Making Enterprise Branches Agile and Efficient with Software-defined WAN (SD-WAN)

Simplify your branch office network with assured application performance with cloud-delivered SD-WAN.

EXECUTIVE SUMMARY

Today's enterprise employees are consuming a lot of wide area network (WAN) bandwidth as they stream video, download large files, collaborate online (e.g., Skype*, WebEx*, Lync*), and perform other bandwidth-intensive activities. Just like employees in headquarters, those in branch offices need reliable and high-performance network connections when accessing data and applications in private and public clouds. But Enterprise IT providing network WAN access to branch offices face major challenges with complexity, performance and cost.

The vast majority of branch office WAN traffic is carried over expensive leased lines (private circuit) and somewhat unpredictable Internet connections — neither of which is ideal. Going with all leased lines can be Going with all leased lines is cost prohibitive and time-consuming, while adopting the public Internet — with its lack of uptime and performance guarantees — may result in a poor user experience. Moreover, both approaches often require multiple appliances, like modems, routers, and firewalls, at each branch office, making WAN deployment and management onerous.

Now, Enterprises businesses can have the best of both worlds — leased-line quality and Internet economics — with VeloCloud's Cloud-Delivered Software-Defined (SD)-WAN Service. It provides enterprise-grade performance, visibility, and control over Internet broadband and private links. WAN traffic is automatically steered across the best links and most-optimal paths. Internet quality is improved by up to 24%[1] to make it enterprise grade with patented error correction technology. The solution implements concepts from software-defined networking (SDN), designed into VeloCloud's customer-premises equipment (CPE) and cloud service gateways.

CHALLENGES WITH BRANCH NETWORKS

WAN technologies used in most branch offices today have changed little, if at all, since the 1990s, according to Ashton, Metzler, and Associates.[2] Many traditional service providers are still focused on Multiprotocol Label Switching (MPLS) technology and have failed to integrate the cloud computing, Software-as-a-Service, virtualization, and other industry advances. Consequently, branch office WANs with just private-circuit connections must have their cloud application and Internet traffic backhauled through the enterprise data center (Figure 1), adding latency and degrading application performance.

Although MPLS provides high-quality service, it is relatively expensive, complex, and low capacity, and there is a long-lead time to install new MPLS circuits. These factors can have negative repercussions, such as:

- **New application adoption** inhibited by costly MPLS bandwidth
- **Branch network deployments** delayed due to IT complexity and installation wait time
- **Cloud migration** not supported by traditional branch network architecture

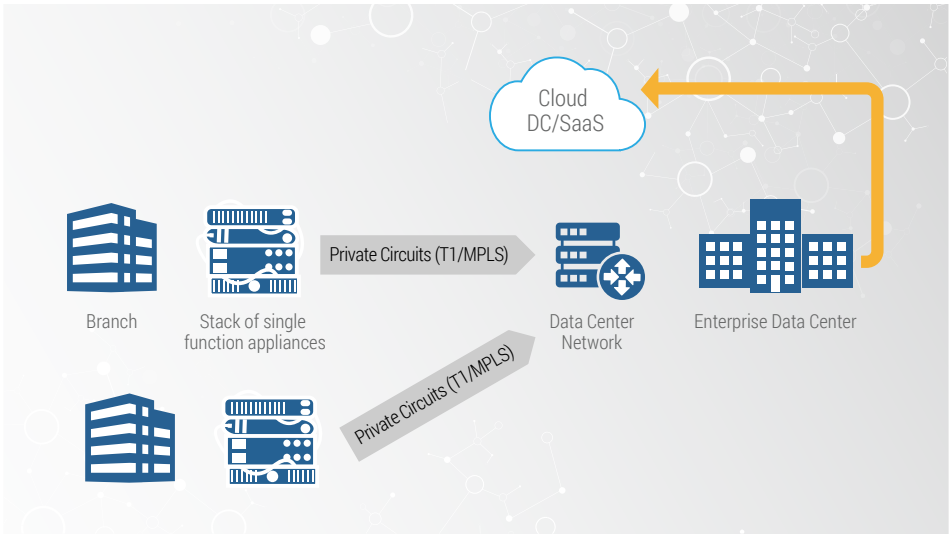

Figure 1. Traditional Branch Office WAN

Overcoming the shortcomings of traditional WAN, new enterprise WAN transport solutions are emerging, including the hybrid WAN, which refers to using a mix of public Internet with private circuits. The hybrid WAN, suggests Andrew Lerner at Gartner, "could very well be the elusive "killer" SDN use-case, supporting the utilization of multiple access technologies (typically MPLS and Internet) to achieve optimal cost and performance for the enterprise."[3] Some of the compelling reasons to adopt hybrid WAN include:

- Branch offices need reliable and direct connectivity to cloud services
- Broadband Internet delivers better price performance
- Critical applications require better availability than individual private circuits
- Broadband is faster to deploy than private circuits

SOLUTION OVERVIEW

VeloCloud's Cloud-Delivered SD-WAN Service combines the economics and

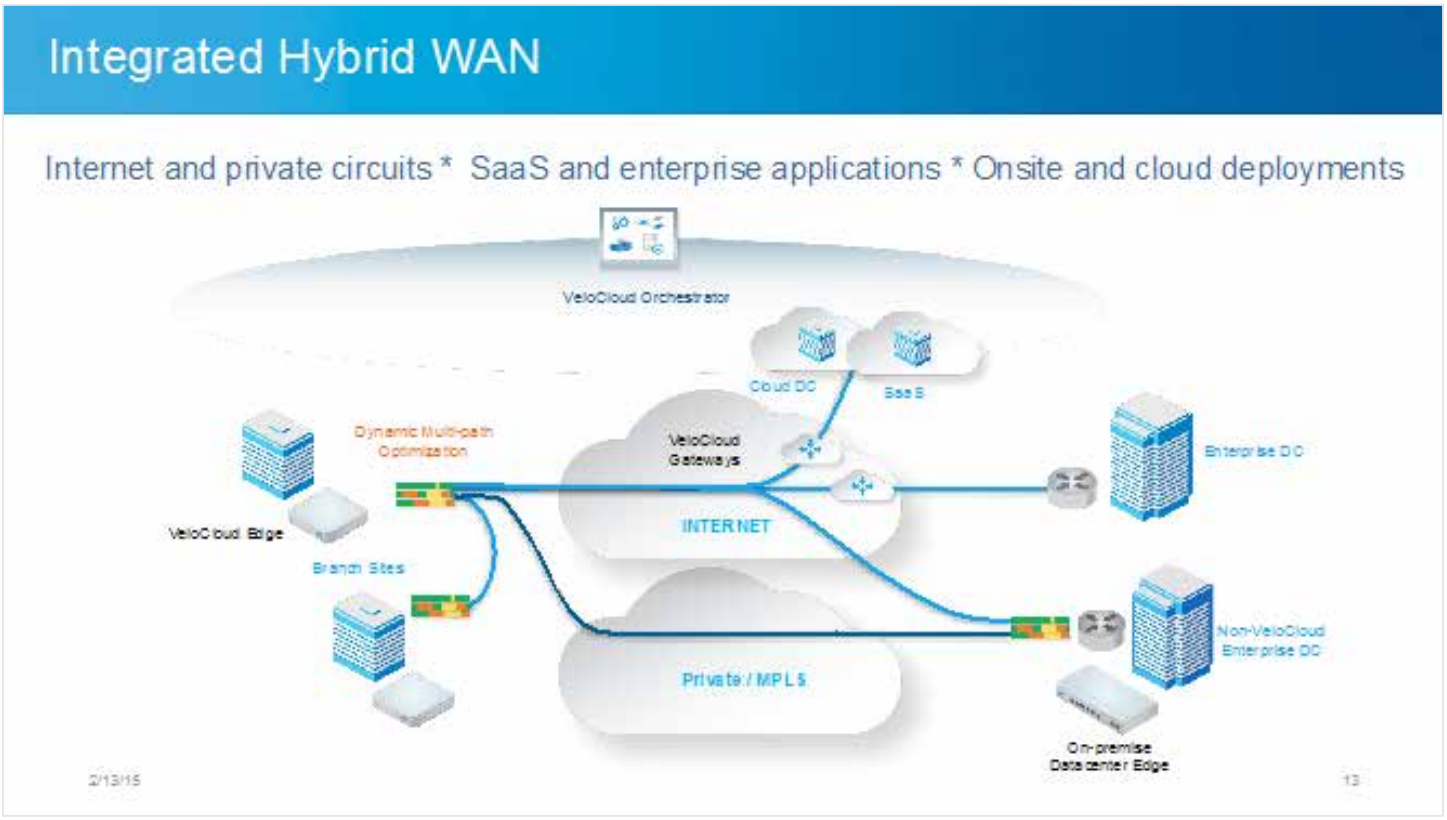

Figure 2. VeloCloud Cloud-Delivered SD-WAN Service

Figure 3. Business Rules Creation

flexibility of the hybrid WAN with the deployment speed and low maintenance of cloud-based services. It dramatically simplifies the WAN by delivering virtualized services from the cloud to branch offices and mobile users everywhere.

VeloCloud's customer-premise equipment Velocloud Edge aggregates multiple broadband links (e.g., Cable, DSL, 4G-LTE) at the branch office, and sends the traffic to VeloCloud gateways, as shown in Figure 2. Using cloud-based orchestration, the service can connect the branch office to any of type of data center: enterprise, cloud, or Software-as-a-Service.

VeloCloud edge is a is a compact, thin edge device that is zero-touch provisioned from the cloud for secure, optimized connectivity to applications and data. A cluster of gateways is deployed globally at top-tier cloud data centers to provide scalable and on-demand cloud network services. Working with the Edge, the cluster delivers dynamic, multi-path optimization so multiple, ordinary broadband links appear as a single, high-bandwidth link. Orchestrator management provides centralized configuration, real-time monitoring, and one-click provisioning of virtual services.

DEPLOY IN MINUTES

VeloCloud Cloud-Delivered SD-WAN Service can be quickly installed with zero-IT-touch branch deployment. The CPE 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 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 partner virtual appliance services to be remotely distributed and activated from the cloud. This capability is a key ingredient for SD-WAN model to deliver virtual network services such as — Firewall, Content filtering and more.

EASY POLICY SETTINGS

VeloCloud Cloud-Delivered SD-WAN Service makes setting policy as simple as a click. Customers can define business rules, such as prioritizing collaborative applications over social media, as illustrated in Figure 3. Many other business application policies, such as the exact QoS mechanism, resource allocations, link/path steering, and error correction, are also configurable. Deployment options, like branch-to-branch and branch-to-data center, are also flexible and easy to set.

SECURITY

VPN Cloud (VPNC) provides site to site virtual private networks (VPNs) to

secure traffic. No additional data center equipment is required if IPsec VPN is already available. The cloud VPN services are interoperable via the one-time configuration of standard VPNC-compliant IPsec to existing headquarter 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 links by implementing a number of patent-pending technologies, including:

Dynamic Multi-Path: Packets are steered to the optimal link based on performance metrics, application requirements, business priority of the application, and

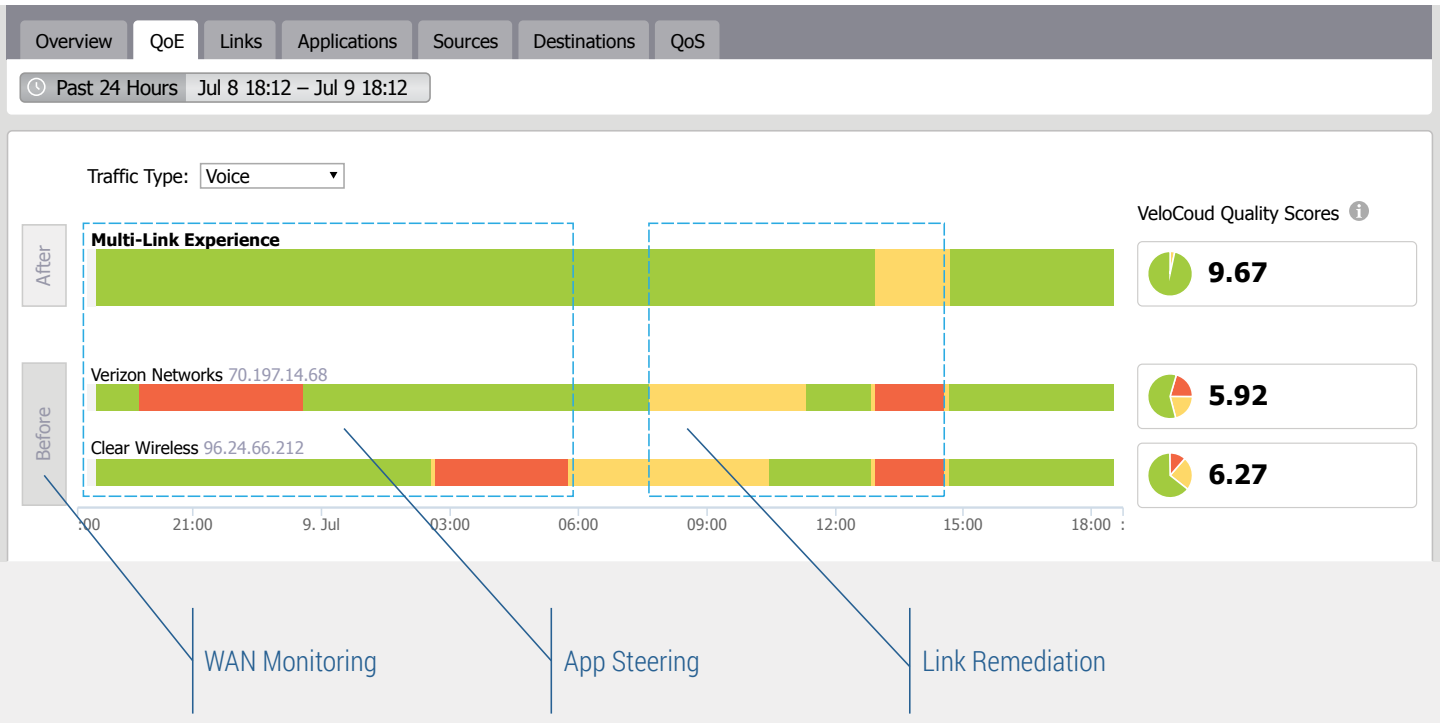

Figure 4. Dynamic Multi-Path Improves Quality of Independent Service Provider Links

link cost. For illustrative purposes, Figure 4 shows how Multi-Path (upper green line) remediates the performance issues experienced when service provider links 1 and 2 operate independently. This technology can create a virtual, high bandwidth pipe from multiple, inexpensive broadband links and leased lines, providing customers improved WAN economics and quality.

Forward Error Correction: When time-sensitive network traffic (e.g., VoIP) with high business priority is identified, forward error correction (i.e., redundant packets added) 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 or calls) about 20 percent of the time. Forward error correction reduced the incidence to 0.7 percent, or a better than 28 percent improvement.[1]

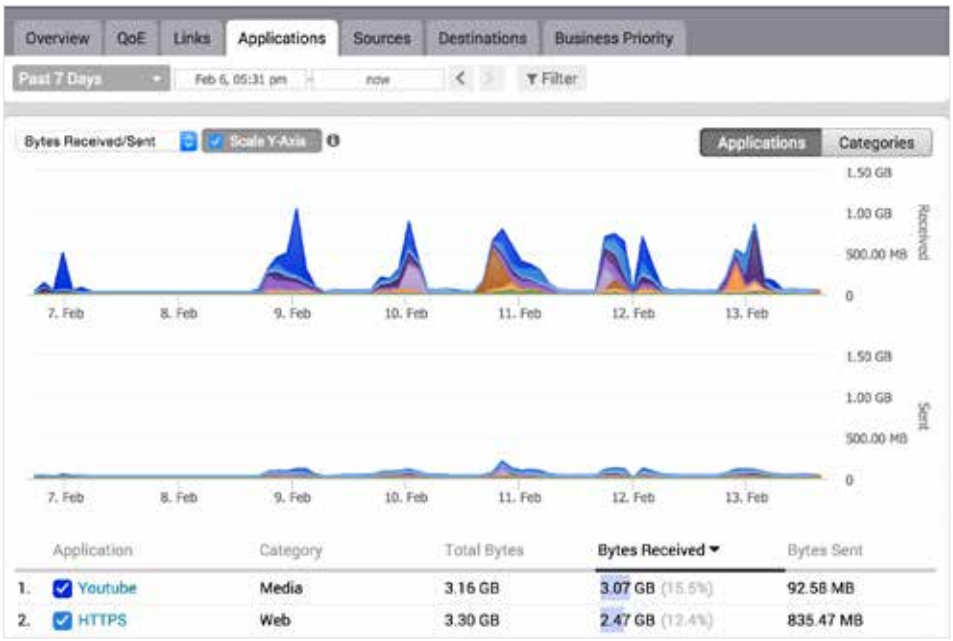

Figure 5. Real-time Analytics

Real-time Analytics: A dashboard displays network and application performance (Figure 5) that can be used to make traffic control decisions, such as treating real-time interactive and bulk streams differently. The service classifies over 3,000 applications, which enables granular control of applications when optimizing QoS.

PLATFORM DETAILS

VeloCloud's powerful CPE and Cloud Services Gateways can host multiple virtualized network functions. This helps

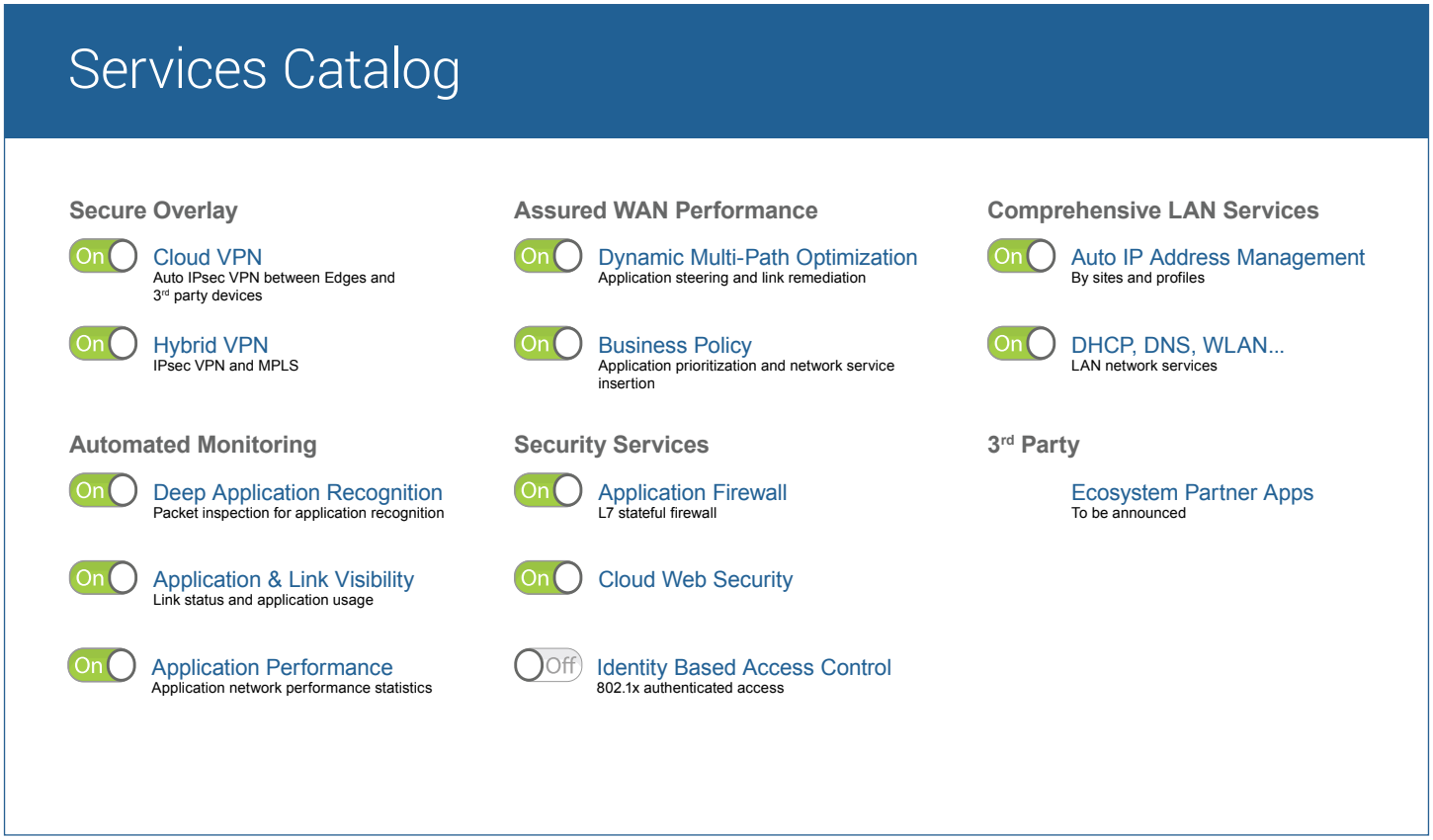

Figure 6. Easy Service Selection

eliminate the need for multiple single-function appliances in the branch.

Customer-premises equipment (CPE): For its Cloud-Delivered SD-WAN Service, VeloCloud designed a compact, virtualized CPE (7-inch x 7-inch box) that was easy to configure, and supported flexible service selection (Figure 6) and additions. The objective was to improve upon traditional on-premises services that typically require a dedicated-function appliance per service, leading to a proliferation of boxes in branch offices.

Cloud Services Gateways: VeloCloud's network consists of service gateways deployed at top-tier network and cloud data centers around the world, offering scalability, redundancy, and on-demand flexibility. The gateways provide cloud-delivered services and optimized paths to all applications, branches, and data centers. VeloCloud's distributed cloud gateways deliver the ideal architecture for supporting cloud data centers and SaaS applications.

SDN PRINCPLES

VeloCloud Cloud-Delivered SD-WAN Service brings SDN concepts to the enterprise branch WAN edge. Following a key principle of SDN, the solution segregates the control and data plane to provide valuable flexibility. For example, this architectural approach enables different packet and flow handling techniques to be implemented as an overlay, which supports link aggregation and service provider abstraction. SDN allows for a highly-distributed and inherently redundant data plane, and a quickly extensible and REST API-controlled control plane, providing centralized visibility to replace traditional routing.

Aligned with SDN concepts, the CPE is virtualized so it can run services at the edge, where they can be more effectively operated and scaled out. In addition, virtualization future proofs the CPE and enables quick delivery of services to branch offices, as in WAN-as-a-Service.

SOLUTION BENEFITS

The branch office WAN is in transition as new solutions help improve the economics and quality of WAN connections. Along these lines, VeloCloud Cloud-Delivered SD-WAN Service offers enterprise-grade

performance, security, visibility, and control over both Internet and private networks, combining the cost-effectiveness of the Internet with the flexibility of the cloud. The service also dramatically simplifies the WAN with zero-IT-touch deployment and by delivering virtualized services from the cloud to branch offices using CPE and gateways based on Intel architecture.

For more information about solutions from VeloCloud, visit www.velocloud.com.

For more information about Intel® solutions for communications infrastructure, visit www.intel.com/go/commsinfrastructure.

For more information about NFV- and SDN-based solutions, visit https://networkbuilders.intel.com.

1 Source: VeloCloud study.

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

3 Source: Andrew Lerner blog, "Hybrid is the new WAN," Jan 2, 2015, blogs.gartner.com/andrew-lerner/2015/01/02/hybridwan.

4 Intel® Virtualization Technology (Intel® VT-x) requires a computer system with an enabled Intel® processor, BIOS, and virtual machine monitor (VMM). Functionality, performance or other benefits will vary depending on hardware and software configurations. Software applications may not be compatible with all operating systems. Consult your PC manufacturer. For more information, visit http://www.intel.com/go/virtualization.

velocloud

295 N. Bernardo Ave, Ste. 200
Mountain View, CA 94043

T: +1.650.209.4180
E: contact@velocloud.com

www.velocloud.com