**vm**ware®

Why Your Enterprise Digital Transformation Needs SD-WAN
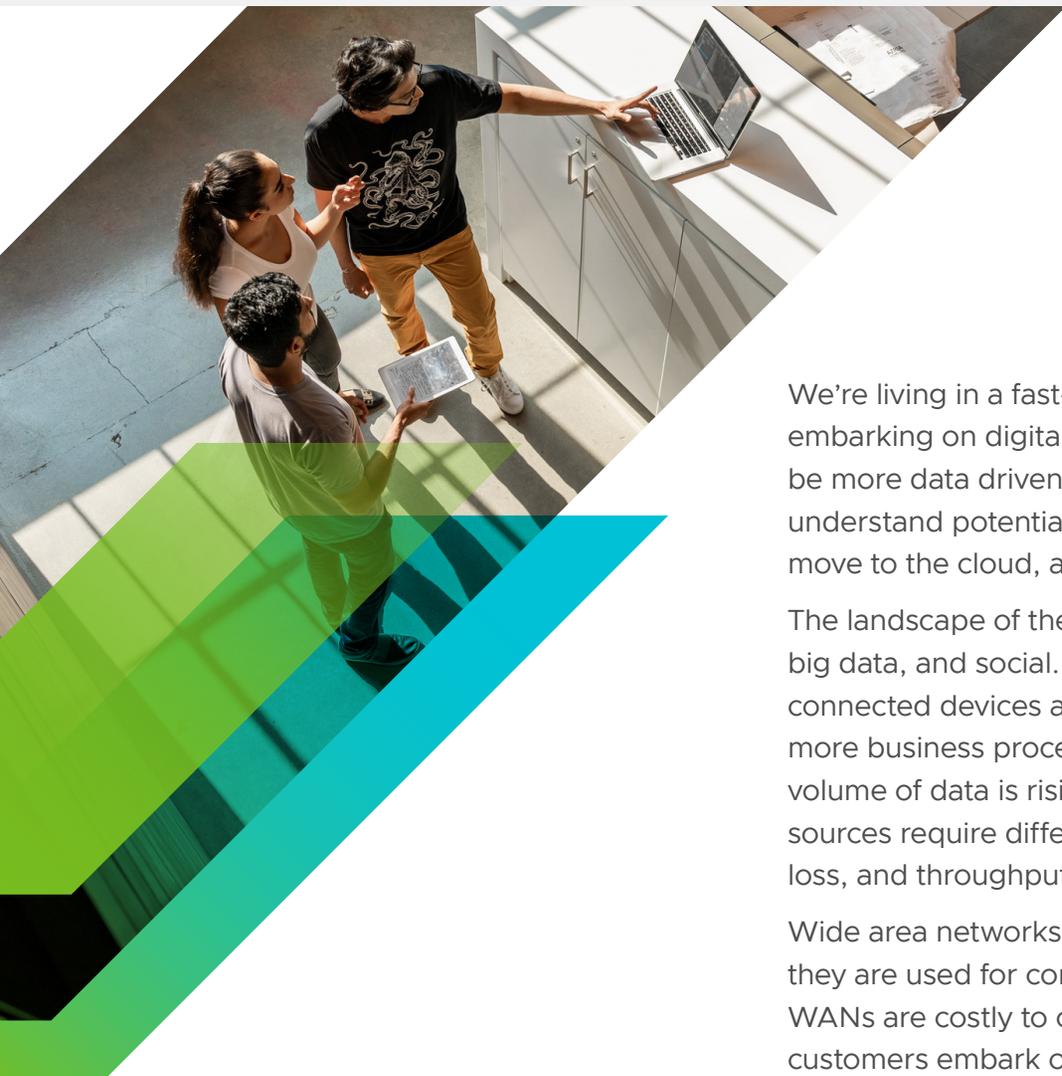
We're living in a fast-moving digital world. Organizations in every industry are embarking on digital transformation journeys to keep up with customer demand and be more data driven. Before diving into digital transformation, enterprises need to understand potential challenges, including a change in data traffic patterns, the move to the cloud, and security.

The landscape of the industry is changing, driven by trends such as cloud, mobile, big data, and social. Data is exploding as a result of the rapidly growing number of connected devices and a large amount of information created by individuals. As more business processes are digitized and new applications are introduced, the volume of data is rising, creating more complex network challenges. Different data sources require different sets of quality of service (QoS) policies for latency, packet loss, and throughput, to ensure optimal performance.

Wide area networks (WANs) experience the burden of transmitting data traffic as they are used for connecting global sites to the cloud infrastructure. Traditional WANs are costly to operate and constrained. A solution is needed that helps customers embark on their digital transformation. Software-defined wide area networks (SD-WAN) help enterprises address these specific challenges, enabling their digital journeys to continue.

In this eBook we will look at the trends in data and digital transformation and the relevant use cases for SD-WAN.

The State of the Digital Economy and the Superpowers that Propel it

Organizations are evolving their IT landscape at a rapid pace to ensure the business can successfully execute against important initiatives. These initiatives and the technologies powering them are shaping the future of IT and include digital transformation, cloud computing, Internet of things (IoT), distributed or edge computing, and the emergence of 5G wireless networks.

In an ESG Master Survey on technology spending intentions, 76 percent of respondents indicated they have multi-cloud environments, 36 percent have IoT initiatives underway, 67 percent have one in five applications delivered by software as a service (SaaS), and 17 percent cite mature digital transformation initiatives.[1] In order to guarantee success for all of these initiatives across a distributed enterprise, the organization must provide the appropriate levels of connectivity.

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1. ESG Master Survey Results: 2019 Technology Spending Intentions, March 2019. All ESG research references and charts in this white paper have been taken from this master survey results set. https://research.esg-global.com/reportaction/2019technologyspendingintentionsmsr/Marketing
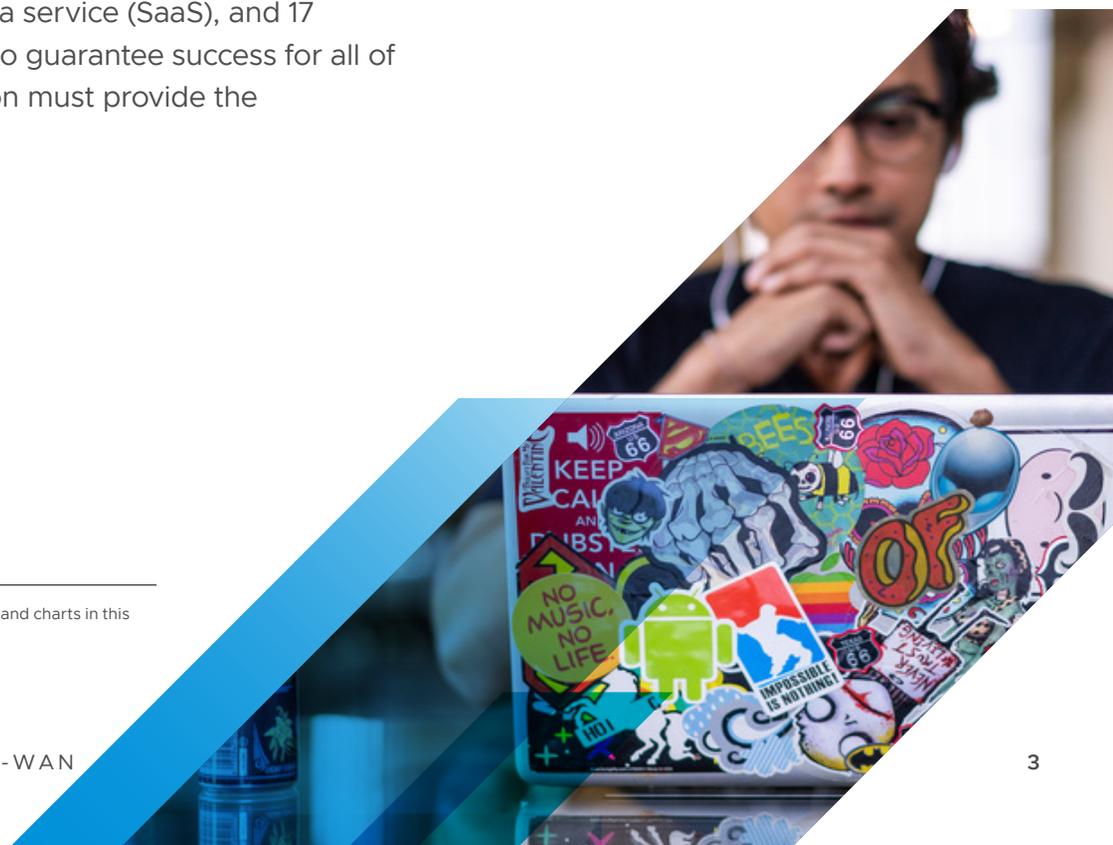
Enterprise Application Trends

30-50%

Of large Enterprise traffic is shifting to the cloud, changing traffic flows and making traditional WAN suboptimal. —Gartner[2]

Applications moving to the cloud DC and cloud

$50B

The total number of connected IoT (Internet of Things) sensors and devices is set to exceed 50 billion by 2022.[3]

Increasing IoT and control at the edge

82%

Globally, IP video traffic will be 82 percent of all IP traffic (both business and consumer) by 2022, up from 75 percent in 2017.[4]

Video and voice still rule

5.11B

There are 5.11 billion unique mobile users in the world today, up 100 million (2 percent) in the past year.[5]

Mobile device proliferation impacts applications

2. https://www.gartner.com/en/newsroom/press-releases/2018-11-07-gartner-identifies-top-10-strategic-iot-technologies-and-trends
3. https://www.juniperresearch.com/press/press-releases/iot-connections-to-grow-140pc-to-50-billion-2022
4. https://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/white-paper-c11-741490.html
5. https://datareportal.com/reports/digital-2019-global-digital-overview

The Movement to the Cloud

Many organizations plan to move to the cloud, with a large percentage of them intending to adopt a hybrid or multi-cloud strategy. One of the reasons for this is because hybrid, multi-cloud and SaaS deliver unprecedented services. Many organizations are using commercially available SaaS applications such as Office 365, and Salesforce, and the like.

The next-generation SD-WAN platform needs to support the application migration from an enterprise data center to a dynamic hybrid cloud or multi-cloud environment.

Hybrid Cloud

Multi-Cloud
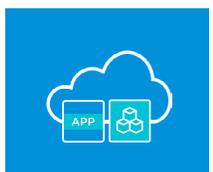
SaaS

The New Digital Branch and WAN Transformation

Business is conducted in the branch. For users at branch sites, accessing applications in the cloud is as important as when they're in the legacy data centers. The IoT, mobility and a massive amount of local data demands a transformation at branch sites.

Transformation has been happening in the data centers with technologies such as virtualization, containers, and cloud. Enterprise data centers are virtualized and software-defined; workloads are spreading across the hybrid cloud to multi-cloud.

The WAN is the connection in the middle between data centers, branches, and clouds. It connects all users and things to applications and data. Organizations must redefine and transform the WAN, just as they have done with data centers, to support increased activity in branches.

While agility, simplicity, scalability, and security are top customer IT goals, what organizations want to focus on is their business, not IT. With digital transformation, organizations can stay competitive and drive revenue growth. As IT transformation powers digital transformation, organizations must transform their IT to deliver services rapidly, regardless of the application types and locations, whether in the on-premises data centers or the cloud. IT transformation is critical in achieving these goals.
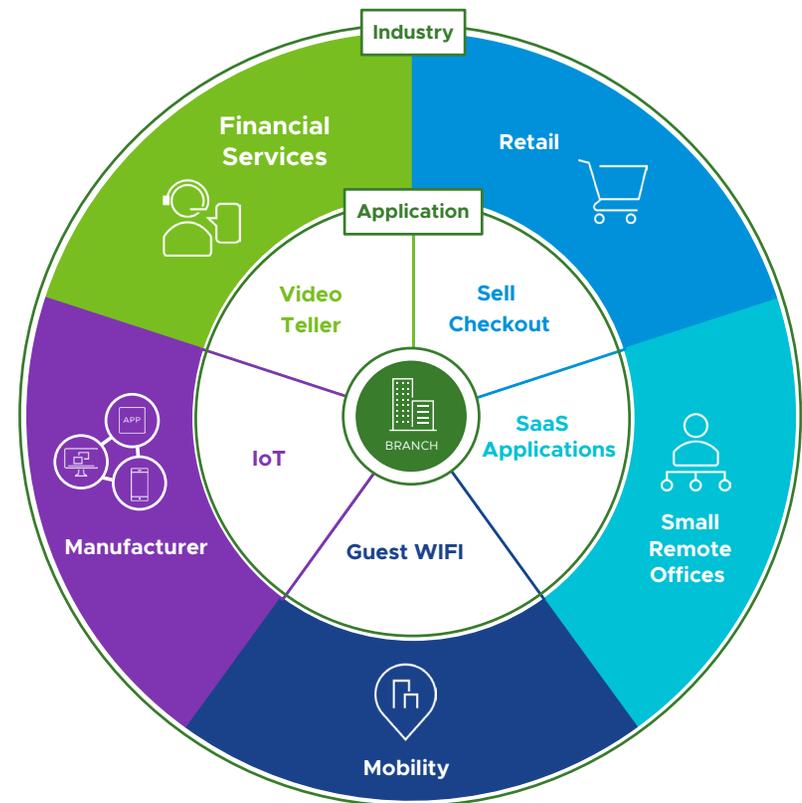
WAN Challenges: Expensive, Complex, and Inefficient

Typically, the enterprise WAN lags behind data centers from the transformation perspective. Legacy WAN is complex, inefficient, and expensive. SD-WAN is designed to solve these challenges.

- Typical WAN connections are private Multiprotocol Label Switching (MPLS) links that are highly reliable but expensive. These connections are supplemented with unreliable but inexpensive Internet connections.

- While legacy WAN operations are slow and labor-intensive, bringing up a branch office also requires a lengthy step-by-step process involving purchasing devices such as routers and switches, provisioning them by using knowledgeable IT personnel on-site, and connecting WAN access lines.

- In addition, backhaul of traffic to the data center, which is a tactic often used in legacy WAN architectures, introduces latency and makes applications run more slowly.
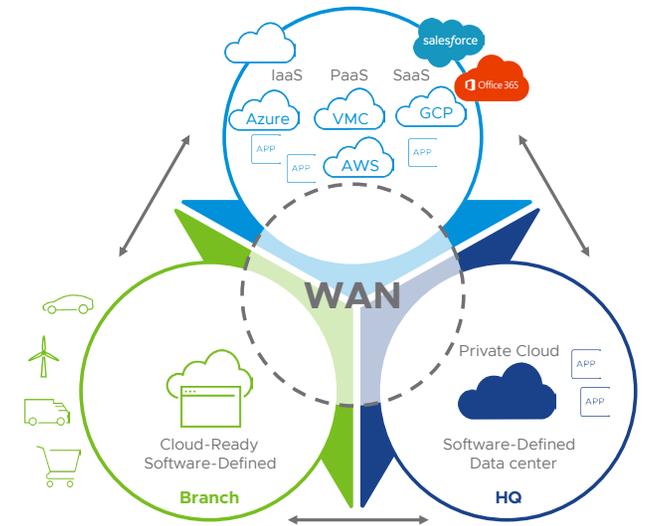
10 IT Principles that Enable Business

Organizations seek to guide their digital transformation according to principles of IT design and operations. As organizations look for solutions, they seek those that support the following principles.

Cloud First

API Based

Balance Commoditization & Differentiation

Secure, Compliant & Reliable

Design for Change

Customer-centered

Cost Conscious

Data-driven

Quick to Market

Innovative
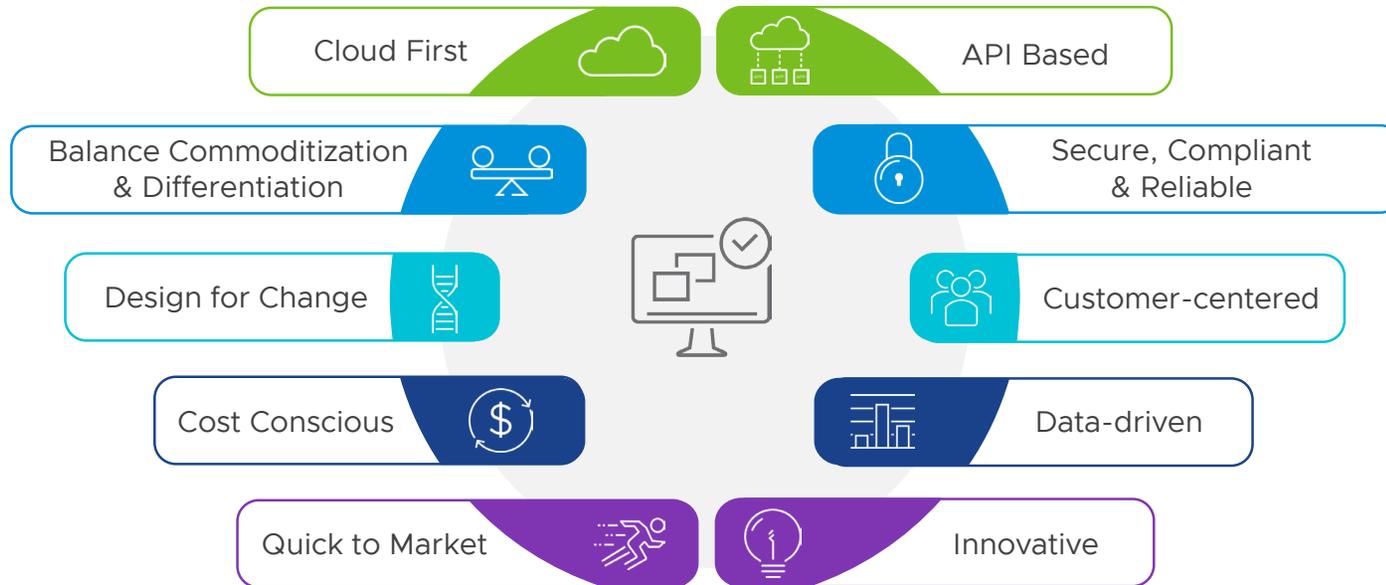
1. **Cloud first –** IT organizations are looking for solutions that are built on contemporary principles for design. They want new solutions that they adopt to be built on a cloud first principle where major components are hosted by the solution provider.

2. **API-based –** Solutions need to be API-based so that they can be integrated with components from the ecosystem to provide other needed functions and to share data for analytics and reporting.

3. **Commoditization vs. Differentiation –** Solutions need to balance commoditization and differentiation. They have to use commonly available components where possible, yet still deliver unique value.

4. **Secure/Compliant/Reliable –** Security for data and identify is mandatory, as is compliance with regulations. Solutions also need to operate reliably.

5. **Designed for Change –** IT organizations should be organized and designed to welcome change. They need to be able to adapt to new processes and technologies.

6. **Customer-centered –** Solutions need to be focused on customers. They need to solve problems from the customer's perspective.

7. **Cost-conscious –** IT organizations are concerned with keeping down costs. They have limited budgets and need to spend wisely.

8. **Data-driven –** IT organizations are data-driven. They rely on metrics for guidance and analytics to see results.

9. **Quick to Market –** Solutions need to be quick to market. IT organization can't wait for innovation.

10. **Innovative –** Solutions need to be innovative. They need to solve real problems in new ways.

The Benefits of a Software-Defined Approach for WAN

SD-WAN is a new way of building the WAN. With the same goals sought by hyperscaled, digital, and cloud-enabled companies for their WAN, SD-WAN is designed to be both application and data-centric, with the following key attributes:

- Application and context-aware programmability for automation and self-healing.

- Extensibility for the solution to be incrementally deployable and integrated with existing networks.

- Adaptability for easily extending and deploying in different environments.

Agile

Cost-effective

Simple

Efficient

Secure

SD-WAN applies the same software-defined principles in data center networking to the enterprise WAN, achieving the same benefits. WAN circuits, as well as the WAN-facing customer premises equipment (CPEs) in remote sites, are the physical resources to be virtualized. SD-WAN creates logical virtualization building a network overlay on top of the WAN circuits and underlying physical resources.

SD-WAN was initially designed as a connectivity infrastructure to simplify WAN operations with centralized and automated provisioning and management. It decouples the WAN hardware and software and overlays WAN services on top of private lines such as MPLS, DSL, LTE, WiFi, and satellite links, allowing organizations to build a high-performing WAN at a lower cost.

This SD-WAN connectivity platform addresses the traditional WAN challenges such as network delay, jitter, and packet loss. Automation is critical in this initial phase. Because abstraction to set policies is based in business language and objectives, it is easier to set business policies, to enable faster deployments, to get more operational consistency, and to lower costs.

SD-WAN Management and Orchestration in the Cloud

Service Insertion

Network Overlay

Distributed Control	Distributed Control	Distributed Control
Edge	Edge	Edge
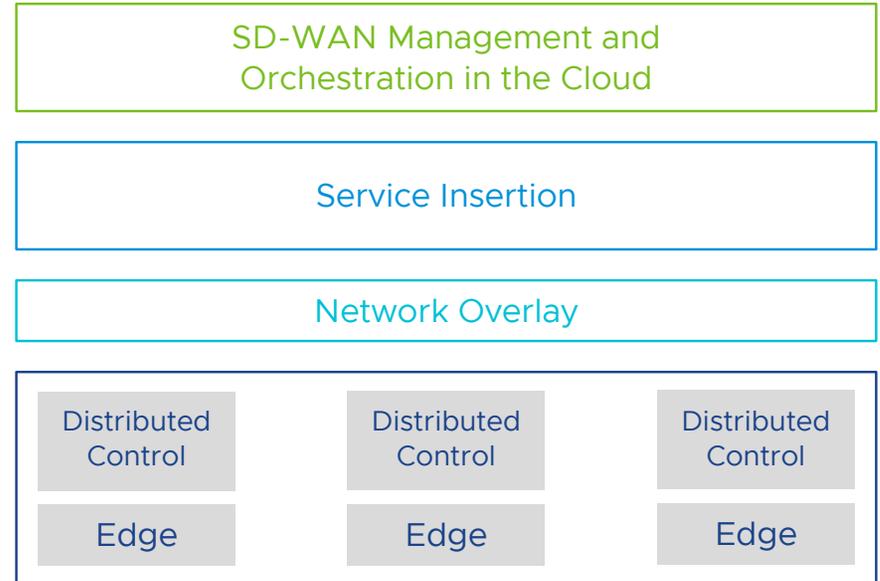
VMware SD-WAN by VeloCloud Benefits

VMware SD-WAN™ by VeloCloud® helps solve the edge challenges, including:

Simplified WAN management

- Zero-touch deployments

- Simplified operations

- One-click service insertion

Assured application performance

- Transport independent performance

- Simple application prioritization policies

Managed on-ramp to the cloud

- Direct cloud access with SD-WAN overlay performance & automation

- Visibility and policy control to cloud

Flexible Deployment and Management Models

VMware SD-WAN provides agility, high quality performance, reliability, and security, enabling customers to:

- Modernize WAN through WAN hardware and software abstraction.

- Improve operational efficiency through deployment and management automation.

- Optimize end-user experience with automation.

- Streamline cloud adoption with simple and scalable cloud on-ramp.

- Reduce costs using hybrid WAN.

SD-WAN can be deployed in four major modes to meet the needs of all organizations. It can be self-deployed or obtained as a service. It can also be self-managed or outsourced.

1. VMware hosts components of VMware SD-WAN in hybrid data centers, including the VMware SD-WAN Gateways and VMware SD-WAN Orchestrator, and offers them as a service. In this model, organizations have control over their configurations, and can self-manage their devices.

2. Enterprise organizations can also deploy SD-WAN in a do-it-yourself model where they manage the infrastructure. This gives them control of their application traffic for compliance with regulations and enables them to utilize their in-house expertise.

3. Service providers can offer SD-WAN as a service in an outsourced model where they manage everything for the customer. In this model they can integrate the SD-WAN service with other services that they offer. This model is good for organizations that have minimal WAN staff.

4. Managed service providers can manage SD-WAN deployments for organizations that want to outsource their operations. These organizations might have on-premises applications that the SD-WAN is serving and want to have all of this managed for them.

SD-WAN
as a Service

VMware
- Hybrid data centers
- Control

Service Provider
- SP integration
- Minimized WAN staff

Self-managed   Outsource Managed

Enterprise DIY
- Compliance
- In-house expertise

MSP
- On-premises apps
- Operations outsourcing

Self-deployed
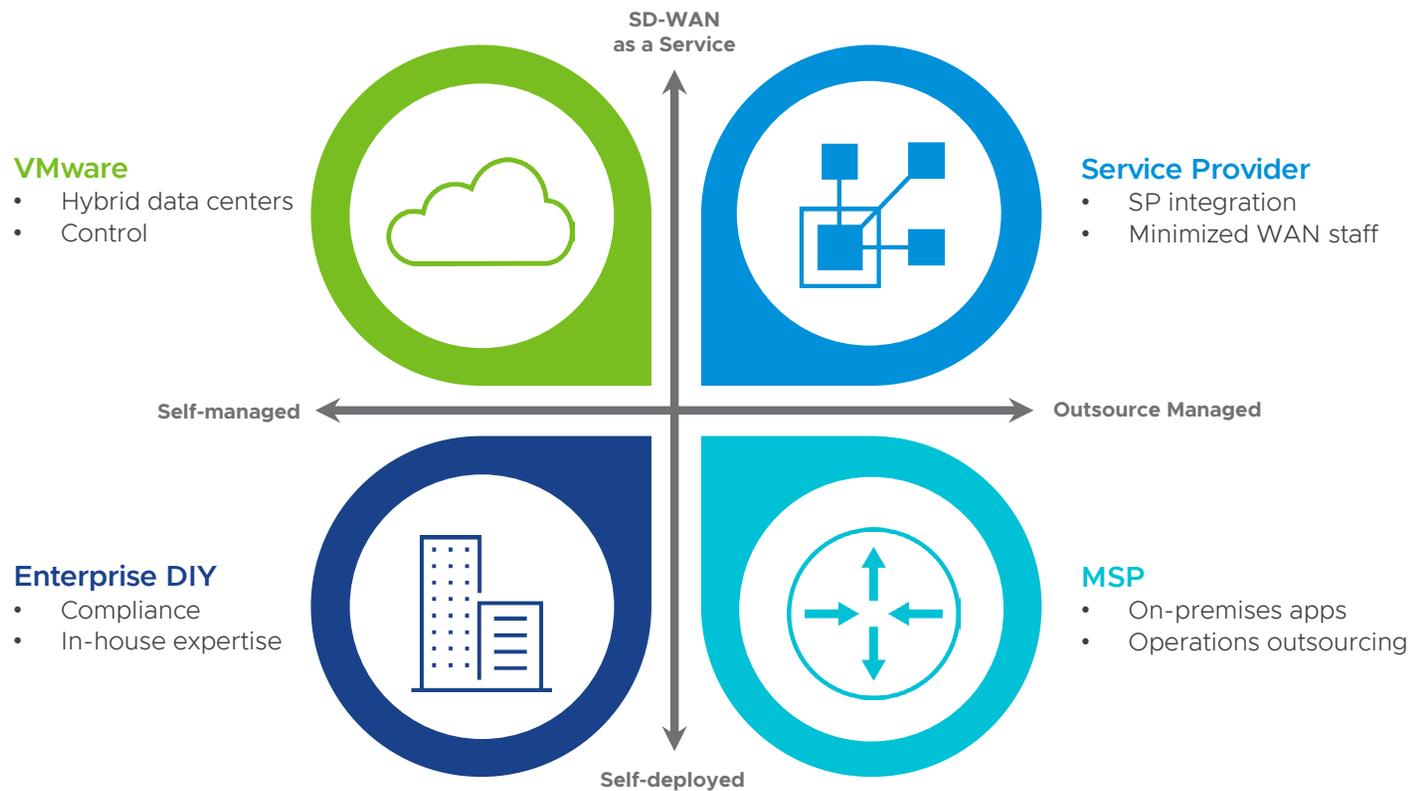
Use Case 1: Branch Networking Modernization

Branch networking equipment is expensive, complex to manage and needs to be replaced every 3 to 5 years. A networking refresh cycle presents a good opportunity to look at alternative solutions. SD-WAN appliances can replace legacy routers and provide SD-WAN capabilities, as well as routing.

Reasons for change

- Refresh presents an opportunity to adopt SD-WAN instead of replacing existing gear.

- Organizations need to modernize branch office networking to enable access to new applications.

Key enabling technology

- VMware SD-WAN Orchestrator - Cloud orchestration for simplicity of management and agility of implementation.

- Software-defined approach to the WAN edge for greater flexibility in deployment.

Benefits

- Cost savings on branch networking and better connectivity to the cloud.

SD-WAN Management and Orchestration in the Cloud

Service Insertion

Network Overlay

Distributed Control	Distributed Control	Distributed Control
Edge	**Edge**	**Edge**
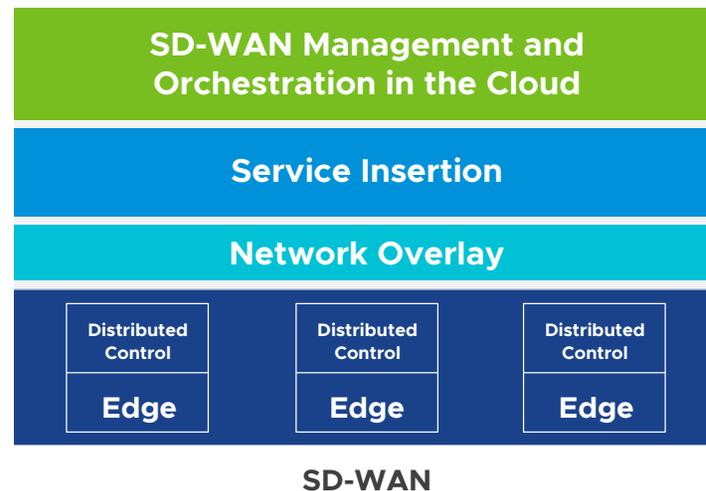
SD-WAN

Use Case 2: WAN Transport Modernization

Organizations need to increase the agility of network deployment and utilize broadband links for access to applications in the cloud. An SD-WAN provides direct access to the cloud using any combination of access type, including public Internet, LTE, WiFi and satellite so that branch office connections can be made quickly.

Reasons for change

- Demand for cheaper and increased bandwidth to access applications in the cloud.

- Need faster deployment of WAN links to more branch office locations.

Key enabling technology

- VMware SD-WAN quality of experience (QoE) and VMware SD-WAN Dynamic Multipath Optimization™ (DMPO).

- VMware SD-WAN continuously computes a quality score to assess the performance of critical voice, video, or data applications with the ability to alert IT staff. This analysis provides administrators a comprehensive before-and-after view into application behavior on individual links and the VMware SD-WAN enhancements.

- DMPO provides automatic link monitoring, auto-detection of provider and auto-configuration of link characteristics, routing and QOS settings. DMPO delivers sub-second blackout and brownout protection to improve application availability and remediate link degradation.

Benefits

- Allocate cost savings from WAN to other innovative and transformative projects.

Emerging or Hybrid Transport

Cloud

SD-WAN

Data center

MPLS
DSL
Broadband
Fiber
Private Line

BRANCH   BRANCH   BRANCH
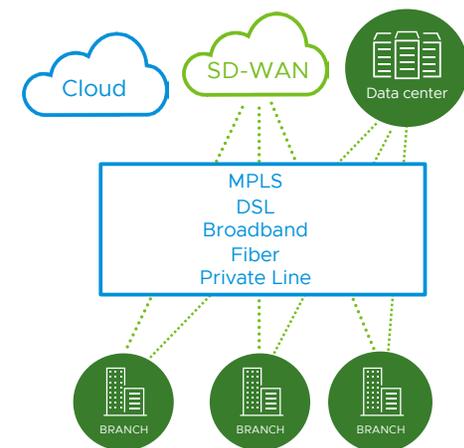
Allocate cost savings from WAN to other innovative and transformative project

Use Case 3: Cloud Adoption and Transition

Organizations are moving their applications to the cloud and using services and applications from the cloud. Applications now exist in the corporate data center, the cloud and in multiple clouds. SD-WAN provides direct access to the cloud using a design that combines a mix of public Internet with private circuits for enterprise WAN transport that gives organizations more network uptime while cutting the costs of the traditional MPLS-driven WAN.

Reasons for change

- Access media-rich and real-time applications in a hybrid cloud and multi-cloud architecture.

- Backhaul of traffic to the data center introduces latency.

Key enabling technology

- VMware SD-WAN Gateways for an onramp to the cloud.

Benefits

- Driving innovation and business value by implementing new and innovative applications.
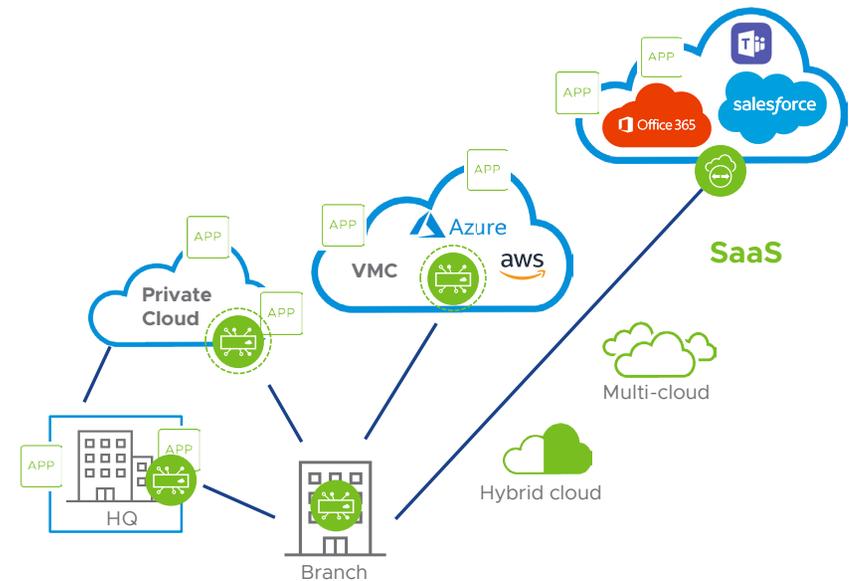
Driving business value through new and innovative applications

Use Case 4: Microsoft Azure Virtual WAN Integration

VMware and Microsoft enable customers to design their networks for optimized cloud access using VMware SD-WAN and a virtual cloud network architecture. The solution combines Microsoft Virtual WAN, which spans 130 edge sites with the optimization, security, and ease of deployment and use provided by VMware SD-WAN. This solution enables customers to gain simple, automated and high-performance connectivity from Azure to branch office locations made quickly.

Reasons for change

- Optimize access to the Azure cloud.

- To accelerate access to Office 365 and other Microsoft applications.

Key enabling technology

- Integration of VMware SD-WAN Gateways with Azure global network.

Benefits

- Low latency, optimal routing within Azure global network.

- Simplified one-click secure connectivity from VMware SD-WAN to Azure virtual WAN.
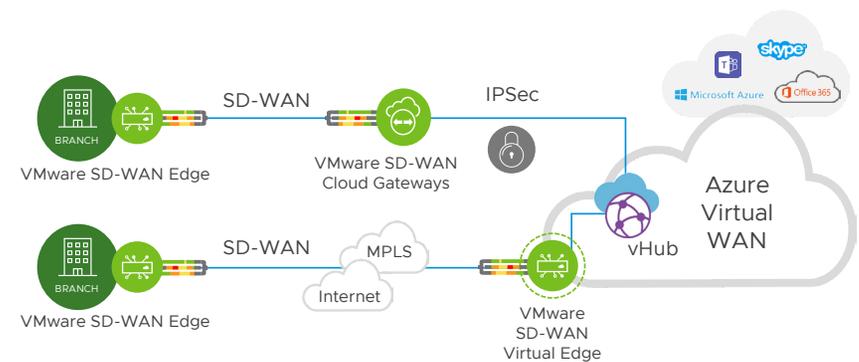
Use Case 5: Edge Computing and IoT

Edge computing involves putting services in the branch offices, allowing for distributed compute at locations close to where the data resides. A leading use case is to run a network functions virtualization (NFV) for a security service. IoT is a top use case that requires real time processing of data traffic, such as control data, and summary reports.

Reasons for change

- Proliferation of devices in the branch office.

- Explosion of data and the need for application performance.

- Support more workloads as they shift to the edge.

Key enabling technology

- Support VNFs and application workloads on VMware SD-WAN.

- Flexible transport for widely distributed branches.

- Optimized access to multi-cloud, especially for analytics.

Benefits

- Cloud edge enabled by VMware SD-WAN powered network edge.

Use Case 6: Simplify WAN Operations

The broadband network offers greater bandwidth and has become more reliable because of SD-WAN. Broadband is no longer viewed as the backup WAN.

SD-WAN offers architectural options. Organizations can mix link types such as traditional private lines, MPLS, broadband Internet and LTE. SD-WAN becomes a service overlay that simplifies operations.

Reasons for change

- Reduce effort to deploy, maintain and troubleshoot remote site WAN.

- Need to support new business initiatives and new application deployments.

Key enabling technology

- Zero-touch deployment.

- Enterprise wide, end-to-end visibility.

- Business level application policies.

Benefits

- Enables IT to focus on strategic projects, rather than just keeping the lights on.

ZERO-TOUCH DEPLOYMENT

Enable IT to focus on strategic projects rather than just keeping the lights on
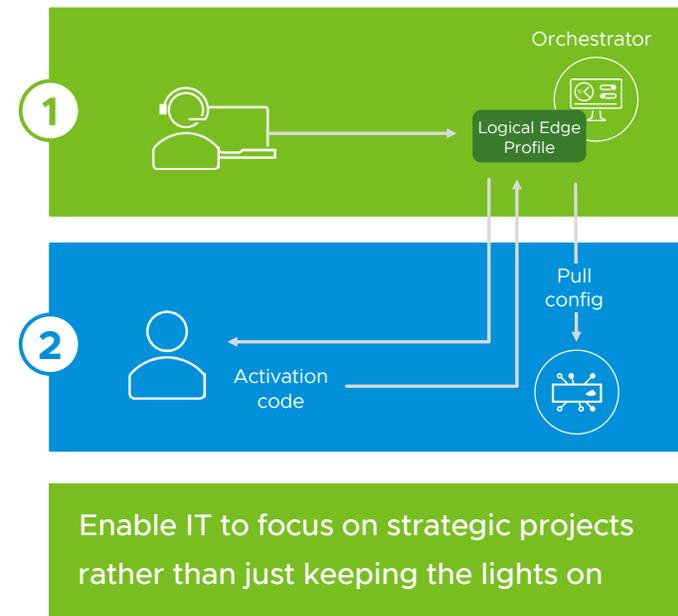
Use Case 7: WAN Service Outsourcing

Organizations are looking to outsource non-core functions of the IT department. Service providers are looking to leverage their expertise with WAN management. SD-WAN enables a WAN service that transforms WAN operations.

Reasons for change

- The organization needs IT to focus on strategic projects which directly benefit the business.

- Infrastructure is moving from on-premises to the cloud, where it can be managed by the service provider.

Key enabling technology

- Cloud-based multitenant orchestration through the VMware SD-WAN Orchestrator is essential to enabling a managed service.

Benefits

- Service provider manages SD-WAN, enabling IT staff to focus on other projects that are more strategic to the business.

VMware SD-WAN Orchestrator

SaaS

VMware SD-WAN Gateway
with Embedded Controller

Internet

Public Internet

Branch Site with
VMware SD-WAN Edge

Private
Circuit

Legacy Enterprise
Data center

Private-
MPLS

Provider
Edge

Provider
Edge

SD-WAN Enterprise
Data center
with VMware
Edge Cluster

Operator

MSP

Enterprise
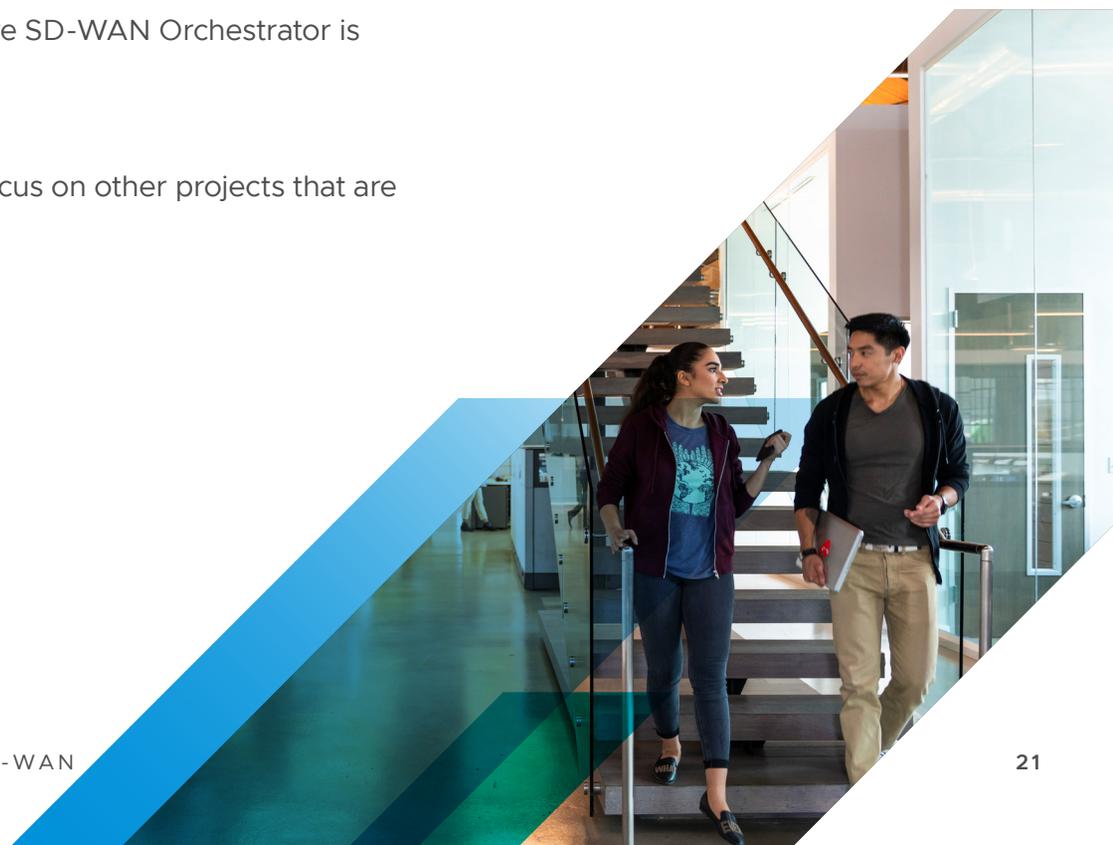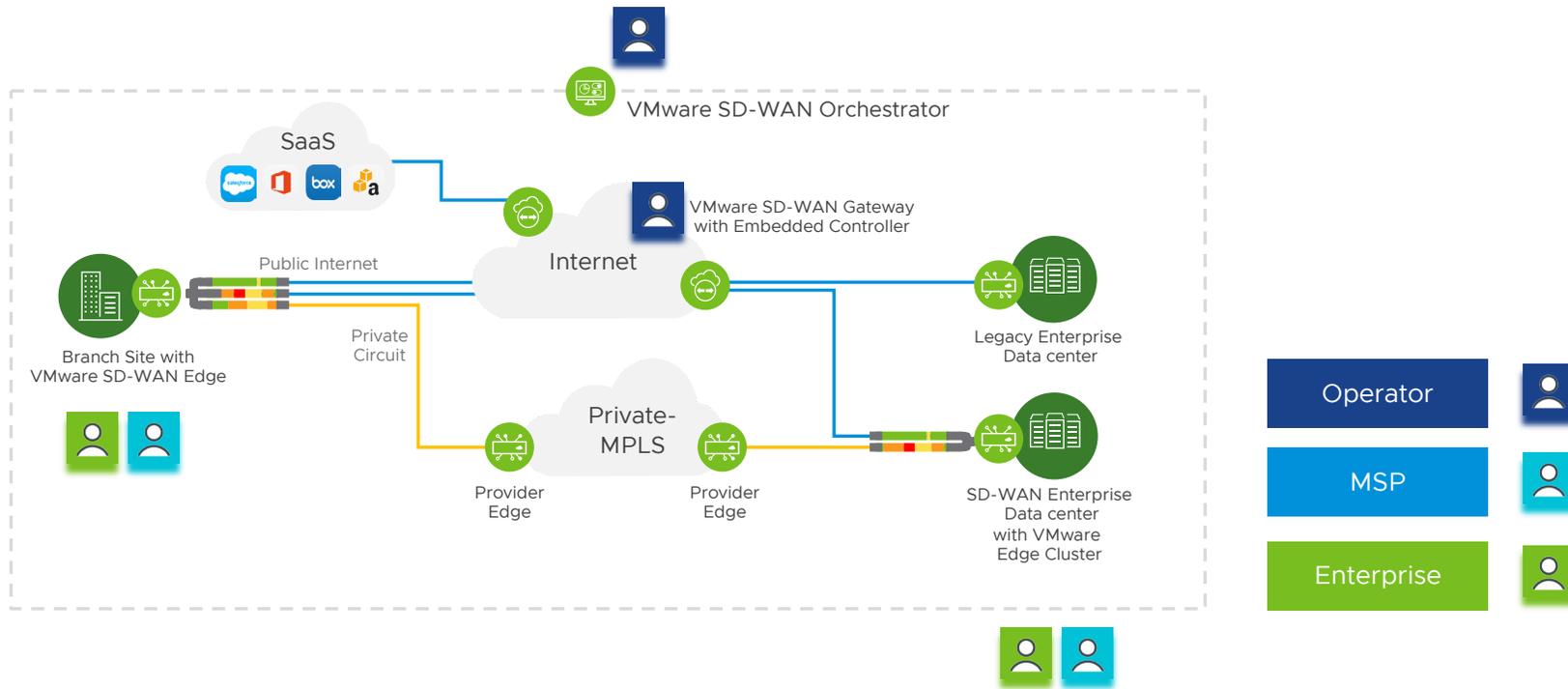
Use Case 8: Security and Compliance

Managing data on the network has become more complex as organizations grow and merge. Sensitive data is transmitted and organizations need to limit access based on business policies. Network segmentation is the way to handle this situation; specifically, end-to-end segmentation from the data center to the branch.

Reasons for change

- Need to isolate and secure data for compliance.

Key enabling technology

- Security service insertion: built-in firewall, cloud access security broker (CASB) service chaining, security VNF service.

- Compliance: data protection, Payment Card Industry Data Security Standard (PCI DSS), General Data Protection Regulation (GDPR).

Benefits

- Data can be isolated and protected, ensuring compliance.
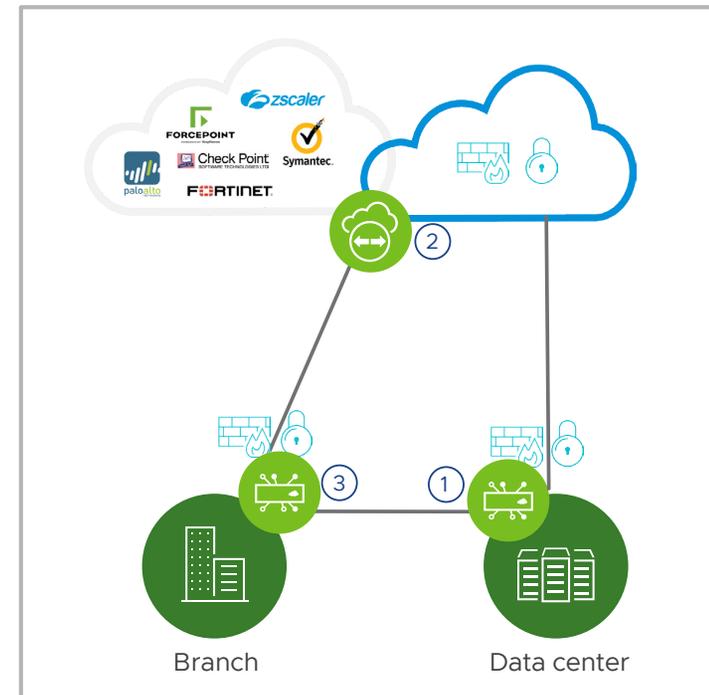
What Real Customers Have Accomplished

Brooks Brothers

- 500 global locations
- Replaced MPLS with broadband Internet
- 25 percent savings

Café Rio

- 115 locations
- Easy cloud applications access through VMware SD-WAN
- 35 percent lower WAN management time

Salon Service Group

- 50+ store locations
- Leveraged VMware SD-WAN PCI DSS certification

Fortune 500 Company

- 5,000+ locations
- Greater VOiP quality
- Service provider managed SD-WAN
- $250,000 annual savings

Experience the Next-Generation SD-WAN

VMware offers the industry-leading SD-WAN solution with VMware SD-WAN. SD-WAN is evolving from a connectivity infrastructure that solves many legacy WAN problems to a service platform that addresses organizations' changing requirements at the edge.

Begin Your Journey

Learn more about VMware SD-WAN>
Start your free trial>

Join us online:

vmware®