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 Communications Service Providers (CSPs) deploying this type of service. Fortunately, the industry is transitioning to a second-generation approach which enables CSPs 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 new and improved business opportunities for CSPs. A real-world use case illustrates the benefits achieved by one CSP who adopted the new approach.

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 CSP 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.

Unlike the traditional router-centric WAN architecture, SD-WAN is designed to fully support applications hosted in on-premise data centers, public clouds or private clouds, as well as Software-as-a-Service (SaaS) solutions like Salesforce, Office365 and Dropbox, while delivering the highest levels of application performance.

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. From the perspective of a Communications Service Provider (CSP), it’s important to note that this growth in SD-WAN does not necessarily imply a decline in MPLS business. Rather, SD-WAN offers an opportunity for new revenue and improved Average Revenue per User (ARPU). Frost and Sullivan estimates that 80% of enterprises would prefer to buy SD-WAN from a CSP as a managed service rather than operate it themselves, so SD-WAN represents a massive new business opportunity for CSPs 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 wants 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”.

None of these options are feasible in a first-generation SD-WAN architecture.

Some first-generation SD-WANs required multiple hardware 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 CSPs that deliver them. The CSP is unable to customize the SD-WAN to meet the specific needs of individual customers, or to offer SD-WAN as a managed service with the flexibility required for modern enterprises.
solutions that are differentiated and optimized for specific 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 CSP with the flexibility to deploy whatever combination of VNFs is best suited to the specific requirements of an enterprise customer or a vertical market segment. The CSP can leverage a catalog of pre-defined service configurations for a range of market segments and customer categories.

CSPs can select from Virtual Network Functions (VNFs) 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 VNF 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 CSP can install and configure the appropriate VNF 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.

The same flexibility applies to the software virtualization platform. As long as the original platform selected by a CSP conforms to the applicable open standards, specifically the ETSI NFV architecture, 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 hardware options for a CSP. Ideally, the CSP 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 CSP can introduce it without changing software.

While some software virtualization platforms use OpenStack to perform the lifecycle management of VNFs, 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 a CSP 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.

In summary, by implementing their managed SD-WAN deployments as multi-vendor solutions hosted on industry-standard uCPE platforms, CSPs 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.

This universal uCPE platform would need to meet all applicable open standards for hosting software-based network services and in parallel minimize the costs of acquisition, installation and operation at remote customer locations.

To address these business and technical challenges, CMC adopted Enea NFV Access, a virtualization and management platform for white-box uCPE deployments.

Enea NFV Access provides CMC with the flexibility to deploy Virtual Network Functions (VNFs) 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 in the market, while accelerating their customers’ business transformation.