

Software- defined, business- driven.

Why the right network
is critical to meeting
the future demands
of your organization.

verizon[✓]



Are you ready?

Every industry is now a digital industry. Your ability to connect users to applications — simply, securely and reliably — is critical to increasing productivity and competitive advantage.

Even just five years ago, most strategy meetings would have looked quite different. For a start, the head of IT would probably not have been there — many organizations still saw IT as a cost and put it under the CFO. And it's unlikely that terms such as the internet of things, smart cities, cyber threats, big data and servitization would have been mentioned.

Today, CIOs are driving conversations about how their organizations can leverage technology to improve their operational efficiency, increase organizational agility, and deliver services more effectively.

Whether your organization is an enterprise, an agency or part of federal, state or local government, serves citizens or treats patients, practically every major initiative underway or being planned will depend upon technologies like cloud, mobile and advanced analytics. And behind all of these enabling technologies is the network. It's the foundation without which they wouldn't be possible.

The network — in all its forms, from the fabric in your data centers to your LANs and WANs, and connections with customers and partners around the world — is critical to the success or failure of the initiatives you're discussing today and the ones that you haven't even thought about yet.

We believe that the models many organizations still use to manage their networks do not meet their needs today, let alone their ambitions for the future. That's why we'll make the case that we need a new vision for the network — one that's more adaptable and intelligent.

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Be a driver of change.

Networks by the book

Traditional network design philosophies revolve around purpose-built network equipment, such as routers and Ethernet switches, based on vendor-specific hardware and software platforms. Networks built in this way include a variety of “bundled” network elements, in which the control, management, and data functions are physically tied together, and the bundled network elements are each provided by the same supplier.

Deployment of new services or upgrades – or modifications to existing services – must be done on an element-by-element basis and requires tight coordination of internal and external resources. This limits operational flexibility and increases reliance on expensive proprietary hardware.

Falling behind

These rigid network configurations were fine when organizations changed slowly and had predictable traffic patterns, and when success could be measured in meeting service level agreements (SLAs). But changing expectations mean that most organizations’ networks – and the approaches to building and operating them – are simply not able to keep up. Without fundamental change, most organizations’ networks will be unable to support their transformation into a digital business.

It’s time for a new approach: to stop thinking about networks in terms of technology and instead think about them in terms of the workflows they enable, and the initiatives and drivers they support.

Instead of letting the technology dictate what the organization can do and how quickly, the business-driven network will provide the agility and flexibility you need for success. When you need to roll out a new service, or scale services to respond to new opportunities, your CIO should never have to say “but that will take ...”. The intelligent network will help IT deliver the sort of experience promised by “as a Service”, but with the availability, security and compliance a modern organization must have.

More than a new technology

Make no mistake, getting to a more intelligent network is not a small project. It’s not just a case of updating some routers and installing some new software. It’s going to require a significant rethinking of how IT delivers services and meets the needs of the organization.

In this paper we’ll explore the new workflow-centric approach that we believe you should start to follow, and how you can make the right decisions now to equip you for the more dramatic changes that technologies like software-defined networking (SDN), and whatever comes after it, have in store for the future.

Decisions you're making now will fundamentally affect your ability to deliver services and innovate not just now, but for years to come.

Get future ready.

At Verizon, we believe that the future of connectivity is intelligent business-driven networks. These networks are technology agnostic and defined by the organization's need rather than topology or protocol. They mix fixed-line and wireless connections, public and private resources, and state-of-the-art with legacy. The rules that govern their performance come from organizational logic, not their physical makeup.

This means that intelligent networks are more attuned to addressing the organization's needs. By rethinking the network in terms of the workflows that it enables, and by making capacity more flexible and allocating it on business need, operational transformation can be simplified and accelerated.

For most organizations, IT is only a few percent of total operating costs, and running networks only accounts for a small portion of that. But as demand grows, cost control will become a major consideration in supporting growth. As staff, partners and consumers increase their network traffic, and as millions of new connected devices join the network, IT needs to look at ways to reduce the costs of running the network and the human overhead of managing it.

The intelligent business-driven network will dynamically manage the allocation of resources, based on the rules that you set, to give you the performance that you need. It will help you allocate the right resources to each workflow – not just prioritizing performance by traffic type (like ensuring smooth video playback) but dynamically reallocating capacity based on sophisticated rules that reflect organizational priorities.

These changes will greatly reduce the burden of managing the network and turn it from a reactive to a strategic task. Instead of firefighting, the role of IT will be to define the right rules and analyze application performance and user experience to ensure that they are meeting expectations.

The intelligent network in action

An organization may have a core MPLS network with broadband connections to some remote offices and homeworkers, and multiple 4G backup connections that sit idle most of the time.

By transforming to an intelligent network model, connectivity can be aligned with the demands of each application – MPLS for mission-critical applications, native Ethernet for performance consistency, broadband for bandwidth-hungry applications, and wireless for true physical diversity. Backup connections can be integrated into the core network, making better use of resources and improving performance.

Where before data was routed based on classes of service, the intelligent network will direct traffic based on a much more granular understanding of its importance and sensitivity. Traffic that's less sensitive or important may be routed across public connections to improve both cost-effectiveness and the performance of the private networks carrying mission-critical applications.

The intelligent network will also extend the network's perimeter, enabling organizations to make cloud-based services, including compute and storage, appear as a seamless part of their infrastructure.

Software-defined networking and network function virtualization are two of the hottest concepts in networking circles right now.

SDN: the hype.

SDN has come from the need to change the way we look at networks, shifting from a technology-centric view to a workflow-centric view. Instead of thinking about wireless and wireline, public and private, primary and backup, you can focus on what users, processes and data need to do.

“ Research by IDC suggests that interest in SDN is primarily driven by the need for the network to have greater agility to support cloud applications, by the need to more effectively deliver new applications, and by the desire to improve operational efficiency by programmatically managing the network¹.

In a survey by Juniper Networks, 77% of respondents said that five years down the road they expected most business networks would include SDN. And more than a quarter (27%) said that they were “completely ready” or “almost completely ready” to adopt SDN².

Another benefit often attributed to SDN is the ability to move away from specialized and proprietary hardware (like switches and firewalls). In fact, this is network function virtualization (NFV) to standards-based software implementations. This enables general-purpose hardware to be assigned the role that best suits the organization’s need at that time. So a box that’s a load-balancer one day might be a firewall the next.

What does SDN do?

Software-defined networking:

Separates the “control” and “data” planes of the network – the parts that respectively organize how traffic flows across the network, and that carry the data itself. This decoupling enables independent scaling of control-plane resources and data-plane resources, maximizing utilization of hardware.

Centralizes the control plane, reducing the number of managed control-plane instances to simplify operations. Software-based network functions can be centralized and run on top of a common operating system using standardized configuration protocols and general-purpose hardware. Centralized control and service orchestration allows the network to be viewed in its totality, improving total capacity utilization by routing traffic to available capacity in near real-time. This is essential for applications where reliability and performance are critical.

Automates many network functions, including configuration, in line with business rules covering application and functional needs. Capacity, routing and service provisioning can change in near real-time to respond to failure, attack or changes in demand.

Despite the enthusiasm of many vendors and analysts, we think that most organizations are taking a conservative approach to SDN.

SDN: the reality.

There are barriers. Juniper found that the biggest concern that organizations have about moving to SDN is cost, followed by integration, security and skills².

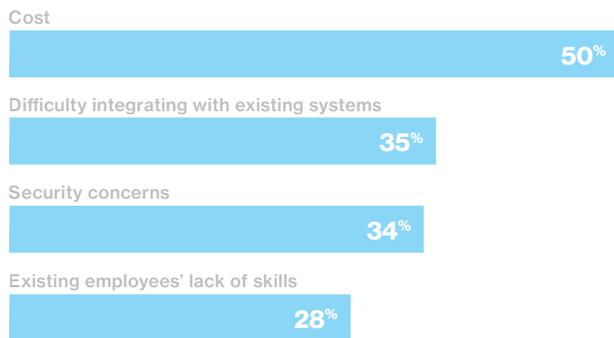


Figure 1: Perceived barriers to SDN adoption²

Sound familiar? They are pretty much identical to the concerns raised about cloud a few years ago.

SDN and NFV are new technologies, and businesses are right to be cautious about adopting them for mission-critical infrastructure. But we're confident that they have an important role to play. That's why they are part of how we're making networks more adaptable and easier to manage.

“Today, we estimate there are between 500 and 1,000 mainstream deployments of SDN globally³.”

Adopting a business-driven approach and adapting your architecture around new technologies like SDN is clearly the way forward. Gartner's strategic planning assumptions indicate that: “By the end of 2016, more than 10,000 enterprises worldwide will have deployed SDN in their networks, compared to less than 1,000 as of September 2014³.”

But as we've said, this transformation is about much more than technology. Whatever their maturity today, and their potential tomorrow, SDN and NFV aren't the first technologies to offer greater manageability and agility, and they undoubtedly won't be the last.

All organizations need to take a long-term view and not look at any technology concept as a permanent solution to their business challenges.

The intelligent network today

The intelligent network isn't tied to any particular technology. But there's a clear link between its goals and the promise of SDN and NFV.

In the world of networks there is no hotter buzzword than SDN – NFV is also very exciting, but is often conflated with SDN. If you're a CIO, we expect you're likely to have been bombarded with sales and marketing communications about the promise of these technologies already.

SDN and NFV are part of a long tradition, both in networking and in wider IT, of delivering flexibility through abstraction, freeing managers from manual control of technology architecture elements. In networking, classes of service (CoS) or quality of service (QoS), like SDN, let you define business rules and then rely on the system to manage traffic for you, to ensure that different workloads get the appropriate experience.

Cloud, virtualization, containerization and related technologies all ultimately enable organizations to manage workloads, without worrying about managing servers.

Changing your approach to how you procure, build and manage networks in three years' time will be too late.

You can't afford to wait.

Not only are traffic volumes, expectations for availability and performance, and the required reach of networks growing rapidly, lines of business now also expect to be able to roll out new services faster than ever before. In the past it was accepted, grudgingly, that it would take weeks or even months to spin up servers and provision bandwidth to support a new initiative or meet changing demand. Now, departments expect those changes to happen in hours or even minutes.

“ Through 2015, at least 50% of cloud deployments will suffer from business-impacting performance issues, requiring extensive network redesign to address them⁴.

Clearly cloud has an important role to play here. And the shift to cloud – not just for test and dev but mission-critical workloads too – is an important factor in the greater demands and expectations being placed on networks. The majority of respondents in a recent survey commissioned by Verizon and conducted by Forrester Consulting said that the network is integral to delivering the promise of cloud computing⁵.

The network is integral to delivering the promise of cloud computing

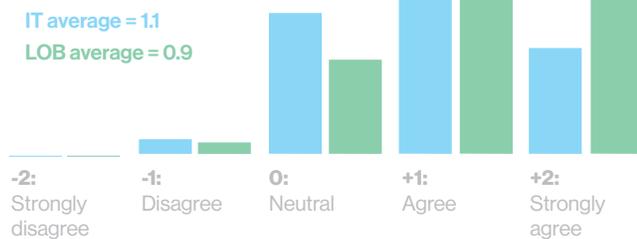


Figure 2: Respondents linking the network to the success of cloud projects⁵

You need to be thinking about the future now. To be ready to embrace new technologies you need to be making preparations, including changing contractual models, now. Making these changes will also help you to get more from your existing infrastructure today.

Given that the technology landscape is always changing, your goal shouldn't be to "adopt SDN"; it should be to prepare your organization for the changes ahead and rethink your approach to IT. SDN may play an important role in the changes that are coming, but this isn't just about changing speeds and feeds, or even protocols and architectures. It's about a fundamental shift in thinking.

It's only to be expected that organizations will take time to fully embrace SDN – just as they took several years to move to cloud, and further back, client-server. As in the early days of cloud, many vendors are making bold claims, but often the services available fail to live up to the promise. It's likely that great steps will be made over the next few years, but transitioning networks and adapting application portfolios are big projects that have to be handled carefully.

**Start
now.**

We have six recommendations to help you start on the path to a more intelligent network.

Benefit now.

Adopting the intelligent network model can help you realize your digital transformation plans and strategic objectives, and it can deliver significant immediate benefits too:

Greater business alignment: this isn't just about improvements to efficiency and manageability today, it's about helping IT become more attuned to the needs of the organization and creating a platform for innovation.

Greater agility: this isn't just about being able to reconfigure the network more quickly when needs change, it's about making it so you don't have to manually reconfigure the network at all.

Greater availability and security: this isn't just about firewalls and backup connections – the intelligent network can prioritize workflows, reroute around failures, and protect critical traffic against threats.

Greater efficiency: this isn't just about faster switches and cheaper bandwidth, it's about saving staff valuable time on configuration and provisioning.

Greater insight: this isn't just about better dashboards and alerts monitoring performance against SLAs, it's about network-wide analytics that reflect the impact of performance on the organization.

We have six recommendations to get you started.

1 Break down organizational silos

It's not just network architectures that need to change. Transformation is about rethinking the organization too. Innovation requires fluid, agile collaboration that spans functions. The network is key to breaking down silos and facilitating collaboration.

2 Take a workflow-centric approach

Start thinking about networks, compute, and storage in terms of the workflows that they enable, not the technologies underneath. Get away from architectures defined by physical location – the data center, the head office, the local branch office – or protocols and speeds and feeds.

3 Converge to an IP-based infrastructure

The debate is over: most commentators agree that Ethernet has won. Moving any legacy non-IP networks to IP will reduce the management burden and help prepare the organization for business transformation.

4 Leverage hybrid cloud and network services

The future is a mix of clouds and public and private networks. Develop a scoring system that defines the performance, availability and security needs of each workload. Then many of the decisions about where workloads are hosted and what resources are allocated to them can be automated and workloads reassigned/ bursted into different environments as demand changes.

5 Segment networks and traffic

Many organizations, including ones in the public-sector, still fail security assessments, like the Payment Card Industry Data Security Standard (PCI DSS). And many struggle to deliver the performance needed for core apps consistently. These problems are often due to a failure to appropriately segment networks and prioritize traffic.

Segmenting infrastructure that carries or stores sensitive information can make it easier (and cheaper) to protect data. It can also help improve performance. You don't need SDN for effective segmentation, but it can certainly make it easier.

6 Identify strong partners for the future

The challenges to achieving all the things that we've discussed in this paper are familiar: lack of budget and time, and difficulty keeping pace with the rate of change. Managed service providers can help.

They can provide specialist skills and knowledge, augment internal capacity, and free up the internal team to focus on governance and monitoring how well the network aligns to the organization's needs.

This can help you improve information sharing, streamline operations, detect and block cyber threats, and meet strict security and budget requirements.

How we're using SDN

SDN is just the latest major technological change in our ongoing network evolution. Like previous advancements, it's changing how we design, develop, manage, and deliver products and services. This is key to maintaining our leadership position in the industry. The goals of our SDN program are to:

Improve customer satisfaction

- Improve time-to-market and reduce the number of point solutions required.
- Enable agile service creation and rapid provisioning.
- Facilitate new pricing models and service offerings.

Deliver operational efficiencies

- Improve elasticity and scalability, network-wide.
- Automate operations, administration, maintenance, and provisioning (OAM&P).
- Simplify the delivery of security services.
- Enable dynamic traffic steering.

SDN is a major component of Verizon's technology platform for all service creation, provisioning, and operations. It already supports many products and in the future will underpin all wireless, fixed broadband, enterprise, and converged wireless and wireline services.

This will enable a variety of products and services, including: dynamic provisioning of bandwidth and cloud resources; secure hybrid VPNs; virtual customer-premises equipment (CPE); workload resource movement between different data centers; mobile private networks; sequences of network functions; multicast broadcast services; and machine-to-machine (M2M) services.

We're not only launching new SDN-enabled products, we're also using SDN to improve and add new features to many of our existing services.

Our networking portfolio.

Connecting users to applications — simply, securely and reliably — is our business. We can help you audit your apps and infrastructure, consolidate existing assets, manage your network better, and prepare for the future.

Managed SD-WAN

Managed SD-WAN takes the reliability of existing WAN technologies and makes them more elastic and responsive. Unlike traditional WANs, it's capable of bonding multiple WAN circuits — private and internet — into a single service.

It enables hybrid networking solutions where internet, Ethernet and MPLS services are combined into a multi-path secure hybrid network. It matches connectivity to application needs and routes traffic accordingly. Security is overlaid across public and private channels for consistent protection of data. Control is managed centrally, with deployment of service functions across the network in near real-time.

Managed SD-WAN in action

One of our early client-side implementations of SDN was at a Fortune 100 healthcare company that was selling several of its hospitals. The hospitals needed access to core systems to keep running during the transition, but for regulatory and commercial reasons the company needed to limit access.

Verizon led the project to create a segmented, multi-tenant network. After a successful proof-of-concept in our lab, we deployed the service to the affected sites. With the new WAN the customer was able to track traffic and manage services centrally. The ability to define and redefine the network in software not only achieved the separation objectives, but also led to cost savings, heightened security and better visibility into the network.

Wi-Fi for Business

Our Wi-Fi for Business solution offers a simple, plug-and-play Wi-Fi LAN service that is easy to use and deploy from the cloud. It includes CPE, the Verizon Management Portal and service desk support.

The Verizon Management Portal provides unified visibility and control, enabling you to monitor applications used over your Wi-Fi service. The service desk provides setup and onboarding in the portal, device monitoring and proactive outage notification, level 1 and 2 support for IT administrators, and warranty/replacement management.

SDN Awareness Workshop

Our SDN Awareness Workshop can give you a concrete understanding of SDN concepts and help frame these in the context of your organization. The workshop covers the benefits of adoption, existing industry standards and solutions, reference use cases, and the challenges faced in incorporating SDN into your infrastructure. It will help you get started on your SDN journey.

SDN Strategic Assessment

This service combines onsite discovery sessions with an analysis of your IT environment and organizational requirements to create a detailed strategy for adopting SDN. We can also help you build a business case and create an implementation roadmap so you can improve network management, launch new capabilities more easily, control costs, and develop new revenue models.

Secure Cloud Interconnect

Secure Cloud Interconnect (SCI) gives you a direct, private connection (keeping your traffic completely separated from public internet traffic) between your infrastructure and the data centers of a growing list of cloud service partners. These connections provide secure, virtual, consumption-based private network bandwidth, leveraging pre-provisioned access to cloud resources. This means you have true bandwidth-on-demand with usage-based pricing.

The SCI portal and open APIs provide the visibility and control you would expect from an SDN solution – including access to interface configurations, cloud service provider details and utilization statistics, and the ability to add/delete VPNs and establish connections to key cloud service providers.

Wireless

Verizon is a leader in wireless communications in the US. We were the first to build a large-scale 4G LTE network and integrate it with our wireline services. We have extended our integrated capabilities outside the US by partnering with wireless carriers in Europe, Canada and Asia Pacific.

Private Network

A part of our overall wireless capabilities, the Verizon Wireless Private Network enables you to extend your corporate network to your employees' mobile devices, securely. This can help increase productivity and agility.

It can connect temporary locations and mobile sites and be used as a back-up connection. Many of our M2M customers use it to maintain the security of the data from their applications during transmission.

Private Network Traffic Management

An industry-leading wireless networking feature, available with Private Network. It enables organizations to prioritize critical applications and improve application performance, even during periods of persistent network congestion.

Private IP and Ethernet

Verizon's MPLS-based Private IP can give you a network as broad and dynamic as your organization. It lets you build a flexible, scalable network that offers any-to-any IP connectivity, and excellent security and reliability.

Multi-Service Ethernet

Our private Ethernet services enable you to connect your offices, data centers, and other sites to deliver both IP and non-IP traffic securely across a single Ethernet connection.

Dynamic Network Manager

This service simplifies network management and enables you to adjust the capacity of a WAN connection through a self-service portal with open-standard APIs. This enables you to scale connections to suit changing traffic demands on a site-by-site basis as needed.

With Dynamic Network Manager you can change your bandwidth speed to meet current needs or schedule adjustments for up to one year in advance.

To find out more about our vision for the network and how we're bringing it to life for our customers, visit: verizonenterprise.com/digitaltransformation

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