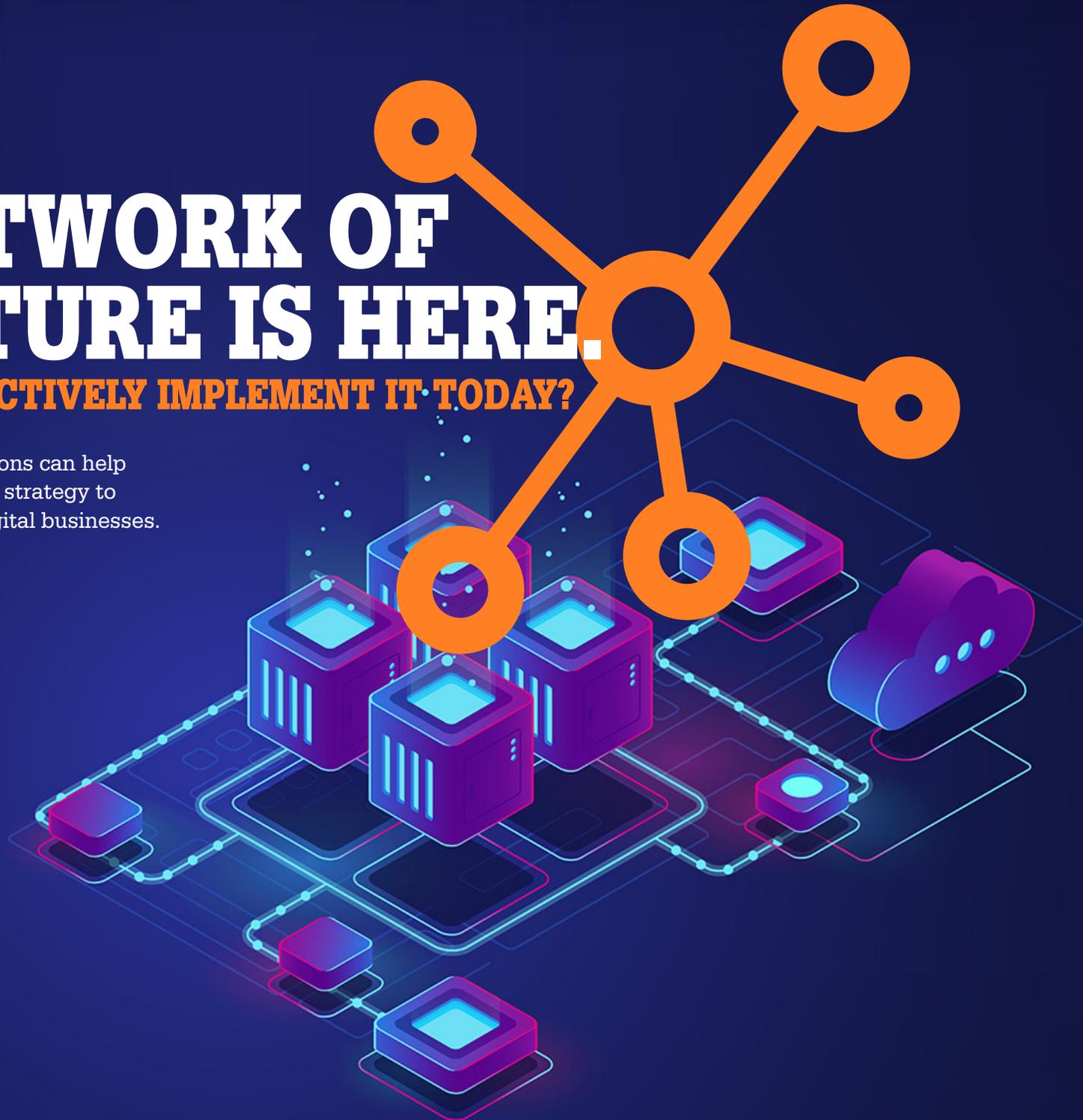
HOW CAN YOU EFFECTIVELY IMPLEMENT IT TODAY?

Software-defined networking solutions can help organizations align IT and business strategy to address the shifting demands of digital businesses.

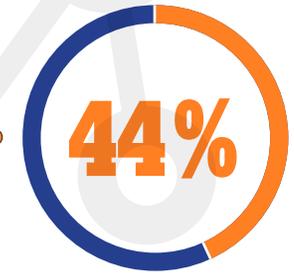
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Business



Digital transformation is no longer a “nice to have”—it’s a must-have. Businesses that are slow to digitize their offerings and operations risk competing for a shrinking slice of markets, as 50% of global GDP will be digitized by 2021, **IDC predicts**. But IDG’s **2018 Digital Business Survey** found that only **44% of organizations have adopted a digital-first approach to business processes, operations, and customer engagement**, indicating there’s still much work to be done. ●



Leadership teams pursuing new digital initiatives are intently focused on fast implementation, flexibility, and cost-effectiveness. As a result, the shift to digital business is disrupting many traditional facets of IT, from the data center to application development to network infrastructure. Four trends in particular are accelerating digital business transformation:

SOFTWARE-CENTRIC IT

The demands of modern digital business require an “everything as a service” approach, where software and virtualized services are abstracted from the underlying hardware infrastructure. As a result, IT organizations are embracing an architectural style that relies on directly programmable network control, leveraging software-centric technologies such as software-defined networking (SDN) to respond more quickly to changing business requirements. IDG’s 2018 Digital Business Survey found that 29% of organizations have deployed SDN in a production environment and another 45% are piloting or actively researching the technology.

PERVASIVE CLOUD

Organizations have reached a tipping point in their cloud transition efforts. The share of IT architecture deployed in the cloud is expected to rise from 48% to 66% in the next 18 months, according to IDG’s 2018 Cloud Insights survey. The top two business goals driving cloud investments are improving the speed of IT service delivery (cited by 71% of the respondents) and greater flexibility to respond to market conditions (63%). More than one-third of the respondents (38%) said they feel pressure to migrate their entire IT architecture to the cloud.

INTERNET OF THINGS (IoT)

Nearly half (49%) of IT decision-makers in IDG’s Digital Business Survey said IoT plays a role in their digital business strategy. These organizations are using IoT in a variety of ways that benefit both IT and the business, from managing IT assets to creating new products and services. **IDC estimates** that spending on IoT solutions and services will reach \$1.2 trillion in 2022. IoT’s biggest impact will be at the network edge, where a massive transformation is taking place as intelligent devices replace traditional embedded systems. These will require more computing power and connectivity as they take on increasingly sophisticated and automated data and analytics tasks.

SECURITY THREATS

Successful digital transformation requires a holistic approach to cybersecurity, as cloud and IoT services have greatly expanded the threat landscape. Executive teams need to be confident that investments in digital transformation initiatives won’t increase risks to their business. Nearly half (44%) of the organizations represented in the IDG Digital Business Survey said they are still in the process of formulating a data security strategy for their digital business transformation.

These trends are helping organizations deliver two key benefits of digital transformation: speed and agility. But there are challenges to these massive modernization efforts, particularly at the networking layer, where corporate wide-area networks (WANs) are straining under increased bandwidth demands and may be ill suited to support broader transformation efforts.

- **“Enterprise WANs are becoming more complex. Many are supporting multiple types of locations, including data centers, large corporate sites, branches, and remote workers, and they’re trying to access public or private clouds. They may have to deal with millions of IoT sensors, RFID tags, and connected devices. All of this generates more WAN traffic, and it’s only going to grow.”**
- Anthony Dynkin, Director, AT&T Edge Solutions

SOFTWARE IS TRANSFORMING ENTERPRISE NETWORKS

Traditional enterprise WANs are built around centralized network hubs designed to meet the needs of data center applications, with many organizations relying on Multiprotocol Label Switching (MPLS) services that support multiple WAN access protocols, including Internet Protocol (IP), Ethernet, frame relay, and asynchronous transfer mode (ATM). MPLS provides the backbone for many critical enterprise applications, many of which aren’t going away anytime soon and are dependent on class-of-service (CoS) prioritization and quality-of-service (QoS) guarantees to help deliver reliability and low latency of critical data traffic.

But that hub-based model is not as well suited for leveraging intelligence in the cloud and at the network edge—such as in branch offices, geographically dispersed manufacturing sites, and IoT devices. Deploying dedicated hardware to every site can quickly become an infrastructure management burden. Traditional WANs may be too inflexible to meet rapidly changing needs, and “back-hauling” all data via centralized switches can be costly and can adversely impact performance, particularly as geographically dispersed locations migrate to cloud services.



Enterprises want a “future-ready” architecture with the flexibility to add new networks and services quickly and cost-effectively. They want to be able to select the right option for each location, which may involve a branch or satellite location’s being able to go directly to the cloud, via the data center, for critical enterprise applications, or by way of a cloud interconnect service, depending on the application or service in use.

As a result, IT teams are under pressure to modernize their organization’s network infrastructure. “The WAN is becoming an important component of digital transformation as intelligence moves to the edge of the network or to the branch,” says Ghassan Abdo, Research Vice President for Worldwide Telecom Cloud & Virtualization Services at IDC.

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EMERGING TECH

A FOUNDATION FOR EDGE INTELLIGENCE

Because many applications generate significant amounts of data and require real-time computing power, more organizations are pursuing edge computing strategies that bring data processing closer to the end user than in a traditional cloud architecture. Decreasing the distance between the data and the end user reduces latency and improves speed; it also reduces data delivery loads.

Edge networking is increasingly important as organizations develop applications built around IoT, artificial intelligence, and forthcoming 5G services. “Instead of sending a complete stream of sensor data all the way across mobile and fixed networks to a centralized data center where analytics can be performed, the intelligent device can send only the relevant data for immediate analysis,” explains Rupesh Chokshi, AT&T Assistant Vice President, Edge Solutions.

A software-defined infrastructure that utilizes a fully virtualized network and functions is essential for edge-to-edge intelligence that provides the visibility, management, and automation capabilities to best support the types of traffic that users demand with the right WAN option. This infrastructure makes it easier to manage voice and data over the same network, simplifying the ability to support Voice over Internet Protocol (VoIP), unified communications, video, internet, and data. As wireless evolves beyond just providing mobile worker connectivity to encompass a world of streaming videos, high-definition games, and photo-intensive social media, having edge-to-edge capabilities and intelligence will be critical to using existing (LTE, Wi-Fi) and future (5G) wireless services.

TRANSFORMATIVE TECHNOLOGIES

The good news is that transformative new technologies have emerged in the past several years and are maturing quickly. They include:

SOFTWARE-DEFINED NETWORKING (SDN)

SDN provides separation, centralization, and automation of network control, increasing the flexibility of core networking services with simplified management and scale to meet enterprise growth requirements. “SDN is a horizontal technology that can be applied anywhere for programmatically controlling networks,” explains **Rajesh Ghai**, IDC Research Director for Carrier Network Infrastructure. “You can take all the intelligence out of the boxes and put it into software, where it can be managed centrally. That provides better control and visibility over your entire network and enables you to make changes dynamically without having to go to and physically configure the device.”

NETWORK FUNCTION VIRTUALIZATION (NFV)

NFV enables organizations to replace dedicated and proprietary network appliances such as switches and routers with multiple virtual network functions (VNFs) running on a single industry-standard hardware platform. Instead of provisioning multiple proprietary appliances to branch offices, enterprises can remotely download and manage multiple VNFs on those standardized devices. This approach avoids appliance lock-in issues while improving speed, cost-effectiveness, and centralized management capabilities across distributed locations. “NFV technology really streamlines IT operations and management,” says Dynkin. “You’re replacing a chaotic environment with one that has been completely standardized. The box in the ‘closet’ looks the same across all sites and is centrally managed. Patching or adding new functions no longer requires a truck roll—it’s just a software download.”

SOFTWARE-DEFINED WAN (SD-WAN)

To meet today’s business needs, new SD-WAN options provide flexible, software-centric connectivity. Intelligent, application-aware traffic routing chooses the optimal connectivity option for best performance and efficiency, which can range from public broadband to IPsec and MPLS VPNs, or even wireless. One in five organizations in the IDG Digital Business Survey currently have SD-WAN solutions in production, and another 38% are piloting or researching the technology.

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VIRTUAL SOLUTIONS GAIN MOMENTUM

Network modernization provides benefits to both the business and IT, because it enables organizations to meet enterprise needs for reduced complexity, better performance, and increased agility. SDN, SD-WAN, and NFV are no longer a promise for the future; they are available today in solutions that form the foundation of network modernization efforts.

Pioneering a software-centric approach to networking, AT&T has set out to virtualize and software-control 75% of its core network functions by 2020. As it went through its own transformation, the company soon realized that it could extend the benefits of virtualization to its customers. The first SDN solution from AT&T, Network on Demand, debuted in 2014, providing enterprises with an online self-service portal for provisioning Ethernet services.

In 2016 AT&T introduced an NFV service, now named **AT&T FlexWareSM**, which replaces purpose-built, on-premises network devices with VNFs running on industry-standard hardware. A single AT&T FlexWare device can run multiple AT&T-certified VNFs from best-of-breed vendors, such as Cisco and Juniper (routing); Riverbed (WAN acceleration); VeloCloud (SD-WAN); and Fortinet, Juniper, Palo Alto, and Check Point (security). Centralized, software-defined orchestration makes it possible to remotely provision and centrally manage these VNFs across all locations.

In 2017 AT&T launched a dynamic, **network-based SD-WAN offering** that provides businesses with the flexibility to choose the access type for different locations with varying needs for reliability, performance, and bandwidth. This means that organizations can readily take advantage of a hybrid WAN approach that accommodates MPLS as well as broadband connectivity options.

The software-centric approach behind SDN, NFV, and SD-WAN is a critical enabler of digital transformation initiatives. These solutions can dynamically adjust networks and infrastructure, with different locations utilizing varying bandwidth and VNFs. Reducing reliance on proprietary appliances across the enterprise sharply reduces the need for infrastructure management and makes it easier to streamline operations.

CASE STUDY

A MEASURED APPROACH—WITH MEASURABLE RESULTS

Netherlands-based Nutreco needed a network that could more easily serve its existing locations and support future growth. An international leader in animal nutrition and aquafeed, Nutreco sells products in more than 200 countries and territories, with many locations in rural areas where connectivity can be a challenge.

Nutreco chose an integrated global network solution that includes AT&T FlexWare, along with AT&T VPN and internet access. With global AT&T VPN and internet access, locations can connect and collaborate in a highly secure way, whether from Nutreco's Dutch headquarters, in Amersfoort, or from a rural factory halfway around the world. The services run across the AT&T infrastructure, which provides a reliable, highly secure global network environment.

Thijn Moons, Nutreco Domain Manager of Network Services, Collaboration and Knowledge Sharing, expects the network to minimize the amount of hardware the company has to ship to local sites. "Instead of buying hardware, we now can just install a function with two clicks of a button," says Moons. "That gives us the flexibility we need." This will help Nutreco adapt and upgrade functions as the company grows and its needs evolve—all with a lower total cost of ownership.

To read the full case study, [click here](#).

PRACTICAL DEPLOYMENT TECHNIQUES

The complexity of existing WAN infrastructure, with growing data volumes and the demands of branch locations and new applications, can make modernization seem overwhelming. But transitioning to virtual solutions can provide flexibility to any transformation initiative. Common use cases for migration include the following:

EQUIPMENT REFRESH & INFRASTRUCTURE OPTIMIZATION

Routers and other network appliances typically have five-to-seven-year life cycles. The end-of-life decision for these devices offers an opportunity to replace them with VNFs, providing more functionality and future readiness. This approach provides a basis for an extensible virtual platform that can accommodate additional services in the future without major hardware upgrades. “Enterprises that previously were locked into proprietary appliance replacement cycles now have more flexibility to switch to VNF vendors that have more suitable pricing, features, and functions,” says Dynkin.

INTERNET TRAFFIC OFFLOAD

Growing bandwidth demands are straining many enterprise network hubs, but few businesses want to invest in expensive networking equipment that may not be able to support future needs of remote locations. Not all applications require QoS guarantees, so it may make sense to route those directly to internet access at the site, using lower-priced broadband internet connections.

HIGHLY SECURE CONNECTION TO CLOUD APPS

With many organizations migrating to cloud-based applications such as Microsoft Office 365 and many users accessing them from mobile devices, back-hauling data to the central hub can inhibit productivity. Depending on the application, enterprises can let users directly access cloud services through options such as broadband or wireless to deliver an optimized cloud experience without overloading data through the enterprise hub.

RAPID UPGRADES TO NEW CAPABILITIES

Enterprise needs for emerging technologies such as IoT, analytics, and edge computing are difficult to project. A flexible network architecture enables businesses to experiment and scale their solutions with multiple devices, network types, applications, APIs, and cloud environments without redesigning their core platforms.

A SMOOTH MIGRATION

For a smooth migration to a modernized network, organizations need to develop a strategic vision and long-term plan, one that positions the entire service ecosystem to scale. Here are some practical steps to consider:

AUDIT Getting started often begins with an inventory of what's in place today, along with an analysis of the risks, challenges, and issues the organization is experiencing with current solutions. Determining what applications and data are best suited for the public internet frees up MPLS and carrier broadband services for more-critical applications.

CADENCE Determining the skill sets of existing staff and current vendor partners is essential to gauge the right balance between in-house and external resources. It's critical to find a trusted third-party provider that can guide an enterprise through complex, transformative initiatives to modernize network infrastructure.

GOVERNANCE As the network takes on new shape, corporate governance policies must evolve to encompass not just the use of technology but also the roles and processes by which business, finance, and service providers move to achieve the goals of transformation.

BLUEPRINT Virtually seamless operational handoffs are critical so that connectivity changes don't leave users and systems exposed. Prioritizing and sequencing the migration effort in this manner is crucial for initial and long-lasting success. As noted earlier, a measured approach to implementing software-defined solutions across the enterprise while maintaining existing infrastructure such as MPLS for mission-critical operations is worth considering.

OPERATIONS A comprehensive solution blueprint is essential for determining what apps and traffic will utilize which connectivity options, for primary as well as backup purposes. Security policies must be clearly articulated to accommodate a more dynamic network architecture, particularly how new types of applications and platforms will impact threat exposure.

SKILLS One crucial decision is whether to migrate gradually or all at once, which heavily influences which types of solutions to pursue. What's likely for larger organizations, at least in the short term, is a hybrid environment that utilizes existing infrastructure with new options as opportunities and needs develop. "Smaller companies may be able pull off a one-and-done migration with 100 sites if they don't care about the underlying transport," Dynkin asserts. "But we've been implementing thousands of locations for larger customers, and they've realized that we can provide a very gradual, elegant migration path."

CONTINUOUS IMPROVEMENT & INNOVATION Continuous improvement/innovation: In planning the network architecture transition, organizations should strive to establish a cycle of continuous innovation and experimentation. With software-defined solutions, functionality is easily swappable and easily managed, providing organizations with the freedom to add new features and functions as their needs change.

THE FUTURE
NETWORK IS HERE
TODAY.

The next wave of networking technologies will transform how you manage your infrastructure. AT&T delivers the foundation for cost-effective, software-defined services that meet enterprise needs for performance, flexibility, scalability, and security.

Click here to see the business value and financial benefits of **virtualizing your network.**

