Intel® Network Builders Insights Series

The Next Generation Intel® Xeon® D SoC and Platform Built for the Edge

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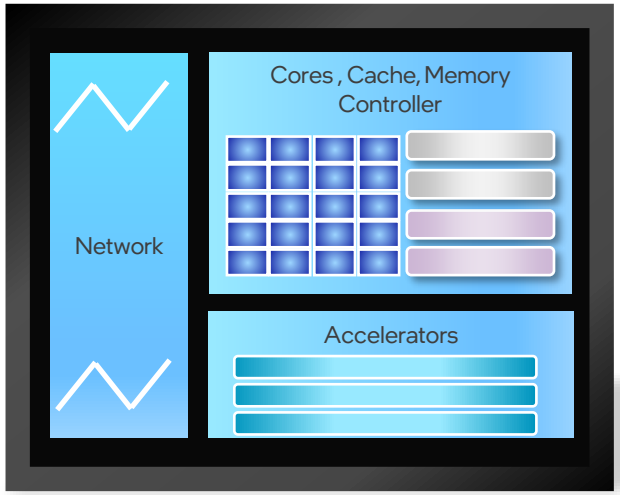
Intel® Xeon® D-2700 and Intel® Xeon® D-1700 Overview

Launched
Feb 24th, 2022

Intel® Xeon® D-2700 (HCC)

Scalable to 20 Cores



Intel® Xeon® D-1700 (LCC)

Scalable to 10 Cores

Breakthrough Performance

- Intel® Integrated Ethernet
- Intel® Crypto Acceleration
- Intel® Software Guard Extensions
- Intel® Advanced Vector Extensions 512

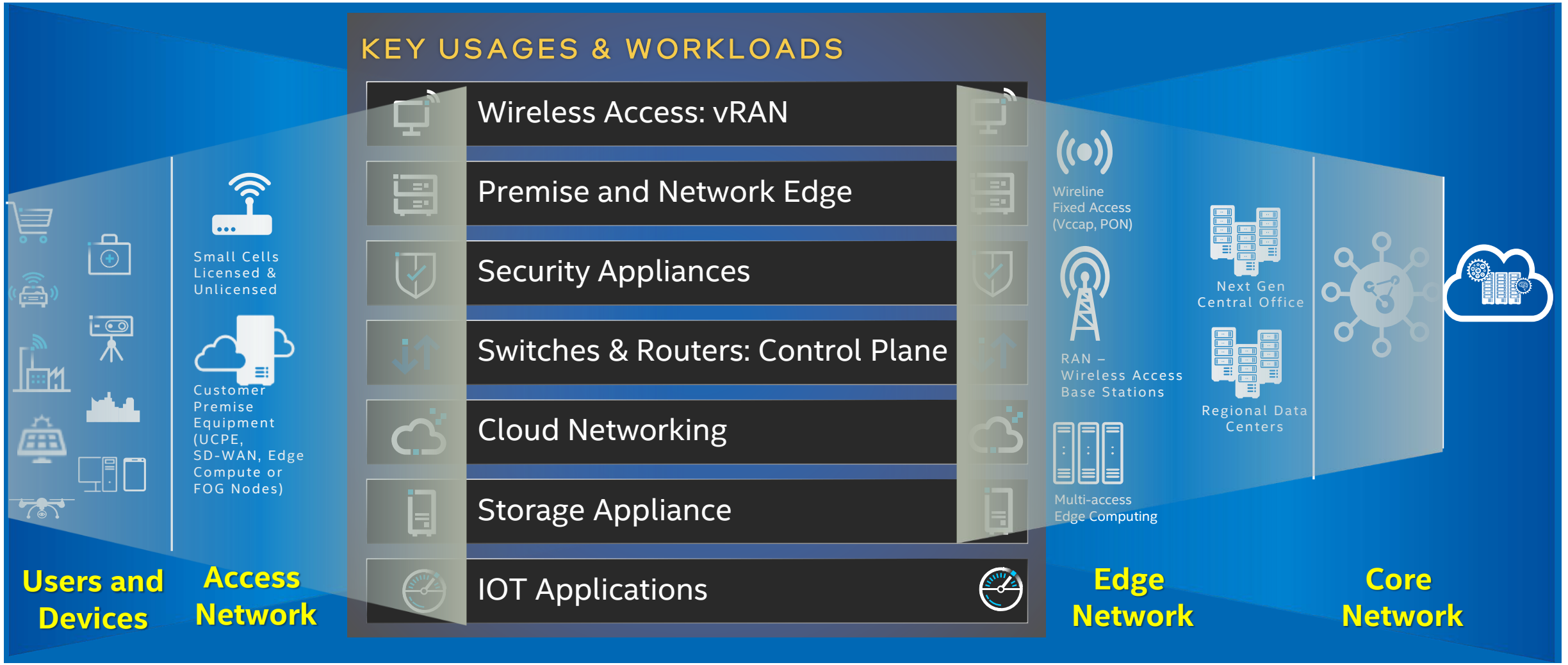
Next-Gen Xeon Density Platform

Up to	Up to	Up to	Up to
20 Cores	4CH	100GbE	32
Compute Capacity	DDR4-3200	Ethernet Throughput Capability	Lanes PCI Express 4

Secure , Faster, Flexible

- Intel® Platform Firmware Resilience
- Intel® Total Memory Encryption
- Intel® Deep Learning Boost
- Intel® Speed Select Technology

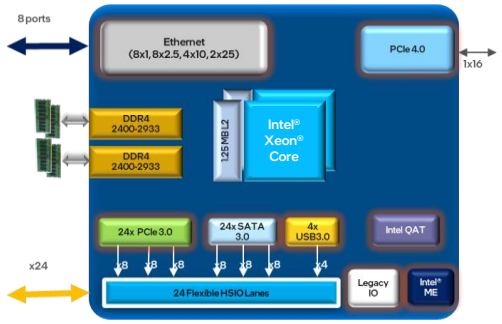
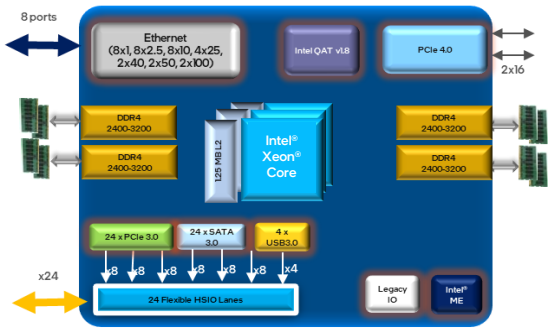
Intel® Xeon® D-2700 and Intel® Xeon® D-1700 Processor Family Market Appeal



Extending Intel® Xeon® Compute with Acceleration Beyond the Core Data Center

Intel® Xeon® D-1700 and D-2700 SoC Comparison

Shipping | Shipping / In Development

	Intel® Xeon® D Standard (LCC) SoC (System on a Chip)	Intel® Xeon® D Advanced (HCC) SoC (System on a Chip)
CPU	Intel® Xeon® D SoC, 2 to 10C, eTemp option	Intel® Xeon® D HCC SoC, 4 to 20C, eTemp option
Socket & TDP	1S SoC, FCBGA, new pinmap 45 mm x 45 mm; 25W – 90W	1S SoC, FCBGA, new pinmap 52.5 mm x 45 mm; 65W – 129W
Memory	2/3 channels DDR4 up to 2933 MT/s 1 and 2 DPC. 8Gb and 16Gb density	4 channels DDR4 (2933MT/s 2 DPC, 3200MT/s 1 DPC) DDR4 speeds 2400-3200 MT/s, 8Gb and 16Gb density
	RDIMM, UDIMM, SODIMM, Memory down	RDIMM, UDIMM, SODIMM, LRDIMM, Memory down
Ethernet/LAN	Throughput: 50Gbps on 4-8core, 100Gbps on 10core SKUs Connectivity: 1G;2.5G;10G;25G;40G; with RDMA (iWARP and RoCE V2) *Note: number of supported ports differs by SKU and by configuration	Throughput: 50Gbps and 100Gbps throughput options Connectivity: 1;2.5;10;25;40;50;100 GbE with RDMA (iWARP and RoCE V2)
Accelerators	Intel® QuickAssist Technology v1.7: SSL (up to 20G), Compression (up to 15G)	Intel® QuickAssist Technology v1.8: SSL (up to 100G), Compression (up to 70G)
PCIe 4.0/3.0	Total of 40 lanes thru combining 16 PCIe 4.0 + 24 HSIO PCIe 3.0 16 PCIe 4.0 full BW dedicated lanes from CPU complex (4 root ports) Bifurcation: x16, x8, x4. NTB via PCI 4.0 lanes: x16 and x8	Total of 56 lanes thru combining 32 PCIe 4.0 + 24 HSIO PCIe 3.0 32 PCIe 4.0 full BW dedicated lanes from CPU complex (8 root ports) Bifurcation: x16, x8, x4. NTB via PCI 4.0 lanes: x16 and x8
High Speed Flexible IO	24 High-Speed Flexible I/O Lanes configured as PCIe/SATA/USB, Up to 24 lanes of PCIe 3.0 (2.5, 5, 8 GT/s, Bifurcation support: x8, x4, x2; 12 root ports) or up to 24 SATA 3.0, or up to four ports of USB 3.0 Combined HSIO bandwidth is limited to equivalent 16 PCIe3.0 lanes of traffic	
Other	UART, LPC, SPI, eMMC 5.1, 2xUSB 2.0, Intel® ME (Manageability Engine), SGX, TME-MT, PFR	
	 Intel® Xeon® D LCC	 Intel® Xeon® D HCC

New capabilities relative to the Intel® Xeon® D-2100 Series in Bolded Blue
Features, SKUs, frequencies are preliminary and are subject to change

Flexible Performance for Most Demanding Workloads

Outstanding Gen-On-Gen Edge Performance

Security

UP TO

1.52x

Increase Security Workloads[1]

5G UPF

UP TO

1.74x

Improvement in Network Communication Workloads[1]

Telco Appliance

UP TO

1.56x

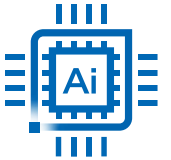
Improvement in Communication Appliances Workloads[1]

Web Services

UP TO

1.80x

Improvement in Web Service Workloads[1]



Artificial Intelligence

UP TO

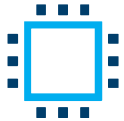
2.40x

Visual Processing Inference Improvement

1 Intel® Xeon® D-2700 compared to the previous generation Intel® Xeon® D-2100 Series 2GHz
Performance varies by use, configuration and other factors. Configurations are outlined on the Performance Claims Slide in the Appendix section.

Intel® Xeon® D-2700 and D-1700 Platform Value Proposition Summary

Compute



- Gen/Gen performance increase over Intel® Xeon® D-2100 Series with new IA Instructions
- Consistent Intel® Xeon® software scalability for easy DC to Edge VM migration

Network

- Integrated 100GbE[1] with new packet processing capabilities and Intel® QuickAssist Technology reduces the overall power, area and cost for TEMs
- Reduced total platform investment with application, control, and data plane workload consolidation at same TDP levels as Intel® Xeon® D-2100

IoT

- Intel® Boot Guard and Trusted Environment mode for secure solutions
- Faster Boot with Slim Bootloader and determinism with Time Coordinated Computing (TCC) capabilities
- 15-year product availability with Extended Temperature* support (-40c to Thermal Specification Limit per IOTG use conditions definition)

Storage

- Dense IA SoC optimized for PCIe 4.0 NVMe SSD transition lowers $/IOPS
- Next generation Intel® QuickAssist Technology[1] for better storage TCO efficiency
- Accelerates memory-intensive application performance with up to 3200[1] 4ch DDR4

1 select SKUs | Intel® Xeon® D-2700 supports up to 4 Channels of DDR4, Intel® Xeon® D-1700 supports up to 3 channels of DDR4
*https://www.intel.com/content/www/us/en/secure/design/confidential/products-and-solutions/processors-and-chipsets/iot-use-conditions.html
Features, SKUs, frequencies are preliminary and are subject to change

Intel® Xeon® D-2700 Ethernet MAC Configurations in Non-switch Mode

Intel® Xeon® D HCC SKU	Ethernet MAC Configuration	Integrated PHY Quad 0				Integrated PHY Quad 1			
		Lane 0	Lane 1	Lane 2	Lane 3	Lane 4	Lane 5	Lane 6	Lane 7
100G	2x 100G	100G				100G (within limited total BW to 100G)			
	2x 50G	50G				50G			
	2x 40G	40G				40G			
	2x 25G + 4x 10G	25G	25G			10G	10G	10G	10G
	4x 25G	25G	25G	25G	25G				
	8x 10G	10G	10G	10G	10G	10G	10G	10G	10G
50G	1x 50G	50G							
	1x40	40G							
	2x 25G	25G		25G					
	4x 10G	10G	10G	10G	10G				
	1x25G + 2x 10G	25G	10G	10G					
	5x 10G	10G	10G	10G	10G	10G			
	4x 10G + 4x 2.5G	10G	10G	10G	10G	2.5G	2.5G	2.5G	2.5G

- Highest supported speed shown per lane. A lower speed can be selected.
  - e.g. 25G lane can support 10G/2.5G/1G/100Mb & 10G lane can support 2.5G/1G/100Mb
  - Except 100G & 40G support (requires use of 4 lanes) and 50G support requires use of 2 lanes.
- Default configuration and lane assignments are not programmable

Intel® Xeon® D-1700 Ethernet MAC Configurations

Intel® Xeon® D LCC SKU	Ethernet MAC Configuration	Integrated PHY Quad 0				Integrated PHY Quad 1			
		Lane 0	Lane 1	Lane 2	Lane 3	Lane 4	Lane 5	Lane 6	Lane 7
100G	2x 40G	40G				40G			
	1x 40G + 1x 10G	40G				10G			
	4x 25G	25G	25G	25G	25G				
	2x25G+4x10G	25G	25G			10G	10G	10G	10G
	8x 10G	10G	10G	10G	10G	10G	10G	10G	10G
50G	1x40	40G							
	2x 25G	25G		25G					
	4x 10G	10G	10G	10G	10G				
	5x 10G	10G	10G	10G	10G	10G			
	4x 10G + 4x 2.5G	10G	10G	10G	10G	2.5G	2.5G	2.5G	2.5G

- Highest supported speed shown per lane. A lower speed can be selected.
  - e.g. , 25G lane can support 10G/2.5G/1G/100Mb & 10G lane can support 2.5G/1G/100Mb
  - Except 40G support (requires use of 4 lanes)
- Default configuration and lane assignments are not programmable

HSIO (High Speed IO) Configuration

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
PCIe 3.0 3 blocks of x8 with up to 4 RPs each	PCIe x8								PCIe x8								PCIe x8							
	PCIe x4				PCIe x4				PCIe x4				PCIe x4				PCIe x4				PCIe x4			
	PCIe x2		PCIe x2		PCIe x2		PCIe x2		PCIe x2		PCIe x2		PCIe x2		PCIe x2		PCIe x2		PCIe x2		PCIe x2		PCIe x2	
	x1		x1		x1		x1		x1		x1		x1		x1		x1		x1		x1		x1	
SATA	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1
USB3																					x1	x1	x1	x1

Feature	Broadwell-DE	Intel® Xeon® D LCC/HCC
Flexible HSIO	None (Dedicated x6 SATA 3.0, x8 PCIe 2.0, x4 USB 3.0)	x20 PCIe 3.0/SATA 3.0 and x4 PCIe 3.0/USB 3.0/SATA 3.0
HSIO throughput	<3.5 GB/s each direction, combined with network	14.5GB/s (256B payload) each direction

4x improvement

4x increase (over Intel® Xeon® D-2100 Series) in total HSIO bandwidth: up to 16 GB/s combined

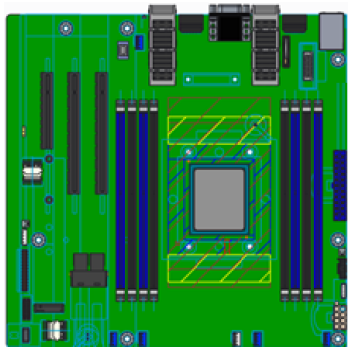
Intel® Xeon® D Memory Summary – Maximum Frequency Individual SKU Details Vary

	Intel® Xeon® D LCC	Intel® Xeon® D HCC
Controller Configuration	1 iMC, 2/3 CH, up to 2DPC 8Gb and 16Gb	2 iMC, 2 CH/iMC, up to 2DPC 8Gb and 16Gb
RDIMM	2933 2DPC	3200 1DPC, 2933 2DPC
LRDIMM	Not Planned	3200 1DPC, 2933 2DPC
SODIMM	2933 1DPC, 2666 2DPC	2933 1DPC, 2666 2DPC
UDIMM	2933 1DPC, 2666 2DPC	2933 1DPC, 2666 2DPC
Intel® Optane™ persistent memory	Not Planned	Not Planned
NVDIMM	Not Planned	Not Planned
Memory Down	2933	2933
VLP-RDIMM	2666 2DPC	2666 2DPC
VLP-UDIMM	Not Planned	Not Planned
Mini-DIMM	SoW	SoW

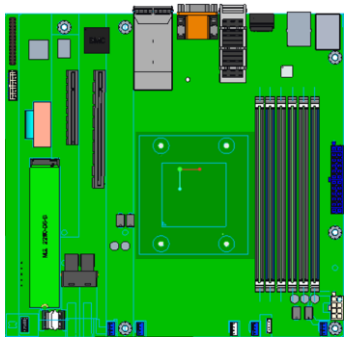
Note: Memory support is subject to change.
Features, SKUs, frequencies are preliminary and are subject to change

Intel® Xeon® D-2700 and D-1700 Platform Reference Designs

Intel® Xeon® D -2700 Series SoC



Intel® Xeon® D -1700 SoC



Form-Factor	10L, uATX w/ extension (9.6”x10”), Midloss PCB, 62mils	8L, uATX w/ extension (9.6”x10”), Midloss PCB, 62mils
CPU / SoC	Intel® Xeon® D HCC BGA socketed	Intel® Xeon® D LCC BGA socketed
Memory	4ch, 2DPC, 8 PTH RDIMM DIMM Connectors	3ch, 2DPC, 6 PTH RDIMM DIMM Connectors
CPU PCIe	2 x16 PCIe 4.0 slots	1 x16 PCIe 4.0 slot
HSIO PCIe	1 x8 PCIe 3.0 slot	1 x8 PCIe 3.0 slot
Ethernet	2x 100GbE QSFP28 connectors	1x QSFP28, 2x2 SFP28 connectors
Manageability	AST2500, onboard VGA, TPM2.0 module	AST2500, onboard VGA, TPM2.0 module
SATA	8 ports using 2x miniSAS HD connectors	8 ports using 2x miniSAS HD connectors
M.2	One M.2 (x4 PCIe 3.0, 22mm x110mm size)	One M.2 (x4 PCIe 3.0, 22mm x110mm size)
USB	2 USB 3.0 on rear IO, one USB 2.0 internal	2 USB 3.0 on rear IO, one USB 2.0 internal
Chassis	4U closed chassis (board can be supported in 1U/2U)	4U closed chassis (board can be supported in 1U/2U)

Features, SKUs, frequencies are preliminary and are subject to change

Intel® Xeon® D-1700 and D-2700 Processor Summary

- LCC SKUs:
  - All LCC SKUs have achieved Production Ready Qualification (PRQ) status
  - All LCC SKUs are available for ordering

- HCC SKUs
  - All except the following HCC NX SKUs have achieved Production Ready Qualification (PRQ) status
    - D-2798NX, D-2777NX, D-2757NX, D-2745NX
  - All HCC SKUs except for the HCC NX SKUs noted below are available for ordering
    - D-2798NX, D-2777NX, D-2757NX, D-2745NX

Questions?

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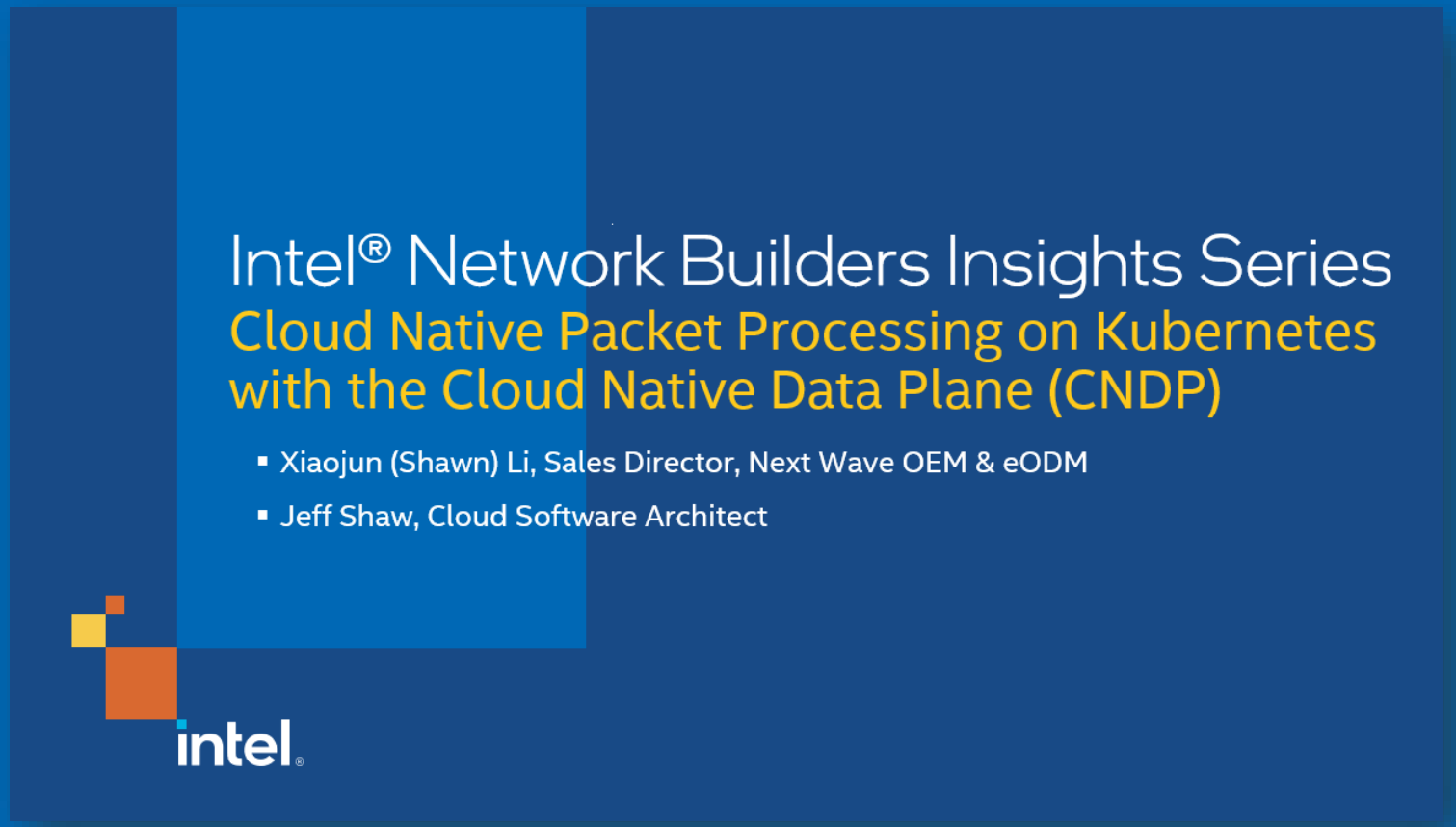
Join Us Next Time

May 4th @ 8am PDT



Performance Claims

Claim	Processor Family	System Configuration	Measurement	Measurement Period
Up to 1.74x higher performance on Intel Xeon D-2700 processor compared to prior generation for 5G UPF at the network edge	Intel® Xeon® D-2700 processors	New: 1-node, 1x Intel Xeon D-2798NX CPU on Intel reference platform (MoroCity) with 64 GB (4 slots/ 16GB/ 2933) total DDR4 memory, ucode 0x1000150, HT ON, Turbo OFF, Ubuntu 20.04 LTS (Focal Fossa), 5.4.0-91-generic, 1x Intel 240G SSD , 2x 100G E810-CQDA2 (chapman Beach) + 4x25G internal Port, PMA4, Gcc 9.3.0, test by Intel on 1/18/2022.Baseline: 1-node, 1x Intel Xeon D-2187NT CPU on Intel reference platform (Yuba City) with 64 GB (4 slots/ 16GB/ 2666) total DDR4 memory, ucode 0x2006c0a, HT ON, Turbo OFF, Ubuntu 20.04 LTS (Focal Fossa), 5.4.0-91-generic, 1x Intel 240G SSD , 3x E810-CQDA2 (Tacoma Rapids), PMA4, Gcc 9.3.0, test by Intel on 1/13/2022.	5G User Plane Function	New: 1/18/2022 Baseline: 1/13/2022
Up to 1.56x higher performance on Intel Xeon D-2700 processor compared to prior generation for vCMTS application	Intel® Xeon® D-2700 processors	New: 1-node, 1x Intel Xeon D-2798NX CPU on Intel reference platform (MoroCity) with 64 GB (4 slots/ 16GB/ 2933) total DDR4 memory, ucode 0x1000150, HT ON, Turbo OFF, Ubuntu 20.04 LTS (Focal Fossa), 5.4.0-91-generic, 1x Intel 240G SSD , 2x 100G E810-CQDA2 (chapman Beach) + 4x25G internal Port, vCMTS 20.10, Gcc 9.3.0, DPDK-20.08, test by Intel on 1/19/2022.Baseline: 1-node, 1x Intel Xeon D-2187NT CPU on Intel reference platform (Yuba City) with 64 GB (4 slots/ 16GB/ 2666) total DDR4 memory, ucode 0x2006c0a, HT ON, Turbo OFF, Ubuntu 20.04 LTS (Focal Fossa), 5.4.0-91-generic, 1x Intel 240G SSD , 3x E810-CQDA2 (Tacoma Rapids), vCMTS 20.10, Gcc 9.3.0, DPDK-20.08, test by Intel on 1/12/2022.	Virtual Cable Modem Termination System	New: 1/19/2022 Baseline: 1/12/2022
Up to 1.52x higher performance on Intel Xeon D-2700 processor compared to prior generation for VPP IP Security	Intel® Xeon® D-2700 processors	New:1-node, 1x Intel Xeon D-2798NX CPU on Intel reference platform (MoroCity) with 64 GB (4 slots/ 16GB/ 2933) total DDR4 memory, ucode 0x1000150, HT ON, Turbo OFF, Ubuntu 20.04 LTS (Focal Fossa), 5.4.0-91-generic, 1x Intel 240G SSD , 2x 100G E810-CQDA2 (Chapman Beach) + 1x100G internal Port, IPSEC - VPP 21.06 , Gcc 9.3.0, Ipsec MB v1.1, test by Intel on 1/14/2022.Baseline: 1-node, 1x Intel Xeon D-2187NT CPU on Intel reference platform (Yuba City) with 128 GB (4 slots/ 32GB/ 2666) total DDR4 memory, ucode 0x2006c0a, HT ON, Turbo OFF, Ubuntu 20.04.3 LTS (Focal Fossa), 5.4.0-91-generic, 1x Intel 240G SSD , 3x E810-CQDA2 (Tacoma Rapids), IPSEC - VPP 21.06 , Gcc 9.3.0, Ipsec MB v1.1, test by Intel on 1/14/2022.	Vector Packet Processing - IP Security	New: 1/14/2022 Baseline: 1/14/2022
Up to 1.8x higher performance on Intel Xeon D-2700 processor compared to prior generation for NGINX Secure TLS 1.3 Web-Server application	Intel® Xeon® D-2700 processors	New: 1-node, 1x Intel Xeon D-2798NX CPU on Intel reference platform (Moro City) with 64 GB (4 slots/ 16GB/ 2933) total DDR4 memory, ucode 0x1000150, HT ON, Turbo OFF, Ubuntu 20.04 LTS (Focal Fossa), 5.15.13-051513-generic, 1x Intel 240G SSD , 2x 100G E810-CQDA2 (Chapman Beach) + 1x100G internal Port, Async NGINX v0.4.7, Gcc 9.3.0, OpenSSL 1.1.1l, QAT Engine v0.6.10,Intel Ipsec MB v1.1, IPP-Crypto ippcp_2021.4, test by Intel on 2/7/2022.Baseline: 1-node, 1x Intel Xeon D-2187NT CPU on Intel reference platform (Yuba City) with 128 GB (4 slots/ 32GB/ 2666) total DDR4 memory, ucode 0x2006c0a, HT ON, Turbo OFF, Ubuntu 20.04.3 LTS (Focal Fossa), 5.15.13-051513-generic, 1x Intel 240G SSD , 3x E810-CQDA2 (Tacoma Rapids), Async NGINX v0.4.7, Gcc 9.3.0, OpenSSL 1.1.1l, test by Intel on 2/7/2022.	NGINX Secure TLS 1.3 Web-Server	New: 2/7/2022 Baseline: 2/7/2022
Up to 2.4x higher performance on Intel Xeon D-2700 processor compared to prior generation for OpenVINO Resnet50 Inferencing	Intel® Xeon® D-2700 processors	New: 1-node, 1x Intel Xeon D-2798NX CPU on Intel reference platform (Moro City) with 64 GB (4 slots/ 16GB/ 2933) total DDR4 memory, ucode 0x1000150, HT ON, Turbo OFF, Ubuntu 20.04 LTS (Focal Fossa), 5.4.0-91-generic, 1x Intel 240G SSD , Gcc 9.3.0, OpenVINO v2021.4.752, ResNet50, INT8, BS=1, test by Intel on 1/31/2022.Baseline: 1-node, 1x Intel Xeon D-2187NT CPU on Intel reference platform (Yuba City) with 64 GB (4 slots/ 16GB/ 2666) total DDR4 memory, ucode 0x2006c0a, HT ON, Turbo OFF, Ubuntu 20.04 LTS (Focal Fossa), 5.4.0-91-generic, 1x Intel 240G SSD , Gcc 9.3.0, OpenVINO v2021.4.752, ResNet50, INT8, BS=1, test by Intel on 1/31/2022.	ResNet50	New: 1/31/2022 Baseline: 1/31/2022

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