

# SD-WAN

Evolving Beyond MPLS  
in the Enterprise Network



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## Overview

Public, private and hybrid cloud services, unified communications/collaboration, mobility, the Internet of Things (IoT), digital signage, ubiquitous Wi-Fi access, and other next-generation workloads require levels of bandwidth and availability beyond the capacity of legacy enterprise networks. IT leaders are tasked with building reliable, highly available and high-performing enterprise networks without additional budget. In the case of organizations with outdated wide area network (WAN) architectures, it can be overwhelming.

In the next three years, these IT professionals will likely confront several or all of the following network traffic challenges:

### Cloud Services

Gartner estimates that approximately 30% of enterprise users are already using public cloud services such as Amazon Web Services, Salesforce.com and Microsoft Office 365. Enterprise cloud adoption is growing at an annual rate of 17%. Gartner also estimates that only 1% of enterprises now use SD-WAN but that the figure will rise to 30% within three years.

### Mobile Computing

Laptops, smartphones and tablets have entered the corporate network, whether or not IT has defined an official mobility policy. The floodgates have opened, and mobile access to not only the Internet but core business applications is fast becoming an expectation of the workforce. In fact, Gartner predicts by 2017, half of employers will actually require employees to supply their own device for work purposes.

### VoIP

VoIP has been adopted by over 50% of businesses at some level, according to several industry reports, and that number is expected to increase significantly over the next few years. VoIP is being deployed as an over the top (OTT) service on existing enterprise LAN and WAN networks, especially considering the oncoming surge of WebRTC technologies. Web services will very quickly become data intensive, encompassing video, messaging and collaboration all together.

### Video Conferencing, Instant Messaging and Web Collaboration

The toll taken on bandwidth from instant messaging, and collaboration applications like web and video conferencing, varies depending on the platform and resolution (for video). The ability for end users to interact seamlessly across all these media is great for productivity, but it means that network demands for collaboration will grow exponentially as these services are mainstreamed.

### Database and Analytics

With enormous amounts of data now being stored and made accessible for big data analytics, aging enterprise networks will be strained by heavy east-west, or server-to-server, data traffic. This traffic increasingly becomes WAN traffic as big data cloud services and analytics become more popular.

### IoT

Businesses looking to gather and analyze data from sensors, machines, wearables and other objects will need to make considerable enhancements in network bandwidth. In the IDC report FutureScope: Worldwide Internet of Things 2015 Predictions, the research firm forecasts that by 2018, 50% of IT networks will go from having more than enough capacity to handle IoT devices to being network constrained with nearly 10% of sites being overwhelmed.

### Wi-Fi


New Wi-Fi 802.11ac standards and upcoming variations are very quickly eclipsing the available LAN speeds for both corporate devices and BYOD devices today. Wi-Fi access traffic in the enterprise LAN is expected to surpass wired LAN traffic as a whole by 2018.

Each of these trends are complex topics and significant challenges in their own right, let alone taken together. But it all boils down to one pretty simple thing easily understood by end users, business unit leaders and IT alike:

**In a data saturated, highly connected world, enterprises need more bandwidth—lots of it—to stay competitive.**

## MPLS - A Brief History

Multi-Protocol Label Switching (MPLS) based telecommunication services were widely embraced and proven to be a reliable choice for providing bandwidth across a distributed enterprise up through the first decade of the 2000s. However, recent industry developments have given rise towards augmenting, or even fully replacing MPLS with business-grade Internet services, primarily because it can get as much as 10 times the bandwidth of MPLS at a fraction of the cost. Additionally, it delivers similar levels of reliability, security and quality of service (QoS) required to support even the most performance-sensitive workloads.



According to a Nemertes Research report, the use of an Internet connection in place of a traditional WAN link in at least one location has jumped to over 50% in the last few years. Several factors are contributing to this shift, but the most significant drivers are:

- 1. The rapidly increasing need for more network bandwidth in the enterprise** to support cloud services, voice and video traffic, data backups and other growing workloads.
- 2. The prohibitively high cost of MPLS compared to Internet services:** Typical costs for MPLS connectivity ranges from \$300-\$600 per Mbps/month. By contrast, the monthly price of broadband connectivity is typically only \$1.50-\$15.00 per Mbps/month.
- 3. The maturation of the Internet** into a resilient service capable of providing sufficient bandwidth and availability for enterprises.
- 4. Advancement in backbone technologies and bandwidth demands,** mostly driven by consumer bandwidth demands at home and on 4G/3G mobile networks.

Further innovations have resulted in combining managed virtual private network (VPN) tunneling and circuit aggregation into one complete SD-WAN solution.

MetTel SD-WAN delivers all the benefits of MPLS with 10 times the bandwidth at a fraction of the cost. This unique solution is built on the Internet WAN model that combines VPN tunneling with multiple circuit aggregation. It provides multiple QoS channels, traffic shaping and encryption to deliver one big enterprise private network fully validated as a replacement for, or supplement to, traditional MPLS WAN.

## What is SD-WAN?

Traditional networks have a rigid architecture consisting of purpose-built network components, such as routers and switches, based on vendor specific hardware and software. Features and capacity are tied to the chosen configuration of the network, and making changes to the network technology to accommodate new functionality is difficult and slow.

The Software-Defined Wide Area Network (SD-WAN) is an intelligent network that can dynamically manage network resource allocation. Custom rules are created to provide the performance, reliability, and security necessary for the successful operation of the business, based on its own strategic priorities.



Research by IDC suggests that:

Interest in SD-WAN is primarily driven by the need for the network to have greater agility to support cloud applications, by the need to more effectively deliver new applications, and by the desire to improve operational efficiency by programmatically managing the network.


There are three major characteristics of SD-WAN technology:

1. **Control of the network**, which organizes “how” the data flows, is fully decoupled from the data itself. Resources for the control plane and the data plane can be scaled independently from each other in order to maximize the efficiency of each.
2. **Centralizing the control plane results** in simplified operations by not having multiple layers of inefficient redundant control points distributed around the network. This provides the network to be viewed in its entirety and allows for coordinated decisions to be made for optimal efficiency of data movement.
3. **Configuration, capacity, routing, and service provisioning** are automated and governed by a set of rules created by the business to meet its application and functional needs. Automation makes the network responsive to failures, attacks, or changes in demand, in near real-time.

SD-WAN delivers flexibility through abstraction, letting you define a set of business rules to ensure that different workloads get the appropriate experience. IT managers can rely on the system to manage traffic, freeing themselves from manual control of technology architecture elements.

## What is a Hybrid SD-WAN Solution?

Hybrid WANs leverage both private, high-quality multiprotocol label switching (MPLS) networks as well as high-speed, lower-cost broadband Internet in an integrated architecture. Combining networks together or statically assigning each application to a particular network type is not enough. Technology to optimize the performance of applications over the hybrid WAN is a requirement, particularly to address the unpredictable performance of Internet connectivity. Software-defined policies dynamically direct applications and services along paths that support their unique performance and security requirements. Compared to traditional network management, SD-WAN can react to changing network conditions as they happen.



A hybrid SD-WAN solution allows you to combine MPLS with broadband Internet to get the best of both worlds. MPLS gives you a private dedicated network, with dedicated bandwidth, plus the advantage of quality of service and other features relevant to voice and video. Broadband Internet gives you cheaper bandwidth, is easier and faster to install or upgrade, and is less complex than MPLS. By combining the two, you achieve redundant connections providing higher availability for your voice and video traffic.

As network conditions change, software-defined networking policies for performance allow you to dynamically redirect services. Intelligent network routing can prioritize workflows, reroute around failures, and protect critical traffic against threats. MetTel takes this optimization one step further, by drilling down to the individual packet level and provides error correction and/or packet duplication as necessary to guarantee orderly data packet delivery. This can drive better user experiences and business results.

## Can SD-WAN replace MPLS?

With the features and functionality that MetTel SD-WAN delivers, many customers are realizing that this technology can be used to completely replace MPLS. Instead of augmenting slow and expensive MPLS circuits with broadband many of our customers are choosing to go with multiple broadband Internet circuits like Cable, DSL, FIOS, AT&T U-Verse, Line of Site Broadband as well as 4G backup as circuits instead. Having said that, our SD-WAN solution allows you to configure your network as you feel most comfortable, whether you choose augmentation, backup/redundancy, or full MPLS replacement.

## SD-WAN Benefits

### Lower WAN OPEX and CAPEX

ROI for implementing SD-WAN is dramatic and immediate, because SD-WAN can be used to augment, or totally replace, existing expensive MPLS networks without losing features or reliability. Operationally, the IT staff will save valuable time on configuration and provisioning, allowing them to focus on providing an innovative network platform to meet future business needs.

### Simple and Flexible

Since the underlying technology for SD-WAN includes broadband Internet, new circuits, or additional bandwidth, can be had in hours or days instead of the several weeks that are necessary for the installation of dedicated, special purpose circuits. The net result is that companies become more agile, and employees become more productive, as new sites, new applications and increased bandwidth are added more quickly and efficiently.

### Cloud Solution

MetTel SD-WAN is deployed in the cloud in five data centers that cover the United States. Your corporate headquarters, data centers, and all branch offices connect directly to the MetTel Cloud, rather than having to be back-hauled to a central location. This architecture further eliminates the need for expensive dedicated circuits between your branch offices and headquarters.

### Cloud Connect

SD-WAN is extensible to other cloud services. In addition to being compatible with its own Cloud Firewall, MetTel has dedicated gigabit connections to other 3rd party cloud services, such as Microsoft Azure, Amazon AWS, and Google.

### Application Awareness

Application awareness allows MetTel to offer you the control to improve the overall performance and quality of service of your SD-WAN traffic. Various types of application traffic can be assigned different priorities with different limitations on their use of available bandwidth. Bandwidth can also be reserved for use by particular time sensitive or critical applications. Plus, the type of traffic can be used to determine the Quality of Service that is assigned. For example, voice traffic can be assigned a higher QoS in an effort to reduce loss, latency, and jitter.

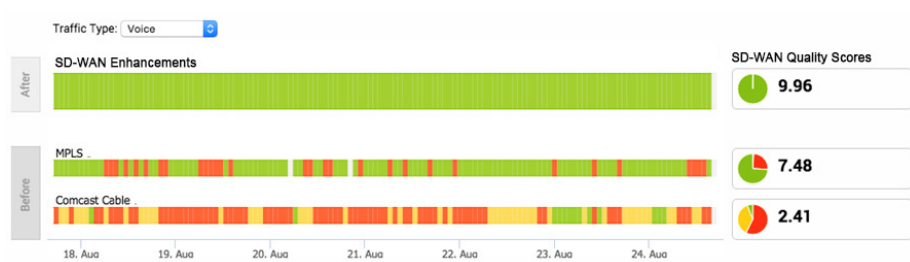
### Security

MetTel is in a unique position to offer SD-WAN, because it can not only offer a cloud based solution for SD-WAN like so many other competitors, but can also provide the underlying network backbone for all interconnections between your corporate sites and data centers. This means that secure communications between multiple sites could be achieved without ever leaving the MetTel network, or the protection of its Cloud Firewall. Security, in combination with Application Awareness, allows for sensitive WAN traffic to be completely segmented from other WAN traffic usage.

### Multi-Path Optimization

MetTel SD-WAN allows a customer to integrate disparate physical network technologies to achieve a single logical network that can be used to meet all its business needs. Not only, can you mix and match cable, DSL, and wireless from different providers, but MetTel provides a unique hybrid approach that also includes MPLS. This aggregation of multiple public and private physical networks into a single logical network allows MetTel to provide constant intelligent analysis of network performance and then dynamically apply the following network communication optimizations:

1. **Forward Error Correction** improves the quality of the communication by correcting transmission errors within data packets as they are received, or reordering data packets that are received out of order, based on internal examinations of each packet. Being able to reconstruct the received data stream reduces the need for any retransmissions that would otherwise waste valuable time.
2. **Packet Duplication**, as necessary, on alternative physical connections assures that the data packets reach their intended destination one way or the other, thus achieving high reliability and eliminating brownouts or dropouts.



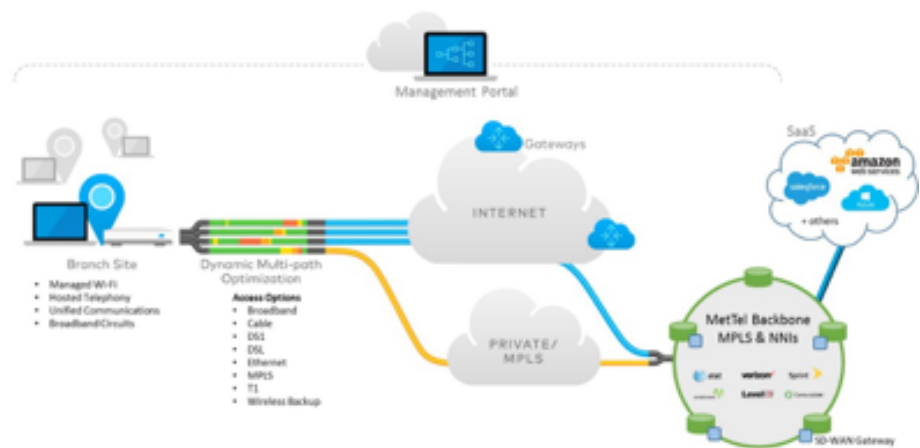
## SD-WAN Key Features

- Secure connection between corporate sites that can be used for private data traffic (for example: credit card processing via a PCI DSS 3.0 compliant network)
- Traffic shaping and QoS for voice through a VPN tunnel—guaranteeing sufficient bandwidth for voice
- Multiple QoS queues available, such as: voice, video, database, best effort
- Can be deployed with client-provided Internet access
- Can be used as a backup to existing MPLS network with multiple routing failover mechanisms available
- Private IP addressing on the local area network (LAN) with full MPLS-like capability
- Current IP address scheme can be extended across all access connections
- Client does not have to manage any VPNs
- Ability to propagate MPLS routes across all access connections
- Inherent disaster recovery abilities via differing access methods and infrastructures
- Access methods can include: MPLS, fiber, Ethernet, broadband cable, DSL, 4G, dedicated Internet access, etc.



- Enterprise-grade reliability and resilience
- Automatic capacity testing
- Continuous link and path quality monitoring
- Virtualize/aggregate resources
- App-aware per packet steering
- Optimal link and path
- Error correction for link remediation
- Automatic steering for brownouts/blackout
- Network usage monitoring provides visibility into usage, capacity, and network behaviors of end-users

## MetTel SD-WAN Service



### The major benefits of the MetTel SD-WAN Service include:

- The client gains up to 10 times the bandwidth of a typical MPLS service at a fraction of the total cost.
- MetTel provides QoS, traffic shaping and encryption in both the inbound and outbound directions.
- MetTel is agnostic to the access method. The solution can be built on broadband, 4G, DSL, Internet T1 and Ethernet. And all these access types can be mixed and matched at one or disparate locations.
- Failover occurs to one of two redundant circuits in a way that is seamless for the client.
- The client takes advantage of multiple circuit aggregation while consolidating all billing with one vendor.
- Allows for staged approach to adopting non MPLS services into the enterprise WAN and integrate with existing MPLS WAN.
- Four fully redundant SD-WAN gateways deployed on MetTel's private backbone provide your business redundancy and reduce latency no matter where you are in North America.

## Conclusion

MPLS was the backbone for the enterprise WAN through the first decade of this century and in many cases will still play an important role. However, the Internet-based WAN model has emerged as an MPLS alternative capable of delivering equal reliability and greater levels of bandwidth for a significantly lower cost. The MetTel SD-WAN solution takes the Internet WAN model to the next evolutionary step by aggregating multiple heterogeneous circuits into one virtual private network. It includes full QoS, traffic shaping, encryption and regulatory compliance for PCI DSS 3.0 and HIPAA. The end result is a bandwidth rich and cost effective enterprise network capable of supporting cloud, collaboration, big data and other next-generation workloads without straining IT budgets.

Look for solutions that effectively combine a zero IT touch branch appliance with both distributed gateways in the cloud as well as on-premise datacenter appliances. Further, look for a solution that optimizes the flow of individual packets for guaranteed delivery, regardless of application or media type.

### Learn More

Contact your MetTel agent, e-mail [sales@mettel.net](mailto:sales@mettel.net), call **1 (877) 963-8663** or visit [www.mettel.net](http://www.mettel.net).