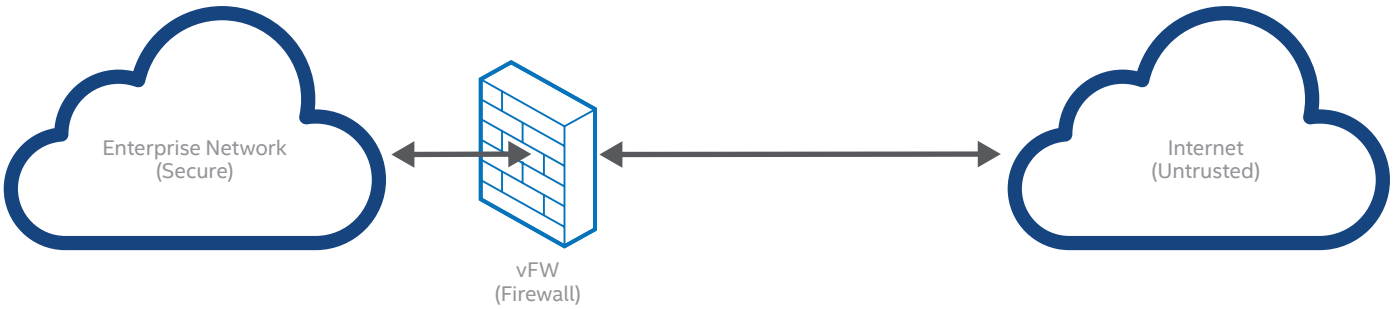
TECHNICAL BRIEF

NFV Network Services Benchmark vFW 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, partnering 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 Firewall (vFW) is a VNF approximation serving as a stateful L3/L4 packet filter with connection tracking enabled for TCP, UDP, and ICMP. It also supports Access Control List (ACL) rule-based policy enforcement, which restricts access to a destination IP address/port, based on various header fields, such as source IP address/port, destination IP address/port, and protocol. The VNF could be a part of Network Services deployed to secure an enterprise network from untrusted networks.

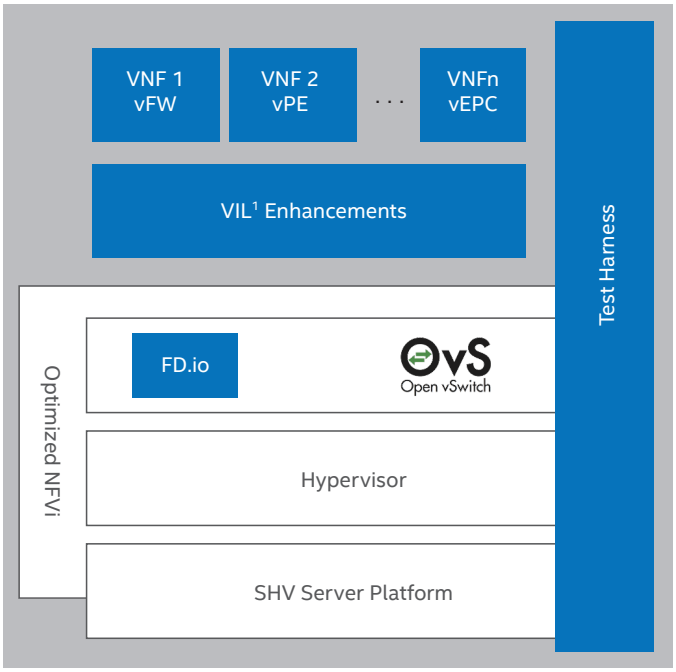


The illustration shows an example of the use of the vFW VNF approximation in an enterprise network where the firewall filters and protects from attacks through basic, dynamic-state full-packet filtering and also policy-based filtering through ACL.

In this example, all IP packets exchanged between the secure enterprise and untrusted external networks are passed through the vFW to provide necessary filtering while counting the dropped packets.

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 (OVS) or Single Root I/O Virtualization.



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

Features approximated in vFW

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, and managed virtualized environments.

The NSB vFW implementation contains the following features of an enterprise firewall:

- Basic packet filter dropping malformed, invalid packets based on L3/L4 packet headers
- Policy/Rule based filtering
- Dynamic packet filtering through connection tracker for TCP and UDP
- SYN-flood protection via synproxy for TCP
- UDP, TCP, and ICMP protocol pass-through
- Command-line-interface-based enable/disable connection tracking, synproxy, basic packet filtering
- Multi-thread support
- Multiple physical port support
- Provides statistics on traffic traversing the VNF

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