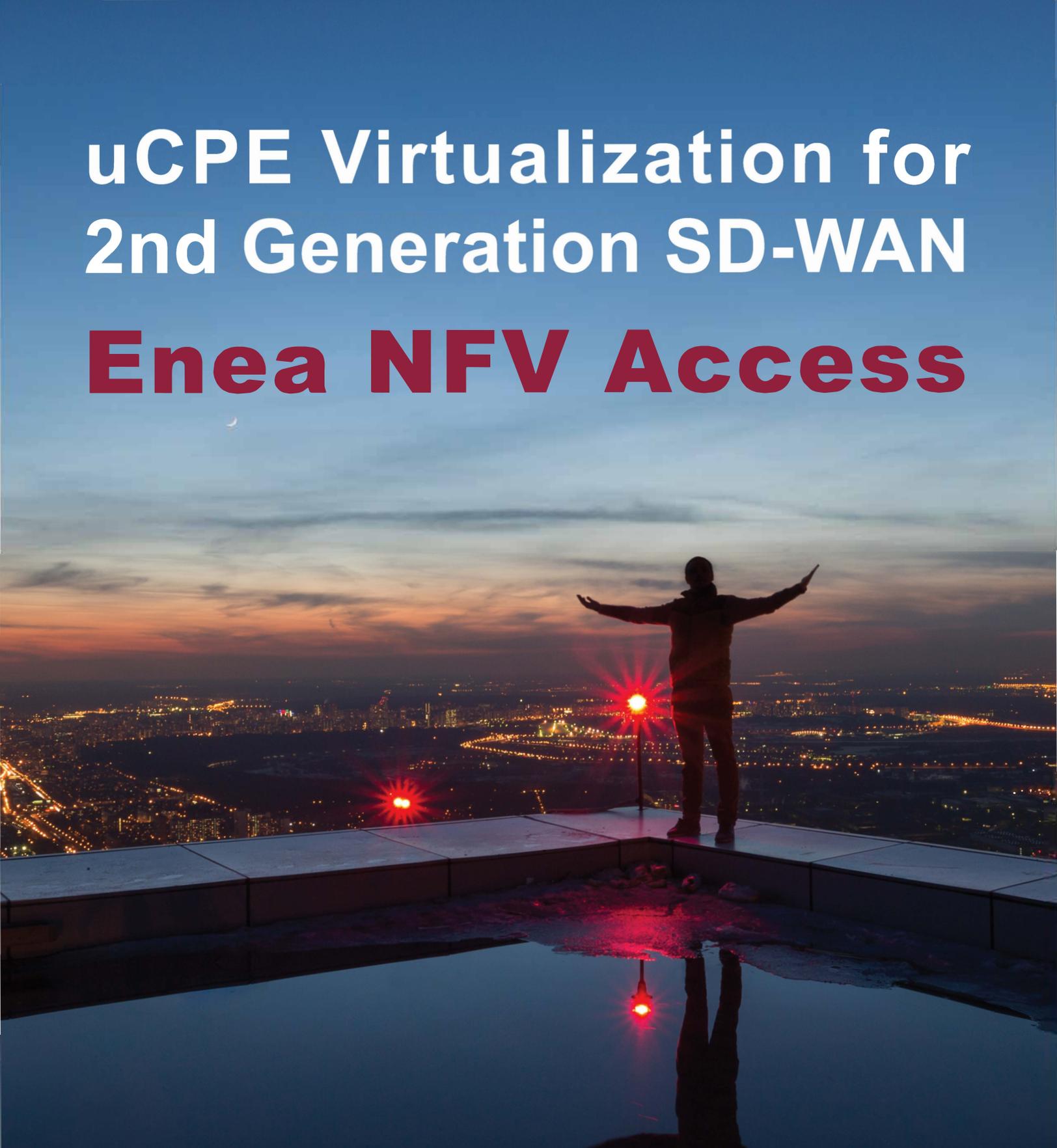




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The New (Best of) Breed of SD-WANs

By Carl Weinschenk

SD-WAN is the up-and-coming thing in networking. It offers the flexibility capable of supporting the increasingly mobile and decentralized business world and reduces costs by cutting the distance data must travel and limiting the use of multiprotocol label switching (MPLS).

Innovators are looking to build on those basic advantages with an even newer approach, and it is gaining momentum. To date, SD-WANs have been mostly offered as single platforms from vendors. This tends to reduce available features and promotes vendor lock-in. The emerging best-of-breed approach expands functionality by enabling platforms to offer features from multiple vendors.

“It’s early days,” said **Datavision** CEO Mark Abolafia. “You have plenty of companies developing different VNFs and you have different customer combinations of x86 platforms and folks trying to evaluate a variety of things including orchestrators and controllers and trying to best fit those combinations to their customers and to the services they want to launch.”

Opportunities for Enterprises and Service Providers

“The second phase of evolution that we are starting to see is that service providers want something a bit more universal,” said Paul Stevens, telecom sector marketing director for Advantech’s Networks and Communications group.

There are drivers to the new approach beyond simply the reduced costs and added features. In best-of-breed environments, hardware and software must truly be interoperable. This means that vendor lock-in is a thing of the past. This opens supply lines (especially for customer premise equipment) and broken equipment can be replaced far more quickly.

The next generation of SD-WAN is here. It will be a gradual shift, however, in a couple of ways. Vendor-specific SD-WANs won’t disappear. Some companies want what in essence is the simplest approach. On the other level, the two approaches will in some way coalesce.

“There are two flavors: Ready to go SD-WAN solutions, which basically are very simple and do what they need to do,” said Niek Van der Ven, the CEO of SDNbucks.

“VeloCloud and Cisco Meraki are examples...The other flavor, including Viptela and Nuage Networks from Nokia, is only sold through carriers or large system integrators, mainly because they roll out building blocks like Lego blocks.”

Best-of-breed SD-WANs already are carving out a niche — and one that is likely to grow. “We are getting traction in most cases faster in the enterprise,” said Karl Mörner, VP of product management at Enea. “The carriers take a little longer time to evaluate and choose their solutions.”

There will be a mix of approaches: Enterprises can buy SD-WAN platforms from vendors, partner with carriers, create their own “best-of-breed” platforms, or rely on non-carriers going “over the top” to meet their needs with platform-as-a-service offerings. Service providers, in turn, have many of the same options when fleshing out their product lines and roadmaps.

Though the core technology is much the same, the difference is significant between deployment by an enterprise itself, by platform-as-a-service companies, and as managed services from carriers. The cobbling networking infrastructure together from a variety of vendors is not an easy task. It’s one thing to have an open and interoperable approach in theory. It’s another to actually enable these discreet hardware and software elements to work together in a way in which speed, efficiency, (perhaps most importantly) security are not sacrificed in comparison to fully integrated single-vendor platforms. “I would argue that the true Lego block approach is not there yet,” said FONEX CTO Pasquale Ricciardi.

Partnerships Forming

The good news is that these vendors are not strangers to each other. Enterprise IT experts or systems integrators most likely will partner with ecosystems that have worked out the intricacies of working together. For instance, last month Enea, Advantech, and SDNbucks announced a collaboration that the companies said will simplify procurement and provisioning of enterprise network services, including SD-WAN. Each of the companies plays a role: Enea provides software professional services, Advantech provides white box uCPE and SDNbucks provides worldwide OTT services. Vinod Sundarraj, senior director of security products

and services at Fortinet, told SDxCentral that the key elements of a best-of-breed SD-WAN are uCPE hardware appliance and platform software; an SD-WAN virtual network function (VNF); a next-generation firewall VNF (which encompasses advanced threat protection, URL filtering, and SSL Inspection); and VNF management, analytics and orchestration. A means of bulk deployment also is on Sundarraj’s list.

Knitting all of these elements together is not easy. System integrators are a very important element of the new world of best-of-breed SD-WANs. While large enterprises are likely to have expertise on staff to deal with the formidable task of establishing, configuring, standing up, managing, troubleshooting, and repairing best-of-breed SD-WANs, smaller businesses and service providers are more likely to go outside to find help.

Management is also a big issue. The SD-WAN must be integrated with the cloud. This can be done by OpenStack, an open source approach to managing computing resources in the cloud. Mörner said that Enea has instead opted for NETCONF, a specialized protocol that requires less computing and processing power.

The networking landscape is changing as people leave their offices to work at home, on trains, in coffee shops, and everywhere else. The development of SD-WANs during the past half-decade was a giant step in supporting this new way of working. The old approach simply was antiquated. Innovation does not stand still, however. Building on the initial approach to SD-WAN is adding even more flexibility to the concept.

However, it’s more than a tweaking of the older approach. Opening up these networks for multiple vendors fundamentally changes how these networks communicate.

The bottom line is that the next-generation SD-WANs bring a lot of elements to the table — and help the bottom line by enabling x86-based white boxes to be the platform’s workhorse hardware element at the customer premises.

“In the end, it’s about price, but it also is about the ability to introduce new functions without changing the overall architecture,” said Mörner. “It lets companies embrace new technology.”



Second Generation SD-WAN: Service Innovation and Flexibility

The principles of SD-WAN have been around for a long time, but the market has really taken off recently, based on first generation, integrated SD-WAN solutions.

These first solutions use integrated, proprietary hardware and software, provided as a package by a single vendor. The solutions are deployment-ready, pre-integrated and verified, providing a quick and low-risk initial path to SD-WAN for many enterprises and service providers.

First generation SD-WAN solutions are closed, proprietary systems: this means that their customers depend on an integrated product roadmap, which may not be in line with their own priorities.

The need for more flexibility has spurred a second generation SD-WAN solutions, based on the concept of universal customer premise equipment (uCPE). The uCPE is built on a whitebox appliance and an open virtualization layer with centralized management

	CPE hardware	Virtualization layer (NFVi software)	Virtual Network Functions (VNFs)	Main benefits
First generation SD-WAN (Integrated)	Proprietary appliances from SD-WAN vendor	Proprietary software from SD-WAN vendor	Proprietary VNFs from a single SD-WAN vendor	Easy roll out of initial SD-WAN solutions thanks to convenient one-stop shopping
Second generation SD-WAN (flexible)	White box uCPE from different ODMs	uCPE NFVi software from different suppliers	VNFs from different network solution providers	Service innovation, deployment flexibility and lower TCO, thanks to choice of CPE, NFVi and VNFs from different vendors

Table 1: Comparison between first and second generations SD-WAN

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(NFVi software). It runs applications as virtual network functions (VNFs). The uCPE disconnects infrastructure from applications to create a flexible platform that can host any application from any vendor.

This is a big step forward as it allows the user to select best-of-breed VNFs and change them as needed. In a second generation SD-WAN, VNFs are not tied to a common base or proprietary operating system; instead the virtualization layer enables multi-vendor VNF solutions by providing services such as service function chaining through open interfaces. It makes it possible, for example, to pick one vendor for security, another for connectivity, and a third for routing.

Migrating from a first to a second generation SD-WAN is straight forward, even when taking into account dependencies tied to the initial implementation. Instead of ripping everything out and installing a completely new solution, enterprises typically follow a gradual approach for migrating to a second generation SD-WAN.

Almost all SD-WAN vendors have packaged their SD-WAN applications as VNFs, making it possible to keep relevant functions such as security and communication also on a virtualized infrastructure. Therefore, the most viable migration path is to first introduce virtualization, then expand to include the application layer, for new or updated functionality.

The migration can be a smooth process if the virtualization software’s management component is well-designed. With a plug & play approach, it is even possible to have the new uCPE installed by non-IT professionals. While larger offices often have their own IT staff, small branches do not, and if that is the case then available staff would have to perform the move to uCPE. Easy provisioning is facilitated by centralized management and zero touch provisioning (ZTP). Once the uCPE is powered on for the first time and connected to the Internet, ZTP is enabled by a “call home” functionality, which registers the device with the management function to receive its “Day 0” configuration. With that, the migration is completed and the VNFs are ready for “Day 1” configurations.

Second generation SD-WAN represents new business opportunities for CSPs, but also for MSPs, SIs and even some enterprises. For those favoring flexibility over integration, the second generation SD-WAN brings benefits such as service innovation, deployment flexibility and lower TCO, thanks to a choice of whitebox hardware, NFVi and VNFs from different vendors.

Enea provides uCPE virtualization software, designed to work with any whitebox and VNF, enabling maximum choice and flexibility. For more information: <https://www.enea.com/products/nfv-virtualization-platforms/enea-nfv-access/>

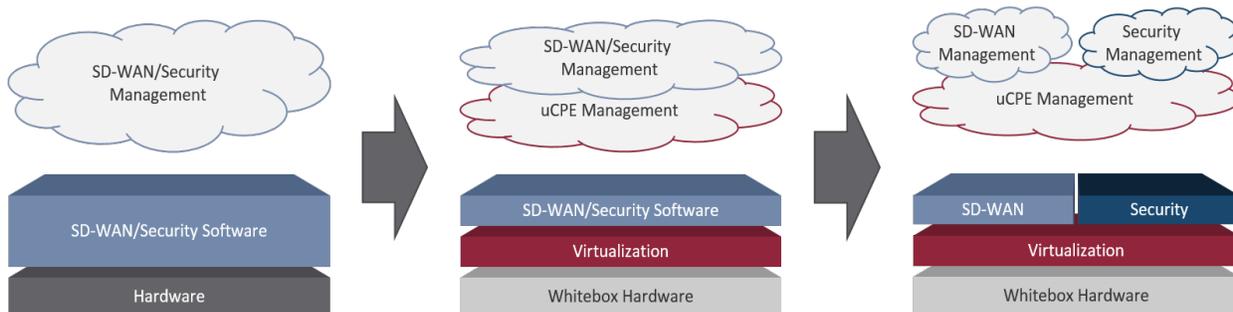


Figure 1: The migration from a first generation to a second generation SD-WAN



uCPE: The Key to SD-WAN's Evolution

By Carl Weinschenk

Two types of SD-WANs have emerged: One in which the major elements come from the same vendor and one in which elements from different vendors are integrated in an effort to create “best-of-breed” platforms.

The two types will coalesce to some extent as networking continues to evolve. The main goal of all iterations of SD-WAN is the same: to increase flexibility by topological streamlining and to cut costs by reducing reliance on MPLS by adding broadband. However, the way the two types are engineered is quite different.

During a recent Enea webinar produced in conjunction with SDxCentral entitled “Future-Proofing SD-WAN: Building on Open and Cost-Effective uCPE,” Enea conducted a poll.

It found only 17% of respondents had no plans to deploy SD-WAN on uCPE. 39% said they planned to do so in less than a year, 33% in one to two years, and 6% beyond two years. 37% of respondents said they planned to use in-house integration, 21% envisioned using a system integrator, 16% said they will buy a managed service, and 21% said they had no uCPE plans.

A best-of-breed SD-WAN has to be configured to integrate elements from different vendors. This is tricky

at both the high-level conceptual and operational levels.

Dramatic Innovation

There are several elements to best-of-breed SD-WANs. Among them are NFV infrastructure (NFVI) and the uCPE. NFVI defines how computing resources are distributed in the SD-WAN network. The networking protocol defines how data flows through the network and operates in a cloud environment. Some vendors use OpenStack. Enea, however, uses NETCONF, a specialized protocol that requires less processing power.

The most important element is the uCPE. A uCPE is a virtualized white box device that sits at the customer premise. It is configured from the cloud to provide any service and serve any function as long as it has sufficient computing power and memory.

The key is that uCPE moves the heavy lifting from on-premise to the cloud.

“A [traditional] CPE is a highly specialized hardware solution at the premise,” said Karl Mörner, VP of product management at Enea. “A uCPE is generic hardware running virtualized functions.”

The uCPE plays a special role in this ambitious reworking

of the SD-WAN concept.

“The bigger driver for uCPE is global deployment... and fast service. uCPE is...important in best-of-breed [deployments] because it supports fast delivery and support. If a device breaks you can get a new device [quickly]. Companies such as VeloCloud are in something like 200 countries in the world [and can store] those devices locally,” said Niek Van der Ven, the CEO of **SDNbucks**.

Older forms of wide-area networking trafficked all data through a secure portal, which generally is at the datacenter. The networking protocol used to do that trafficking is MPLS, which is expensive. In addition, the centralization means that data meant, for example, to go from a branch office in Manhattan to a telecommuter in Brooklyn may have to be sent to and from a data center in Minneapolis.

The challenge facing the SD-WAN sector is taking the secure and centralized portal out of the equation and distributing the tasks that it previously performed. The catch is that it's virtually impossible to replicate these functions for hundreds (or in some cases thousands) of remote endpoints.

Move Intelligence to the Cloud

The answer is to put that functionality in the cloud. The branch office won't directly “touch” the Internet. Instead, the generic white boxes, the uCPE, at the end user locale connects via VPN to the cloud.

“Customer traffic is tunneled from/to a simple CPE device to/from the service provider edge where virtualized traditional CPE functions like routing, security, WAN Optimization, etc. are applied,” said Vinod Sundarraj, senior director of security products and services at **Fortinet**. “Here the customer's environment is expected to be simple and lower scale in terms of traffic types, security needs, users, and devices.”

This means that the uCPE can be upgraded remotely as long as the device at the premises has enough computing horsepower. Paul Stevens, telecom sector marketing director for Advantech's Networks and Communications group, told SDxCentral that this is a hot topic among those looking at best-of-breed SD-WANs.

“The first thing a lot of customers want to know is if the uCPE they are investing in won't have to be swapped out and if it's got [the] flexibility to be reprogrammed on the fly. It can be turned into anything you want when... virtualized.”

This approach solves a lot of challenges for the organization. Since the uCPE is nothing but a standard computing device, vendor lock-in is no longer an issue. It enables organizations to keep spares in warehouses or elsewhere. A malfunctioning uCPE can easily be replaced. This is a key benefit if the organization has branch offices or telecommuters in remote areas. Along the same lines, such a scenario will make it easier (and, eventually, less expensive) to scale the network up.

Some insiders say the development of uCPE has not been smooth.

“The uCPE is not evolving as quickly as the market would have thought it would because there still are some cost challenges associated with it,” said **FONEX** CTO Pasquale Ricciardi. “It's still an Intel monopoly. Cost curve is not coming down quickly enough to support those compared to more vertically integrated solution.”

Costs will rise and fall in relation to the number and complexity of the tasks the uCPE is called on to perform.

“You need to size the uCPE according to the amount of and type of virtual network functions you are instantiating on it,” said **Datavision** CEO Mark Abolafia.

The uCPE is the key element of this evolutionary step in SD-WAN networking because it eliminates much of the investment that formerly was made at the customer premise. Minimizing the amount of functionality that must be housed at end users' premises reduces costs and increases flexibility.