White Paper

trustgrid

Connecting Cloud Applications To

Healthcare Providers and Medical Imaging Devices

Healthcare technology experiences unique challenges when moving to the cloud.

Tens of thousands of healthcare providers and medical imaging devices are rapidly embracing cloud applications to deliver online/mobile services to their customers. But healthcare software providers in this market are being held back from successful cloud migrations by their network connectivity requirements.

The technical limitations and complexity of legacy WAN solutions have become one of the biggest challenges for healthcare software providers seeking to capitalize on the benefits of moving their applications to the cloud. This white paper highlights the challenges that providers must take into consideration as they seek to connect healthcare applications to customer systems and medical equipment data.

Cloud migrations for healthcare applications

Unlike branch-to-branch networks, connecting cloud-hosted healthcare applications to a provider's facilities or data center presents challenges that are unique to the healthcare industry.

Compliance

In a compliance heavy industry such as healthcare, due diligence in selecting vendors should be thorough. The current infrastructure of healthcare has been built on a foundation of technology that has passed the rigor of previous compliance testing. But all of this must be re-evaluated with new compliance testing when moving to the cloud. Healthcare providers and medical equipment vendors will want to ensure that new solutions are both vetted and tested. New compliance standards have been established for the cloud to help software providers navigate these waters. Product and service vendors supporting a cloud migration should be asked about their ability to meet standards such as SOC 2 Type II and HIPAA.

- Amazon Web Services and Microsoft Azure maintain compliance to most major security standards and publish their compliance reports, including SOC 2, for customers.
- Many SD-WAN and other network providers are not compliant with standards such as PCI, HIPAA, and SOC 2 Type II. Some use partners for deployment and management that may also require compliance audits.

Security

The control and security of data is much easier when the application resides behind the same firewall as the provider or equipment it relies upon. Moving to the cloud forces a rethinking of some security functions such as reporting, access controls and the dynamic of how data is transported over the internet. A variety of pre-packaged security solutions are available (IDS, IPS, SIEM, IAM, etc) and allow for the easy implementation of security features that can strengthen an application's security posture far beyond what has been used historically. A cloud migration also presents a great time to begin thinking about the implementation of more advanced networking features like certificate-based authentication or Zero Trust networks.

- Encryption at rest is available in most major cloud providers but is usually not configured by default. Support for encryption at rest can vary widely by the service in use at the cloud providers.
- The configuration of users and organizations within public clouds is complex and requires extensive research of best practices and planning. The complexity of this task is often underestimated.

Coexistence with Legacy Systems

Moving applications to the cloud reshuffles and optimizes an organization's IT infrastructure. Modern application architectures allow for storage and compute workloads to be separated across geographic and organizational boundaries. New systems will sit alongside legacy ones and cloud resources will need communication with on-premise systems. As these hybrid cloud environments are being rearchitected, special consideration should be paid to where these resources will live, how they will be managed and, perhaps most importantly, how they will connect to each other. Reliable, highly available and secure connections will be required.

- Dedicated network connections from cloud providers, such as AWS Direct Connect and Azure ExpressRoute, deliver high bandwidth and low latency between legacy data centers and new public cloud environments. These solutions are priced by the hour and amount of data transferred.
- VPN connections may be an effective alternative if Direct Connect or ExpressRoute are not options, but require complex configurations and can be difficult to manage at scale.
- Software-defined networking options have emerged as a more flexible and inexpensive way to manage the connection between cloud and on-premise environments. Attention should be paid to a vendor's ability to support your particular cloud environment and customer deployment needs.

Heterogeneity of Customer Environments

Healthcare applications rely on the data produced by healthcare providers and on-premise medical equipment. Current WAN connectivity solutions such as VPN and MPLS were not designed for cloud environments and present a number of challenges during both deployment and management phases. Variability in onsite technical expertise, network configurations and security policies can complicate new customer deployments. While scaling connectivity to these heterogeneous environments adds to the management complexity as application providers must manage dozens, hundreds or even thousands of unique connections at great time and expense.

Networking solutions should be flexible enough to connect from the cloud to any customer environment without the need of advanced skillsets on site.

- Many SD-WAN solutions offer limited public cloud support for mission critical applications (high availability and/or multi-region failover). Native networking solutions from the public cloud providers can offer high availability or multi-region failover, but frequently struggle with other networking challenges that would be considered basic features of routers.
- Overlapping RFC 1918 private subnets (e.g., 192.168.0.0, etc) are a serious challenge when connecting from an application provider's network to a variety of different customer networks. Managing the NAT translations can be tedious and cumbersome, if it's even supported. Software-defined networking solutions offer features to handle this problem and speed up initial deployments.

DevOps Transformation

Moving to the cloud means gaining the ability to centralize operations, automate tasks and move to a more agile form of product/service delivery. Initially, the network had not been part of that transformation. Recent developments have changed this. Advances in software-defined networking have allowed for IT and software development teams to take greater control of connectivity between applications and operate with DevOps like efficiency.

By abstracting the complexity, incorporating automation features and allowing for flexibility in deployments, a software-defined network can begin to evolve and operate as fluidly as the applications it is serving.

- Basic coding skills with languages such as Python can automate many common tasks in all public cloud environments and software-defined networks.
- Training up networking teams for new responsibilities often creates concern about the stability of their positions. Focusing on the new challenges of public cloud and opportunities for the automation of manual tasks can help overcome this concern.

Time to Transition

Cloud migrations present a significant shift for healthcare software, medical equipment, and provider organizations. Not only are architectures and infrastructures being improved, but so are the workflows and staffing resources needed to get everything accomplished in both the short and long term. Considering the number of transformative changes occurring, it is not uncommon for timelines to take much longer than originally anticipated with many taking at least a year for an initial phase to be completed.

- Cloud environments can be configured to best practices from scratch in days or weeks. However, the steep learning curve and application compatibility issues will inevitably cause some schedules to slip.
- For healthcare application providers that connect to their customers, engaging each customer on issues from new network connections, firewall rules, DNS, or other changes may present the greatest scheduling challenge.

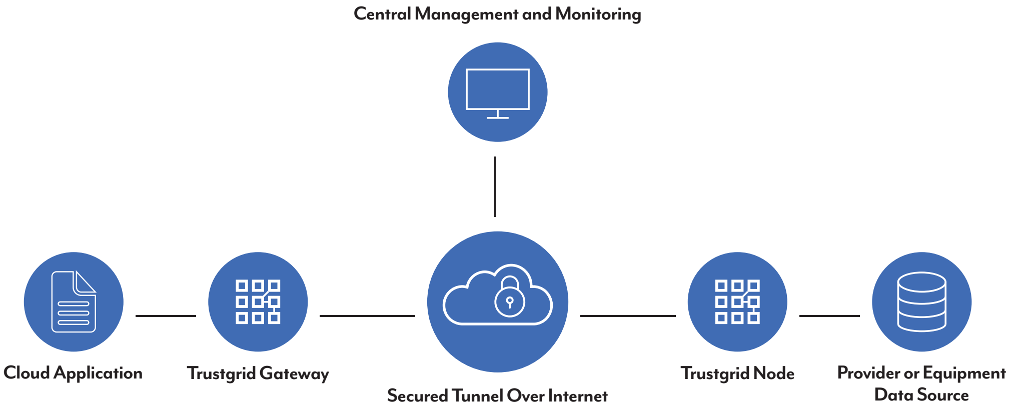
Often many of these cloud migration challenges are either not considered or under-appreciated in the planning phase. By getting in front of these questions early in the planning process, organizations can minimize the time to success and improve business outcomes.

Trustgrid enables seamless transitions to the cloud for healthcare technology providers that must integrate to on-premise data sources

Trustgrid's software-defined connectivity was designed for healthcare technology providers connecting to customer environments. As an application-specific networking solution, it has been engineered to facilitate seamless cloud migrations by securely connecting cloud environments to on-premise networks and devices.

Quickly Connect to On-Premise Systems

Deploy new customers in a fraction of the time by replacing legacy WAN infrastructure with a cloud-native networking solution that improves the visibility and control of hybrid environment resources.


Central Management and Monitoring
Cloud Application
Trustgrid Gateway
Secured Tunnel Over Internet
Trustgrid Node
Provider or Equipment Data Source

Trustgrid Software-Defined Network Architecture

For more information visit www.trustgrid.io

Lower the Cost of Connectivity

Trustgrid allows software providers to eliminate costly VPN and MPLS connectivity, enable remote monitoring, and automate management functions to deliver both hard and soft cost savings that are realized immediately.

Invest in Cloud-Ready WAN

Trustgrid's software-defined architecture is designed for today and tomorrow's hybrid cloud environments. This means your network is accessible, continuously improving and easily deployed in any environment.

Securely connect cloud-hosted healthcare applications to medical equipment or provider systems.

99.99%
Cloud to Customer Uptime

1
Deploy New Connections in as Little as a Single Day

50%
Cut Networking Cost in Half

0
Eliminate VPN and MPLS

The Trustgrid Difference

Networking

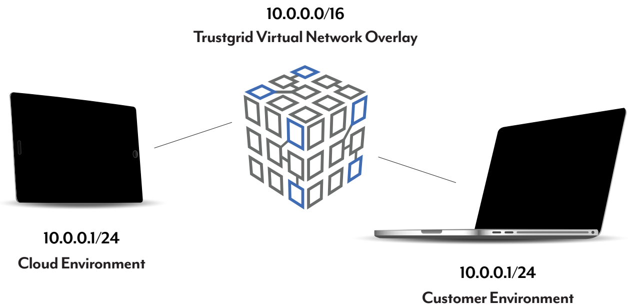
Eliminate dependence on VPN hardware and MPLS subscriptions with software-defined networking that meets or beats the performance of these legacy solutions. Advanced security, failover, and automated management features ensure greater security and reliability with less management overhead than traditional network solutions. Connections support high availability (99.99%) and are capable of ultra-high throughput for data intensive applications such as medical imaging.

Additionally, when connecting a customer's network to a cloud application, challenges arise when the two networks use a common IP space. Trustgrid also handles the challenging task of overlapping private subnets (RFC 1918) with intuitive network address translation (NAT) features. By creating a virtual network overlay, application providers are able to configure and manage segmented networks as if they are all on the same virtual network. This virtual network streamlines the management of connected customer networks from deployment to support.

Security and Compliance

Trustgrid is a SOC 2 Type II certified organization built for compliance with HIPAA, PCI, as well as many other cloud security standards.

Advanced security features including certificate-based authentication, Zero Trust networking, and granular activity logging work to enhance security over legacy networking solutions.



And because it is software defined, updates are continuously and seamless pushed to all connections to enable effortless patching and network compliance. The logs of these activities are then made available as reports for auditors or can be pushed to other security applications for analysis.

Management

From a single pane of glass, the Trustgrid cloud-delivered management portal gives complete control and visibility over all connections to provide centralized troubleshooting and support. This portal allows operators to see the status of all connections, be alerted to anomalies and centrally support all connected customers in a DevOps-like fashion.

The portal also provides role-based access control features which enables the secure co-management of connections. This gives a cloud software provider's customers the ability to monitor network connections and produce reports on the activities of their connected IT resources without having to manage the connections themselves.

Deployments

Difficulties in deployments cause frustration, loss of revenue, and poor customer experience. Trustgrid has streamlined and automated the way healthcare application providers establish initial connectivity between the cloud and various on-premise systems.

Leveraging software deployed as virtual appliances or on off-the shelf hardware appliances, Trustgrid accelerates deployments to cloud or on-premise customer environments and eliminates the need for onsite networking specialists.

Example Deployment

Step 1	An Amazon Machine Image (AMI) is deployed in the AWS environment using a Transit Gateway VPC.
Step 2	Trustgrid helps the application provider select a secure off-the-shelf hardware appliance and images it with Trustgrid software.
Step 3	A new customer or equipment site is sent the imaged hardware device with instructions to simply provide power and a network connection.
Step 4	Once connected, the device is configured from the application provider's cloud management portal.
Step 5	Secure connection is established remotely between the cloud and on-premise environments.

Hybrid Cloud Connectivity Consulting

Delivering on a cloud-first strategy brings a consistent stream of unforeseen questions, challenges and surprises. Trustgrid provides consultatory services to assist with the technical and operational aspects of network infrastructures that hybrid cloud environments require. Network analysis, connectivity roadmapping and implementations are all provided by a team of cloud networking experts.

The Answer is Trustgrid

From simplified deployments to automated management and support, Trustgrid has empowered some of the leading software providers to make the switch to cloud. Get cloud migration ready and connect with software-defined networking from Trustgrid.

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For more information visit www.trustgrid.io