Intel® Open Network Platform Server Release 1.3: Driving Network Transformation

The Intel® Open Network Platform Server (Intel® ONP Server) r1.3 reference architecture provides a validated template to spur adoption of software-defined networking (SDN) and network function virtualization (NFV) in telecom carrier networks, cloud data centers, and enterprise environments.

As an active, long-term member of the open-source community, Intel contributes to a number of open-source projects and participates in industry consortiums' work to help increase SDN and NFV market visibility and strengthen the supporting ecosystem. Intel's engineering work on individual projects also improves the use of processor, memory, and I/O resources in SDN and NFV deployments—optimizing performance and enhancing efficiency.

Intel ONP Server is a reference architecture that provides engineering guidance and ecosystem support to enable widespread adoption of SDN and NFV solutions across telecommunications, cloud, and enterprise sectors. The reference architecture is based on any cost-effective, standard high-volume servers (SHVS) and on an Intel ONP Server reference open-source software stack. The open-source released software ingredients include contributions made by Intel and the extensive work done in community projects, including Data Plane Development Kit (DPDK), Open vSwitch*, OpenDaylight*, OpenStack*, and KVM*. It is an integrated, "better together" software stack tuned for use in SDN and NFV implementations. Intel ONP Server simplifies the evaluation and development process and makes it easier to establish open solutions within an SDN and NFV environment. The framework provided by this reference design enables an open ecosystem based on Intel® architecture that delivers industry-leading performance, power, cost, and security-optimized solutions.

As shown in Figure 1, Intel and the Intel® Network Builders community of partners collaborate with cloud-service providers and telecommunication firms on trial deployments and solution implementations. These collaborations have helped Intel shape and refine the Intel ONP server reference architecture so that it addresses a wide range of telecommunication, enterprise, and cloud deployment use cases.

New Features Added to Intel® Open Network Platform (Intel® ONP) Server Release 1.3

The latest version of the Intel ONP Server Release 1.3 is a Minor Release providing incremental enhancements to Intel ONP Server Release 1.2. It includes:

- OpenStack* Juno 2014.2.2 support
- OpenDaylight* Helium.1 support
- Open vSwitch* 2.3.90 support
- First release to support Fedora* 21 release, server version
- First release to support Real-Time Linux* Kernel, patches release 3.14.31-rt28
- First release validated with 4x10GbE Intel® Ethernet Controller XL710 (code-named Fortville)

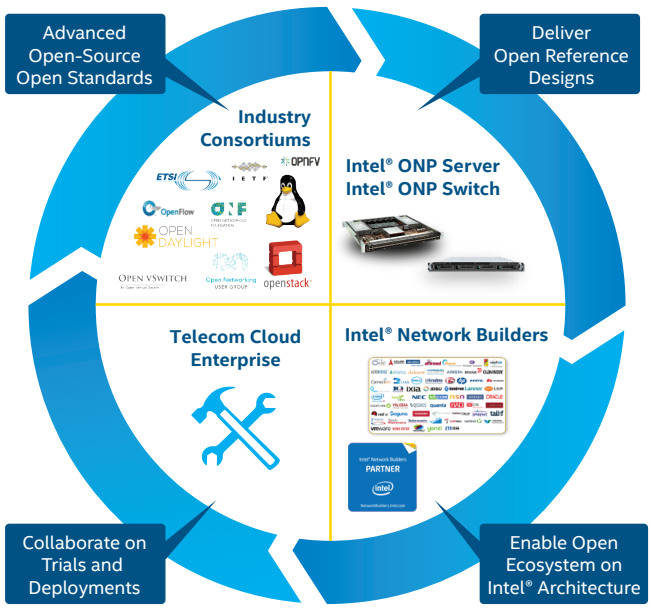

Figure 1. Market enablement with Intel® Open Network Platform Server reference architecture.

Intel Open Network Platform Server Overview

Intel ONP Server is a comprehensive reference architecture available on 01.org and composed of three elements: the compute node, OpenDaylight* controller, and OpenStack platform. This reference architecture is aligned with the architecture defined by ETSI for NFV and with the goals of the Open Platform for NFV* (OPNFV*) project.

The key characteristics of the Intel ONP Server reference architecture are as follows:

- It is based on Intel architecture, using industry-standard servers. Ongoing advances in Intel® processors—including new microarchitectures and smaller-scale process technologies—enable Intel ONP Server to keep pace with the capabilities of future generations of platforms to deliver amazing performance and energy efficiency in SDN and NFV networks.
- The Intel ONP Server software stack includes only open-source software, sourced from open-standards community projects. Contributions to projects and standards such as Open vSwitch, the DPDK, OpenStack, and OpenDaylight have played a key role in the development of the Intel ONP Server reference architecture; open-source code developed as part of the Intel ONP Server initiative is communicated through the communities, as well as 01.org. A view of the Intel ONP Server as a single node in the network appears in Figure 2.
- The Intel ONP Server reference architecture defines a test environment composed of the server, a control layer, and an OpenStack layer. Figure 3 illustrates the key ingredients of this test environment. OpenStack and OpenDaylight provide the management and controller platforms. Toward the bottom of the figure are the compute nodes, which consist of network interface control cards, the Open vSwitch functionality, DPDK, and supplier-specific applications executing in virtual machines.

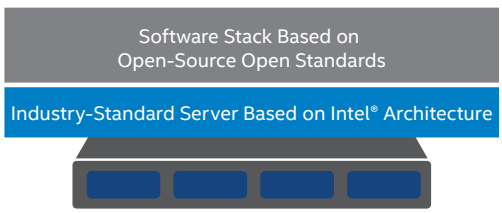

Figure 2. Intel® Open Network Platform Server node view.

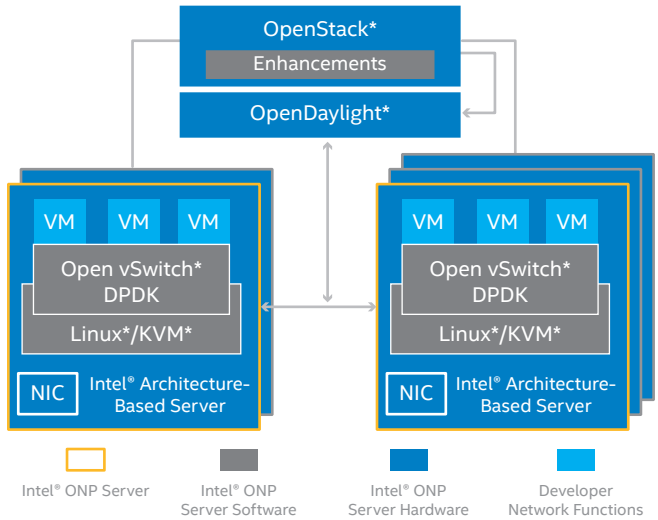

Figure 3. Key hardware and software ingredients in an Intel® Open Network Platform Server test environment.

Intel Open Network Platform Server Release Deliverables

Intel ONP Server is released quarterly through 01.org. Two main documents are offered:

- **Intel® ONP Server Reference Architecture Guide**
  - Documentation for building and validating an SDN test environment based on the Intel ONP Server software stack. The software is running on a cost-effective, standard high-volume server (SHVS) based on Intel architecture.
- **Intel® ONP Server Benchmark Test Report**
  - Benchmark test criteria are based on use cases informed by customers and market requirements.

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 (TEMs) and original equipment manufacturers (OEMs), gain an edge in the market by being able to accelerate development projects and take advantage of Intel contributions to open source software projects, Intel addressing the software ingredients integration gap, Intel solution performance benchmark analysis, and the latest Intel processor-based server platforms.
- **Software producers**, including independent software vendors (ISVs) and operating-system vendors (OSVs), 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 1.3 - Software and Hardware Components

The following four tables detail the software and hardware for the Intel ONP Server, as specified for release 1.3.

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 3.17.8-300.fc21.x86_64 kernel. This is the Fedora 21 server version.
Linux* Real-Time Kernel	Real-time Linux Kernel 3.14.31-rt28; a baseline for providing real-time aspects to the compute nodes.
Data Plane Development Kit (DPDK) 1.7.1	Software libraries used to dramatically accelerate packet processing, increasing throughput and scalability.
Open vSwitch* 2.3.90	Open vSwitch 2.3.90 with DPDK-netdev.
Intel® QuickAssist Technology	Hardware-based acceleration and communication mechanisms for services such as encryption/decryption and compression/decompression.
Libvirt 1.2.9.1-2.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 2.1.2-7.fc21x86_64	Open-source machine emulator and virtualizer. Includes Intel KVM that is 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* 20 x86_64	Underlying system-level OS, based on the 3.15.6-200.fc20.x86_64 kernel.
OpenStack* Juno 2014.2.2	OpenStack, related tools, and Intel patches for building and managing clouds; includes DevStack shell script for automating development-environment builds.
OpenDaylight* Helium.1	OpenDaylight's second software release, Helium, which provides deeper integration with OpenStack. This is the SU1 (Stable Update 1 aka Helium.1) released November 2014.

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

ITEM	DESCRIPTION	NOTES
Platform	Intel® Server Board S2600WTT 1100 W power supply	Intel® Xeon® processor-based DP server (2 CPU sockets) 120 GB, SSD, 2.5-in SATA 6 Gb/s, Intel SSDSC2BB120G4
Processor	Intel® Dual Xeon® Processor Series 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
Memory	8 GB, DDR4, RDIMM, Crucial CT8G4RFS423	64 GB RAM (8x 8 GB)
NICs	Intel® Ethernet Controller XL710 4x10 GbE (code-named Fortville)	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 single root I/O virtualization (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 8950 chipset Supports SR-IOV

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

ITEM	DESCRIPTION	NOTES
Platform	Intel® Server Board 2U 8x3.5 SATA 2x750 W, 2xHS Rails, Intel® Server System R2308GZ4GC	Intel® Xeon® processor-based DP server (2 CPU sockets) 240 GB, SSD 2.5-in, SATA 6 Gb/s Intel® Solid-State Drive DC S3500 Series Supports SR-IOV
Processors	Intel® Xeon® processor E5-2680 v2 LGA2011, 2.8 GHz, 25 MB, 115 W, 10 cores	Socket-R (EP), 10 core, 2.8 GHz, 115 W 2.5 M per core LLC, 8.0 GT/s Intel® QuickPath Interconnect, DDR-3-1867, HT, turbo Long product availability
Cores	10 physical cores per CPU	20 Hyper-threaded cores per CPU for 40 total cores
Memory	8 GB, 1600 Reg ECC, 1.5 V, DDR3, Kingston KVR16R11S4/8I	64 GB RAM (8 x 8 GB)
NICs	Dual port Intel® 82599 10 Gigabit Ethernet Controller (code-named Niantic)	NICs are on socket zero (3 PCIe* slots available on socket 0) Supports single root I/O virtualization (SR-IOV)
BIOS	SE5C600.86B.02.01.0002.082220131453 Release Date: 08/22/2013 BIOS Revision: 4.6	Intel® Virtualization Technology for Directed I/O (Intel® VT-d) enabled only for QAT tests Hyper-Threading disabled
Intel® Quick Assist Technology	Intel® Communication Chipset 8950	PCIe server add-in card with 8950 chipset Supports SR-IOV

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

Intel processor numbers are not a measure of performance. Processor numbers differentiate features within each processor family, not across different processor families. See http://www.intel.com/content/www/us/en/processors/processor-numbers.html for details.

Intel® Virtualization Technology requires a computer system with an enabled Intel® processor, BIOS, and virtual machine monitor (VMM). Functionality, performance or other benefits will vary depending on hardware and software configurations. Software applications may not be compatible with all operating systems. Consult your PC manufacturer. For more information, visit http://www.intel.com/go/virtualization

0315/NU/MESH/PDF 331544-002US