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What's Next for SDN?

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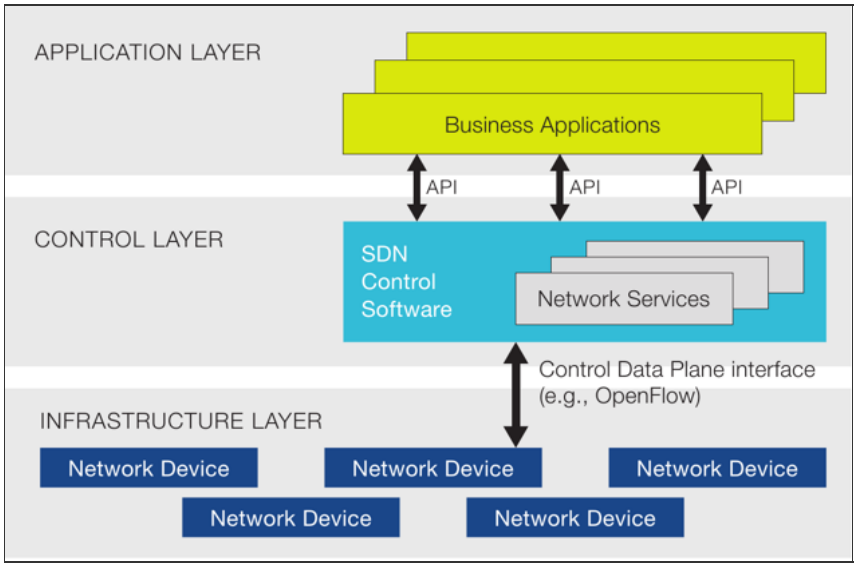
As I think about the traditional telecom network today, the taxi versus Uber is an apt metaphor. If I need a ride in the traditional taxi "system", I call a central number and hope they dispatch my request to an available cab. I'm at their mercy in terms of controlling the message, dependent on available capacity (cabs), and uncertain of when the cab will get there to pick me up to take me where I need to go. Contrast that to Uber where there is more capacity (notice all the cars with Uber stickers), and from my phone or PC, I can see what's available and know when they will pick me up. I make the selection based on my needs, pre-pay based on a known amount, and then get to my destination faster and probably less expensively.

Many traditional network providers are like today's taxicabs, wondering why they're losing business and then running to catch up with the rapidly changing demands of today's tech savvy customers. Amidst this environment of growing expectations and all-too-often flat-footed responsiveness, software-defined networking (SDN) offers an opportunity for many players—not just traditional network providers—to take advantage of abstraction to address customer demands while solving internal operational and network cost issues, as well.

A Simple Definition of SDN

Software-defined networking is an architecture that virtualizes the control and configuration of networks. SDNs are directly programmable which enable administrators to control a network's behavior through application program interfaces (APIs). The advantage is that it provides an agile management platform that decouples the control plane–decisions about where traffic is routed—from the data plane which determines how traffic is forwarded. The ability to offload work onto software to control or "orchestrate" increases network management flexibility and simplifies customized security policy implementation based on the application and use. In a simplified graphic, it looks like this:

SOFTWARE-DEFINED NETWORK ARCHITECTURE



Drivers of a New Architecture

SDN is part of a long history of efforts to make data networks more programmable. Internet usage began growing rapidly in the 1990s, and by the early 2000s, increasing traffic volumes, greater emphasis on network reliability, predictability and performance led network operators to seek improvements in network-management functions such as control over the paths used to deliver traffic.

SDN emerged in the early 2010s out of necessity from the growing demands placed on networks that were designed for a "simpler," more static computing environment. However, the need for simultaneous access to different databases and servers and greater capacity, together with the explosive growth of personal mobile devices, require a network with greater agility, scalability, and flexibility to access applications, infrastructure and other IT resources on demand. Faced with such complexity and limited by existing equipment and policies, the move to SDN is a matter of when, not if.

The Impetus to Adopt SDN

Despite early predictions that widespread SDN adoption was inevitable, the original architectural approach behind SDN has earned more interest than acceptance. Gartner estimates that there are less than 2,000 deployed networks that meet the architectural requirements for SDN. Many of these networks can be found among household names like Google, Amazon, Facebook, and Microsoft that have fully integrated SDN with their business plans.

These internet content providers (ICPs) also play a significant role in the growth of SDN by redefining how the underlying cloud networks are designed and operated.

The explosive growth of the internet and increase in broadband availability have fueled a nearly insatiable demand for online content including immediate news updates, blogs, streaming movies and music, social media sites and online retailers to millions of users all over the world. This demand has pushed the limits of scalability and traffic growth, driving new approaches to building and operating networks. ICPs also bring new solutions to the table with software playing an increasingly major role in achieving greater efficiencies, reduced capital and lower operating costs. This software first approach is also helping drive the acceptance of open source frameworks and with it, changes to networking gear and inter-operation that simplify installations, provisioning, and maintenance.

Even with its obvious advantages, SDN's adoption rate is still in its early stages among mainstream enterprise customers. A 2017 survey by *Network World* of 294 networking professionals found that almost half (49%) are either considering or actively piloting SDN technologies. Another 18% said they had already deployed SDN technology or were upgrading it within their organization.

Executives are aware of SDN's benefits, and the move toward agile development and continuous delivery is forcing companies to examine their own readiness for the new age of "everything-as-a-service" and pursue new goals like elastic scaling, agile provisioning, and disaggregation. Plus, with SDN, network maintenance is easier, less expensive, more flexible, and delivers new services faster. Ultimately, application delivery improved by SDN's operational efficiency, network automation, rapid time to service, cloud integration and accelerated revenue receipt will likely be the biggest drivers of adoption.

No Time Like the Present

For providers and enterprises still on the fence about SDN, there are additional reasons for adopting an open standards-based SDN solution sooner rather than later. Competitors are meeting

customer demands using multi-vendor, purpose-built networks, as well as companies like Amazon AWS that enter the SDN arena to provide data-center-to-data-center connectivity. There is also a demand for cross-border networks to link international customers to a provider with full connectivity to the cloud. Content customers are looking for on-demand delivery of services to manage operating expenses and only pay for what they use, whether for brief periods of days or weeks, or by the gigabyte or terabyte transferred. Access customers are looking to SDN solutions to mesh with their own service delivery functions for quicker installs for their end users. Network simplification, standardization, and orchestration of multi-vendor platforms in an SDN system reduce human error and installation intervals which means faster revenue recognition from the services provided.

From a customer service perspective, SDN-enabled self-service portals let customers quote, order, and manage services without delay based on the requirements of the end-user. Standard pricing, streamlined order submission, and order statuses further enhance the customer experience and differentiate a provider in this new SDN world. Similarly, reduced provisioning to a real-time, on-demand model gives customers increased control of their networks and provides the agility they need to address requirements for bandwidth changes or new services.

All these reasons for moving to SDN point to one obvious conclusion. In the future, service providers *without* SDN solutions will be left to compete solely as "vendors of last resort" based upon the uniqueness of their network access and diversity.

The Next Big Thing: Intent-Based Networking

While the adoption of SDN is still in the early stages, this hasn't stopped some in the industry from planning for the next big thing: intent-based networking systems (IBNS). Based on many tenets associated with SDN, intent-based networking builds on the ability for the network to monitor overall network performance, identify issues, and solve problems automatically without manual intervention. New machine learning algorithms position the network administrator in an almost futurist "think-it-and-it-shall-happen" role. The network administrator defines what they want the network to do (intent), and an automated network orchestration software implements those policies.

Intent-based networking holds promise for organizations of all sizes. All IT administrators want greater access control, scalability, security, and multi-vendor device management. IBNS makes those a reality by replacing today's tedious processes with automated software that instructs the hardware what to do. These operations are based upon the administrator's intent and interprets the data based on its context—the who, what, where, when, and how—for security, customization and faster operations. Moreover, IBNS has built-in machine-learning that can analyze, interpret, and apply all the data to provide predictive and actionable insights. This intelligence and efficiency will enable autonomous, self-driving networks for extremely efficient infrastructure planning and management.

Software-defined-networking and all it brings is the wave of the future that is happening today. Providers and administrators that embrace the technology now will be in a far better position to take advantage of the current benefits and future innovations it will deliver to the organization and end-users. And like the on-demand, smartphone-enabled taxi service, SDN enables users to control the use of the network and not the other way around.