

Maximizing the flexibility of managed SD-WAN services through uCPE-based platforms

Open, uCPE-based virtualization platforms enable communication service providers to address new, high-value opportunities in managed SD-WAN services

SD-WAN: strong traction and room for improvement

While Software-Defined Wide Area Networking (SD-WAN) has achieved strong traction with enterprise customers worldwide, constraints imposed by the architecture of first-generation solutions limit the business potential for System Integrators (SIs) and Managed Service Providers (MSPs) who are deploying this type of service. Fortunately, the industry is transitioning to a second-generation approach which enables SIs and MSPs to maximize the flexibility of the SD-WAN services that they provide while expanding their customer base and improving their profitability in this segment.

This solution brief reviews the basic benefits of SD-WAN, discusses the limitations of first-generation architectures and explains how newer solutions based on the second-generation approach offer improved business opportunities for SIs and MSPs. A real-world use case illustrates the benefits achieved by one service provider who adopted the new approach. The brief also highlights new opportunities enabled by the instantiation of edge cloud applications on the same platform as SD-WAN services.

Transforming business operations through managed SD-WAN

SD-WAN is a virtual WAN architecture that allows enterprises to leverage any combination of transport services, including MPLS, LTE, 5G and broadband Internet services, to securely connect users to applications. Enterprises worldwide are adopting SD-WAN to reduce the costs of their networking infrastructure by reducing the dependence on MPLS, while improving the performance of their cloud-hosted applications, enhancing users' experience and increasing their business productivity. In a managed services scenario, the MSP delivers the necessary hardware, software and network connections to

the customer, then remotely manages the SD-WAN deployment to ensure that service-level agreements (SLAs) are met.

Most industry analysts estimate that the SD-WAN market is growing at 35-40% per year, with IDC forecasting a total market size of \$4.5B in 2022. Frost and Sullivan estimates that 80% of enterprises would prefer to license SD-WAN as a managed service rather than operate it themselves, so SD-WAN represents a massive new business opportunity for SIs and MSPs looking to improve their bottom line.

Limitations of first-generation SD-WAN solutions

First-generation SD-WAN products were vertically integrated, comprising proprietary software running on dedicated hardware appliances, with no flexibility for changes or enhancements to the function set after deployment at the customer premise. This represents a significant limitation in the case of an enterprise customer who, for example, has standardized on a specific security vendor across their IT network that is different from the security vendor selected by the SD-WAN provider.

In many cases, a customer needs their SI or MSP partner to add a newly-released network function to their SD-WAN after deployment, such as a next-generation firewall or load balancer. Alternatively, a customer may want to exchange a specific application within the SD-WAN for an alternative provided by another software vendor, for reasons of cost, performance, quality or reliability.

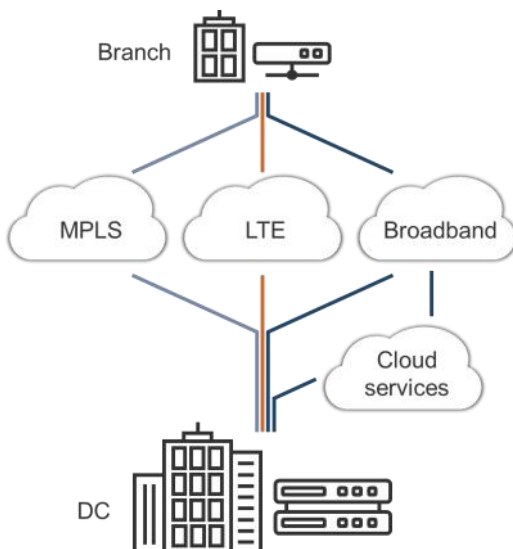
In other scenarios, customers need to run their own applications on the servers that host the SD-WAN functions, in a dedicated "tenant space". In many cases, these are edge compute applications representing extensions of functions hosted in a public or private cloud.

Locating compute and storage at the edge of the network, close to the physical location where data is collected, enables that data to be processed and analyzed locally rather than in a central data center or in the cloud. Applications such as industrial IoT (IIoT), highly-immersive augmented reality (AR), video surveillance and smart retail all leverage edge compute to achieve critical low-latency decision-making and/or to minimize the bandwidth required for backhaul to the cloud. In many cases, these applications are physically co-located with SD-WAN services, so significant CAPEX and OPEX savings are possible if they are hosted on the same platform.

Neither of these configurations are feasible in a first-generation SD-WAN architecture.

In terms of physical hardware, some first-generation SD-WANs required multiple appliances to implement all the SD-WAN functions, such as separate Customer Premise Equipment (CPE), router and firewall.

Beyond these limitations that directly impact enterprise customers, first-generation SD-WANs also impose significant limitations on the SIs and MSPs that deliver them. They are unable to customize the SD-WAN to meet the specific needs of individual customers, or to offer SD-WAN solutions that are differentiated and optimized for specific



SD-WAN brought multi-link capabilities and centralized management to enterprise networking.

vertical markets such as healthcare, financial services, manufacturing etc.

Fortunately, all these limitations can be addressed by adopting a second-generation SD-WAN based on a universal CPE (uCPE) platform.

Benefits of managed SD-WAN services based on uCPE platforms

Rather than proprietary software running on dedicated hardware appliances, second-generation SD-WAN solutions comprise standards-compliant virtualized applications running on “white box” servers under the control of a secure software virtualization platform.

A uCPE-based SD-WAN platform deployed under a managed services agreement provides the SI or MSP with the flexibility to deploy whatever combination of applications is best suited to the specific requirements of an enterprise customer or a vertical market segment.

SIs and MSPs can select from compatible applications available from multiple suppliers, while retaining the option to replace one function with another after deployment in order to improve the performance or functionality of their customer’s SD-WAN. Security patches can be implemented as soon as an updated application is available, without waiting for a vendor to update a complete, monolithic hardware-plus-software product.

For customers that require the installation of, for example, a firewall from a vendor pre-approved or even mandated by their IT organization, the SI or MSP can install and configure the appropriate firewall as part of the unique application set for that customer.

Customers who need to run their own applications in a dedicated tenant space on the uCPE servers can be accommodated by provisioning appropriate compute, networking and storage resources while providing secure access to whitelisted team members. Edge compute applications can be hosted on the same platform as the SD-WAN services and managed within the same dashboard.

The same flexibility applies to the software virtualization platform. As long as the original platform selected by the SI or MSP conforms to the applicable open standards, then it can be replaced at a later date if a newer product offers superior performance, latency, security, reliability or cost. This applies whether the replacement product is from a competing vendor or simply an upgrade to the original platform.

Finally, the uCPE approach to managed SD-WAN maximizes the customer’s hardware options. Ideally, the SI or MSP will choose a white box server based on an Arm or Intel Architecture processor, provisioned appropriately for the expected workloads. If resource requirements change because of different workloads, or a more cost-effective server becomes available, then as long as it meets the appropriate standards the SI or MSP can introduce it without changing software.

While some software virtualization platforms use OpenStack to perform the lifecycle management of virtualized applications, others have emerged that eliminate the need for OpenStack. Typically using NETCONF, these platforms have smaller footprint requirements for CPU cores, memory and storage, enabling the SD-WAN to be installed on lower-cost, lower-power hardware.

A fully-scalable software virtualization platform allows an SI or MSP to cost-effectively support an enterprise customer whose requirements for throughput, capacity and even hosted applications vary widely across a large number of branch offices and remote users. The identical, scalable virtualization platform can be deployed at each node.

A uCPE platform with centralized management of both infrastructure and services ensures efficient operational support for remote branch offices, especially if they lack local IT support with the necessary skills in configuration and management.

In summary, by implementing their managed SD-WAN and/or edge compute deployments as centrally-managed multi-vendor solutions hosted on industry-standard uCPE platforms, SIs and MSPs can maximize the flexibility of the services they provide, expand their customer base and boost their Average Revenue per User (ARPU).

Case Study: CMC Networks and Enea

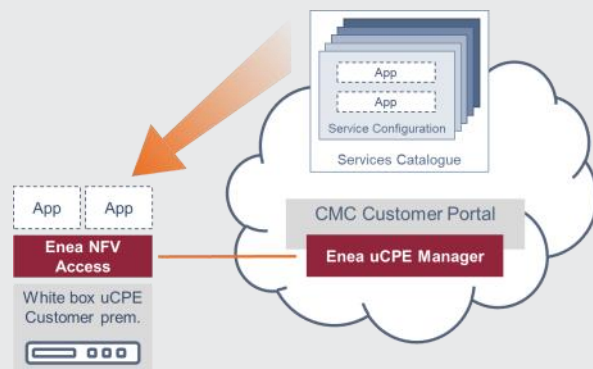
CMC Networks, a Global Telecommunications Carrier headquartered in South Africa, servicing the largest Pan African and Middle Eastern network, envisioned a new business opportunity in SD-WAN.

CMC observed that they could grow and enhance their managed SD-WAN business significantly by delivering to their customers a set of networking services selected and configured to match the specific needs of each customer.

To achieve this flexibility, CMC required the ability to deploy a unique combinations of services from multiple vendors on a flexible software platform located at each customer premise.

To address these business and technical challenges, CMC adopted Enea NFV Access, a virtualization and management platform for white-box uCPE deployments whose reliability, security and performance has already been proven in demanding telecom networks.

Enea NFV Access provides CMC with the flexibility to deploy virtualized applications from multiple vendors, running in a virtualized environment on appropriately-sized servers from industry-standard suppliers.



CMC can now supplement basic SD-WAN connectivity with additional customer-requested functions such as next-generation firewalls or routers, all provisioned, configured and updated remotely using Enea uCPE Manager to minimize operational costs while maximizing security.

By adopting this second-generation SD-WAN architecture, CMC was able to expand their managed SD-WAN services business, while accelerating their customers’ business transformation.



Enea is a world-leading supplier of innovative software components for telecommunications and cybersecurity. Focus areas are cloud-native, 5G-ready products for mobile core, network virtualization, and traffic intelligence. More than 3 billion people around the globe already rely on Enea technologies in their daily lives. Enea is listed on Nasdaq Stockholm.