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Intel

Intel Xeon Gold 6421N Processor (PK8071305122001)

Datasheet

Product Overview

- The Intel Xeon Gold 6421N is a 4th Gen Intel Xeon Scalable processor designed for network, edge, enterprise, and general-purpose server platforms.
- It provides 32 cores and 64 threads, with a 1.80 GHz base frequency, up to 3.60 GHz Intel Turbo Boost frequency, 60 MB cache, and a 185 W TDP.
- Built on Intel 7 process technology, the processor supports single-socket deployment and up to 4 TB of ECC memory.
- It supports DDR5-4400 at both 1DPC and 2DPC, with eight memory channels and 80 PCI Express 5.0 lanes for network adapters, storage, and accelerators.
- Intel DL Boost, one default DSA device, and AVX-512 support selected inference, analytics, data-movement, and compute workloads; Intel AMX is not supported.
- Hardware security features include Intel SGX with Intel SPS, Total Memory Encryption, Boot Guard, Control-Flow Enforcement Technology, and Intel virtualization technologies.

Product Highlights

- **32-Core Network-Optimized Compute:** 32 cores and 64 threads provide parallel processing capacity for network infrastructure, edge computing, enterprise servers, and general-purpose workloads.
- **1.80 to 3.60 GHz Frequency Range:** The processor combines a 1.80 GHz base frequency with up to 3.60 GHz Intel Turbo Boost frequency for responsive server performance.
- **DDR5-4400 and PCIe 5.0 I/O:** DDR5-4400 at 1DPC or 2DPC, eight memory channels, and 80 PCIe 5.0 lanes support high-throughput single-socket server designs.
- **Data-Movement Acceleration:** Intel DL Boost and one default Intel DSA device support selected inference, analytics, and data-movement workloads.

Detailed Features



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Component	Specification
Processor	Intel Xeon Gold 6421N, 32 cores / 64 threads
Ordering Information	PK8071305122001, FC-LGA16A Tray, Spec Code SRMH0
Frequency and Cache	1.80 GHz base, up to 3.60 GHz turbo, 60 MB cache
Memory	Up to 4 TB ECC memory, DDR5-4400 1DPC or 2DPC, 8 channels
Power and Expansion	185 W TDP, 1S Only scalability, PCIe 5.0 with 80 lanes

32-Core Single-Socket Compute

The 6421N combines 32 physical cores with 64 threads, a 1.80 GHz base frequency, and a 185 W TDP. Its compute profile suits network infrastructure, edge computing, virtualization, and general-purpose workloads.

Network and Edge Positioning

Intel identifies the 6421N as a 4th Gen Xeon Scalable processor with a single-socket scalability profile. This makes it suitable for compact server platforms where high core density and predictable platform design are important.

Speed Select Performance Profiles

Intel documents three SST-PP configurations: 32 active cores at 1.8 GHz and 185 W, 32 active cores at 1.8 GHz and 185 W, and 32 active cores at 1.9 GHz and 185 W.

PCIe 5.0 I/O Expansion

Eighty PCIe 5.0 lanes provide direct expansion capacity for Ethernet adapters, storage controllers, accelerators, and other high-bandwidth server devices.

DDR5-4400 ECC Memory

The processor supports up to 4 TB of ECC memory across eight channels, with DDR5-4400 at both 1DPC and 2DPC. This supports high-capacity single-socket systems with flexible DIMM population requirements.

High-Bandwidth PCIe 5.0 Connectivity

Eighty PCIe 5.0 lanes provide direct expansion capacity for Ethernet adapters, storage controllers, accelerators, and other high-bandwidth devices. The lane budget supports balanced I/O in a single-socket platform.

Acceleration for Inference and Data Movement

Intel DL Boost supports selected inference workloads, while one default DSA device supports data-movement operations. Intel AMX is not supported on this model, so the content does not attribute AMX acceleration to the 6421N.

Security and Virtualization Foundation

The processor includes Intel SGX with Intel SPS, Total Memory Encryption, Boot Guard, Control-Flow Enforcement Technology, AES instructions, VT-x, VT-d, and Extended Page Tables. These capabilities help protect workloads and support virtualized server platforms.

Technical Specifications

Product Specifications

Feature	Value
User SKU	INTL-6421N
Intel ordering code	PK8071305122001
Intel Spec Code	SRMH0
Processor model	Intel Xeon Gold 6421N Processor
Product collection	4th Gen Intel Xeon Scalable Processors
Code name	Products formerly Sapphire Rapids
Vertical segment	Server
Processor number	6421N
Lithography	Intel 7
Marketing status	Launched
Launch date	Q1 2023
Embedded Options Available	Yes
Use conditions	Server/Enterprise

Feature	Value
Total cores	32
Total threads	64
Processor base frequency	1.80 GHz
Max turbo frequency	3.60 GHz
Cache	60 MB
TDP	185 W
Intel DL Boost	Yes
SST-PP 6421N(0)	32 active cores, 1.8 GHz base, 185 W
SST-PP 6421N(2)	32 active cores, 1.8 GHz base, 185 W
SST-PP 6421N(3)	32 active cores, 1.9 GHz base, 185 W
Scalability	1S Only
Memory types	Up to DDR5-4400 MT/s 1DPC and 2DPC
Max memory size	4 TB
Max memory channels	8
ECC memory supported	Yes
PCI Express revision	5.0
Max PCI Express lanes	80
Sockets supported	FCLGA4677
Package carrier	E1B
Package size	77.5 mm x 56.5 mm
DTS max	95 °C
TCASE	85 °C
Intel On Demand Activation Model	No
Intel Data Streaming Accelerator	1 default device
Intel Advanced Matrix Extensions	No
Intel Speed Select Technology - Core Power	Yes
Intel Speed Select Technology - Turbo Frequency	Yes
Intel Speed Select Technology - Performance Profile	Yes
Intel Resource Director Technology	Yes
Intel Speed Shift Technology	Yes

Feature	Value
Intel Turbo Boost Technology	2.0
Intel Hyper-Threading Technology	Yes
Intel Transactional Synchronization Extensions	Yes
Intel 64	Yes
Instruction set extensions	Intel SSE4.2, Intel AVX, Intel AVX2, Intel AVX-512
AVX-512 FMA units	2
Intel QuickAssist Software Acceleration	Yes
Intel Control-Flow Enforcement Technology	Yes
Intel Total Memory Encryption	Yes
Intel AES New Instructions	Yes
Intel Software Guard Extensions	Yes with Intel SPS
Default maximum SGX EPC size	128 GB
Intel Trusted Execution Technology	Yes
Intel OS Guard	Yes
Execute Disable Bit	Yes
Intel Boot Guard	Yes
Intel Platform Firmware Resilience	Yes
Intel Run Sure Technology	Yes
Mode-based Execute Control	Yes
Intel Crypto Acceleration	Yes
Intel Virtualization Technology	VT-x, VT-d, and VT-x with EPT
Shipping media	Tray
Stepping	S3

Product Comparison

Feature	Intel Xeon Gold 6421N / PK8071305122001	Intel Xeon Gold 6428N	Intel Xeon Gold 6430
Processor family	4th Gen Intel Xeon Scalable	4th Gen Intel Xeon Scalable	4th Gen Intel Xeon Scalable
Positioning in this comparison	32-core single-socket network and edge processor	32-core two-socket network and enterprise processor	32-core two-socket enterprise processor
Total cores	32	32	32
Total threads	64	64	64
Processor base frequency	1.80 GHz	1.80 GHz	2.10 GHz
Max turbo frequency	3.60 GHz	3.80 GHz	3.40 GHz
Cache	60 MB	60 MB	60 MB
TDP	185 W	185 W	270 W
Scalability	1S Only	2S	2S
Max memory size	4 TB	4 TB	4 TB
Memory channels	8	8	8
Memory support	DDR5-4400 1DPC and 2DPC	DDR5-4000 1DPC and 2DPC	DDR5-4400 1DPC and 2DPC
ECC memory	Yes	Yes	Yes
PCI Express	5, 80 lanes	5, 80 lanes	5.0, 80 lanes
Default accelerator devices	DSA: 1	QAT: 2; DLB: 2; DSA: 1	DSA: 1
Intel AMX	No	Yes	Yes
Intel DL Boost	Yes	Yes	Yes
Best-fit role	Single-socket network, edge, and infrastructure server	Two-socket network and enterprise server	High-capacity two-socket enterprise and cloud server

Accessories

Category	Accessories
Included Accessories	- Intel Xeon Gold 6421N processor - Tray shipping media
Optional Accessories	- FCLGA4677-compatible server board and CPU heatsink solution - DDR5 ECC memory and PCIe 5.0 network or storage adapters

Support & Warranty

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Shenzhen Branch

Jingfeng Building, 1001 Shangbu South Road, Futian District, Shenzhen, China

USA Branch

35 E Horizon Ridge Pkwy, Ste 110 #30131, Henderson, NV 89002, USA

UK Branch

Third Floor, 207 Regent Street, London W1B 3HH, UK

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[2] Intel. (2026). Intel Xeon Gold 6421N Processor Ordering and Spec Information. https://www.intel.com/content/www/us/en/products/sku/232395/intel-xeon-gold-6421n-processor-60m-cache-1-80-ghz/ordering.html