

Refreshing CPUs for Network and Security Now Drives Performance, Sustainability and TCO Advantages

Network-optimized 5th Gen Intel® Xeon® Scalable processors improve throughput, latency, security and TCO over their predecessors, helping reduce costs in network and network security infrastructure. The platform is optimized for high-value, specialized AI and virtualized workloads, increasing processing and energy efficiency with built-in accelerators. It also builds on existing investments through full compatibility with the previous generation, for minimal testing and validation.



The battle for competitive advantage among network service providers such as communication service providers (CoSPs) and network security vendors continues to be waged and won based largely on network performance and cost efficiency. High throughput and low latency are needed at maximum density to effectively deliver differentiating services and compelling user experiences. At the same time, improvements in energy efficiency are not only a primary contributor to achieving competitive operating costs but also reducing carbon footprint to support corporate sustainability initiatives.

Dynamic software-defined networks have evolved to meet these challenges using virtualized network functions (VNFs) deployed throughout distributed networks. Traffic processing, security and other functionality are instantiated as needed across the network, from edge to cloud. Server platforms and ecosystems must be adapted to these models with the flexibility to deliver value across the full range of changing use cases.

5th Gen Intel® Xeon® Scalable processors drive network performance vs. prior gen

5G UPF

UP TO **1.51x**

higher throughput with 5G Core
User Plane Functions¹

Packet Processing

UP TO **1.60x**

higher throughput
on VPP IPv4 FIB²

Security Gateway

UP TO **3.73x**

higher throughput on
VPP IPSec (1420B) with integrated
Intel QAT accelerator³

Web Servicing Connections

UP TO **1.69x**

higher connections/second on NGINX
TLS 1.3 Webserver Handshake with
integrated Intel QAT accelerator⁴



The image shows a central Intel Xeon Scalable Processor 5th Gen. Surrounding it are six circular icons, each with a text description of a key feature:

- Up to 64 high-throughput, high-efficiency cores⁵** (Icon: Microchip)
- Built-in accelerators for key networking workloads** (Icon: Head with gear)
- Virtual environment isolation for confidential computing** (Icon: Shield with checkmark)
- Up to 3x total last level cache⁵** (Icon: Lightbulb)
- Up to 16% increased DDR5 memory speed⁵** (Icon: Memory module)
- Up to 80 lanes of PCIe 5.0 per socket** (Icon: PCIe slot)

Network-optimized 5th Gen Intel® Xeon® Scalable processors provide more compute resources, faster memory and higher performance per watt than predecessors, delivering a ready source of value for network and network security operators. The platform enhances throughput and energy efficiency with high per-core performance, built-in accelerators, enhanced power management and Intel Ethernet Network Controllers and Adapters. Enhanced confidential computing enables protected sharing of sensitive data and IP with granular control. Software optimizations, tools and reference architectures combine with Intel’s unmatched ecosystem of partners to help accelerate time to value, while drop-in upgradeability, extended availability⁶ and improved telemetry capabilities maximize the value of network investments.

Boost performance and energy efficiency for common network workloads

Network-optimized 5th Gen Intel Xeon Scalable processors are designed to enable performant, cost-effective transport of ever-growing data volumes. The architectural advances across the balanced platform’s execution, memory and I/O resources are complemented by its industry-leading collection of built-in hardware accelerators.

These accelerators are purpose-built to speed up specific workload tasks, accelerating them in hardware, rather than in software on the CPU cores. This approach performs the prescribed work in less execution time and consumes less energy, while also freeing up processor cycles for other work. Intel has invested heavily in APIs, tools and other software enablement to streamline development of solutions that take advantage of Intel Xeon processor accelerators.

- **AI and machine learning.** Intel Advanced Matrix Extensions (Intel AMX) accelerate core math and tune the precision of calculations to AI workload needs, reducing resource requirements and increasing throughput. This accelerator fuels AI-powered next-generation network tuning, particularly boosting SASE deployments, vRANs and cloud security functions including advanced threat detection.

- **Streaming data movement.** Intel Data Streaming Accelerator (Intel DSA) improves the performance of applications that depend heavily on data movement and transformation, especially CDNs. It relieves the CPU of nearly all overhead associated with moving data among memory, storage and networking subsystems, optimizing data handling across the system and attached devices.
- **Cryptography and compression.** Intel QuickAssist Technology (Intel QAT) offloads crypto and compression tasks from the CPU, increasing throughput and supporting pervasive encryption without loss of performance for critical workloads. It offers up to 400 Gbps crypto, 160 Gbps verified compression, 100 kops PFS ECDHE and RSA 2K decrypt on select SKUs, with particular applicability to SASE, CDN and 5G UPF workloads.
- **Load balancing.** Intel Dynamic Load Balancer (Intel DLB) increases throughput by improving distribution of network data and processing across parallel CPU hardware. For example, Intel DLB enables CDNs to share packet processing across processor cores more efficiently, enabling it potentially to support more simultaneous video streaming connections per server, for lower TCO.
- **In-memory analytics.** Intel In-Memory Analytics Accelerator (Intel IAA) increases query throughput and reduces memory footprint for in-memory analytics workloads. Media analytics provide network operators with real-time insight into the contents of video streams and other media to optimize delivery as well as to support advanced capabilities such as AI-based ad insertion.

To help maximize throughput, Intel has optimized key open source projects relevant to packet processing and network security for 5th Gen Intel Xeon Scalable processors to take full advantage of platform features, including hardware accelerators. These include the data plane development kit (DPDK), which cuts overhead by bypassing the kernel to handle packet processing in user space, and vector packet processing (VPP), which uses DPDK to accelerate encrypted packet forwarding. The processors provide an up to 1.37x performance/watt improvement with Intel Infrastructure Power Manager software for 5G UPF applications vs the prior generation.⁷

Protect sensitive workloads with confidential computing

Protecting sensitive and regulated workloads — such as subscriber payment details and corporate IP — is an ongoing challenge for network operators that has only gotten more complex with increasingly distributed networks. Encrypting data in transit and at rest is not enough to protect the data, which must be in an unencrypted state while in active use by applications and services on the network. As a result, operators need additional means to mitigate their risk.

Confidential computing protects sensitive data, workloads and AI models with trusted execution environments (TEEs) that provide isolation from untrusted entities while the data is in use. 5th Gen Intel Xeon Scalable processors provide the hardware capabilities that underlie these trust domains, enabling even confidential or regulated data to be protected while in use. This enables network and network security operators to take advantage of those compute resources available on-prem, at the edge or in the cloud while remaining compliant.

Hardware-based isolation and access controls help harden application and data security to protect against attack, tampering or theft. 5th Gen Intel Xeon Scalable processors support VM-level isolation in addition to application-level isolation of workloads:

- **Application-level isolation.** Intel Software Guard Extensions (Intel SGX) is the most researched, updated and deployed confidential computing technology in data centers on the market today. For customers that need the least amount of code to access confidential data, Intel SGX provides the smallest trust boundary available, using TEE “enclaves” comprised of isolated and encrypted private memory space.
- **Virtual environment isolation.** Intel Trust Domain Extensions (Intel TDX) offers isolation and confidentiality at the virtual machine (VM) level. Within an Intel TDX confidential VM, the guest OS and VM applications are isolated from access by the cloud host, hypervisor and other VMs on the platform. Unlike Intel SGX, Intel TDX does not require application code changes, offering a simpler migration path for existing VMs to move to a TEE.

This range of isolation options is unique to Intel’s confidential computing technologies. It enables network and network security operators to match their solutions to their individual needs, including balance between solution complexity and trust boundary requirements.

Maximize the value of current and future investments

The platforms based on Intel Xeon Scalable processors are engineered to streamline implementation and deployment as well as to foster operational efficiencies. Software and full pin-compatibility between 4th Gen and 5th Gen Intel Xeon Scalable processors enable drop-in upgrades that help minimize testing and validation requirements when adopting the new platform. Extended availability of up to seven years¹ for SKUs specific for network operators and industry-leading support improve the reliability of the network’s foundation for the long term.

Intel tools and technologies complement the platform’s native value by improving continuity and efficiency of network operations. For example, Seamless Firmware Update Technology increases server uptime by enabling platform-firmware updates without rebooting systems. The capability reduces system downtime from minutes to a few seconds, without perceived degradation to the services running on the platform. Simplified firmware updates help network and network security operators maintain security, reliability and SLA compliance.

5th Gen Intel Xeon Scalable processors also feature advanced telemetry that contributes to operational efficiency. Intel Platform Monitoring Technology (Intel PMT) is a converged telemetry framework that unifies discovery, collection and management of telemetry data from across the infrastructure. This comprehensive, consistent view enables performance and resource management, including real-time automation of workload orchestration across network resources.

Intel Resource Director Technology (Intel RDT) provides visibility and control over the allocation and use of shared resources such as last-level cache (LLC) and memory bandwidth by applications, VMs and containers. In particular, Intel RDT aids in the detection and resolution of “noisy neighbor” issues where specific workloads over-utilize shared resources in complex environments. By re-aligning those resources, network operators can reduce resource contention and performance interference, increasing determinism and reliability of critical applications and services.

Ecosystem support through Intel Network Builders

The **Intel Network Builders Program** helps partners innovate and adapt to evolving business, technology and end-user needs, effectively and cost-efficiently. The program provides members with a variety of technical enablement options such as hands-on support from subject matter experts, access to virtual testing and optimization labs, training, tools and other resources.

Hardware enablement for key networking usages

Performance, efficiency, data protection and ROI from 5th Gen Intel Xeon Scalable processors deliver enhanced value to network and network security operators across key usage models, including the following:

- **5G Core UPF** deployments deliver high capacity at low latency, bolstered by higher packet-processing performance than the predecessor platform at the same core count and frequency.³
- **CDNs** improve their operation across key performance indicators that include latency, power efficiency and security. They can be optimized using Intel QAT and Intel DSA.

- **Network security solutions** such as SD-WAN, network firewalls, network appliances and SASE become more scalable, flexible and future-ready, with hardware acceleration of crypto and AI, plus confidential computing to protect encryption keys and sensitive workloads.
- **Media enhancement** improves user experiences by upscaling content to higher resolution with advanced algorithms and machine learning. These capabilities are accelerated by Intel AMX, enabled by OpenVINO toolkit and enhanced with other software optimizations to increase their operational value.

Specifications

5th Gen Intel® Xeon® Scalable Processors for Networking Segment																
Refer to ark.intel.com for a complete list of SKUs																
SKU [§]	Processor Cores	Base Frequency (GHz) [§]	All-Core Turbo (GHz)	Max Turbo (GHz)	Cache (MB)	TDP (Watts)	Maximum Scalability	DDR5 Memory Speed	Intel UPI Links Enabled	Default Intel DSA Devices	Default Intel IAA Devices	Default Intel QAT Devices	Default Intel DLB Devices	Intel SGX Enclave Capacity (per Processor)	Long-Life Availability [§]	Intel On Demand Capable
2S Networking Optimized																
Intel® Xeon® Platinum 8592+ processor	64	1.9	2.9	3.9	320	350	2S	5600	4	1	1	1	1	512 GB	No	Yes
Intel Xeon Platinum 8570 processor	56	2.1	3.0	4.0	300	350	2S	5600	4	1	0	0	0	512 GB	No	Yes
Intel Xeon Gold 6548N processor	32	2.8	3.5	4.1	60	250	2S	5200	3	1	0	2	2	128 GB	Yes	Yes
Intel Xeon Gold 6538N processor	32	2.1	2.9	4.1	60	205	2S	5200	3	1	0	2	2	128 GB	Yes	Yes
1S Networking Optimized																
Intel Xeon Platinum 8571N processor	52	2.4	3.0	4.0	300	300	1S	4800	0	4	4	4	4	512 GB	Yes	Yes

[§] 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/intel-turbo-boost-technology.html for more information. 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. For more information about Intel® On Demand, visit intel.com/ondemand. For product specifications, please refer to ark.intel.com.

Learn More

www.intel.com/5thgenxeon-network



¹ See [N4] at intel.com/processorclaims: 5th Gen Intel® Xeon® Scalable processors. Results may vary.

² See [N2] at intel.com/processorclaims: 5th Gen Intel® Xeon® Scalable processors. Results may vary.

³ See [N18] at intel.com/processorclaims: 5th Gen Intel® Xeon® Scalable processors. Results may vary.

⁴ See [N6] at intel.com/processorclaims: 5th Gen Intel® Xeon® Scalable processors. Results may vary.

⁵ On select SKUs. See [G11 and G12] at intel.com/processorclaims: 5th Gen Intel Xeon Scalable processors. Results may vary.

⁶ 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.

⁷ See [N17] at intel.com/processorclaims: 5th Gen Intel® Xeon® Scalable processors. Results may vary.

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

Performance varies by use, configuration and other factors. Learn more on the Performance Index site.

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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