Powering Patient-centered "Smart Healthcare" with SD-WAN

Transforming Healthcare Services with Silver Peak Unity EdgeConnect

Healthcare providers are continuously challenged to create higher value at lower costs, improve financial viability, comply with regulations and increase patient satisfaction. In parallel, they must also remain competitive among disruptive market entrants and oftentimes do this through mergers, acquisitions and partnerships and/or collaborations with complementary providers.

To address some of these business challenges, healthcare providers are turning to technology innovations such as:

- Telemedicine to expand outpatient services while helping bend the cost curve and boost revenue
- Virtual reality to enhance medical training
- Cloud computing for enhanced access and availability of Electronic Health Records/Electronic Medical Records (EHR/EMR)
- Artificial Intelligence (AI) to improve clinical and business tasks currently performed by humans
- IoMT (Internet of Medical Things) such as connected wrist bands to help improve the speed and accuracy of monitoring and diagnostics that enable more efficient and effective targeted therapy

The wide area network (WAN) plays a vital role in enabling these new healthcare services based on digital innovations. The WAN connects 'things' (e.g. medical devices, monitoring devices, etc.), applications, clinics, providers and patients together. Connectivity across the WAN must be reliable and secure to provide the best patient and doctor experience and service.

Market dynamics also impact the behavior of healthcare providers. There are new entrants to healthcare technology markets that threaten to redefine healthcare business practices. For example, according to Deloitte 2019 Global Health Care Outlook, Apple is adding diagnostic data to the iPhone, and Alphabet's Google unit is creating an API management layer, both of which will enhance medical information exchange between hospitals, physicians and patients.

Another evolution is an increased emphasis on building a value-based care model that focuses on the health outcome of the patient. It requires building a data infrastructure that enables seamless and secure communications between entities that can easily share a patient's information. Furthermore, these entities encompass convenient care facilities as they are expanding rapidly to provide specialized and lower-cost healthcare services. Supporting this expansion requires the ability to rapidly add new locations to their business — and their networks — with limited resources.

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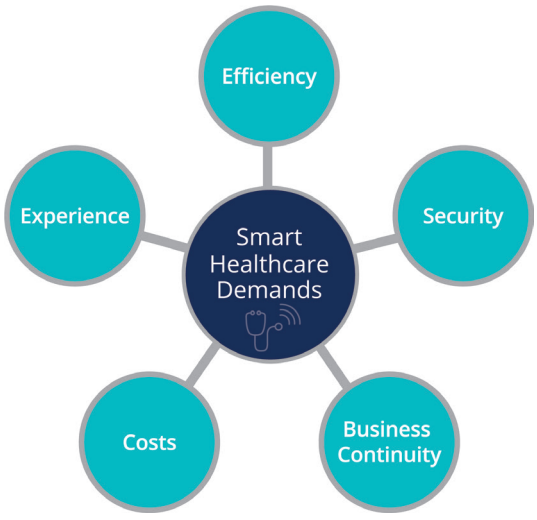
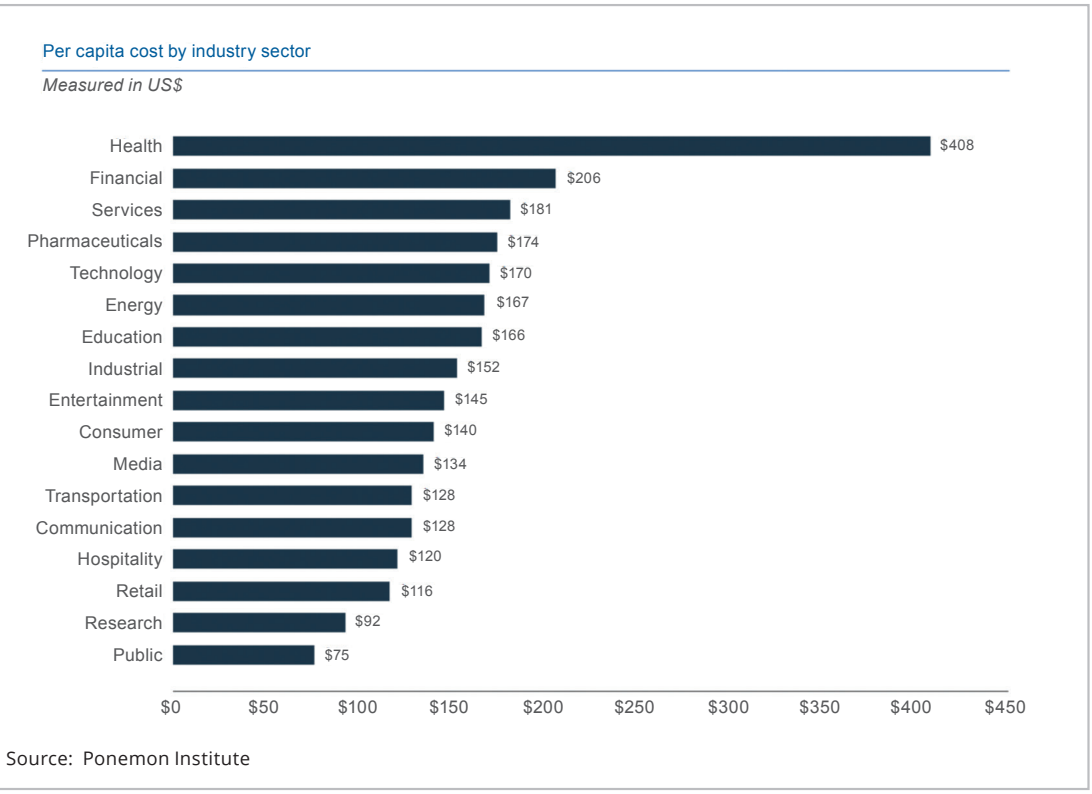
The Challenge: Today's WAN Infrastructure Can't Keep Up with Healthcare Industry Demands

Traditional router-centric WAN architectures are unable to meet the demands of today's data-driven healthcare services, and this is having a negative impact on efficiency, business continuity, experience, cost and security. Limitations of today's router-based WAN approach impedes a healthcare provider's ability to keep up in a number of ways that include:

- The prohibitive costs associated with private MPLS networks combined with the unreliability of broadband services to transmit massive amounts of data collected from medical imaging, monitoring devices and other data-intensive innovations quickly and efficiently
- Lack of intelligence to identify new traffic types like IoMT, virtual reality, telemedicine, etc., including cloud-based SaaS applications
- Inability to segment applications and services end-to-end across the LAN and WAN to minimize the attack surface and to maintain HIPAA compliance
- Limited flexibility and automation of router-centric architectures and long provisioning times for new or upgraded MPLS circuits impairs the ability to bring new care centers online quickly
- Manual management, cumbersome deployment and maintenance of the WAN that result in high on-going operational costs, shifting dollars away from healthcare innovation investments
- Lack of real-time visibility into traffic limits network troubleshooting abilities and fast time-to-resolution of application or network issues
- MPLS backhaul or use of broadband circuits that can't deliver consistent, high-quality patient services for VoIP, telemedicine services and access to cloud-based, data-intensive applications
- Inability to maintain 24/7/365 network resiliency or business continuity, impacting patient experience and satisfaction

In addition, healthcare providers have become high-value targets for cyber-attacks and have the highest incidence of and the highest per capita cost





Source: Ponemon Institute

of data breaches among all industries. According to privacy and information management research firm, Ponemon Institute, healthcare data breaches cost organizations an average of $408 per record. That figure is more than 2.5 times the global average across all industries at $148 per record. According to Ponemon, it takes more than six months on average to detect an incident and an average of 55 days — nearly two months — to contain it.

WAN Edge Requirements for the Healthcare Industry

In order to address healthcare business needs and IT challenges, the wide area network edge solution must:

- Accelerate the speed of transmitting large medical imaging files such as 2D/3D mammogram images, ultrasound images, X-rays and MRIs to PACS (Picture Archiving and Communication System) over the most cost-effective transport
  - Actively use multiple transport services including lower cost, higher bandwidth broadband services
  - Cost-effectively provide higher aggregate data transmission bandwidth with bonded tunnels using multiple transports
- Provide a secure and reliable WAN to transmit collected data to cloud-hosted or data center-hosted applications
  - Segment traffic within the clinic and across the WAN to protect data from unauthorized access, thereby minimizing the attack surface
  - Eliminate access disruptions to vital patient services including telemedicine and real-time patient diagnostic data caused by WAN link brownouts or failures
  - Provide an intelligent wide area network that enables new healthcare technologies such as IoMT, telemedicine, cloud-based applications, virtual reality and more
  - Ensure continuous access and availability to healthcare applications like EMR systems
  - Enable secure transmission and segmentation of IoMT traffic from other traffic

- Implement the appropriate security profile for different healthcare services with seamless service chaining to best-of-breed security infrastructure and services
- Ensure HIPAA compliance with dynamic application routing based on centrally defined policies

> Bring new healthcare centers and applications online more quickly

- Centrally orchestrate Quality of Service (QoS) or security policies for new applications and changes for current ones
- Leverage unified, centrally orchestrated network functions such as SD-WAN, routing, security, WAN optimization and visibility that simplifies the WAN edge and eliminates the complexity associated with configuring, deploying and managing disparate infrastructure
- Provision WAN connectivity at new locations services in days, not months, using broadband internet services instead of private circuits
- Secure WAN connectivity to maintain HIPAA compliance while delivering always-on, high-performing applications

> Reduce network operational costs freeing resources for further investment in healthcare services and innovations

- Accelerate troubleshooting with built-in real-time application and network visibility tools and alerts
- Accelerate deployment, maintenance and automation of network services via centralized orchestration
- Reduce WAN costs while delivering improved performance and security across the WAN

> Deliver an improved telemedicine service experience

- Provide uninterrupted connectivity across common cellular signals required for remote and/or mobile emergency telemedicine services
- Enable reliable bandwidth to support the communications between sites as well as access to applications including cloud-based applications such as EMR

> Optimize application-based traffic routing without backhauling

- Apply QoS policies over broadband for the different types of applications such as EMR, VoIP, lab systems, drug ordering, IoMT, telemedicine, virtual reality, etc. to continuously improve the services that the medical staff delivers to patients
- Easily and cost-effectively deploy a high availability WAN architecture that ensures no single points of failure to continuously provide availability of healthcare services and the best patient-staff experience

Silver Peak Unity EdgeConnect SD-WAN Edge Platform

Silver Peak is revolutionizing WAN architecture with a business-first networking model. A Unity EdgeConnect™ SD-WAN powers advancement in healthcare technologies to deliver on the promise of patient-centered, technology-enabled, "smart" healthcare, both inside and outside a healthcare provider's walls.

The Silver Peak EdgeConnect SD-WAN edge platform delivers the requirements needed at the WAN edge and provides unprecedented levels of business success, uniquely fueled by these four key differentiators:

Business driven — Healthcare organizations can optimize business applications and operations without being constrained by the wide area network. The WAN will just work based on business needs. IT drives and defines business intent policies for healthcare services applications from the centralized Unity Orchestrator™. With EdgeConnect, performance, security and routing are dictated by top-down healthcare business policies, not bottoms-up technology constraints:

> EdgeConnect enables the creation of virtual WAN overlays — or business intent overlays — for every class of healthcare service and business

application that specifies priority and quality of service requirements. EdgeConnect then routes application traffic based on the defined policies, improving delivery of all healthcare services.

- EdgeConnect provides simplified end-to-end network segmentation within and outside the walls of the clinic through centralized orchestration and automated enforcement of security policies maintaining continuous compliance. Each healthcare service is isolated and segmented from other services, minimizing the attack surface and maintaining HIPAA compliance. Cloud application traffic can be easily service-chained to industry-leading next generation firewalls or to cloud-hosted security services.

Highest quality of experience — Patients, healthcare providers and IT enjoy the highest quality of experience as the network becomes an enabler for delivering high-quality, highly available applications and services such as VoIP calls, telemedicine, transmission of large imaging files, etc., even over broadband.

- With tunnel bonding and packet-by-packet load balancing, EdgeConnect utilizes all available WAN transports to deliver higher bandwidth capacity, minimize bottlenecks and reduce WAN costs when transmitting imaging medical files, business applications and other healthcare services.
- With the built-in capabilities like QoS over internet and path conditioning using adaptive Forward Error Correction (FEC) and Packet Order Correction (POC) techniques, real-time VoIP and video application performance is greatly improved, enhancing telemedicine and clinical services experience. EdgeConnect maintains availability of healthcare services even during transport service brownouts and outages.
- With local internet breakout, cloud-based applications like UCaaS, business applications like Office 365 are dynamically and intelligently identified and routed to their closest hosting destinations, without backhauling to headquarters. This delivers the highest quality of experience.
- With a high availability architecture to build resilient healthcare facilities, any single point of failure is eliminated to maintain continuous business operations

Continuous adaptation — The EdgeConnect platform continuously monitors network resources to power real-time response, eliminating the impact of brownouts and blackouts on healthcare services and application performance.

- Continuous monitoring detects and responds to changing network conditions, automatically triggering immediate adjustments to maintain application performance and availability.
- Automated daily updates of SaaS application definitions and IP address ranges ensure EdgeConnect local internet breakout continuously delivers the highest application performance for SaaS and IaaS services.

Unified platform — By simplifying WAN edge infrastructure, healthcare providers can bring new clinics online more quickly. The EdgeConnect WAN edge platform is designed from the ground up as a single system, unifying SD-WAN, firewall, segmentation, routing, WAN optimization and application visibility and control in one platform:

- Centralized orchestration of unified network functions via Unity Orchestrator enables fast provisioning of new healthcare facilities, services and applications.
- Unified Unity Boost™ WAN optimization accelerates transmission of large imaging medical files to and from patient service centers several folds, resulting in a better experience for radiologists and patients.
- Centralized management provides complete observability of the entire WAN from a single pane of glass and accelerates troubleshooting to maintain continuous delivery of healthcare services; IT resource savings dollars can be shifted toward development of new healthcare innovations and services.

Numerous healthcare providers have already realized tremendous business and operational benefits after deploying the Silver Peak Unity EdgeConnect SD-WAN edge platform. For example, swyMed's DOT Telemedicine Backpack is powered by EdgeConnect which ensures uninterrupted voice and data communications enabling first responders to communicate vital patient data in any emergency. By bonding two LTE links together with EdgeConnect, swyMed achieves an aggregate signal quality in excess of 90 percent, bringing mobile telemedicine to areas that would have been impossible in the past due to poor signal strength.

For enterprises like Solis Mammography, a national leader in mammography and imaging services, integrated Boost WAN Optimization became a critical part of their WAN infrastructure to accelerate the transfer of large files over a mix of MPLS and broadband connections, delivering higher quality care with greater cost savings. For Nuffield Health in the UK, EdgeConnect was critical to deliver the best customer experience, improve network performance and securely support their cloud-first IT strategy.

Delivering the Best Patient-centered "Smart" Healthcare Experience

The wide area network is core to today's data-intensive and distributed patient care. Accessing patient records, displaying digital medical images through PACS, and delivering telemedicine services effectively—all depend on the WAN. The EdgeConnect SD-WAN platform is pivotal in addressing the WAN challenges and powering improvement in healthcare technologies to deliver on the promise of patient-centered, technology-enabled "smart" healthcare by:

- Delivering the highest quality telemedicine experience to both staff and patients
- Ensuring and maintaining HIPAA compliance
- Accelerating the speed of transmitting large imaging medical files to and from patient service
- Bringing up new clinics online quickly and securely
- Embracing the cloud to deliver secure, high-performance medical services and applications

BUSINESS DRIVEN

Nuffield Health

Enabled cloud-first strategy and extremely fast deployments with SD-WAN installed in 189 sites in just four months

HIGHEST QUALITY OF EXPERIENCE

SOLIS Mammography

Increased application performance by 50 percent and lowered cost by 40 percent per year. Allowed to prefetch images usually taking 13 hours in only 4.5 hours

CONTINUOUS ADAPTATION

swyMed

Enabled emergency teams to initiate live consults with remote medical experts by improving the cellular signal quality by over 90 percent

UNIFIED PLATFORM

USANA

Increased application performance fivefold and cut WAN costs by $30K/month by retiring branch routers and consolidating on Unity EdgeConnect

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