Product Brief

13th Gen Intel® Core™ Mobile Processors
Edge Deployments

Maximize Reliability and Performance at the Edge for Industrial, AI, Video, and Other Demanding Applications

13th Gen Intel® Core™ mobile processors for IoT edge drive consistent performance and offer accelerated AI, immersive graphics, and industrial-grade capabilities in a compact, ruggedized form factor with a range of power bases.

The new 13th Gen Intel® Core™ mobile processors combine power efficiency, performance, flexibility, and industrial-grade features to drive success for demanding AI, graphics, and rugged edge use cases. This new generation offers a performance hybrid architecture[1] with up to 14 cores and flexible processor base power from 15W to 45W. 13th Gen Intel Core mobile processors also offer enhanced Intel® Iris® Xᵉ graphics[2] for fast, power-efficient parallel AI processing and immersive visual experiences. And with industrial-grade features and ruggedized SKUs, this lineup will enable advanced intelligence and real-time performance in the most-challenging environments.

Maximize the performance of critical workloads and bring intelligence to more places

Drive platform flexibility and efficiency with up to 14 cores and up to 20 threads in the 13th Gen Intel Core mobile processor platform. The performance hybrid architecture[1] on Intel® 7 process technology implements hyper-threaded Performance-cores for primary workloads and single-threaded Efficiency-cores to offload background tasks and facilitate smoother multitasking. 13th Gen Intel Core mobile processors for IoT edge deliver a boost in performance compared to the previous generation[3] while also offering a range of options for base power. This allows you to get exactly the performance per watt you need in space- and power-constrained deployments.

Move data faster with PCIe 5.0 and DDR5/LP5x

13th Gen Intel Core mobile processors are the first generation of mobile CPUs to introduce PCIe 5.0 connectivity. Available on H-series SKUs, PCIe 5.0 allows you to deploy demanding workloads in more places by offering a bigger data pipeline and faster, more capable connections to peripherals and add-in cards. The addition of support for DDR5-4800 and LPDDR5x-6400[4] memory can help improve productivity by enabling higher bandwidth to increase data throughput in a small footprint. These new, faster memory standards enable the development of solutions with fast multitasking and simultaneous applications on the same device.

What's new

- Select SKUs with extended temp range of -40°C to 100°C Tjmax, compliant with industrial use conditions of 100 percent operation over 10 years
- Select SKUs support in-band error-correction code (IBECC) memory
- Select SKUs support Intel® Time Coordinated Computing (Intel® TCC) and Time-Sensitive Networking (TSN) with discrete, real-time-capable 2.5GbE connectivity

13th Gen Intel® Core™ mobile processors

Estimated performance compared to 12th Gen Intel® Core™ processors

Up to
1.08x
faster single-thread performance
vs. 12th Gen Intel Core mobile processors[3]

Up to
1.05x
faster multithread performance
vs. 12th Gen Intel Core mobile processors[3]

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

Develop and deploy fast, flexible media and display systems with Intel Iris Xe graphics[2]

The new generation of Intel® Core™ processors allows you to deploy experiences with rich graphics and to add more video streams and HDR displays. These processors feature Intel Iris Xe graphics[2] with up to 96 graphics EUs. This enhanced graphics capability delivers fast graphics performance. A single processor can support up to four display pipes for up to four 4K60 HDR displays. It can also support an 8K60 HDR display. With Pipelock synchronization, you can generate impressive 2x2 video walls and interactive digital signage. Support for the ingestion of up to 48x simultaneous 1080p video streams means you can also incorporate simultaneous video streams to enhance applications like network video recorders (NVRs).

Speed up inferencing at the edge with hardware acceleration for AI workloads

Capitalize on the growing value of AI and computer vision solutions. The same architecture that offers up to 96 graphics EUs is also a strong match for parallel AI workload processing at the edge for applications such as computer and machine vision solutions for smart cities and automated part inspection. 13th Gen Intel Core mobile processors deliver fast GPU image classification performance. This new platform also integrates AI acceleration with Intel® Deep Learning Boost (VNNI) and streamlines your AI development process with optimization support, thanks to the Intel® Distribution of OpenVINO™ toolkit.

Speed digital transformation with industrial-grade features[2] on select SKUs

With enhancements for operation in industrial settings and with real-time workloads, 13th Gen Intel Core mobile processors will redefine industrial intelligence by bringing flexible, scalable, and durable computing to the edge. Support for Intel TCC and TSN with real-time-capable 2.5GbE connectivity will help synchronize latency-bounded workloads, such as programmable logic controllers (PLCs) or robotics.[2] What's more, select SKUs are compliant with industrial use conditions of 100 percent operation over 10 years. They also offer extended temp ranges of -40°C to 100°C and support for IBECC to help ensure reliability and deliver the performance you need to operate in harsh environments for installations in machine control, autonomous mobile robots (AMRs), or avionics.

Scale with confidence thanks to long-term software support and long-life availability[5]

Intel delivers long-life availability[5] on IoT SKUs to help enterprises maximize the value of their technology investments. With 13th Gen Intel Core mobile processors, you'll also get support for Windows 10 IoT Enterprise 2021 Long-Term Servicing Channel (LTSC), EFLOW, Linux LTS, and real-time operating systems (RTOS). This support makes it easier to adopt IoT features and to manage extended deployments with longer periods between software updates.

Key features

Performance

- Up to 14 cores and 20 threads with performance hybrid architecture[1]
- Intel® Thread Director[6] to match your cores to your workload
- Up to 24 MB Intel® Smart Cache
- Processor base power range of 15W to 45W (with min assured power as low as 12W and max assured power up to 65W)

Intel Iris Xe Graphics[2]

- Intel Iris Xe graphics[2] with up to 96 graphics EUs
- Support for up to four independent displays at up to 4K60 HDR resolution or one display at 8K60 HDR resolution
- Embedded DisplayPort (eDP) 1.4b, HBR3, DP2.1, HDMI 2.0b (HDMI 2.1 via bridge)
- Up to three multiformat codec (MFX) engines for enhanced video stream capabilities (up to 2x video decode and 1x video encode)
- Support for up to 48 simultaneous 1080p streams ingestion
- AV1 codec, 8K60 12b decode
- Pipelock video synchronization for Windows, 2x2 combined desktop mode with EDID management, bezel correction, and SR-IOV for digital signage applications

Accelerated AI

- Intel DL Boost with VNNI instructions on the CPU and DP4a (int8) instructions on the GPU to accelerate AI inferencing workloads with the Intel Distribution of OpenVINO toolkit

Real-time computing[2]

- 1GbE and discrete 2.5GbE connectivity
- Support for TSN
- Support for Intel TCC

Industrial-grade features[2]

- IBECC memory
- Extended temp (-40°C to 100°C Tjmax) on select SKUs

Memory, I/O, connectivity

- Up to DDR5-4800, LPDDR5x-6400,[4] and up to DDR4-3200, LPDDR4x-4266
- PCIe 5.0 support on select SKUs helps move more data faster
- Up to eight PCIe 4.0 (U/P/H series) + eight PCIe 5.0 (H series) off the CPU complex
- Up to 12 PCIe 3.0 off the PCH
- CPU chipset on-package I/O (OPIO) interface: up to eight Gen2 lanes
- Up to four integrated Thunderbolt™ 4/USB4 ports
- Support for discrete Wi-Fi 6E, integrated Wi-Fi 5 (802.11ac)

Security and manageability

- Intel vPro® eligible on select SKUs
- Intel® Converged Security and Management Engine Version 16.1

Flexible deployments

- Soldered-down BGA package for low z-height and mechanical integrity in compact IoT applications
- Low-power SKUs from 15W to 45W processor base power

Key features, continued

Software

- Windows 10 IoT Enterprise 2021 Long-Term Servicing Channel (LTSC)
- Support for EFLOW
- Linux kernel overlay to enable easy adoption of IoT features
- Celadon (Android) in VM (community support)
- Support for Ubuntu, Red Hat Enterprise, Wind River Linux, and Wind River VxWorks 7
- KVM and ACRN hypervisor (community support) and Real-Time Systems (RTS) hypervisor
- Intel® Slim Bootloader
- Intel® oneAPI toolkits, Intel Distribution of OpenVINO toolkits

Use cases

Industrial manufacturing: Rugged, small form factor platforms that support machine vision and industrial processes

Applications: AI-based industrial process control (AIPC), industrial PCs, PLCs, vision systems, and autonomous mobile robots (AMRs)

- Select SKUs compliant with industrial use conditions support 100 percent operation over 10 years in environments with extended temperatures, shock, and vibration.
- Fast GPU image classification performance and Intel Deep Learning Boost (VNNI) support machine vision use cases for process and quality control on the factory floor or AMRs.
- Intel TCC with real-time-capable discrete 2.5GbE connectivity enables Time-Sensitive Networking for critical workloads.[2]

Retail, banking, education, hospitality: Consolidate workloads on converged, scalable infrastructure

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

- Support four 4K displays with support for Pipelock synchronization to enable high-impact 2x2 video walls.
- Support an 8K display without a discrete GPU to give businesses a cost-effective means to engage new customers with impactful digital signage.
- 13th Gen Intel Core mobile processors provide fast graphics performance at the edge for visually rich advertising.
- Example use case: Integrated flat panel displays (IFPDs) support remote learning with 4K student gallery views and AI-driven teacher cameras with automatic pan, tilt, and zoom.

Federal and aerospace: Powerful and efficient compute ruggedized for challenging environments

Applications: Embedded computing for vehicles and aircraft; edge devices for intelligence, safety, and reconnaissance (ISR); and next-generation avionics

- Performance hybrid architecture[1] with up to 14 cores/20 threads and 15W to 45W processor base power drives multitasking performance in space-constrained areas.
- Soldered-down BGA durability and compliance with industrial use conditions[2] help ensure mechanical integrity.
- Extended temp ranges of -40°C to 100°C Tjmax[2] and shock and vibration resistance allow deployment in harsh environments and challenging conditions.
- Up to 96 graphics EUs drive highly parallel performance for fast edge inference results in field operations and informed decision-making.

Healthcare: Fast data processing and hardware-enabled AI for medical imaging

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

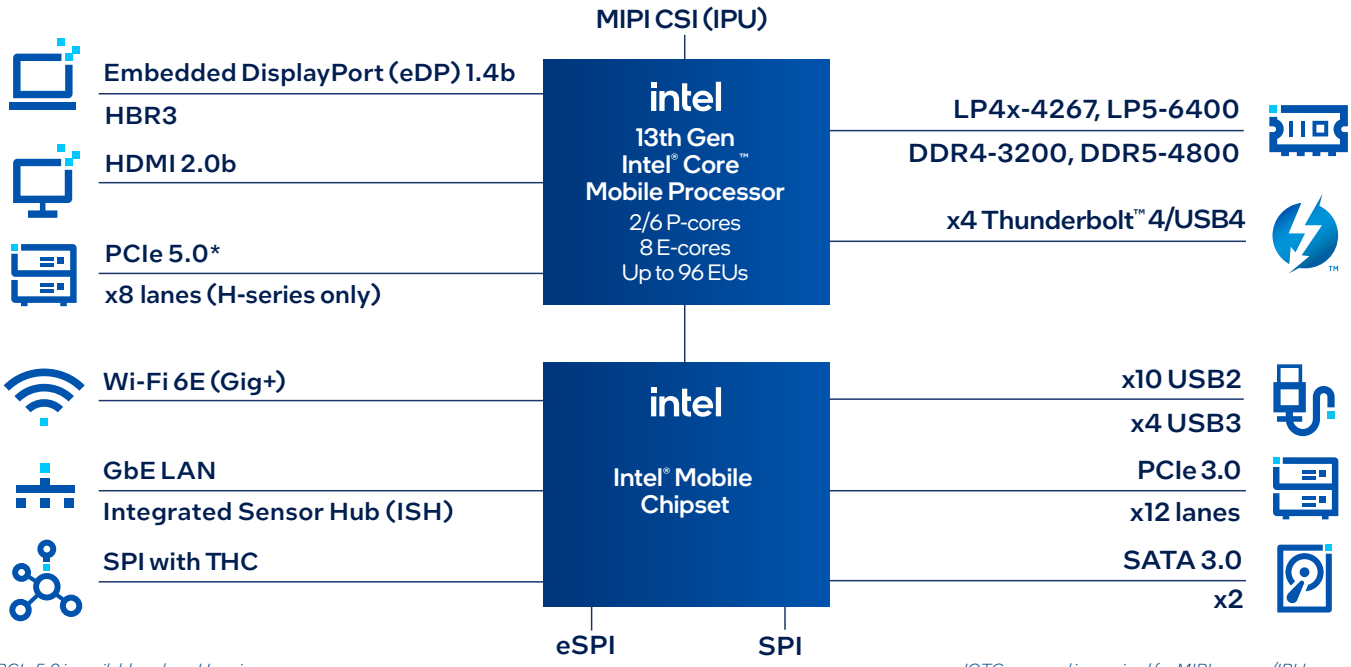
- Up to 14 cores and 20 threads with performance hybrid architecture[1] support a broader range of devices and applications and deliver more multitasking per processor.[6]
- Up to 96 graphics EUs and up to eight additional lanes of PCIe 5.0 on the CPU provide high data throughput for embedded signal processing and imaging workloads.
- Intel DL Boost and the Intel Distribution of OpenVINO toolkit improve AI-driven tools to support efficient inferencing used to assist in diagnostics and medical procedures.
- Long-life availability[5] ensures consistent supply for repairs and maintenance and helps to drive long-term value.

Computer vision, smart cities, and transportation: Incredible density for AI and graphics/video processing in compact, rugged form factors

Applications: Roadside units (RSUs) and network video recorder (NVR) with AI box

- Up to PCIe 5.0 bandwidth and up to 48x simultaneous video streams ingestion with Intel Iris Xᵉ graphics[2] enable more connected cameras for smart roadway and digital safety deployments.
- Ruggedized platforms with soldered-down BGA durability and embedded or industrial use conditions compliance are ideal for outdoor deployments that require resiliency against heat, cold, and other environmental factors.
- Fast GPU image classification performance with Intel DL Boost enables efficient, small-footprint video AI analytics.

Processor block diagram



**PCIe 5.0 is available only on H-series processors.*

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

IOTG approval is required for MIPI camera/IPU support.
IOTG approval is required for Thunderbolt™ 4 support.
Please contact your Intel representative.

Software overview

CATEGORY	OPERATING SYSTEMS/SDKS/ BOOTLOADERS	IMPLEMENTATION	DISTRIBUTION AND SUPPORT
Operating systems	Windows 10 IoT Enterprise 2021 LTSC	Intel	Intel, Microsoft
	Ubuntu, Red Hat Enterprise, WR Linux[B]	Canonical Ltd., Red Hat, Wind River Systems	Distributed and supported by commercial Linux vendors and Intel upstream kernel drivers
	Kernel overlays and BKC	Intel	Intel, Linux ISVs
	Celadon (Android) in VM	Intel	Celadon community, ISV partners
RTOS	Wind River VxWorks, QNX	Wind River, BlackBerry	Wind River, BlackBerry QNX
	Zephyr RTOS	Intel	Zephyr project community
Hypervisors	KVM, ACRN[B]	KVM, ACRN community	KVM, ACRN community
	RTS Hypervisor[B]	Real-Time Systems	Real-Time Systems
Boot loaders[A]	UEFI/BIOS and Intel® Firmware Support Package (Intel® FSP)	Intel	Intel, IBVs
	Slim Bootloader and Intel FSP	Intel	Bootloader ecosystem and SBL community
SDK	Intel® oneAPI Video Processing Library (Intel® oneVPL)	Intel	Intel
	OpenVINO™ toolkit	Intel	Intel
	Intel® oneAPI Toolkits	Intel	Intel
	Intel® In-Band Manageability	Intel	Intel

Not all features are supported in every operating system. Refer to Intel's IoT Solutions Community for partner contact information.
A. Legacy boot is not supported for Windows, Linux. Customers should work with their BIOS vendors for enabling/validating legacy BIOS features.
B. Supported by Intel via upstreaming to the open source community. Adoption into individual Linux distributions/hypervisors is dependent upon the OS/HV vendors.

Processor lineup

13th Gen Intel® Core™ processors (H-series 45W)

Brand	Processor Number General Embedded/ Industrial	Processor Cores	Number of P-cores	Number of E-cores	Number of Threads	Intel® Smart Cache (L3)	Max Turbo Freq (GHz)[A]		Processor Base Frequency (GHz)		Graphics Max Freq (GHz)	Intel vPro® Eligible[B]	Version and Type of Firmware Support		Processor Graphics	Number of Execution Units (EUs)	Video Decode Boxes	Total PCIe Lanes	Max Memory Speed	Max Memory Capacity	TCC/ TSN and In-Band ECC	Extended Temp	Processor Base Power (W)
							P-core	E-core	P-core	E-core			CSME16.1	CSME16.1									
Intel® Core™ i7 processor	i7-13800HE i7-13800HRE	14	6	8	20	24MB	5.0	4.0	2.8 (@65W) **2.5 (@45W)** 1.8 (@35W)	1.8	1.4	Yes	Corp	Consumer	Intel® Iris® Xe Graphics[D]	96	2	16 (CPU: x8 PCIe 5.0+ 2x4 PCIe 4.0) Up to 12 (PCH: PCIe 3.0)	DDR5-4800 LPDDR5x-6400 DDR4-3200 LPDDR4x-4266	64 GB	Yes, on industrial SKUs	Yes, on industrial SKUs	65W (max assured power) **45W (base power)** 35W (min assured power)
Intel® Core™ i5 processor	i5-13600HE i5-13600HRE	12	4	8	16	18MB	4.8	3.6	2.9 (@65W) **2.7 (@45W)** 1.9 (@35W)	1.9	1.4	Yes	Corp	Consumer		80	2				Yes, on industrial SKUs	Yes, on industrial SKUs	
Intel® Core™ i3 processor	i3-13300HE i3-13300HRE	8	4	4	12	12MB	4.6	3.4	2.6 (@65W) **2.1 (@45W)** 1.2 (@35W)	1.5	1.3	No	Corp[C]	Consumer	Intel® UHD Graphics	48	1				Yes, on industrial SKUs	Yes, on industrial SKUs	

13th Gen Intel® Core™ processors (P-series 28W)

Brand	Processor Number General Embedded/ Industrial	Processor Cores	Number of P-cores	Number of E-cores	Number of Threads	Intel® Smart Cache (L3)	Max Turbo Freq (GHz)[A]		Processor Base Frequency (GHz)		Graphics Max Freq (GHz)	Intel vPro® Eligible[B]	Version and Type of Firmware Support		Processor Graphics	Number of Execution Units (EUs)	Video Decode Boxes	Total PCIe Lanes	Max Memory Speed	Max Memory Capacity	TCC/ TSN and In-Band ECC	Extended Temp	Processor Base Power (W)
							P-core	E-core	P-core	E-core			CSME16.1	CSME16.1									
Intel® Core™ i7 processor	i7-1370PE i7-1370PRE	14	6	8	20	24MB	4.8	3.7	2.0 (@35W) **1.9 (@28W)** 1.3 (@20W)	1.2	1.4	Yes	Corp	Consumer		96	2	8 (CPU: 2x4 PCIe 4.0) Up to 12 (PCH: PCIe 3.0)	DDR5-4800 LPDDR5x-6400 DDR4-3200 LPDDR4x-4266	64 GB	Yes, on industrial SKUs	Yes, on industrial SKUs	35W (max assured power) **28W (base power)** 20W (min assured power)
Intel® Core™ i5 processor	i5-1350PE i5-1350PRE	12	4	8	16	12MB	4.6	3.4	2.2 (@35W) **1.8 (@28W)** 1.2 (@20W)	1.3	1.4	Yes	Corp	Consumer	Intel® Iris® Xe Graphics[D]	80	2				Yes, on industrial SKUs	Yes, on industrial SKUs	
Intel® Core™ i5 processor	i5-1340PE N/A	12	4	8	16	12MB	4.5	3.3	2.2 (@35W) **1.8 (@28W)** 1.2 (@20W)	1.3	1.35	No	Corp[C]	Consumer		80	2				N/A	N/A	
Intel® Core™ i3 processor	i3-1320PE i3-1320PRE	8	4	4	12	12MB	4.5	3.3	2.2 (@35W) **1.7 (@28W)** 1.2 (@20W)	1.2	1.35	No	Corp[C]	Consumer	Intel® UHD Graphics	48	1				Yes, on industrial SKUs	Yes, on industrial SKUs	

13th Gen Intel® Core™ processors (U-series 15W)

Brand	Processor Number General Embedded/ Industrial	Processor Cores	Number of P-cores	Number of E-cores	Number of Threads	Intel® Smart Cache (L3)	Max Turbo Freq (GHz)[A]		Processor Base Frequency (GHz)		Graphics Max Freq (GHz)	Intel vPro® Enterprise[B]	Version and Type of Firmware Support		Processor Graphics	Number of Execution Units (EUs)	Video Decode Boxes	Total PCIe Lanes	Max Memory Speed	Max Memory Capacity	TCC/ TSN and In-Band ECC	Extended Temp	Processor Base Power (W)
							P-core	E-core	P-core	E-core			CSME16.1	CSME16.1									
Intel® Core™ i7 processor	i7-1365UE i7-1365URE	10	2	8	12	12MB	4.9	3.7	2.7 (@28W) **1.7 (@15W)** 1.2 (@12W)	1.2	1.3	Yes	Corp	Consumer		96	2	8 (CPU: 2x4 PCIe 4.0) Up to 12 (PCH: PCIe 3.0)	DDR5-4800 LPDDR5x-6400 DDR4-3200 LPDDR4x-4266	64 GB	Yes, on industrial SKUs	Yes, on industrial SKUs	28W (max assured power) **15W (base power)** 12W (min assured power)
Intel® Core™ i5 processor	i5-1345UE i5-1345URE	10	2	8	12	12MB	4.6	3.4	2.5 (@28W) **1.4 (@15W)** 1.0 (@12W)	1.1	1.25	Yes	Corp	Consumer	Intel® Iris® Xe Graphics[D]	80	2				Yes, on industrial SKUs	Yes, on industrial SKUs	
Intel® Core™ i5 processor	i5-1335UE N/A	10	2	8	12	12MB	4.5	3.3	2.5 (@28W) **1.3 (@15W)** 0.8 (@12W)	1.1	1.25	Yes	Corp	Consumer		80	2				N/A	N/A	
Intel® Core™ i3 processor	I3-1315UE i3-1315URE	6	2	4	8	10MB	4.5	3.3	2.5 (@28W) **1.2 (@15W)** 0.8 (@12W)	0.9	1.2	No	Corp[C]	Consumer	Intel® UHD Graphics	64	1				Yes, on industrial SKUs	Yes, on industrial SKUs	
Intel® processor	U300E N/A	5	1	4	6	8MB	4.3	3.2	2.5 (@28W) **1.1 (@15W)** 0.8 (@12W)	0.9	1.1	No	Corp[C]	Consumer	Intel® UHD Graphics	48	1				N/A	N/A	

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, Intel® VT-d).

A. *The frequency of cores and core types varies by workload, power consumption, and other factors. Visit intel.com/content/www/us/en/architecture-and-technology/turbo-boost/turbo-boost-technology for more information.*
B. *Intel vPro® Enterprise includes Intel® TXT, Intel® Hardware Shield, Intel® AMT. Please refer to vPro brand requirements for full details (RDC #635949).*
C. *Validated, but Intel® Active Management and other security features not available.*
D. *To use the Intel® Iris® Xe brand, the system must be populated with 128-bit (dual-channel) memory. Otherwise, use the Intel® UHD brand.*

For product specifications, please refer to ark.intel.com.

Learn more about 13th Gen Intel Core mobile processors at intel.com/13thgencoremobile-iot.

1. Performance hybrid architecture combines two new core microarchitectures, Performance-cores (P-cores) and Efficient-cores (E-cores), on a single processor die. Select 13th Gen Intel® Core™ processors (certain 13th Gen Intel® Core™ i3 processors and lower) do not have performance hybrid architecture, only P-cores.
2. Available on select SKUs.
3. Performance varies by use, configuration, and other factors. Learn more at edc.intel.com/content/www/us/en/products/performance/benchmarks/internet-of-things.
4. LPDDR5x DRAMs operating in LPDDR5 speed mode are supported.
5. 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. Contact your Intel account rep for additional information.
6. Built into the hardware, Intel® Thread Director is provided only in performance hybrid architecture configurations of 13th Gen Intel® Core™ processors. OS enablement is required. Available features and functionality vary by OS.

Notices and disclaimers

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.

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Not all features are available on all SKUs.

Not all features are supported in every operating system.

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Your costs and results may vary.

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

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