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# The Evolution of WAN to SD-WAN: 7 Things Every IT Manager Needs to Know

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Wide area networking (WAN) has evolved over the years to its latest iteration: software-defined wide area network (SD-WAN). For a number of sound business reasons, each step in the evolution has become more integrated with the Local Area Network (LAN) and the broader technology environment of the enterprise.

As a result of this evolution, many enterprises are deciding they need SD-WAN (or are at least exploring it as an option). This is because SD-WANs can offer many benefits for the enterprise including cost savings, improved uptime, better security, and greater network performance.



A recent study by Ovum, the leading network and telecommunications industry analyst organization (now part of Omdia), shows that 34 percent of customers in the study have deployed SD-WAN and 46 percent plan to deploy SD-WAN in the next two years. Larger enterprise customers are much more likely to have experience with SD-WAN and have major deployments to date. Global companies are more likely to have adopted SD-WAN but Ovum sees growing interest in the mid-market segment. The study also showed that the top reasons to choose a service provider for SD-WAN are service guarantees, security protection, analytics insights, and help with migration.

Those responsible for implementing SD-WAN environments in enterprises need to consider a number of things when guiding the planning process for choosing and implementing the best solution operationally for the organization.

## Consider the Problem Being Solved

An SD-WAN is a WAN that uses software-defined network (SDN) technology to simplify the management and operation of a WAN by decoupling the networking hardware from its control mechanism. This concept is similar to how software-defined networking implements virtualization technology to improve data center management and operation.

A key application of SD-WAN is to allow companies to build higher-performance enterprise networks by replacing more expensive private WAN connection technologies, such as MPLS, with lower-cost and more commercially available Internet access solutions. Because of the SD-WAN's ability to redirect traffic instantly in the event of a connectivity issue, customers can deploy multiple lower-cost connections without affecting network uptime.



The banner features the Pipeline Market Research logo in the top right corner. The main text is centered and reads: 'CUSTOM RESEARCH REPORTS AND SURVEYS' in large, bold, black letters on a yellow background. Below this, in white text on a dark blue background, it says 'LEVERAGING THE COLLECTIVE KNOWLEDGE OF THE GLOBAL MARKETPLACE'. At the bottom, there is an orange button with the text 'GET PRICING & DETAILS' in white.

That said, some SD-WAN platforms are good for some situations but maybe not for others. It may sound too simplistic, but it is important to ask the right questions upfront to understand this issue:

- Are the network requirements nationwide or worldwide?
- Do different groups within your organization require varying degrees of security?
- Are multiple Internet egress points required?
- Are applications moving from a data center or customer site to a cloud provider?

## Considerations for Integrating Access to the Internet

In addition to these basic questions, enterprises will want to understand how the Internet integrates with the SD-WAN. Is there a need for a simple circuit failover while maintaining the same IP address? Sites that have traditionally had a single Internet connection may have trouble integrating a second circuit from a different ISP, which can cause trouble with security and long-duration sessions, such as voice and video conferencing.

## MPLS Replacement or Enhancement?

Depending on the customer, an organization may want to implement the SD-WAN environment to complement an existing MPLS network or to completely replace it. To design an SD-WAN environment that is secure, delivers high performance, and can quickly adjust to fit changing business needs, enterprises and providers alike should consider some key factors:

- Complementing an MPLS network with SD-WAN can add redundancy to the environment, which improves uptime and prevents against costly outages
- Replacing MPLS with SD-WAN is also a common practice to increase scalability and agility, and can be easily implemented because the SD-WAN uses similar topology and routing rules as the MPLS network
- In some cases, an enterprise can use the SD-WAN for private network functionality as opposed to the MPLS network

# The Security Architecture Is Integral

The security policies and architecture team should be integral to the decision process. The more complex the objectives, the more security must be integrated up front. Entire network designs have been invalidated when security is included as an afterthought. Typical security considerations include:

- Where will internet access be allowed, and what rules apply at each point?
- How is the existing security implementation changing, if at all?
- How are remote workers handled?
- What Extranet VPNs are required? What site(s) have VPNs to third parties?
- Do some devices require Un-Natted public addresses instead of RFC-1918 addresses?

## Where Should the SD-WAN Center of Excellence Be Sourced—Internally or Externally?

One of the tougher questions to address when implementing an SD-WAN environment is whether or not to keep development internal or to outsource it, given that the LAN and WAN are integrated more deeply than ever before.

While SD-WAN simplifies some configuration steps, it introduces substantially more complexity, requiring experienced SD-WAN engineers to deliver a more sophisticated implementation fully and correctly. Like security engineers, SD-WAN engineers are expensive and difficult to retain. In addition, SD-WAN environments rely on hardware and software that require regular maintenance, upgrades, and troubleshooting, as well as interoperability with the rest of the environment. Organizations need to consider whether they are committed enough to build and maintain a sophisticated and highly skilled in-house staff to operate the SD-WAN or, alternatively, bring in a reputable managed solutions provider (MSP) who can manage your environment through an experienced team of experts. Very often, these organizations offer a range of network-related services, around-the-clock support, and reporting and analytics capabilities.

## Know the Applications and the Computation Environment Well

One element of application performance depends on the proximity of an organization's databases to its computation environment. Introducing too much latency between the two can have a detrimental effect on application performance and user experience. Consider the following to help determine an appropriate enterprise solution:

- Where is the computation for the mission-critical applications performed? On the desktop or in the cloud?
- What are the actual latency requirements between the data, the computation engine, and the user's keyboard and monitor?
- Do applications get wrapped in some VPN native to the application or virtual desktop? This obscures the SD-WAN visibility into the application, and consequently treats all traffic in the VPN the same.

## Transparency in the SD-WAN Network

Most SD-WAN systems provide more visibility and analysis capabilities than basic routers and switches. This can be a curse as much as a blessing. The SD-WAN environment can precisely track and report latency

and packet loss. While this data is good to help understand what happened in a particular incident or identify network behavior patterns for analysis, the temptation to fix specific instances of problems that are transient by nature can be counterproductive. At the same time, for chronic issues or as a means to gather intelligence related to a business change, the data available with most SD-WAN solutions is absolutely critical.

With the knowledge of how public data networks are built, network operators can identify real problems by using the data to address critical issues.

## **A Single ISP for at Least One Circuit at Every Site is Best**

SD-WAN devices can only prioritize the transmission of traffic into the WAN. The WAN implementation determines the priority at every hop between sites. Traffic that traverses multiple ISPs will not get the benefit of Class of Service within the WAN, so all traffic will be treated as best effort.

Using the same ISP at every site can create an MPLS-like experience between the sites. In fact, many carriers provide the same SLAs for two on-net internet circuits as they do for MPLS circuits. Certain ISPs allow for end-to-end class of service between internet circuits, and in most cases, the routes with the lowest latency are likely to be using the same ISP at both sites.

Finally, be careful that the ISP is using the same network ASN for all sites. Carriers may have multiple networks through acquisition that are not integrated. Without a common ASN, the benefits of a single carrier are nullified.

## **Always Favor Flexibility**

As the SD-WAN capabilities improve and business needs change, the SD-WAN network must keep pace—sometimes even before the SD-WAN is fully implemented. Last-minute changes in requirements or network demands may be uncovered as the implementation progresses. External events such as a change in an organization's remote work policy could substantially change the environment as well. While some platforms and licenses have more attractive prices, changes and modifications could be limited in the agreement. It's important to thoroughly understand your ability to make modifications and the flexibility of working arrangements, particularly within the SLA.

## **The WAN Will Continue to Evolve with SD-WAN**

Wide area networking has evolved from point-to-point to IP to MPLS and now to SD-WAN. Each step in the evolution has become more integrated with the LAN and the broader technology environment of the enterprise. Such integration is necessary for more intelligent routing, management of critical applications and, ultimately, optimization of the user experience. SD-WAN integration requires an increasingly comprehensive set of considerations to assure that the correct problems are solved efficiently, economically, securely, and flexibly—and, most importantly, without disruption of enterprise operations.