White Paper

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. As they continue this journey, many need to rethink 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 workforces distributed 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 because technologies like Multiprotocol Label Switching (MPLS) cannot 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 and home 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 infrastructure, 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. Citrix SD-WAN also includes:

Intelligent traffic steering

Establish and enforce firewall and SD-WAN policies with an integrated database including more than 4,300 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.

Ensure a 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, bi-directional QoS capabilities, user-level reporting, and more.

Boost networking capabilities with Citrix SD-WAN on AWS

By running Citrix SD-WAN on AWS, you can build upon its native features and enhance their networking capabilities. AWS is a recognized cloud provider, being named as a Cloud Leader in Gartner's Infrastructure and Platform Services Magic Quadrant each year since 2011[1]. 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.

[1]https://aws.amazon.com/blogs/aws/aws-named-as-a-cloud-leader-for-the-10th-consecutive-year-in-gartners-infrastructure-platform-services-magic-quadrant/

High availability on AWS

As of 2020, AWS spans 77 Availability Zones (AZs) within 24 geographic Regions around the world. 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.

AWS Transit Gateway Connect

AWS Transit Gateway allows you to create and manage a single gateway to connect your Amazon Virtual Private Cloud (Amazon VPC) deployments and their on-premises networks. As you scale your networks across multiple Amazon VPCs and AWS accounts, AWS Transit Gateway simplifies management and reduces operational costs by acting as a hub that controls how traffic is routed throughout the connected networks. Additionally, AWS Transit Gateway makes it easy to scale your network because each new connected Amazon VPC is automatically available to the other connected networks.

AWS Transit Gateway Connect is a native integration between Citrix SD-WAN and AWS Transit Gateway that simplifies the ability to build and manage global private networks. It allows you to connect Amazon VPCs and on-premises networks using Citrix SD-WAN, enabling the use of per-packet load balancing from on-premises environments to AWS for a higher quality user experience. Additionally, Transit Gateway Connect enables the consolidation of Citrix SD-WAN deployments on AWS.

On-premises to cloud routing with OSPF and BGP

Citrix SD-WAN provides 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, you may have Citrix SD-WAN deployed at your branch office, but not deployed within your Amazon VPC. Here, you 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 you to interoperate your on-premises Citrix SD-WAN deployments, even if you don't have a Citrix SD-WAN instance provisioned in your 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 Elastic Compute Cloud (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. You 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
- SD-WAN VPX for branch offices

Resources to learn more

- Citrix SD-WAN
- Citrix and AWS
- AWS Global Infrastructure
- Amazon VPC
- Amazon CloudWatch

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