

Citrix SD-WAN on AWS

Use cases to deliver
stronger branch
office connectivity



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Enterprises are continuing to move more and more applications to the cloud to achieve greater speed, scalability, and cost savings. However, those with many branch offices need to embrace new approaches to networking in order to deliver consistent, reliable, and high-quality application experiences to their end users.

This white paper will explain how Citrix SD-WAN enables organizations to fulfill these initiatives and complement the benefits of the cloud. Furthermore, it will explore how to augment the capabilities of Citrix SD-WAN by running the solution on Amazon Web Services (AWS).

Challenges created by legacy WAN architectures

Geographically distributed enterprises are embracing AWS to improve agility, cost-efficiency, and flexibility. AWS is an ideal choice for these enterprises, in part, because its global footprint makes it easy to provide IT resources to branch offices around the world with high availability and low latency. However, many of these businesses are still using legacy wide area network (WAN) architectures that make it difficult to deliver enterprise applications in a predictable and reliable manner.

These WAN challenges arise due to an inability for technologies like Multiprotocol Label Switching (MPLS) to handle the uptick in bandwidth from cloud-based and Software-as-a-Service (SaaS) applications, degrading performance and creating inconsistent end-user experiences. Furthermore, sub-optimal routing practices add to this challenge as many organizations backhaul application traffic to a central location for inspection purposes, creating additional latency that can worsen application performance for branch office users. Typically, legacy WAN architectures also create complex and costly branch office operations with rigid and siloed tools that divert critical resources away from forward-looking projects.

Software-defined WAN (SD-WAN) solutions present an opportunity to overcome these challenges and deliver high-quality end-user experiences around the world. This is done by treating the network as code, separating control mechanisms from hardware to infuse network agility. In particular, Citrix SD-WAN offers a scalable, reliable, and cloud-ready approach to handle today's application traffic.

Introducing Citrix SD-WAN



Citrix SD-WAN is a next-generation WAN edge platform that provides high performance and consistent application delivery to branch office users. This means global business users can securely connect to the cloud, SaaS applications, public internet, and data centers, giving them the flexibility to meet their unique business needs. Additionally, Citrix SD-WAN provides resiliency to minimize outages and the resulting impact on day-to-day operations. Within the branch office, Citrix SD-WAN can replace and/or consolidate expensive routing and security hardware, simplifying network management and reducing costs. Businesses can further streamline management by controlling all aspects of the SD-WAN from a single pane of glass.

Citrix SD-WAN vs. other solutions

When considering SD-WAN solutions, it is important to understand what separates Citrix SD-WAN from other providers. Citrix SD-WAN provides a unique combination of proactive application traffic management, end-to-end Quality-of-Service (QoS), routing, and WAN optimization capabilities that result in a consistent, high-quality end-user experience. Additionally, Citrix SD-WAN is the only SD-WAN solution that provides:

- **Intelligent traffic steering**
Establish and enforce firewall and SD-WAN policies with an integrated database including more than 4,000 applications and sub-applications, so you can identify and classify applications in real time using deep packet inspection.
- **Failover resiliency**
Don't let network problems degrade the end-user experience. Failover resiliency reacts to small changes in the network state in just sub-seconds, taking just a couple of packets to failover.
- **Intelligent path selection by packet vs. flow-based**
Dynamically select the best path for each packet based on application requirements and network conditions.
- **WAN Edge Mode**
Simplify network insertion using Border Gateway Protocol (BGP) or Open Shortest Path First (OSPF) routing.
- **Superior user experience for virtual desktops/applications and enterprise applications**
Deliver consistent, reliable, high-performance access to virtual applications and desktops and enterprise applications with optimized HDX traffic, automatic QoS capabilities, and more.

Boost networking capabilities with Citrix SD-WAN on AWS



By running Citrix SD-WAN on AWS, businesses can build upon its native features and enhance their networking capabilities. AWS is a recognized cloud provider, being named as a Leader in Gartner's Magic Quadrant for Infrastructure as a Service each year since 2011¹. Key advantages of running on AWS include a massive global footprint, native access to a broad and deep set of traditional and emerging IT resources, and continuous innovation. This document will explore the various use cases and benefits unique to running Citrix SD-WAN on AWS.

High availability on AWS

As of 2018, AWS spans 55 Availability Zones (AZs) within 18 geographic Regions around the world. There are currently plans to launch 12 additional AZs and four more Regions. These AZs are connected with low latency, high throughput, and highly redundant networking, which makes it possible for businesses of all sizes to seamlessly establish a global presence while reducing their on-premises footprint to provide reliable access to IT resources. Citrix SD-WAN customers can use the AWS global footprint to easily construct a geographically redundant, highly available network architecture. Doing so enhances the reliability of application access and reduces the risk that users are impacted by outages or a disaster.

IPsec connectivity to Amazon VPC

Amazon Virtual Private Cloud (Amazon VPC) is a service that enables organizations to provision a logically isolated section of AWS. This provides a secure environment for users to launch IT resources and store critical data, while still benefitting from the simplicity, scalability, and reliability of AWS. Geographically distributed businesses need a method of establishing connectivity between their on-premises environments, branch offices, and their Amazon VPC. This is because — by default — the instances run in an Amazon VPC can't communicate with external resources. Instead, organizations must enable access to the resources running in an Amazon VPC by:

- Attaching a virtual private gateway (VGW) to the Amazon VPC
- Creating a custom route table to determine where traffic should be detected
- Updating security group rules to allow the appropriate inbound and outbound traffic
- Creating an AWS virtual private network (VPN) connection, establishing connectivity between the customer's network and the Amazon VPC

¹ <https://aws.amazon.com/blogs/aws/aws-named-as-a-leader-in-gartners-infrastructure-as-a-service-iaas-magic-quadrant-for-7th-consecutive-year/>

With Citrix SD-WAN, organizations can then create Internet Protocol Security (IPsec) VPN connections to share data between on-premises environments and an Amazon VPC. Using the IPsec connection protects data in transit through encryption, while also ensuring data integrity by verifying that data hasn't been altered during transmission. The result is a secure and reliable hybrid network connection for users to transfer data to and from the cloud.

On-premises to cloud routing with OSPF and BGP

Citrix SD-WAN provides strong connectivity via tunnels between branch offices, data centers, and AWS resources. This is done by applying route tables that overlay the existing underlay network. These route tables can replace or coexist with the current routing infrastructure. Citrix SD-WAN supports OSPF and BGP (among other) routing protocols, making it easier to integrate Citrix SD-WAN in complex underlay networks where these protocols are already in use.

In some situations, customers may have Citrix SD-WAN deployed at their branch office, but not deployed within their Amazon VPC. Here, customers can integrate Citrix SD-WAN with the existing underlay network, using OSPF and BGP routing protocols. Doing so enables communication between the SD-WAN-enabled site and non-SD-WAN Amazon VPC via the VGW, or over the IPsec VPN connection. Ultimately, this allows customers to interoperate their on-premises Citrix SD-WAN deployments, even if they don't have a Citrix SD-WAN instance provisioned in their Amazon VPC.

Enhanced networking with SR-IOV support

One of the core values of Citrix SD-WAN is that it helps global businesses provide a high-performance, reliable experiences to end users for all types of applications – regardless of where the end users are located. By running Citrix SD-WAN on AWS, organizations can further augment these capabilities, thanks to support for single root I/O virtualization (SR-IOV).

SR-IOV is a Peripheral Component Interconnect (PCI) Express technology that enables high performance networking capabilities. It allows a single PCI device to appear as multiple, virtualized devices (called “virtual functions”). From there, the hypervisor assigns one or more virtual functions to an SR-IOV-enabled Amazon Elastic Compute Cloud (Amazon EC2) instance to handle its traffic.

In this particular use case, SR-IOV works with Amazon EC2 instances equipped with an Elastic Network Interface (ENI). An ENI is a logical networking component that represents a virtual card with attributes like IP address, MAC address, security groups, port rules, and more attached to it. Ultimately, SR-IOV support enables higher input/output (I/O) performance on the ENI with lower CPU utilization, as well as lower latency between SR-IOV-enabled Amazon EC2 instances. Citrix SD-WAN supports Amazon EC2 M4 and C4 instances.

Resource monitoring with Amazon CloudWatch

Amazon CloudWatch is a service from AWS that provides actionable insights for monitoring and managing cloud and on-premises resources. By collecting monitoring and operational data in the form of logs, metrics, and events, Amazon CloudWatch delivers users a singular view of all their environments. Customers can use Amazon CloudWatch to generate alarms, create visualizations, automate actions, and more.

Citrix SD-WAN supports basic Amazon CloudWatch metrics to help organizations monitor SD-WAN instances running on AWS. This enables the generation of notifications that correspond with specific events and automated changes to the resources being monitoring. Overall, this creates richer insights and streamlined management for the users operating Citrix SD-WAN.

The following metrics can be managed and monitored through Amazon CloudWatch for Citrix SD-WAN:

- **CPU utilization**
The percentage of allocated compute units that are currently being used for the instance. This metric identifies the processing power required to run an application upon a selected instance.
- **Disk read operations**
Read operations from all instance volumes available for the specified period.
- **Disk write operations**
Write operations for all instance store volumes available for the instance in a specified duration of time.
- **Disk read bytes**
Bytes written to all instance store volumes available to the running instance.
- **Network in**
The volume of incoming traffic for a single instance.
- **Network out**
The volume of outgoing traffic for a single instance.
- **Network packets out**
Number of packets sent out on all network interfaces by the instances (only available for basic monitoring).

Get started: Test drive Citrix SD-WAN



Citrix SD-WAN enables you to embrace a cloud-first strategy by reliably delivering high-quality connections to applications for end-users around the world. By running Citrix SD-WAN on AWS, you can improve application availability, modernize your WAN for the cloud, get real-time monitoring and insights, and more.

Explore the benefits of running Citrix SD-WAN on AWS for yourself. Below are free-trial options available through AWS Marketplace:

- [Citrix SD-WAN Standard Edition 100 Mbps](#)
- [Citrix SD-WAN Standard Edition 200 Mbps](#)
- [Citrix SD-WAN Standard Edition 500 Mbps](#)

Resources to learn more

- [Citrix SD-WAN](#)
- [Citrix and AWS](#)
- [AWS Global Infrastructure](#)
- [Amazon VPC](#)
- [Amazon CloudWatch](#)



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