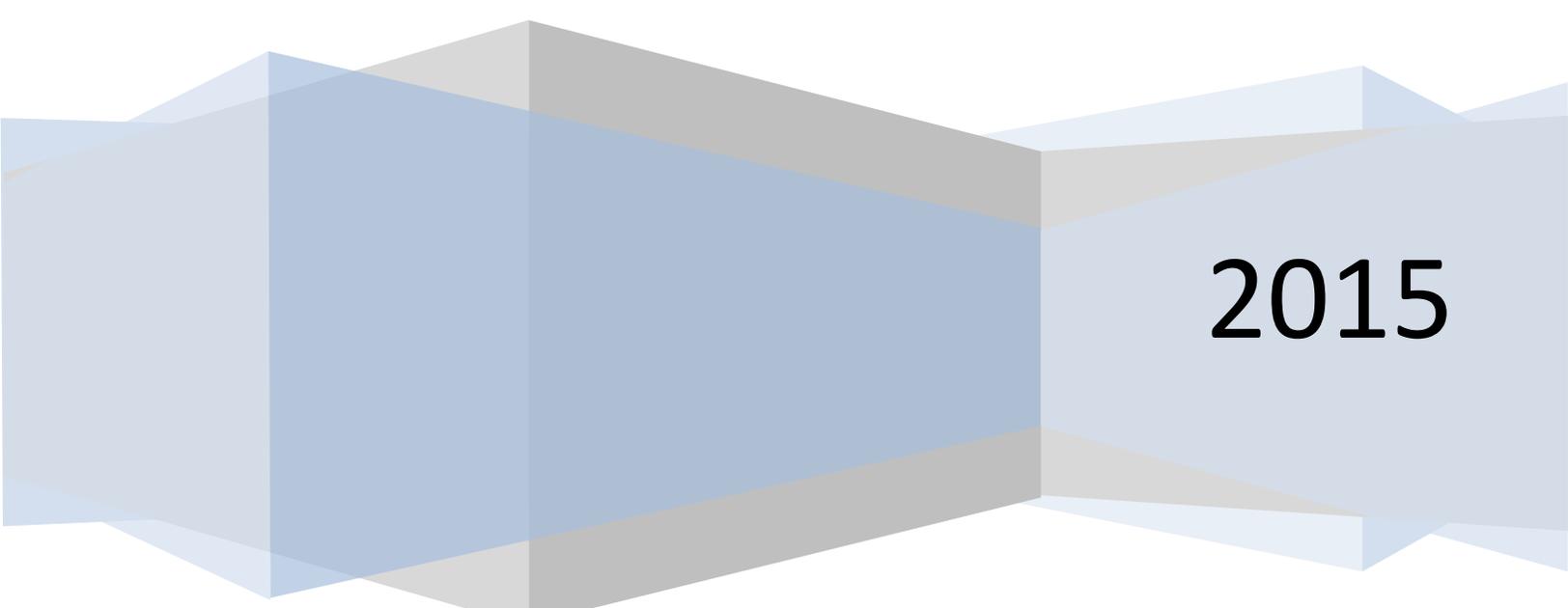*Network World and Robin Layland present*

The 2015 WAN Challenge

Your Guide to Understanding and Choosing a Hybrid WAN and SD-WAN Solution

2015

The Future of the Branch Office is a Hybrid WAN

## *Your Guide to Selecting a the Right Hybrid WAN and SD-WAN Solution*

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Traditional WAN architecture had a spoke and hub design. Enterprises architected a connection to the nearest data center using MPLS or some other leased-line style connection. Using symmetrical optimization technology at both the branch and data center squeezed out more bandwidth and reduced response time. All Internet-bound traffic passed through the data center's security, creating a strong perimeter defense for the enterprise. The data center also has web screening to ensured employees didn't go someplace inappropriate or create a security risk. This WAN design for branch offices worked for decades, but it doesn't any more.

The days of needing to send all traffic from your branch offices to the data center by the MPLS is over. While a significant number of business applications still reside on servers in the enterprise's data center, an increasing number are in the cloud. They are either SaaS (Software-as-a-Service) applications such as Salesforce, or the enterprise is using a cloud service like AWS to host applications.

The branch office is also generating additional business traffic destined for other Internet sites. This includes everything from booking travel reservations, watching videos for training, or just catching up with what competitors are doing.

The other big driver of change is personal Internet usage. Everyone knows you should use the Internet at work for business, not personal reasons, but side-surfing happens. Just blocking usage is not an option because, depending on the job, you can't always tell what usage is personal and what is business. It is impossible to tell if an employee is watching a video to learn something job-related or just catching up on the latest kitten video. The web and apps are just as useful for business as for your personal life. Trying to figure out which is which and setting up blocking isn't worth the time and effort it takes and may upset your employees.
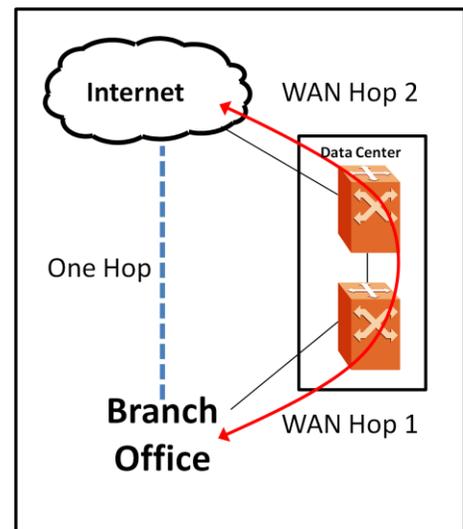
The result is that balance between Internet and data center service traffic is shifting. In 2000 most of the traffic would have been destined for data center servers. Now it is starting to shift strongly in favor of the Internet. Bringing all that traffic back to the data center introduces several costs.

First, it adds unnecessary hops. In the diagram, the Internet bound traffic leaves the branch office and takes a WAN hop to the data center. Within the data center, it has to take one or more hops to get from the router supporting the branch office to the Internet router, plus the trips through all the security and other equipment providing services. Next it takes another WAN hop to reach the Internet. This increases latency. If the traffic goes directly to the Internet, there is only one WAN hop (the dotted line).

Next is the cost issue. You are paying WN freight twice instead of once as with a direct Internet connection. Costs also mount because that extra hop uses expensive MPLS bandwidth rather than a lower cost Internet broadband connection. When Internet traffic was a small part of the overall traffic, extra cost and delays were easily absorbed, but that equation changes as the Internet percentage grows.

Hybrid WAN

The solution is to move to a hybrid WAN architecture. The basic concept of a hybrid WAN is simple. A hybrid WAN solution has at least two connections from the branch office. One is the traditional MPLS (or other technology) that connects directly back to the data center. All the normal business traffic destined for the data center, plus any other traffic you want specifically routed through the data center, takes this path. The other connection is made through direct broadband to the Internet allowing traffic to flow directly to the broader Internet or as a VPN connection to the data center

A hybrid WAN solves the problems with older WAN architecture. Using the direct path to the Internet eliminates the extra hops and latency associated with Internet traffic going through the data center. It reduces cost since Internet broadband is lower in cost than an MPLS link. This can reduce, sometimes significantly, the WAN cost to the branch office. Additionally, using a VPN back to the data center over the Internet gives you an alternative path back to the data center, increasing availability and throughput.

Another key feature of a hybrid WAN is path selection. A hybrid WAN can decide which link is the best path for the traffic based on real-time monitoring of latency, utilization and error rates over the link.

Complete Solution

A hybrid WAN is a step up from the old WAN architecture, but to gain full benefit from it, you need to make sure it can do more than just supporting two links. WAN optimization techniques are still important and should be part of your solution, but you need to ask how they support not just the MPLS link, but the Internet connection as well. The issue is that older WAN optimization solutions were symmetrical. That means they had hardware or software at both ends of the link, something easy to do when you owned both ends. This allowed the solution to provide significant bandwidth reduction along with other benefits, which still applies to the MPLS link to the data center. With the Internet link, you only have the optimization solution on one end - the branch office. Vendors need to explain their asymmetrical optimization technique -- what they can do to help when the optimization solution is only on one end.

Just because you can't put equipment at your SaaS vendor's facility, there are ways to get the benefits of symmetric optimization. Some SaaS vendors may support a software version of your optimization solution. Your cloud vendor may be able to support a software version of your optimization solution that allows you to get full symmetrical benefits. Additionally, many WAN optimization/hybrid vendors have other creative ways to help. Again the important thing is to ask them.

Another key feature is path selection. A hybrid WAN can decide which link is the best path for the traffic based on real-time monitoring of latency, utilization and error rates over the link. It is important to understand how the vendor performs path selection. It is generally based on the application. You need a vendor that can report and understand the characteristics of the applications using the link. This information is also useful for control and security purposes. Have the vendor explain in depth their path selection ability.

Turning your hybrid WAN into a software-defined WAN (SD-WAN) is a step up from just a hybrid WAN. Basically an SD-WAN means the path selection and configuration are controlled by policies. This approach has several benefits. It allows you to move to a "no-touch branch office" so you can bring up and reconfigure the branch office more easily and quickly. It also allows you to have a rich set of policies driving path selection.

Security

"Direct to the Internet" does present some security issues. With traditional WAN architecture, all the traffic headed to the Internet goes through your security infrastructure in the data center. The direct connection means you need to consider how to you are going to provide security at the branch. There are three basic approaches to providing security:

- Replicate all or part of your security infrastructure at the branch as needed
- Route all or part of the Internet traffic to a cloud security vendor and have them provided the security
- Establish hubs closer to the branches in the cloud where you run the necessary security.

Security should not stop you from implementing a hybrid WAN. Any one of these solutions has proved its ability to solve the security issue. Additionally, hybrid WAN vendors may provide solutions such as web filtering that can help by replicating the web security at your data center. It is important to have them explain how they can help solve the security issues and how they can work with other security vendors to provide a more complete solution. A hybrid WAN is already a step in the right direction because it understands the applications going over the link and provides you greater visibility.

Questions to Ask

When comparing solutions, here are a few questions to consider. It is by no means a complete list.

- How easy is it to set up their solution and make changes? Does it fit within your current controls and management structure?
- Does it understand the applications that are running over your network? What type of reporting does the vendor provide?
- How is path selection done? What variables are considered? Is it static or dynamic?
- How easy is it to set up policies? Do they provide "out of the box" policy for common applications? Does it fit within existing policy framework?
- What type of security features do they provide? Can they easily block websites and do they have the ability know which are bad ones?
- Do they provide a complete SD-WAN solution or have a path to one?

The Challenge

It is clear that moving to a new WAN architecture is the right direction. Hybrid WANs and SD-WANs provide significant advantage over the old single-link design. The question is "Which hybrid WAN solution is right for my network?" Not all hybrid WAN solutions are created equal. Many can't handle the challenges and complexity created by the move to this new WAN architecture. You need to understand the differences between vendors, and then find the one that best fits into your WAN strategy.

I have ask **Cisco** to explain how they meet the challenge of today's WAN**.** Rather than having them list everything they do (which is a long list), I asked them to explain their view on the changing WAN landscape and their primary competitive differentiators, concentrating on where they excel compared to the entire industry. Your next step is to read and listen to what they have to say, so you can understand how they can help you implement the right WAN solution for your enterprise.

This document is just one part of the 2015 WAN Challenge. There are also two webcasts at the Challenge site. In each of these webcasts, I bring together two experts to explore hybrid WAN issues in depth. You can find the webcast, along with additional material on application and network performance management, at the Challenge site at Network World -- or click on this link to go there directly.

CISCO

Ensuring Application Performance in the Hybrid WAN Environment

Allison Park
Marketing Manager

Power the hybrid WAN via Cisco Intelligent WAN with WAAS

Introduction

The digital era is creating unprecedented innovation opportunities that allow you to re-invent your business on demand. This requires an enterprise network that can help you power your business with agility, simplicity, openness and security. An important element of the network that sometimes can be overlooked is the wide area network (WAN). In order to achieve the transformation, the WAN needs to support the branch, stores and mobile users with high-quality business applications and data access from anywhere. So the question is how to get more out of the WAN while your budget is flat or shrinking. How can you reduce costs, but still maintain the application performance that your users expect, to keep employee productivity up and customers satisfied?

Enabling the hybrid WAN

The answer is hybrid WANs. A hybrid WAN is a network that utilizes multiple circuits (figure 1), such as MPLS, Internet, 3G/4G/LTE, together simultaneously. By leveraging circuits that otherwise may have been on standby, allows you to get more capacity out of your WAN with lower costs. Hybrid WAN also allows you to use direct internet access for employees to access the public cloud with better performance and offload the guest user's connections directly. Our calculations suggest that for major cities around the world, on average, an internet link is about 45% cheaper for a 10Mbps connection versus MPLS.
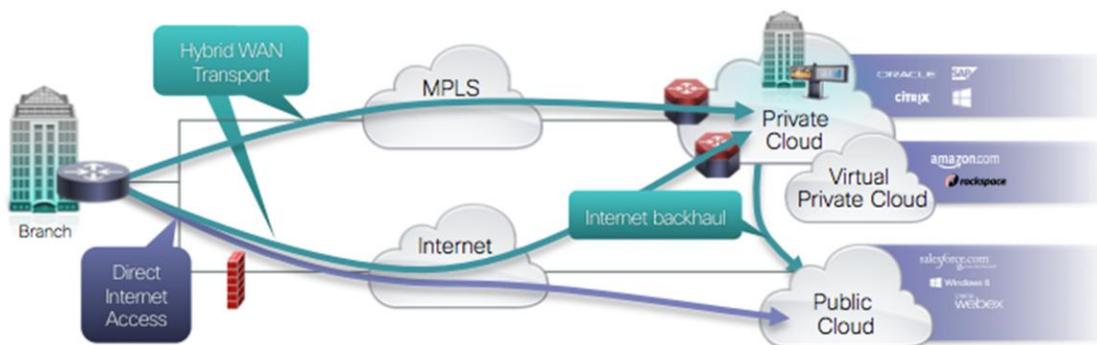

Figure 1 Hybrid WAN - utilizing MPLS and Internet

The key benefits of a hybrid WAN are:

- **Increase Cost Savings**: IP traffic is expected to multiply by three times over the next five years due to video, cloud applications, rich media, and data center consolidation. Cisco's Advanced Services team has been working with dozens of customers on this journey, and the early results show cost savings of 30-50% can be achieved using internet transport and Cisco's WAAS application optimization. These strategies allow IT to keep pace with bandwidth demand without the need for additional budget.
- **Better Application Performance**: In a hybrid WAN environment, applications can be routed through connections that are best suited for their purpose. Specifically, now with direct internet access as an option, SaaS applications can be accessed directly without getting backhauled through the data center, saving time and reducing latency.
- **Greater Business Agility**: A leased line can take weeks or even months to bring up. This might not be feasible for a company that consistently sets up short-term offices or a fast growing enterprise that needs to get new offices open. Having a hybrid WAN architecture, IT has the flexibility to turn on a 4G LTE connection immediately to move forward with daily business.

Cisco's Approach To Hybrid WAN

Not all hybrid WANs are created equal. You need a solution that can maximize the benefits of a hybrid WAN – manage multiple links securely, reliably, and with high performance. Cisco Intelligent WAN (IWAN) with Wide Area Application Services (WAAS) helps you successfully design, implement, and manage a hybrid WAN with these core capabilities:

- *Performance routing*: With multiple links, IWAN can dynamically determine which path an application should take for optimal performance. When one link has either a blackout or brownout, IWAN automatically diverts selected traffic to another connection so that users can have a seamless experience without degraded performance.
- *Deep visibility and control*: The ability to control traffic on a per application basis is now more important than ever. With Application Visibility and Control (AVC), IWAN can steer traffic onto appropriate paths and apply QoS based on its business value as driven by policy rather than port numbers of IP address.
- *Secure connectivity*: With SaaS applications and direct internet access, branches are now vulnerable to new threats and increased complexity of network management. IWAN addresses this challenge by providing a framework for IT to deliver a common operational model across all connections using Dynamic Multi-point VPN (DMVPN) and allowing IT to build out a single virtualized WAN across all sites while managing only one routing and security domain. IOS Firewall and Cloud Web Security (CWS) allow you to have comprehensive threat defense as well as scalable direct internet access across all the branches.

These capabilities all support the ultimate goal of providing an optimal user experience with high application performance. Cisco WAAS, a leader in Gartner's Magic Quadrant for WAN Optimization, accelerates applications over any connection within the hybrid WAN to any location, public or private cloud. Cisco WAAS will take the visible, secured, and dynamically path-controlled application and give it another boost. In addition to accelerating applications that all WAN optimization products can do, Cisco WAAS has these unique features:

- *Cisco AppNav*: This award-winning technology helps you scale WAN optimization resources in the data center by virtualizing WAAS resources into an elastic pool and binding capacity to specific applications or locations based upon business requirements. This makes deploying WAN optimization in the data center simple and easy to manage and help protect your investment.
- *Cisco IWAN with Akamai Connect*: Akamai's web caching technology is integrated with WAAS to cache and preposition web and mobile applications, software, and videos. This significantly reduces the actual bandwidth across the WAN (figure 2), reducing congestion and contributing to efficient bandwidth utilization.
- *Branch automation:* The APIC-EM IWAN Application offers a simple interface for automation and orchestration when managing your branch and WAN infrastructure. Combined with the Cisco ISR, the IWAN Application delivers an SD-WAN solution that helps reduce cost to operate the WAN and optimize bandwidth.
- *Router-integrated solution*: WAAS is tightly integrated into Cisco's branch routers, the ISR range. WAN optimization does not require another device added to an already IT-constrained branch office, rather Cisco delivers one solution with all the capabilities it needed for a secure, fast, and agile connection to the data center and cloud. This dramatically simplifies deployment and reduces branch operational complexity.

	App Load Time/ Latency Reduction	Network Offload
Education Provider e-Learning app—dual sided deployment, WAN/backhauled Internet	**70%**	**99%**
Retailer iPad omni-channel app—dual sided deployment, WAN	**80%**	**40%**
Energy Company Web apps—single sided deployment, DIA	**75%**	**50%**
Services Provider Web apps—single sided deployment, DIA	**75%**	**82%**

Figure 2 Example of application performance benefits and WAN offload with Cisco IWAN

Conclusion

The move to, and need for, a hybrid network is happening now. Cisco IWAN is a prescriptive design that is tailored to your needs. IWAN, Cisco's SD-WAN solution, provides a dynamic hybrid WAN that can helps IT abstract network complexity and design for business intent. Counter the exploding bandwidth demands driven by mobile, SaaS, and cloud applications with Cisco IWAN and WAAS. This solution delivers improved user experience, efficient bandwidth utilization, and costs saving.

For more information about Cisco's solutions described here, please visit:
cisco.com/go/waas, cisco.com/go/iwan.