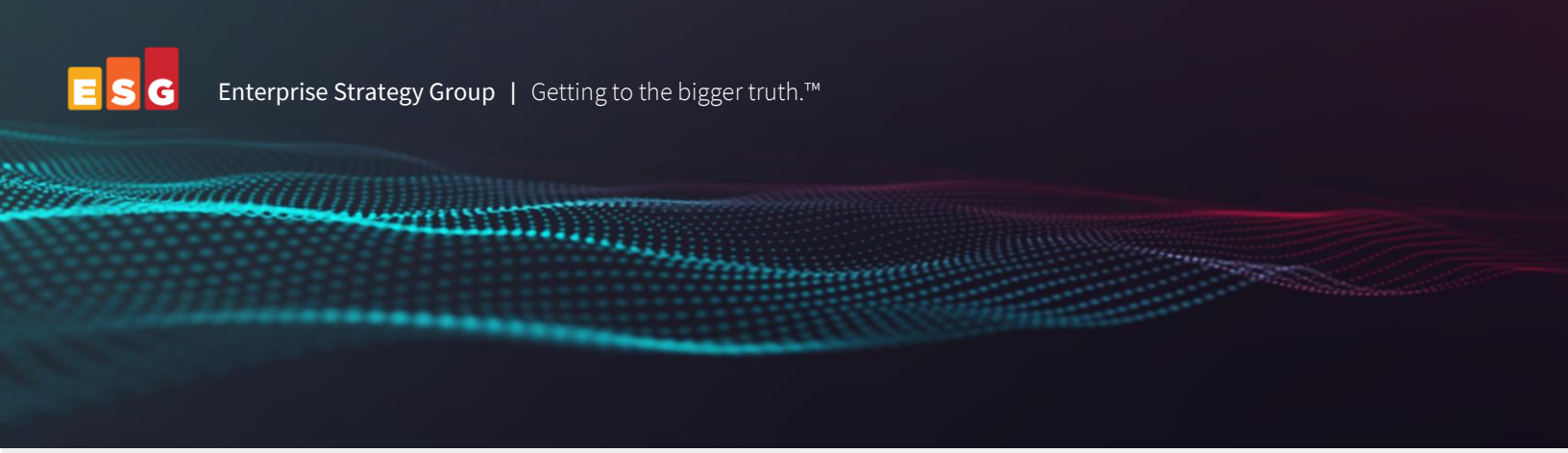

ESG WHITE PAPER

The Positive Impact of SD-WAN on Healthcare

How Technology Is Helping to Enhance the Patient Experience

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A Rapidly Evolving Market

The healthcare industry continues to evolve—from both a technology and business perspective. Advanced, innovative technologies are dramatically improving healthcare, from diagnostic imaging and scanning tools to the digitization of medical records. On the business side, the industry continues to consolidate, with metropolitan or regional medical providers absorbing local clinics and rural practices, and large retailers acquiring pharmacies, minute clinics, and urgent care facilities. And most recently, all healthcare organizations have had to adapt to working through a global pandemic.

All of these changes will result in providers delivering higher levels of care and a better overall experience, e.g., improved access to new diagnostic tests, more precise and rapid test results, and remote access to specialists who may be hours from the patient's location. Healthcare providers are now working harder than ever to provide the same high-quality care to customers visiting their main facilities as they do in geographically distributed clinics, urgent care centers, pop-up testing centers, and rural offices.

To meet these rapidly evolving requirements, healthcare organizations are increasingly embracing digital transformation initiatives to efficiently deliver the correct workflows, policies, processes, and IT environments that can give their customers an enhanced experience. Electronic medical records (EMR), access to cloud-based applications, and a vast array of connected IoT devices are all assisting healthcare professionals to provide higher levels of service. New technology is making it easier for patients to attend a virtual or online doctor's visit, and for healthcare workers to collect, analyze, and access data about a patient's wellbeing via remote monitoring.

In fact, ESG research indicates that 23% of healthcare organizations report having mature digital transformation initiatives, up from 7% just two years ago, while 55% report they are either beginning or in process with these initiatives.[1] In addition, 94% of healthcare organizations currently use some form of public cloud service, whether SaaS, IaaS, or PaaS

It is vital for organizations to understand the effects of digital transformation—its effect on its customers and on the bottom line. An organization's underlying IT environment/infrastructure is a key enabler of digital transformation, essential for connecting to cloud applications, centralizing and accessing medical records, supporting pop-up testing centers, and transmitting diagnostic imaging and other protected health information (PHI) to and from patients and their healthcare providers. Based on ESG research, the most common goals for healthcare organizations embarking on digital transformation initiatives are providing a better customer experience (58%), becoming more operationally efficient (58%), and developing new data-centric products and services (42%).

Healthcare organizations recognize that the customer experience and driving increased operational efficiencies are critical and are looking for innovative IT solutions to help achieve these goals, while also ensuring security and mitigating risk. However, a number of challenges must be overcome as they transform into highly flexible and agile organizations.

The majority of challenges involve the network, connecting the main data centers and cloud applications of healthcare organizations to distributed urgent care centers, clinics, rural offices, and even pop-up testing sites and hospitals. Today the network challenges also extend to patient and healthcare workers' homes as these organizations shift to leverage telemedicine and virtual care, which require secure reliable connectivity. Unfortunately, many healthcare organizations still rely on outdated, legacy service provider-fixed network connectivity, which is creating a number of challenges and preventing organizations from operating as efficiently as they could and delivering an optimized customer experience.

[1] Source: ESG Master Survey Results, *2020 Technology Spending Intentions Survey*, January 2020. All ESG research references and charts in this white paper have been taken from this set of master survey results.

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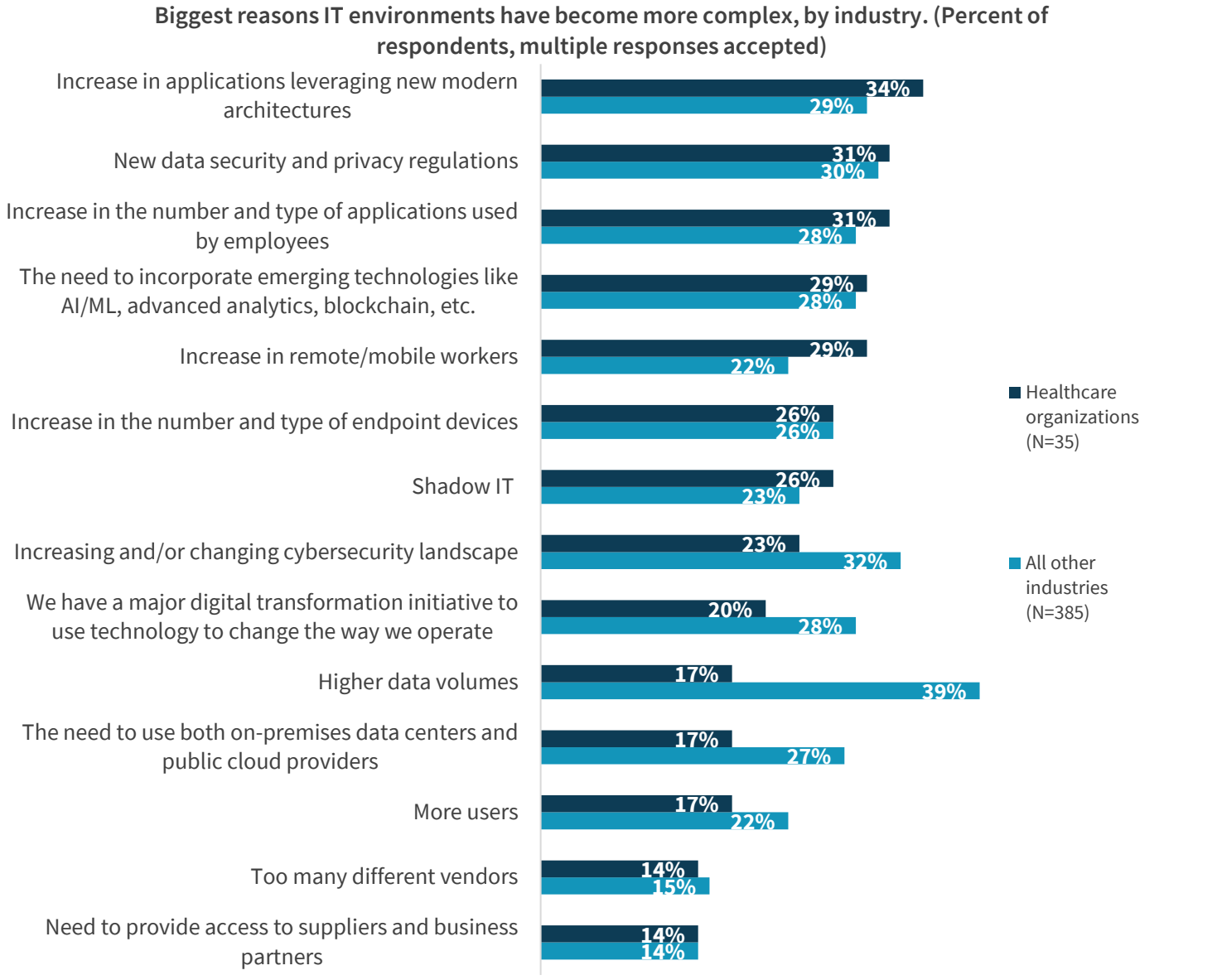
Challenges Adapting to New Environments

Healthcare organizations undergoing digital transformations, acquiring new facilities, and supporting rural locations and pop-up testing centers will face the following challenges, including:

- Increasing complexity of IT environment. ESG research shows that nearly two-thirds (66%) of survey respondents from the healthcare sector believe that their IT environment is either more complex or significantly more complex than it was relative to two years ago. Why is that? More than one-third (34%) of respondents cited that they are seeing an increase in applications leveraging new modern architectures, and 31% cited new data security and privacy regulations, while 31% cited an increase in the number and type of applications used by employees. In addition, 29% cited an increase in remote workers (see Figure 1). Clearly, healthcare organizations are modernizing their environments to support new applications and remote workers, while also enabling remote work.

Figure 1. Factors Driving Increased IT Complexity among Healthcare Organizations



Source: Enterprise Strategy Group

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- Growing numbers of connected medical devices. This factor was mentioned as a contributor to IT complexity, though it deserves its own breakdown. Respondents stated that an increase in the number and type of endpoint devices was creating complexity. For the healthcare industry, this goes beyond just laptops, tablets, and phones and extends into connected medical devices and IoT devices. In fact, ESG research shows that 40% of healthcare organizations have IoT initiatives underway, with another 40% planning to deploy it within 12-24 months.

  This is significant—not only because the ever-proliferating number of connected medical devices creates more complexity for the IT staff, but also because the huge numbers of connected medical devices create greater risk. The greater the number of connected devices, the more expansive the attack surface. It is essential for organizations to ensure these devices remain segmented or isolated from applications that contain sensitive or private information (e.g., large imaging files or substantial quantities of small bits of information that need to be transferred over the wide area network [WAN] to centralized repositories in data center or cloud environments).

- Geographically dispersed locations. Hospitals located in large metropolitan areas are typically connected to one another with ample bandwidth and availability; however, these hospitals now need to connect these metro rings to regional clinics, urgent care centers, rural healthcare offices, and now pop-up centers and doctors' homes. These remote locations may also need to connect to cloud applications and services—as well as to one another. It may be difficult (and prohibitively expensive) to achieve adequate connectivity and resiliency in remote locations. This is problematic because organizations must be able to deliver the same level of application performance and experience regardless of the location.

- Critical security considerations due to the variety of traffic over the WAN. A great deal of traffic traverses the WAN in a distributed healthcare organization. IT must be able to identify and separate traffic generated from a wide assortment of all devices, electronic medical records, back office or productivity applications, and guest internet. To mitigate increased risk, IT must be able to differentiate between medical images or a virtual care/telemedicine session, and a user streaming an entertainment video over the guest network.

  Additionally, healthcare systems often need to communicate with one another, or provide a viable means to host visiting doctors. Remote locations must be able to collect and process insurance copayment and deductibles, typically in the form of a credit card payment. Healthcare organizations must ensure that every new health center or office meets compliance with a standard set of policies and technologies, validating that all traffic is segmented and secure, and there is proper alignment with existing firewall policies, which may entail sending IT staff to remote sites to validate proper platform configuration.

- Growing need for technology platforms to support telemedicine and virtual care. Organizations need to enable doctors and medical staff to leverage technology to deliver services to patients in remote locations or conversely, for medical staff to deliver services from home offices. This presents challenges related to ensuring both security and customer experience. This may require the use of live video, audio, and instant messaging for medical staff to communicate with their patients remotely.[2]

- Compliance with industry regulations. The healthcare industry must adhere to strict regulations set forth in HIPAA. The HITECH Act has increased penalties for data breaches, while there are even PCI compliance requirements for

[2] Source: InTouch Health, *Telemedicine vs. Virtual Care: Defining the Difference*.

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organizations to maintain a secure network for credit card transactions. Because medical records and diagnostic imaging are digitized, organizations must duly ensure this digital data is protected.

- Ensuring data availability. While data protection is important, data availability is just as important. In order to meet with a patient, doctors and other caregivers must access the patient's medical record—and if the patient files are centralized, organizations are dependent on the WAN. In remote locations where there may only be a single network link, that means significant risk.

- Legacy network infrastructure. One of the biggest challenges facing healthcare organizations is working with a legacy network environment consisting of fixed links (MPLS) that are costly, rigid, and have limited scalability. For organizations with distributed clinics, urgent care centers, offices, and now pop-up locations and home offices, IT teams will struggle to maintain a mix of dedicated and independently managed links. As each new location is added, organizations will struggle to spin up connections in a timely fashion. And with increased competitive pressure, organizations must ensure that networking costs are not cost-prohibitive.

How SD-WAN Can Enable Healthcare Organizations

SD-WAN solutions can help transform a hodge-podge collection of inflexible legacy WAN links into a dynamic enabler for healthcare organizations by delivering:

- Secure connectivity between remote offices, home offices, hospital data centers, hosted applications, pop-up centers, and cloud applications. Given the need for the healthcare industry to be compliant with HIPAA, HITECH, and PCI regulations, it should not come as a surprise that ESG research shows that improving security and risk management is the most common justification for new IT purchases for healthcare organizations. SD-WAN solutions provide encrypted traffic across broadband and MPLS connections.

  For many rural locations and home offices, the only connectivity available may be broadband, and SD-WAN enables secure connectivity. This is also a significant factor for organizations acquiring new locations, as broadband connections can usually be turned up much faster than MPLS links. One of the keys to offering enhanced security is that many SD-WAN vendors offer service integration with next-generation firewalls (NGFW) to eliminate any gaps in protection. When evaluating solutions, organizations should evaluate security ecosystems that SD-WAN vendors have built with NGFW vendors that include the following abilities:

  - The ability to leverage virtualization to segment all traffic traversing the network. Given the need to mitigate risk and reduce the attack surface, segmentation can ensure medical records are separated from PCI traffic or IoT/OT and guest internet. Although segmentation seems like an obvious step, a number of public data breaches have been the result of hacks on connected thermostats or HVAC devices that were not properly segmented. In those scenarios, hackers gained access to sensitive files.

  - The ability to segment traffic by type, and even link variety (broadband or MPLS if both are available). This is important for enhancing security posture and mitigating risk.

- Effective failover protection. SD-WAN technologies enable healthcare organizations to leverage a combination of fixed and broadband connections that can be used to ensure availability in the event of an outage. For example, a typical SD-WAN connection may have a fixed MPLS connection and two broadband connections. In other environments, organizations may deploy dual broadband connections with an LTE link for backup. Traffic flow will be segmented and based on priority going over one of those links. If a site has lost its MPLS link, SD-WAN would automatically divert

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that traffic to run on the best performing broadband link or LTE network. The most important applications would be given priority for the remaining bandwidth. This is critical because it means that even if performance were slightly degraded, an organization could continue to provide uninterrupted patient care and credit card processing. When the down link is restored, the SD-WAN rebalances the applications across the available links.

- Centralized and simplified control of policies and management. This is a key point for IT teams responsible for managing these distributed environments. In fact, based on ESG research mentioned previously, operational efficiency is a top goal of healthcare organizations and centralized control will enable that. This is because SD-WAN vendors offer zero-touch deployments and the ability to centrally manage policy and configuration. This allows organizations to dramatically reduce the time to provision a new site. Simply connect the SD-WAN solution to the internet at the remote site, and the rest can be done remotely. In some cases, this is done automatically, which will be very important for home offices and pop-up sites.

  Just as important as getting new sites up and running is the ability to quickly and efficiently enforce global policy changes. With a legacy routing environment, a highly skilled network engineer may have to connect to each device at every location in order to issue a series of commands via CLI to implement a change. This method could take days or weeks to implement across a large environment. With SD-WAN solutions, this may only require a few mouse clicks. Most importantly, these changes can be made using an easy-to-understand user interface (i.e., it does not require an advanced degree to use), thus allowing IT staff to focus on more strategic projects.

- Appropriate levels of performance to ensure the highest level of customer experience. Because SD-WAN technology enables organizations to leverage broadband as well as MPLS connections, each remote site will typically have access to a greater amount of bandwidth. Having additional bandwidth provides healthcare organizations with the ability to not only segment traffic but also prioritize it to ensure performance. This means that telemedicine applications with latency-sensitive voice and video are assured priority, even in the event of an outage. It may also mean that traffic is shifted to an alternate route if the current one can't support the defined performance requirements.

  Advanced SD-WAN providers leverage self-aware systems with artificial intelligence or machine learning to continuously monitor performance and automatically rebalance traffic (across broadband and LTE links) based on the assigned policy or performance requirement. This is a tremendous time saver and ensures the best possible experience for end-users. In contrast, if a link were degraded, end-users would complain to IT, who then would open a ticket with the service provider, who in turn would then undertake an investigation to potentially fix the problem. This process might take hours at best—and days or weeks at worst.

The Bigger Truth

Healthcare continues to evolve at a rapid pace. New diagnostic techniques and innovative connected medical devices are making their way into the lives of patients and professionals, and world events are driving the need for even greater levels of connectivity, collaboration, and security. Healthcare organizations continue to expand by acquiring clinics, urgent care centers, and offices in rural locations, in addition to enabling home offices as well as pop-up sites. As always, the goal is to ensure they can securely provide the highest levels of care and a better experience to all these remote locations.

As these healthcare organizations have become more geographically dispersed, the role of the network and more specifically, the wide area network has become more important. Unfortunately, legacy WAN solutions are costly and inflexible, hindering progress in many cases. This is especially true for organizations that need to connect remote clinics, urgent care centers, pop-up sites, and offices directly to cloud apps. It is time for these organizations to see how SD-WAN

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solutions can provide higher levels of service, operational efficiency, and customer satisfaction across the entire organization, from the largest hospital to the smallest home office.

SD-WAN solutions will enable healthcare organizations to implement a flexible, cost-effective, and secure WAN that will enhance the customer experience, while improving operational efficiency and employee productivity. SD-WAN technology is already proven in the field and delivering value to organizations. It is only a matter of time before it becomes ubiquitous in healthcare and expands to all locations. With all the consolidation that is linking remote locations to large healthcare organizations, now is the time to see how SD-WAN could have a positive impact on your healthcare organization.

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