



Intel® Open Network Platform Release 2.1 Application Note on Hardware and Software Differences between Reference Architecture Guide and Performance Test Report

SDN/NFV Solutions with Intel® Open Network Platform

**Document Revision 1.0
March 2016**



Revision History

Date	Revision	Comments
March 31, 2016	1.0	Initial document for release of Intel® Open Network Platform Release 2.1



Contents

1.0 Introduction	5
2.0 Hardware Specifications.....	6
3.0 Software Versions	8
Legal Information.....	9



Tables

Table 1-1 Reference documents	5
Table 2-1 Differences in hardware specifications between Intel® ONP 2.1 Reference Architecture Guide and Intel® ONP 2.1 Performance Test Report.....	6
Table 3-1 Differences in software versions between Intel® ONP 2.1 Reference Architecture Guide and Intel® ONP 2.1 Performance Test Report.....	8



1.0 Introduction

Intel® Open Network Platform (Intel® ONP) is a Reference Architecture that provides engineering guidance and ecosystem-enablement support to encourage widespread adoption of Software-Defined Networking (SDN) and Network Functions Virtualization (NFV) solutions in Telco, Enterprise, and Cloud. Intel® ONP is released in the form of a software stack and a set of documents available on 01.org (e.g. Intel® Open Network Platform Reference Architecture Guides, Performance Test Reports).

Ideally, Intel® ONP integration and benchmarking activities should use identical hardware platform specifications and software versions. Differences however do sometimes occur due to software issues, timing of software version and patch revisions and other factors due to parallel engineering activities.

This application note contains information on differences in hardware and software specifications between the following documents:

- Intel® ONP Release 2.1 Reference Architecture Guide, which describes an integration of the open-source ingredients into Intel® ONP Reference Architecture.
- Intel® ONP Release 2.1 Performance Test Report, which describes packet processing performance and test procedures for Intel® ONP 2.1 software on Intel® Xeon® processor E5-2600 v4 (formerly Broadwell-EP) product family platform.

Following table references the documents relevant to this application note.

Table 1-1 Reference documents

Document	Location
Intel® ONP Release 2.1 Reference Architecture Guide	01.org
Intel® ONP Release 2.1 Performance Test Report	01.org



2.0 Hardware Specifications

This section lists differences between hardware specifications in Intel® ONP Release 2.1 Reference Architecture Guide and Intel® ONP Release 2.1 Performance Test Report. The integration tests were done with the following hardware platforms:

- Intel® Xeon® processor E5-2600 v3 product family (formerly Haswell) and Intel® Xeon® processor E5-2600 v4 product family (formerly Broadwell-EP) platforms
- Intel® Xeon® processor D-1500 product family SoC platforms.
- Intel® Atom™ C2750 SoC platform.

Packet processing performance tests were conducted only on Intel® Xeon® processor E5-2699 v4 based platform.

Thus, [Table 2-1](#) lists the differences in hardware specifications between integration and performance tests for platforms based on Intel® Xeon® processor E5-2600 v3 and Intel® Xeon® processor E5-2600 v4 product families.

[Table 2-1 Differences in hardware specifications between Intel® ONP 2.1 Reference Architecture Guide and Intel® ONP 2.1 Performance Test Report](#)

Item	Intel® ONP 2.1 Reference Architecture Guide	Intel® ONP 2.1 Performance Test Report	Notes
Platform	Intel® Server Board S2600WTT Intel® Server Board S2600WT2	Supermicro X10DRH-I	S2600WTT board has two integrated 10GbE ports based on Intel® Ethernet Controller X-540. S2600WT2 board has two integrated 1GbE ports based on Intel® Ethernet Controller I350-AM2. Supermicro X10DRH-I board has two integrated 1GbE ports based on Intel® Ethernet Controller I350-AM2. LAN on motherboards were not used in integration and performance tests. http://ark.intel.com/compare/82156,82155 http://www.supermicro.com/products/motherboard/Xeon/C600/X10DRH-i.cfm
Processors	Dual Intel® Xeon® processor E5-2658 v3		Packet processing performance tests for Intel® ONP Release 2.1 were not conducted with Intel® Xeon® processor E5-2600 v3 product family CPUs.
	Dual Intel® Xeon® processor E5-2697 v3		
	Dual Intel® Xeon® processor E5-2699 v3		
	Dual Intel® Xeon® processor E5-2699 v4	1x Intel® Xeon® processor E5-2695 v4	Both the integration and packet processing performance tests started before the official release of Intel® Xeon® processor E5-2600 v4 product family. For this reason number of CPU SKUs available for testing was limited. Please note that integration tests were done with two instances of flagship model of the CPU family in contrary to packet processing performance tests which used only one CPU onboard and the model lower in family hierarchy.



Item	Intel® ONP 2.1 Reference Architecture Guide	Intel® ONP 2.1 Performance Test Report	Notes
Memory	64 GB total; DDR4 RDIMM Crucial CT8G4RFS4213	64GB Total; Samsung 8GB 2Rx8 PC4-2400MHz, 8GB per channel, 8 Channels	Servers used for integration and performance tests may have memory modules from various vendors. For current tests, different memory modules are not expected to limit performance.
	64 GB total; DDR4 2133 Reg ECC 1.2V Kingston KVR21R15S4/8 Single Rank		
NICs	Intel® Ethernet Converged Network Adapter X710-DA4	2 x Intel® Ethernet Converged Network Adapter X710-DA4 Total: 8 Ports; 2 ports from each NIC used in tests.	Intel® Ethernet Converged Network Adapters X710-DA4 and XL710-QDA2 belong to the same controller family (formerly Fortville). http://ark.intel.com/compare/83967,83965
	Intel® Ethernet Converged Network Adapter XL710-QDA2		
	Intel® Ethernet Converged Network Adapter X540-T2		
	Intel® Ethernet Converged Network Adapter X520-SR2		
BIOS	Servers with Intel® Xeon® processor E5-2600 v3 product family: <ul style="list-style-type: none"> SE5C610.86B.01.01.0009.060120151350 Release date: 06/01/2015 SE5C610.86B.01.01.0011.081020151200 Release date: 08/10/2015 Servers with Intel® Xeon® processor E5-2600 v4 product family: <ul style="list-style-type: none"> GRRFCRB1.86B.0267.R00.1509110656 RC revision 2.4.0 Release date: 09/11/2015 	AMIBIOS version: 2.0 Release Date: 12/17/2015	Integration and performance tests were done on server boards from different vendors. Generally, the latest BIOS versions are used on all platforms. Changes can result, if there are known issues or BIOS versions change during integration and benchmarking activities.
	Intel® QAT		
Local Storage	Intel® SSDSC2BB120G4 120 GB SSD 2.5in SATA 6 Gb/s	500 GB HDD Seagate SATA Barracuda 7200.12 (SN:Z6EM258D)	For current tests, disk drive/SSD is not expected to limit performance.



3.0 Software Versions

Table 3-1 lists the differences in software versions between integration and performance tests for platforms based on Intel® Xeon® processor E5-2600 v3 and Intel® Xeon® processor E5-2600 v4 product families.

Table 3-1 Differences in software versions between Intel® ONP 2.1 Reference Architecture Guide and Intel® ONP 2.1 Performance Test Report

Item	Intel® ONP 2.1 Reference Architecture Guide	Intel® ONP 2.1 Performance Test Report	Notes
Operating System	Fedora 23 Server x86_64 Kernel version: 4.3.3-300.fc23.x86_64 CentOS-7.2 (1511) x86_64 DVD ISO Kernel version: 3.10.0-327.el7.x86_6464	Fedora 23 x86_64 (Server version) Kernel version: 4.2.3-300.fc23.x86_64	Packet processing performance tests were done only on Fedora 23 Server. Although kernel 4.3.3-300.fc23.x86_64 is recommended for Intel® ONP Release 2.1 for its most recent set of features, kernel 4.2.3-300.fc23.x86_64 was used in performance tests as a native, verified for stability, Fedora 23 kernel.
QEMU-KVM	Fedora 23: <ul style="list-style-type: none"> qemu-kvm version: 2.4.1-7.fc23.x86_64 libvirt version: 1.2.18.2-2.fc23.x86_64 CentOS-7.2: <ul style="list-style-type: none"> qemu-kvm version: 1.5.3-105.el7_2.3.x86_64 libvirt version: 1.2.17-13.el7.x86_64 	<ul style="list-style-type: none"> QEMU-KVM version 2.5.0 libvirt version: 1.2.18.2-2.fc23.x86_64 	QEMU was updated to the latest available version during performance tests.
Open vSwitch and Open vSwitch with DPDK	Open vSwitch 2.5.90 Commit ID: 1589ee5ae97c3f71c50413db64ddd0546daecc0	Open vSwitch 2.4.9 Commit ID: 53902038abe62c45ff46d7de9dcec30c3d1d861e	Performance tests were basing on the latest available and known stable version of Open vSwitch.
Intel® Ethernet Drivers	ixgbe-4.3.13 <ul style="list-style-type: none"> Intel® Ethernet Server Adapter X520 Series Intel® Ethernet Converged Network Adapter X540-T2 Intel® Xeon® processor D-1500 family deployments i40e-1.4.25 <ul style="list-style-type: none"> Intel® Ethernet Converged Network Adapters XL710-QDA2 and X710-DA4 igb-5.3.3.5 <ul style="list-style-type: none"> Intel® Atom™ processor C2000 family deployments 	i40e-1.4.25 <ul style="list-style-type: none"> Intel® Ethernet Converged Network Adapters X710-DA4 	Intel® Ethernet Converged Network Adapters X710-DA4 with the same driver versions were used both for packet processing performance tests.



Legal Information

By using this document, in addition to any agreements you have with Intel, you accept the terms set forth below. You may not use or facilitate the use of this document in connection with any infringement or other legal analysis concerning Intel products described herein. You agree to grant Intel a non-exclusive, royalty-free license to any patent claim thereafter drafted which includes subject matter disclosed herein.

INFORMATION IN THIS DOCUMENT IS PROVIDED IN CONNECTION WITH INTEL PRODUCTS. NO LICENSE, EXPRESS OR IMPLIED, BY ESTOPPEL OR OTHERWISE, TO ANY INTELLECTUAL PROPERTY RIGHTS IS GRANTED BY THIS DOCUMENT. EXCEPT AS PROVIDED IN INTEL'S TERMS AND CONDITIONS OF SALE FOR SUCH PRODUCTS, INTEL ASSUMES NO LIABILITY WHATSOEVER AND INTEL DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY, RELATING TO SALE AND/OR USE OF INTEL PRODUCTS INCLUDING LIABILITY OR WARRANTIES RELATING TO FITNESS FOR A PARTICULAR PURPOSE, MERCHANTABILITY, OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.

Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors. Performance tests, such as SYSmark and MobileMark, are measured using specific computer systems, components, software, operations and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products.

The products described in this document may contain design defects or errors known as errata which may cause the product to deviate from published specifications. Current characterized errata are available on request. Contact your local Intel sales office or your distributor to obtain the latest specifications and before placing your product order.

Intel technologies may require enabled hardware, specific software, or services activation. Check with your system manufacturer or retailer. Tests document performance of components on a particular test, in specific systems. Differences in hardware, software, or configuration will affect actual performance. Consult other sources of information to evaluate performance as you consider your purchase. For more complete information about performance and benchmark results, visit <http://www.intel.com/performance>.

All products, computer systems, dates and figures specified are preliminary based on current expectations, and are subject to change without notice. Results have been estimated or simulated using internal Intel analysis or architecture simulation or modeling, and provided to you for informational purposes. Any differences in your system hardware, software or configuration may affect your actual performance.

No computer system can be absolutely secure. Intel does not assume any liability for lost or stolen data or systems or any damages resulting from such losses.

Intel does not control or audit third-party web sites referenced in this document. You should visit the referenced web site and confirm whether referenced data are accurate.

Intel Corporation may have patents or pending patent applications, trademarks, copyrights, or other intellectual property rights that relate to the presented subject matter. The furnishing of documents and other materials and information does not provide any license, express or implied, by estoppel or otherwise, to any such patents, trademarks, copyrights, or other intellectual property rights.

2016 Intel® Corporation. All rights reserved. Intel, the Intel logo, Core, Xeon, and others are trademarks of Intel Corporation in the U.S. and/or other countries. *Other names and brands may be claimed as the property of others.