

FAQ SHEET: TRANSITIONING TO THE 5G CORE NETWORK

Why you should run the virtual user plane function on Intel® Architecture

Q Why transition to the 5G Core (5GC) network?

- A**
- The 5GC network is designed from the outset to support both virtualized and 'cloud native' deployments, comprising pure software-based network functions and services.
 - This new architecture gives communications service providers (CoSPs) the agility, scalability and responsiveness they need to meet the diverse network requirements of 5G services, going well beyond high speed fixed wireless or mobile broadband services.
 - Separation of the control and user planes brings flexibility in connecting users and provides CoSPs with an easy way to support a multitude of access technologies, as well as better support for network slicing and edge computing.

Q What's the role of the user plane function (UPF) in the 5GC network?

- A**
- In the 5GC network, the UPF has part of the serving gateway (SGW) and packet data network gateway (PGW) functionality from the 4G LTE evolved packet core (EPC).
 - The UPF supports packet routing and forwarding, packet inspection, QoS handling, acts as external packet data unit (PDU) session point of interconnect to the data network (DN), and is an anchor point for intra- and inter-radio access technology (RAT) mobility.
 - With the advent of 5G, major expectations on ultra-reliable low-latency communications (URLLC) and enterprise vertical services will expand the 5G UPF from the 5GC to the edge of the network.



Why run the virtual UPF on Intel® Architecture (IA)?



- The 2nd generation Intel Xeon Scalable processor provides CoSPs with a platform that offers the processing and capability needed for the mass amount of data traffic created by new 5G services. Optimized for network-centric workloads, 2nd generation Intel Xeon Scalable processors improve the performance of network functions virtualization (NFV) workloads by up to 1.25 - 1.58x.¹
- Basing the UPF on IA allows functions to be hosted at the edge or at the core, or anywhere in a cloud-like infrastructure, while also enabling a wider range of URLLC applications to be supported, such as augmented reality (AR) and virtual reality (VR) on common, shared infrastructure. Resources can also be scaled up or down as required to meet performance needs.
- Rolling out a 5G network on IA provides a CoSP with an easily upgradable infrastructure. As 5G evolves, more features and capabilities will become available requiring functions like the UPF to be upgraded. Network functions running on Intel® platforms can be easily upgraded by design.
- Hardware-assisted Intel® Network Interface Cards (NICs) handle user plane bottlenecks and enable better network utilization, including support for virtual switching, overlay termination for tenant separation, and more granular load balancing.



Learn More

Intel® Xeon® Scalable processor

<https://www.intel.com/content/www/us/en/products/processors/xeon/scalable.html>

Accelerating the Virtualized User Plane for 5G Core Network Readiness

<https://www.intel.com/content/dam/www/public/us/en/documents/solution-briefs/accelerating-virtualized-user-plane-for-5g-core-network-readiness-brief.pdf>

¹ 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. For more complete information visit www.intel.com/benchmarks

Configurations: Up to 1.25 to 1.58X NFV Workload Performance Improvement comparing Intel® Xeon® Gold 6230N processor to Intel® Xeon® Gold 6130 processor.

VPP IP Security: Tested by Intel on 1/17/2019 1-Node, 2x Intel® Xeon® Gold 6130 processor on Neon City platform with 12x 16GB DDR4 2666MHz (384GB total memory), Storage: 1x Intel® 240GB SSD, Network: 6x Intel XXV710-DA2, Bios: PLYDCRB1.86B.0155.R08.1806130538, ucode: 0x200004d (HT= ON, Turbo= OFF), OS: Ubuntu* 18.04 with kernel: 4.15.0-42-generic, Benchmark: VPP IPsec w/AESNI (AES-GCM-128) (Max Gbits/s (1420B)), Workload version: VPP v17.10, Compiler: gcc7.3.0, Results: 179. Tested by Intel on 1/17/2019 1-Node, 2x Intel® Xeon® Gold 6230N processor on Neon City platform with 12x 16GB DDR4 2999MHz (384GB total memory), Storage: 1x Intel® 240GB SSD, Network: 6x Intel XXV710-DA2, Bios: PLYXCRB1.PFT.0569.D08.1901141837, ucode: 0x4000019 (HT= ON, Turbo= OFF), OS: Ubuntu* 18.04 with kernel: 4.20.0-042000rc6-generic, Benchmark: VPP IPsec w/AESNI (AES-GCM-128) (Max Gbits/s (1420B)), Workload version: VPP v17.10, Compiler: gcc7.3.0, Results: 225.

VPP FIB: Tested by Intel on 1/17/2019 1-Node, 2x Intel® Xeon® Gold 6130 processor on Neon City platform with 12x 16GB DDR4 2666MHz (384GB total memory), Storage: 1x Intel® 240GB SSD, Network: 6x Intel XXV710-DA2, Bios: PLYDCRB1.86B.0155.R08.1806130538, ucode: 0x200004d (HT= ON, Turbo= OFF), OS: Ubuntu* 18.04 with kernel: 4.15.0-42-generic, Benchmark: VPP FIB (Max Mpackets/s (64B)), Workload version: VPP v17.10 in ipv4fib configuration, Compiler: gcc7.3.0, Results: 160. Tested by Intel on 1/17/2019 1-Node, 2x Intel® Xeon® Gold 6230N processor on Neon City platform with 12x 16GB DDR4 2999MHz (384GB total memory), Storage: 1x Intel® 240GB SSD, Network: 6x Intel XXV710-DA2, Bios: PLYXCRB1.PFT.0569.D08.1901141837, ucode: 0x4000019 (HT= ON, Turbo= OFF), OS: Ubuntu* 18.04 with kernel: 4.20.0-042000rc6-generic, Benchmark: VPP FIB (Max Mpackets/s (64B)), Workload version: VPP v17.10 in ipv4fib configuration, Compiler: gcc7.3.0, Results: 212.9.

Virtual Firewall: Tested by Intel on 10/26/2018 1-Node, 2x Intel® Xeon® Gold 6130 processor on Neon City platform with 12x 16GB DDR4 2666MHz (384GB total memory), Storage: 1x Intel® 240GB SSD, Network: 4x Intel X710-DA4, Bios: PLYDCRB1.86B.0155.R08.1806130538, ucode: 0x200004d (HT= ON, Turbo= OFF), OS: Ubuntu* 18.04 with kernel: 4.15.0-42-generic, Benchmark: Virtual Firewall (64B Mpps), Workload version: Opnfv 6.2.0, Compiler: gcc7.3.0, Results: 38.9. Tested by Intel on 2/04/2019 1-Node, 2x Intel® Xeon® Gold 6230N processor on Neon City platform with 12x 16GB DDR4 2999MHz (384GB total memory), Storage: 1x Intel® 240GB SSD, Network: 6x Intel XXV710-DA2, Bios: PLYXCRB1.PFT.0569.D08.1901141837, ucode: 0x4000019 (HT= ON, Turbo= OFF), OS: Ubuntu* 18.04 with kernel: 4.20.0-042000rc6-generic, Benchmark: Virtual Firewall (64B Mpps), Workload version: Opnfv 6.2.0, Compiler: gcc7.3.0, Results: 52.3.

Virtual Broadband Network Gateway: Tested by Intel on 11/06/2018 1-Node, 2x Intel® Xeon® Gold 6130 processor on Neon City platform with 12x 16GB DDR4 2666MHz (384GB total memory), Storage: 1x Intel® 240GB SSD, Network: 6x Intel XXV710-DA2, Bios: PLYDCRB1.86B.0155.R08.1806130538, ucode: 0x200004d (HT= ON, Turbo= OFF), OS: Ubuntu* 18.04 with kernel: 4.15.0-42-generic, Benchmark: Virtual Broadband Network Gateway (88B Mpps), Workload version: DPDK v18.08 ip_pipeline application, Compiler: gcc7.3.0, Results: 56.5. Tested by Intel on 1/2/2019 1-Node, 2x Intel® Xeon® Gold 6230N processor on Neon City platform with 12x 16GB DDR4 2999MHz (384GB total memory), Storage: 1x Intel® 240GB SSD, Network: 6x Intel XXV710-DA2, Bios: PLYXCRB1.PFT.0569.D08.1901141837, ucode: 0x4000019 (HT= ON, Turbo= OFF), OS: Ubuntu* 18.04 with kernel: 4.20.0-042000rc6-generic, Benchmark: Virtual Broadband Network Gateway (88B Mpps), Workload version: DPDK v18.08 ip_pipeline application, Compiler: gcc7.3.0, Results: 78.7.

VCMTS: Tested by Intel on 1/22/2019 1-Node, 2x Intel® Xeon® Gold 6130 processor on Supermicro*-X11DPH-Tq platform with 12x 16GB DDR4 2666MHz (384GB total memory), Storage: 1x Intel® 240GB SSD, Network: 4x Intel XXV710-DA2, Bios: American Megatrends Inc.* version: '2.1', ucode: 0x200004d (HT= ON, Turbo= OFF), OS: Ubuntu* 18.04 with kernel: 4.20.0-042000rc6-generic, Benchmark: Virtual Converged Cable Access Platform (iMIX Gbps), Workload version: vcmts 18.10, Compiler: gcc7.3.0, Other software: Kubernetes* 1.11, Docker* 18.06, DPDK 18.11, Results: 54.8. Tested by Intel on 1/22/2019 1-Node, 2x Intel® Xeon® Gold 6230N processor on Neon City platform with 12x 16GB DDR4 2999MHz (384GB total memory), Storage: 1x Intel® 240GB SSD, Network: 6x Intel XXV710-DA2, Bios: PLYXCRB1.PFT.0569.D08.1901141837, ucode: 0x4000019 (HT= ON, Turbo= OFF), OS: Ubuntu* 18.04 with kernel: 4.20.0-042000rc6-generic, Benchmark: Virtual Converged Cable Access Platform (iMIX Gbps), Workload version: vcmts 18.10, Compiler: gcc7.3.0, Other software: Kubernetes* 1.11, Docker* 18.06, DPDK 18.11, Results: 83.7.

OVS DPDK: Tested by Intel on 1/21/2019 1-Node, 2x Intel® Xeon® Gold 6130 processor on Neon City platform with 12x 16GB DDR4 2666MHz (384GB total memory), Storage: 1x Intel® 240GB SSD, Network: 4x Intel XXV710-DA2, Bios: PLYXCRB1.86B.0568.D10.1901032132, ucode: 0x200004d (HT= ON, Turbo= OFF), OS: Ubuntu* 18.04 with kernel: 4.15.0-42-generic, Benchmark: Open Virtual Switch (on 4C/4P/8T 64B Mpacket/s), Workload version: OVS 2.10.1, DPDK-17.11.4, Compiler: gcc7.3.0, Other software: QEMU-2.12.1, VPP v18.10, Results: 9.6. Tested by Intel on 1/18/2019 1-Node, 2x Intel® Xeon® Gold 6230N processor on Neon City platform with 12x 16GB DDR4 2999MHz (384GB total memory), Storage: 1x Intel® 240GB SSD, Network: 6x Intel XXV710-DA2, Bios: PLYXCRB1.86B.0568.D10.1901032132, ucode: 0x4000019 (HT= ON, Turbo= OFF), OS: Ubuntu* 18.04 with kernel: 4.20.0-042000rc6-generic, Benchmark: Open Virtual Switch (on 6P/6C/12T 64B Mpacket/s), Workload version: OVS 2.10.1, DPDK-17.11.4, Compiler: gcc7.3.0, Other software: QEMU-2.12.1, VPP v18.10, Results: 15.2. Tested by Intel on 1/18/2019 1-Node, 2x Intel® Xeon® Gold 6230N processor with SST-BF enabled on Neon City platform with 12x 16GB DDR4 2999MHz (384GB total memory), Storage: 1x Intel® 240GB SSD, Network: 6x Intel XXV710-DA2, Bios: PLYXCRB1.86B.0568.D10.1901032132, ucode: 0x4000019 (HT= ON, Turbo= ON (SST-BF)), OS: Ubuntu* 18.04 with kernel: 4.20.0-042000rc6-generic, Benchmark: Open Virtual Switch (on 6P/6C/12T 64B Mpacket/s), Workload version: OVS 2.10.1, DPDK-17.11.4, Compiler: gcc7.3.0, Other software: QEMU-2.12.1, VPP v18.10, Results: 16.9.

Performance results are based on testing as of the date set forth in the configurations and may not reflect all publicly available security updates. See configuration disclosure for details. No product or component can be absolutely secure.

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