

## Faster, More Flexible Networks with Built-in Accelerators on 5th Gen Intel® Xeon® Scalable Processors



*“As software-defined 5G networks become more prevalent, Intel Network Engines provide more CPU processing cycles, more efficiency and more intelligence to accelerate the network from core to edge.”*

—Sachin Katti, SVP and GM, Network and Edge Group, Intel

5th Gen Intel® Xeon® Scalable processors integrate Intel® Network Engines — accelerators targeting key networking workloads — directly onto the processor. This innovation reduces the dependence on external accelerators, speeds up data processing and frees up CPU cycles for key networking workloads. The result? Networks that are ready for increased virtualization, more traffic and future workloads at the core and the edge.

### Taking advantage of opportunities at the network edge

5G network topologies reach from the cloud to the core to the edge. Software-defined networking (SDN) is making it possible to orchestrate end-to-end virtualization for moving data and running applications across a common architecture that’s easier to manage than disparate networks. The main challenges that stand in the way are network complexity, a security perimeter that’s harder to protect from more sophisticated attacks, and persistent growth in data variety and volume.

### Managing network expansion across four big categories

To keep up with rapid market changes and evolving competitors, mobile network architects need to accelerate networking workloads across four key categories.

- **Encryption processing:** Two critical elements of network security are data encryption and decryption, which are resource-intensive workloads. If you expend all your CPU cycles on encryption/decryption, you have less processing power for packet forwarding and control plane apps.
- **Control plane:** Control plane activities set behaviors for specific components, such as a network switch, so the components know what rules to follow. Low latency is a top priority for control plane activities, and failure to issue controls in a timely manner can degrade total network performance.
- **Data plane:** Simply put, the data plane or data path refers to moving data around the network and across the core, cloud and edge. In 5G networks, data rates are growing from tens of gigabits to hundreds. In data centers, the data rates are pushing into terabit territory.
- **Signal processing:** Signal processing converts radio signals to digital commands and vice versa. Without fast signal processing, cloud-native, virtualized radio access networks (vRAN) wouldn’t be possible. As 5G increases data loads, signal processing will require more processing resources to meet demand.

## Intel Network Engines: Built-in accelerators drive network expansion

How do you manage networking workloads flexibly and intelligently while leaving headroom for growth? That's where 5th Gen Intel Xeon Scalable processors really shine. This generation takes several external accelerator technologies and integrates them into the processor. Workloads can be shifted to/from accelerators within the processor through simple code changes, allowing for easy data mobility and scalability as the number of cores increases in edge, cloud or data center deployments.

### Enhanced network performance with 5th Gen Intel Xeon Scalable processors



**Fewer cores, faster compression**

[Intel QAT >](#)

Up to

**2.56x** higher MS SQL+Backup

performance with 5th Gen Intel Xeon using integrated Intel QAT vs. 3rd Gen Intel Xeon using default compression<sup>1</sup>



**Better small packet random read**

[Intel DSA >](#)

Up to

**2.45x** higher IOPs

and

**59%** latency reduction

for small packet random read with 5th Gen Intel Xeon using integrated Intel DSA vs. 3rd Gen Intel Xeon processors OOB<sup>2</sup>



**NGINX performance**

[Intel QAT — NGINX\\* Performance White Paper >](#)

Up to

**1.73x** higher NGINX TLS handshake

performance with 5th Gen Intel Xeon vs. 3rd Gen Intel Xeon processors<sup>3</sup>

## Encryption accelerators free up CPU cycles for network functions

Previously available as an accelerator on Intel® Ethernet controllers and other Intel® Xeon® processors, Intel® Quick Assist Technology (Intel® QAT) is now a built-in accelerator on the 5th Gen Intel Xeon Scalable processor platform. The processor moves encryption, compression and public key exchange workloads to Intel QAT, freeing up CPU cycles for other network functions. As network architects look to virtualize more functions and capabilities — such as secure access service edge (SASE) — Intel QAT helps create vital processing capacity that benefits the whole network.

## Smarter resource allocation supports low-latency control plane commands

Intel® Dynamic Load Balancer (Intel® DLB) automatically balances workloads across different CPUs so that one CPU isn't overloaded, which can lead to bottlenecks and degrade whole system performance. Even when system loads fluctuate, Intel DLB delivers consistent workload balancing. Intel DLB also helps ensure low latency for control plane commands so that networks stay responsive to orchestration, even in periods of dense traffic.

## Faster data movement between processors and networked resources

Intel® Data Streaming Accelerator (Intel® DSA) is an evolution of the direct memory access capability that optimizes data copy and transformation operations. This improvement takes place both within the processor and between the processor and external resources in a network, including add-in cards, memory, storage arrays and other CPUs. The impact on network performance yields high efficiency for software tools.

## More-granular controls for fine-tuning network performance

Not all resources in a network need the same amount of compute performance, nor do they experience the same peak workloads at the same time. Intel® Speed Select Technology (Intel® SST) is a key feature of 5th Gen Intel Xeon Scalable processors that grants communications service providers (CoSPs) more active, expansive control over CPU performance. CoSPs can use Intel SST to create multiple configuration profiles on each server. Intel SST profiles can prioritize specific workloads across specific time frames or prioritize server utilization and energy efficiency. CoSPs can use Intel SST to offer scalable performance for end users by setting base or priority frequency to workloads as needed.



## How Intel Network Engines make network operators' lives easier

### Challenge

#### Encryption processing:

CPU-intensive workloads for data security

#### Control plane:

Network orchestration requiring low latency

#### Data plane:

Data growth in the gigabits (edge) and terabits (core)

### Solution

#### Intel QAT

accelerates encryption and frees up CPU cycles for network functions.

#### Intel DLB

helps prevent bottlenecks and delivers low latency for control plane workloads.

#### Intel DSA

moves data quickly throughout the network

## Conclusion: Intel Network Engines deliver more value from essential hardware

By integrating accelerators into the 5th Gen Intel Xeon Scalable processor die, Intel is providing more value to a baseline component that network builders are already buying. Integrated accelerators also reduce the need for external accelerators, which leads to less complexity in the configuration and a more concise bill of materials (BOM). For enterprises that are driving end-to-end virtualization across their networks, this latest generation of processors makes it easier to run core, edge and RAN workloads on a common platform.

## Learn more

See how built-in accelerators can help improve the performance of your fastest-growing workloads: [Accelerator Engine Overview](#).

Explore how to get the most out of Intel Xeon Scalable processors with built-in accelerators at [intel.com/xeonscalable](https://intel.com/xeonscalable).

Learn more about Intel Network Accelerator Engines:

[Intel QuickAssist Technology >](#)

[Intel Dynamic Load Balancer >](#)

[Intel Data Streaming Accelerator >](#)



<sup>1</sup>See [D5] at [intel.com/processorclaims](https://intel.com/processorclaims): 5th Gen Intel Xeon Scalable processors. Results may vary.

<sup>2</sup>See [N16] at [intel.com/processorclaims](https://intel.com/processorclaims): 5th Gen Intel Xeon Scalable processors. Results may vary.

<sup>3</sup>See [N15] at [intel.com/processorclaims](https://intel.com/processorclaims): 5th Gen Intel Xeon Scalable processors. Results may vary.

#### Notices and disclaimers

Availability of accelerators varies depending on SKU. Visit the [Intel Product Specifications page](#) for additional product details.

Performance and power vary by use, configuration, and other factors. Learn more at [intel.com/PerformanceIndex](https://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.

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

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Your costs and results may vary.

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