



Power up your next IoT project with 3rd Gen Intel® Xeon® Scalable processors

Deliver flexible performance for compute-intensive IoT workloads with the next evolution in processing



IoT applications are making the world smarter, more connected, and more efficient. Across industries, edge devices and distributed applications are demonstrating a massive impact. However, these game-changing results aren't without technical and business challenges. Security, performance, and cost are critical issues that those changing the world with IoT technologies need to address.

The 3rd Gen Intel® Xeon® Scalable processor is designed to make meeting these critical requirements simpler and easier.

Achieve more with the next evolution in IoT compute, memory, I/O, AI, and security

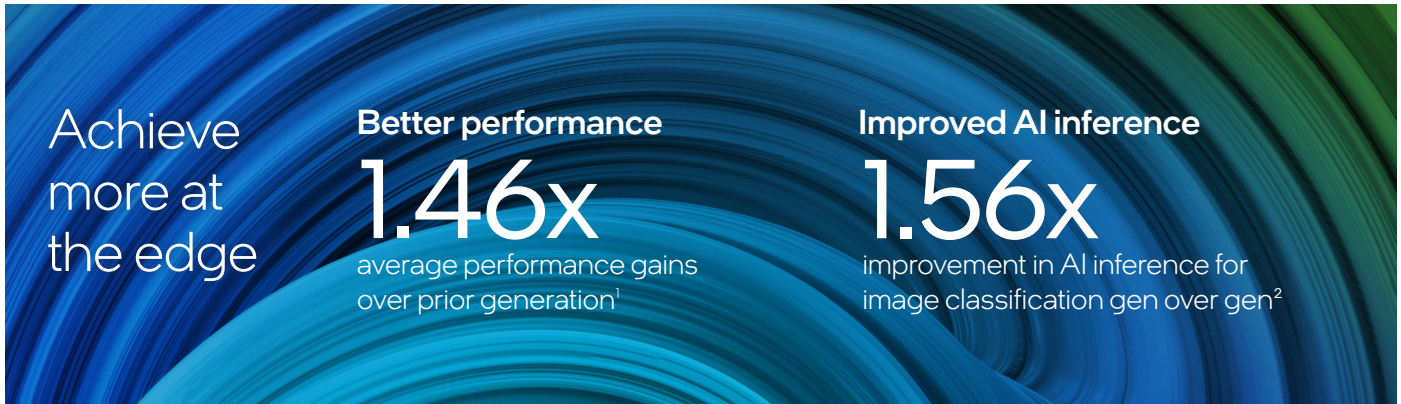
The 3rd Gen Intel Xeon Scalable processor delivers advanced performance, security, and efficiency alongside built-in AI acceleration. In your IoT solution designs, you can achieve 1.46x average performance gains over the prior generation.¹ Intel® Deep Learning Boost delivers a 1.56x improvement in AI inference for image classification gen over gen.²

Increase performance with built-in AI acceleration

As businesses adjust to increasingly performance-hungry AI video and analytics use cases, 3rd Gen Intel Xeon Scalable processors can help ease the technical debt of legacy solutions and facilitate a smoother transition to future technology investments. Enhanced performance and instruction processing powers help you enhance results and optimize speed. Intel Deep Learning Boost (VNNI) drives exceptional inference for AI in flexible configurations.

Take advantage of foundational agility, flexibility, and efficiency

3rd Gen Intel Xeon Scalable processors help you meet evolving business and budget goals with greater control and configuration flexibility. Intel® Speed Select Technology (Intel® SST) is a collection of features that improve performance and optimize TCO by providing more control over CPU performance. Plus, Intel® Resource Director Technology (Intel® RDT) enables monitoring and control of shared resources to deliver better quality of service for applications, virtual machines (VMs), and containers.



Enhance security with advanced technologies

Reduce your attack surface, help prevent memory snooping, and deliver confidence in edge server deployments with robust security technologies. Built-in encryption accelerators provide enhanced crypto processing acceleration of vector AES, SHA, and RSA/DH protocols. Plus, take advantage of Intel® Software Guard Extensions (Intel® SGX) to help protect sensitive data in trusted enclaves and Intel® Total Memory Encryption (Intel® TME) to enable full physical memory encryption.

Meet the demands of next-gen projects

3rd Gen Intel Xeon Scalable processors provide critical capabilities to help you meet ever-increasing IoT demands:

- Employ faster Ultra Path Interconnect (UPI) to deliver enhanced interplatform data movement performance³
- Accelerate I/O with PCIe 4.0 and up to 64 lanes (per socket) at 16 GT/s⁴
- Utilize up to 6 TB/socket⁵ of total system memory and enhanced performance with support for up to 3200 MT/s DIMMs (2 DPC)
- Leverage an increase of up to 1.6x memory bandwidth⁶ and up to 2.66x memory capacity⁷ over the previous-generation processors
- Connect more peripherals, more SSDs, and more accelerators to help achieve low TCO for both video analytics and storage while leveraging Intel® Optane™ persistent memory⁸ and Intel® Optane™ SSDs

Leverage high-bandwidth connectivity

The higher bandwidth of PCIe 4.0 unlocks higher storage performance with double the speed of PCIe 3.0.

Get to market faster with Intel partners and solutions

Intel is part of a large and expanding ecosystem that is driving innovation at the edge. Intel and our IoT technology partners work together to help you build and deploy high-performance embedded devices.

Intel® Partner Alliance can help you accelerate the design and deployment of intelligent devices and analytics so you can deliver first-in-market IoT solutions.

Intel® Solutions Marketplace is a searchable directory where you can find ready-to-run solutions and connect with Intel partners that can help you develop your IoT products.

Intel® AI: In Production is our partner community for computer vision and edge AI equipment providers, system integrators, software providers, and solution aggregators/distributors who can help you integrate scalable AI solutions into your IoT platforms.



Key features

Performance

- Up to 28 cores/socket in IoT SKUs⁹
- 1.46x average performance gains over prior generation¹
- PCH includes Intel® C620A series chipset that enhances security with new stepping and new firmware signing keys
- Advanced processor architecture with Intel® Mesh Architecture and Intel® Data Direct I/O Technology (Intel® DDIO) delivers intelligent, system-level I/O performance
- Vector Bit Manipulation Instructions (VBMI) helps accelerate applications with in-line data compression and immediate algorithm operations

AI acceleration

- Intel Deep Learning Boost delivers a 1.56x improvement in AI inference for image classification gen over gen²
- Intel® Advanced Vector Extensions 512 (Intel® AVX-512) and Intel Deep Learning Boost provide built-in AI acceleration
- The Intel® Distribution of OpenVINO™ toolkit optimizes AI performance with “write once, deploy anywhere” efficiency
- AI architects can test-drive the Intel Distribution of OpenVINO toolkit on 3rd Gen Intel Xeon Scalable processors using Intel® DevCloud for the Edge

Virtualization and manageability

- Intel Speed Select Technology (Intel SST) provides more control over CPU performance to help optimize TCO
- Intel Resource Director Technology enables monitoring and control over shared resources to help increase resource utilization
- Intel® Virtualization Technology (Intel® VT-x) offers seamless VM migration from up to five prior generations of Intel Xeon processors

Security

- Intel® Software Guard Extensions (Intel® SGX) allows creating trusted enclaves within applications; a maximum enclave size of 1 TB can be supported in a two-socket server. IoT SKUs support a maximum enclave size of 64 GB.¹⁰
- Intel® Total Memory Encryption (Intel® TME) completely encrypts top security data in memory, with small performance overhead

Storage

- Validated for Intel® 3D NAND SSDs and Intel Optane SSDs⁸
- Intel® Volume Management Device 2.0 (Intel® VMD) enables aggregation of storage devices, with robust hot-plug capability and LED management
- Intel® Virtual RAID on CPU (Intel® VROC) uses Intel® VMD to RAID NVMe SSDs to CPU directly

Memory and I/O

- PCI Express 4.0 and 64 lanes (per socket) at 16 GT/s
- Support for up to 3200 MT/s DIMMs (2 DPC)
- Increased memory capacity with eight channels
- 16 GB–based DDR4 DIMM support, up to 256 GB DDR4 DIMM support
- Leverage breakthrough system memory and storage with Intel® Optane™ persistent memory 200 series and Intel Optane SSD support to reach up to 6 TB system memory per socket⁵

Flexible deployments

- Long-life availability¹¹ to support ongoing validation and certification in key markets
- Yocto Project Linux support
- TDP between 105W and 205W¹²

 Use cases

3rd Gen Intel Xeon Scalable processors are optimized for IoT usage, with key technologies such as Intel Deep Learning Boost to help accelerate AI workloads. The portfolio delivers up to 28 cores in a standard socket⁹ to help meet demanding IoT customer requirements across TDP ranges of 105W to 205W.¹²

Video: Analyze multiple video streams quickly

Applications: Video storage servers, video analytics servers

- Improved performance and more cores along with increased memory bandwidth⁵ allow for faster object recognition analysis on multiple video streams simultaneously.
- Intel VMD enables hot-swapping NVMe SSDs without service outages. Hardware-assisted security features such as Intel TME and Intel SGX help secure servers and help protect data in memory.

Industrial sectors: Expedite IT/OT convergence

Applications: Edge servers, test and measurement controllers

- Gather and analyze data fast, consolidate computing workloads, and help harden data security
- Use machine vision and deep learning inference for assembly verification, defect detection, and quality inspection
- More cores⁹ and fast object recognition analysis help machine vision operate accurately and efficiently

Healthcare: Enhance privacy while augmenting clinical workflows

Applications: High-end imaging systems, CAT scan, MRI, and X-ray

- Enable federated learning and allow research institutions to collaborate without sharing confidential patient data
- Increase throughput with PCIe 4.0 to enable movement and analysis of large healthcare data sets—including digital pathology, genomics, drug discovery, and medical imaging
- Help radiologists more quickly identify, quantify, and compare features in imaging data to automate and standardize complex diagnoses

Public sector: Create a more secure foundation

Applications: Avionics, communication networks, and rugged servers

- Encrypt all memory accessed by the CPU, including customer credentials, intellectual property, encryption keys, and personal information transmitted on external memory
- Help protect platforms against malware or privileged malware by using Intel SGX to partition data and applications into highly protected memory enclaves

Retail, banking, hospitality, and education: Process more data and transactions, more efficiently

Applications: Edge servers, transactional back-end servers, VDI, IDV, and transparent computing servers

- Enable AI workloads to run on servers more efficiently, using key technologies such as Intel Deep Learning Boost
- Accelerate applications with in-line data compression and immediate algorithm operations, helping improve in-memory analytics performance with Vector Bit Manipulation Instructions
- Get the expanded memory capacity to deliver rich, interactive customer experiences or custom content for remote classrooms

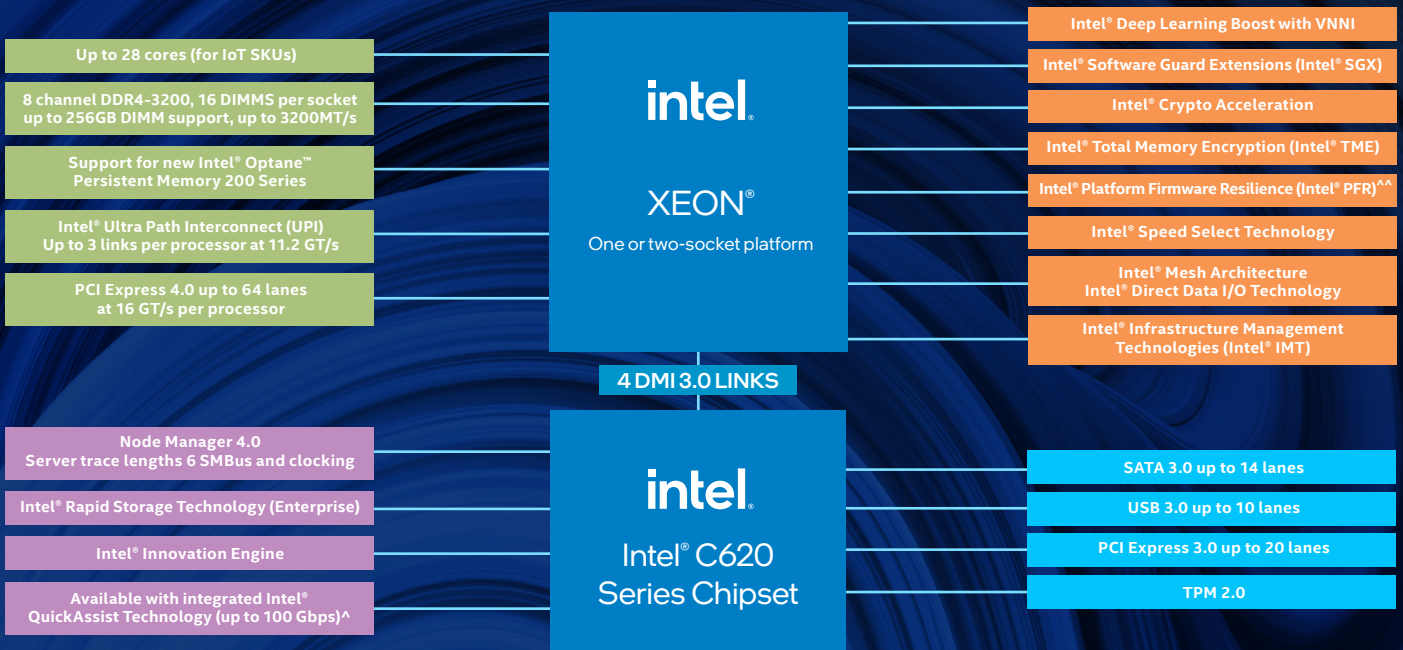
Software Overview

OS TYPE	OPERATING SYSTEM [^]	SUPPORT ^{^^}	DISTRIBUTION	BIOS
Linux	Red Hat Enterprise Linux 7.8 and later 7.x branches	Red Hat		American Megatrends
	Red Hat Enterprise Linux 8.2 and later 8.x branches	Red Hat		
	SUSE Enterprise Linux SLE 15 SP2 and later	SUSE, Open Source	SUSE	
	Ubuntu 20.04 LTS and later	Canonical, Open Source	Canonical	Insyde Software
	Wind River Linux	Wind River		
	Yocto Project latest	Intel, Open Source	Yocto Project	Phoenix Technologies
	Clear Linux latest	Open Source Community		
Windows	Windows Server 2016 LTSC and 2019 LTSC Windows Server 19H1, 19H2, 20H1, 20H2	Intel, Microsoft	Microsoft	BYOSOFT
VMM	Linux KVM	Open Source Community		
	Microsoft Azure	Microsoft		
	Hyper-V: Win Server 2016 LTSC, 2019 LTSC	Microsoft		
	VMware ESXi (contact VMware)	VMware, Open Source		

[^]Intel does not certify or fully validate any OS. This list is what was used for internal platform testing.

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

3rd Gen Intel® Xeon® Scalable Processor Block Diagram



[^]Intel QuickAssist Technology is not POR for IOTG. Provided here for reference purposes only.

^{^^}Intel PFR is not POR for IOTG. Provided here for reference purposes only.

Processor Lineup

PRODUCT SKU	NUMBER OF CORES	BASE NON-AVX CPU FREQUENCY (GHZ)	POWER/TDP (W)	INTEL® SPEED SELECT TECHNOLOGY (INTEL® SST)	INTEL SST BASE FREQUENCY, TURBO FREQUENCY, CORE POWER	INTEL® SOFTWARE GUARD EXTENSIONS (INTEL® SGX) ENCLAVE SIZE	ADVANCED/STANDARD RAS1
Intel® Xeon® Gold 6330 Processor	28	2	205	N	Y	64GB	A
Intel® Xeon® Gold 6338T Processor	24	2.1	165	N	Y	64GB	A
Intel® Xeon® Gold 6336Y Processor	24	2.4	185	Y	Y	64GB	A
Intel® Xeon® Gold 6326 Processor	16	2.9	185	N	Y	64GB	A
Intel® Xeon® Gold 5318Y Processor	24	2.1	165	Y	Y	64GB	A
Intel® Xeon® Gold 5320T Processor	20	2.3	150	N	Y	64GB	A
Intel® Xeon® Gold 5317 Processor	12	3	150	N	Y	64GB	A
Intel® Xeon® Gold 5315Y Processor	8	3.2	140	Y	Y	64GB	A
Intel® Xeon® Silver 4316 Processor	20	2.3	150	N	Y	8GB	S
Intel® Xeon® Silver 4314 Processor	16	2.4	135	N	Y	8GB	S
Intel® Xeon® Silver 4310 Processor	12	2.1	120	N	Y	8GB	S
Intel® Xeon® Silver 4310T Processor	10	2.3	105	N	Y	8GB	S

All Gold and Silver 16C/135W SKUs support Intel® Optane™ persistent memory 200 Series

A = Advanced RAS
S = Standard RAS

Learn more about 3rd Gen Intel Xeon Scalable processors at intel.com/icelake-sp.



1. See [125] at www.intel.com/3gen-xeon-config. Results may vary.
2. See [121] at www.intel.com/3gen-xeon-config. Results may vary.
3. 3x Intel® Ultra Path Interconnect (Intel® UPI) available in new Intel® Xeon® Gold 5300 processors and higher.
4. The x4 3rd Gen Intel Xeon Scalable processor DMI lanes can only be used as DMI lanes and cannot be used as PCIe lanes.
5. Maximum memory support of 6 TB is based on all eight memory channels populated with one 256 GB DDR4 DIMM and one 512 GB Intel Optane Memory 200 series DIMM.
6. 8Ch 3200 MT/S (2 DPC) vs. 2nd Gen Intel Xeon Scalable processor 6Ch 2666 MT/S (2 DPC).
7. In a two-socket configuration, eight channels (256 GB DDR4) vs. 2nd Gen Intel Xeon Scalable processor, eight channels (128 GB DDR4).
8. Intel® Optane™ persistent memory (PMem) does not work with Intel® SGX.
9. The 3rd Gen Intel Xeon Scalable platform offers a maximum of 40 cores/socket; a maximum of 28 cores/socket are offered on the IOTG road map.
10. SKUs with larger enclave sizes can be purchased from IOTG via the IOTG SPS program.
11. Intel does not commit or guarantee product availability or software support by way of road map guidance. Intel reserves the right to change road maps or discontinue products, software, and software support services through standard EOL/PDN processes. Please contact your Intel account rep for additional information.
12. Targeting ~105W-205W on IOTG SKUs.

Notices and Disclaimers

Intel® Advanced Vector Extensions (Intel® AVX) provides higher throughput to certain processor operations. Due to varying processor power characteristics, utilizing AVX instructions may cause, a) some parts to operate at less than the rated frequency and, b) some parts with Intel® Turbo Boost Technology 2.0 to not achieve any or maximum turbo frequencies. Performance varies depending on hardware, software, and system configuration, and you can learn more at <http://www.intel.com/go/turbo>.

Intel® processors of the same SKU may vary in frequency or power as a result of natural variability in the production process.

Performance varies by use, configuration and other factors. Learn more at www.intel.com/PerformanceIndex.

Performance results are based on testing as of dates shown in configurations and may not reflect all publicly available updates. See backup for configuration details. No product or component can be absolutely secure.

Intel contributes to the development of benchmarks by participating in, sponsoring, and/or contributing technical support to various benchmarking groups, including the BenchmarkXPRT Development Community administered by Principled Technologies.

Your costs and results may vary.

Intel® technologies may require enabled hardware, software, or service activation.

Some results may have been estimated or simulated.

Not all features are available on all SKUs.

Not all features are supported in every operating system.

All product plans and roadmaps are subject to change without notice.

Statements in this document that refer to future plans or expectations are forward-looking statements. These statements are based on current expectations and involve many risks and uncertainties that could cause actual results to differ materially from those expressed or implied in such statements. For more information on the factors that could cause actual results to differ materially, see our most recent earnings release and SEC filings at www.intc.com.

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