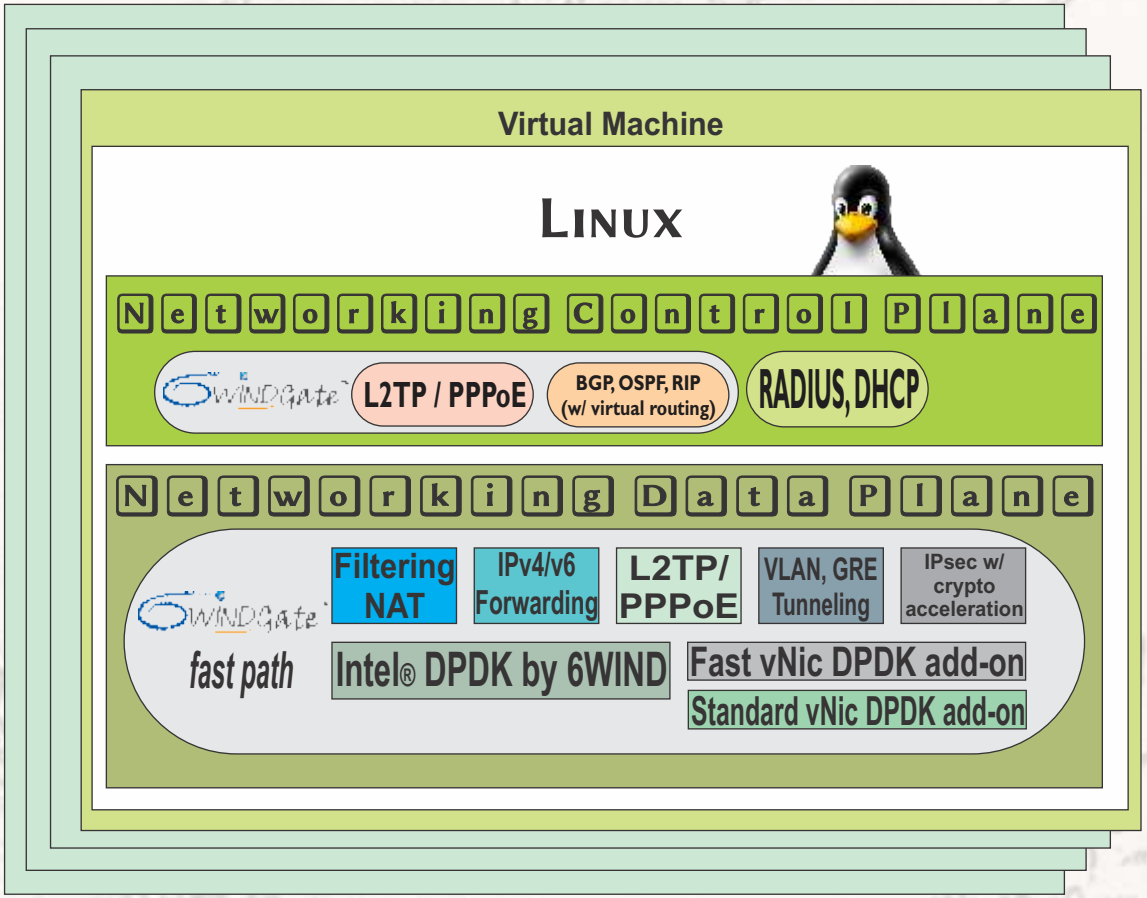
Enabling High-performance NFV for New Generation BRAS Services

Telecom service providers are migrating edge, access and CPE networking infrastructure to open, programmable, software-based appliances with network functions virtualization **(NFV)**. The objective for NFV appliances versus proprietary hardware equipment for the new generation of legacy services is clearly targeted at lowering cost of infrastructure and operations while testing, trialing and delivering these services quickly. NFV also gives content service providers and network equipment providers another solution to OEM for telecom and network vendor customers.

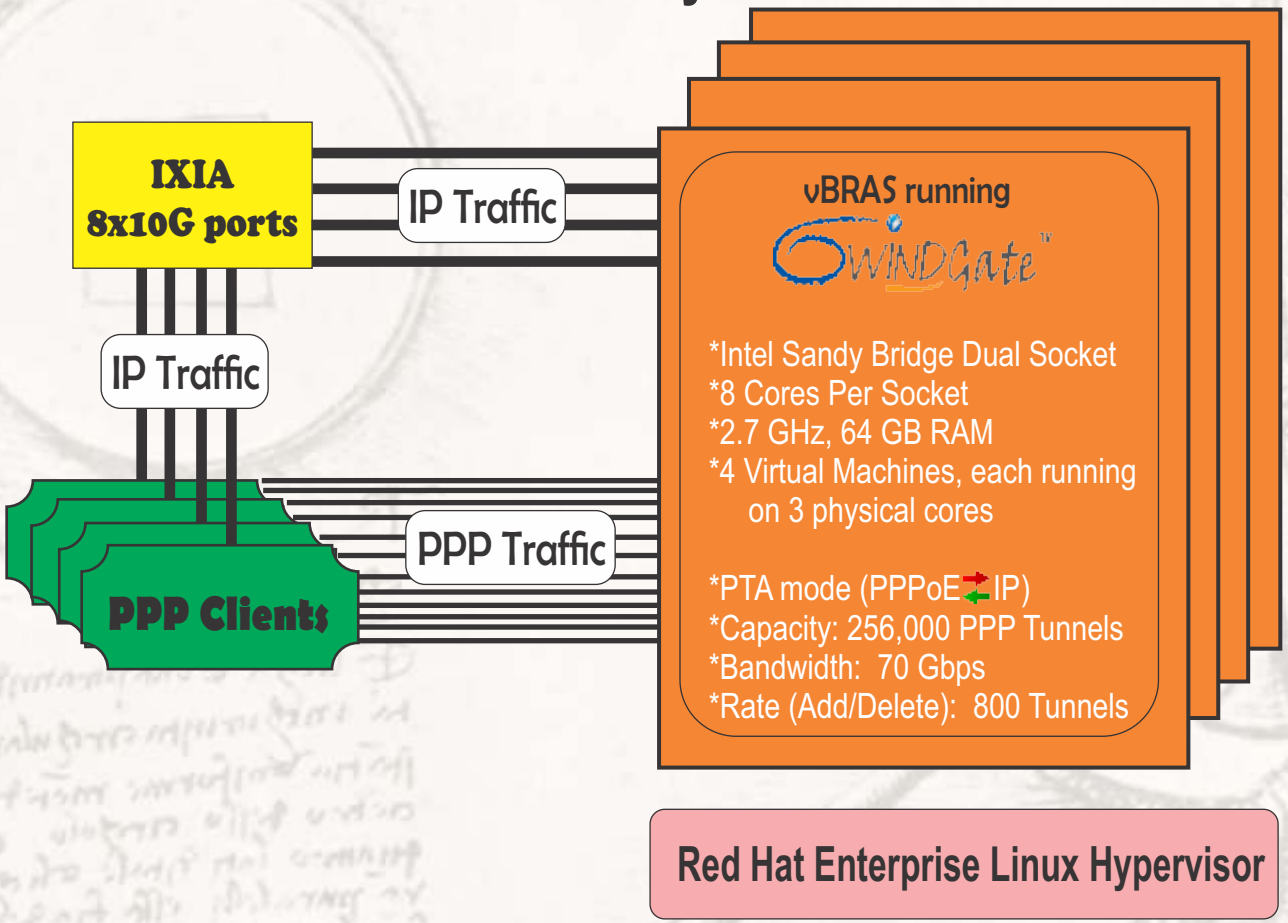
One such service is BRAS (broadband remote access server), which routes traffic to and from broadband remote access devices to address residential broadband and Evolved Packet Core (EPC) requirements. BRAS network functions include data processing intensive protocols such as Point-to-Point Protocol over Ethernet (PPPoE), which require scale, and it is known that networking functions, when moved from bare metal to hypervisor, lose performance. A requirement of migrating from BRAS hardware to a next-generation virtual (vBRAS) appliance is that the same or greater performance be achieved with virtualization as with the legacy physical equipment to realize cost savings and flexibility.

To overcome vBRAS performance bottlenecks, 6WIND delivers its 6WINDGate packet processing software with a fast path architecture that maximizes performance of Layer 2 through 4 protocols. To maximize bandwidth between the host OS and the guest OSs, 6WIND includes an enhanced driver for Intel® DPDK. This driver is instantiated in the host OS running the hypervisor as well as in the guest OSs running the vBRAS solution. Inside the host, 6WINDGate processes virtual switch functions in the fast path to boost its switching capabilities, delivering up to 10x performance of the standard Linux networking stack. Thus, networking performance is maximized to enable high bandwidth communication between the VMs and the outside world and from VM to VM.

6WINDGate Solution Brief: vBRAS



vBRAS Demo Platform Key



High-performance vBRAS NFV: Accelerating PPPoE Performance

Within the vBRAS solution, PPPoE is a network protocol for encapsulating PPP frames inside Ethernet frames. Most DSL providers use PPPoE, which provides authentication, encryption and compression, and PPPoE is a high overhead DSL delivery method previously requiring performance only available in proprietary hardware. With 6WINDGate packet processing software innovation, telecom service providers can now unlock hidden performance in commodity hardware running Linux to enable similar or even higher performance, in addition to flexibility, leveraging virtual appliances with NFV.

In this demo, vBRAS is created on a commodity server running Linux with 6WINDGate on an Intel Sandy Bridge dual socket processor with eight cores per socket. There are four virtual machines (VMs), with each VM running on three physical cores used as servers configured for PPPoE/PPP termination, and all running on a Red Hat Enterprise Linux hypervisor. 6WINDGate leverages the Intel® DPDK and provides the networking stack for packet processing with high-performance data plane acceleration for the PPPoE protocol.

The objective of the demo is to create the highest amount of PPPoE sessions in the least amount of time. The vBRAS solution receives PPP traffic, decapsulates it and forwards it as IP traffic for DSL access. 12 cores (four VMs, each running three cores) are used for vBRAS. The vBRAS server can handle 256,000 tunnels total. 70 Gbps throughput can be processed with 1350-byte packets and 800 tunnels are created per second.

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