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SD-WAN

Eight Questions to Ask When Considering an SD-WAN

Increase network agility and lower costs with a flexible software-defined WAN.

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ANYWHERE, ANYTIME ACCESS IS CONSTRAINED BY THE WAN

Workers want access to their critical information anywhere, anytime, and from any device. This expectation is driving significant changes in how and where enterprise applications are consumed, including the embrace of cloud services and enterprise mobile applications.

As the nature and location of enterprise application usage changes rapidly, it puts tremendous pressure on the enterprise wide area network (WAN). Instead of primarily dealing with client-server computing to and from one or two data centers, more and more traffic comes from the cloud and mobile devices. In addition, businesses are rapidly adopting voice and video—both latency-sensitive, real-time applications—that place additional demands on the WAN.

At the same time, IT budgets are not growing as fast as the demand for additional WAN bandwidth. As next-generation, bandwidth-hungry applications put significant strain on traditional, legacy WANs—comprised of technologies that are two decades old—IT managers seek modern alternatives. NetworkWorld contributor Zeus Kerravala calls overhauling the WAN nothing short of a business imperative. "Cloud and mobile computing create entirely different traffic patterns than legacy computing models," he writes. "Also, business agility is a top priority for company leaders, and that drives the need for IT agility and, more specifically, network agility."[1]

Other experts agree. "Leading IT service trends, such as on-demand IT service delivery, server and storage virtualization, an increasing remote and mobile workforce, and software-as-a-service (SaaS) are stressing the current network operations model," declares the Open Networking User Group (ONUG) in its landmark position paper.[2] "As a result of vendor lock-in, today's networks are costly, inflexible, proprietary, and poorly aligned with IT operations. In short, networking has become the weakest link in the service chain of application delivery, limiting IT's ability to respond directly to business imperatives."

As ONUG's white paper describes, enterprise WANs are increasingly complex and costly to manage and maintain. At the same time, businesses require 24/7 network uptime. As a result, enterprises experience high costs, coupled with low control over and visibility into the WAN, as well as delays and additional costs in provisioning remote sites.

So, what's next for the enterprise WAN?

DEFINING THE SD-WAN

A new type of networking solution has emerged to address businesses' evolving needs: the software-defined WAN (SD-WAN). SD-WAN technology can be seen as an extension of software-defined networking (SDN). Similar to SDN, SD-WAN decouples the network configuration from individual WANs, links, and hardware components. Instead, an SD-WAN uses software and virtual network overlays to take advantage of available WAN connections while centralizing control of and visibility into the entire WAN fabric. SD-WANs enable greater network capacity, lower costs, and more flexible management.

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Zeus Kerravala
Network World

SD-WAN offerings can vary dramatically from vendor to vendor, but they have a few things in common:

- Abstraction of the WAN overlay from any single service provider's WAN

- Leverage of internet links, with resulting internet economics and bandwidth scalability

- Active use of all available network links and the elimination of unused standby connections

- Centralized policy control for WAN traffic flow classification, prioritization, and quality of service (QoS)

- Centralized visibility into and monitoring of the WAN

Driven by the cost and complexity of existing enterprise WANs and changes in application and cloud usage, experts predict the SD-WAN market will reach $7.5 billion in the next five years.[3]

SIX BUSINESS BENEFITS OF AN SD-WAN

Organizations can reap substantial business benefits from an SD-WAN. An SD-WAN delivers:

1. Far greater WAN bandwidth

Broadband internet costs less than multiprotocol label switching (MPLS) at private, corporate data centers, and it is especially cost-effective at branch offices and at carrier-neutral colocation facilities. With an SD-WAN solution, businesses can afford far more WAN bandwidth than they could with an all-MPLS approach. SD-WAN solutions that support aggregation of disparate links enable much more bandwidth per enterprise location, especially at locations not connected via fiber links.

2. Lower WAN costs

Broadband internet costs are a fraction of MPLS costs. Per Mb/sec pricing of MPLS can run up to 100 times the price of internet bandwidth, especially in remote or rural locations. With an SD-WAN, businesses can lower their operating costs by relying less on more expensive private links and leveraging more inexpensive public connections.

With the proper SD-WAN solution, spending on MPLS can be capped and, if desired, eventually eliminated altogether for maximum cost savings. This cost reduction occurs even as bandwidth greatly increases to meet the demands of modern application usage. Businesses can use all the bandwidth they're paying for and delay the need to increase spend from current levels.

3. Greater network agility

With SD-WAN technology, businesses are no longer limited to the speed of old-school telecom service providers. Enterprises can leverage new technologies, such as long-term evolution (LTE) or fiber optic service (FiOS), as they become available—even if they are only available at some enterprise locations. While it can take weeks or months to add new locations to an MPLS network, with an SD-WAN solution, businesses can add new locations in a day—sometimes even in minutes. With SD-WAN, IT has the freedom to adapt the network as rapidly as the business demands.

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[1] "The Software Defined Enterprise WAN Is Now a Business Imperative," NetWorkWorld, April 30, 2014. Available at networkworld.com.

[2] "Open Networking Challenges and Opportunities," Open Networking User Group, July 2014. Available at onug.net.

[3] "The Future of Cloud WAN," The Rayno Report, January 2015, http://raynoreport.com/15/01/cloud wan-a-7-5b-opportunity/

4. High-performance access to SaaS and the cloud

Properly designed and implemented SD-WAN solutions enable enterprises to leverage cloud computing and SaaS in an incremental, secure, and reliable way. With the appropriate SD-WAN solution, network managers can prepare and enable their networks for the move to private, hybrid, or public cloud—at whatever pace the computing side of IT wants to go—without sacrificing network reliability and network security.

5. A superior experience for high-bandwidth applications

By providing reliable access to cloud applications and offering far more bandwidth in an affordable manner, SD-WANs enable some applications that were simply not practical over a limited-bandwidth private WAN. SD-WAN solutions that deliver reliability and application performance predictability enable the cost-effective deployment of videoconferencing, unified communications, and desktop virtualization—all solutions that are very sensitive to latency or packet loss and are difficult to deploy and support over a global WAN.

6. Lower troubleshooting and ongoing network management costs

With an SD-WAN, IT managers spend less time troubleshooting the external WAN—where they have historically had the least visibility and control. Instead, IT managers have greater visibility into network issues and can more easily track down the specific cause of problems after they occur. More importantly, an SD-WAN mitigates problems in real time even before users notice, virtually eliminating calls to the helpdesk about network performance problems and outages. IT managers can spend more time on proactive projects, rather than fixing problems and dealing with unhappy users.

With the right SD-WAN solution, the WAN is more fault tolerant and impervious to a variety of problems, including errors that might be introduced by the IT team itself, such as software upgrades or the need to take connections down for maintenance. By eliminating single points of failure from temporarily taking down the network and causing applications to fail, SD-WAN can enhance network uptime and application performance predictability.

EIGHT CONSIDERATIONS FOR CHOOSING THE RIGHT SD-WAN SOLUTION

Not all SD-WAN solutions are created equal. Here are eight key considerations when evaluating your options.

1. Deliver at least MPLS-level reliability and application performance predictability

If businesses are going to move successfully from purely MPLS, private WANs to SD-WANs, then reliability and predictability of application performance are essential. Ensure that the new solution can match or exceed the reliability, predictability, and performance of expensive, over-engineered, single-vendor networks such as MPLS.

QUESTIONS TO ASK

- Does the SD-WAN solution offer subsecond response to network problems-not just link failures but even network brownouts, periods of high packet loss, and excessive jitter?
- Are end-user connections (TCP flows) terminated when traffic has to be moved from one link to another, or are the sessions maintained?
- Does the SD-WAN solution deliver four 9s (99.99 percent) reliability and performance predictability when only internet connections are used?

"We projected that if we were going to increase bandwidth at our sites to 20 Mb/sec using MPLS, we would spend an additional $1 million over three years. We have seen a 3:1 return on our investment with Oracle SD-WANs."

Dave Badgley
Senior Systems Engineer
Dayton Superior

2. Dynamic support of multiple active links

The question is not whether merely two links can be used. Rather, determine how many links can be supported and ascertain whether they can they all be used whenever they are available. You don't want a solution that limits certain traffic types to certain links in the event of a connection failure.

QUESTIONS TO ASK

- Are more than two links per location supported? How many links?
- Can a single flow be striped across multiple disparate links, allowing all available bandwidth to be used even for just a single active large transfer? Is each flow limited to a single connection?
- Can all links be used whenever they are working, or are certain traffic types designated for certain connections in the absence of a network event for that connection?

3. Efficient use of each WAN link, both inbound and outbound

When leveraging high-bandwidth internet connections—with traffic coming in from multiple enterprise locations as well as from the internet and the cloud—the ability to efficiently use available bandwidth while still delivering predictable application performance is key. Historical recommendations have been not to run an inbound link at more than 30 percent to 40 percent sustained utilization if predictable performance is important. However, with a well-designed SD-WAN that supports traffic prioritization and QoS, businesses can increase the utilization rate of their WAN and reduce over-provisioning and wasteful spending.

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QUESTIONS TO ASK

- At what percentage utilization can links with traffic inbound from multiple locations be sustained while still delivering predictable application performance?
- If the answer is greater than 40 percent, how is this done? Can it be demonstrated?
- Can business priorities and policies be enforced to ensure critical application traffic always has an adequate share of network resources?

4. Support for real-time apps in real time

Videoconferencing and unified communications, including those hosted in the cloud, are now everyday business tools. The ability to handle real-time applications is a crucial component of any SD-WAN solution.

QUESTIONS TO ASK

- Can the SD-WAN solution deliver four 9s reliability for real-time applications, even if private MPLS bandwidth alone is insufficient?
- Can real-time application quality be maintained with an all-internet WAN?
- How is this done?

5. Secure and reliable access to cloud services and SaaS

In the age of the cloud, creating secure, reliable access to applications running outside the business' premises is critical. Whether accessing storage and compute resources from an infrastructure-as-a-service (IaaS) provider or using any SaaS application, no business can run effectively without ensuring that connections to the cloud are as reliable as connections between offices.

QUESTIONS TO ASK

- How is performance and reliability for SaaS and public cloud services traffic assured?
- Can we maintain our existing centralized security model, or does the SD-WAN solution require a migration to a decentralized security approach?

Whether accessing storage and compute resources from an infrastructure-as-a-service (IaaS) provider or using any SaaS application, businesses must ensure that connections to the cloud are as reliable as connections between offices.

6. Non-disruptive augmentation of existing enterprise WAN

Very few WANs are designed from scratch. Some businesses might be able to drop their existing WAN and switch completely to, say, a cloud-based SD-WAN, but for most enterprises, this is simply not a practical option. A seamless, pain-free integration and migration is desired.

QUESTIONS TO ASK

- Does the solution work with our existing MPLS WAN? Does all of the functionality work across the MPLS connections, or is it just a subset of that offered over internet connections?
- Can the solution aggregate MPLS and internet connections so a single session can simultaneously use both forms of network?
- Does the solution work with our existing WAN optimization appliances?

7. Ease of use and ongoing manageability

SD-WAN solutions must be easy to deploy and make day-to-day management and maintenance easier and less crisis-driven. IT should be able to easily add locations and network connections as the business evolves.

QUESTIONS TO ASK

- Does the SD-WAN solution offer extensive network-level and application-level visibility and reporting?
- Does the approach not only report on, but also mitigate network problems in real time?
- How easy is it to add a new location to an existing WAN?
- Can changes be made during business hours without disrupting network operations?

8. Ability to scale

It's one thing for an SD-WAN solution to work in a few locations, but scaling is another challenge.

QUESTIONS TO ASK

- How large an SD-WAN network can be built? How many locations? How many WAN links?
- What are the vendor's largest actual deployments?
- Can we talk to other customers with a deployment the same size?

HOW ORACLE SD-WAN IS DIFFERENT

Oracle SD-WAN is used by enterprises of all sizes across many industries and geographic locations. The patented technology makes the network intelligent so it can think for itself and deliver four 9s reliability even when using only multiple, imperfect internet links. The superior, no-compromises Oracle SD-WAN is easy to integrate into existing WAN designs.

Better-than-MPLS reliability and application performance predictability

The Oracle SD-WAN solution was designed from the ground up with reliability and application performance predictability in mind. The SD-WAN's intelligence begins with continuous, unidirectional measurement of the performance—loss, latency, jitter, and bandwidth utilization—of every packet on every connection between any two locations.

All packets are measured individually enabling Oracle SD-WAN to know what's happening in real time on the network. Rather than basing measurement on the occasional round-trip ping or "weather maps" that describe what happened nearby at a previous time, Oracle SD-WAN uses actual, current measurements.

Continuous measurement and real-time knowledge enable automatic subsecond reactions to network problems, including congestion-based loss and latency increases as well as connection failures. Oracle SD-WAN mitigates the impact of packet loss, making the WAN appear to all TCP applications as a zero-loss network with occasional bouts of jitter. This is especially helpful for Microsoft file services, which can perform poorly on the WAN in the face of packet loss. This real-time knowledge, coupled with subsecond reaction, enables Oracle SD-WAN to deliver better-than-MPLS reliability.

Efficient use of each WAN link—inbound as well as outbound

Oracle allows WAN links to run very hot without negatively impacting performance predictability. That is, Oracle SD-WAN does not cause packet loss or excessive last-mile delay. Almost any solution that supports QoS can do this with outbound traffic, but Oracle SD-WAN can do this with inbound traffic as well. When sharing an inbound WAN link with traffic direct from public internet locations, Oracle SD-WAN can run the link at more than 90 percent utilization—sustained indefinitely.

If your locations are only communicating with other locations that also use Oracle SD-WANs, sustained utilization can exceed 97 percent. This enables enterprises to safely use all of the capacity of their network connections, freeing them to delay bandwidth upgrades.

Unmatched support for real-time applications

In addition to the subsecond reaction and loss-mitigation functionality, Oracle SD-WAN can optionally replicate packets across two different paths—suppressing the duplicates at the other end—to deliver platinum-quality voice, video, or even latency-sensitive virtual desktop infrastructure (VDI) performance. Oracle SD-WANs can be configured by policy per application either to always replicate packets or to wait until sufficient bandwidth is available.

Reliable and secure access to cloud services and SaaS

Oracle offers two approaches for supporting SaaS and public cloud services. Both enable the same reliable, predictable access to those services that enterprise users have come to expect from applications deployed at private data centers. With a virtual cloud gateway located at the edge of the cloud, Oracle SD-WAN extends the reach of the corporate WAN into the cloud, making it possible to control, manage, and gain visibility into the connection to the cloud. You can also use Oracle SD-WANs to add locations to an organization's WAN at carrier-neutral, colocation facilities. This enables enterprises to centralize the complexity in the network at locations where diverse bandwidth is cheap

"We had light-bulb thinking about the return on investment of Oracle SD-WANs. For many of our WAN connections where we had redundancy, we were paying for bandwidth we weren't using. Our backup links were costing money, but we were largely leaving them unused unless there was an outage."

David Rahbany
Director of IT Infrastructure
The Hain Celestial Group

and plentiful and that provide excellent connectivity to the core of the internet, and thus to public cloud services and SaaS applications. Backhauling internet traffic to colocation facilities—where an enterprise's security technology of choice is also deployed, rather than to private data centers—makes tremendous sense, because it enables the preservation of the business' existing security model and technology.

Non-disruptive augmentation of the existing enterprise WAN

The Oracle SD-WAN solution can be deployed seamlessly, augmenting existing MPLS networks and WAN optimization gear. It enables incremental, at-your-own-pace evolution of the WAN, rather than requiring periodic forklift upgrades. Older WAN connections such as MPLS don't need to be ripped out and replaced all at once, but instead can be augmented with inexpensive internet links. Replacing the more expensive links can be done as contracts expire and when all stakeholders are comfortable with the performance and reliability of Oracle SD-WAN.

Oracle SD-WAN provides easy, cost-effective bandwidth scalability. Almost as importantly, bandwidth additions now can be incremental and completed in days, rather than the weeks or months it can take to get an additional MPLS circuit deployed, or the months and years it can take to get fiber to some locations.

Superior scalability

Oracle SD-WAN can support up to eight WAN links per location, not just the two links that most competing solutions allow. This density is particularly important for locations where fiber is not be available and multiple ADSL links must be aggregated to obtain sufficient bandwidth. Oracle SD-WAN enables a single flow to take advantage of all of the bandwidth across completely disparate links between locations, resulting in much faster transfers of large files. The Oracle SD-WAN solution is field-proven to support very large networks; some deployments incorporate more than 200 locations, all communicating directly with each other and using three or more links at each location.

MAKE YOURS AN ORACLE SD-WAN

The demand for anywhere, anytime access to business information and applications is driving the need for a modern WAN—one that is more agile, more efficient, and lower cost than simply deploying more MPLS everywhere.

An Oracle SD-WAN solution from Oracle is the answer. Oracle SD-WANs provide better than-MPLS reliability, while offering enterprises maximum agility and the ability to take advantage of internet economics. Oracle SD-WAN provides a smooth, scalable path that enables IT managers to safely and reliably support bandwidth-intensive and latency-sensitive next-generation applications, SaaS, and public and hybrid cloud computing, without increasing WAN budgets. IT managers can deploy an Oracle SD-WAN in an incremental, nondisruptive fashion to augment or eventually replace legacy MPLS WAN.

Oracle SD-WAN is complementary to existing WAN optimization products, ensuring smooth coexistence. With it, businesses gain a network that thinks for itself, freeing IT to focus on strategic projects to support the business, rather than the details of managing the WAN and troubleshooting application performance issues.

Learn More

Learn how to meet the demands of today's demanding applications and lower costs with Oracle's intelligent, flexible Oracle SD-WAN at oracle.com/sdwan.

"Adding an Oracle SD-WAN immediately slowed the number of user complaints we were receiving. We haven't experienced any downtime since deploying it."

Andrea Martfeld
Vice President and Information Technology Officer
Lake Area Bank and Roundbank

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Integrated Cloud Applications & Platform Services

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Oracle is committed to developing practices and products that help protect the environment