



VeloCloud SD-WAN Enables Managed Hybrid WAN with MPLS for Service Providers

Service providers can transform MPLS networks to deliver managed hybrid WAN, enable direct access to cloud services and increase network agility.

A private MPLS-based Wide Area Network (WAN) has been the cornerstone for Enterprises to connect branch offices with their corporate data centers for the last decade. Service Providers around the world have invested heavily in their MPLS network infrastructure to support their customers' demand. However, the branch networking landscape has changed recently with the ubiquitous availability of Internet broadband and widespread adoption of cloud services. According to Nemertes research, enterprises' adoption of Internet as a WAN is growing 25% annually¹.

Cloud-based applications drive enterprises to rely more heavily on Internet connectivity, and also change the traditional traffic pattern from a branch-to-Data Center to a branch-to-Cloud pattern. The legacy network design of traffic flow from the branch-to-Data Center causes inefficiencies that impacts the performance of cloud applications, while driving up costs and complexities of enterprise networking. All these changes are happening at a time when service providers are facing fierce competition that is adversely impacting growth of MPLS deployment and the associated services.

Enterprise Demand for Bandwidth and Access to Cloud Services

Enterprises are asking for a managed network service that allows them to consume cloud and rich media applications while maintaining the stellar performance to which they are accustomed. They are also increasingly aware of a hybrid WAN networking paradigm that allows them to combine both MPLS and Internet transport. Hybrid WAN has gained popularity in the last few years but it is quite difficult to manage and operate due to its complexity.

For the Service Provider, managing two disparate, disjointed networks of MPLS and Internet can be quite complex to configure, operate, and troubleshoot.

Service Providers around the world are assessing how to transform their networks to meet the customer demands:

- Need for on-demand bandwidth without major network re-architecture
- Expand WAN services to provide direct, optimal path for Cloud services and enhance application delivery
- Unified management and orchestration network model
- Seamlessly integrate with existing network infrastructure, improve operation efficiency and reduce total cost of ownership

Transforming the MPLS Network to a Service-ready Network

VeloCloud is a pioneer in branch networking with a solution that combines the economics and flexibility of multiple WAN transports with the deployment and agility of a cloud-based service. VeloCloud provides a managed, cloud-ready solution for Service Providers looking to deliver managed hybrid WAN with MPLS service. In addition to higher reliability, increased available bandwidth, and

improved application performance for their end customers, Service Providers can easily operate and integrate this new architecture into their existing MPLS network. Managed Hybrid WAN can be the next generation WAN service that is easier to manage and deploy, and is one valuable service that can be built on the foundation of a cloud-delivered SD-WAN.

How the VeloCloud Solution Enables Service Providers

VeloCloud delivers a solution that enables service providers to deliver a Hybrid WAN with MPLS. The solution consists of multiple key components.



VeloCloud Orchestration

VeloCloud orchestration provides centralized policy management, monitoring, and troubleshooting as well as simplified control plane elements. Its multi-tenant architecture enables SP operators to easily provision new customers and manage across multiple customers. Each customer can be provided access to their own self-service Web portal for monitoring and policy configuration. Both the SP and Enterprise portals have granular role based access. Its easy to use, intuitive Web interface enables operational efficiency with minimal training. VeloCloud's application level policy framework provides a business level abstraction for how the network should steer application flows across different transports and to hybrid cloud destinations. Its API driven architecture also means that SPs can easily integrate the Orchestrator into their operations.



VeloCloud Edge

VeloCloud Edge is a high performance branch customer-premise edge (CPE) or virtual CPE (vCPE) that is designed to be very easy to deploy and supports various throughput performance tiers. The virtual form factor supports major hypervisors including VMware, Xen, and KVM. The VeloCloud edge supports multiple wired connectivity options on the WAN side and can be provisioned remotely from the Orchestrator. Once enabled, it automatically detects the circuit characteristics, such as bandwidth, latency and more. It then builds a secure overlay network with the VeloCloud gateways across all the available links and starts steering the applications per the configured policy. VeloCloud dynamic multipath optimization™ ensures superior application experience by dynamically steering packets on the best available path and applying on-demand link remediation to protect critical applications from sub-optimal performance of the underlying transport.



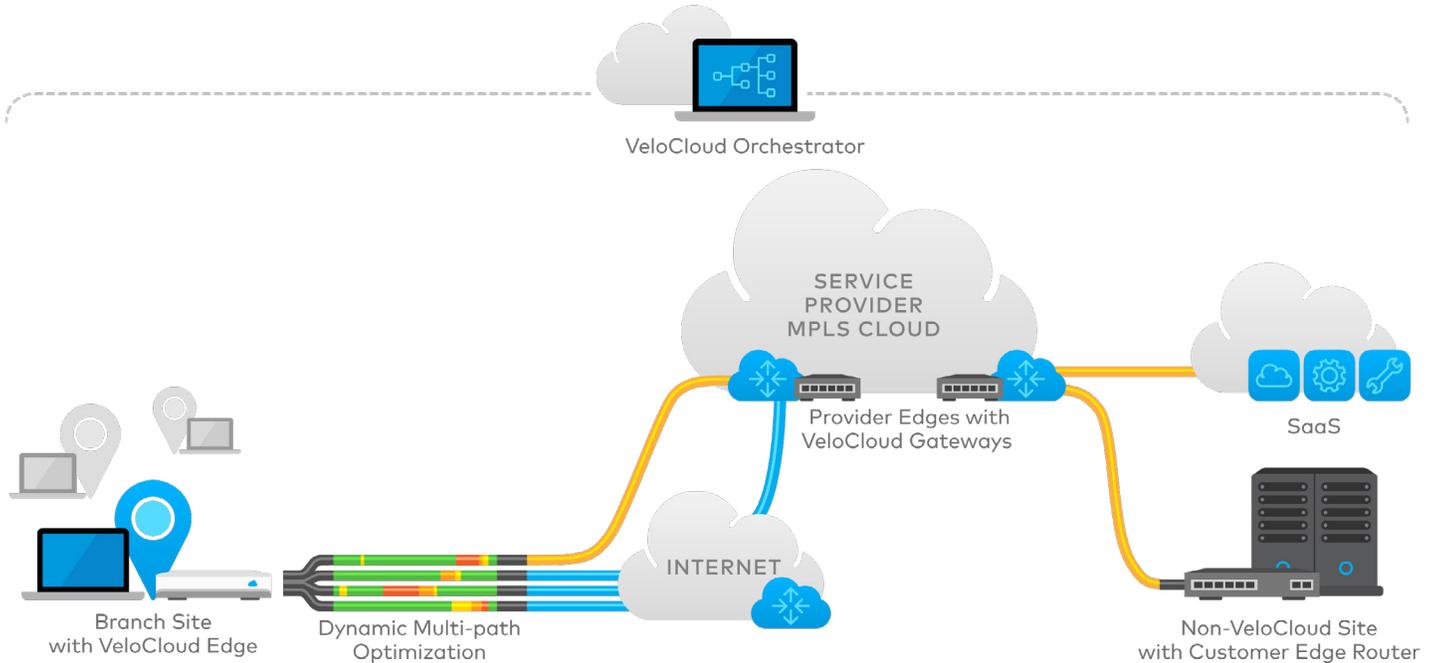
VeloCloud Gateways

VeloCloud Gateway is a multi-tenant virtual appliance that is installed in the service provider core network. It terminates the overlay tunnels from the VeloCloud Edge coming over both private (MPLS) and public (Internet) links. Its multi-tenant architecture provides cost effective, scalable SD-WAN gateway installation in the service provider core network. It also seamlessly integrates with existing MPLS VPN networks by supporting virtual routing and forwarding (VRF) handoff to the service provider router. This allows service providers to support multiple customers including those with non-VeloCloud equipped branches. VeloCloud gateways scale horizontally in order to meet the scale and performance requirement of the service providers.

Easy Deployment and Configuration

VeloCloud SD-WAN Service can be quickly installed with zero-IT-touch branch deployment. The branch edge is either provisioned as a virtual machine or custom-hardware shipped to the branch office, where a non-technical person simply plugs in a few cables. Activation, configuration,

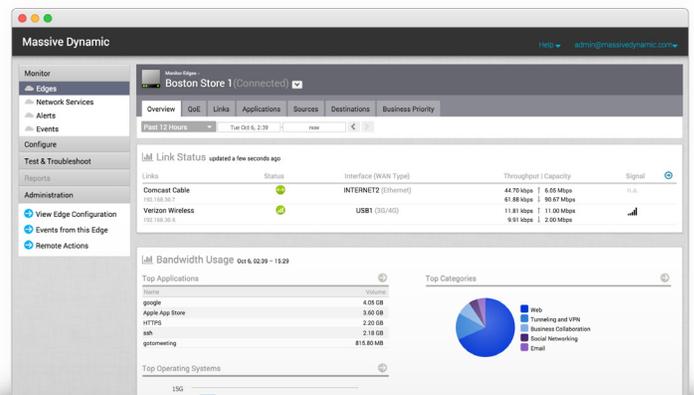
and on-going management are all managed in the cloud. It efficiently integrates Private-MPLS circuits, ordinary broadband circuits like DSL, Cable and Fiber with wireless 4G-LTE connectivity options in a single-device.



Cloud Orchestration and Management

Working with the Edge, Velocloud Orchestrator delivers dynamic, multi-path optimization so multiple, ordinary broadband and private links appear as a single, high-bandwidth link. Orchestrator management provides centralized configuration, real-time monitoring, and one-click provisioning of virtual services.

The VeloCloud Orchestrator business policy framework makes setting policy as simple as one-click. Providers can define business rules, such as prioritizing collaborative applications over social media, and the corresponding QoS mechanisms such as resource allocations, link/path steering, and error correction are automatically optimized. Deployment options, like branch-to-branch and branch-to-data center, are also flexible and easy to configure.

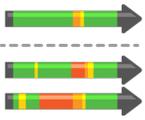


Security

Cloud VPN provides site-to-site virtual private networks (VPNs) to secure traffic. Edge-to-Edge and Edge-to-Gateway VPN tunnels are automatically provisioned. Legacy sites can be connected to the cloud VPN with no additional appliance installations via standard VPNC-compliant IPsec tunnels.

Performance is Critical

VeloCloud Cloud-Delivered SD-WAN boosts the service level of standard private MPLS and broadband links by implementing a number of patent-pending technologies, including:



Dynamic Multi-Path Optimization

Packets are steered on a per-packet basis to the optimal link based on performance metrics, application requirements, business priority of the application, and link cost. This technology can create a virtual, high bandwidth pipe from multiple, inexpensive broadband links and leased lines, providing customers improved WAN economics and quality.

When real-time traffic (e.g., VOIP) with higher business priority is identified, on-demand forward error correction can be performed to reduce or eliminate packet loss. In tests on approximately six million anonymous data records, an Internet connection had performance issues that impacted voice quality (dropped segments of calls) about 25% of the time. A combination of packet steering and forward error correction reduced voice degradation to less than 1% of the time¹.



Real-time Analytics

A dashboard displays network and application performance that can be used for tuning business policies or circuit provider selection such as treating real-time interactive and bulk streams differently. The service classifies over 3,000 applications, which enables granular control of applications for prioritization, optimal link steering and on-demand re-mediation.

Solution Benefits

Service Providers can continue to leverage their investment in their MPLS networks, but gradually and seamlessly enable integrated SD-WAN technology into their core network. The multi-tenant architecture and flexible form factor of the VeloCloud solution enables Service Providers to quickly implement and operationalize a hybrid WAN with MPLS service. Service Providers can quickly meet the customer demand and protect their existing MPLS revenue. It also lays a foundation for the Service Provider to transform their network to become

an extensible, service-aware platform that supports their customers' adoption of cloud services.

The branch office WAN is in transition as new solutions help improve the economics and quality of WAN connections. Along these lines, the VeloCloud solution offers enterprise-grade performance, security, visibility, and control over both Internet and private networks, combining the cost-effectiveness of private MPLS and Internet with the flexibility of the cloud.

1. Nemertes Research, WAN Adoption Benchmark survey, Q3 2014



VeloCloud Networks, Inc., the Cloud-Delivered SD-WAN™ company, Gartner Cool Vendor 2016 and a winner of Best Startup of Interop, simplifies branch WAN networking by automating deployment and improving performance over private, broadband Internet and LTE links for today's increasingly distributed enterprises. For more information, visit www.velocloud.com and follow the company on Twitter @VeloCloud.