Why Performance Matters When Building Your New SD-WAN

Not all SD-WANs are created equal.

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The New Generation of High Performance SD-WANs

As enterprise IT considers ways to improve WAN functionality and service levels while lowering costs, the interest in SD-WANs has dramatically increased. Almost all of today's SD-WAN solutions support dynamic path selection from multiple WAN services including MPLS and broadband Internet, centralized provisioning to increase IT efficiency and zero-touch provisioning to enable rapid deployment.

But not all SD-WANs are created equal. As new applications emerge, whether hosted on premise or in the cloud, demands on WAN throughput, efficiency, and reliability increase. Performance-driven SD-WANs significantly improve application performance and Quality of Service (QoS) compared to other SD-WAN offerings, making it even easier for enterprises to justify adopting SD-WAN solutions.

The ability to intelligently optimize the WAN based on specific application QoS demands, link quality, availability, or throughput levels in the same manner as with other types of networks is a game-changer. When evaluating SD-WANs, look for a solution that provides more options for IT while saving both CAPEX and OPEX and improving the performance of the WAN.

Driving Performance through Multiple WAN Connections

To optimize available WAN options, organizations who are contracted with connectivity services and plan to use lower-cost broadband Internet services, should look for solutions that can bond different links together to meet optimum performance and QoS demands for different types of applications. Consider a solution where two or more WAN links - even of different connectivity types such as MPLS, Internet, or 4G/LTE, can be bonded into a single logical connection delivering numerous benefits.

By using two or more connection types, a failure of a single link will not cause the entire connection to fail. Traffic is automatically rerouted to the remaining WAN link(s) without interruption. This provides substantially enhanced reliability without complex management and allocation processes that are difficult to administer.

In addition, all WAN links should be able to be used to carry production traffic. In contrast to solutions that simply mirror traffic over multiple links for reliability, performance-driven solutions intelligently send traffic based on pre-defined Business Intent Policies across all links configured for the bonded logical connection.

IT can prioritize the use of each WAN service in an optimal fashion. For example, lower-cost Internet connectivity may be prioritized for certain types of applications or workloads while assigning MPLS connections for the highest priority traffic. This can lower the overall WAN costs and allow the addition of incremental WAN capacity at a lower cost.
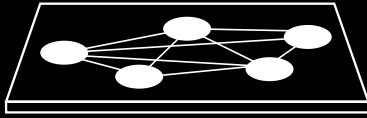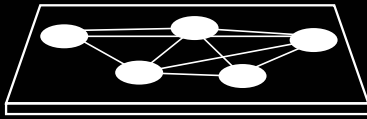
Business Intent Policies for Superior Performance

Guest Wifi
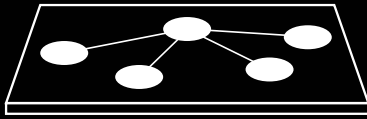
Enterprise Application

VoIP

Transport — Internet, MPLS, 4G LTE

Business Intent Policies provide the means for tuning network parameters according to application performance requirements. There are four options for choosing how connections are bonded together:

High Availability – Both quality and reliability. Applications that require high availability tend to be critical real-time services such as emergency services or call center VoIP that cannot tolerate interruptions or lost data.
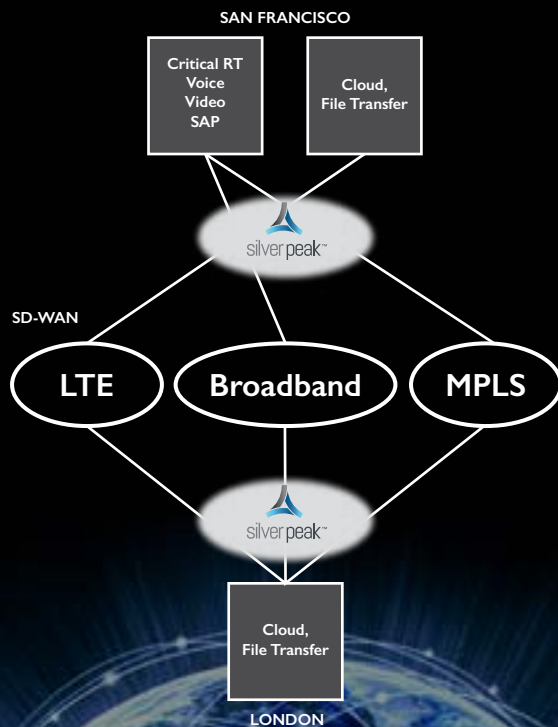
High Quality – Focused on applications where poor connectivity will have a negative impact on the workload such as Skype for Business or video conferencing. This option also supports sub-one-second failover when a connection is lost.

High Throughput – Focused on high throughput. This option is for applications and workloads more tolerant of data errors, such as file transfer or backup applications with built-in error recovery mechanisms, but demand the full bandwidth of the bonded connection.

High Efficiency – General-purpose option. Usually the best choice for typical TCP applications such as email and web browsing. In this scenario, a few applications will use the full bonded bandwidth of the connection.

Increasing Routing Intelligence with Dynamic Path Control

SAN FRANCISCO

Critical RT Voice Video SAP

Cloud, File Transfer

SD-WAN

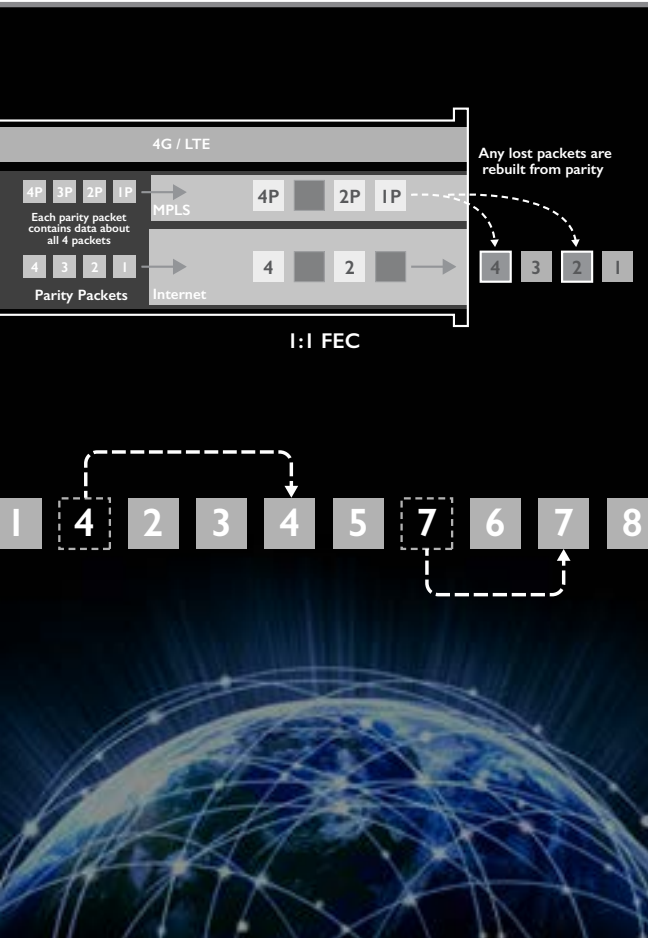LTE | Broadband | MPLS

Cloud, File Transfer

LONDON

Routing protocols are an essential part of WAN operations. Not all routing protocols are the same, or have similar levels of intelligence to route traffic over available paths. Dynamic Path Control (DPC) provides this ability and is unique to traditional routing protocols. DPC actively monitors packet loss, latency, jitter, and throughput to route or re-route flows in real-time to most effectively allocate traffic across the available WAN links.

DPC enables the solution to choose the best link for the given application to deliver the best performance based on a pre-defined business intent policy. Using this approach, the decisions made for applications are implemented to make the most efficient routing choice, based on a real-time measurement of link quality and required QoS.

However, if conditions change, such as a link failure or even the failure of an entire logical connection, DPC automatically re-routes traffic to an alternate path in less than one second to maintain 100% uptime.

The Many Benefits of Path Conditioning

4G / LTE

4P 3P 2P 1P   MPLS   4P ▮ 2P 1P

Each parity packet contains data about all 4 packets

4 3 2 1   Internet   4 ▮ 2 ▮

Parity Packets

Any lost packets are rebuilt from parity

4 3 2 1

1:1 FEC

1 | 4 | 2 | 3 | 4 | 5 | 7 | 6 | 7 | 8

Any WAN link can have transmission quality issues; however, the problem is more acute with lower quality WAN services. With new available technology, with new technology, it is now possible to condition the connections to improve performance. The benefit comes primarily from eliminating retransmission of packets or corrupted data streams that degrade performance and negatively impact efficiency. There are two technologies that improve path conditions:

The first is Forward Error Correction (FEC). This technology reconstructs packets lost during transmission. Broadband Internet connections typically drop far more packets than MPLS. By periodically inserting parity packets, FEC reconstructs any lost packets, avoiding retransmission and substantially improving the performance of broadband links. FEC is also flexible. The ratio of FEC to data packets can be varied and configured differently depending on the business-criticality of the application.

The second technology is Packet Order Correction (POC). POC detects packets that arrive out-of-order at the receiving location and correctly reorders them. This is a fairly common problem, especially when load balancing application traffic across different WAN links. For example, with video traffic an out-of-order packet might be perceived as a glitch in the video stream. However, for a file transfer or data backup, an out-of-order packet could result in a completely corrupt and useless transfer or backup operation. Without POC, it is necessary to retransmit the entire flow that was impacted.

Traffic Shaping to Ensure Quality of Service (QoS)

When evaluating SD-WANs look for ones that feature traffic-shaping technology that ensures individual connections are not oversubscribed. The traffic-shaper engine should allocate bandwidth as a percentage of system bandwidth and provide support for as many as 10 different classes of traffic. Four predefined classes typically include Real-Time, Interactive, Default, and Best Effort.

Traffic shaping technology works independently on both inbound and outbound traffic. For outbound traffic, the traffic shaping engine can be configured to deliver minimum and maximum bandwidth providing IT the flexibility necessary to ensure QoS.

For inbound traffic, the shaper engine is mandatory on IP links to ensure that low-priority traffic does not override higher-priority traffic. A good use case is ensuring that YouTube videos or social media applications don't compromise the link performance for mission-critical business applications.
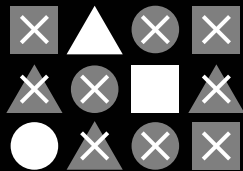
To further enhance the benefits of bidirectional traffic shaping, some SD-WANs include Dynamic Rate Control (DRC) capability. DRC allows the appliance to automatically adjust the maximum bandwidth for each tunnel. This helps to eliminate congestion on the WAN as well as the connection speed.

More Performance on Tap!

Data
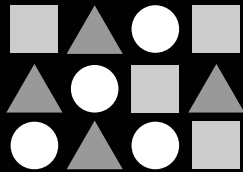
De-duplication

Data Compression

Reduced latency

WAN Optimization is essential for many organizations, so when evaluating SD-WANs consider ones that offer an optional software performance pack. This is necessary for latency-sensitive applications or applications where large amounts of data must be transferred.

Certain TCP/IP applications such as transaction processing require handshaking or acknowledgements between end points before moving to the next compute operation. In the LAN, where distance and therefore latency is small, this is not an issue. But if a remote branch office is accessing a transaction processing application at headquarters or in the cloud, latency caused by distance can significantly slow down performance and response time. Some SD-WAN technologies can accelerate the TCP protocol resulting in much better application response time, ultimately improving productivity.

When reviewing SD-WAN solutions ensure they have a WAN optimization component that is proven to transfer data efficiently and with the highest levels of performance over long distance. De-duplication and data compression techniques minimize repetitive transmission of files and data across the WAN and create fingerprints to the original data for retrieval. This allows IT to complete backups within their allotted time window or recover from data loss rapidly.

Not All SD-WANs are Equal: Performance Matters

Unity EdgeConnect

Introducing Silver Peak's Unity EdgeConnect

The use of broadband Internet connections in an SD-WAN environment has many benefits, however for any enterprise, performance and reliability cannot be compromised. Unlike other SD-WAN solutions in the market, Silver Peak's Unity EdgeConnect delivers all the functionality needed to meet these essential requirements. Silver Peak delivers unrivalled levels of Performance and Quality of Service by:

• Bonding different links together to meet performance and QoS demands for every application
• Intelligently sending traffic based on Business Intent Policies
• Actively monitoring packet loss, latency, jitter and throughput through Dynamic Path Control
• Automatically allocating bandwidth to prevent congestion through the traffic-shaping engine
• Building overlays that treat each application's needs individually, heightening its performance
• Improving Path Conditioning through Forward Error Correction and Packet Order Correction
• Providing the most advanced WAN optimization capabilities of any SD-WAN vendor*

This all adds up to a truly enterprise-grade, performance-centric offering that positions the SD-WAN to become an even more effective solution for rapidly connecting users to any type of application, reducing time-to-market for new regional offices and overall increasing the performance, visibility and control over the entire network.

For more information on Why Performance Matters for SD-WANs underline the video.

*2016 Gartner Magic Quadrant on WAN technologies positions Silver Peak farthest on the completeness of vision axis

About Silver Peak

Silver Peak gives enterprises and service providers the flexibility to securely connect their users to their applications via the most cost-effective source of connectivity available. Silver Peak customers can quickly migrate to an enterprise-grade WAN that leverages the Internet (often referred to as SD-WAN), while dramatically improving application performance and lowering networking costs.

For more information on Silver Peak SD-WAN solutions, visit www.silver-peak.com.