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White Paper

A hybrid cloud blueprint with Citrix SD-WAN for Microsoft Azure

Where the apps go, networks follow

For decades, business-critical applications have resided in data centers – and for good reason: IT had operational control for management, scale, and security. With the proliferation of cloud services as a viable alternative to on-premises computing, the location of applications has taken a dramatic shift. 451 Research cites that 70% of enterprises are utilizing SaaS applications and that more than 32% are using a form of private cloud, IaaS, or PaaS.[1]

SD-WAN eases the transition to the cloud

As organizations migrate their application workloads to the cloud, the network needs to undergo a shift to align with this new paradigm. This means extending into public cloud environments, which could be any combination of IaaS, PaaS, or SaaS. Further, organizations are leveraging the best of both worlds: data center connectivity combined with cloud connectivity in the form of hybrid cloud.

This is where SD-WAN can help. A software-defined wide area network (SD-WAN) is defined as a virtual WAN architecture in which the control of network connections, application flows, policies, security mechanisms and general administration is separated from the underlying hardware. Everything is managed via software on centralized consoles instead of at each physical location on individual edge devices and infrastructures.

SD-WAN leverages multiple connections (broadband internet, MPLS, 4G/LTE, satellite) to provide resiliency and performance. One of the unique SD-WAN attributes is the ability to identify and precisely steer traffic directly to the resources in data center or cloud environments. SD-WAN can provide cloud on-ramps so organizations can quickly connect branches and locations to applications running on public cloud environments such as Microsoft Azure.

1. Voice of the Enterprise: Cloud, Hosting and Managed Services, 2019

This guide explores four cloud migration stages designed to match an organization's network and application requirements. It also looks at the benefits provided by Citrix SD-WAN in terms of application experience, security, and cloud on-ramp automation.

Scenario #1: Optimize the WAN for virtual and legacy apps hosted in an on-prem data center

Both virtual and legacy apps are used in many industries and their WAN networks are typically built in a hub-spoke model with legacy IP routers at the branches accessing applications in the private data center. This is most often architected with one active MPLS connection and an IPsec VPN connection operating in standby mode.

Challenges:

- MPLS comes with a high monthly cost, is inflexible from a provisioning perspective, and bounds customers to lengthy contractual terms.
- Since MPLS does not allow for customer control over the network, poor user experience can result especially for latency-sensitive applications such as voice, video, and virtual desktops.
- Bandwidth on the standby link cannot be utilized until failover occurs and cannot be combined with the primary link.
- IT lacks control over infrastructure at each branch increasing complexity and costs.

Solution:

- Deploy Citrix SD-WAN in the data center and branches as an overlay to the underlay physical network.
- Use Citrix SD-WAN to bond up to 8 MPLS and/or broadband links into a single virtual network with all links active with sub-second failover in case of blackout or brownout of a link.

- Automatically detect over 4,500 unique applications and apply policies and optimizations that are configurable. Prioritize latency-sensitive traffic streams such as voice and multimedia.
- Utilize bandwidth from all available links for better efficiency and increased traffic throughput.

Citrix SD-WAN Orchestrator's Zero Touch Deployment capability quickly and remotely onboards SD-WAN appliances remotely at branches. It also leverage templates for zone cloning, application and firewall configuration to further save time. As a single-pane of glass management and analytics tool, centrally manage your infrastructure through an informative dashboard and intuitive graphical interfaces.

Benefits:

- Improve WAN operational costs by leveraging lower-cost broadband connections (Internet, cable, 4G/LTE and satellite). These connections can either replace or augment MPLS and provide better reliability and performance through link bonding and load balancing and sub-second failover.
- Steer the right traffic to the most optimal links for the best possible application experience in branches. Improve critical and real-time application performance through automatic detection and optimization.
- Provide the best experience for all applications.
- Centrally and easily provision, monitor, and manage the entire network from a cloud service.

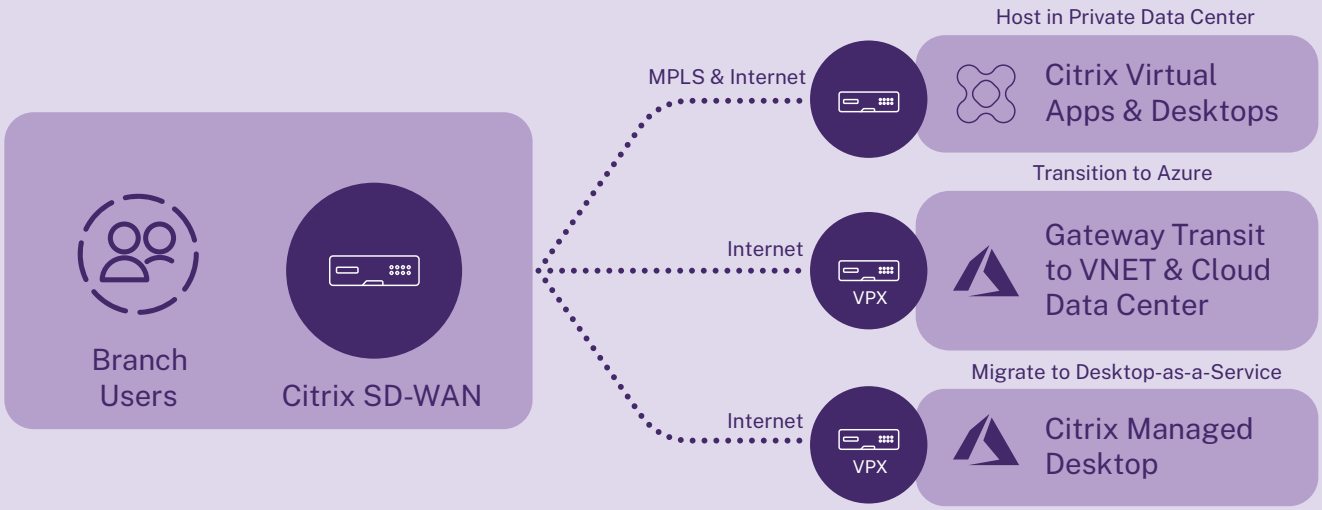
Scenario #2: Extend the wan to optimize any workload in Microsoft Azure

Organizations are migrating applications to the public cloud to leverage greater elasticity, self-service provisioning, redundancy, and flexibility through pay-per-use models. To ensure a great application experience after a cloud migration, the network has to be extended into environments such as Microsoft Azure.

Challenges:

- MPLS was not natively architected to connect to the cloud. Therefore, customers have to look to services such as Azure ExpressRoute. However like MPLS, ExpressRoute is also expensive particularly because egress data charges occur on a metered basis and it is subject to lengthy provisioning times.
- For control, security, and compliance reasons, traffic is commonly backhauled from branches to the data center adding more bandwidth on the already strained MPLS circuits. The data center then connects to Azure via ExpressRoute or the internet which, due to a hairpin effect, adds latency when branch users access cloud resources.

Figure 1: Citrix SD-WAN Phased Migration Scenarios



- Connecting branch offices directly to Azure today involves utilizing manual IPsec VPNs over the public internet which is time consuming, prone to human error, link congestion and packet loss. A single IPsec tunnel from a branch to Azure does not mitigate the risk of outages.
- Configuring connections between a large number of branches and SD-WAN instances on Microsoft Azure could be time intensive and complex.

Solution:

- Deploy Citrix SD-WAN as a virtual instance on Microsoft Azure to avoid the complexities and costs associated with using Azure ExpressRoute. SD-WAN seamlessly extends enterprise networks to the public cloud.
- Avoid data center backhaul by directly and automatically connecting branches directly to virtual SD-WAN instances on Azure VNets.
- Establish secure, reliable connections between branches and Azure VNets, leveraging SD-WAN capabilities including: link bonding and load balancing, subsecond failover, selective packet replication, bi-directional QoS, etc.
- Citrix SD-WAN Orchestrator provides automated on-ramps to Microsoft Azure through point-and-click provisioning of SD-WAN VPX instances on new or existing VNets.

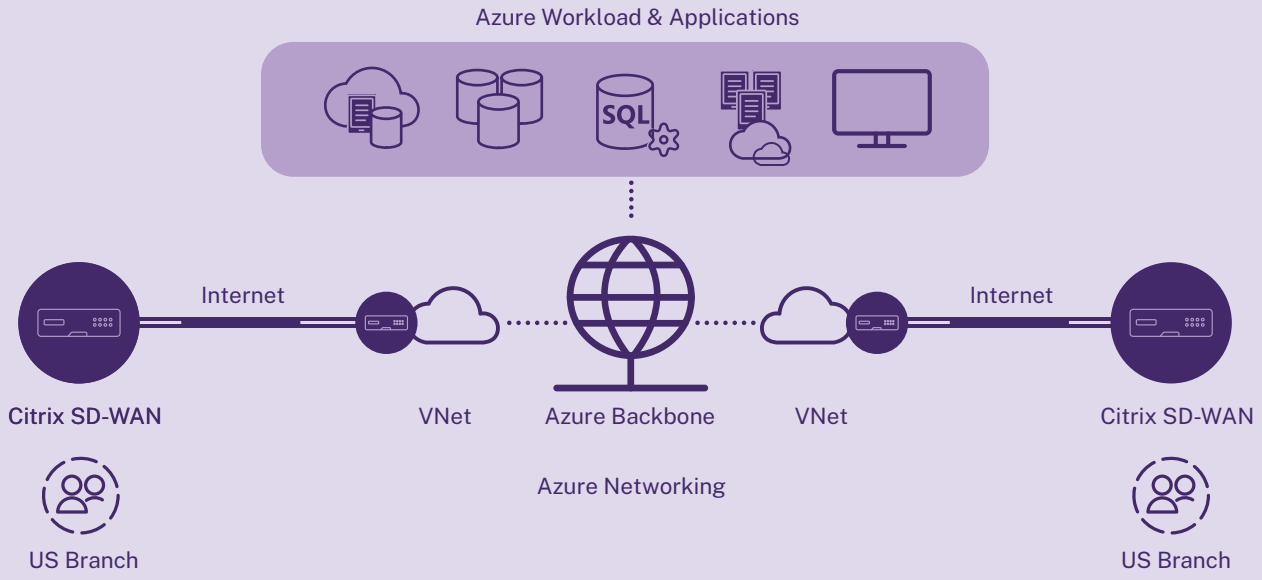
Benefits:

- Lower cost and greater flexibility compared to Azure ExpressRoute.
- Maximum uptime and productivity through highly available connectivity.
- Secure and reliable connectivity from branch to Azure.
- Agility through fast onboarding and ease of scale for SD-WAN resources on Azure.

Scenario #3: Migrate Citrix virtual apps and desktops to Microsoft Azure

In the next phase of the hybrid-cloud implementation, organizations are looking to migrate their virtual workloads to Azure. Organizations can do this with their on-premises Citrix Virtual Apps and Desktops deployment or with the Citrix Virtual Apps and Desktops service (where the management or control plane for a customer deployment is provisioned and managed by Citrix on Citrix Cloud).

Figure 2: Citrix SD-WAN enables branch-to-branch connectivity and automated on-ramps to Azure workloads



Challenges:

- Running virtual desktops in a data center requires significant upfront infrastructure capital and ongoing operational costs.
- Productivity can be hampered by a bad experience when the network is not optimized for virtual desktops.
- For a hybrid cloud scenario (applications in the data center and the cloud), backhauling cloud traffic to an on-prem data center can degrade performance and add latency.
- Additionally, backhauling virtualized Microsoft Office 365 traffic through the Azure network may introduce latency since the Office 365 applications may be geographically distant from the local Azure VNet.
- Lack of optimization and prioritization for Microsoft Teams traffic along with network latency and jitter causes a sub-optimal multimedia experience.

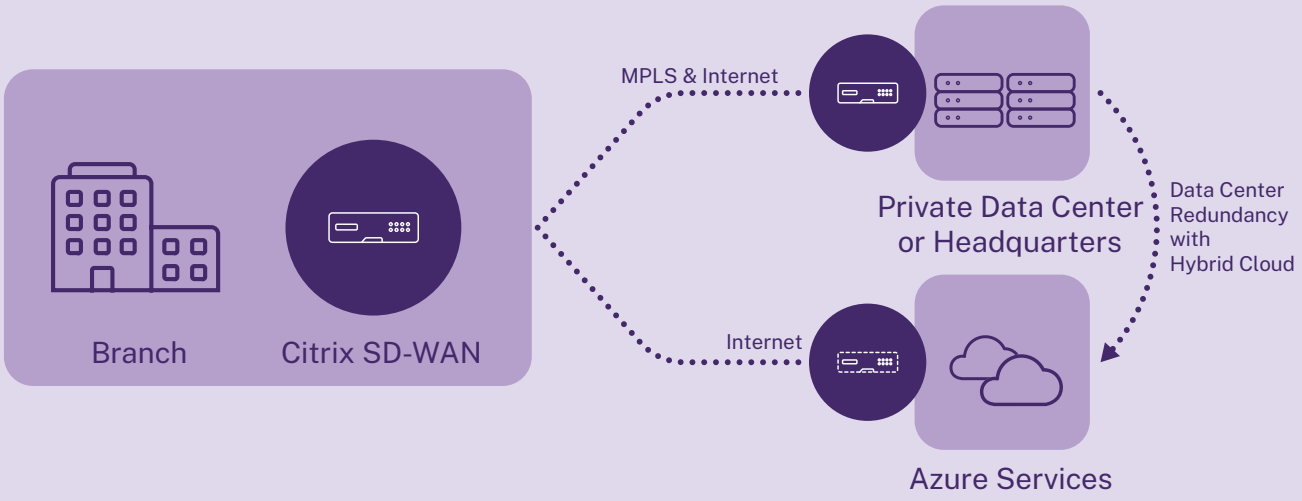
Solution:

- Leverage Citrix SD-WAN which is purpose-built to optimize cloud, SaaS, and virtual applications, especially Citrix Virtual Apps & Desktops with HDX. Citrix SD-WAN has granular visibility into HDX tafffic streams and can use AutoQoS for HDX to prioritize latency-sensitive traffic streams such as voice and multimedia.
- Extend the WAN to connect branch users directly to Citrix Virtual Apps & Desktops hosted in Microsoft Azure.
- Use Citrix SD-WAN to optimize Microsoft Office 365 traffic by leveraging APIs and direct local breakout to steer traffic to the closest Office 365 front door without backhauling it through Azure.
- Citrix HDX optimization technology for Microsoft Teams traffic offloads audio and video processing as well as screen sharing to the user's device in the branch. Then, as the Citrix SD-WAN appliance at the branch sees the Teams traffic, it identifies and categorizes it, and then directly steers it to the closest Office 365 front door.

Benefits:

- Take advantage of the economics, elasticity, financial flexibility offered by the public cloud for users in branches.
- Granular prioritization of HDX traffic channels within a session stream for virtualized applications in Azure provides an always-on workspace experience.
- Proactively address any network issues that arise. Deep visibility into traffic, including HDX and Microsoft Office 365, provides even more granularity and control.
- Deliver an optimal user experience for virtual desktops and other applications including virtualized Microsoft Office 365.

Figure 3: Data center redundancy with hybrid cloud



Scenario #4: Move to desktop-as-a-service with Citrix SD-WAN

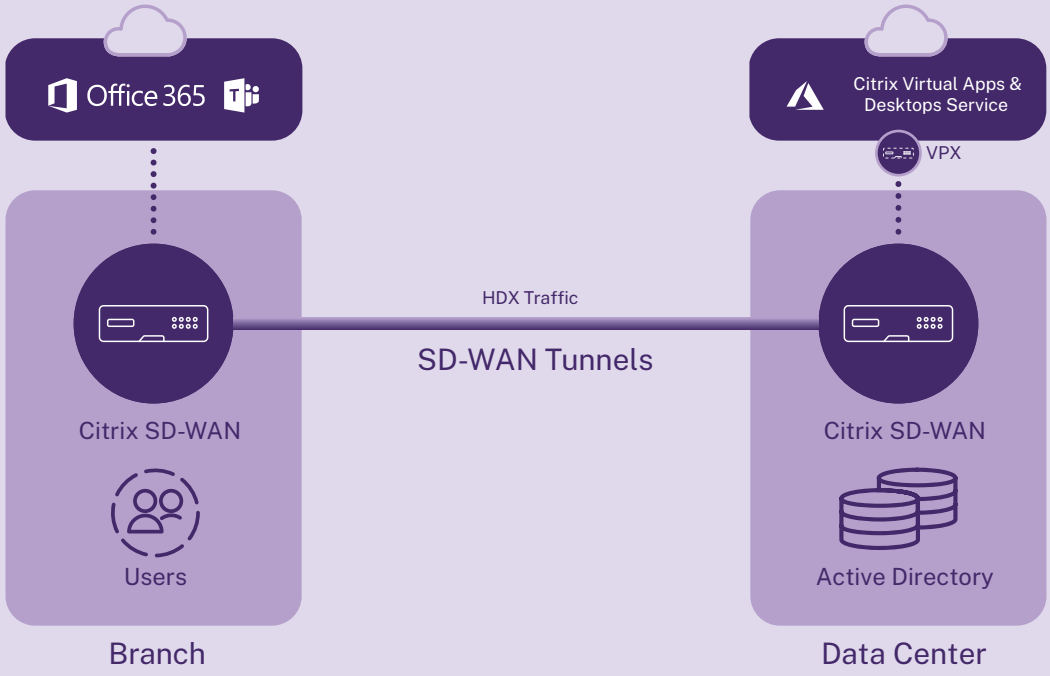
The last consideration for migrating to Azure is to fully embrace Desktop-as-a-Service. Citrix Managed Desktops is the simplest, fastest way to deliver Windows apps and desktops from Microsoft Azure. Citrix Managed Desktops offers cloud-based management, provisioning, and managed capacity for delivering virtual apps and desktops to any device from Citrix or its partners. The solution also provides managed Azure IaaS, including Azure compute, storage, and networking for delivering managed virtual desktops.

Citrix SD-WAN is integrated into the administrator workflow of Citrix Managed Desktops and offers a streamlined way to setup both the applications and the underlying network.

Challenges:

- Virtual desktops are complex and expensive to deploy and operate.
- Swivel-chair, manual provisioning is required for the virtual desktops and Citrix SD-WAN in the branch and on Azure.
- Productivity can be hampered by a bad experience when the network is not optimized for virtual desktops.
    - Local internet breakout provides no prioritization of HDX and other critical traffic, lacks visibility into network conditions, and requires manual failover.
    - Backhauling traffic to an on-prem data center increases congestion on private WAN links, adds latency adds complexity and requires manual failover.

Figure 4: Citrix SD-WAN eliminates capacity contraints and improves the application experience



Solution:

- Subscribe to Citrix Managed Desktops hosted on Micosoft Azure. Citrix SD-WAN is the recommended connectivity option for Citrix Managed Desktops with integrated provisioning and application optimization.
- Simplify provisioning with Citrix SD-WAN for Citrix Managed Desktops through an integrated workflow that quickly onboards an included SD-WAN VPX instance on Azure.
- Use Citrix SD-WAN for Microsoft Office 365 which leverages APIs and direct internet breakout to steer traffic to the closet front door, without being backhauled through Azure.

Benefits:

- Citrix Managed Desktops offers a fully managed, turnkey service that includes every component needed to securely deliver desktops and applications to any device from Azure with simplicity.
- Citrix SD-WAN delivers the best Citrix Managed Desktops experience with always-on, high-performance connectivity, where VoIP and HDX traffic are optimized and prioritized.
- Users benefit from the best experience for virtual apps and desktops.
- Simple integrated workflow allows any IT staff to easily set up network connections.

Figure 5: Citrix SD-WAN with Citrix Managed Desktops

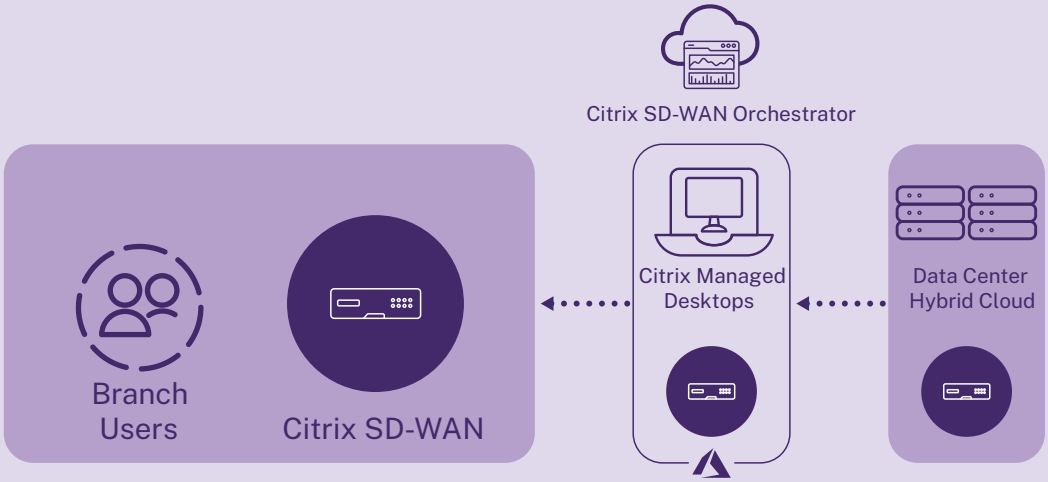
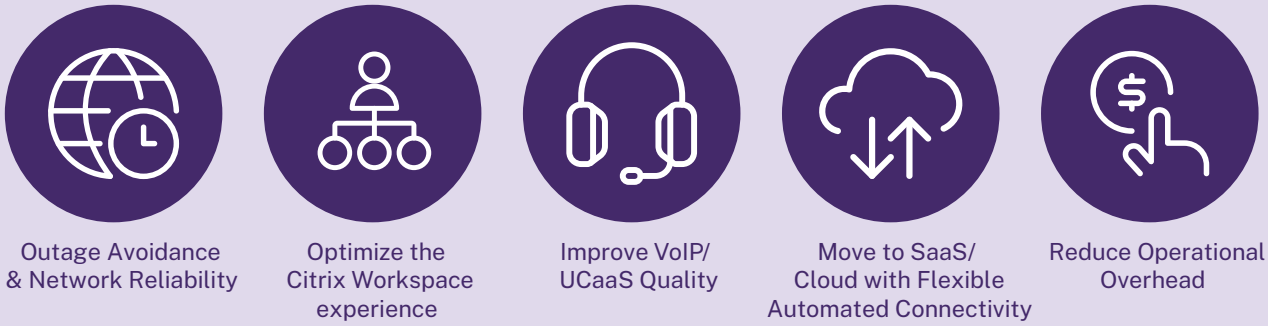


Figure 6: Benefits of Citrix SD-WAN



Conclusion

The journey to the cloud varies for every organization. As this solution guide has shown, Citrix offers a wide range of options designed to help organizations embark on their cloud journey, migrate network and applications resources to Azure, while realizing the unique value of Citrix SD-WAN.

As a comprehensive WAN edge solution, Citrix leads the industry with a purpose built SD-WAN that delivers the best experience for all applications – virtual, SaaS, cloud, and legacy, while protecting users and data from branches to the cloud.

For more information or to get started today, visit citrix.com/sd-wan.

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