

Enterprise WAN Agility, Simplicity, and Performance with SD-WAN

vmware®

SD-WAN™

VMware SD-WAN increases agility and cost effectiveness, while assuring application performance across the WAN.

Today's branch office users are consuming more wide area network (WAN) bandwidth as they collaborate online (for example: Zoom, WebEx, Microsoft 365), increase the use of Software-as-a-Service (SaaS) and cloud services, access large rich-media files, and use other bandwidth-intensive applications. Corporate IT is facing significant challenges addressing these demands due to the complexity, cost, and static architecture inherent in their existing WAN.

The vast majority of branch office WAN traffic is carried over expensive leased lines (private MPLS circuits) or unpredictable Internet connections (DSL, cable, LTE)—neither of which is ideal on its own. Deploying leased lines for all bandwidth needs is cost prohibitive and time-consuming, while adopting the public Internet—with its lack of uptime, reliability and performance guarantees—may result in a poor user experience.

VMware SD-WAN enables enterprises to support application growth, network agility, and simplified branch implementations while delivering optimized access to cloud services, private data centers and enterprise applications simultaneously over both ordinary broadband Internet and private links.

Challenges with branch office WANs

WAN technologies used in most branch offices today have changed little, if at all, in the last couple of decades. Traditional wide area networks utilize rigid architectures which are optimized around private data center applications. These architectures are unable to seamlessly integrate cloud computing, SaaS, virtualization, and other industry advances. Branch offices with only private-circuit connections rely on backhauling of all cloud applications, SaaS and Internet traffic through the enterprise data center, adding latency, degrading application performance and driving up network bandwidth costs.

MPLS typically provides high quality of service, but with the tradeoff of limited capacity, higher cost, and long deployment lead times. Broadband provides fast deployments and greater capacity, but with the tradeoff of reliability. These factors can have the following negative impacts:

- New applications inhibited by bandwidth or the lack of assured performance
- Branch network deployments delayed due to IT complexity or lack of wireline service
- Cloud migration not supported by traditional hub and spoke wide area network architecture

SD-WAN enables enterprises to incorporate both private MPLS and broadband Internet links, which can reduce costs and increase agility and performance, while reducing complexity.

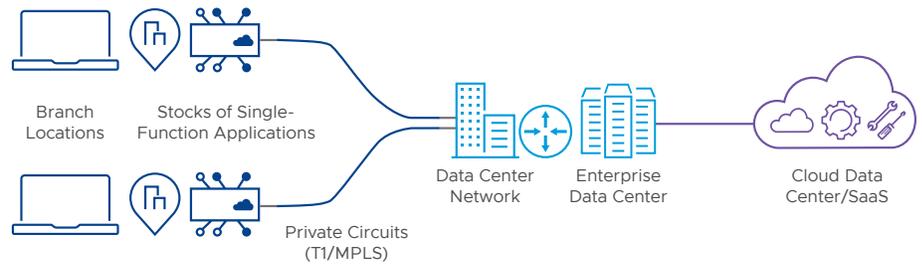


FIGURE 1: Traditional branch office WAN.

VMware SD-WAN overview

VMware SD-WAN™ improves upon the economics and flexibility of a hybrid WAN with the deployment speed and low maintenance of a cloud-based service. It includes policy-based, network-wide application performance, visibility and control while dramatically simplifying the WAN by delivering virtualized services from the cloud to branch offices.

The VMware SD-WAN Edge appliance is a compact, thin edge device that is zero-touch provisioned from the cloud for secure, optimized connectivity to applications and data. The VMware SD-WAN Edge is also available as a virtual network function (VNF) for instantiation on a customer premises equipment (CPE) platform for great deployment flexibility.

The VMware SD-WAN Edge uses Dynamic Multipath Optimization™ (DMPO) and deep application recognition to improve delivery reliability. It aggregates multiple links (for example: private line, cable, DSL, 4G-LTE or 5G, satellite) and steers traffic over the optimal links to other on-premises VMware SD-WAN Edges in branch offices, private data centers, campuses, and headquarters. The VMware SD-WAN Edge can also optionally connect to the system of global VMware SD-WAN Gateways to provide performance, security and visibility for cloud services (SaaS, IaaS, B2B Internet).

This system of VMware SD-WAN Gateways is deployed globally at top-tier cloud data centers to provide scalable and on-demand cloud network services. VMware SD-WAN Gateways implement VMware DMPO, cloud VPN and VMware Multisource Inbound Quality of Service (QoS) between global cloud services (SaaS, IaaS, network services) and each VMware SD-WAN Edge, enabling multiple broadband and private leased lines to appear as a single, high-performance WAN. The cloud-based VMware SD-WAN Orchestrator is used to provision network-wide business policy, enable services insertion, perform real-time monitoring and analyze application performance.

Deploy in minutes

Using VMware's zero touch deployment capability, VMware SD-WAN Edge can be quickly installed. The VMware SD-WAN Edge is shipped to the branch office where a non-technical person simply plugs in power and a network cable. Activation, configuration, and ongoing management are all handled from the cloud.

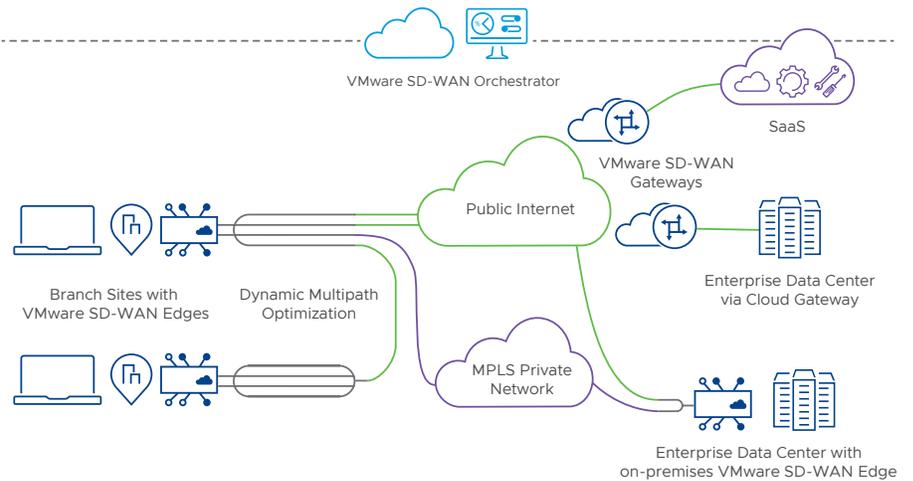


FIGURE 2: VMware SD-WAN service.

Enterprise-wide business policies

VMware SD-WAN makes setting policy as simple as a single click. Enterprises or their managed service providers can define business level policies that apply enterprise-wide across many Edges, all through a centralized, cloud-based orchestrator. Link steering, link remediation, and QoS are all applied automatically based on set business policies; however, specific configuration overrides may also be applied. The centralized VMware SD-WAN Orchestrator also provides an enterprise-wide view and configurability of routing in an overlay flow control table, eliminating complex node-by-node route configurations.

Assured application performance

VMware SD-WAN boosts the service level and capacity of hybrid networks or of standard broadband Internet links by implementing its unique DMPO. This includes a number of patent-pending technologies.

Continuous monitoring

WAN circuits are automatically profiled, enabling zero touch deployments without manual, site-by-site adjustments of configuration parameters. Continuous monitoring of link and path quality and available capacity provide the real-time feedback for dynamic optimization.

Dynamic application steering

Applications are automatically recognized and steered to the optimal link(s) based on business priority, built-in knowledge of application network requirements, and real-time link performance and capacity metrics. Dynamic per-packet steering can move a session, for example a voice call, mid-stream to avoid link degradation without any call drop or even voice quality glitch. Single, high bandwidth flows can utilize aggregated bandwidth for faster response times.

On-demand remediation

Remediation, including error correction, jitter buffering, and local re-transmits are applied on-demand when only a single link is available or concurrent link degradations cannot be steered around. Remediation is only applied for priority applications that are network-sensitive and only when brownout link degradations occur.

Quality of experience

The SD-WAN overlay with DMPO enables an application-specific quality of experience. Application performance is assured, delivering a high quality and capacity WAN through a virtual overlay across multiple links, including private and Internet broadband.

Unified and robust security

VMware SD-WAN provides unified, secure communications, no matter what underlying transport traffic may be steered across. Standard IPsec encryption is provided end-to-end from branches to data centers and for dynamic branch-to-branch communications. The unique, cloud-delivered architecture also provides automatic VPN from branches-to-cloud gateway aggregation points for interoperable access to IaaS, eliminating manual, two-sided tunnel setup from 1XN branches to 1XN cloud data centers. The solution provides the scalability and robust security of a public key infrastructure (PKI) with the consolidated management of an integrated certificate server, secure onboarding of devices and revocation management. Risk is minimized by pinning certificates to specific devices and using unique pair-wise encryption keys.

One-click service delivery

The VMware SD-WAN solution simplifies the deployment of services at the branch, at more consolidated enterprise service hubs, and to the cloud, eliminating the need for many single function devices in the branch. One-click service provisioning activates multiple VMware native services and third-party VNFs from technology partners on the branch edge. One-click business policies can service chain traffic from branches to both enterprise service hubs and cloud services easily and with application-level granularity.

VMware SD-WAN components

VMware SD-WAN Edges provide zero-touch SD-WAN deployments in branches, and scalable on-premises hub deployments for headquarters and data center locations. Additionally, all the benefits of SD-WAN, namely assured performance, security, and policy control are available directly at the doorstep of cloud SaaS and IaaS locations through VMware Gateways. The cloud-based VMware SD-WAN Orchestrator provides enterprise-wide business policy, configuration, troubleshooting and at-a-glance monitoring.

VMware SD-WAN Edges

VMware SD-WAN Edges are available as easy to install appliances for remote branches with a range of throughput, ports for WAN and LAN connectivity and integrated wireless LAN. Dynamic routing enables policy-based overlay insertion for both in-line and out-of-path deployments. High availability deployments are also supported. In addition to appliance options, the VMware SD-WAN Edge is available as VNF software for deployment on standard x86 servers, including virtual CPE devices.

VMware SD-WAN Gateways

Multitenant VMware SD-WAN Gateways are deployed by VMware and its partners at top-tier network points of presence (PoPs) and cloud data centers around the world for the full range of SD-WAN benefits. VMware SD-WAN Gateways provide a scalable and distributed infrastructure with the advantages of hosted, network-as-a-service flexibility. VMware SD-WAN Gateways provide the ideal architecture for optimized access to cloud applications and data centers, as well as access to private network backbones and legacy enterprise sites.

VMware SD-WAN Orchestrator & Controllers

The VMware SD-WAN Orchestrator & Controllers provide centralized, enterprise-wide installation, configuration and real time monitoring, in addition to orchestrating the data flow through the cloud network. The VMware Orchestrator enables one-click provisioning of virtual services in the branch, cloud, or data center. Controllers collect and distribute enterprise-wide routing information and are distributed alongside gateways as a service or can be deployed on-premises.

SDN for the WAN

VMware SD-WAN brings SDN concepts to the enterprise branch WAN. Business policies implemented across the logical overlay deliver abstraction of application flows from the underlying physical transport. Agility is achieved based on adjusting forwarding to meet policy, as well as real-time link conditions. SD-WAN has a distributed control plane for forwarding decisions to be made locally with context, so there are no latency issues, nor points of failure across the WAN. Yet each SD-WAN node receives centralized control policies for easy programmability and enterprise-wide visibility.

A software-based approach enables the flexibility and portability of deploying virtual VMware SD-WAN Edges on off-the-shelf x86-based hardware or as VNFs on virtual CPEs. Management is configurable via both a GUI and a REST API.

SD-WAN and VMware Secure Access Service Edge (SASE)

VMware SD-WAN is a component of VMware SASE™, which converges SD-WAN and cloud-hosted security. The VMware SASE Platform™, architected to leverage the power of the cloud while minimizing complexity at the edge, is an easy to consume one-stop shop for security and network services, enabling a unified edge and cloud service model with a single place to manage business policy, configuration, and monitoring.

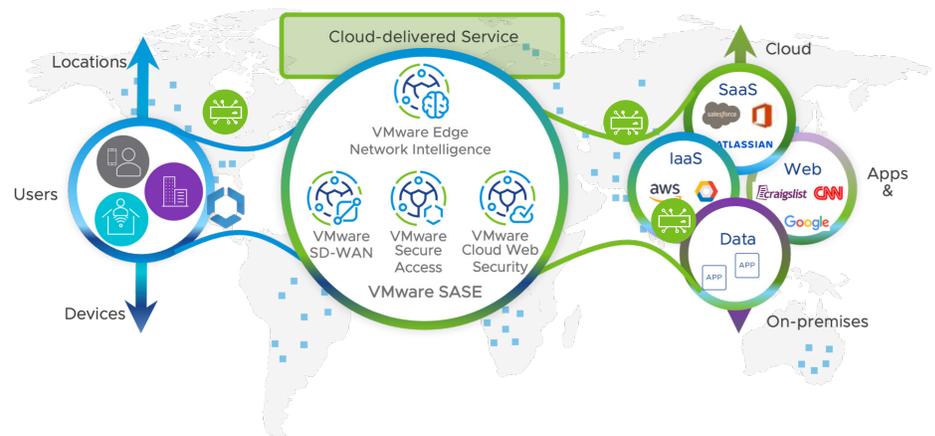


FIGURE 3: VMware SASE

Remote and mobile workers who require optimal and secure cloud application access can utilize VMware Secure Access™. Bringing off-premises users into the VMware fabric enables remote users to access cloud-based applications that are optimized for delivery and performance, leveraging zero trust network access (ZTNA) and the benefits of a cloud-hosted solution. VMware Secure Access eases IT deployment and maintenance of costly virtual private network (VPN) services.

VMware Cloud Web Security™ offers IT teams visibility and control when users access SaaS applications, and ensures compliance. It also includes URL filtering which helps IT control the web sites employees can or cannot access. IT can also reduce the attack surface with content filtering by determining what type of content users can or cannot access or upload. Content is inspected for malware attacks from known viruses using up to date threat intelligence. The solution protects against zero-day malware with sandbox support where the content is inspected in a contained environment.

VMware Edge Network Intelligence™ is an AIOps solution that gives IT true visibility and analytics for the IoT and end user devices on their network. IT can gain visibility into networks they don't control, such as home networks of remote users. This proven, vendor-agnostic solution provides a rich client experience for employees working from anywhere, and helps IT shift their time away from chasing root causes to proactive remediation.

Solution benefits

The WAN is in transition as enterprises seek to improve agility and economics and adapt to the shift of applications to the cloud. VMware SD-WAN offers enterprise-grade performance, security, visibility, and control over both public Internet and private networks. VMware dramatically simplifies the WAN with zero-touch deployment, one-click business policy and services insertion, and cloud-based network as-a-service. The result is a better performing WAN with increased reliability and lower cost of ownership, with security for users working from anywhere.

For more information about VMware SD-WAN, visit [sase.vmware.com](https://www.vmware.com/sase).

