Product Brief

Intel® Xeon® D-1700 and D-2700 Processors
Enhanced for IoT

Build Transformative Solutions for the Intelligent IoT Edge

Next-gen Intel® Xeon® D processors bring server-class performance in two form factors tailored to meet the growing demands of compute at the edge.

As the edge compute market continues to evolve, there is a greater need for high-performance processors with IoT-centric feature sets. Next-gen Intel® Xeon® D-1700 and D-2700 processors are high-performance SoCs with integrated Ethernet and high-capacity I/Os optimized specifically for IoT. They deliver server-class computing, security, and bandwidth in two performance levels and package sizes, each with built-in AI acceleration and support for hard real-time computing.[1]

Extended operating temperature ranges[1] and industrial-class reliability make Intel Xeon D-1700 and D-2700 processors ideal for high-performance, soldered-down designs. They are suitable for rugged equipment, small form factors, and sealed fanless devices that must run nonstop in the toughest environments.

Accelerate deep learning AI workloads

The platform includes integrated hardware acceleration for deep learning inference—Intel® Deep Learning Boost (Intel® DL Boost). Intel DL Boost combines three Intel® Advanced Vector Extensions (Intel® AVX) instructions into one, which speeds processing of int8 workloads. To take advantage of Intel DL Boost, use the Intel® Distribution of OpenVINO™ toolkit to tune and optimize deep learning models.

Run hard real-time workloads faster and more predictably

Available on select processors, Intel® Time Coordinated Computing (Intel® TCC)[1] improves performance for latency-sensitive applications at the system level. Intel TCC includes a toolkit for tuning the system and creating precise time and task management for systems running real-time hypervisors.

Fine-tune CPU performance for multiple concurrent workloads

Intel® Speed Select Technology (Intel® SST)[1] provides precise control over per-core throughput and performance, including base frequency and frequency prioritization at the CPU core level. It supports performance profiles that allow you to configure a single CPU to run multiple workloads with a mix of critical priorities for specific processes like factory operations, command and control systems, or business processes.

Consolidating workloads reduces the number of systems you need to certify, which can lower your bill of materials. For critical applications, the processors' high core counts give systems the resources they need to run multiple redundant versions of the same system for error checking and failover support.

Build a more secure edge with hardware-based security

Embedded devices are vulnerable to weaknesses in the network and on-site physical tampering. To help combat these threats, Intel Xeon D-1700 and D-2700 processors have hardware-based security measures. The measures can help reduce your physical and cyberattack surface and help prevent memory snooping in edge deployments.[2]

Major performance gains for IoT	CPU performance gains	Improved AI inferencing
Intel® Xeon® D-1700 processor (Intel® Xeon® D-1746TER processor vs. previous-generation Intel® Xeon® D-1539 processor)	Up to 2.32x faster[3]	Up to 5.73x faster[4]
Intel® Xeon® D-2700 processor (Intel® Xeon® D-2796TE processor vs. previous-generation Intel® Xeon® D-1577 processor)	Up to 2.97x faster[5]	Up to 7.40x faster[6]

For workloads and configurations, visit intel.com/PerformanceIndex. Results may vary.

Split cores for multiple workloads and more-robust systems

With options from four cores up to 20 cores, Intel Xeon D-1700 and D-2700 processors can run multiple virtual machines, operating systems, and control systems. Multi-OS support—including real-time operating systems, hypervisor support, and multiple Intel® technologies for fine-tuning CPU performance—lets you consolidate multiple disparate workloads onto a single device.

Support high-bandwidth networks and peripherals

Large video systems, automated manufacturing lines, and high-speed communications devour bandwidth. Intel Xeon D-1700 and D-2700 processors meet this demand with integrated 50Gb or 100Gb Ethernet and up to 56 high-speed PCIe lanes—including up to 32 PCIe 4.0 and 24 configurable PCIe 3.0 lanes.[1]

Use cases[1]

Top use cases for Intel Xeon D-1700 and D-2700 processors[1]

The combination of AI acceleration, real-time capabilities, and high-speed I/Os in a high-density BGA package makes these processors ideal for embedded servers and high-performance compute in rugged applications and extreme environments at the edge.

Public sector: Avionics and guidance systems

- True server-grade processing, memory, and security in soldered-down packages for rugged devices
- Rated for continuous duty cycle under extended temperature ranges
- Intel® AVX-512 accelerates vector processing workloads for radar and other compute-intensive workloads
- Hard real-time capabilities[1] and Intel Xeon processor-class RAS for critical workloads in avionics, flight controls, and weapons systems
- Large core counts can run multiple identical systems for error control, redundancy, and failover support

Industrial sectors: Industrial PCs, edge servers, real-time control systems

- Real-time capabilities and Intel Xeon processor-class RAS features can run multiple, simultaneous process and motion control systems with high reliability
- Consolidate workloads and validate a single, software-based platform for multiple applications
- Four up to 20 cores, AI acceleration, and up to 56 high-speed lanes deliver server-grade performance
- Extended temperature ranges and industrial ratings in BGA packages provide rugged performance for extreme environments

Video systems: Smart video servers, including storage, analytics, and hybrid servers

- Intel® DL Boost accelerates AI-powered object detection, image search, and smart video management
- Intel Distribution of OpenVINO toolkit supports write-once, deploy-anywhere deep learning inference for object detection, recognition, and classification
- High bandwidth, high-speed I/Os, larger memory bandwidth support multiple video streams, expansive storage, and fast video analytics
- Intel® Total Memory Encryption (Intel® TME) and Intel® Software Guard Extensions (Intel® SGX) help secure servers and help protect data in memory[2]
- Small form factor, soldered-down design brings high performance to demanding environments

Key features[1]

Performance

- Server-grade performance and I/Os in high-density BGA packages for rugged, soldered-down applications
- Intel® 10 nm process technology
- Intel Xeon D-1700: four to 10 cores, up to 348 GB RAM, 40W to 67W power range
- Intel Xeon D-2700: four to 20 cores, up to 1,024 GB, 65W to 118W power range
- Faster booting with Intel® Slim Bootloader

AI acceleration

- Intel DL Boost (VNNI) and Intel AVX-512 boost performance for deep learning workloads
- The Intel Distribution of OpenVINO toolkit optimizes deep learning models and creates inference engines that can run across Intel® CPUs, GPUs, and VPUs

Real-time capabilities and hypervisor support

- Intel TCC ensures low-latency, deterministic performance for real-time applications[1]
- Intel® TCC Tools provides precise system tuning for real-time applications
- Supports ACRN hypervisor plus real-time operating systems like Yocto Linux with PREEMPT_RT patch and Wind River VxWorks
- Time-Sensitive Networking (TSN) support provided by optional Ethernet components:
  - Intel® Ethernet Network Adapter I225 – 2.5GbE with TSN capability
  - Cyclone® V FPGA-based PCIe card with TTTech TSN Switch IP solution

Core splitting and workload consolidation

- Intel SST[2] provides precise control over per-core throughput and performance. Use it to fine-tune CPU performance for multiple concurrent workloads.
- Intel® Resource Director Technology—including Intel® Cache Monitoring Technology (Intel® CMT), Intel® Cache Allocation Technology (Intel® CAT), and Intel® Memory Bandwidth Monitoring (Intel® MBM) technology—helps share processor resources between applications and monitor how they are used

Security[2]

- Intel® Boot Guard authenticates initial BIOS code, before BIOS starts, extending the hardware root of trust
- Intel SGX isolates applications within trusted enclaves during runtime to help protect data
- Intel TME completely encrypts data in memory, helping to protect it from physical access

Select Enhanced for IoT SKUs offer industrial reliability and long product availability

- Rated for continuous industrial duty cycles 24/7/365 in extended temperature ranges
- Long product availability supports the longer lead times, extensive validation, and certification required in IoT markets
- Intel Xeon processor-class reliability, availability, and serviceability (RAS)

High-speed I/Os

- Up to 56 high-speed I/Os
- Up to 32 PCIe 4.0 lanes
- Up to 24 configurable lanes: 24x PCIe 3.0, 24x SATA 3.0, 4x USB 3.0
- PCIe support for hot-plug swaps

Networking

- 50Gb or 100Gb options for integrated Ethernet
- Intel® Dynamic Device Personalization (Intel® DDP) supports programmable protocols for routing and security, reducing calls to the CPU for networking tasks

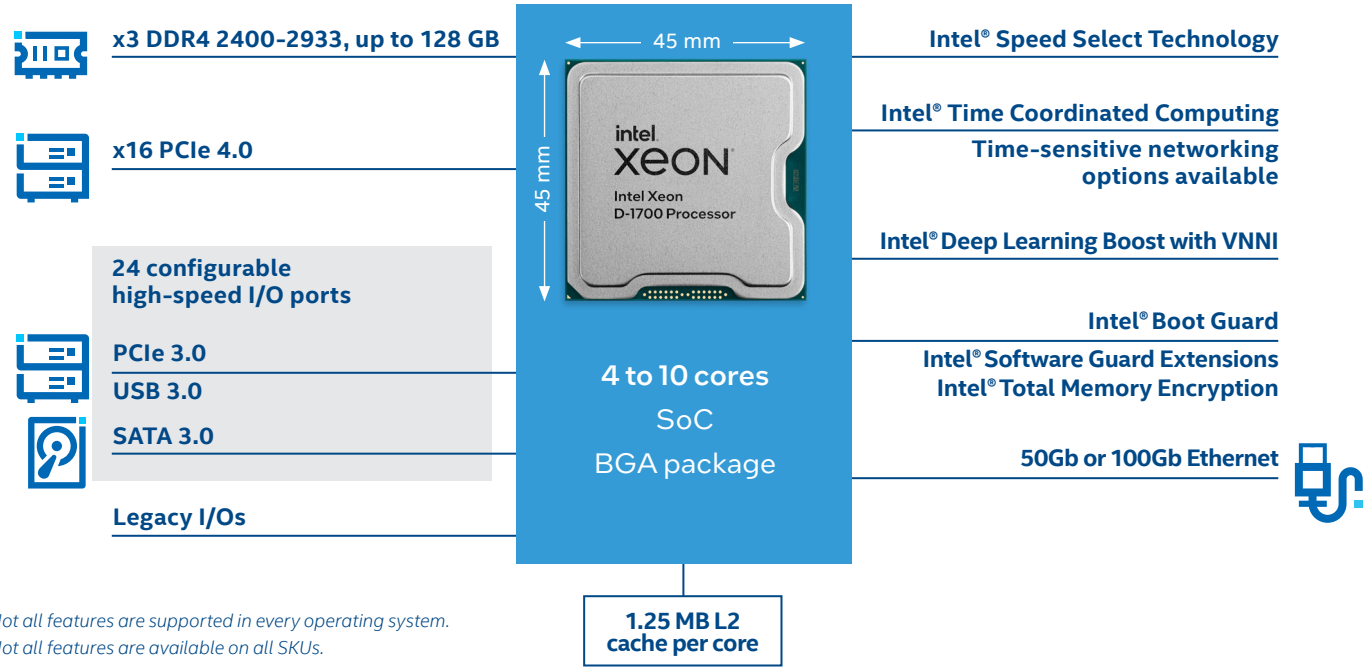
Memory and storage

- Supports up to four channels DDR4 2933MT/s at two DIMMs per channel, max 1,024 GB memory capacity
- Supports error correcting code (ECC) memory
- Intel® Volume Management Device (Intel® VMD) 2.0 aggregates SSDs into a single address space
- Intel® Virtual RAID on CPU (Intel® VROC) shifts raid controller from host bus adapter to the CPU itself

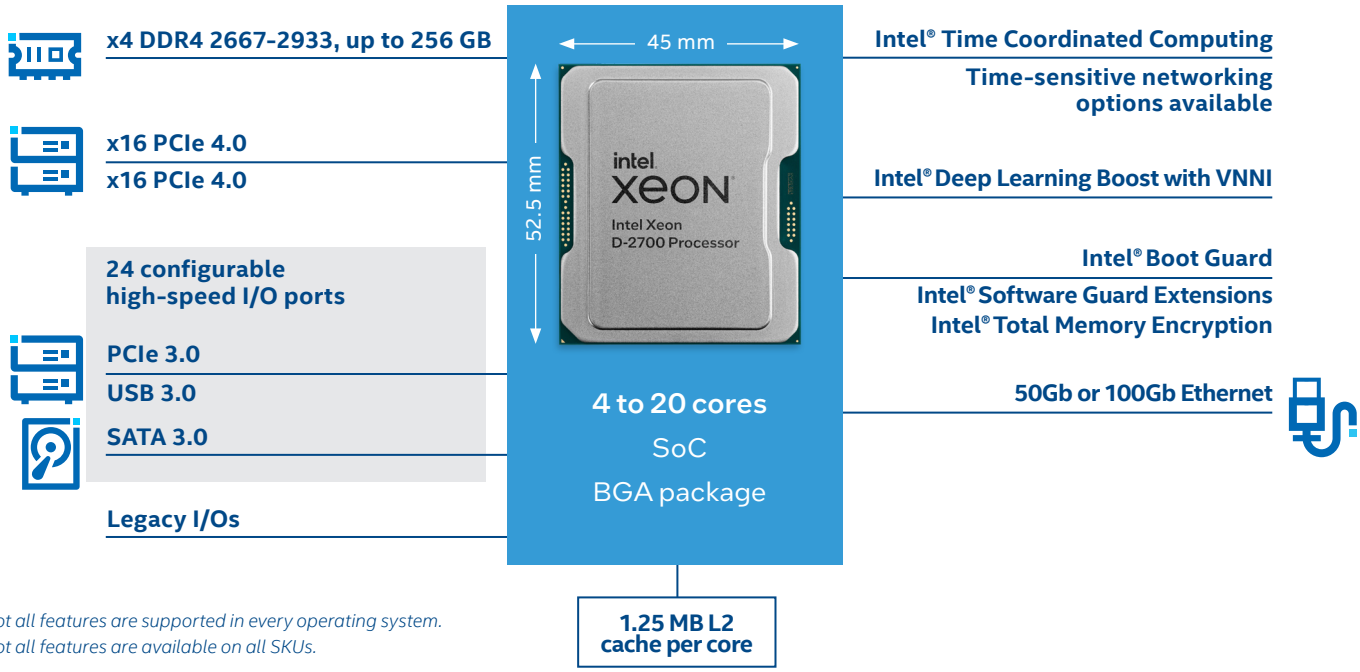
Intel® development tools

- Intel® oneAPI Base and IoT Toolkit, Intel® oneAPI Video Processing Library
- Intel Distribution of OpenVINO toolkit for deep learning inference
- Intel® DevCloud for the Edge is an online sandbox running the OpenVINO toolkit in a JupyterLab environment. DevCloud includes Intel® hardware, tutorials, and sample applications.
- Intel TCC Tools

Processor block diagrams



Not all features are supported in every operating system.
Not all features are available on all SKUs.



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Two server-class performance levels for IoT and edge computing

Intel Xeon D-1700 processors

Server-grade performance for small form factors

- Options from four cores up to 10 cores
- Up to three channels DDR4 and 384 GB memory capacity
- Up to 16 PCIe 4.0 plus 24 high-speed I/Os
- 40W to 67W power range
- 50Gb and 100Gb integrated Ethernet options (100GbE enabled on select SKUs)
- Intel SST on select SKUs
- 45 mm x 45 mm package size

Intel Xeon D-2700 processors

High compute performance for soldered-down, edge computing applications

- Options from four cores up to 20 cores
- Up to four channels DDR4 and 1,024 GB memory capacity
- Up to 32 PCIe 4.0 plus 24 high-speed I/Os
- 50Gb and 100Gb integrated Ethernet options (100GbE enabled on select SKUs)
- 65W to 118W power range
- 52.5 mm x 45 mm package size

Software overview

OS TYPE	OPERATING SYSTEM	SUPPORT	DISTRIBUTION
Linux	Red Hat Enterprise Linux 8.5, 8.4*	Red Hat	
	SUSE Linux Enterprise Server 15 SP2	SUSE, open source	SUSE
	Ubuntu 20.04 LTS, 18.04 LTS*	Canonical, open source	
	Wind River Linux 11	Wind River	
	Yocto Project BSP Linux 5.15	Intel, open source	Yocto Project
Windows	Microsoft Windows 10 IoT 2021 Enterprise LTSC** Microsoft Windows Server 2022, 2019	Intel, Microsoft	Microsoft
RTOS	Wind River VxWorks	Wind River	
	Real-Time Hypervisor	Real-Time Systems	
VMM	Linux KVM	Open source	
	ACRN	Open source	
	VMware ESXi	VMware, open source	
	Microsoft Windows Hyper-V: Windows Server	Microsoft	
	Microsoft Azure	Microsoft	

Not all features are supported in every operating system. Refer to Intel's IoT Solutions Community for partner contact information.

**Linux is supported by Intel through Intel Linux drivers distributed to the Linux Open Source Community. Adoption into individual Linux distributions is dependent upon the OS vendors.*

***Intercepts next LTSC.*

Intel® Xeon® D-1700 processor lineup

Processor Number*		MM#	Ordering Code	Cores	TDP	LLC Cache	DDR Channels	DDR4 1DPC	Integrated Intel® Ethernet	PCIe 4.0 Lanes	High-Speed Input/ Output (HSIO) Lanes	Base Frequency	All Core Turbo	Max Turbo	eTemp	Intel® Time Coordinated Computing
Intel® Xeon® D-1746TER processor	Base	99AV7R	FH8068604436317	10	67W	15 MB	3	2667 MHz	100GbE	16	24	2.0 GHz	2.5 GHz	3.1 GHz	Yes	Yes
	SST-PP profile			10	56W							1.5 GHz	1.8 GHz	2.3 GHz		
	SST-BF profile			6 + 4	67W							6@2.5 GHz + 4@1.0 GHz	2.5 GHz	3.1 GHz		
Intel® Xeon® D-1735TR processor		99AV7T	FH8068604436405	8	59W	15 MB	3	2933 MHz	50GbE	16	24	2.2 GHz	2.7 GHz	3.4 GHz	No	Yes
Intel® Xeon® D-1732TE processor		99AV7V	FH8068604436505	8	52W	15 MB	3	2667 MHz	50GbE	16	24	1.9 GHz	2.4 GHz	3.0 GHz	Yes	No
Intel® Xeon® D-1715TER processor		99AV7W	FH8068604436605	4	50W	10 MB	3	2667 MHz	50GbE	16	24	2.4 GHz	2.9 GHz	3.5 GHz	Yes	Yes
Intel® Xeon® D-1712TR processor		99AV83	FH8068604436820	4	40W	10 MB	3	2400 MHz	50GbE	16	24	2.0 GHz	2.5 GHz	3.1 GHz	No	Yes

Intel® Xeon® D-2700 processor lineup

Processor Number*	MM#	Ordering Code	Cores	TDP	LLC Cache	DDR Channels	DDR4 1DPC	Integrated Intel® Ethernet	PCIe 4.0 Lanes	High-Speed Input/ Output (HSIO) Lanes	Base Frequency	All Core Turbo	Max Turbo	eTemp	Intel® Time Coordinated Computing
Intel® Xeon® D-2796TE processor	99AV90	FH8068604676163	20	118W	30 MB	4	2933 MHz	100GbE	32	24	2.0 GHz	2.4 GHz	3.1 GHz	Yes	No
Intel® Xeon® D-2775TE processor	99AV91	FH8068604676146	16	100W	25 MB	4	2933 MHz	100GbE	32	24	2.0 GHz	2.4 GHz	3.1 GHz	Yes	No
Intel® Xeon® D-2752TER processor	99AV92	FH8068604676164	12	77W	20 MB	4	2667 MHz	50GbE	32	24	1.8 GHz	2.1 GHz	2.8 GHz	Yes	Yes
Intel® Xeon® D-2733NT processor	99AV8X	FH8068604676143	8	80W	15 MB	4	2667 MHz	50GbE	32	24	2.1 GHz	2.6 GHz	3.2 GHz	No	No
Intel® Xeon® D-2712T processor	99AV8Z	FH8068604676144	4	65W	15 MB	4	2667 MHz	50GbE	32	24	1.9 GHz	2.4 GHz	3.0 GHz	No	No

**Intel® processor numbers are not a measure of performance. Processor numbers differentiate features within each processor family, not across different processor families.*

Learn more about Intel Xeon D-1700 and D-2700 processors at intel.com/icelake-d.

1. Not all features are available on all SKUs. Not all features are supported in every operating system.
2. No product or component can be absolutely secure.
3. See [15] at www.intel.com/processorclaims: Intel® Xeon® D. Results may vary.
4. See [8] at www.intel.com/processorclaims: Intel® Xeon® D. Results may vary.
5. See [14] at www.intel.com/processorclaims: Intel® Xeon® D. Results may vary.
6. See [7] at www.intel.com/processorclaims: Intel® Xeon® D. Results may vary.

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 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.

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