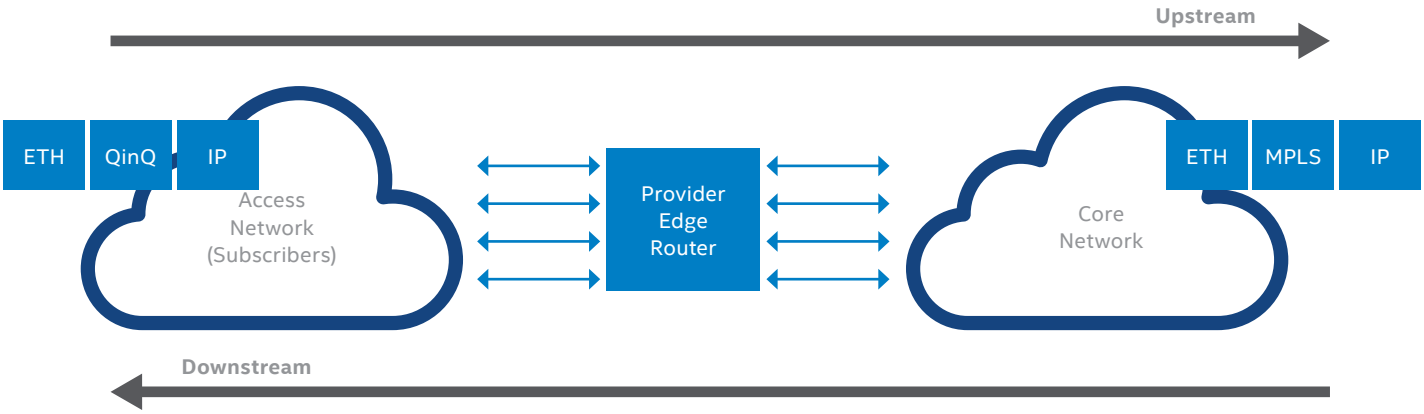
TECHNICAL BRIEF

NFV Network Services Benchmark vPE VNF Approximation

Software-Defined Networking (SDN) and Network Functions Virtualization (NFV) deployments are challenged by a lack of broadly accepted industry benchmarks to drive conformance to carrier-grade requirements. Dimensioning network workloads and modeling the impact of stress vectors on system-level capacity according to key performance indicators enable operators to calculate the total cost of ownership for transforming their network to SDN and NFV. Intel, in partnership with a leadership group of global operators and solution providers, is proud to introduce the Network Services Benchmark (NSB) initiative. This initiative aims to deliver a common set of benchmarks, open source tools, test suites, and reference Virtual Network Functions (VNFs) to the industry. The NSB initiative consists of the benchmarking test methodology for VNFs demonstrated using the Test Harness tool with a reference set of open source approximations of VNFs.

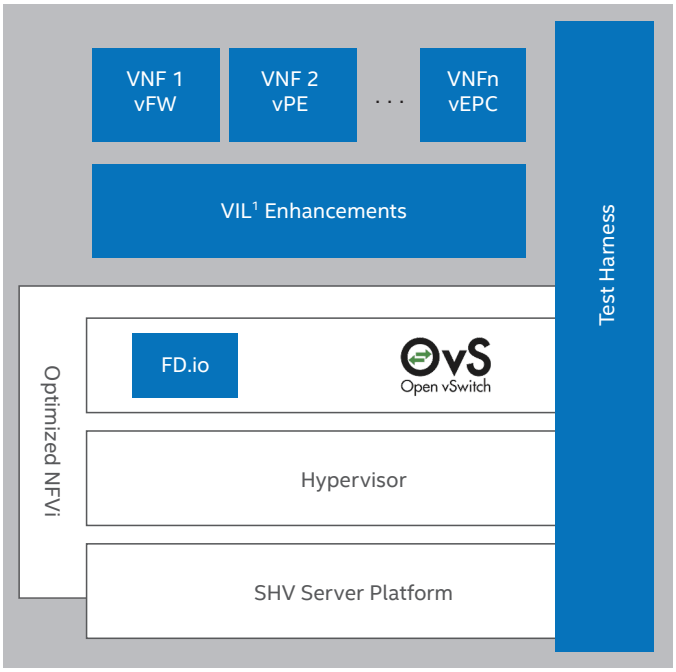
The NSB Virtual Provider Edge Router (vPE) is a VNF approximation serving as an edge router. This VNF could be a part of Network Services related to the enterprise and cloud segment.



The illustration shows an example of the vPE VNF typically located between two networks such as the provider core network and the provider access network. The customer edge router sits in the provider access network and MPLS cloud network represents the provider core network. The edge router processes the traffic in both directions. The functionality of the edge router varies while processing each direction of traffic. The packets to the core network will be filtered, classified, and metered with Quality of Service (QoS) parameters. The packets to the access network will be shaped according to the subscription policy.

Architecture of VNF approximation

The NSB VNFs are implemented as Data Plane Development Kit (DPDK) applications using the VNF Infrastructure Library (VIL). The VIL implements common VNF internal functions, optimized for Intel® architecture, such as load balancing between cores and common IPv4/IPv6 stack features, and the interface to NFV infrastructure like Open vSwitch* or Single Root I/O Virtualization.



[1]VIL - VNF Infrastructure Libraries includes DPDK Optimized NFVi - DPDK based Open vSwitch* (OVS). Refer to Test Harness for KPIs for details: https://builders.intel.com/docs/networkbuilders/network_services_benchmark_NSB_test_harness.pdf

Features approximated in vPE

This NSB VNF approximation is a reference implementation of actual commercial-grade equivalent Network Functions that were created for demonstrating VNF characterization by measuring the Network, VNF, and NFVi key performance indicators in bare metal, standalone virtualized, managed virtualized environments.

The diagram below shows the components of the vPE VNF in handling upstream and downstream traffic.

The NSB vPE implementation contains the following features of a carrier-grade vPE system:

- Provides a command-line interface for each component of the edge router
- Provides built-in statistics of each stage of the edge router application
- Provides a flexible core assignment to each functional block: (https://builders.intel.com/docs/networkbuilders/network_services_benchmark_NSB_test_harness.pdf)
- Edge router application can be easily configured as a run-to-completion model or pipeline model
- ACL filtering of the ISP bound traffic
- Policing and marking for the ISP bound traffic on configurable rate parameters
- MPLS tagging to ISP bound traffic
- QinQ tagging to customer bound traffic
- Bandwidth limiting for each customer based on the service-level agreement