

# SDN: POWERING THE NEXT GENERATION OF HEALTHCARE NETWORKS

**Healthcare technologies have proven their worth for practitioners and facilities in increasing the quality of patient care while saving time and streamlining operations. The Internet of Things (IoT) and big data analytics, coupled with wearable devices and other patient-centric technologies, have extended patient care beyond the four walls of traditional medical facilities and dramatically decreased diagnosis and treatment times. Additionally, electronic health records and pill dispensing systems are increasing the accuracy of patient care with fewer human errors.**

In some cases, however, the benefits of these technologies are outweighed by their impact on the network; such innovations can slow network performance sometimes to the point of ineffectiveness.

As a result, many facilities are moving to upgrade their networks to accommodate the technologies that are increasingly at the vanguard of health care. Indeed, Software-defined networking can be the bridge to help healthcare providers update their networks and avoid disruption. SDN helps organizations save money on networking infrastructure, reduces the complexity of managing networks, enhances security through added intelligence, and simplifies compliance, among other benefits.

Adoption of SDN in healthcare is growing, driven in large part by an increase in cloud computing, big data, and mobility technologies—which are all critical in delivering the new generation of patient-focused health care. SDN separates the data from the network intelligence, enabling network administrators to increase the efficiency of their networks while reducing complexity.

According to Accuray Research, the SDN market is expected to grow at a compound annual growth rate of 48 percent through 2025, to reach about \$432 billion.<sup>1</sup> However, analysis by ZK Research shows that the health-care sector traditionally has been slow to adopt new networking technologies, under the assumption that doing so would prove too disruptive. This mode of thinking exists even as the complexity of healthcare networks continues to rise, creating potential for even greater disruption should the network fail.<sup>2</sup>

## **BENEFITS OF SDN IN HEALTH CARE**

The impact of data-intensive applications and increased connectivity demands are changing the way networks are being built. SDN helps to ease the complexity of the network. Its benefits are many, ranging from agility and cost savings to efficiency and security. In particular, SDN offers benefits of interest to healthcare providers, including:

## **NEXT-GENERATION APPLICATIONS SUCH AS BIG DATA AND DATA ANALYTICS ARE FURTHER PUSHING THE NEED FOR BETTER, MORE RELIABLE NETWORKS**

**Centralized provisioning and management:** Software-defined networking separates the intelligence of the network from the data, enabling network administrators to manage the devices on a network from one central site. Using an SDN controller, organizations can provision all of their network resources in all locations, saving time and money by reducing the amount of manpower needed at each facility. What's more, updates to the network, including those affecting regulatory compliance, can be delivered to all network devices with the push of a button, ensuring all network elements are current and compliant.

**Better security control:** Central management also benefits the security of the network, with SDN controllers providing a central point of control to distribute security and policy information consistently. As more devices are added to networks, ensuring each has the proper security controls can become challenging. By centralizing the management of security for all devices on the network, however, healthcare organizations can ensure their networks—and the devices connected to them—are secure and compliant.

**Lower operating costs:** Because many routine network administration issues can be centralized and automated with software-defined networking, healthcare organizations that adopt SDN can save on manpower costs. Central management means tasks are completed more quickly and with a lower risk of error, further reducing network administration overhead, especially in organizations with multiple locations.

**Lower hardware costs:** The open-source nature of SDN enables organizations to reduce reliance on their existing hardware for software-defined networking, as all the intel-

ligence lives at the controller. This not only can help organizations save money, but also provides a smooth path for migration.

**Application performance control:** Centralized management also gives organizations control over data traffic, which can help ensure that applications perform as expected. More critical data—such as those needed for patient diagnosis—can be prioritized for immediate delivery over applications that are not considered mission-critical. The ability to shape and control data traffic ensures the right services are delivered first.

### **SDN IN HEALTHCARE: BIG DATA, CLOUD, AND VIRTUALIZATION**

Applications and technologies in the healthcare space, such as electronic health records or telemedicine, are fundamentally data-intensive, requiring hefty bandwidth and processing power to run effectively. Consequently, healthcare facilities have felt a drag on their networks brought about by these technologies, which were designed to enhance health care, not degrade it. Yet because most healthcare providers' networks were not designed with these technologies in mind, they are not powerful enough to handle such network-intensive needs.

What's more, next-generation applications such as big data and data analytics are further pushing the need for better, more reliable networks. Using big data and analytics, healthcare providers have the power to predict epidemics, more accurately diagnose and cure illness, and avoid preventable deaths. However, such technologies are placing unprecedented demands

on the network, and healthcare facilities are scrambling to find a solution without depleting their budget or disrupting existing applications and services.

Virtualization is one method organizations are using to address these issues. Through virtualization, organizations can reduce the amount of hardware their infrastructure requires, which could equate to cost and operational efficiencies by having less hardware to manage.

Cloud computing, meanwhile, is enabling healthcare organizations to work more flexibly and meet their goals of higher innovation, greater agility, and increased focus on patients. Via the cloud, applications and networks can be virtualized, and patient care can be enhanced through new services that are not readily available in traditional on-premises IT environments.

## **SOFTWARE-DEFINED NETWORKING HOLDS THE PROMISE OF GREATER EFFICIENCIES AT LOWER OPERATING COSTS**

SDN is helping networks keep pace without the need to rip and replace. SDN is an enabler of both cloud and virtualization technologies, by providing visibility into and easier management of network components, which helps make networks more agile.

In addition, more organizations are looking to SD-WAN to help them further address network complexity. SD-WAN is a next-generation solution designed to simplify complex networks, increase control and visibility, reduce costs, and deliver consistent network and application performance across a distributed enterprise. SD-WAN utilizes open-source technologies and provides a level of intelligence to the network that doesn't exist in traditional WANs, enabling smarter, more efficient routing of traffic.

The application-aware nature of SD-WAN enables IT administrators to determine the most intelligent path for their applications, and to push, manage, and update policies for optimal application and network performance across their organization. What's more, SD-WAN is centrally managed, so all provisioning and changes to the network and applications are done from one location, reducing the amount of time and manpower necessary to manage the network.

### **EXAMPLES OF SDN USE IN HEALTH CARE**

SDN is proving its value in a number of vertical markets, and health care is no exception. A growing number of healthcare facilities are adopting software-defined networking to address a range of issues that include increased bandwidth needs and better network control.

Bay State Health is one such example. The healthcare provider used software-defined technologies to build out its data center, and now uses software-defined networking to connect its three sites. If one site goes offline, everything running on that network is switched over to one of the other two sites, greatly reducing downtime. What's more, the software-defined networking technology, along with micro segmentation and multi-tenancy technologies, are enabling the nonprofit to offer SDN services to other health-care facilities as a potential revenue generator.<sup>3</sup>

### **SDN IN HEALTH CARE: THE NETWORK IS THE KEY**

Software-defined networking holds the promise of greater efficiencies at lower operating costs. However, as with any other technology, the network is critical in delivering on that promise.

Health-care facilities need a highly reliable, secure, and flexible network. SDN and SD-WAN technologies can complement these organizations' existing networks, delivering unprecedented network visibility and centralized control to optimize network and application performance and security for all facilities in all locations. The ability to combine SDN with high-speed broadband delivers a new, cost-effective business model for adding broadband, and for creating intelligent IP VPN connections to accommodate the growing need for bandwidth as treatments and services become even more customer-centric.

Comprehensive and uncompromised connectivity is key to ensuring healthcare facilities can provide services in the manner that today's technology-centric patients have come to expect. The Internet of Things, cloud computing, big data analytics, mobility, and other next-generation technologies are enabling true digital business transformation in the healthcare industry. A solid and flexible network foundation is imperative.

## CONCLUSION

The growing popularity of next-generation technologies and services, such as big data and analytics, necessitate the transformation of legacy networks to support them. Software-defined networks hold the promise of lower cost, greater flexibility, and easier management for organizations of all size. In the health-care space, SDN technology can both support applications used today and help organizations prepare for the future, with the added benefits of streamlining operations, ensuring compliance, and realizing cost savings.

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<sup>1</sup> "Global \$432.2 Billion Software-Defined Networking Market Analysis & Trends - Industry Forecast to 2025," research report, Accuray Research, January 2017, <http://www accurayresearch.com/software-defined-networking-market-analysis-size-share-trends>

<sup>2</sup> "Bedside Software-Defined Networking and the Evolution of Healthcare IT," research report, ZK Research for Avaya, February 2016, <http://www.hitechtopics.com/content58311>

<sup>3</sup> Alissa Irei, "SDN Service for Sale ... from a Healthcare Provider?" TechTarget, March 2017, <http://searchsdn.techtarget.com/feature/SDN-service-for-sale-from-a-healthcare-provider>