ThousandEyes

Thrive in a connected world

eBook

Opportunities, Challenges, and Solutions in the SD-WAN Era

The Rise of SD-WAN in the Cloud Era

Not long ago, the enterprise WAN was the state of the art. And it was sufficient for most companies' needs. Enterprises didn't have to worry too much about the Internet or the cloud— they only really needed to think about their internal and IT applications.

But a few related recent trends have changed that. The cloud revolution and mass adoption of SaaS apps for essential work functions is one part. The growth of organizations globally is another. And most recently, the rise of telecommuting and the diversity of ways that employees and customers connect to business resources (via VPNs, home laptops, mobile, etc.) has made a huge impact.

Adopting SD-WAN can help make enterprise networks cloud ready, more cost-efficient, and better suited to delivering quality digital experiences to customers and employees. But ensuring that SD-WAN delivers on expectations requires a modern approach to monitoring that addresses network visibility and application performance, equally.

That's no small feat. In this eBook, we'll examine some of the challenges companies face throughout the WAN modernization process, including:

Adopting an SD-WAN network
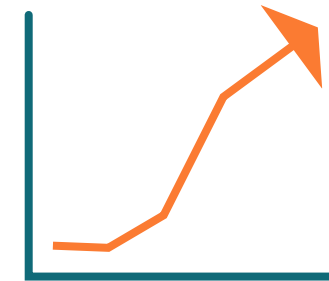
Maximizing SD-WAN value before and after set-up

Monitoring, testing, controlling and customizing an SD-WAN network effectively
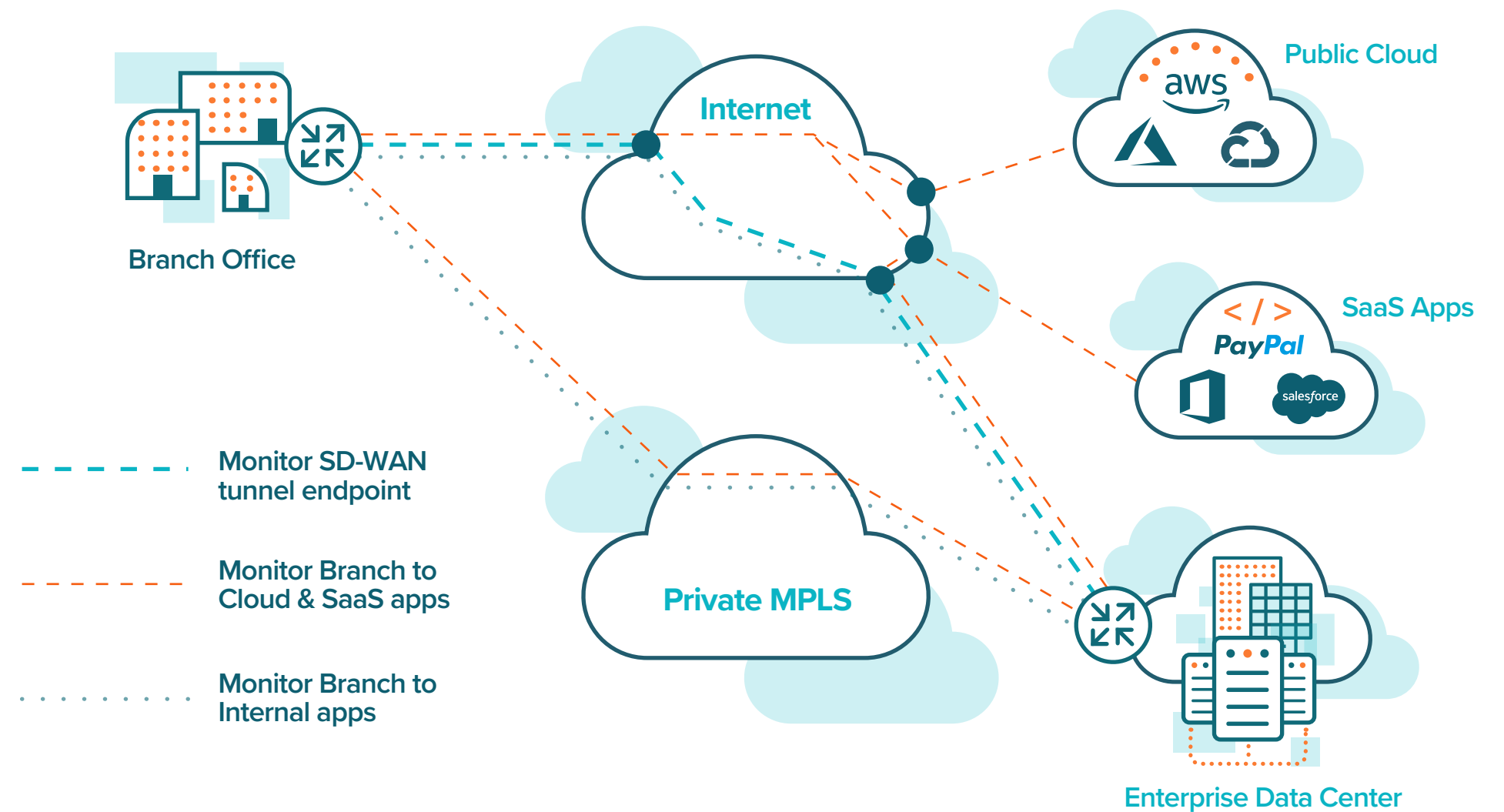
Then, we'll see what a true end-to-end solution to those challenges looks like in practice.

Modern Business Needs Have Changed Dramatically

Recent digital transformation trends have rendered many traditional WAN infrastructures inefficient. Routing customers, clients and employees through a WAN network that might be located far away from those connecting now means noticeable delays for the increasingly real-time needs of businesses and workers. And as bandwidth consumption is dramatically expanding to accommodate SaaS and cloud, the lack of flexibility offered by a traditional WAN network limits IT Operations ability to maximize traffic and resource efficiency. Put simply, the traditional WAN is increasingly out of touch with the new era of work.

These issues, along with the prospect of rising transport costs and suboptimal app performance, is driving enterprises to move away from traditional WANs. Instead, they're opting for modern WANs that are software-defined, Internet-centric, and architected for optimal interconnection with cloud and external services—or SD-WANs.

An SD-WAN network modernization can solve many of the problems companies encounter with their traditional WAN network configuration. But setting one up is much more complex a task than establishing the original WAN infrastructure, and a lack of visibility into the end-to-end environment means network teams can't test or predict how it will perform until they go live. That means there are risks involved, but big rewards if you get it right.

Branch Office

Internet

Public Cloud
aws

SaaS Apps
</ />
PayPal
salesforce

Private MPLS

Enterprise Data Center

- - - - Monitor SD-WAN tunnel endpoint

- - - - Monitor Branch to Cloud & SaaS apps

········ Monitor Branch to Internal apps

SD-WAN Is a Challenge of Opportunity

Traditional WAN network adoption or extension is a relatively "simple" process. It mostly involves installing and configuring a router at a site, and connecting it to a managed wide area network—most recently based on routing techniques such as MPLS (Multiprotocol Label Switching). The trade-off is that once a connection is established, your WAN network is essentially fixed—so adapting, re-routing and customizing that infrastructure after the fact is costly and difficult.

With an SD-WAN, that network is now entirely virtualized. There's huge opportunity for an adaptive, customized network infrastructure that responds efficiently to your company's changing needs. But with all that freedom comes a new challenge—a challenge of opportunity.
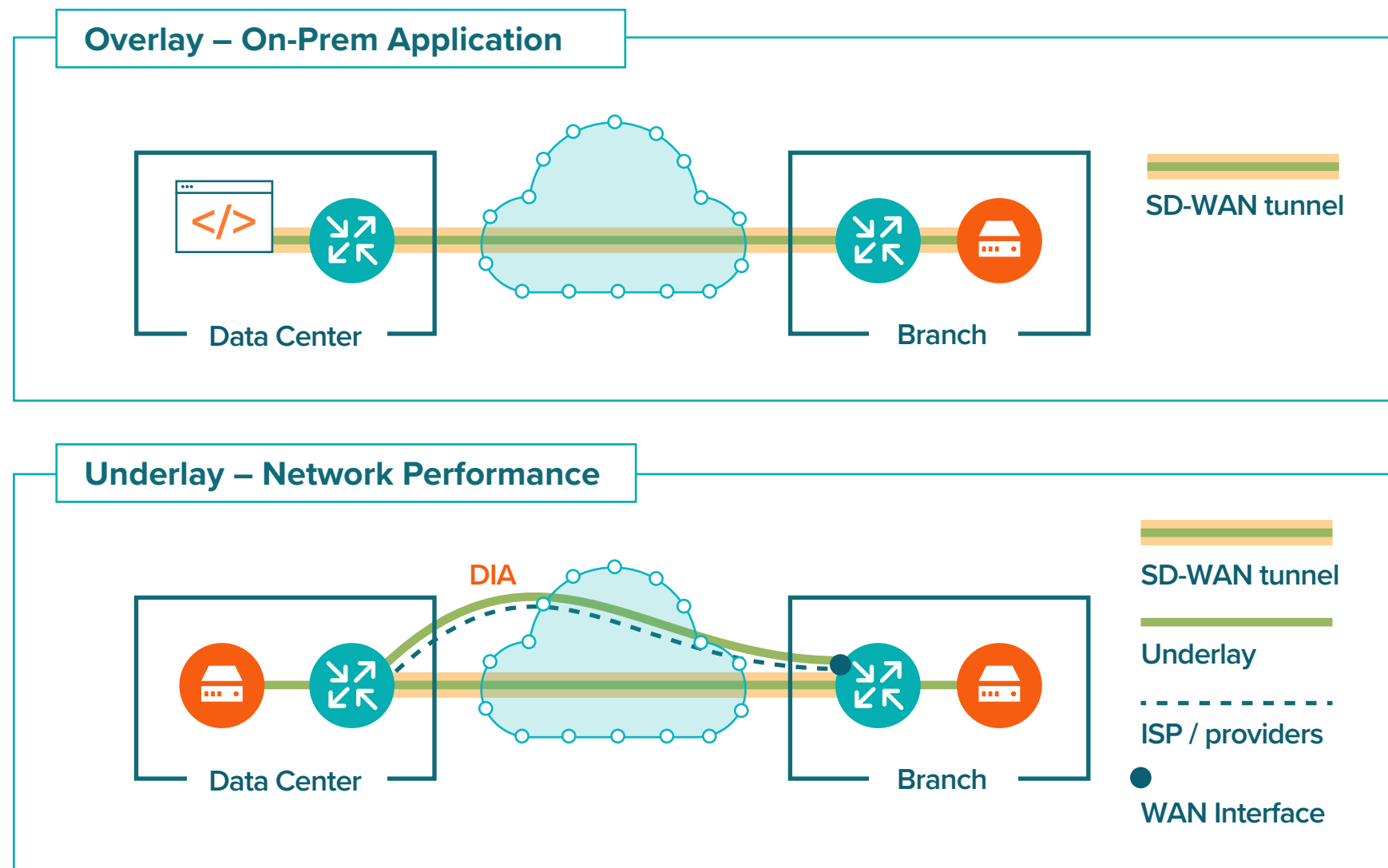
Here's another way to think about it. If a business is opening a new SD-WAN connected office, for instance, how do they determine the best configuration to give people the best experience on the apps they need the most bandwidth for? The SD-WAN hasn't been deployed yet, so how can they make sure the set-up and configuration will be truly effective before a costly installation? There's a clear opportunity to provide a lot more value with a strong, adapted SD-WAN set-up, but failing to deliver improved performance can result in project delays and poor user experience, which can be the enemies of a successful project roll-out.

At the same time, the increased dependence on third-party apps and services that SD-WAN enables comes with its own set of obstacles. These apps, which frequently includes SaaS, are reached across many external providers and an unpredictable Internet, where lack of visibility can hamper problem domain isolation, prevent fast issue resolution and impact business outcomes.

Common Monitoring Scenarios to Consider

Given the complexities of SD-WAN deployments, it makes sense to discuss some common monitoring scenarios and how they help to ensure a positive experience.

Overlay – On-Prem Application

Data Center

SD-WAN tunnel

Branch

Underlay – Network Performance

DIA

SD-WAN tunnel

Underlay

ISP / providers

WAN Interface

Data Center

Branch

Branch to Data Center

This type of monitoring scenario can serve IT and network teams in a variety of situations. For one, an IT team may be interested in understanding how the performance of an on-premises application that is hosted in a data center would be affected by a planned SD-WAN migration. By monitoring page load, for instance, over the SD-WAN overlay, IT teams can understand whether the proposed SD-WAN tunnel would cause that particular application to load faster or slower than baseline—and they can work to optimize it. Another area in which this monitoring scenario would apply would be to understand how network performance on the SD-WAN underlay, between branch and data center, is impacting experience—and whether any issues with third-party service providers need to be escalated.

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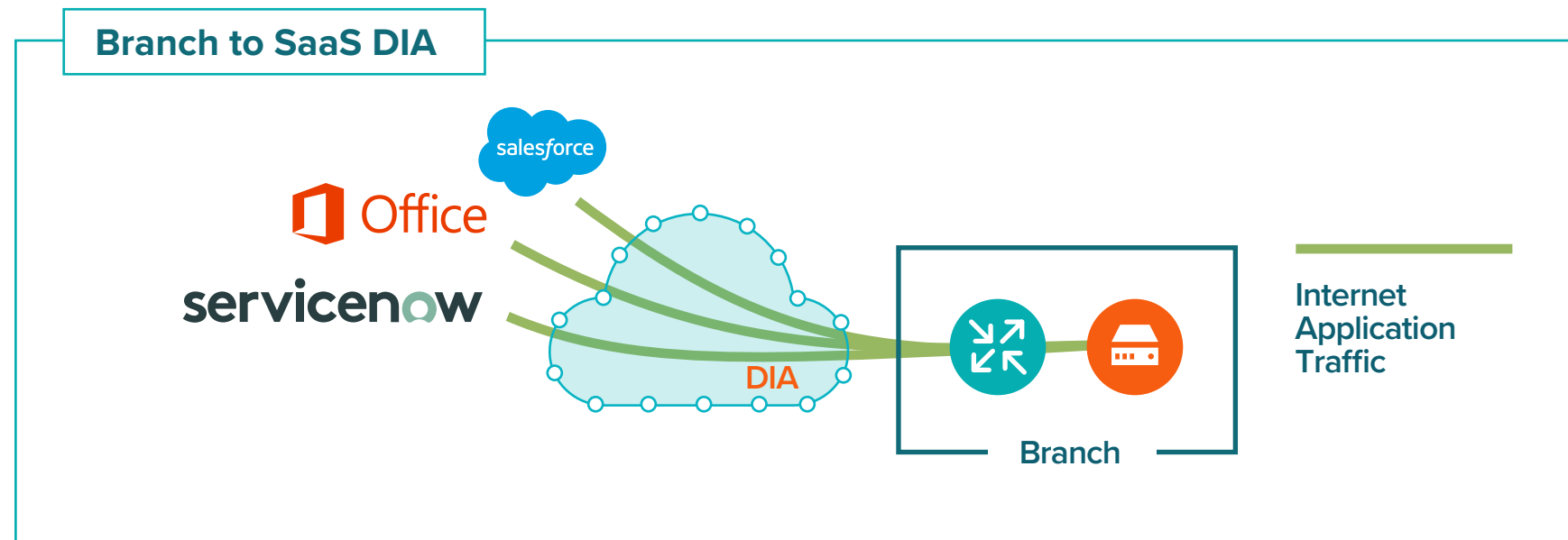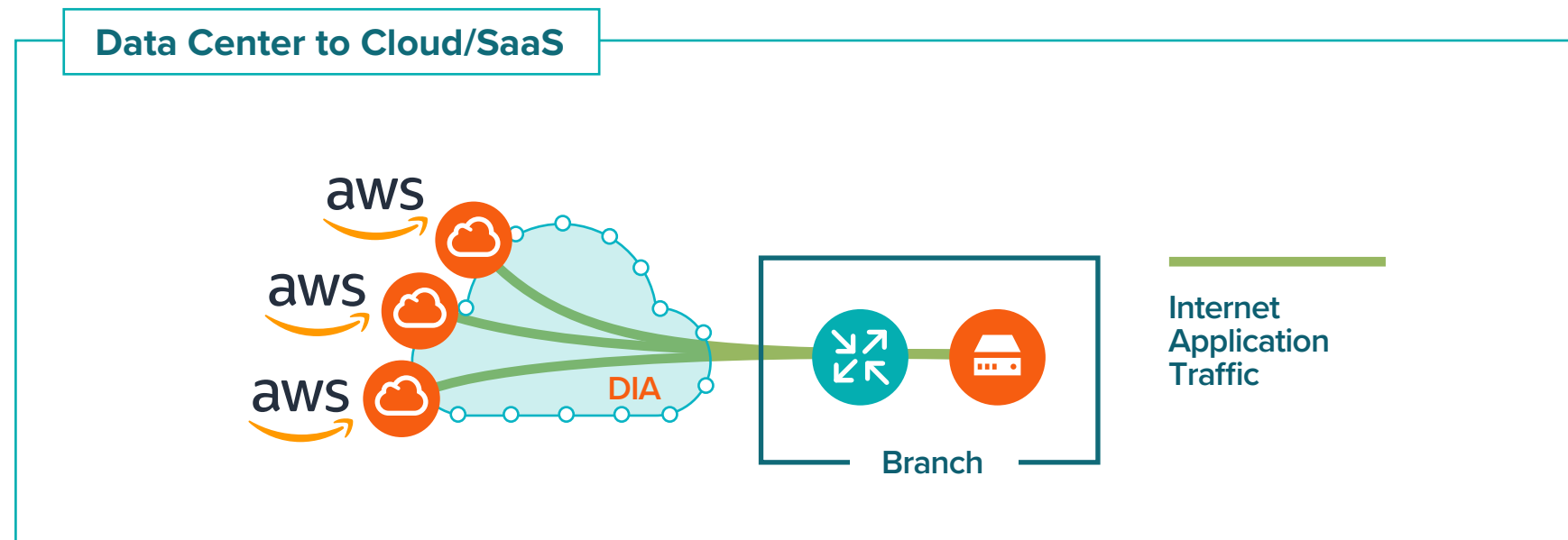

Branch to Cloud or SaaS

In this monitoring scenario, an IT team may be interested to know how a planned SD-WAN implementation would affect users' ability to reach critical SaaS applications (such as Microsoft 365, Salesforce or ServiceNow) from a branch using a Direct Internet Access (DIA) policy. While it used to be that outbound traffic was backhauled to the main data center prior to connecting to applications, SD-WAN allows for branch offices to connect directly to SaaS applications in an effort to improve user experience. IT teams will want to know that critical performance metrics like page load times and HTTP server times are well within expected thresholds before rollout.

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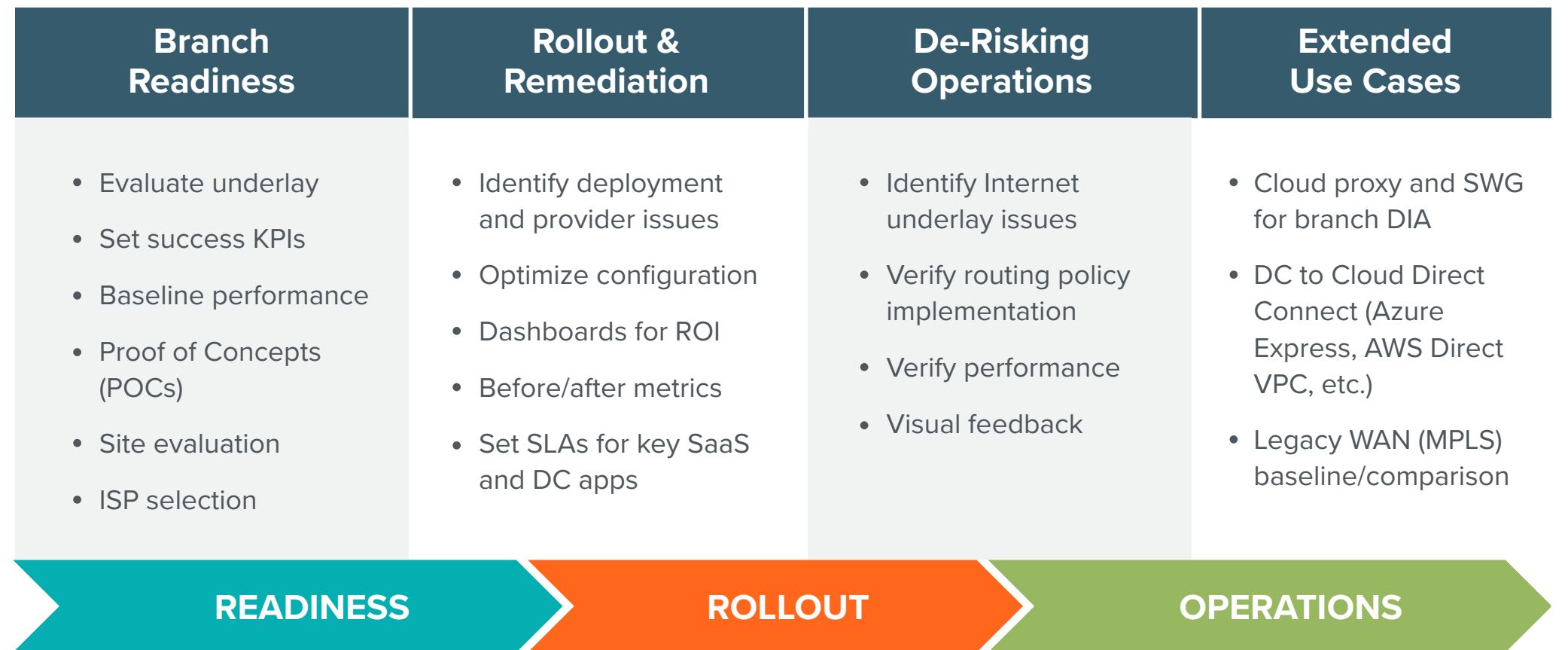

Data Center to Cloud or SaaS

In this third monitoring scenario, an IT team may want to understand how data center traffic that is destined for a critical SaaS application or Cloud Service Provider is transiting over the Internet. As more and more workloads move to the cloud, it is becoming increasingly important to understand every step along a packet's journey between data center and the cloud so that you can identify weak spots and work with your service providers to optimize routing policies to ensure maximum performance.

Successful SD-WAN Migrations Begin (and End) with Visibility

SD-WAN is one of the most consequential network architecture changes you will make. To ensure a successful migration, it's wise to start with a data-driven process to reduce performance risk, such as by performing a readiness audit to establish the foundation for a full readiness lifecycle as shown here.

Branch Readiness	Rollout & Remediation	De-Risking Operations	Extended Use Cases
• Evaluate underlay • Set success KPIs • Baseline performance • Proof of Concepts (POCs) • Site evaluation • ISP selection	• Identify deployment and provider issues • Optimize configuration • Dashboards for ROI • Before/after metrics • Set SLAs for key SaaS and DC apps	• Identify Internet underlay issues • Verify routing policy implementation • Verify performance • Visual feedback	• Cloud proxy and SWG for branch DIA • DC to Cloud Direct Connect (Azure Express, AWS Direct VPC, etc.) • Legacy WAN (MPLS) baseline/comparison

READINESS ▸ **ROLLOUT** ▸ **OPERATIONS**

ThousandEyes enables you to set up your SD-WAN architectures at pilot sites and data centers, and measure how all those apps and services will work from a branch and end user device point of view—all before you place a single real user on it. And if you're contemplating using a cloud-based security service like Zscaler, you can fold that into the mix and measure it as part of your pilot as well.

Conducting an SD-WAN Readiness Audit

To make the most of these preparations, it's a good idea to define a set of audit activities and goals for your business, like those seen below.

	SD-WAN Internet Connectivity	On-Premises App Performance	SaaS App Performance
Readiness Audit	• Monitor IP connectivity between branch and hub sites by monitoring the health of the Internet Service Provider connectivity. • Monitoring end-to-end network performance and thoughput inside VPN Tunnel	Compare application performance and user experience of on-premise applications when routed over different topologies, such as SD-WAN-VPN & MPLS	Compare performance of SaaS when routed via DIA versus MPLS paths
Goals	• Find issues with underlying Internet providers • Perform performance comparisons between routing via DIA (SD-WAN/VPN Tunnel) and MPLS (non SD-WAN) paths • Monitor per hop latency and packet loss for Internet paths • Monitor for issues inside IPSec tunnels, router overloads and internal routing issues • Track bi-directional end-to-end throughput, comparing between DIA and MPLS routes • TCP throughout monitoring and comparison for VPN tunnel vs. MPLS	Provide performance comparisons between routing via SD-WAN VPN tunnel and MPLS paths	Determine branch readiness for DIA based on performance of key SaaS apps: • Google • Workday • Salesforce • Oracle Financial • ServiceNow

Addressing SD-WAN Visibility Challenges

To sum it up, there are two core challenges businesses need to overcome for WAN modernization success:

1   **The ability to visualize, test, and monitor before and during the modernization process.**

2   **The ability to see end-to-end across the entire network infrastructure so that, when problems arise, they can be quickly escalated and solved.**

Yet most off-the-shelf SD-WAN solutions only provide simple edge-to-edge performance statistics, which means that IT and network teams are in need of visibility that goes beyond what is provided by their SD-WAN vendors. In order to assure sound readiness audits, architecture planning, deployment and efficient operations, enterprises need to see end-to-end underlay and overlay connectivity correlated with app experience.

# Monitoring That Helps You Make the Most of SD-WAN

ThousandEyes is a different monitoring solution, offering visibility from the very start of your SD-WAN journey. Once you start targeting branch sites, you can use ThousandEyes to measure ISP performance to key SaaS providers, evaluate branch readiness, and quickly resolve provider and Internet issues before you even pull the go-live trigger. Meanwhile, global cloud-based vantage points and agents installed within your data centers allow you to start baselining your application and network performance—even before you begin your rollout.

The insight that you gain by having this level of visibility is incredibly valuable. You may find your broadband ISP actually performs more consistently than your high-cost MPLS line, or that your regional provider isn't properly routing packets to your data center. That's not possible with traditional monitoring or vendor SD-WAN dashboards.

Next, once you're up and running, ThousandEyes gives you visibility into not only the entire SD-WAN fabric, but also into every hop within the end-to-end underlay—every transit provider, to every cloud and SaaS provider, from every branch location. This means you can identify exactly where an ISP might be underperforming, how it's impacting application performance, and quickly escalate and resolve issues.

But SD-WAN isn't a "set it and forget it" operation. It's application-centric, so your monitoring needs to correlate network performance directly with application performance. And, with more of your network riding on the Internet, you're exposed to issues that would otherwise be outside your control. ThousandEyes Browser Synthetics gives you a complete picture of SaaS and on-prem application performance so you can quickly spot and escalate performance issues.

Finally, ThousandEyes also gives you data-driven insights that can prove the value of your WAN modernization. Our solutions provide powerful reports and dashboards for key stakeholders—so you can showcase the performance of applications across your entire SD-WAN fabric, demonstrate reduction in downtime and network bottlenecks, and highlight how SD-WAN has improved service delivery.
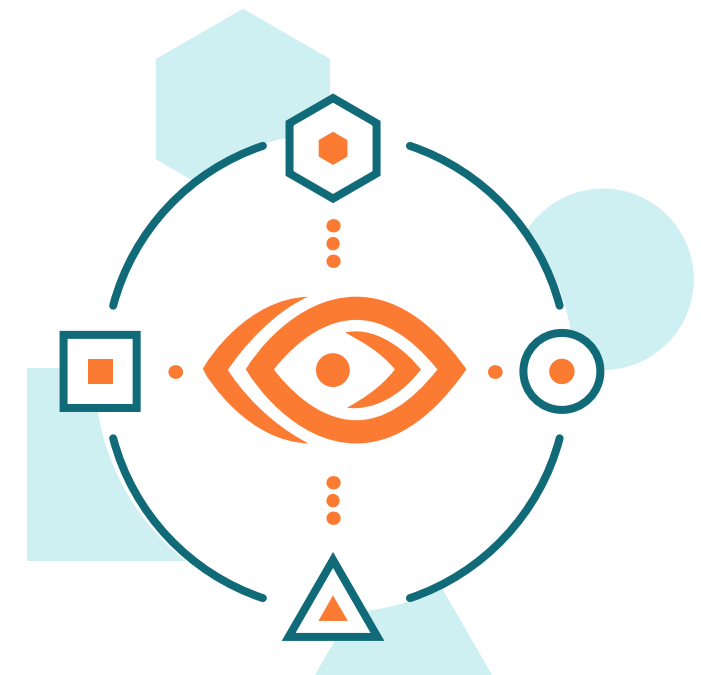
Assure Your SD-WAN Rollout Now, and Into the Future

As for what comes next, in the cloud there's no such thing as a steady state. Once you finish your SD-WAN implementation, more changes will surely be knocking at the door. So, use that same data-driven readiness lifecycle model to ensure success in every cloud, SaaS, Internet and WAN move you make.

About ThousandEyes

ThousandEyes delivers visibility into digital experiences delivered over the Internet. The world's largest companies rely on our platform, collective intelligence and smart monitoring agents to get a real-time map of how their customers and employees reach and experience critical apps and services across traditional, SD-WAN, Internet and cloud provider networks.

Ready to make the most of your WAN modernization?

Book a demo here to see what ThousandEyes can do for your business.

ThousandEyes◉

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