DATA SHEET

Intel® Open Network Platform Server Release 1.5

Intel® Open Network Platform Server Release 1.5: Driving Network Transformation

The Intel® Open Network Platform Server (Intel® ONP Server) reference architecture provides engineering guidance and ecosystem support to enable widespread adoption of software-defined networking (SDN) and network functions virtualization (NFV) solutions across the telecommunications, cloud, and enterprise sectors. The reference architecture is based on a standard high-volume server (SHVS) and on an Intel ONP Server open-source software stack. To grow the SDN/NFV ecosystem, Intel contributes to a number of open-source projects and participates in industry consortiums. Intel ONP software includes contributions made by Intel and the extensive work done in open-source community projects, including Data Plane Development Kit (DPDK), Open vSwitch* (OVS), OpenDaylight*, OpenStack*, and KVM*. This integrated, "better together" software stack is tuned for use in SDN and NFV deployments, offering greater performance and scalability, and it is easier to deploy.

Intel ONP release 1.5 focuses on performance optimizations. Major enhancements in OVS with DPDK implementation provide the forwarding paths to increase data path performance across key usage models implementing a virtual switch. Added capabilities, including Virtual Extensible LAN (VXLAN) tunnel configurations, link bonding, vHost Cuse and vHost User accelerating interfaces in OVS, and deployments by means of Neutron* enable scalability and higher throughput. Another release 1.5 improvement, better integration with latest OpenStack and OpenDaylight releases, simplifies network management and deployment.

Service Function Chaining (SFC), a vital requirement of NFV environments, defines an ordered list of network services. Functions to support SFC, including enhanced orchestration and extended control options, are provided by the OpenDaylight Lithium release—included as part of Intel ONP release 1.5.

To maintain a competitive edge and deliver high-value, cost-effective services, Communications Service Providers (CSP) are introducing managed broadband and enterprise communication services strategies. Those CSPs often cite the Customer Premises Virtual CPE (CP vE-CPE) as one of the first business targets for delivering this strategy. As part of the Intel ONP release 1.5, thorough use-case characterization and benchmark tests for CP vE-CPE were performed on the ONP platform.

Intel and the Intel® Network Builders community of partners collaborate on trial deployments and solution implementations (see Figure 1).

New Features Added to Intel® Open Network Platform (Intel® ONP) Server Release 1.5

Intel ONP Server Release 1.5 introduces major performance improvements enabled through OVS with Data Plane Development Kit (DPDK) 2.0 support. Incremental improvements to OpenStack* Kilo were introduced and the OpenDaylight* Lithium release added new functionalities to Service Function Chaining (SFC) .

- OpenStack Kilo release 2015.1.1
- OpenDaylight Lithium SR1
- Open vSwitch* 2.4.90
- DPDK release 2.0
- Fedora* 21 release
- Real-Time Linux* Kernel, patches release 3.18.16-rt13
- Support for Intel® Ethernet Controller X710 2x40 GbE

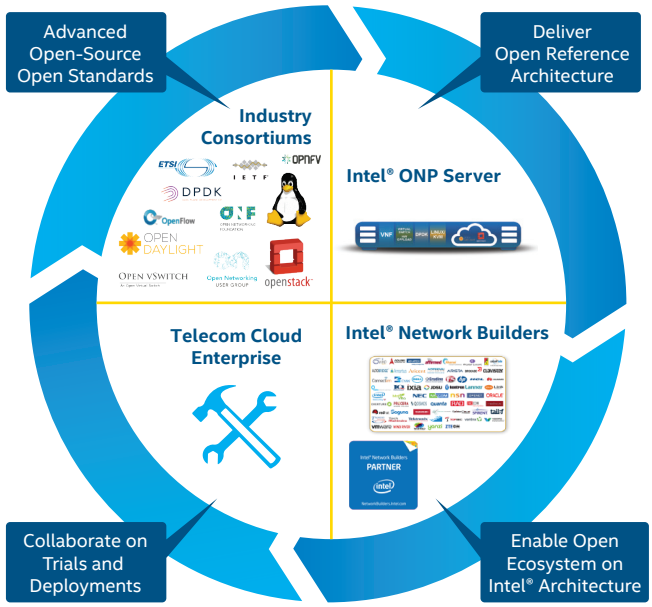

Figure 1. Market enablement with Intel® Open Network Platform Server reference architecture.

Intel Open Network Platform Server Overview

The primary Intel ONP Server elements include the compute node, OpenDaylight* controller, and OpenStack platform. Aligned with the architecture defined by the European Telecommunications Standards Institute (ETSI) for NFV and with the goals of the Open Platform for the NFV* (OPNFV*) project, the Intel ONP Server has these characteristics:

- Based on Intel® architecture, the design uses industry-standard servers. Advances in Intel® processors—including new microarchitectures and smaller-scale process technologies—enable Intel ONP Server to keep pace with the emerging platform technologies and deliver optimal performance and energy efficiency in SDN and NFV network implementations.
- The Intel ONP Server software stack includes only open-source software from open-standards projects. Contributions to projects and standards such as OVS, DPDK, OpenStack, and OpenDaylight have accelerated the development of Intel ONP Server; open-source code developed as part of the Intel ONP Server initiative is shared through the communities and 01.org. Figure 2 shows Intel ONP Server as a single node in the network.

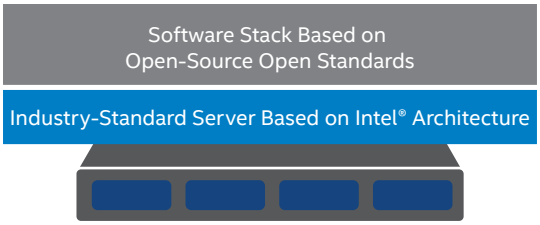

Figure 2. Intel® Open Network Platform Server node view.

- The Intel ONP Server reference architecture defines a test environment composed of the server, a control layer, and an OpenStack layer (see Figure 3). OpenStack and OpenDaylight provide the management and controller platforms. The compute nodes consist of network interface control cards, the Open vSwitch functionality, DPDK, and supplier-specific applications executing in virtual machines.

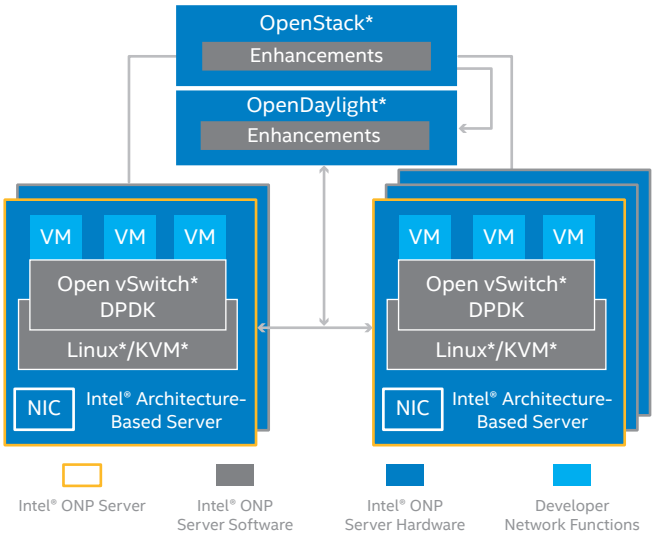

Figure 3. Key hardware and software ingredients in an Intel® Open Network Platform Server test environment.

Values and Benefits of the Latest Release

The Intel ONP Server release 1.5 features enhancements that boost performance and simplify deployment and manageability of virtual network solutions, including:

- **vHost user vif driver**. This accelerated interface uses DPDK from the host to the guest operating system to boost network I/O throughput.
- **DPDK 2.0 support in OVS**. Intel contributions to OVS, supporting DPDK 2.0, take advantage of features and performance increases that are newly available.
- **VXLAN deployable additions**. Support for VXLAN with ovs-dpdk improves scalability and delivers higher network I/O throughout through an accelerated interface from the host to the guest, by means of DPDK. Enables OVS native tunneling support.
- **OVSDB plug-in** improves the manageability of servers running OVS, providing OpenDaylight services by means of the OVSDB protocol. The refactored OVSDB Southbound plug-in provides improved DVR capabilities, improved stability, and better parity with Neutron features.
- **Service Function Chaining (SFC) enhancements** were introduced and delivered as part of the OpenDaylight Lithium release. Added APIs for monitoring service functions enhance orchestration and SFC control. For example, monitoring a service functions' processor use supports intelligent load balancing, which in turn can improve scalability in large-scale deployments.

Intel Open Network Platform Server Release Deliverables

Intel ONP Server is released quarterly through 01.org.
Intel ONP Server release 1.5 is delivered in these forms:

- **Release 1.5 Scripts**. Help quickly install the ONP Server release 1.5 software stack based on open-source ingredients defined by Table 1 and Table 2 (on the following page).
- **Intel® ONP Server Reference Architecture Guide Release**. Provides guidelines for configuring and installing the ONP software stack and for validating the software in an SDN test environment. The software is running on a cost-effective SHVS based on Intel architecture.
- **Intel® ONP Server Performance Benchmark Test Report**. Provides performance test results for ONP 1.5 software and provides guidance for data plane characterization and performance measurements.
- **Intel® ONP Server Release Notes**. These notes detail the relevant information for each release.

Capitalizing on the Benefits of Intel Open Network Platform Server

Intel ONP Server offers these distinct benefits:

- **Service providers**, data center operators, and enterprises can use Intel ONP Server during a technology proof-of-concept process to validate performance and operational objectives, collaboratively define industry standards, and test equipment and software prior to commercial deployment.
- **Hardware producers**, including telecomm equipment manufacturers and original equipment manufacturers, gain an edge in the market by being able to accelerate development projects and take advantage of Intel contributions to open-source software projects and the manner in which Intel has addressed the software ingredients.
- **Software producers**, including independent software vendors and operating-system vendors, can capitalize on optimized, integrated, pre-validated, released open-source software that provides access to the latest Intel processor-based server platforms.

Industry-wide, Intel ONP Server is enabling wide-scale network transformation—using SDN and NFV simply and cost-effectively on Intel architecture. The flexible reference architecture helps organizations accelerate their network virtualization initiatives, harnessing the rich functionality of current and future open platforms.

Intel® Open Network Platform Server Release 1.5 - Software and Hardware Components

The following four tables detail the software and hardware for the Intel ONP Server, as specified for release 1.5.

Table 1. Software components included in Intel® Open Network Platform Server compute node software.

SOFTWARE COMPONENT	DESCRIPTION
Fedora* 21 x86_64	Underlying system-level OS based on the 3.18.8-201.fc21.x86_64 kernel.
Linux* Real-Time Kernel	Linux Real-Time Linux Kernel 3.18.16-rt13. A baseline to give real-time aspects to the compute nodes.
DPDK 2.0	Software libraries used to dramatically accelerate packet processing, increasing throughput and scalability.
Open vSwitch* with kernel datapath v2.3.2 and DPDK datapath v2.4.90	Includes support for Open vSwitch with DPDK-netdev.
Intel® QuickAssist Technology	Hardware-based acceleration and communication mechanisms for services such as encryption/decryption and compression/decompression.
Libvirt 1.2.13.1.fc21.x86_64	Toolkit and API used by QEMU*-KVM* to manage virtual machines. OpenStack* (Nova) also uses it to manage the computer resources of the host.
QEMU-KVM* 2.3.0.5.fc21.x86_64	Open-source machine emulator and virtualizer. Includes KVM used to enable hardware acceleration on Intel® platforms.

Table 2. Software components included in Intel® Open Network Platform Server controller node software.

SOFTWARE COMPONENT	DESCRIPTION
Fedora* 21 x86_64	Underlying system-level OS. Upgraded to the 3.18.8-201.fc21.x86_64 kernel.
OpenStack* Kilo 2015.1.1	OpenStack and related tools for building and managing clouds. Includes DevStack shell script for automating development-environment builds.
OpenDaylight* Lithium SR1	OpenDaylight's third software release, Lithium, added new capabilities to improve performance and scalability, including MD-SAL clustering along with enhancements and API extensions.
OpenvSwitch v2.3.1-git4750c96	Includes support for Open vSwitch with DPDK-netdev.

Table 3. Example of Intel® Open Network Platform Server hardware (other hardware configurations are available).

Please note that benchmark tests for vE-CPE (virtual Enterprise CPE) use case were performed on a platform featuring the Intel® Atom™ processor C2750, next generation system-on-chip (SoC) 8-core processor, 2.40 GHz BIOS version: 1.0c. Additional information about the vE-CPE benchmark testing can be found on 01.org.

ITEM	DESCRIPTION	NOTES
Platform	Intel® Server Board S2600WTT	Intel® Xeon® processor-based DP server (2 CPU sockets) 120 GB, solid-state drive, 2.5-in SATA 6 GB/s, Intel® Solid-State Drive SSDSC2BB120G4. Supports single root I/O virtualization (SR-IOV).
Processor	Intel® Xeon® processor E5-2699 v3	18 cores, 2.3 GHz, 145 W, 45 MB total cache per processor, 9.6 GT/s Intel® QuickPath Interconnect, DDR4-1600/1866/2133
Cores	18 physical cores per CPU	36 hyper-threaded cores per CPU for 72 total cores
Memory	8 GB, DDR4, RDIMM, Crucial CT8G4RFS423	64 GB RAM (8x 8 GB)
NIC	Intel® Ethernet Controller XL710 2x40 GbE	Production version, FM f4.33 a 1.2 n04.42 has been tested with Intel® TLX8571D3BCV-IT and Intel® AFBR-703sDZ-IN2 850nm SFPs. NICs are on socket zero.
BIOS	BIOS revision: SE5C610.86B.01.01.005	Intel® Virtualization Technology for Directed I/O (Intel® VT-d) enabled for SR-IOV and PCI pass-through tests. Hyper-threading enabled, but disabled for benchmark testing.
Intel® QuickAssist Technology	Intel® Communications Chipset 8950	PCIe* server add-in card with Intel Communications Chipset 8950 chipset. Supports SR-IOV.

Table 4. Example of Intel® Open Network Platform Server hardware (other hardware configurations are available).

ITEM	DESCRIPTION	NOTES
Platform	Intel® Server Board S2600WTT	Intel® Xeon® processor-based DP server (2 CPU sockets) 120 GB, solid-state drive 2.5-in, SATA 6 Gb/s, Intel® Solid-State Drive SSDSC2BB120G4. Supports single root I/O virtualization (SR-IOV).
Processor	Intel® Xeon® processor E5-2697 v3 2.6 GHz, 25 MB, 145 W, 14 cores	14 core, 2.6 GHz, 145 W 3.5 M per core LLC, 9.6 GT/s Intel® QuickPath Interconnect, DDR-4-1600/1866/2133
Cores	14 physical cores per CPU	28 Hyper-threaded cores per CPU for 56 total cores
Memory	8 GB, DDR4 RDIMM, Crucial CT8G4RFS423	64 GB RAM (8 x 8 GB)
NIC	Intel® Ethernet Controller XL710 4x10GbE	Production version, FM f04.33 a1.2 n04.42 NICs are on socket zero.
BIOS	GRNDSDP1.86B.0038.R01.1409040644 Release Date: 09/04/2014	Intel® Virtualization Technology for Directed I/O (Intel® VT-d) enabled only for SR-IOV PCI passthrough tests. Hyper-Threading enabled, but disabled for benchmark testing.
Intel® QuickAssist Technology	Intel® Communications Chipset 8950	PCIe* server add-in card with Intel Communications Chipset 8950 chipset. Supports SR-IOV.

Learn more about the Intel Open Network Platform: **www.intel.com/ONP**

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