

Enterprise Branch Agility, Simplicity & Performance with Software-Defined WAN

Simplify branch office networks with assured application performance using
VeloCloud Cloud-Delivered SD-WAN™

Today's branch office users are consuming more wide area network (WAN) bandwidth as they collaborate online (e.g., Skype for Business, WebEx, Office 365), increase the use of Software-as-a-Service (SaaS) and cloud services, access large rich-media files, and leverage other bandwidth-intensive applications. Corporate IT is facing significant challenges addressing these demands due to the complexity, cost and static architecture inherent in their existing WAN.

The vast majority of branch office WAN traffic is carried over expensive leased lines (private MPLS circuits) and unpredictable Internet connections (DSL, Cable, LTE) — neither of which is ideal. Deploying leased lines for all bandwidth needs is cost prohibitive and time-consuming,

while adopting the public Internet — with its lack of uptime, reliability and performance guarantees — may result in a poor user experience.

VeloCloud Cloud-Delivered SD-WAN enables enterprises to support application growth, network agility and simplified branch implementations while delivering optimized access to cloud services, private datacenters and enterprise applications simultaneously over both ordinary broadband Internet and private links. Global service providers are able to increase revenue, deliver advanced services and increase flexibility by delivering elastic transport, performance for cloud applications, and integrated advanced services all via a zero-touch deployment model.

Challenges with Branch Networks

According to Ashton, Metzler, and Associates, WAN technologies used in most branch offices today have changed little, if at all, since the 1990s.¹ Traditional wide area networks utilize rigid architectures which are optimized around private data center applications. These architectures are unable to seamlessly integrate cloud computing, Software-as-a-Service, virtualization, and other industry advances. Branch offices with only private-circuit connections rely on backhauling of all cloud applications, SaaS and Internet traffic through the enterprise data center (Figure 1), adding latency, degrading application performance and driving up private network bandwidth costs.

MPLS typically provides high quality of service, but with the tradeoff of increased complexity, limited capacity,

higher cost and long deployment lead times. These factors can have the following negative impacts:

- **New applications** inhibited by bandwidth, cost and time to deploy
- **Cloud migration** not supported by traditional hub and spoke branch network architecture
- **Branch network deployments** delayed due to IT complexity

Hybrid WAN enables enterprises and service providers to incorporate both private MPLS and broadband Internet which can reduce costs. Hybrid WAN, on its own, does not increase security, performance, simplicity or agility.

1. Ashton, Metzler, and Associates, "The Need to Rethink the WAN," Dec. 2104, http://www.bitpipe.com/detail/RES/1418844637_637.html

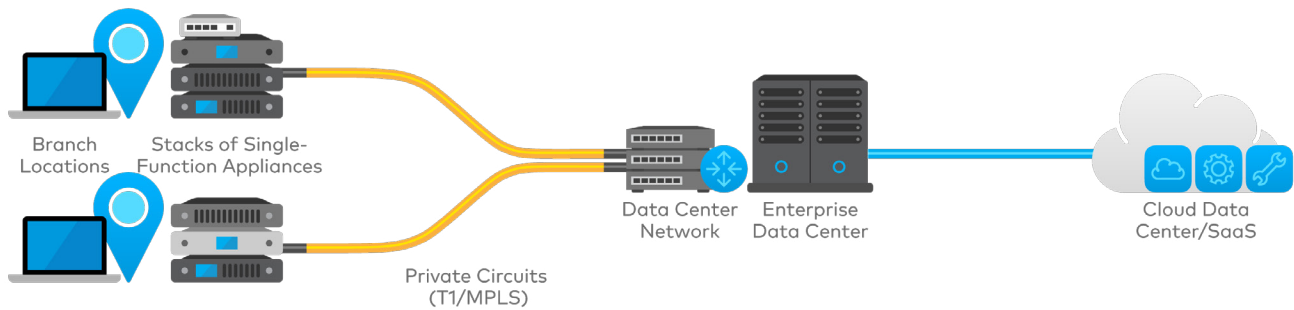


Figure 1. Traditional Branch Office WAN

Solution Overview

VeloCloud Cloud-Delivered SD-WAN combines the economics and flexibility of a hybrid WAN with the deployment speed and low maintenance of a cloud-based service. It also includes policy-based network-wide application performance, visibility and control while dramatically simplifying the WAN by delivering virtualized services from the cloud to branch offices.

VeloCloud Edges, available as an enterprise appliance, vCPE (virtual CPE), VNF (virtual network function), or virtual machine, aggregate multiple broadband links (e.g., Cable, DSL, 4G-LTE) at the branch office. The VeloCloud Edge with VeloCloud Dynamic Multi-Path Optimization (DMPO) and deep application recognition aggregates multiple private MPLS and broadband links (e.g., Cable, DSL, 4G-LTE) and steers traffic directly to other on-premise VeloCloud Edges in branch offices, private data centers, campuses, and headquarters. The VeloCloud Edge can also optionally connect to the system of global VeloCloud Gateways as shown in Figure 2 to provide performance, quality, visibility and prioritization for

cloud services (SaaS, IaaS, B2B Internet, generic Internet, etc.). The cloud-based VeloCloud Orchestrator is used to provision network-wide business policy, enable services insertion, provide visualization and analyze application performance.

The appliance version of the VeloCloud Edge is a compact, thin edge device that is zero-touch provisioned from the cloud for secure, optimized connectivity to applications and data. The system of VeloCloud Gateways are deployed globally at top-tier cloud data centers to provide scalable and on-demand cloud network services. Working with the VeloCloud Edges, the system of VeloCloud Gateways delivers VeloCloud Dynamic Multi-Path Optimization, deep application recognition, and VeloCloud Inbound Quality of Service while enabling multiple ordinary broadband Internet and private leased lines to appear as a single, high-bandwidth link. The VeloCloud Orchestrator provides centralized configuration, real-time monitoring, and one-click provisioning of virtual services.

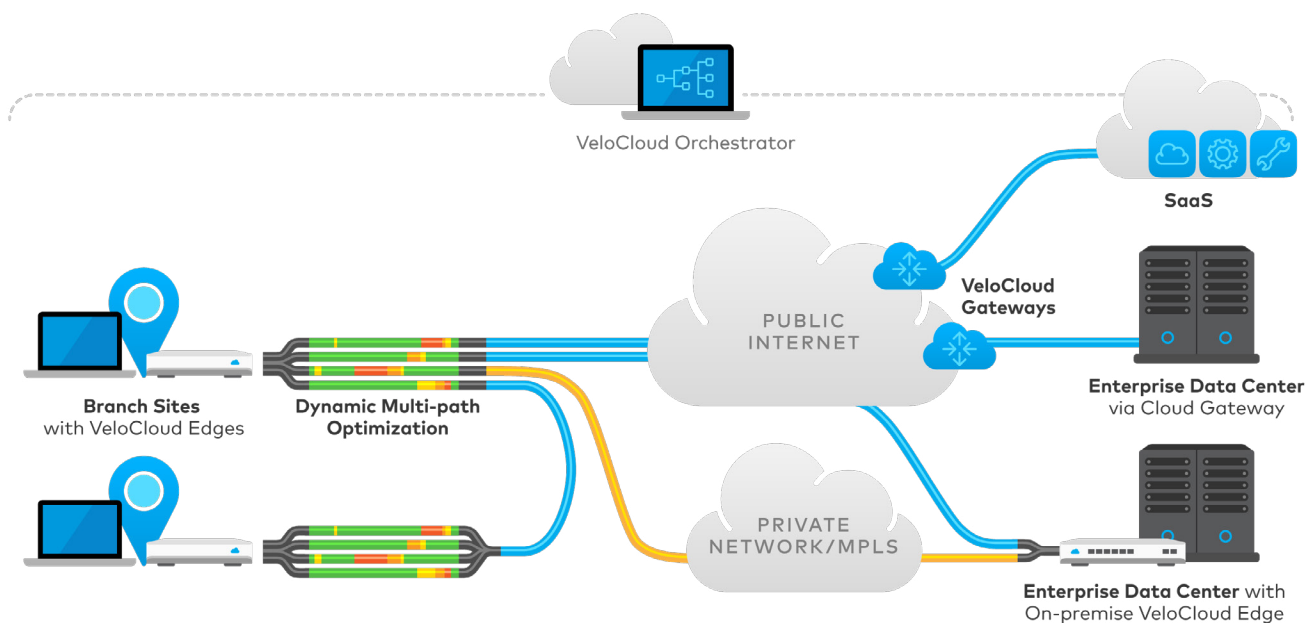
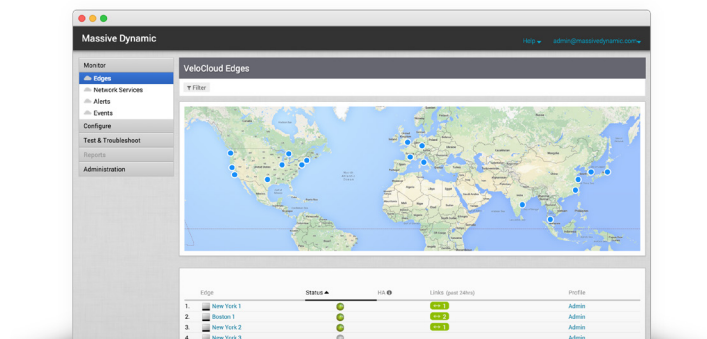


Figure 2. VeloCloud Cloud-Delivered SD-WAN Service

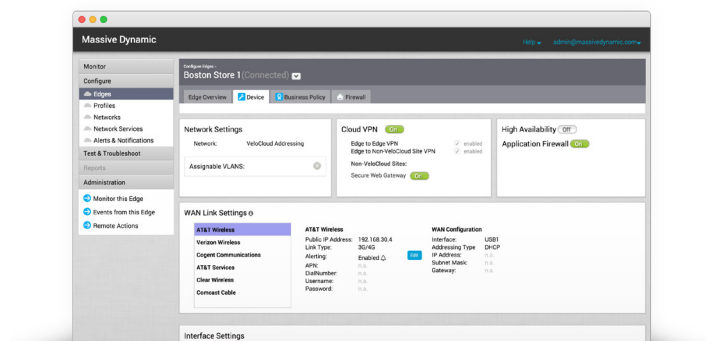
Deploy in Minutes

Using VeloCloud's zero-touch deployment capability, VeloCloud Cloud-Delivered SD-WAN can be quickly installed. The VeloCloud Edge is shipped to the branch office where a non-technical person simply plugs in a few cables. Activation, configuration, and on-going management are all handled in the cloud.



Virtual Service Delivery

The VeloCloud Edge can host multiple virtualized network functions, thereby eliminating the need for single function appliances in branch offices and reducing IT complexity. One-click service provisioning allows VeloCloud and third party virtual network function services to be remotely distributed and activated from the cloud. This capability is a key ingredient of VeloCloud Cloud-Delivered SD-WAN to deliver virtual network services such as cloud web security via Zscaler, Raytheon Forcepoint, etc.



Easy Policy Settings

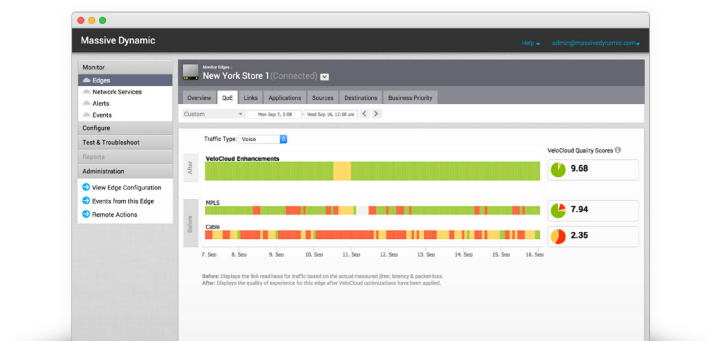
VeloCloud Cloud-Delivered SD-WAN makes setting policy as simple as a click. Enterprises or service providers can define business rules, such as prioritizing collaboration applications over social media. Many other business application policies, such as specific prioritization mechanisms, resource allocations, link/path steering, and error correction are also configurable. Deployment options, such as branch-to-branch and branch-to-data center, are also flexible and easy to set.

Security

VeloCloud Cloud VPN provides site to site virtual private networks (VPNs) to secure traffic. No additional data center equipment is required if IPsec VPN is already available. VeloCloud Cloud VPN services are interoperable via the one-time configuration of standard VPN-compliant IPsec to existing headquarters, campus or data center sites. The IP address manager enables unique blocking of IP addresses per site with a single click and the dashboard displays real-time status and health of VPN sites.

Performance Is Key

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



VeloCloud Dynamic Multi-Path Optimization: Applications are steered to the optimal link based on available throughput, performance metrics, application requirements, application business priority, and link cost. For illustrative purposes, the screenshot above shows how VeloCloud Multi-Path Optimization (upper green line) remedies the performance issues experienced when transport links 1 and 2 operate independently. This technology creates a virtual, high bandwidth pipe from multiple, inexpensive broadband links and private leased lines, providing customers improved WAN economics and quality.

Forward Error Correction: When real-time traffic (e.g., VoIP) with higher business priority is identified, forward error correction is dynamically performed to reduce or eliminate packet loss. In tests on approximately 24 million anonymous data records, Internet connections had performance issues that impacted voice quality (dropping segments of calls) about 18% of the time. A combination of application steering, dynamic jitter buffering and forward error correction reduced voice degradation to less than 1% of the time.

Real-time Analytics: A dashboard displays network and application performance which can be used to make traffic control decisions, such as treating real-time interactive and bulk streams differently. The service classifies over 2,500 applications, which enables granular control of applications when optimizing quality of experience.

Platform Details

VeloCloud Edges and multi-tenant VeloCloud Gateways can host multiple virtualized network functions. This helps eliminate the need for multiple single-function appliances in the branch. The multi-tenant VeloCloud Orchestrator enables provisioning, business policy, and rapid cost effective deployment of branch sites and services.



VeloCloud Edges

In addition to a virtualized software instance, the VeloCloud Edge is available as a compact CPE (7-inch x 7-inch box) that is easy to configure and supports flexible service selection and additions. The VeloCloud Edge improves upon traditional on-premises services that typically require a dedicated-function appliance per service which then leads to a proliferation of boxes in branch offices.



VeloCloud Gateways

Multi-tenant VeloCloud Gateways are deployed at top-tier network and cloud data centers around the world, offering scalability, redundancy, and on-demand flexibility. The VeloCloud Gateways are available to optionally provide the insertion of cloud-delivered services and optimized paths to all cloud-based applications to and from any branch, campus, headquarters or private data center. VeloCloud Gateways deliver the ideal architecture for optimized access to cloud data centers and SaaS applications.



VeloCloud Orchestrator

The VeloCloud Orchestrator provides centralized enterprise side installation, configuration and real time monitoring in addition to orchestrating the data flow through the cloud network. The VeloCloud Orchestrator enables one-click provisioning of virtual services in the branch, the cloud, or the datacenter.

SDN Principles

VeloCloud Cloud-Delivered SD-WAN brings SDN concepts to the enterprise branch WAN. Following a key principle of SDN, VeloCloud separates the data, control and orchestration planes to provide valuable flexibility. This architectural approach enables different application, packet and flow handling techniques to be implemented as an overlay, which supports link aggregation and service provider abstraction. The architecture allows for a highly-distributed and inherently redundant data plane with a rapidly extensible and REST API-controlled control plane.

Aligned with SDN concepts, the VeloCloud Edge is designed as a virtual network function (VNF) which enables the deployment of services at the edge at scale. This model future-proofs branch office design by providing a framework for best of breed services in the branch. At the same time, the system of VeloCloud Gateways operates as a VNF in the cloud while also enabling service chaining and insertion of cloud services and other best of breed VNFs.

Solution Benefits

The branch office WAN is in transition as new solutions help improve the economics, agility and quality of WAN design. VeloCloud Cloud-Delivered SD-WAN offers enterprise-grade performance, security, visibility, and control over both public Internet and private networks combining

the cost-effectiveness of the Internet with the flexibility of the cloud. VeloCloud dramatically simplifies the WAN with zero-touch deployment and via virtualized services from the cloud to branch offices using VeloCloud Edges and VeloCloud Gateways operating on Intel-based devices.



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](https://twitter.com/Velocloud).