

HOW SD-WAN CAN FUTURE-PROOF YOUR OPERATIONS

As new technologies place greater demands on networks, network optimization solutions deliver peak performance.

EXECUTIVE SUMMARY

Increasing amounts of data are being transferred among data centers, cloud environments, branch offices and other remote locations, driven by data analytics, media traffic, storage demand and data backup. This traffic creates the need to optimize the performance of wide area networks (WANs) and the applications that run on them.

As traffic levels steadily rise, network administrators are also seeing an increase in latency-sensitive data transmissions. WAN and application performance optimization solutions, which deliver the scalability and throughput that this traffic demands, have become a necessity. Optimization uses several techniques to improve performance, including the monitoring and management of bandwidth capacity, network latency, protocols and overall network traffic. Techniques such as deduplication, compression, Secure Sockets Layer (SSL) and other protocol optimization are used to enhance performance.

Meanwhile, software-defined WAN (SD-WAN) technology is emerging as a networking approach that can deliver multiple performance and cost benefits, including end-to-end network visibility and feedback to improve transmission efficiencies on the fly. This technology also creates a painless pathway from proprietary hardware devices to software-defined WANs that are agile and programmable, enabling organizations to keep pace with IT innovations.

How WAN and Application Optimization Boost Network Performance

As IT environments grow more complex, applications are being delivered from a wide range of sources, including the internet, data centers and other remote sites, placing increasing demands on WANs. Network performance has become critical to efficiently handle latency-sensitive and mission-critical workloads. To meet the increasing need for more responsive, flexible, efficient and available networks, WAN and application performance optimization solutions have arrived to optimize bandwidth, increase visibility and give network administrators the control they need to ensure peak performance. Optimization solutions can also help an organization prepare for the demands of emerging network technologies, such as the Internet of Things (IoT).

WAN and application optimization solutions boost performance with various tools and methods, including:

Compression: Data compression applies an algorithm to data flows to remove redundancy wherever possible. The efficiency and effectiveness of a compression scheme is measured by its compression ratio, which compares the size of uncompressed data with compressed data. A compression ratio of 2 to 1, for example, indicates that the compressed data is half the size of the original data.

Deduplication: In a WAN context, deduplication is a form of data compression that conserves bandwidth by reducing the number of bytes transferred between endpoints without adversely affecting data integrity or quality.

Transport Control Protocol acceleration: This approach improves network efficiency and quality without changing the network infrastructure, enabling better throughput on an internet link than standard TCP allows.

SSL optimization: This technique allows SSL traffic to be safely accelerated across an internet connection without sacrificing security.

Protocol optimization: Some legacy file-sharing protocols don't operate efficiently over WAN connections. WAN protocol optimization tweaks these protocols to reduce latency. Protocol optimization can improve the efficiency of traffic that uses the Common Internet File System, File Transfer Protocol, Hypertext Transfer Protocol or Messaging Application Programming Interface, as well as general TCP traffic.

Application optimization and control: This term refers to tools and techniques that improve the reliability, performance and delivery of applications securely across a WAN.

Web caching: This optimization technique is used to temporarily store web pages from any web server to reduce bandwidth usage and server load.

The Power of the Software-Defined WAN

SD-WAN technology is emerging as a networking approach that is able to deliver multiple performance and cost benefits. An SD-WAN supplies the software abstraction necessary to create a network overlay and decouple network software services from the underlying hardware. For any organization managing multiple data centers, private and public cloud environments or critical branch operations, SD-WAN offers several key benefits, including increased agility, enhanced application performance and lower bandwidth costs.

With public and private cloud use rapidly expanding, WAN performance is critical to the handling of latency-sensitive and mission-critical workloads. Therefore, as organizations plan and deploy cloud strategies, WAN architectures should be carefully evaluated for their ability to support workloads, performance, availability and security. SD-WAN can play a key role in achieving performance goals securely, reliably and affordably.

SD-WAN Defined

SD-WAN supplies the benefits generally associated with software-defined networking (SDN), but in the context of a

SD-WAN Meets the Internet of Things

Software-defined wide area networks (SD-WANs) offer a level of control and visibility that dovetails nicely with enterprise Internet of Things (IoT) deployments. Mike Fratto, principal analyst for enterprise network systems with Current Analysis, is one of a growing number of network experts who believe that pairing SD-WAN with IoT networking makes a lot of sense.

Fratto notes that commercial IoT deployments usually incorporate a large number of devices, creating a major management burden. Furthermore, IoT

networks are often deployed in remote locations, where it can be costly to send technicians to troubleshoot problems. Finally, multiple access methods spanning wired and wireless networks are currently plagued by weak or nonexistent security. SD-WAN products deliver the automation, management and security capabilities to address these challenges.

However, many of today's SD-WAN products aren't deployable in the field at scale due to licensing costs, which can increase significantly as the number of locations

increases. Additionally, current SD-WAN hardware isn't usually hardened for use in outdoor or hazardous locations. Water, heat, vibration and electro-mechanical interference are some of the hazards IoT devices and associated technologies can encounter in the field.

Many experts such as Fratto, however, believe that as SD-WAN technology matures in the coming years, it will overcome these hurdles and deliver significant advantages to IoT deployments.



wide area network. By automating network deployment and management, both SDN and SD-WAN virtualize resources to supply enhanced performance, accelerated services delivery and improved availability while lowering total cost of ownership.

An SD-WAN operates by measuring essential network traffic metrics, such as latency, packet loss, jitter and availability. Using this data, the SD-WAN is able to respond proactively to real-time network conditions, selecting the optimal path for each data packet. In many instances, SD-WAN adopters can take advantage of proprietary capabilities that suppliers offer with their solutions. Riverbed Technology's SteelHead RIOS, for example, can accelerate SSL traffic across a WAN without requiring faking and spoofing.

An SD-WAN is often integrated into an organization's existing WAN. One advantage of an SD-WAN overlay is that it can support multiprotocol label switching (MPLS) as well as hybrid WANs, delivering improvements no matter what type of network infrastructure is already in place.

Inside the Matrix of SD-WAN, SDN and SDDC

Organizations are rapidly turning to software-defined networking (SDN) to cut costs and increase IT agility. SDN addresses the fact that the static architecture of conventional networks is poorly suited to the dynamic computing and storage needs of today's data centers, campuses and carrier environments.

SDN changes the way organizations build their IT networks. Instead of acquiring expensive routers and switches with powerful, sophisticated features, they can purchase simpler, cheaper hardware. With SDN, a new layer of software delivers and manages the sophisticated features.

SDN itself is being rolled into the software-defined data center. An SDDC integrates server, networking and storage resources in an autonomous unit, creating, in essence, a cloud operating system.

With its roots in SDN, SD-WAN technology is critical to SDDC performance and reliability. As organizations pass workloads between private and public clouds, they need a single policy to move along with the workload as it departs the data center and enters the WAN. Without an SD-WAN in place, traffic moving between the WAN and the data center would not be managed in the same manner, degrading application performance.

SD-WAN solutions also enable users to create custom policies for various traffic types, such as voice and video. When an SD-WAN is operating in conjunction with an SDDC, these custom policies carry over from the organization's internal network. In this way, processes at the data center are more effectively aligned with the organization's needs.



SD-WAN adoption is growing rapidly because the technology provides a wide range of important operational and financial benefits, including:

Agility: SD-WAN routers can combine the bandwidth of multiple WAN connections. Organizations using SD-WANs can easily add or remove WAN connections as needed. They can also combine cellular and fixed-line connections. Under an SD-WAN implementation, bandwidth can easily be added or reduced as requirements evolve. The technology also allows the rapid deployment of WAN services to a remote site without the need to dispatch IT personnel to the location.

Cost: Internet links are generally much less expensive than carrier-grade MPLS connections, which are typically encumbered by long provisioning times and expensive contracts. SD-WAN technology also allows organizations to effectively leverage all available network connections to their full capacity without worrying about maintaining idle backup links.

Security: An SD-WAN can improve network security by encrypting WAN traffic as it moves from one location to another, and by segmenting the network so that if a breach occurs, the damage is minimized. SD-WANs can also help IT administrators detect attacks more quickly by providing constant visibility into the amount and types of traffic on a network.

Reliability: MPLS networks typically offer highly reliable packet delivery. Internet uplinks, on the other hand, often fail. To compensate for this fact, many organizations that move entirely to SD-WANs choose to order multiple internet links from different providers to maintain "four nines" (99.99 percent) availability in the case of link failure.

Performance: SD-WAN technology uses the internet to create secure, high-performance connections, eliminating the backhaul penalties imposed by MPLS networks. This allows SD-WANs to deliver business applications cost-effectively while optimizing Software as a Service (SaaS) and other cloud-based services. The technology also improves IT efficiency at branch offices by enabling automation and provides reliable, inexpensive links for IoT projects.

Adoption: Distributed organizations, as well as those moving toward the adoption of IoT technology, should evaluate SD-WAN solutions in terms of ease of use, manageability, ability to integrate with existing MPLS networks and the intelligence to automatically adjust traffic flows to accommodate network conditions.

WAN and Application Performance Optimization Products

As the need for WAN optimization grows, providers, such as the following market leaders, have responded with a wide range of sophisticated, powerful and imaginative solutions.

Cisco Systems: Cisco's Wide Area Application Services (WAAS) solution provides an elastic "scale as you grow" enterprise deployment model using Cisco AppNav and exceptional scalability for the secure acceleration of email, file, web, SaaS, video and virtual desktop applications.

Riverbed Technology: SteelHead is Riverbed's solution to ensure optimal performance of applications among data centers, branch locations, cloud networks and end users. The solution

utilizes a bookend setup, in which one SteelHead deployment resides at a data center and another at a remote site to speed up the connection.

Juniper Networks: As part of the Open Convergence Framework (OCF), Juniper and its technology alliance partners provide comprehensive wired and wireless LAN solutions that deliver high-performance, easy-to-manage and secure enterprise networks with excellent user experience. OCF allows organizations a choice on how to deploy their networks with advanced technologies from Juniper's leading wireless LAN vendors.

F5 Networks: The BIG-IP WAN Optimization Manager (WOM) from F5 Networks helps organizations overcome WAN and application issues to ensure that application performance, data replication and disaster recovery requirements are met. BIG-IP WAN Optimization Manager's high throughput and scalable architecture reduce data replication times and enable efficient use of existing bandwidth.

Brocade: Designed as a virtual Layer 7 application delivery controller, the Brocade Virtual Traffic Manager balances workloads to websites and cloud services. It also controls and optimizes end-user services by inspecting, transforming, prioritizing and routing application traffic. Through the use of local and global load balancing, the Virtual Traffic Manager also makes applications more reliable.

Citrix: NetScaler SD-WAN (formerly CloudBridge) from Citrix is designed to provide a scalable, reliable and cloud-ready optimization approach. The product aims to increase the performance and reliability of traditional enterprise applications, SaaS applications and virtual desktops for remote users. This fully integrated platform virtualizes enterprise WANs to reduce bandwidth requirements, increase application performance,

simplify branch office networking and gain flexibility through a hybrid WAN architecture.

CDW: A Networking Partner That Gets IT

CDW's solution providers can serve as your organization's WAN optimization and SD-WAN partner. The CDW team offers a variety of networking solutions that will help you take advantage of WAN optimization opportunities. CDW's solution architects have the experience necessary to help organizations optimize and improve the performance, security and resiliency of their networks, ensuring that mission-critical applications remain reliably available and workers can stay productive.

CDW takes a comprehensive approach to identifying and meeting the needs of every customer. Each engagement includes five phases designed to help you achieve your objectives in an efficient, effective manner. These phases include:

- Initial discovery session
- Assessment review
- Detailed manufacturer evaluations
- Procurement, configuration and deployment
- 24/7 telephone support

In addition to assisting with the design and implementation of network optimization solutions, CDW staff are available to perform a wide range of services.

To learn more about CDW's solutions and services for WAN and application optimization, visit CDW.com/WanAppOpt

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