Deploy new levels of performance, connectivity, and accelerated AI with 4th Gen Intel® Xeon® Scalable processors for IoT. Use up to 52 cores\(^1\) to deliver fast performance and benefit from breakthrough memory and I/O capabilities with PCIe 5.0, DDR5 memory and Compute Express Link (CXL) 1.1. Drive powerful AI with a new acceleration engine under the Intel® Deep Learning Boost (Intel® DL Boost) framework called Intel® Advanced Matrix Extensions (Intel® AMX). Address complex edge-server workloads, including video analytics, medical imaging, and industrial machine vision, with greater efficiency, long-life availability,\(^2\) and high-reliability/long-use-life SKUs\(^3\) that help maximize the value from technology investments.

Accelerate advanced workloads with a new AI engine

Design and deploy AI projects faster with more-efficient and optimized training and inference. Intel AMX brings extensive hardware and software optimizations, with support for INT8 and BF16 data types, to enable fast and efficient AI and deep learning for IoT applications in video analytics, industrial machine vision, and visual data edge servers.

DDR5-driven multitasking and boosted data mobility

Ramp up memory capacity and speed with up to eight channels of DDR5 and up to 16 DIMMs per socket and support for 3rd Gen Intel® Optane™ persistent memory. This platform supports up to 4800 MT/s at one DPC or 4400 MT/s at two DPC. The introduction of hardware-enabled Intel® Data Streaming Accelerator improves data mobility between compute, storage, and networking layers, while PCIe 5.0—enabled Compute Express Link (CXL) 1.1 helps ensure coherent interconnects between CPUs and accelerators working on the same data.

Robust platform hardening

Help reduce attack surfaces while strengthening protections for memory and firmware. The 4th Gen platform integrates many of the key technologies that solution providers depend on to help protect customer IP and data from unauthorized access.

- Intel® Software Guard Extensions (Intel® SGX) helps protect data in flight by isolating workloads within memory enclaves, which can be effective against privileged malware attacks.
- Intel® Total Memory Encryption (Intel® TME) helps secure total system memory, including user credentials and encryption keys, which helps defend against DIMM removal attacks.
- Intel® Platform Firmware Resilience (Intel® PFR) monitors system bus traffic, verifies platform integrity, and restores corrupted firmware.
More flexibility and manageability with high VM density

Drive workload consolidation with more-powerful and effective tools. This platform provides a host of capabilities to streamline resource management in highly virtualized environments, enabling high numbers of VMs on consolidated servers.

- **Intel® Resource Director Technology (Intel® RDT)** provides more visibility into shared resources such as last-level cache to help reduce resource contention between applications and VMs.
- **Intel® Speed Select Technology (Intel® SST)** supports platform tuning with multiple configurations per server and the ability to allocate different CPU frequencies to specific workloads, raising or lowering overall TDP.
- **Intel® Scalable I/O Virtualization (Intel® Scalable IOV)** enables scalable sharing of I/O devices across more VMs and containers.

Connect more devices with 80 lanes of PCIe 5.0

Get expandability to support more devices, add-in cards, and accelerators for flexible solution customization. The PCIe 5.0—ready 4th Gen platform supports future I/O needs with industry-leading bandwidth, featuring up to 80 lanes of PCIe 5.0 on the CPU and up to three Intel® Ultra Path Interconnect (Intel® UPI) 2.0 links of up to 16 GT/s. The PCH provides an additional 20 lanes of PCIe 3.0 for 100 lanes total.

Long-life availability with long-use-life SKUs

Customers in multiple industries, including healthcare, the public sector, and manufacturing, depend on a steady supply of inventory, oftentimes for equipment that needs to operate always-on for many years. IoT SKUs of the 4th Gen Intel Xeon Scalable platform provide long-life manufacturing availability to help customers extend the life of their systems and ensure replacements throughout the equipment life cycle. Select SKUs also support high-reliability, long-life use of up to 10 years, up to 100 percent active (no turbo), with support for extended-use temperatures.

Key features

**Performance**
- Up to 52 cores/sockets on IoT SKUs with the overall Intel® product lineup offering SKUs up to 60 cores
- Socket scalability with support for 1S or 2S platforms

**Accelerated AI**
- Intel AMX accelerates a variety of DL inference and training workloads with BFl6 and INT8 data type support
- Optimized for industry-relevant frameworks and libraries
- Support for the Intel® Distribution of OpenVINO™ toolkit to accelerate AI inferencing workloads

**Memory and I/O**
- Up to eight channels DDR5 per CPU, up to 16 DIMMs per socket, and up to 4,800 MT/s (IDPC) or 4,400 MT/s (1 and 2DPC)
- Up to 80 lanes of PCIe 5.0 on the CPU with up to three Intel UPI 2.0 links at up to 16 GT/s
- Up to 20 lanes PCIe 3.0 on the PCH with up to 20x SATA 3 ports and up to 10x USB 3.1 Gen 1 (5 Gbps) ports
- CXL 1.1 for coherent interconnects between CPUs and accelerators or external devices
- Validated for Intel® Optane™ Persistent Memory 300 Series

**Virtualization and manageability**
- Intel SST available on select SKUs for enhanced control over CPU performance to help optimize TCO
- Intel RDT to enable monitoring and control over shared resources
- Intel Scalable IOV for efficient resource allocation across VMs, containers, and functions
- Support for shared virtual memory

**Greater security**
- Intel SGX for trusted memory enclaves within applications
- Intel TME to encrypt top-security data in memory with a small performance overhead
- Intel PFR for firmware resilience and platform integrity

**Storage**
- Intel® Volume Management Device 3.0 (Intel® VMD 3.0) for storage aggregation with robust hot-plug capability and LED management
- Intel® Virtual RAID on CPU (Intel® VROC)

**Software**
- Cross-architecture support with Intel® oneAPI toolkit
- Multiple OS support: Windows Server 2022/2019 LTSC; Windows 10 (CSME or SPS FW); Red Hat Enterprise Linux 8.4 LTS, 8.5, and later; SUSE Enterprise Linux SLE 15 SP3 and later; Ubuntu 21.10, 22.04 LTS and later; Alibaba Cloud Linux; VMware ESXi

**Value-maximizing deployments**
- Long-life manufacturing availability, supporting products that have extended certification and life cycles
- High-reliability, long-use SKUs

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For workloads and configurations, visit [intel.com/processorclaims: 4th Gen Intel Xeon Scalable processors](https://www.intel.com/processorclaims). Results may vary.
Use cases

**Video: Get to market faster, support faster analytics and more simultaneous streams**

Applications: Video/data analytics server, NVR storage server, management services server

- Benefit from fast AI inference performance with a potentially low BOM cost from consolidated hardware, enabled by Intel AMX—a new acceleration engine in Intel DL Boost.
- Up to 80 PCIe 5.0 lanes allow for up to eight AI accelerators, and fast I/O helps eliminate data transfer bottlenecks.
- DDR5 memory helps move data fast for object recognition and analytics workloads.

**Healthcare: Support emerging use cases in AI-enabled drug research, genomics sequencing, and medical imaging**

Applications: Ultrasound imaging, medical carts, endoscopy, clinical devices

- High performance with DDR5 memory helps improve processing time for scanned medical images.
- Support potential acceleration of vector- and matrix-heavy applications in fields like drug research, biomanufacturing, and genomics with Intel DL Boost, enhanced with new Intel AMX.
- Long-life availability supports medical system procurements with lengthy certification processes.

**Industrial manufacturing: Run compute-intensive automation in less time and boost factory output**

Applications: Assembly line verification, defect detection, human-machine interfaces (HMI)

- Support more workload convergence in automation and machine vision with up to 52 cores, high-bandwidth DDR5 memory and PCIe 5.0, and enhanced Intel DL Boost with new Intel AMX.
- Optimize control loop timing on x86 hardware with support for Intel RDT and the ability to allocate cache and memory to high-priority tasks.
- Long-life availability and 10-year industrial-commercial temperature use condition (on select SKUs) enhance the reliability of systems.

**Public sector: Trusted, consistent experiences for digital safety and reconnaissance applications**

Applications: Intelligent surveillance/reconnaissance systems, command and control systems, communication networks

- In recon applications, offload video and AI to the Intel AMX accelerator for rapid processing, and leverage up to 52 cores and high memory bandwidth of up to 4,800 MT/s to enable the creation of high-quality images fast, with clarity and accuracy.
- High DDR5 memory capacity and PCIe 5.0 help deliver fast results for radar data processing with the addition of more accelerators in edge servers and CXL to provide data coherency.
- Hardware-assisted features, such as Intel TME and Intel SGX, help meet strict security requirements.

**Retail, banking, hospitality, and education: Capture more revenue across multiple touchpoints**

Applications: Small-format retail for POS, digital security, digital signage, video walls

- More cores and higher performance support more virtual desktops for banking and education.
- 80 lanes of PCIe 5.0 at 32 GT/s open up the possibility for single-socket solutions.
- Intel DL Boost with new Intel AMX enables fast and responsive inference-based solutions.
Processor block diagram

Software overview

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>OPERATING SYSTEMS/SDKs/BOOT LOADERS</th>
<th>IMPLEMENTATION</th>
<th>DISTRIBUTION AND SUPPORT</th>
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<tr>
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Not all features are supported in every operating system. Refer to Intel’s IoT Solutions Community for partner contact information.

<sup>a</sup> Please contact OS vendor for the exact support and version information.
<sup>b</sup> Please contact your VMware rep for compatible ESXi versions.
<sup>c</sup> This version will have limited support at launch. More features will become available later.
<sup>d</sup> Legacy features only. No 4th Gen platform features enabled. Versions will be dropped if the OS vendor discontinues commercial support.
<sup>e</sup> Many new OS-supported features will be included out of box.
## 4th Gen Intel® Xeon® Scalable processors

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<tr>
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**Base Frequency (GHz)**

**All-CORE Turbo (GHz)**

**Max Turbo (GHz)**

**Cache (MB)**

**TDP (Watts)**

**Maximum Scalability**

**DDR4 Memory Speed**

**Intel® UPI Links Enabled**

**Default Intel® SAS Devices**

**Default Intel® QAT Devices**

**Default Intel® DBL Devices**

**Default Intel® AA Devices**

**Intel® SGX Enclave Capacity (per Processor)**

**Long-Life Availability**

**Intel® On Demand Capable**

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Intel® UPI: Intel® Ultra Path Interconnect  
Intel® DSA: Intel® Data Streaming Accelerator  
Intel® QAT: Intel® QuickAssist Technology  
Intel® DBL: Intel® Dynamic Load Balancer  
Intel® IAA: Intel® In-Memory Analytics Accelerator

Intel® processor numbers are not a measure of performance. Processor numbers differentiate features within each processor family, not across different processor families. All processors are lead free (per EU RoHS directive July 2006) and halogen free (residual amounts of halogens are below November 2007 proposed IPC/JEDEC J-STD-709 standards). All processors support Intel® Virtualization Technology (Intel® VT-x, VT-d).  
A. 6418H long-life-use SKU is also an in-memory database (IMDB) workload-optimized SKU.  
B. Y-SKU: Supports Intel® Speed Select Technology Performance Profile (Intel® SST-PP) 2.0.  
C. Unless noted, all 8400, 6400, and 5400 processors include support for Intel® Speed Select Technology (Intel® SST) featuring Intel® SST Base Frequency (Intel® SST-BF), Intel® SST Core Power (Intel® SST-CP), and Intel® SST Turbo Frequency (Intel® SST-TF) capabilities. The 5420+ SKU does not have Intel SST.  
E. Intel does not commit or guarantee product availability or software support by way of roadmap guidance. Intel reserves the right to change roadmaps or discontinue products, software, and software support services through standard EOL/PDN processes. Contact your Intel account rep for additional information.  
F. High-reliability industrial use supports always-on conditions for up to 10 years. For more information about Intel® On Demand, visit intel.com/ondemand. For product specifications, please refer to ark.intel.com.
Get performance, connectivity, and security for video analytics, edge and industrial servers, and AI/deep learning workload consolidation.

Learn more about 4th Gen Intel Xeon Scalable processors at intel.com/4thgenxeon-iot.

Notices and disclaimers
1. The 4th Gen Intel® Xeon® Scalable platform offers a maximum of 60 cores/sockets; a maximum of 52 cores/sockets are offered on the IOTG road map.
2. Intel does not commit or guarantee product availability or software support by way of roadmap guidance. Intel reserves the right to change road maps or discontinue products, software, and software support services through standard EOL/PDN processes. Contact your Intel account rep for additional information.
3. SKUs with long product use life (up to 10 years, up to 100 percent active, no turbo) – Industrial-commercial temperature use condition.
7. IOTG SKUs only support 1S and 2S configurations. 4S SKUs are available on the broader platform SKU stack. Availability of accelerators varies depending on SKU. Visit the Intel® Product Specifications page for additional product details. Performance varies by use, configuration, and other factors. Learn more at 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.
Your costs and results may vary.

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