SOLUTION BRIEF

Communications Service Providers
Universal Customer Premises Equipment (uCPE)

OneAccess* Open Virtualization Platform Creates Flexible uCPEs

Open Virtualization Platform (OVP) from OneAccess, running on Intel processor-based servers, delivers a complete, cost-effective universal CPE through its virtualization platform, appliance consolidation capabilities, and support for third-party VNFs.

ONEACCESS
an Ekinops company

Introduction

The trend toward increased enterprise adoption of cloud services by branch offices and small businesses is taking place at the same time as very powerful network functions virtualization (NFV) systems are available that offer new options for building branch office networks. Universal customer premises equipment (uCPE), a fast-growing category of virtualized systems, gives communications service providers (CommSPs) a new ability to meet this small/branch office cloud demand.

OneAccess,* an Intel® Network Builders ecosystem member, has leveraged its experience building branch office routers for hundreds of CommSPs to develop the Open Virtualization Platform (OVP). OVP is a complete, cost-effective uCPE software platform that offers simplified deployment and service chaining of virtual network functions (VNFs) to run on Intel processor-based servers.

The Challenge

The market for wide area network (WAN) services is evolving as virtualization of network functions gives CommSPs new capabilities for services delivery. The market was initially served by virtual customer premises equipment (vCPE), which was deployed to provide a consolidated platform for router, firewall, and other networking services.

Demand for expanded data services with new functionality and complex service chaining, as well as requests for CPE that can deliver branch office cloud hosting services, are driving the need for higher-performing and more capable CPE server hardware. Universal CPE is a new platform that has emerged to deliver these services. Like vCPE, the uCPE hardware platform utilizes NFV to provide multiple services from a single server. Universal CPEs can also support software defined networking (SDN) applications, which communicate with a centralized controller in order to make network data flow switching decisions. These additional services are possible due to increased processing power, memory, storage, and networking capabilities in uCPE platforms.

Some of the key use cases that are driving demand for uCPE include:

- Appliance consolidation: Combining multiple, standalone networking appliances into one uCPE server. Typical functions include router, firewall, and WAN optimization. These VNFs can be shipped with the server or added later as the customer needs them.
- Platform as a service (PaaS): The compute performance of the uCPE offers the opportunity for CommSPs to provide on-premises cloud resources that a company can use to host and maintain its own applications at branch offices

without the capital expenditure required to buy an extra server, nor the additional operational expenditures required to maintain that server.

- High-performance appliance: For many networking applications operating at 10 Gbps, a dedicated appliance is a requirement to deliver the high throughput levels. Examples include 10 Gb routing or firewall applications.
- Vertical-specific applications: Just like the use case for appliance consolidation, the compute performance of a uCPE means it can host more than just networking VNFs for specific vertical markets. For example, a CommSP might offer a mobile point of sales (POS) application as a service or an inventory management application as a service to a nationwide retail chain.
- Software defined WAN (SD-WAN): Today, the uCPE use case with the most momentum behind it is SD-WAN. SD-WAN systems leverage a centralized SDN controller capability to make WAN switching decisions based on traffic type. For example, the SD-WAN can choose a broadband IP link for cloud traffic and a legacy WAN link for enterprise application traffic. SD-WAN services are growing as enterprises replace centralized software with cloud-based applications and re-design branch WANs to provide more Internet connection options to facilitate access to these cloud services.

uCPE Flexibility and Integration

NFV systems are composed of multiple layers of software for virtualization, orchestration, and management. It's important that the NFV infrastructure for a uCPE is simple to manage remotely and supports remote deployment of the widest possible range of VNFs for flexible service provisioning. Some of the key elements of a high-performance uCPE platform include:

- Commercial off-the-shelf server: The server hardware needs compute performance to support a wide range of networking and hosted services as well as the network interfaces to provide connectivity options. Intel® Xeon® processors and Intel Atom® processors offer the right combination of processing power, connectivity, and cost.
- VNF Ecosystem: Given the breadth of possible use cases, uCPEs should support a wide variety of VNF options from as many third-party providers as possible. Experience has shown that the breadth of the ecosystems comes from using open source virtualization technologies and the use of standard off-the-shelf hardware without specific hardware components like proprietary switches.
- Virtualization platform: Simplified deployment of services from a uCPE is critical to the cost-effective operation of these systems. An integrated virtualization software platform makes rapid and remote service delivery possible by providing a complete virtualization infrastructure layer, built-in networking functionality that is open and interoperable, and a small footprint on the server.

Intel Network Builders ecosystem member OneAccess meets these needs with its Open Virtualization Platform (OVP), an open hosting platform that delivers a complete, cost-effective uCPE through its appliance consolidation capabilities and support for third-party VNFs all running on an Intel processor-powered server.

The Solution

The OneAccess OVP creates an environment that takes care of virtualization, service chaining, network connectivity, and unified management.

The OVP software or local infrastructure manager (LIM) leverages open source software at its foundation to ensure very broad compatibility with third-party VNFs. This starts with the virtualization layer, which is based on Kernel-based Virtual Machine (KVM).* OVP can host any VNF that supports KVM and service-chain them together—and to its own networking VNFs—to ensure the right data flow needed for the service.

Additionally, the platform leverages containers to run networking microservices such as dynamic host configuration protocol (DHCP) server, network address translation, monitoring probes, and others.

On top of that, OneAccess has integrated Open vSwitch (OvS)* with the Data Plane Development Kit (DPDK) for networking and service chaining. OvS is a production-quality, multilayer open virtual switch, and DPDK is a set of user-space libraries and drivers that accelerate packet performance.

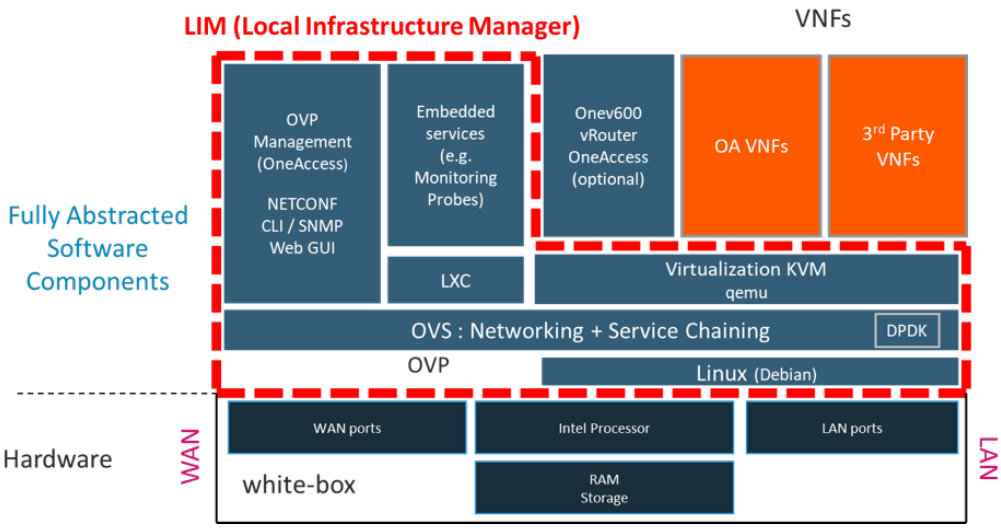

Figure 1. Block diagram of OneAccess Open Virtualization Platform[2]

For WAN services, CommSPs can choose the OneAccess ONEv600* vRouter, a feature-rich IPv4/v6 WAN router VNF that runs in a very small memory and processor footprint. This integration gives CommSPs complete networking services designed to run at 100 Mbps on a single virtual processor core with only 512 MB of RAM, ensuring that ample server resources are available for other VNFs.

ONEv600 is based on the OneOS6* operating system software that OneAccess has sold into more than 100 carriers worldwide. OneOS6 is the foundation for OneAccess' fixed-function appliances for corporate WANs.

Management
All OVP functionality is programmable with Netconf/YANG, which provides an API to the compatible service orchestrators for enabling functionality and deploying services. A CommSP's service development team can build these services via a web-based GUI that provides drag-and-drop service creation and service chains. Additionally, a command line interface (CLI) is also available for those technicians trained and familiar with this mode. Using either interface, the created service chain can be exported as an XML template and then imported into other uCPE devices for rapid service deployment.

Intel® Technologies
OVP specifies a white box server that can be powered by a range of Intel processors, including Intel Xeon D processor, Intel Xeon processor E5, Intel Atom processor C2000, or Intel Atom processor C3000. The OVP platform can operate utilizing a minimum of four Intel Xeon D processor cores for network services running at 1 Gbps or less, or eight Intel Xeon D processor cores for services over 1 Gbps. Both of these are dependent on the nature of the processing requirements of the VNFs in the service chain. In all networks, more cores can be added to provide extra computing footprint to support additional VNFs. This allows CommSPs to develop a solution for a wide range of price points and applications.

The servers also support gigabit Ethernet functionality provided either by the controllers built into the Intel Atom processors or Intel Xeon D processors, or by utilizing the Intel Ethernet Controller I350 or Intel Ethernet Controller I211. The OVP can also utilize the Intel® Advanced Encryption Standard New Instructions (Intel® AES-NI) instruction set in applications where acceleration is needed to meet encryption workloads.

Conclusion

Universal CPE systems provide CommSPs with a way to offer a wide variety of services tailored to users' needs at the customer premises and help companies to effect a transition to cloud services across their entire enterprise. OneAccess has developed a production-ready NFV platform that offers the power of the company's virtualization platform for easy system installation, support for a broad range of VNFs, and remote programming and updating.

About OneAccess

OneAccess, an Ekinops* company, provides a catalog of carrier-grade network functions to enable service providers and large network providers to deploy NFV today. Our open and highly interoperable approach ensures no vendor lock-in. Together with a full range of physical and virtual platforms for genuine flexibility in service migration, OneAccess offers a wide choice of service deployment options to accelerate the delivery of virtualized network functions (VNFs) including value-added hybrid WAN services. Of the top 100 service providers in the world, 29 have already chosen OneAccess to enhance their competitive edge in delivering managed services to their SMB and enterprise customers. With OneAccess, service providers can maximize cost savings, deliver market innovation, and accelerate time to market. More information is at https://www.oneaccess-net.com.

About Intel® Network Builders

Intel Network Builders is an ecosystem of infrastructure, software, and technology vendors coming together with communications service providers and end users to accelerate the adoption of solutions based on network functions virtualization (NFV) and software defined networking (SDN) in telecommunications and data center networks. The Network Edge Ecosystem is a new initiative gathering ecosystem partners with a focus on accelerating network edge solutions. As an integral part of the broader Intel Network Builders program, this initiative aims to facilitate partners' access to tested and optimized solutions for network edge and cloud environments. Learn more at http://networkbuilders.intel.com.

[1] Testing conducted by Intel. Configurations: Servers with Intel Xeon processor E5-2695 v4 with 64 Gbps of RAM and dual integrated 1 GbE ports via Intel® Ethernet Controller I350-AM2. More details can be found in the following document: Open vSwitch* with DPDK Overview https://software.intel.com/en-us/articles/open-vswitch-with-dpdk-overview

[2] Figure provided courtesy of OneAccess.

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