

An aerial photograph of a dense urban skyline, likely Hong Kong, featuring numerous high-rise buildings and a large body of water in the background. The sky is blue with light clouds. The text is overlaid on the left side of the image.

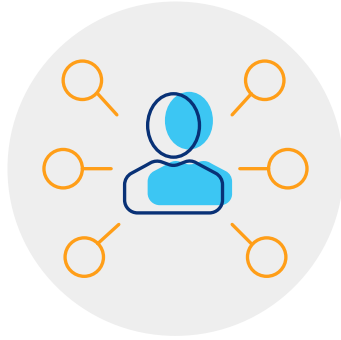
SASE: Architecting an adaptable enterprise for the post-pandemic world

October 6, 2023

LUMEN®

Adaptability is essential for today's landscape

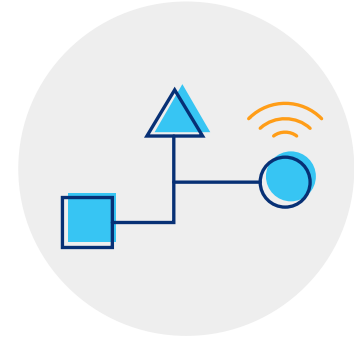
The global pandemic resulted in sudden shifts that have left a lasting impact summarized by three persistent trends



The adoption of hybrid work models



An evolving and expanding threat landscape



The proliferation of next-generation data flows

The adoption of hybrid work models

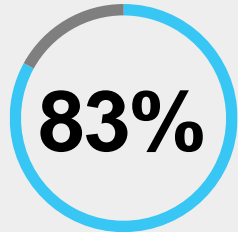
Employee advantages:

- Reduced or eliminated commuting
- Improved productivity and flexibility
- Better work-life balance

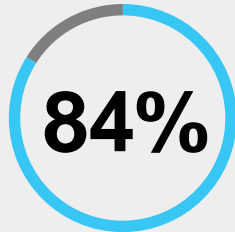
Employer advantages:

- Lower real estate costs
- Reduced turnover
- Better disaster preparedness
- Progress toward environmental goals
- Access to new pools of talent

Employees on remote work:



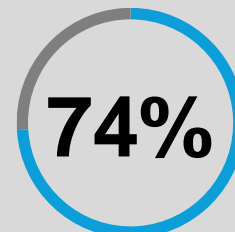
say they have better work-life balance ¹



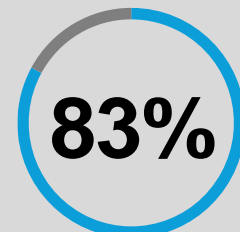
say they want to continue hybrid or remote work post pandemic ²



Employers on remote work:



of CFOs say they plan to make remote work permanent ³



of IT decision makers expect remote work policies to stay in place ⁴

The evolving and expanding threat landscape

The pandemic accelerated the shift to a distributed model of IT with band-aid solutions:

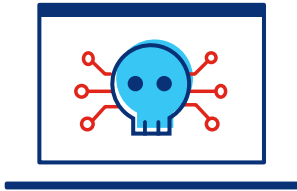
- VPN
- BYOD
- Hairpinned access to cloud, SaaS and services at the cost of user experience

The result:

- Unapproved devices and network access
- Shadow IT efforts
- Bring your own collaboration
- Security policies playing catch-up
- High susceptibility to malware, phishing, and botnet attack vectors

The evolving and expanding threat landscape

The risk-reward is overwhelmingly in cybercriminals' favor and encourages continued activity



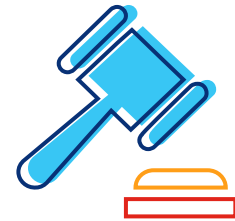
Ransomware attacks have increased nearly

500%⁵



The average payment to unlock corporate resources increased

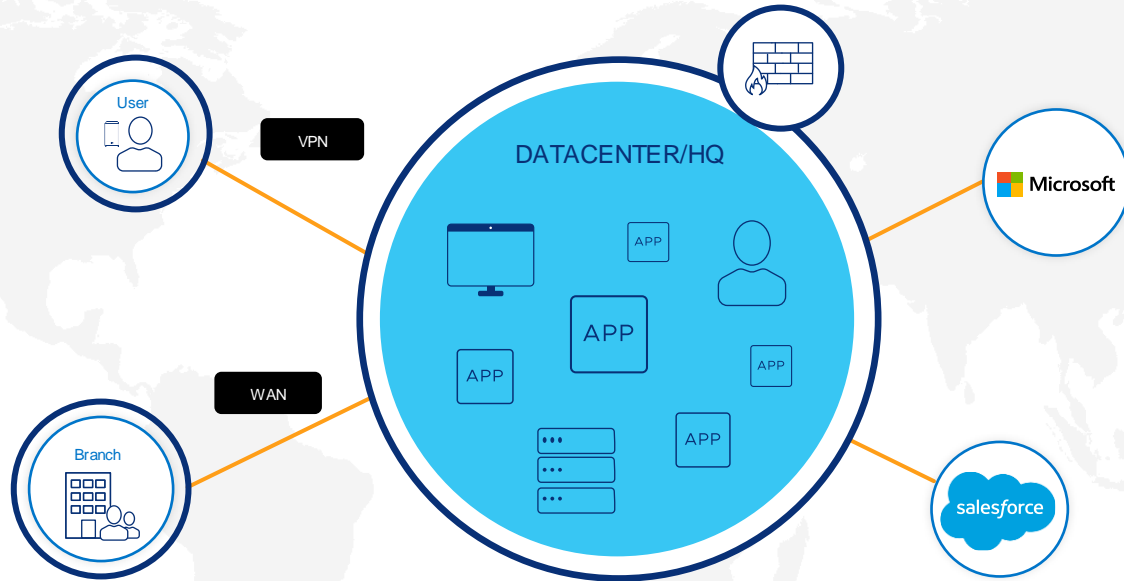
78%
to \$541,010⁶



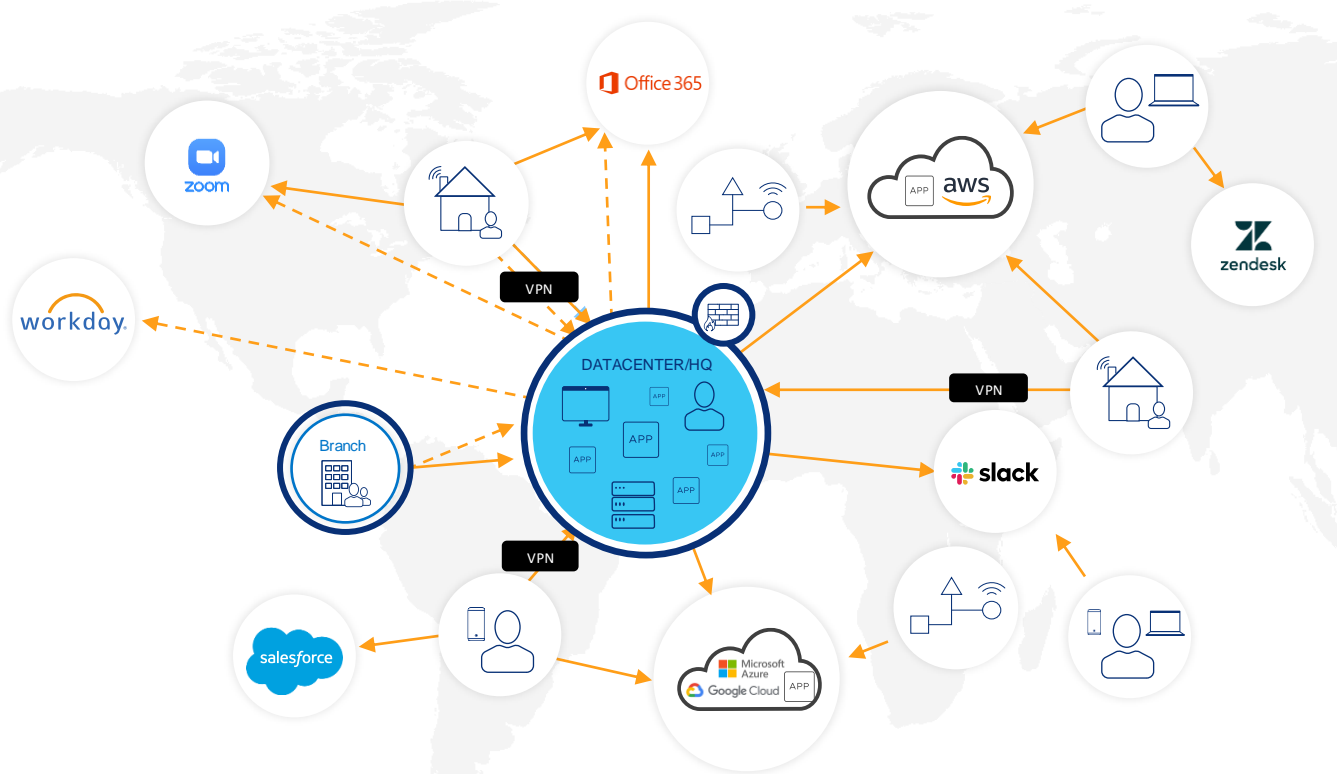
The ransomware prosecution rate is just

0.05%⁷

From defined WAN perimeter



To operating anywhere



**Any time
data moves
(or is created),
you are exposed**

**3 most important edge
security considerations:**

1. New network patterns
2. Larger physical footprint
3. Broader data footprint

**Where does your
data live?**

**What about emerging
apps and “what’s
next”?**

Next-generation data flows pose new security challenges as operational network threats impact traditional IT networks

Advances in compute power, AI, machine learning and IoT, are fueling vast amounts of data over networks.



The ability to move and harness data is integral.



91% of IT decision-makers say the ability to quickly acquire, analyze and act on data determines future leaders.⁸



90% of IT decision-makers say that edge compute is vital to their future.⁸

When addressed quickly and correctly, the impacts are substantial



Increased worker productivity:

- Up to 20% increase in worker productivity while keeping total investment flat⁹
- Enhanced security without sacrificing user experience



Enhanced security, reduced complexity:

- Increased security posture while consolidating dozens of security-related tools
- Visibility across all network operations, not just the corporate network
- Elimination of shadow IT through robust security and policy controls for BYOD, Web and SaaS



New levels of performance and agility:

- Agile deployments and the ability to expand and contract OPEX as needed
- Network readiness for emerging next-gen apps and experiences

Enabling hybrid and remote work boosts worker productivity

- People, devices, and the networks they access are in a state of perpetual movement.
- To maintain security and control, IT has to move away from force-fit access through centralized data centers.
- A cloud-native solution to *hybrid and remote work enables maximum network performance and security without compromising user experience.*
- IT benefits from strong security while workers enjoy an uncompromised user experience.



90% of employees say they are **as productive or more productive** working remotely when compared to the office.¹⁰

Up to **20% productivity increase** is seen in some employees working remotely each day.⁹

A converged network and security approach helps reduce IT complexity, eliminate shadow IT, and strengthens security controls and visibility

Reducing IT complexity of the average enterprise:



400+ applications deployed across on-prem, cloud and SaaS



Unmanaged devices exacerbated by the rapid shift to remote work and supply chain issues for company-issued laptops



Shadow IT solutions adopted by employees, particularly for file storage and sharing, productivity, collaboration and project management



New attack vectors from IoT operational data using traditional IT networks



Constantly changing network technologies



45 different cybersecurity-related tools

Businesses are striving to enact a converged network and security approach that:

- delivers contextual security
- provides enterprise-wide visibility
- is simple to manage

New network approaches increase business and IT flexibility



Moving toward a cloud-native future

By 2025

95%

of new digital workloads will be deployed on cloud-native platforms ¹¹

85%

of organizations will embrace a cloud-first principle ¹¹

Proactive organizations are enabling greater IT agility *and* performance:

- Connecting people, processes, apps, and things
- Enabling quick response to changing market demands
- Supporting agile deployments
- Expanding and contracting OPEX as needed
- Improving business resiliency and continuity
- Accelerating innovation and increasing competitiveness
- Supporting new data-rich, latency-sensitive apps & experiences

How SASE enables these outcomes through a converged network and security approach

Secure Access Service Edge, or SASE, is a new framework for network architecture designed to excel in a highly distributed, cloud-first world:

- Streamlines network access
- Enhances security
- Boosts network performance
- Reduces management complexity



The core attributes of SASE

A cloud-native architecture designed to increase network performance and agility, optimizing client-to-cloud latency by taking security to the edge, where the users and traffic are.

Contextual, identity-based policy enforcement at the edge for improved security, no matter where or how users are connecting and what they're attempting to connect to.

Centralized cloud-based management for simplified orchestration and enhanced visibility, all through a single service designed for reduced complexity and cost.



How the Lumen Platform enables SASE

A platform modeled on SASE is only as good as its underlying infrastructure

The Lumen network is one of the largest, most connected and most deeply peered networks in the world:

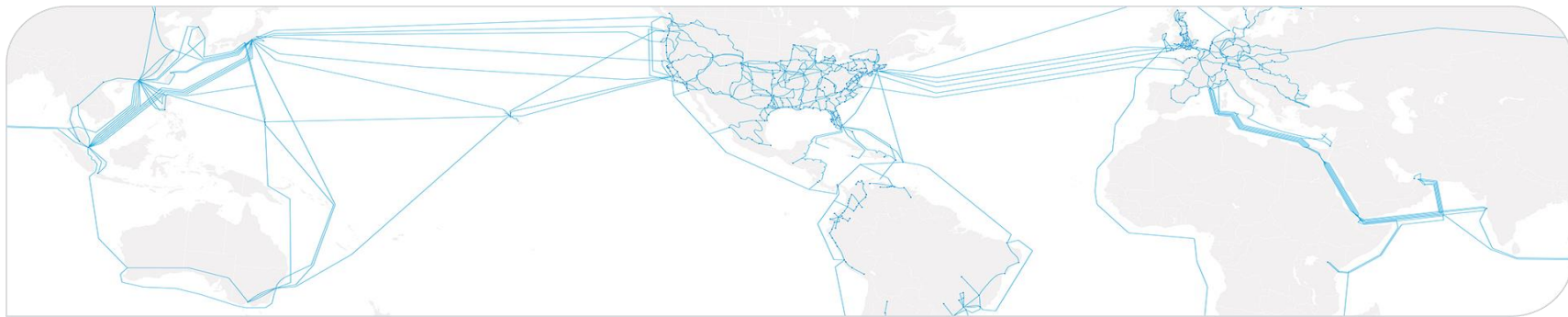
- ~450,000 route miles of fiber
- ~190,000 on-net fiber locations
- Services to customers in 60+ countries

The Lumen network is the #1 peered global network*:

- Dynamic connectivity to more than 2,200 public and private data centers
- Seamless access to all of the top cloud providers

Lumen excels at the edge to supercharge compute-intensive application experiences:

- More than 60 edge node deployments
- A dense metro IP network of PoPs
- Designed to deliver 5ms or less of latency to 95% of businesses in the U.S.



*CAIDA AS Ranking, May 2022

How the Lumen Platform enables SASE

Built on top of **Lumen network infrastructure** is the **Lumen Platform**:
A cloud-based network and security experience modeled on SASE attributes that is fully converged, centrally controlled, and flexibly managed.

APPLICATION



Integrated, cloud-native architecture



Secure any-to-any connectivity



Simple flexible management

INFRASTRUCTURE

The Lumen Platform

An integrated, cloud-native architecture

Combines Lumen's metro edge presence, cloud connectivity, underlying network assets, and market-leading SD-WAN and security partners.



Metro
edge



Cloud
connectivity



Lumen
network

vmware®

FORTINET®

VERSA
NETWORKS

paloalto®
NETWORKS

Abstracts away network complexities to manage resources as a service.



Scales on demand for enhanced organizational agility and performance where and when needed.



The Lumen Platform


Secure any-to-any connectivity

Combines expansive threat intelligence, connected cloud data centers, and leading security partner capabilities.

Provides secure access to work resources from virtually anywhere, on any device, at any time.

Through Black Lotus Labs[®], the Lumen Platform benefits from more than 200 billion NetFlow sessions, 1 billion DNS queries, and 2.3 million unique threats monitored every day.



**BLACK
LOTUS**  **LABS[®]**

The Lumen Platform

Simple, flexible management

Unites orchestration and management providing a centralized point of control and visibility into security operations and network traffic.

Can design, price, purchase and deploy software-defined network infrastructure and information security capabilities.

Flexible management options to choose from.



Self-managed



Co-managed



Pro-managed

Use Case: Enabling hybrid work with the Lumen Platform

A global semiconductor business depends on its design engineers, located across 40 locations. Faced with poor user experience and overwhelming complexity, the company sought a new approach to enabling secure hybrid work.



Challenges:

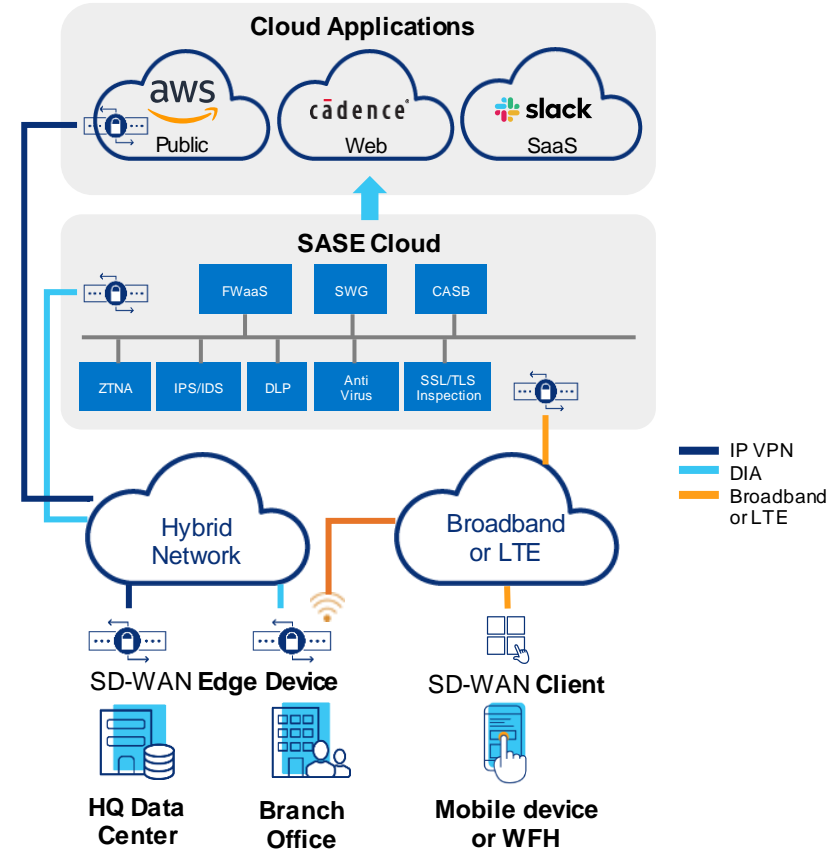
- Existing remote access solution heavily dependent on good network performance
- Using 60+ vendors around the world to connect its employees and secure work
- Different vendors with different SLAs
- Too many vendors involved to identify issues needing remediation
- Hard outages occurred frequently, and there was no immediate failover
- Impacted the business as engineers couldn't do their work

The Lumen solution

- Modest proof-of-concept, delivering connectivity to four sites with mixed business use cases, agreed upon SLAs, all based on a SASE model
- Deployment company-wide of an integrated software-defined approach that abstracted away network complexity, and a Zero-Trust approach for secure remote access to sensitive resources
- The Lumen Platform was used to centrally define security policies and manage operations

The results

- Engineers enjoyed improved performance and consistent network speed allowing them to complete their work
- Flexible network approach virtually eliminated downtime, enabling multiple failover states for any connectivity or resource issues
- Using the Lumen Platform, the IT team now had a simplified way to manage operations and gain visibility across the network
- While reliability was the key need, the solution also provided better scalability, management, and security for hybrid work



Use Case: Fueling Financial Services innovation with the Lumen Platform

A global financial services firm risked being left behind by faster moving competitors. It sought to increase its competitiveness by modernizing its technology to drive new innovations.



Challenges

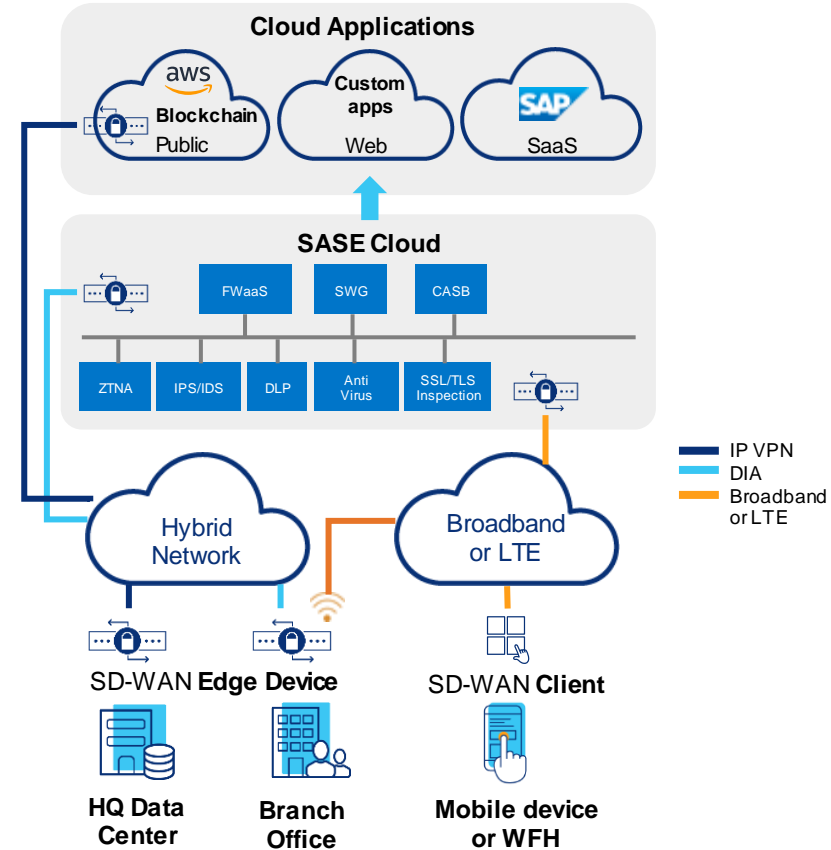
- 'Good enough' architecture is showing its age with on-prem datacenters not able to scale up new capabilities as quickly as needed
- Increasingly distributed processes for payment processing and settlement, remittances, credit approvals and other transactions requires more secure and performant network architectures
- Merchants and consumers are increasingly adopting new, non-traditional payment networks with new rules and standards, increasing pressure on the bank to support those with critical mass

The Lumen solution

- Augmented cloud capabilities enabling more agile DevOps, increased experimentation, real-time scalability of operations, increased ML-driven insights, and ability to rapidly support new payment networks
- Increased network and cloud security enabling more secure end-to-end transaction processing, and direct branch-to-cloud connectivity through a global network of PoPs
- Implemented network segmentation to reduce attack surfaces and provide PCI compliance across banking environments

The results

- Boosted innovation capabilities through secure cloud-based experimentation with existing platforms and emerging platforms like blockchain
- Ability to grow customer base through support of new payment networks
- Strengthens security and compliance
- Increased competitiveness through greater flexibility, value, and speed to market



Use Case: Simplifying network and security management with the Lumen Platform

A growing cloud-based online consumer goods company needed to expand sales to six branded retail locations and large ecommerce and social venues.



Challenges

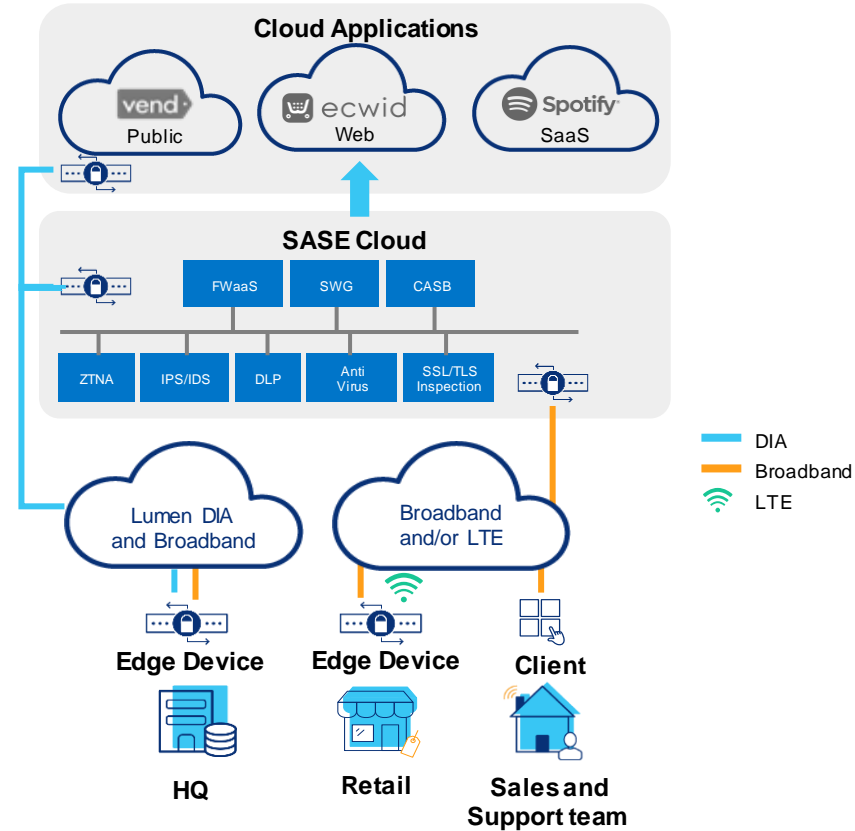
- Seamless integration of in-store and online shopping experiences supporting customer discounts and automated checkout, among other services
- The mobile account team required secure access to up-to-date customer data and site updates
- Maintaining application performance, segmenting users, and managing highly distributed secure access with limited IT staff

The Lumen solution

- Lumen architected and deployed a SASE-based solution supporting secure internet, broadband, and LTE access to retail locations, cloud applications, and remote staff
- Lumen edge devices were deployed at HQ and stores for improved application performance and traffic segmentation
- Using the Lumen Platform, IT teams centrally defined security policies and Lumen then provided pro-managed monitoring and maintenance

The results

- The Lumen solution enabled secure, performant application access, allowing distributed sales and retail staff to stay productive
- The mobile account team gained secure access from any device
- IT benefited from centralized management of network and security policies, and the ability to segment customer and internal application experiences to provide consistent quality of service.



Use Case: Increasing network performance and agility with the Lumen Platform

A healthcare system needed to minimize patient impact on hospitals while maintaining optimal patient care during the pandemic and beyond.

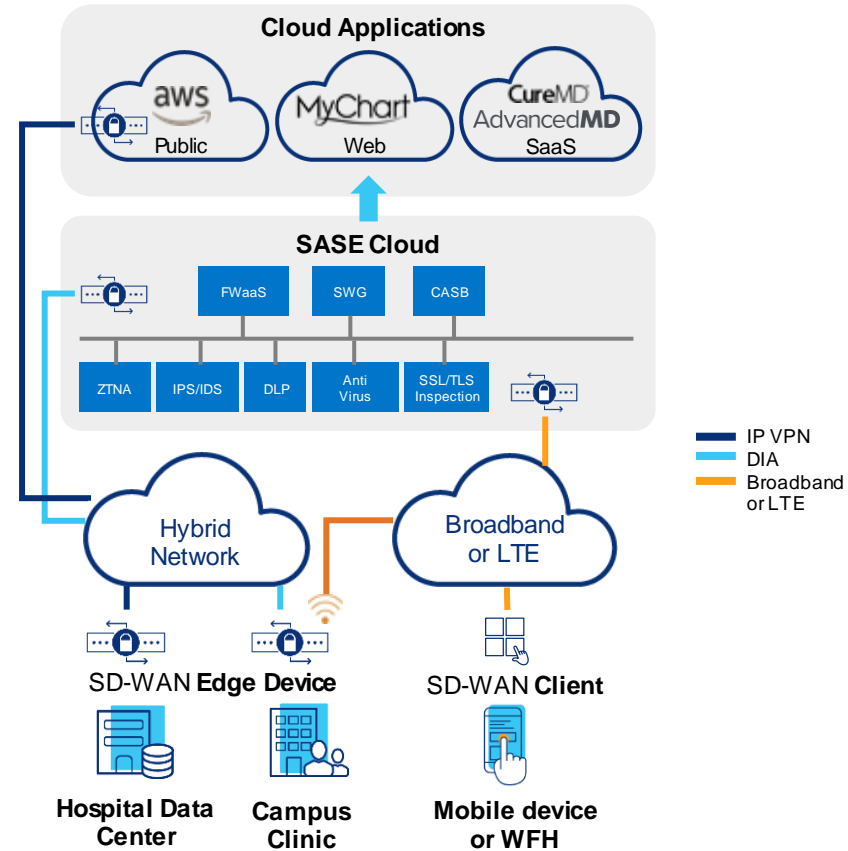


Challenges

- Distributed healthcare system made up of
 - two hospitals
 - 20 partner clinics
 - and a professional campus with partner servicesrelies on private data center storing personal health information shared with multiple cloud-hosted applications
- Need to greatly increase remote access to its electronic medical records application
- Need to accommodate significantly higher telemedicine consultations
- Required a new network and security approach to improve application performance, securely share compliant patient information, and ensure up-to-date accuracy.

The Lumen solution

- Lumen architected and deployed a SASE-based solution integrating and simplifying the secure, high-performance delivery of medical record applications
- Combined Lumen private and dedicated internet connections to segment data center traffic and share uninterrupted transport of critical data between hospital and campus environments
- Patient data collected across devices and diagnostics is privately shared while maintaining uninterrupted delivery
- Lumen network storage keeps patient data secure at the edge and regular snapshots reduce risk
- Broadband and LTE mobile user traffic was secured and prioritized using Zero-Trust Network Access to Lumen's secure cloud gateway
- The Lumen Platform enabled centralized policy management with Lumen handling monitoring and maintenance
- Application performance was improved by scrubbing traffic closer to the data source at the service edge and cloud gateways for mobile and remote users



A female scientist with dark hair tied back, wearing safety goggles and blue gloves, is focused on her work in a laboratory. She is wearing a white lab coat and is positioned in front of a piece of scientific equipment. The background is a blurred laboratory setting with other equipment and shelves.

The results

- Hospitals rapidly offloaded non-pandemic-related patients to partner clinics and telemedicine services
- Healthcare providers and patients benefited from secure and performant experiences, including:
 - clear telemedicine sessions
 - secure sharing of personal health information across devices, users and locations
- IT gained end-to-end visibility and policy control

Architecting the adaptable enterprise with Lumen

- The lasting impacts of the pandemic demand business outcomes that enable adaptability
- The Lumen Platform, modeled on SASE attributes, empowers organizations to achieve their outcomes
- The Lumen Platform enables highly secure, highly performant any-to-any connectivity for today's workloads and next-gen applications

Next steps

Discussion questions

Key areas to consider

Sources:

1. Citrix and OnePoll: Work 2021: Prepare for a Flexible Future, 8 December 2020, <https://tminahancitrix.medium.com/work-2021-prepare-for-a-flexible-future-d9f7a1effce>
2. Owl Labs: State of Remote Work 2021, <https://owllabs.com/state-of-remote-work/2021>
3. Gartner: Gartner CFO Survey Reveals 74% Intend to Shift Some Employees to Remote Work Permanently, 3 April 2020, <https://www.gartner.com/en/newsroom/press-releases/2020-04-03-gartner-cfo-survey-reveals-74-percent-of-organizations-to-shift-some-employees-to-remote-work-permanently2>
4. Lumen 4IR Report by Quadrant Strategies: Global Trend Report, July 2020, <https://assets.lumen.com/is/content/Lumen/global-trend-report-4th-industrial-revolution-4IR?Creativeid=d3d10187-3a60-4195-b0bf-d1d0528631c3>
5. Infosecurity Magazine: Ransomware Attacks Grew by 485% in 2020, 6 April 2021, <https://www.infosecurity-magazine.com/news/ransomware-attacks-grow-2020/>
6. Palo Alto Networks: Ransomware Payments Hit New Records in 2021 as Dark Web Leaks Climbed, According to New Report from Palo Alto Networks Unit 42, 24 March 2022 <https://www.paloaltonetworks.com/company/press/2022/ransomware-payments-hit-new-records-in-2021-as-dark-web-leaks-climbed--according-to-new-report-from-palo-alto-networks-unit-42>
7. U.S. Congressional Record: 28 March 2022 <https://www.congress.gov/117/crec/2022/03/28/168/54/CREC-2022-03-28.pdf>
8. Lumen 4IR Report by Quadrant Strategies: Global Trend Report, July 2020, <https://assets.lumen.com/is/content/Lumen/global-trend-report-4th-industrial-revolution-4IR?Creativeid=d3d10187-3a60-4195-b0bf-d1d0528631c3>
9. Stanford University: The ROI of Remote Work Productivity, 26 October 2021, <https://quiere.io/blog/p/remote-work-ROI.html#:~:text=According%20to%20studies%20on%20productivity,do%20not%20work%20well%20remotely>
10. Owl Labs: State of Remote Work 2021, <https://owllabs.com/state-of-remote-work/2021>
11. Gartner: Gartner Says Cloud Will Be the Centerpiece of New Digital Experiences, 10 November 2021, <https://www.gartner.com/en/newsroom/press-releases/2021-11-10-gartner-says-cloud-will-be-the-centerpiece-of-new-digital-experiences>