A Platform for the Future of IoT

The Internet of Things is transforming the way we do business. By connecting the unconnected, creating smart and connected things, and building a software-defined autonomous world, we are leading the way to healthier, safer, and more secure lives. The common denominator that will transform this vision into a reality is data. With access to data, the IoT can build a future with endless possibilities. Intel is redefining the performance and capabilities of the next generation of ultra-responsive and scalable machine to cloud IoT Systems with the introduction of Intel® Xeon® Scalable processors.
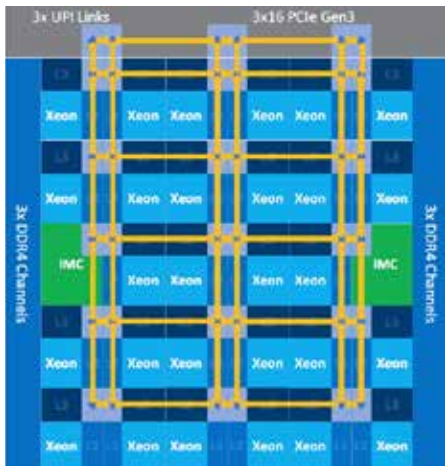
In the Intel® Xeon® Scalable processors mesh architecture with up to 24 cores, the Last Level Cache (LLC), six memory channels, and 48 PCIe channels are shared among all the cores, giving access to large resources across the entire die and creating dynamic scalability without sacrificing performance for a variety of deployments, such as virtualization.

Pervasive, Breakthrough Performance

From its mesh architecture and widely expanded resources to its hardware-accelerating and newly integrated technologies, the Intel® Xeon® Scalable processors enable a new level of consistent, pervasive, and breakthrough performance. Whether it's speeding up the diagnosis process by providing doctors with fast CT scan image processing, or building smarter cities that can analyze traffic data like never before, the Intel Xeon processor Scalable family provides you with up to 24 cores of processing power and six-memory channels to get the job done. When paired with the unparalleled speed of the Intel® Advanced Vector Extensions 512[3], peak performance is up to 1.52X[1] faster and helps to ensure the most demanding computational tasks in applications, such as video analytics, image processing, machine learning, signal processing, and data compression are completed quickly.

Intel® Xeon® Scalable processors provide consistent performance for diverse workloads

Market Segment	What Matters?	Intel® Xeon® Scalable Processor Advantages
Healthcare	Reducing patient risk and dosage exposure, with faster image-processing calculations	✓ Advanced core with Intel® AVX-512 extensions and increased memory bandwidth for fast image processing, reducing exposure time for patients
	Expediting diagnosis and treatment	✓ Fast response times with integrated 4x10Gbps (for uploading & sharing images)
Industrial	Increasing system reliability to keep operations running	✓ Maintaining continuous operation by helping to prevent cyber attacks with Intel® Boot Guard, Intel® Memory Protection Extensions, Intel® Platform Trust Technology
Video	Quickly retrieving and disseminating data to analyze traffic patterns and other city-monitoring applications	✓ Integrated and enhanced I/O delivers reduced latency and higher bandwidth to help meet performance and scale needs for video systems
Autonomous	Increasing memory bandwidth to support demanding Autonomous Driving workloads	✓ Six memory channels provide 50 percent increased memory bandwidth and capacity compared to previous generation[2]

For more complete information about performance and benchmark results, visit
www.intel.com/benchmarks

Built for the Connected World

The Intel® Xeon® Scalable processors were designed to keep up with your growing demands. Integrated Intel® Ethernet with scalable iWARP RDMA in the Intel® C620 series chipset provides up to four 10Gbps high-speed Ethernet ports for high data throughputs and low-latency. Ideal for storage, data intensive, and connected IoT solutions. Applications such as factory automation systems can now offer near-real-time processing.

With a richer set of I/O, 48 lanes of PCIe 3.0 per CPU, USB 3.0 and SATA 3.0 on Intel® C620 series chipset, the most demanding workloads such as video analytics are completed with ease. Also featuring up to three Intel® Ultra Path Interconnect (Intel® UPI) channels that increase scalability of the platform to as many as eight sockets, as well as improves inter-CPU bandwidth for I/O-intensive workloads.[3] Intel® UPI offers the perfect balance between improved throughput and energy efficiency. This expanded I/O set also improves total cost of ownership (TCO) by having larger performance pools in a single platform.

Industry-Leading Storage Support

Storage innovations have driven significant improvements in efficiency and performance of data-hungry workloads. Intel® Volume Management Devices (Intel® VMD) enables hot swapping of NVMe SSDs from the PCIe bus without shutting down the system, while standardized LED management helps provide much faster identification of SSD status. Support for Intel® Optane™ SSDs and Intel® 3D NAND Solid State Drives delivers an industry-leading combination of high throughput, low latency, high QoS, and ultra-high endurance to break through data access bottlenecks.[4] Intel® Intelligent Storage Acceleration Library (Intel® ISA-L) optimizes storage operations, such as encryption, for increased storage performance.[5] These innovations are well-suited for digital healthcare and video storage systems.

Security Enabled

Helping to secure your Intel® Xeon® Scalable processor-based system means technologies like Intel® Boot Guard and Intel® Memory Protection Extensions play an integral role in providing additional layers of data and system level protection. The Intel® Xeon® Scalable processors help build highly trusted infrastructures with world-class platform data protection, resiliency, and uptime. As more data-rich workloads flow through IoT infrastructures and high-performance edge devices, the comprehensive suite of hardware-enhanced features brings better data- and platform-level protection mechanisms for trusted services in edge and IoT devices.

Whether a manufacturer needs to move information to different servers or healthcare providers need to transmit and store data while maintaining patient privacy, communications are enabled to be protected and comply with regulatory compliances. Integrated Intel® Platform Trust Technology (Intel® PTT) and Intel® Trusted Execution Technology (Intel®TXT) also help protect the platform and control workloads in increasingly virtualized and distributed environments.

Enhanced Intel® Run Sure Technology (Intel® RST) provides new enhancements to deliver advanced Reliability, Availability and Serviceability (RAS) and device uptime, helping to protect the most critical workloads. Hardware-assisted capabilities diagnose and recover from previously fatal errors while helping to maintain data integrity within the memory subsystem.

Supported Future

Offering a 10-year use case reliability, the Intel® Xeon® Scalable processors help protect your system from the taxing IoT use conditions. With 15-year production availability, the platform is built for the future and investments are protected. It also allows for greater device development and integration. The range of high-productivity software tools, optimized libraries, foundational building blocks, and flexible frameworks for parallel computing help simplify workflows. Developers can create applications with confidence, helping to provide quicker medical decisions or build more intelligent city-management object recognition technology that will have continued lifecycle with minimal modification.

Complementary Offerings for Even Greater Performance, Scalability

Intel also offers a broad hardware and software portfolio that complements this new processor. Intel® FPGAs offer efficient acceleration[6] along with flexibility when using programmable hardware for low-latency applications, such as virtual switching, data analytics, and machine learning. Pairing this with the range of software tools and libraries for general and highly parallel computing, developers can easily optimize applications for Intel® architecture.

Intel® Xeon® Scalable Processors at a Glance

Intel® Xeon® Scalable processors offer a range of performance, scalability, and feature options to meet a wide variety of workloads in the data center, from the most advanced (Intel® Xeon® Platinum Processor 8XXX Family) to entry-level (Intel® Xeon® Bronze Processor 3XXX Family).

Best Performance, Most Scalable, Best Business Agility

Intel® Xeon® Platinum Processor 8XXX Family

- Best choice for mission-critical, real-time analytics, machine learning, and artificial intelligence workloads
- Best workload-optimized performance* for general-purpose compute and multi-cloud deployments
- Best performance for the most demanding storage and networking workloads
- Best memory bandwidth and 2, 4, 8+ socket scalability

Great Performance, Fast Memory + More Interconnect/Accelerator Engines

Intel® Xeon® Gold Processor 6XXX Family

- Significant workload-optimized performance improvements for general-purpose compute
- Significant improvements for demanding storage and networking workloads
- Highest memory speed, highest memory capacity, and enhanced Intel® AVX-512
- Enhanced 2-4 socket scalability and performance

Best Performance, Advanced Reliability

Intel® Xeon® Gold Processor 5XXX Family

- Improved performance for compute-bound workloads
- Affordable advanced RAS and 4-socket scalability
- Suitable for a wider range of workloads

Efficient Performance at Low Power

Intel® Xeon® Silver Processor 4XXX Family

- Solid compute capability (Hyper-Threading, Turbo Boost)
- Improved memory speed, energy efficiency
- Suitable for a moderate range of workloads

Entry-level Performance and HW-Enhanced Security

Intel® Xeon® Bronze Processor 3XXX Family

- Affordable, entry-level 2-socket support suitable for light-range workloads
- Reliable upgrade versus Intel® Xeon® processor E3 product family

For more complete information about performance and benchmark results, visit **www.intel.com/benchmarks**

Family Features

	Intel® Xeon® Bronze Processor (3000 Series)	Intel® Xeon® Silver Processor (4000 Series)	Intel® Xeon® Gold Processor (5000 Series)	Intel® Xeon® Gold Processor (6000 Series)	Intel® Xeon® Platinum Processor (8000 Series)
Pervasive Performance and Security					
Highest Core Count Supported	8 cores	12 cores	14 cores	20 cores	24 cores[a]
Highest Supported Frequency	1.7 GHz (8C/85W)	2.2 GHz (10C/85W)	2.3GHz (12C/105W)	2.6GHz (12C/125W)	2.1 GHz (24C/150W)
Number of CPU Sockets Supported	Up to 2	Up to 2	Up to 4	Up to 4	Up to 8
Intel® Ultra Path Interconnect (Intel® UPI)	2	2	2	3	3
Intel® Ultra Path Interconnect (UPI) Speed	9.6 GT/s	9.6 GT/s	10.4 GT/s	10.4 GT/s	10.4 GT/s
Intel® Advanced Vector Extensions 512 (AVX-512)	1 FMA	1 FMA	1 FMA	2 FMA	2 FMA
Memory Speed Support (DDR4)	2133 MHz	2400 MHz	2400 MHz	2666 MHz	2666 MHz
Highest Memory Capacity Supported Per Socket	768 GB	768 GB	768 GB	768 GB	768 GB
Intel® Optane ™ Technology-based SSDs (3D XPoint™)	•	•	•	•	•
Intel® SSD Data Center Family (3D NAND)	•	•	•	•	•
PCIe 3.0 (48 lanes)	•	•	•	•	•
Intel® QuickData Technology (CBDMA)	•	•	•	•	•
Non-Transparent Bridge (NTB)	•	•	•	•	•
Intel® Turbo Boost Technology 2.0		•	•	•	•
Intel® Hyper-Threading Technology		•	•	•	•
High Reliability					
Reliability, Accessibility and Serviceability (RAS) Capability	Standard	Standard	Standard	Advanced	Advanced
Intel® Run Sure Technology				•	•
Agility & Efficiency					
Intel® Volume Management Device (VMD)	•	•	•	•	•
Intel® VT-x	•	•	•	•	•
Intel® Speed Shift Technology	•	•	•	•	•
Intel® Node Manager 4.0	•	•	•	•	•
Security					
Intel® Memory Protection Extensions (MPX)	•	•	•	•	•
Mode-based Execute Control	•	•	•	•	•
Intel® Platform Trust Technology (PTT)	•	•	•	•	•
Intel® TXT w/One-Touch Activation (OTA)	•	•	•	•	•

[a] Note: Platinum SKU not on IOTG roadmap but available via the IOTG- Supplemental Product SKUs (SPS) Process

Intel® Xeon® Scalable Processors SKUs

Class	SKU	Cores	Based Non-AVX Speed (GHz)	TDP (W)
Gold	6138	20	2.0	125
Gold	6130T[a]	16	2.1	125
Gold	6130	16	2.1	125
Gold	6126T[ab]	12	2.6	125
Gold	6126[b]	12	2.6	125
Gold	5120T[a]	14	2.2	105
Gold	5119T[a]	14	1.9	85
Gold	5118	12	2.3	105
Silver	4116T[a]	12	2.1	85
Silver	4116	12	2.1	85
Silver	4114T[a]	10	2.2	85
Silver	4110	8	2.1	85
Silver	4109T[a]	8	2.0	70
Bronze	3106	8	1.7	85

[a] Note: SKUs optimized for extended reliability (10-year use) and NEBS-friendly thermal specification
[b] Note: SKUs optimized for highest per-core performance and have non-default 19.25 MB cache

Intel® C620 Series Chipset SKUs

Product	10Gb/1Gb Ethernet Ports	Max PCIe* Uplink	TDP (W)
Intel® C624 Chipset	4/4	x16	19
Intel® C622 Chipset	2/4[a]	x8	17
Intel® C621 Chipset	0/4	x1	15

[a] Note: Four ports total: ports 0 & 1 can run up to 10GbE, while ports 2 & 3 are limited to 1GbE

Software Overview

The following independent operating system and BIOS vendors provide support for these platforms.

OS Type	Operating System[8] (Targeted for Support)	Support[7]	Distribution	BIOS
Linux	Red Hat* Enterprise Linux 7.2, 7.3	Red Hat		American Megatrends Inc
	SUSE* Linux Enterprise Server 11 SP4, 12 SP2	SUSE, Open Source	SUSE	
	Ubuntu* 15.10, 16.04 LTS	Canonical, Open Source	Canonical	
	Yocto* Linux	Intel, Open Source	Yocto Project*	Insyde Software
	CentOS* 6.8, 7.3, FreeBSD	Open Source		
Windows*	Microsoft Windows* Server 2016 (including Nano Server), Server 2012 R2	Intel, Microsoft	Microsoft	Phoenix Technologies
VMM	Linux KVM	Open Source Community		
	VMware* ESXi	VMware*, Open Source		BYOSOFT
	Microsoft Windows* Hyper-V	Microsoft		
	Xen* 4.7	Linux* Foundation, Open Source		

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.

Intel technologies' features and benefits depend on system configuration and may require enabled hardware, software, or service activation. Performance varies depending on system configuration. No computer system can be absolutely secure. Check with your system manufacturer or retailer, or learn more at www.intel.com.

Cost-reduction scenarios described are intended as examples of how a given Intel®-based product, in the specified circumstances and configurations, may affect future costs and provide cost savings. Circumstances will vary. Intel does not guarantee any costs or cost reduction.

Where to Get More Information

Learn more about the Intel® Xeon® Scalable processors at www.intel.com/design/products-and-solutions/processors-and-chipsets/purley/intel-xeon-scalable-processors.html

Learn more about IoT at intel.com/iot

1 Up to 1.52x claim based on SPECint*_rate_base2006 : 1-Node, 2 x Intel® Xeon® Processor E5-2699 v4 on Grantley-EP (Wellsburg) with 256 GB Total Memory on Red Hat* Enterprise Linux* 7.2-kernel 3.10.0-327 using Compiler: C/C++: Version 16.0.0.101 of Intel C++ Studio XE for Linux;   - Fortran: Version 16.0.0.101 of Intel Fortran Studio XE for Linux. Data Source: Request Number: 2342, Benchmark: SPECint*_rate_base2006, Score: 1670 vs. 1-Node, 2 x Intel® Xeon® Platinum 8180 Processor on Neon City with 384 GB Total Memory on Red Hat Enterprise Linux* 7.2-kernel 3.10.0-327 using CPU2006_FOR-OEMs-cpu2006-1.2-ic17.0-lin-binaries-20160922. Data Source: Request Number: 2498, Benchmark: SPECint*_rate_base2006, Score: 2550 Higher is better.

2 Intel® Xeon® Scalable processors offer 6-memory channels versus Intel® Xeon® E5 v4 processors offer 4-memory channels.

3 Up to 2.27x claim based on LINPACK*: 1-Node, 2 x Intel® Xeon® Processor E5-2699 v4 on Grantley-EP (Wellsburg) with 64 GB Total Memory on Red Hat Enterprise Linux* 7.0 kernel 3.10.0-123 using MP_LINPACK 11.3.1 (Composer XE 2016 U1). Data Source: Request Number: 1636, Benchmark: Intel® Distribution of LINPACK, Score: 1446.4 Higher is better vs. 1-Node, 2 x Intel® Xeon® Platinum 8180 Processor on Wolf Pass SKX with 384 GB Total Memory on Red Hat Enterprise Linux* 7.3 using mp_linpack_2017.1.013. Data Source: Request Number: 3753, Benchmark: Intel® Distribution of LINPACK, Score: 3295.57 Higher is better.

4 System Configuration: 4 Node vSAN* Cluster. Per Node configuration: Supermicro* SuperServer 2028U-TN24R4T+ Dual Intel® Xeon® E5-2687Wv4 (12 Core @ 3.0 Ghz), Supermicro* Server Board, 256 GB DDR4 RAM, Boot Drive, 1x Intel® SSD DC S3710 Series (200 GB, 2.5"), vSAN Intel 3D NAND Cluster: Virtual SAN SSDs - 2 Disk Groups comprised of 2x Intel® SSD DC P4600 Series (1.6TB, 2.5" SFF), 8x Intel® SSD DC P4500 Series (4 TB, 2.5" SFF), vSAN Intel 2D NAND Cluster: Virtual SAN SSDs - 2 Disk Groups comprised of 2x Intel® SSD DC P3700 Series (800GB, 2.5" SFF), 8x Intel® SSD DC P3500 Series (2 TB, 2.5" SFF), Intel® Ethernet Server Adapter X540-DA2.

5 Intel Xeon® processor Scalable Family: Platinum 8180 Processor, 28C, 2.5 GHz, H0, Neon City CRB, 12x16 GB DDR4 2666 MT/s ECC RDIMM, BIOS PLYCRB1.86B.0128.R08.1703242666.

Intel® Xeon® E5-2600v4 Series Processor, E5-2650 v4, 12C, 2.2 GHz, Aztec City CRB, 4x8 GB DDR4 2400 MT/s ECC RDIMM, BIOS GRRFCRB1.86B.0276. R02.1606020546.

Operating System: Redhat* Enterprise Linux 7.3, Kernel 4.2.3, ISA-L 2.18, BIOS Configuration, P-States: Disabled, Turbo: Disabled, Speed Step: Disabled, C-States: Disabled, ENERGY_PERF_BIAS_CFG: PERF.

6 As measured by Intel® Xeon® processor Scalable Family with Intel® FPGA optimized workload and Intel® Xeon® processor Scalable Family without FPGA optimized workload.

7 This is the OS list that is tested internally and does NOT reflect the OS vendor support for these exact release versions. Please contact respective OS vendor(s) for the release version numbers and support. Several software patches will be upstreamed and will be picked up over time. These will be required to enhance platform support.

8 Intel only provides support for our tools, patches, and utilities on the OS. Actual OS support should come from the OS vendor.

* Other names and brands may be claimed as property of others