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Extreme networks

The Case for SD-WAN: Optimizing Today's Digital Network

High Performance, Resiliency, and Scalability

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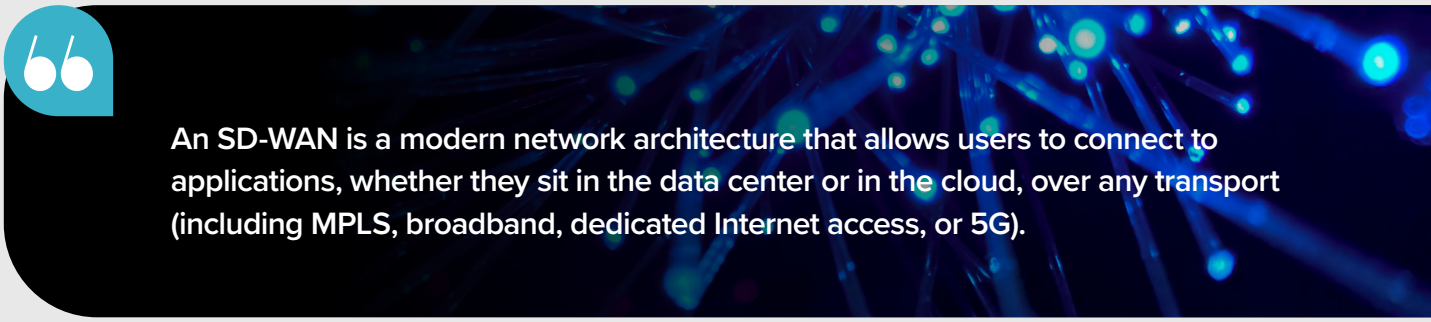
KEY Takeaways

1. What is SD-WAN and why does it matter?
2. The real benefits of SD-WAN within your organization
3. How SD-WAN makes the difference: industry highlights
4. Trends shaping SD-WAN technology
5. How you can enable true network optimization

What is SD-WAN and Why Does It Matter?

The accelerated digital transformation that companies across the globe have undergone has placed increased demand on the wide area network (WAN). Digital transformation has fundamentally altered how data flows around the organization, and Ecosystm research finds that 51% of them have already turned to software-defined WAN (SD-WAN) to boost performance, resilience, and scalability.

The traditional WAN architecture, where applications resided in the data center and were accessed at a predictable rate by branch employees, was not designed with today's cloud-native environments in mind. Moreover, it is expensive to maintain and difficult to scale primarily due to the dependence on MPLS circuits. Organizations are increasingly deploying latency-sensitive cloud applications, which require high performance, resiliency, and scalability. Moreover, brick-and-mortar organizations have responded to disruption from born-in-the-cloud new entrants by developing digital customer experiences even at the branch. Sluggish service and outages are no longer just an inconvenience to employees but are also detrimental to customer experience and brand image.



> An SD-WAN is a modern network architecture that allows users to connect to applications, whether they sit in the data center or in the cloud, over any transport (including MPLS, broadband, dedicated Internet access, or 5G).

A critical feature of SD-WAN, as the name suggests, is that it is software-defined. It leverages principles of software defined networking (SDN): ie centralizing the control plane from the data plan for better resiliency and performance. It can be used to shape network traffic according to application, user, time, location, and transport. This can be controlled by defining policies centrally and even by using automation and AI to make adjustments dynamically.

Today's SD-WAN is about ensuring high performance for commonly used SaaS applications, such as Zoom and Microsoft Office, along with customer-facing services. The networks of the future will also incorporate IoT devices that are integral to an organization's operating environment.

The SD-WAN will become a critical component of any IT infrastructure, which will underpin the emergence of digitally infused organizations.

Benefits of SD-WAN

1

Cost

One of the most quantifiable benefits of SD-WAN is the reduction of network spend when the more expensive MPLS is completely or partially replaced. SD-WAN is transport-independent, meaning cheaper broadband or dedicated Internet access (DIA) can be used in many instances. A recent study by TeleGeography demonstrated that MPLS was over 11% more expensive than DIA at 2 Mbps, with the differential approaching 40% at 100 Mbps. At sites with multiple transports, traffic can be inspected and prioritized according to latency sensitivity, using MPLS for only selected applications and cheaper circuits for others. Moreover, SD-WAN allows users to access cloud services directly rather than taking more circuitous routes via the central data center and back, again reducing bandwidth costs.

2

Application Performance

A defining feature of SD-WAN is the ability for branches to access cloud services, such as video conferencing, directly over the Internet rather than being routed first through a corporate data center and back. This can immediately reduce latency by shortening the distance between the user and the cloud service provider by avoiding backhauling. SD-WAN is capable of considerably more, however, if advanced features such as the following are used:

APPLICATION-AWARE ROUTING

Using Deep Packet Inspection (DPI) to identify thousands of applications and steering traffic according to priority based on predefined policies, according to latency sensitivity, identity, and schedule. This can be very important for latency-sensitive, voice and video applications such as Zoom or Teams.

CLOUD GATEWAYS

Deploying dozens of Points of Presence (PoPs) close to each of the major cloud service provider regions help ensure service level quality through continuous monitoring and route traffic along the highest performing path.

FORWARD ERROR CORRECTION (FEC)

A technique to avoid packet loss, it transmits additional parity bits which can be used to recover lost packets. The ratio of extra packets sent can be dynamically scaled up during periods of degraded network quality, then back down to reduce bandwidth overhead.

3

Resiliency

A traditional WAN architecture relying solely on MPLS is vulnerable to outages due to the single path from the branch to data center to cloud. An SD-WAN builds in resiliency by adding redundant transport types across the network and employing local break-out to the cloud. While many earlier implementations replaced MPLS with broadband, organizations are increasingly maintaining both to boost availability. As an additional form of redundancy, an SD-WAN may include a cellular connection such as LTE or 5G. In this case, an application-aware SD-WAN can maintain continuity for critical systems, such as retail payments, while shutting down guest Internet access to minimize costs. SD-WANs with a cloud gateway capability can also seamlessly redirect traffic to alternative regions in the event of a local cloud services outage.

4

Scalability

Organizations that are undergoing geographic expansion do not want to be hindered by infrastructure that lacks scalability.

An SD-WAN allows new branches to be onboarded quickly by utilizing automatically discoverable, plug-and-play appliances that can be deployed by non-IT personnel. Also playing an important role in the scalability of SD-WAN is the ability to select from a range of transport types when adding new branches. Locations with only broadband or mobile Internet connections can be onboarded without the need to build MPLS infrastructure. An SD-WAN can perform bandwidth aggregation to steer traffic from a single application across multiple transport types to avoid congestion during peak periods.

5

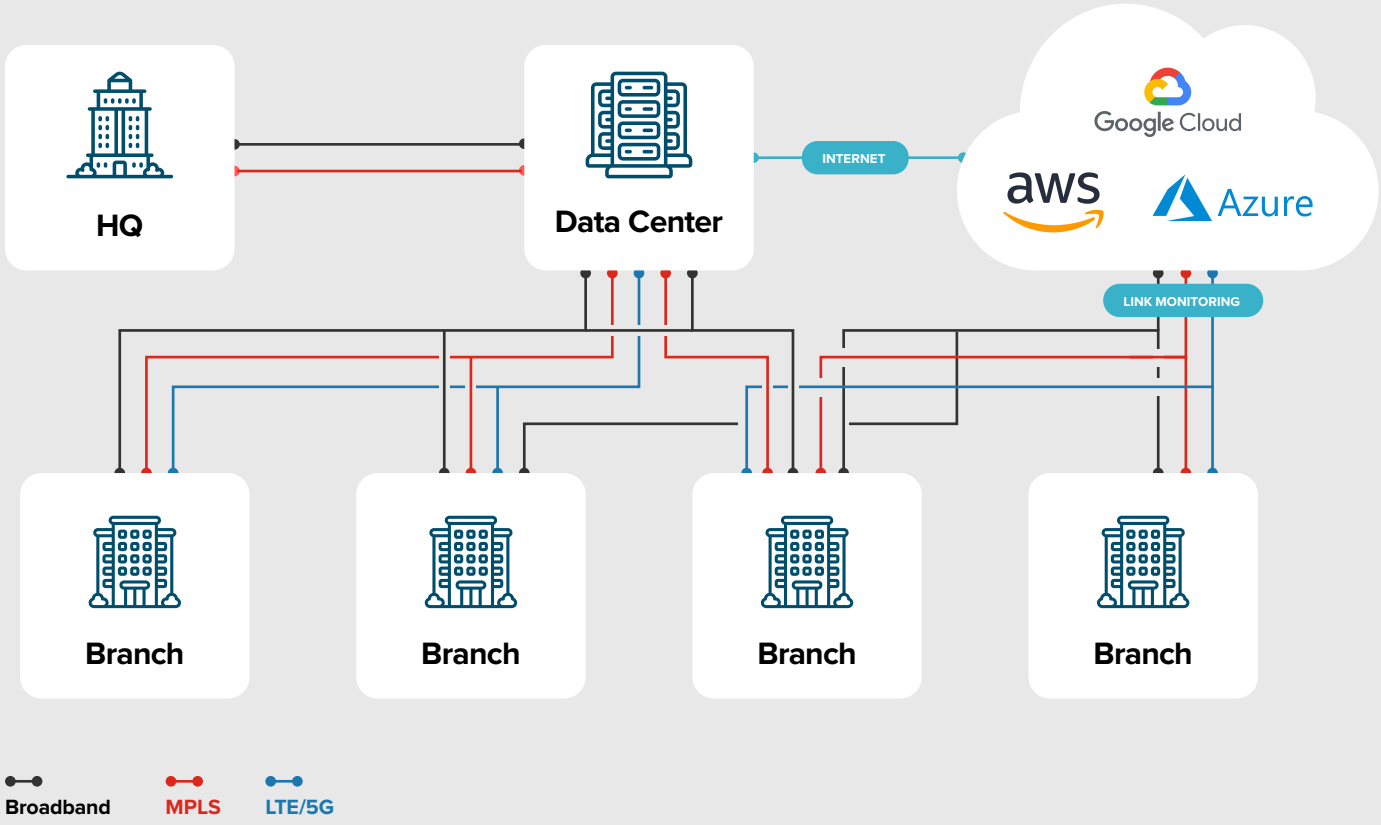
Manageability

As a WAN increases in size, it becomes increasingly complex, with the need to integrate a variety of applications, transports, and cloud services across an ever-growing number of sites. Not only does this create additional workload for network administrators, but it also has the potential to introduce new vulnerabilities.

A key benefit of SD-WAN is the ability to improve observability of the network and gain control. Centralized monitoring includes granular dashboards revealing metrics, such as latency, jitter, and packet loss across last and middle mile (in case of cloud gateways) paths for each application. This reporting not only enables trouble shooting and optimization, but it also lets network managers build in automation through insights into performance under various conditions.

Once zero-touch appliances are deployed, branches can be configured according to a template, which allows the orchestrator to enforce policies without requiring manual processes. Changes to policies can be made to multiple branches with a few clicks rather than updating them one at a time or sending technicians out to physically manage the device. Other valuable reporting features include network provider SLA policing, shadow IT discovery, and compliance audit logging.

FIGURE 1:
SD-WAN Architecture: Transport Redundancy, Local Cloud Break Out, and Link Monitoring



Source: Ecosystm, 2022

Industry Use Cases Of SD-WAN

Retail

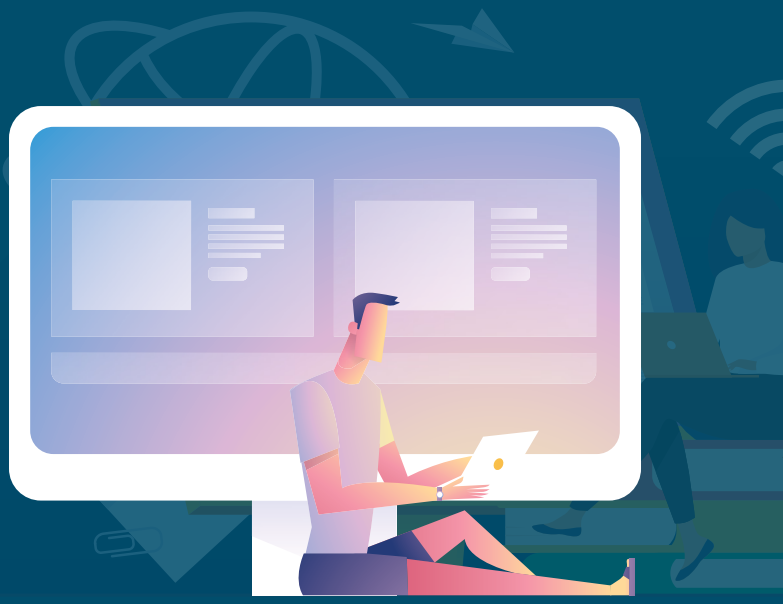
Many retail chains — whether they are small outlets, supermarkets, or big box stores — do not have IT personnel on site. Many branches are in small towns, remote from headquarters with varying access to connectivity. SD-WANs allow for simple, zero-touch deployment for new branches and ongoing remote management. To combat the incursions of online retailers, brick-and-mortar stores are now creating digital experiences for their customers, such as interactive fitting rooms, augmented reality, and check-out free shopping. SD-WAN can ensure high quality and consistent performance for such customer-facing applications.

Transportation and Logistics

A major challenge that transportation and logistics organizations face is that their networks are inherently dynamic due to their distributed and mobile nature. Not only can network coverage be spotty, but bandwidth can also vary greatly from location to location. SD-WAN is transport-independent, allowing vehicles and equipment to employ whichever connectivity is most suitable, whether it is fixed or wireless. For organizations operating global transportation or logistics networks, SD-WAN ensures minimal latency by employing load balancing and link monitoring of cloud providers around the world. Management and automation features remove some of the complexity that is associated with an industry with so many moving parts.

Education

With millions of students forced to participate in remote learning, the education sector has experienced the most abrupt change in its history. Although many will return to the classroom, education will never be the same. Schools and universities have adopted SaaS to benefit from the scalable OpEx model and collaborative features of the cloud. An SD-WAN that allows local break-out for cloud services helps educational institutions to reduce bandwidth costs. Application-aware and identity-based steering policies ensure live-streamed lectures gain priority over less critical traffic. Additionally, although the campus environment of many universities and schools requires network segmentation, the SD-WAN overlay allows for simple management.



Healthcare

Resiliency and scalability were thrust into the limelight in the healthcare sector as waves of the pandemic stretched resources. Temporary and remote sites were launched for testing, vaccination, and treatment, requiring secure access to patient records. SD-WAN can provide rapid scaling by deploying zero-touch appliances with whichever connectivity is available. Telehealth also became mainstream as clinics sought to reduce the number of in-person visits, requiring high-quality video conferencing services. As a critical sector, many healthcare providers must demonstrate resiliency, including redundant transport. Compliance audit logging features in SD-WAN can also reduce the manual processes previously required.

SD-WAN Trends

SD-WAN shifts from DIY to 'as a service'

Early adopters of SD-WANs employed a DIY approach, building their own networks combining vendor appliances with transport from service providers. Organizations are now increasingly procuring their SD-WANs as a service as they move their focus from reducing costs to improving access to applications delivered from the cloud. The first benefit of these subscription services is the shift from CapEx to OpEx, allowing WAN spend to scale up as the business grows, without the need to invest valuable capital. Organizations using cloud applications are already familiar with this model. Building on this are service providers working with technology vendors to develop integrated offerings that include both transport and SD-WAN services to provide consolidated billing. This is called a managed SD-WAN service. Moreover, this ensures customers have only one throat to choke in the event of network performance issues. SD-WAN providers also offer additional link monitoring and path selection services by deploying PoPs close to the major cloud data centers. Several of these providers optionally allow traffic to traverse their own private backbones, in many cases delivering better performance than broadband and lower costs than MPLS.

Automation will bring network complexity under control

In every domain of IT, there is growing complexity and ever-increasing volumes of data. At the same time, organizations have less time to resolve issues and are constantly battling to recruit, upskill, and retain staff.

SD-WAN vendors are injecting automation, machine learning and AI into their solutions to free network operators to focus on more strategic initiatives. Tools similar to AIOps, including the following, are being acquired or developed to improve observability, recommend actions, and in some cases to autonomously respond:

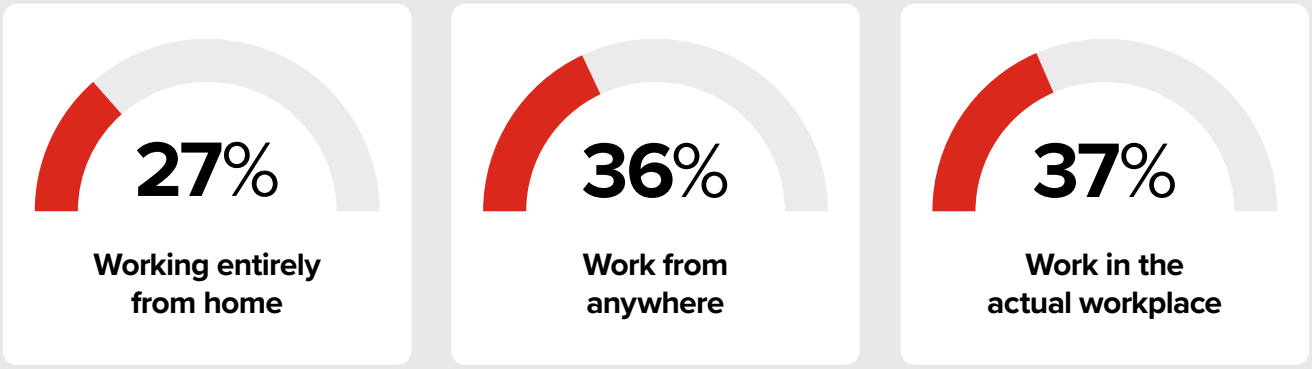
- **Noise reduction** to identify tickets that have the greatest impact on the network
- **Failure correlation** to troubleshoot and reduce time to resolution
- **What-if analysis** to predict how changes would affect application performance
- **Performance analysis** to identify Internet tunnels that perform as well as MPLS
- **SLA violation assessment** by identifying seasonal patterns for tunnel failure
- **Path optimization** by predicting congestion and selecting alternate routes
- **Threshold setting** by learning the impact of jitter, loss, and latency on specific network topology

SD-WAN delivers quality of service to remote workers

When much of the world was forced to work from home en masse in 2020, many organizations were left scrambling to provide remote access for employees who were assumed to be entirely office bound.

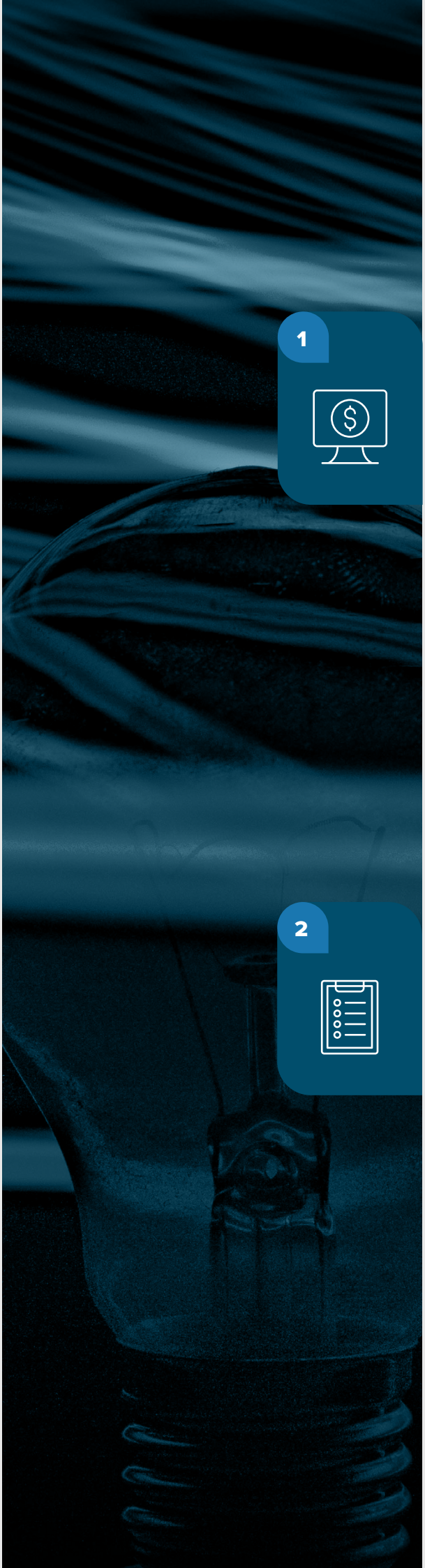
Ecosystm research finds that only 34% of knowledge workers in 2022 expect to be located primarily at the workplace, with the remainder performing their jobs entirely from home or from any location of choice.

FIGURE 2:
Expected Work Locations for Knowledge Workers



Source: Ecosystm, 2022

Remote access has traditionally been provided with a VPN. However, many organizations struggled with performance when they attempted to scale their solutions suddenly. The lack of centralized visibility and control is also a limitation. SD-WAN vendors will increasingly accommodate remote access by developing small, work-from-home appliances for power users, such as executives or those requiring low latency. While most home-based workers with only a single broadband connection will be unable to take full advantage of the features of an SD-WAN, there will be improvements in user experience and centralized control. A desktop SD-WAN appliance will not be suitable for the majority of workers; but it will definitely become a consideration for a segment in every organization.



Recommendations

Consider an SD-WAN business case beyond reduced transport costs

Early SD-WAN implementations were justified based on cost reduction by replacing MPLS circuits with cheaper transports. Modern SD-WANs are about more than just costs and now offer greater resiliency, improved application performance, scalability, and manageability. Organizations should consider the possibility that network costs could in fact increase if they retain MPLS while adding broadband and 5G for redundancy. Moreover, organizations are likely to require greater bandwidth as their application catalog increasingly moves to the cloud. A more suitable goal is to right-size MPLS while focusing on other advantages.

Conduct a 6Rs application assessment to futureproof the SD-WAN

A 6Rs assessment evaluates whether each application should be rehosted, re-platformed, refactored, repurchased, retained, or retired. When selecting an SD-WAN provider, consider how the organization's application portfolio will evolve over the next several years. Network requirements will evolve as organizations' digital transformation journeys progress, and they develop additional cloud-native applications. When it is possible to make more accurate predictions on which applications will eventually be migrated to private, public, or hybrid cloud, a clearer view of the most suitable SD-WAN will emerge.

3

Include delivery models and management capabilities in TCO calculations

SD-WANs can be deployed using a variety of delivery models, particularly either DIY or as a subscription service. A common variation includes the option of bundling transport services from a telecom provider. Cloud-native vendors operate a network of gateways deployed closely to SaaS and IaaS providers for improved path selection. Several of these vendors also grant access to their private global backbones. A decision on which delivery model will have the lowest TCO can be made following an assessment of the organization's application portfolio, data flows, middle mile transport availability, in-house skills, and geographic requirements.

Management features will play an important role as the convergence of networking, security, and cloud increases complexity.

Intelligent tools to reduce the workload of network administrators are vital in a world where the cost of experienced employees continues to rise.

Conclusion

> While initial implementations were cost-focused, new benefits of SD-WAN implementations have since emerged.

As organizations digitize their production environments, business operations and customer-facing services, the application performance improvements, automated connectivity and security that SD-WAN offers are essential.

Business continuity and resiliency has become a critical consideration as WAN downtime results in greater losses in production and poor customer experience. As organizations grow by adding branches and connected production locations, the zero-touch deployment capabilities of an SD-WAN ensures scalability. Moreover, as a network expands, it becomes more complex, requiring comprehensive management features to monitor and control the environment. Increasingly there will be requirement for AI-infused tools to autonomously take action and reduce the burden on network administrators.

A modern SD-WAN can provide each of these benefits and will become a key component in a network that underpins an organization's digital transformation.

ABOUT THE Author

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Darian helps businesses navigate the path towards digital transformation, providing insight into cloud, automation, data management, and telecommunications. He has spent two decades advising business leaders on using technology to enter new markets, improve client experience, and enhance service delivery.

Previously, Darian spent ten years at IBM, where he was a principal advisor for infrastructure services and hybrid cloud in Europe, with a focus on the telco and energy industries. Prior to this, he was a research manager at IDC, gaining emerging markets experience in Asia Pacific, Central Eastern Europe, Middle East, and Africa. In his final position, Darian headed up IDC's ANZ offshore research team based in Kuala Lumpur.

Originally from New Zealand, Darian holds a Bachelor of Business, majoring in marketing, from the University of Auckland. Outside of the office, Darian enjoys running up mountains, biking with his young daughters, and researching his family tree.

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ABOUT ecosystm

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This white paper is sponsored by Extreme Networks. It is based on the analyst's subject matter expertise in the area of coverage in addition to specific research based on interactions with technology buyers from multiple industries and technology vendors, industry events, and secondary research.

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