SOLUTION BRIEF

Communications Service Providers
Virtual Routers

MANO-Deployed Virtual Router Simplifies Network Deployments

6WIND,* Advantech,* and Cloudify* create virtual routers with simplified deployment and lifecycle management to scale networks. Italian CommSP EOLO* utilizes this solution to create a backbone mesh connecting thousands of wireless base stations.

Virtual routers provide the functionality of legacy, fixed-function routers with more flexibility and lower cost. The next step for communications service providers (CommSPs) who have embraced this technology and are deploying thousands of these virtual network functions (VNFs) throughout their network is to add management and network orchestration (MANO) features that can provide better configuration, deployment, and lifecycle management functions to all of the vRouters in a network. 6WIND,* Cloudify,* and Advantech*—all Intel® Network Builders ecosystem partners—have integrated their technologies to provide a MANO-deployed vRouter solution.

vRouters Need MANO

A virtual router is a virtual network function (VNF) application that runs on commercial off-the-shelf (COTS) server platforms and replaces legacy routers that run on fixed-function hardware appliances. The use of COTS servers typically makes vRouters less expensive to purchase, while the remote deployability and life cycle management of software-based vRouters reduces the cost to operate routed networks.

Virtual router companies like 6WIND have made significant progress on evolving vRouter software. With new Intel® Xeon® Scalable processors and packet forwarding technology such as the open source Data Plane Development Kit (DPDK), vRouters can offer the outstanding performance that CommSPs require.[1]

Now, 6WIND is tackling the challenge of mass deployment and management of vRouter networks by working with MANO software from Cloudify. CommSPs could require thousands of these routers installed in their network. Whereas with legacy routers installing, upgrading, or maintaining the devices required a truck role, adjustments to a virtual router can be made remotely, which means a centralized team needs some way to configure and change router settings for one or multiple routers in the network.

Recently, 6WIND, Cloudify, and Advantech set up a high-performance IPsec network for security-enabled multi-site, multi-cloud networks with automatic orchestration of the vRouter software to remote Advantech servers using Cloudify. The network highlights the significant improvement in deployability for large-scale network implementations.

Demonstration Components

The key components of the routed network include:

vRouter Software: 6WIND Turbo IPsec* was the vRouter software used for this demonstration. 6WIND Turbo IPsec is high-performance vRouter software with up to 18 Gbps per core of site-to-site IPSEC performance. 6WIND Turbo IPsec provides accelerated VPNs based on IPsec and internet key exchange (IKE) for a wide range of complex data center and CommSP networks. To improve throughput performance, 6WIND Turbo IPsec uses the open source Data Plane Development Kit (DPDK) libraries and drivers for fast packet processing. A critical encryption performance enhancement built into 6WIND is Intel® Advanced Encryption Standard New Instructions (Intel® AES-NI), which improves performance of the Advance Encryption Standard (AES) algorithm by implementing some of the algorithm's complex steps in hardware on the CPU.

6WIND Turbo IPsec scales linearly with each additional CPU core that is provided for data plane processing. Additional cores can be used to scale security performance, add more tunnels, or increase services on an existing server. Since it is software-based, 6WIND Turbo IPsec can quickly and efficiently manage network variables such as configuration changes, reducing time and management costs. 6WIND Turbo IPsec supports 1/10/25/40/50/100G NICs for scalable IPsec VPN networking. Other features include:

- Extensive set of L2 to L4 networking protocols, including IP forwarding, IPsec, and more
- Command-line interface (CLI), Linux* and API-based management options
- Software works for either bare metal or virtual machine deployments

Intel® Xeon® Scalable processor-based server: The server chosen for this demonstration is Advantech's SKY-8211, which is purpose-built for white box networking applications using a standard carrier grade server motherboard. The SKY-8211* is 2RU high and features a 430-mm chassis depth to fit short-depth server racks used in some telecom applications.

Figure 1. Advantech SKY-8211F - 16x 10 GbE, 8x 1 GbE ports[2]

Figure 2. Advantech SKY-8211B - 8x 10 GbE, 24x 1 GbE ports

The Advantech SKY-8211 is a highly configurable high performance server designed to balance the outstanding Intel® architecture server-class processing with maximum I/O density. The system is a cost effective, robust platform optimized for excellent reliability in business critical applications such as communications, edge, and industrial high performance computing. It is specifically designed to meet high density I/O connectivity requirements. The power and cooling options along with the streamlined mechanical design make it ideal for demanding applications such as cell tower equipment requiring a -20°C to 70°C operating environment. The SKY-8211 meets a variety of acquisition, preprocessing, and forwarding performance needs and can operate in environments with limited space, high ambient temperature, and low noise level constraints.

Architected around the new Intel® Xeon® Scalable processors, the single-socket SKY-8211 combines an unprecedented choice of performance levels from 6-to-28-cores with the ruggedness, reliability, and long system lifecycles required by the industry. Intel Xeon Gold processors offer high performance, advanced reliability, and hardware-enhanced security optimized for demanding data center, hybrid-cloud compute, network, and storage workloads. With accelerated encryption and compression using Intel® QuickAssist Technology (Intel® QAT) at up to 100 Gbps, the system offers exceptional integration in a compact form factor.

The SKY-8211 is designed to withstand harsh environmental conditions in terms of shock, vibration, and operating temperature. Redundant power supplies, the ability to withstand single fan failures, and redundant firmware images with failsafe upgrades improve the reliability of the SKY-8211. The hot swappable FRUs, power connectors and I/O ports are all positioned at the front of the server, allowing installation in transmission equipment racks where no service access is available from the rear.

The two variants offer a flexible range of connectivity options:

- SKY-8211B: 8x 10 GbE, 24x 1 GbE ports,1x RJ45 console port, 2x GbE LAN RJ45 (management ports), 1x Display port, 2x USB 3.0/2.0
- SKY-8211F: 16x 10 GbE, 8x 1 GbE ports,1x RJ45 console port, 2x GbE LAN RJ45 (management ports), 1x Display port, 2x USB 3.0/2.0

Enhanced and security-enabled Intelligent Platform Management Interface (IPMI)* management functions are integrated into the platform and enable features such as remote, fail-safe firmware and BIOS updates.

Management & Orchestration: In the demonstration, Cloudify Manager* served as VNF manager and NFV orchestrator for the network.

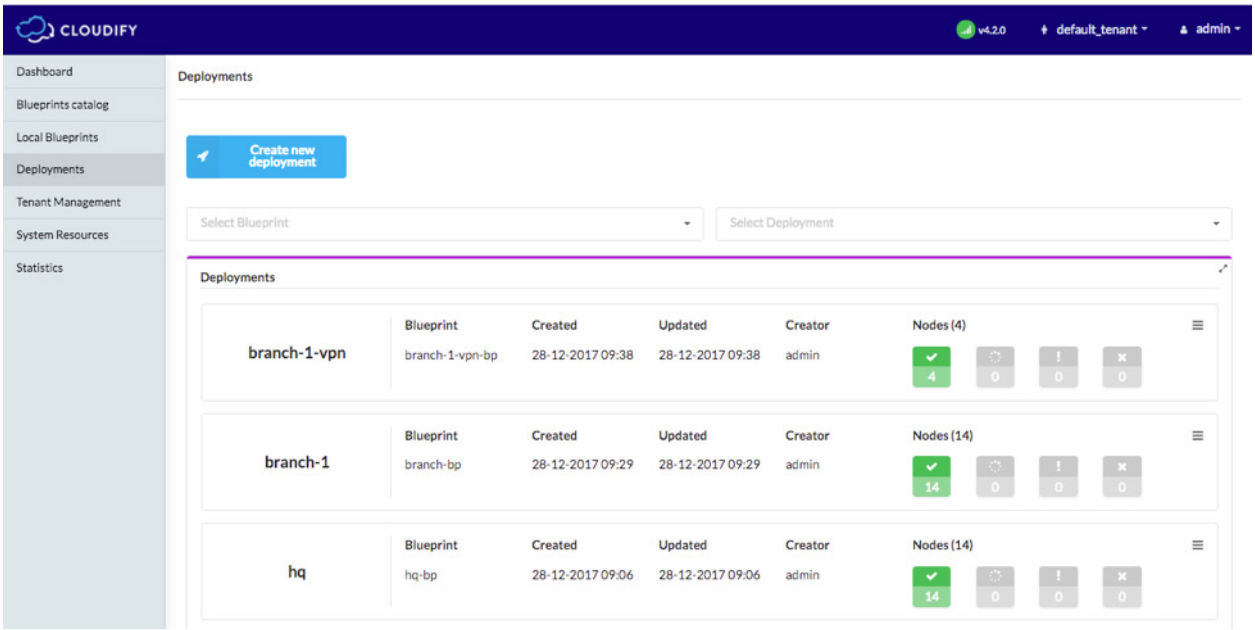

Figure 3. Screenshot of Cloudify Manager configuration screen[3]

Cloudify Manager is an open source-based orchestration platform. It features an easy-to-use interface (see Figure 3) and enables IT architects and developers to orchestrate an entire IT environment through topology-based, domain-specific language that is based on TOSCA (Topology and Orchestration Specification for Cloud Applications). The advantage of Cloudify Manager is its service lifecycle management capabilities, which provide service instantiation, decommissioning, scaling, and healing from single console. Cloudify Manager provides added capabilities such as the web interface, REST API, security features, blueprint catalog, multiple blueprint deployments, concurrent workflow executions, and more.

Other features include:

- Application modeling that describes an application, along with its infrastructure, middleware, application code, scripts, tool configuration, metrics, and log requirements and resources. All of this modeling is done in a generic, descriptive manner.
- Network services modeling where network services are expressed in a form of TOSCA-based, topology-driven blueprints.
- Openness through plug-in framework. Cloudify Manager integrates with infrastructure through the concept of plug-ins that deliver TOSCA constructs to model services. Plug-ins are written in Python* via a Cloudify software development kit (SDK).
- Extendibility through workflows that enable custom lifecycle actions.
- Cloudify Manager has built-in secure sockets layer (SSL) security-enabled communications facilitating permissions control for executing various operations.

Integration

All of these technologies came together at a recent demonstration (see Figure 4), where a vRouter solution for security-enabled, multisite, multicloud networks was presented. In the demo, 6WIND's virtual routers were instantiated on OpenStack,* with BGP routing and IPsec VPN tunnels configured, deployed, and orchestrated by Cloudify Manager utilizing TOSCA-based templates. Four Advantech servers were used to simulate an enterprise network with one headquarters location, one public cloud location, and two branch offices.

In the demo, a network blueprint was uploaded from 6WIND into Cloudify that would create the network pathways between the various sites. Once uploaded, then the network was configured in Cloudify using inputs that included network name, network gateway, router IP address, management IP address, and others. Once the configuration was finished, the vRouter network blueprint was instantiated and deployed creating the active multisite network.

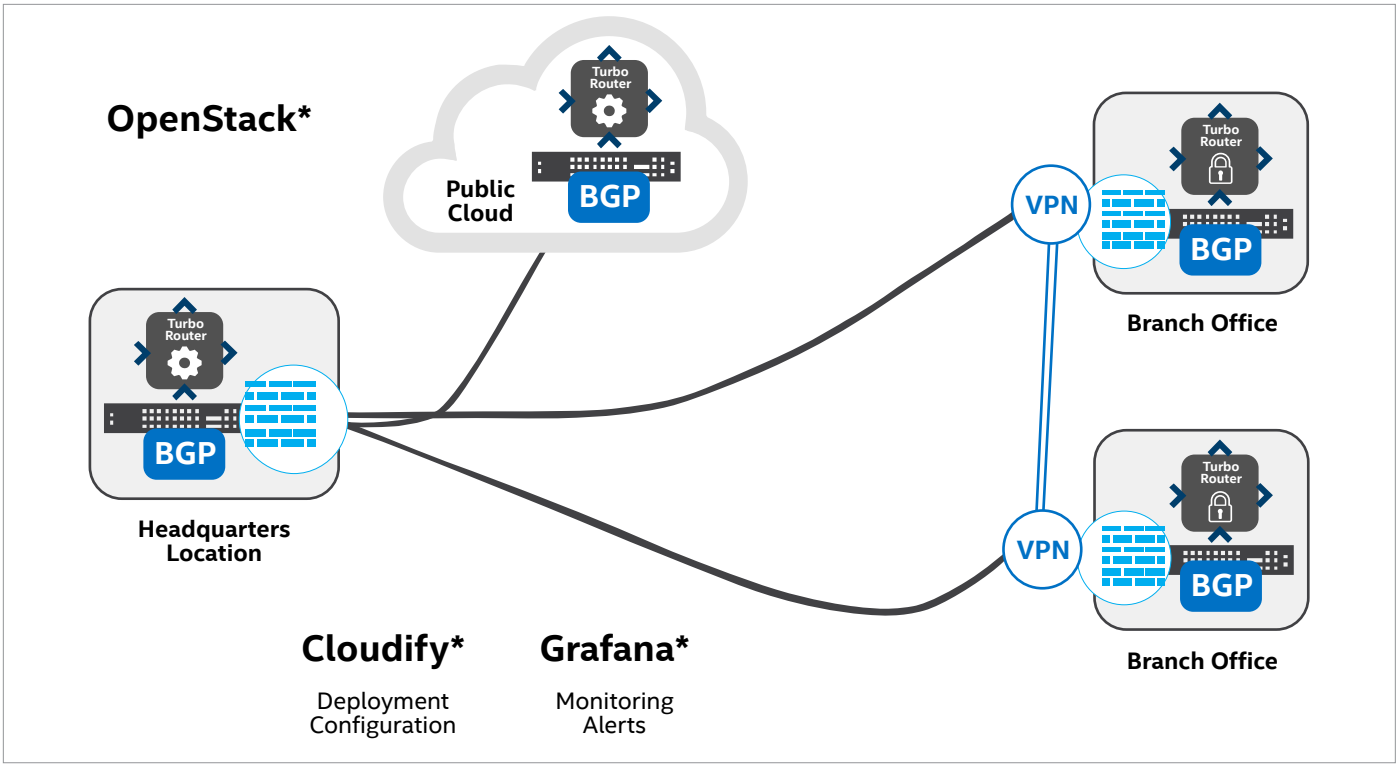

Figure 4. Diagram of virtual router network demonstration.

The next step was to create the configuration blueprint for the vRouter itself, which will be pushed out to all of the servers from Cloudify. The first step in configuring the blueprint is identifying BGP subnets and gateways and setting these configurations. The demo also utilized the open source Grafana* platform for network analytics and monitoring, which was configured before the network went live. With these configurations set, the vRouter VNFs are pushed out to the servers where they are installed in the OpenStack virtual machines. Following that, the vRouter VNFs are attached to their local network and data flows can begin.

This simplicity and speed is a significant boost for provider edge networking, replacing expensive truck rolls with remote configuration using Cloudify.

Conclusion

The approach to this vRouter solution has the benefit of cherry picking and integrating feature-rich and high-performing solutions from each ecosystem partner to help build a high-throughput network that can scale to thousands of locations. The addition of MANO to a vRouter solution emphasizes the deployment simplicity advantage that vRouters have over appliance-based routers. The demonstration showed how 6WIND, Advantech, Cloudify, and Intel provide a carrier-grade solution that is ready for the market.

About Cloudify

Cloudify specializes in IT operations automation technology that manages application and network services through open orchestration. The company's open source Cloudify software enhances the velocity and reliability of software deployment, lifecycle management and network functions in cloud-native environments. Cloudify is used by telecoms, internet service providers, financial services firms, e-commerce companies, and others for NFV operations and cloud management and orchestration. Cloudify is the leading orchestration provider behind the TOSCA specification, is a founding member of ONAP, and is an active member in the OASIS and ETSI standard bodies. Cloudify has corporate offices in the US, Europe, and Asia. More at cloudify.co.

EOLO* Case Study

eolo
Internet dove gli altri non arrivano

EOLO SpA is an internet service provider based in Varese, Italy, that chose a vRouter solution from 6WIND and Advantech to create a network connecting thousands of radio towers spread across Italy for ultra-broadband Internet wireless access. EOLO's solution—called Blu*—utilizes software-defined networking (SDN) vRouters that provide a cost-effective alternative to their incumbent vendor. EOLO's Blu platform includes high performance packet processing with packet inspection and encryption. Blu has been in development for five years and is designed to help EOLO continue to expand its services and coverage.

About Advantech

Advantech Networks & Communications Group provides a broad range of communications infrastructure platforms, scaling from one to hundreds of Intel® processor cores, consolidating workloads onto a single platform architecture and code base. Its technology leadership stems from x86 design expertise combined with high-performance switching, hardware acceleration, and innovative offload techniques. For more information, please visit us at http://www.advantech.com/nc.

About 6WIND

6WIND's networking software solves routing and security performance and time-to-market challenges for service providers, enterprises, and OEMs. The company's flagship vRouter technology is available in software appliance, source code and hypervisor networking form factors optimized for cost-effective hardware, such as commercial off-the-shelf (COTS) servers, with a choice of multicore processors. 6WIND is based near Paris, France with regional offices in China and the United States. For more information, visit http://www.6wind.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 program offers technical support, matchmaking, and co-marketing opportunities to help facilitate joint collaboration through to the trial and deployment of NFV and SDN solutions. Learn more at http://networkbuilders.intel.com.

[1] Testing conducted by 6WIND. Software configurations: 6WIND Turbo IPsec 1.4.2 running on Ubuntu* Linux 16.04 kernel 4.4.0-77-generic. Hardware configurations: Intel® Xeon® Platinum 8170 processor 2.1 GHz, 26 cores, turbo and HT on, BIOS PLYDCRB1.86B.0131.R09.1704, 4GB total memory, 1 slot / 4GB / 2133 MT/s / DDR4 RDIMM, 2x Intel® Ethernet Connection X722, 1 x 500 GB. Performance results are based on testing as of February 28, 2018, and may not reflect all publicly available security updates. See configuration disclosure for details. No component or product can be absolutely secure.

[2] Figures 1 and 2 provided courtesy of Advantech.

[3] Figure 3 provided courtesy of Cloudify.

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