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Unity EdgeConnect^{SP} SD-WAN Solution

As cloud-based application adoption continues to accelerate, geographically distributed enterprises increasingly view the wide area network (WAN) as critical to connecting users to applications. As enterprise applications migrate from the corporate data center to the cloud, private line connections such as multi-protocol label switching (MPLS) can be augmented by integrating broadband services into the WAN transport mix.

The Silver Peak Unity EdgeConnect^{SP} SD-WAN solution enables service providers to build high-performance managed SD-WAN services to drive new revenue streams, expand market reach and deliver SD-WAN services with SLAs in and out-of-region quickly and cost effectively.

Unity EdgeConnect Solution

Three components comprise the Unity EdgeConnect^{SP} SD-WAN solution:

- **Unity EdgeConnect** physical or virtual appliances (supporting any common hypervisor) deployed in branch offices to create a secure, virtual network overlay. This enables customers to move to a broadband WAN at their own pace, whether site-by- site, or via a hybrid WAN approach that leverages MPLS and broadband internet connectivity.
- **Unity Orchestrator^{SP}** delivers highly granular levels of visibility into thousands of customer branch deployments for both legacy and cloud WAN applications. It provides the ability to centrally configure and manage secure SD-WAN deployments for each individual customer, while providing customized, segregated views and reporting.
- **Unity Boost** is an optional performance pack that service chains WAN optimization to the EdgeConnect^{SP} SD-WAN solution. Boost allows companies to accelerate performance of latency-sensitive applications and minimize transmission of repetitive data across the WAN in a single, fully integrated SD-WAN solution.

Figure 1: EdgeConnect XS shown here. Also available as a virtual appliance.

EdgeConnect Key Features

- **Zero-Touch Provisioning:** A plug-and-play deployment model enables Unity EdgeConnect to be deployed at a branch office in seconds, automatically connecting with other Silver Peak instances in the data center, other branches, or in cloud Infrastructure as a Service (IaaS) such as Amazon Web Services, Microsoft Azure and VMware's vCloud Air.
- **Tunnel Bonding:** Configured from two or more physical WAN transport services, bonded tunnels form a single logical overlay connection, aggregating the performance of all underlying links. If a link fails, the remaining transport links continue to carry all traffic avoiding application interruption.
- **Virtual WAN Overlays:** The EdgeConnect^{SP} SD-WAN solution is built upon an application-specific virtual WAN overlay model. Multiple overlays may be defined to abstract the underlying physical transport services from the virtual overlays, each supporting different QoS, transport, and failover characteristics. Applications are mapped to different overlays based upon business intent. Virtual WAN overlays may also be deployed to extend micro-segmentation of specific application traffic from the data center across the WAN to help maintain security compliance mandates.
- **Dynamic Path Control (DPC):** Real-time traffic steering is applied over any broadband or MPLS link based on company-defined policies based upon business intent. In the event of an outage or brownout, DPC automatically switches-over to a secondary connection.
- **WAN Hardening:** Each WAN overlay is secured edge-to-edge via 256-bit AES encrypted tunnels. No unauthorized outside traffic can enter the branch. With the option to deploy EdgeConnect directly onto the Internet, WAN hardening secures branch offices without the appliance sprawl and operating costs of deploying and managing dedicated firewalls.

Unity EdgeConnect^{SP} SD-WAN Solution

- **Path Conditioning:** Provides private-line-like performance over the public Internet. Includes techniques to overcome the adverse effects of dropped and out-of-order packets that are common with broadband Internet and MPLS connections to improve application performance.
- **Application Visibility and Control:** EdgeConnect identifies applications on the first packet to deliver SaaS and trusted web application traffic directly to the Internet while directing unknown or suspicious traffic to the data center firewall or IDS/IPS. First packet application identification is especially important when branches are deployed behind Network Address Translation (NAT); the correct path must be selected based on the first packet to avoid session interruption.
- **Internet Breakout:** Intelligently steer trusted Internet-bound application traffic from the branch directly to the Internet, eliminating inefficient backhaul of all HTTP traffic to the data center. First packet application identification directs other applications and unknown traffic to corporate security firewall and IDS/IPS services.
- **Stateful Firewall:** An extension of WAN hardening, stateful firewall integrated with Edge Connect ensures no unauthorized outside traffic can enter the branch, but branch-initiated sessions are allowed enabling secure Internet Breakout.
- **Routing:** EdgeConnect supports standard Layer 2 and Layer 3 open networking protocols such as VLAN (802.1Q), LAG (802.3ad), IPv4 and IPv6 forwarding, GRE, IPsec, VRRP, WCCP, PBR, BGP (version 4).
- **Cloud Intelligence:** Real-time updates on the best performing path to reach hundreds of Software-as-a-Service (SaaS) applications, ensuring users connect to those applications in the fastest, most intelligent way available.

Orchestrator^{SP} Key Features

- **Secure and Single Sign-on Administration:** Ensures privacy and security per enterprise customer instance and easy implementation of network-wide virtual WAN overlays for each customer instance in accord with their business policies.
- **Multi-tenant Hosted:** Scales to support SD-WAN deployments for hundreds to thousands of enterprise customers.
- **Flexible Licensing and Billing**: Provides easy license management for provisioning licenses, upgrade or downgrade licenses without any interruptions to enterprise customers, and a variety of billing options for service providers, including CAPEX and OPEX variations.
- **Real-Time Enterprise Customer Monitoring and Historical Reporting**: Provides specific details into application, location, and network statistics, including continuous performance monitoring of loss, latency, and packet ordering for each enterprise customers' network paths.
- **Easy On-Boarding of New Customers**: Enables rapid deployment of new sites without any specialized IT expertise required at the branch.

Orchestrator^{SP} Enables Faster SD-WAN Deployments

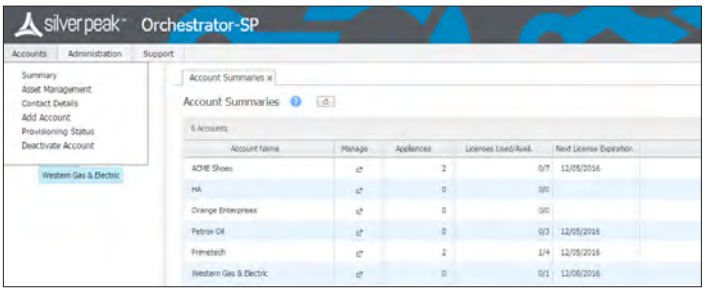

Figure 2: Orchestrator^{SP} enables the automated distribution of business intent policies to multiple branch offices.

Unity Orchestrator^{SP} enables zero-touch provisioning of EdgeConnect appliances at all branch sites of thousands of enterprise customers. Unity Orchestrator^{SP} enables service providers to:

- Simplify enterprise WAN reconfigurations by delivering customized virtual overlays to each enterprise to support application priority and QoS based on business intent.
- Simplify branch deployments with EdgeConnect Profiles that describe the virtual and physical configuration of the location.

Unity EdgeConnect^{SP} SD-WAN Solution

Real-Time Monitoring and Historical Reporting

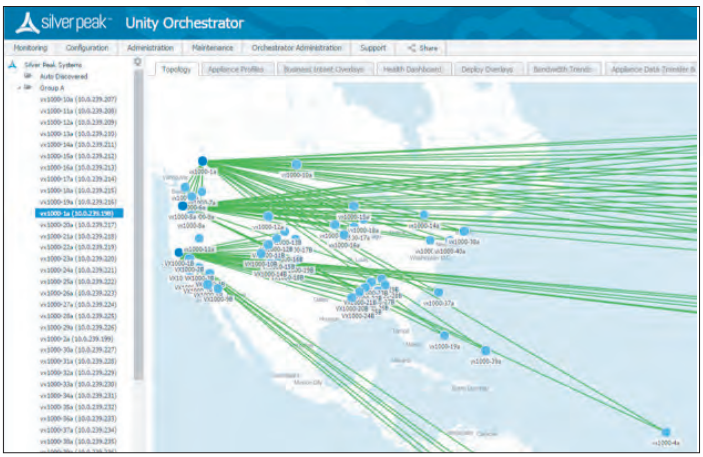

Figure 3: Orchestrator enables centralized and automated overlay management.

Boost Application Performance as Needed

Unity Boost is an optional performance pack that includes:

- **Latency Mitigation:** TCP and other protocol acceleration techniques are applied to all traffic, minimizing the effects of latency on application performance and significantly improving application response times across the WAN.
- **Data Reduction:** Data compression and deduplication eliminates the repetitive transmission of duplicate data. Silver Peak software inspects WAN traffic at the byte-level and stores content in local data stores. Advanced finger- printing techniques recognize repetitive patterns for local delivery. Data Reduction can be applied to all IP-based protocols, including TCP and UDP.

Why Add Boost?

Boost enables service providers to create tiered WAN service offering for SD-WAN that includes an optional WAN optimization service that can be offered as a value-added service on the EdgeConnect appliance.

Silver Peak Unity EdgeConnect appliances alone provide enhanced application performance for broadband or hybrid WAN deployments, utilizing the included Dynamic Path Control (DPC) for real-time traffic steering over multiple WAN links, and Path Conditioning for overcoming the adverse effects of dropped and out-of-order packets that are common with Internet connections.

However, sometimes additional performance is needed for specific applications or locations. As distance between locations increases over the WAN, application performance degrades.

This has less to do with the available bandwidth, and is more about the time it takes to send and receive data packets over distance, and the number of times data must be re-sent.

Boost Use Case Examples

- Customers replicating to a disaster recovery (DR) site thousands-of-miles away might want to add Boost to ensure recovery point objectives (RPOs) are not compromised.
- Enterprises with remote sites located in rural areas, or with sites that are exceptionally farther away from the company's data center, might want to add Unity Boost to overcome the effects of high latency.

With Unity Boost, customers gain the flexibility to enable enhanced WAN optimization capabilities where and when it is needed in a fully integrated solution.

Overcome Effects of Latency

The time it takes for information to go from sender to receiver and back is referred to as network latency. Since the speed of light is constant, WAN latency is directly proportional to the distance traveled between the two network endpoints. Silver Peak offers a variety of TCP acceleration techniques to mitigate WAN latency, including Window Scaling, Selective Acknowledgement, Round-Trip Measurement, and High Speed TCP.

Windows and other applications that rely on the Common Internet File System (CIFS) often take longer to perform common file operations over distance, such as retrieving and sharing files. Unity Boost helps these applications not only by improving the underlying TCP transport, but also by accelerating CIFS through CIFS read-ahead, CIFS write-behind, and CIFS metadata optimizations.

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Increase Throughput

As packets flow through EdgeConnect appliances, Boost inspects WAN traffic at the byte-level and stores content in local data stores. As new packets arrive, Silver Peak computes fingerprints of the data contained within the packets, and checks to see whether these fingerprints match data that is stored locally. If the remote appliance contains the information, there is no need to resend it over the WAN. Instead, specific start-stop instructions are sent to deliver the data locally.

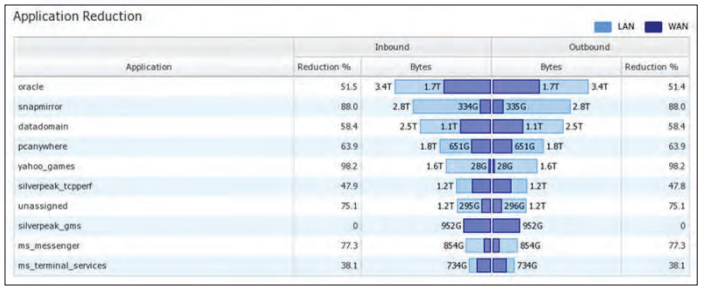

Figure 4: Boost enables customers to add application performance as needed.

Unity EdgeConnect Hardware Platforms

	EdgeConnect XS	EdgeConnect S	EdgeConnect M	EdgeConnect L	EdgeConnect XL
					
Part Identifier	EX-XS	EC-S	EC-M	EC-L	EC-XL
Typical Deployment	Small Branch	Large Branch	Head Office Small Hub	Data Center Large Hub	Data Center Large Hub
Typical WAN Bandwidth	2 - 200 Mbps	10 - 1000 Mbps	50 - 2000 Mbps	1 - 5 Gbps	2 - 10 Gbps
Simultaneous Connections	256,000	256,000	2,000,000	2,000,000	2,000,000
Recommend Boost up to	50 Mbps	200 Mbps	500 Mbps	1 Gbps	5 Gbps
Redundancy / FRUs	No	No	Power and SSD	Power and SSD	Power and SSD
Datapath Interfaces	4 x RJ45 10 / 100 / 1000	6 x RJ45 2 x 1/10G Fiber Option	4 x RJ45 2 x 1/10G Fiber	4 x RJ45 2 x 1/10G Fiber	4 x 1/10G Fiber

Unity EdgeConnect^{SP} SD-WAN Solution

Unity EdgeConnect Technical Support

Term	Annual (multi-year plans available)
Web-based Support Portal	Unlimited access 24 / 7 / 365 includes software downloads, technical documentation, and online knowledge base
Software Updates	Major and minor features releases; maintenance releases
Technical Support	24 / 7 / 365 Phone / E-mail / Web
Response Time	2 Hours
Extended Warranty Advanced Replacement	Ships same business day via priority overnight shipment if submitted and verified by 12:00PM local time of the supporting depot.

Flexible Deployment Models

- EdgeConnect Virtual (EC-V) – Download and install EdgeConnect from anywhere in the world. The software runs on all common hypervisors, including VMware vSphere, Microsoft Hyper-V, Citrix XenServer, and KVM.
- EdgeConnect Physical (EC) – For enterprises that are not virtualized in the branch, choose one-of-five EdgeConnect hardware appliance models for plug-and-play deployment.