Agency Roadmap

Digital Transformation with SD-WAN

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Technologies driving digital transformation today, including cloud- and mobile-based applications, big-data analytics, network telemetry, and the Internet of Things, require optimal network performance and consume large amounts of bandwidth.

They require a robust and agile network infrastructure that can scale with IT platforms and adapt to user demands. That's why government agencies in the throes of modernization are turning to software-defined wide-area networks (SD-WANs), in order to provision connectivity and services at branch office locations, key regional and data center sites, and cloud environments in order to boost the power, efficiency, and scalability of the network.

SD-WAN overlay networks utilize intelligent, application-aware software to steer traffic over the optimal network technology, based on business policies and technical metrics. This means that government agencies do not have to depend solely on Multiprotocol Label Switching (MPLS) links for multi-site connectivity, but instead can consider hybrid wide-area network (WAN) deployments that leverage the internet and MPLS connections.

SD-WAN controls and automation allocate network resources to ensure users have access to the applications they need.[1] Other benefits include simplified, centralized WAN operation and management; increased network visibility and control; support for service chaining via VNF (virtual network functions), which supports a reduction in hardware sprawl; advanced network generation firewall features; and reduced costs, because SD-WAN eliminates the need to deploy specialized appliance-based WAN technology using costly fixed circuits or proprietary hardware. SD-WAN can increase an agency's security and allow for different levels of security depending on the type of application.

Modernizing a network with the introduction of an SDWAN overlay can take several approaches, depending on the status of the current network architecture, the inventory and embedded base of customer premise equipment (CPE), and willingness to adopt hybrid access technologies. The process can present challenges, including developing a transformation implementation plan, identifying workloads and applications that will require unique policy creation and oversight, overcoming operational skill-set shortages, and ensuring security is in place over public and private networks. Other challenges include outdated architecture, time-division multiplexing (TDM) support requirements, real-time workload optimization such as voice and video support, and prioritizing network traffic as additional locations are added. But an experienced partner and other agencies can help provide a roadmap to get an agency started. A comprehensive plan executed with an experienced managed SD-WAN service provider that has a track record of successful implementations can help agencies overcome challenges, reduce risk, and quickly see results.

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Assessing costs and benefits

Agencies often grapple with the cost-benefit analysis associated with SD-WAN, compared with traditional branch networking. A series of questions related to business value can determine how each will help meet agency goals. Agencies should ask:[1]

- How important is it for all locations to have continuous and consistent access to critical applications?
- Does it make sense to provision high-priced methods of transport technologies for lower-priority workloads and traffic?
- Is it time to look at how we can benefit from broadband internet access for groups of our applications?
- Do agency network technicians have enough time and knowledge to manage branch networking, either centrally or onsite?
- What is the cost of application downtime (which is often caused by network outages)?
- Will applications and network traffic volumes remain static or fluctuate at each site?
- Does it make sense to spend budget on overprovisioning network resources to support business-continuity/high-availability solutions and accommodate peak traffic times?
- Is supporting multiple types of hardware platforms and specific functional appliances at branch office locations becoming cumbersome and a drain on both capital and operating expenses and staff?

A detailed assessment of the agency's applications, topology, hardware, and transport connections can identify potential cost savings with SD-WAN, helping agencies demonstrate the benefit of WAN transformation.

Getting started

Based on its deep experience designing and deploying SD-WANs for customers of all sizes, Lumen recommends a four-step process for agencies getting started on the path to network modernization.

1. Identify the agency's business specific drivers for SD-WAN – such as cost savings, improved network visibility, tailored application performance, or greater security, and quantify those benefits. The rationale for SD-WAN should also be tied directly to digital transformation initiatives.
2. Undertake a thorough review of the agency's current environment, beginning with an inventory of sites, including types of offices; applications and performance requirements; and existing network connections and utilization across them. Determine whether SD-WAN will be implemented on premises in a dedicated model or in the cloud as a hosted model.
3. Explore which workloads would perform well on broadband internet links and which applications – due to more stringent performance metrics – require MPLS connections. In addition, identifying site types such as branch offices, regional offices, and data center locations by bandwidth, number of users, handoff requirements, and available access types is critical in determining where SD-WAN might fit in an overall agency-specific environment. Agencies should also consider whether wireless will be used as a backup connection or as a load-balanced connection in some cases.

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4. Evaluate the agency's current router platform and decide whether it will be leveraged or replaced. Often, SDWAN capabilities can be added to the router platform, preserving capital investment and reducing hardware sprawl. Operational staff benefits, too, from familiarity with the existing router platform and a streamlined approach to CPE via the support for service chaining features such as VNF support.

Gaining momentum – Choose a pilot

Following the assessment phase, the agency should build a roadmap, ranking sites agency-wide according to the greatest need – for example, agencies often start with the costliest network links or the most critical applications. Then, the agency can select specific remote locations with a limited number of regional larger sites to pilot SD-WAN. The pilot will provide a realistic test and demonstration of the value of SD-WAN and enable the agency to build profiles and templates for each location type, create policies and traffic rule sets to support traffic steering by application, and outline access types and other essential information, such as whether an SD-WAN appliance or Universal Customer Premise Equipment (uCPE) device will be needed to support multiple VNFs.

The pilot lowers agency risk and positions it for a successful phased migration to SD-WAN, across a broad range of sites throughout the network. Optimal application performance, increased traffic visibility, and cost saving results will help the agency gain support for continued SDWAN expansion.

A pilot and phased migration provides opportunities to fine-tune the agency's approach to SD-WAN and to meet short-term needs while taking steps toward long-term transformation. Early adopters have found that the greatest benefits – in cost savings, management simplicity, and application consistency – are gained as additional sites are deployed, giving agencies multiple reasons to expand quickly after initial success.

> An experienced partner can help with the initial inventory and assessment of sites and requirements, evaluate broadband internet vs. MPLS for agency workloads and locations, and design a solution that leverages the best connections available at each location based on reliability and performance requirements.

Security, of course, is a critical component of SD-WAN evaluation and planning. SD-WAN offers flexibility to connect directly with the cloud using the internet, bringing greater network efficiency. The principal challenge is managing that split tunnel connection between the enterprise network and the internet. To start, the agency's current security requirements must be lifted to the SDWAN. When fulfilling those requirements, new approaches can be considered. For example, the agency may move to an integrated, on-premises and cloud security solution spanning network segmentation, enterprise firewall, secure web gateway, and DNS-layer security. Such a solution provides centralized visibility and control of all traffic and protection against internal and external threats across all environments. Managing the network virtualization and security requirements involves experience and well-managed processes.

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Considering Managed Services

Many organizations lack the time, budget, and skilled resources to implement SD-WAN effectively, so they are turning toward managed SD-WAN services. According to research and consulting firm Frost & Sullivan, managed SD-WAN users report faster branch deployments, greater visibility into network and application performance, and more efficient network access to cloud applications.[2]

Managed SD-WAN service providers' ability to aggregate and manage network services from multiple providers, troubleshoot problems quickly, and simplify vendor management are the top three reasons enterprises choose a managed SD-WAN service, Frost & Sullivan found.[3] Partnering with a managed service provider can benefit resource-strapped IT teams by creating a shift in costs from capital expenditures to operational expenditures.

Agencies considering a managed service should evaluate partners based on multiple criteria: experience building networks and deploying managed network services, including SD-WAN across a range of enterprises; ability to customize solutions; support for private and public connectivity options; and expertise in the nuances of SD-WAN such as Day 0 builds of SD-WAN environments, including template and policy creation, orchestration and controller setup and oversight and network management. In addition, deep peering and direct access to most cloud providers, experience in providing network security solutions, managed broadband expertise, and professional services support are all critical elements to be considered when evaluating a managed SD-WAN provider.

Then, agencies should consider how the providers' solutions will work with their architecture – and define what they want from the partnership. Some agencies might want to be very involved with the development of how the SD-WAN overlay will interact with their current environment; others may want a more hands-off approach. For example, one agency might want 24/7 tech support across the entire WAN; another might want to relieve its IT team from upgrade management.[4]

SD-WAN as a Managed Service or DIY?

As agencies consider whether a managed service or self-managed SD-WAN is the right approach, they should ask these questions:[3]

- Do we have the expertise and resources to build the roadmap and research vendors?
- Do we have the necessary expertise and proven track record of past performance to transition, deploy, transform, and manage SD-WAN across a vast number of sites?
- Do we want to invest capital in on-site equipment or move to flexible, subscription-based operating expenditures?
- Can we provide our stakeholders with a service-level agreement for site deployments or availability?
- Do we have the experience to oversee numerous access and broadband providers to effectively manage a network that leverages a broad range of access types?

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Some agencies may want to go all-in on the managed services approach; others may not. A co-managed approach enables agencies to retain a level of control over their WAN operations. A provider offering both fully managed and co-managed SD-WAN will work with the agency to define the areas that a managed services provider will take on and the areas that the agency will retain.

Choosing Lumen

A managed services and security solutions provider, Lumen has deep experience designing and implementing networks worldwide, including SD-WAN. In addition to 80 years of network experience, approximately 450,000 route miles of global fiber, and 2,000 technicians worldwide managing customer networks and infrastructure 24 hours a day, seven days a week, 365 days a year, Lumen partners with leading industry OEMs. Lumen can assist agencies implementing SD-WAN, regardless of where the agency is in their journey.

The market recognizes the leadership that Lumen provides in SD-WAN. Notably, Lumen received the Frost & Sullivan 2019 Frost Radar® Award for Innovation Excellence in the North American managed SD-WAN services market. The award recognizes Lumen's market leadership, research and development investments and innovation in SD-WAN, visionary understanding of the future, and ability to effectively address new challenges and opportunities. Lumen also received the 2019 MEF award for Global SD-WAN Service Provider of the Year. This prestigious award recognizes Lumen's excellence and innovation in providing communications solutions optimized for the digital economy.

SD-WAN with Hybrid Networking

Solution components

Customer Portal
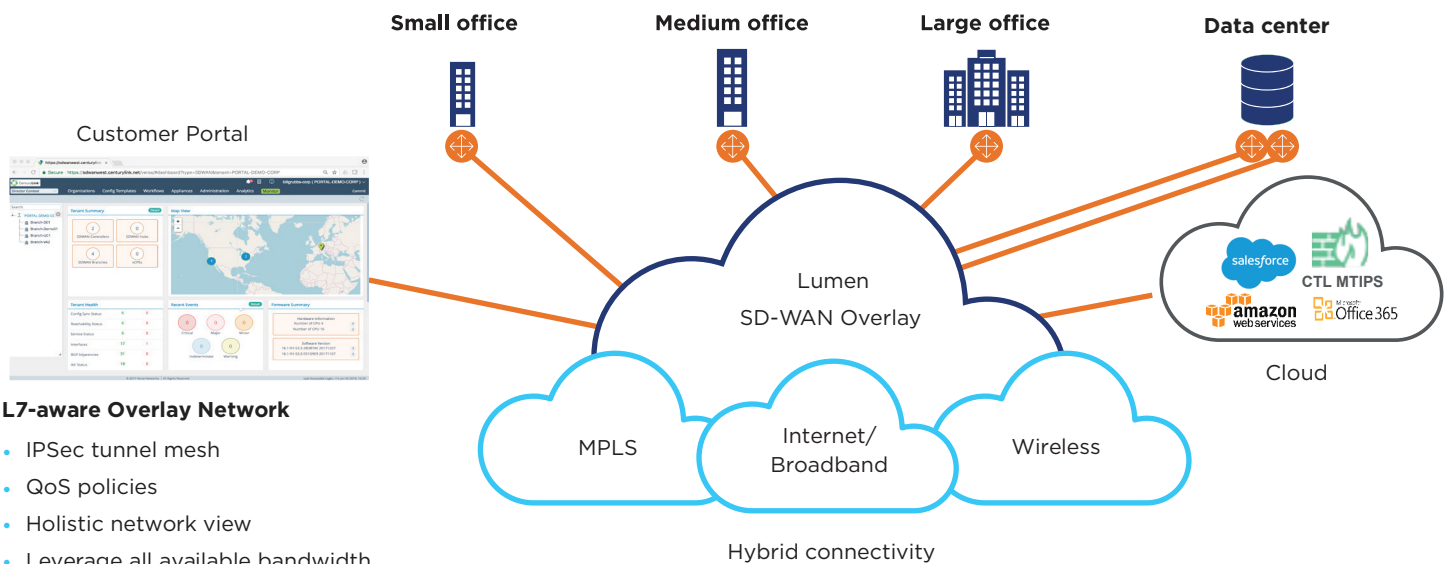
L7-aware Overlay Network
- IPSec tunnel mesh
- QoS policies
- Holistic network view
- Leverage all available bandwidth
- Improved Cloud/SaaS app performance

Small office

Medium office

Large office

Data center

Lumen SD-WAN Overlay

salesforce

CTL MTIPS

amazon web services

Microsoft Office 365

Cloud

MPLS

Internet/ Broadband

Wireless

Hybrid connectivity

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How to procure SD-WAN

Two recommended options for procuring SD-WAN are the General Services Administration's Enterprise Infrastructure Solutions (EIS) and Alliant 2.

EIS*	Alliant 2
Use Task Order Unique (TUC) or Individual Case Basis (ICB) contract line item numbers (CLINS).	Allows for rapid inclusion of new technologies; any solution included on the task order is automatically added to the contract. SD-WAN can be procured today on Alliant 2.
With TUCs, agencies can solicit custom solutions that are not otherwise defined and priced on the contract. A contract modification is not required.	An agency looking to implement SD-WAN can request the assessment, design, installation, implementation, and evaluation of the solution as a statement of work through an Alliant 2 task order.
Alternatively, one or more pre-defined EIS CLINs are associated with a single TUC for purposes of ordering the group as though it were a single service with a single price.	A flexible contract vehicle that focuses on IT solutions, Alliant 2 is designed with the flexibility to adapt to upcoming innovation. Leverage GSA's Alliant 2 guide.

*At this writing, the General Services Administration is drafting a modification to add SD-WAN as a managed network service under EIS.

Implementing SD-WAN in multiple locations: A success story

One organization, with operations in more than 30 states, routed communications from all of its locations to its firewall for security purposes. It needed more control of its network and its devices, so it upgraded its network with managed hybrid SD-WAN as an overlay. The SD-WAN incorporated MPLS and broadband transport for greater efficiency and performance, while providing centralized security, control, and visibility for all locations. Common security policies were applied at every location and routing of traffic through the headquarters firewall was streamlined. Now, the organization has one platform that can expand with whatever connectivity options are available at a new site. It also was able to share its VoIP system across sites, replacing 20-year-old phones at smaller locations.

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Roadmap to successful SD-WAN implementation

Assessment

- Review agency requirements, assessing current network state and performance
- Identify and document technical and business goals and objectives
- Identify quality of service needs and site priorities
- Review WAN circuits, alternate access methods, site cabling, rack space, and power

Design

- Begin high-level design efforts, followed by lowlevel design efforts
- Conduct SD-WAN site survey and begin custom template design

Installation and implementation

- Build environment, identifying top sites for initial testing purposes
- Load initial templates into centralized control environment
- Install SD-WAN capable CPE devices

Evaluation

- Test connectivity, validate management tools, configure IP parameters, install and test routing and security
- Perform tests with custom templates
- Perform edits/changes, reevaluate, and continue rollout based on data center(s) and site priority list
- Test/acceptance efforts and final overlay establishment

Footnotes

1. Assessing the Cost-Benefits of SD-WAN Services
2. Managed vs. Do-It-Yourself WAN: Which Approach is Right for Your Business?
3. 2018 U.S. SD-WAN End-User Survey Analysis
4. 4 Modernizing the WAN to Drive Digital Business

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