Al-Driven SD-WAN Will Optimize User Experiences Across a Distributed Enterprise

An ENTERPRISE MANAGEMENT ASSOCIATES® (EMA™) White Paper Prepared for Juniper Networks

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EXECUTIVE SUMMARY

Software-defined WAN is a powerful platform for network transformation, but it also introduces tremendous complexity. To ensure that SD-WAN can optimize user experiences, IT organizations must implement a solution that provides AI-driven operations with end-to-end visibility from the client to the cloud. This white paper explores the roots of SD-WAN complexity and how one should counter it with AI-driven operations.

SD-WAN SHOULD TARGET USER EXPERIENCES, NOT JUST COST OPTIMIZATION

Cost reduction can make the math work when calculating a return on investment, but it shouldn't be the only driver of software-defined WAN (SD-WAN) adoption. During the first wave of SD-WAN adoption, enterprises quickly recognized the opportunities for saving money. After all, SD-WAN's

hybrid WAN connectivity allows enterprises to reduce their reliance on costly MPLS circuits by adding cheaper internet bandwidth to the network. Also, the centralized management offered by SD-WAN could reduce operational overhead via management simplicity, integrated operational visibility, and network security capabilities.

However, Enterprise Management Associates (EMA) research often reveals that network investments driven by cost reduction are less successful and deliver less value to a business than those driven by increased business and/or IT value. The current wave of SD-WAN investment is aiming higher. New EMA research found that today's enterprises are primarily targeting three benefits with this technology: stronger network security (52%), deeper network and application visibility (48%), and improved network and application performance (48%).¹

These drivers of SD-WAN adoption are reflected in the SD-WAN capabilities that enterprises consider most critical today: integrated network security, native monitoring and visibility, and application quality of service functionality.

The mandate for SD-WAN buyers is clear: they must focus on user and application experience and security. However, SD-WAN technology is just the starting point.

COMPLEXITY CAN UNDERMINE THE VALUE OF SD-WAN

SD-WAN centralizes and simplifies network engineering and operations, but complexity remains. The top two challenges to SD-WAN success are implementation/operational complexity (42%) and integration with security architecture (41%).

IMPLEMENTATION/OPERATIONAL COMPLEXITY

One of the biggest challenges to successful SD-WAN deployment and operations is ISP heterogeneity. As enterprises adopt hybrid WANs with MPLS and internet, many are using two or more ISPs at each site to reduce the risk of service degradation. ISP visibility and intelligence are essential for managing this performance, meeting application latency requirements, and identifying internet brownouts. Also, if one ISP is a wireless operator, cost optimization is a complexing factor given that wireless operators charge by data usage rather than capacity.

Cloud onramps add even more complexity. An SD-WAN overlay will drive direct cloud access from the user edge. By connecting corporate sites directly to cloud environments, SD-WAN exposes the network to cloud dynamism and scalability. Cloud VPCs can multiply, expand, relocate, and disappear with two or three button clicks. Multi-cloud architecture is also increasingly common. Not only must SD-WAN maintain connectivity into this cloud chaos, it must secure that cloud access, too.

SD-WAN also introduces dynamism around application performance. These solutions typically offer granular quality of service (QoS) settings for WAN applications, but QoS configuration will require trial and error. Network engineers must identify the applications that require priority and track applications with business criticality that changes over time. For instance, EMA research found a significant spike in real-time application traffic since the beginning of the pandemic. End

¹ Unless otherwise specified, all data in this research was originally published in the EMA research report "Enterprise WAN Transformation: SD-WAN, SASE, and the Pandemic" in January 2021.

users who can no longer meet face-to-face with coworkers and customers are relying on voice, video, and collaboration tools to remain productive and connected. These bandwidth-hungry applications require careful QoS management. User experience can be hard to optimize, since most SD-WAN solutions rely on static policies configured by tunnels rather than by individual user sessions.

ARCHITECTURAL COMPLEXITY

EMA research found that 88% of SD-WAN implementations introduce a full or partial mesh to the network. This architecture requires the configuration and management of multiple tunnels. It also requires a new security architecture, since central security hubs are unfeasible. This means network architects must configure security for each site with controls put in place to protect corporate traffic and isolate guest traffic.

Moreover, the COVID-19 pandemic has created additional complexity. Fifty-nine percent of enterprises are expanding the scope of their SD-WAN implementation due to the public health crisis. EMA suspects that many enterprises are becoming more distributed, creating smaller offices in more locations to improve social distancing for employees and customers.

COUNTERING COMPLEXITY

Complexity has prompted a shift in strategies with second- and third-generation SD-WAN implementations. Sixty-two percent of enterprises now prefer to consume SD-WAN as a managed service. Only 12% proceed with a "do it yourself" (DIY) SD-WAN implementation. Five or six years ago, DIY SD-WAN implementations were much more common, but IT organizations have learned their lessons.

While a managed service can reduce complexity, enterprises want to maintain control. Only 16% of enterprises outsource SD-WAN operations, such as change management, monitoring, and troubleshooting. Instead, 63% prefer a hybrid operations model in which the SD-WAN provider and the IT organization share management responsibility. These in-house network operations teams need a solution for reducing SD-WAN management complexity. SD-WAN's native monitoring capability usually exists in a silo, with limited or no integration with the WAN underlay or LAN and WLAN management. This makes troubleshooting harder and limits endto-end visibility of user experiences. EMA research has found over the years that enterprises are seeking management integration between SD-WAN and LAN infrastructure. How does one reduce complexity while maintaining control?

SD-WAN with an integrated security architecture will also reduce complexity significantly. SD-WAN typically offers a suite of native and third-party security capabilities. When network managers can manage and orchestrate these security capabilities through an SD-WAN controller, network and security management is unified. Security configuration and policy design can be done side-by-side with network design and management.



EMA PERSPECTIVE: AI-DRIVEN SD-WAN WITH END-TO-END VISIBILITY IS THE FUTURE

To ensure a secure network with excellent end-user experiences, operators of SD-WAN environments need true end-to-end visibility from the client to the cloud, and they need AI-driven operations solutions and support.

End-to-end visibility provides essential, granular insight into user experiences. This goes beyond visibility into individual tunnels that make up an SD-WAN overlay. Instead, end-user experience on the WAN should be treated as an end-to-end service that includes the data center and the cloud, the user edge (branch office Ethernet and Wi-Fi), and individual user sessions. The need for this end-to-end visibility becomes obvious when one looks at the most frequent root causes of IT service problems that affect branch offices and remote sites. Application performance issues, network provider underlay problems, and end-user errors and client device failures are the most common causes of branch office trouble, according to EMA research.

End-to-end performance visibility requires AI-driven analytics and operations. The typical enterprise has three to six tools for managing network performance.² Enterprises need to correlate insights across these tools to get useful insights. The problem is about more than dealing with multiple user interfaces. An AI engine can correlate insights and build a session-level view of the network to optimize user experience (Was the problem in the WAN? Within the application? The Wi-Fi networks? The client device? Inputs from all these sources must be correlated and optimized). It can also adjust its understanding of end-to-end services as enterprises shift to microservices clouds, ensuring scalability, resiliency, and agility of the network.

EMA's early research on this topic confirmed this shift toward AI. Ninety-two percent of network operations teams apply or want to apply AIOps capabilities to their performance management solutions.³ EMA's research found that enterprises that use an AI-driven solution to correlate insights across their NPM tools are more successful with that correlation.

Al-driven networking opens up a variety of use cases and opportunities to the network team. It can baseline networks, detect anomalies, and automate root-cause analysis during a troubleshooting process. Over time, this technology can also enable self-driving networks with closed-loop operations. Some networking vendors, such as Juniper, are also applying Al technology to their customer support organizations to provide proactive support via a virtual network assistant. Network infrastructure vendors envision a day when their support organizations open and resolve a ticket without involving the customer's IT organization, proactively triggering a return merchandise authorization (RMA) if the AI engine detects a hardware failure, for instance.

EMA's research has demonstrated that enterprises are ready to derive significant value from Aldriven networking technologies. At the same time, SD-WAN has proven itself to be a transformative technology that helps enterprises improve application performance and network security. Enterprises should explore the combination of both these technologies.

² EMA, "Network Performance Management for Today's Digital Enterprise," May 2019.
³ Ibid.





Al-driven SD-WAN can counter the complexity that many enterprises encounter when they adopt SD-WAN solutions. Powered by Al technology, enterprises can streamline and automate SD-WAN configuration, event detection, troubleshooting, and capacity management. When a network team applies these capabilities to an SD-WAN implementation, it can improve and protect user experience across a distributed enterprise.

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