Solution Brief

Secure Access Service Edge (SASE)
Intel® Xeon® 6 SoC with P-cores

Higher Performance and Lower TCO for SASE Points of Presence (PoPs) and Edge Servers

The Intel® Xeon® 6 SoC with Performance-cores provides a balanced, integrated, accelerated platform for the deployment of SASE resources, including private SASE PoPs and PoPs in private edge locations.

As enterprise data volumes grow exponentially, the computations to draw value from that data are pushed increasingly to the edge, closer to where it is generated and used. By avoiding the transport latency associated with moving data back and forth to a data center or cloud, edge computing enables rapid or real-time analytics and other workloads. Eliminating that backhaul also saves on bandwidth costs. The growth in data and intelligence collected, processed and stored at the edge creates a more distributed environment with a dramatically increased cyberattack surface.

Monolithic applications have been replaced by chains of containerized microservices that traverse on-premises and cloud infrastructure, decoupled from the underlying hardware in dynamic, software-defined topologies. Traditional perimeter-focused protection measures are no longer applicable, and security functions must be applied at the per-workload, per-user, and per-device levels. The SASE model addresses these novel requirements by converging networking and security into a set of lightweight containerized services. Global SASE adoption is poised to continue its expansion with a CAGR of more than 25% through 2034, growing nearly tenfold over the decade 2024-2034.[1]

Gartner, which coined the term Secure Access Service Edge (SASE), differentiates the security services within the SASE model under the umbrella "security service edge" (SSE). The components of SSE, which include next-generation firewall (NGFW), Zero Trust Network Access (ZTNA), Secure Web Gateway (SWG), Cloud Access Security Broker (CASB), and others constitute the fastest growing part of SASE. Within the broader adoption context, SSE is expected to maintain a double-digit CAGR through 2028, together with the growth seen in software-defined WAN (SD-WAN) services, the network side of SASE.[2]

The Intel® Xeon® 6 SoC with Performance-cores (P-cores) drives higher performance and performance per watt in the packet-processing pipeline, increasing SD-WAN throughput and cost efficiency. It also provides hardware acceleration for cryptography, AI inference and other workloads to make security functions more robust and cost-effective, driving up per-server connection density. The Intel Xeon 6 SoC is part of a scalable architecture for SASE PoPs that can meet a range of capacity and functional requirements.

The evolution of SASE infrastructure

Conventionally, enterprises have consumed SASE as services deployed in vendor cloud infrastructure, which provides network bandwidth, elasticity, failover and geographic reach.

Ecosystem Support Through Intel® Industry Solution Builders

The Intel Industry Solution 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.

As low-latency services for networking and security have become more central to the ever more distributed enterprise infrastructure, the physical distance between users and cloud resources that host SSE services becomes more critical. In addition, as some organizations find their edge locations distant from SASE PoPs, network connectivity stability and latency can become inadequate. Customers are now looking beyond cloud-deployed SASE services, to SASE PoPs deployed at their own edge locations.

The ascendancy of private PoPs and single-vendor SASE

By gaining more power over where services are hosted, enterprises can realize better responsiveness for real-time and near-real-time usages, better TCO and more control over the design and operation of their distributed networks. Colocation vendors are rising to meet this need, hosting private PoP locations with closer proximity to the end users and applications they support.

Private PoPs host SASE networking and security services at scale, often with the ability to support thousands or even millions of secure tunnels. Sites can range dramatically in size, from a single server to multiple racks of servers, depending on customer requirements in a specific vicinity. Ethernet adapters are the physical interface between the servers within the PoP and the network infrastructure, enabling high-speed, reliable, and secure communication.

Single-vendor SASE solutions are expected to represent over 85% of the market by 2028, driven by enterprises' preference for integrated, one-stop solutions that simplify deployment and management.[2] As the market matures, the common approach of building solutions based on best-of-breed components from multiple providers is giving way to vendor consolidation, providing more unified environments. This emerging consolidation approach helps organizations overcome challenges from tool sprawl, including increased operational complexity that can elevate costs and time to market as well as limit visibility, potentially creating security exposures.

SASE deployments in enterprise edge locations resonate with the drive toward single-vendor SASE. The SASE stack needs to function together as a unified whole, and organizations expect fidelity at edge locations with the rest of the network. The platforms deployed at the edge to support comprehensive but complex SASE application stacks require characteristics and capabilities that are tailored to the workload.

"The modern data center is facing unprecedented demands, requiring smarter, more efficient solutions to overcome challenges such as space, power and cooling constraints. At Cisco, we understand these complexities and are committed to optimizing infrastructure — from the data center to the edge — for peak performance and efficiency.

Seamless consolidation of diverse enterprise workloads — across cloud-native, virtualized and hyperconverged environments — combined with robust network security, is more critical than ever. Leading organizations like Huntington Bank are choosing Cisco UCS with Intel® Xeon® 6 to scale smarter, faster and more efficiently, with a focus on zero-touch provisioning and automated lifecycle management."

– Jeremy Foster, GM and SVP, Cisco Compute

AI for traffic handling, network security and beyond

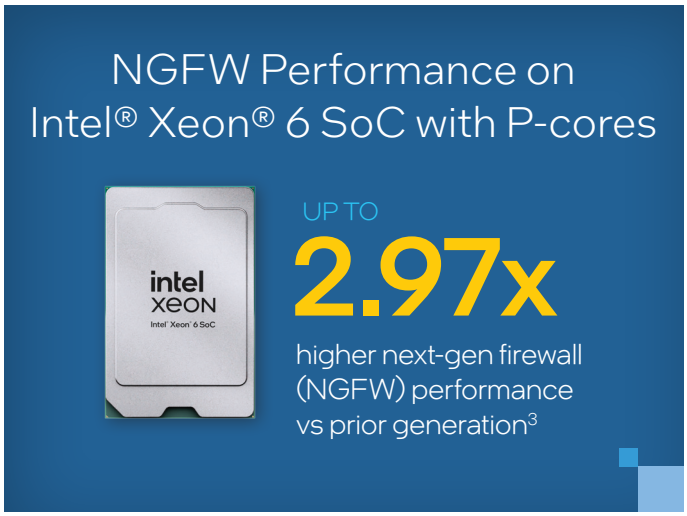
Accelerated inference on the Intel Xeon 6 SoC supports advanced, AI-enabled performance for the SASE stack and other workloads, with the latency and cost advantages of using a shared hardware platform and avoiding backhaul to do inference at a cloud data center. AI can be deployed at SASE PoPs on hardware at any scale, from systems based on Intel® Core™ processors to the largest multisocket servers based on Intel Xeon processors. The open software models optimized for Intel processor AI capabilities, including those in PyTorch, TensorFlow, ONNX and OpenVINO™ toolkit, streamline development of AI solutions and provide a "write once, run anywhere" environment where a single codebase can scale across Intel CPUs and GPUs as a common execution environment.

AI-powered traffic steering determines the best datapath based on factors such as traffic priority, the quality of individual links and available bandwidth. The SASE platform responds to those insights automatically, adjusting network paths in real time on the software-defined network. Dynamically reducing traffic congestion and service disruptions helps the business get more value from its bandwidth investment. In addition to real-time monitoring and control, deep learning models can also analyze captured metrics such as link saturation, jitter and packet loss to further optimize the network.

The Intel® NetSec Accelerator Reference Design is a blueprint for a PCIe add-in card that features the functionality of an independent Intel processor-based server, enhancing the density, performance and scale of SASE deployments, including as a dedicated or shared compute resource for network, security and AI functions.

AI-powered observation of network behavior for traffic management also enables security functions. Using telemetry from devices on the network, for example, models can establish baseline, expected behaviors and then identify anomalies within network traffic that reveal potentially malicious actions. Capturing these attack indicators can improve an organization's security posture by helping security teams identify and isolate compromised systems affected by vectors such as malware and phishing attacks. This capability has become common in mainstream threat detection and response tools, including for deployment in SASE solutions.

Beyond network and security usages, the growth of AI in general-purpose enterprise workloads makes it increasingly valuable to deploy inference across all available resources — including both CPUs and GPUs.



Intel Xeon 6 SoC for Private SASE PoP and edge

The Intel Xeon 6 SoC provides high packet-processing throughput for networking and security workloads, with a new high-performance microarchitecture supported by a range of built-in hardware accelerators for crypto, AI and other functions. Results such as up to 2.97x higher next-generation firewall (NGFW) performance for security and SASE vs. the prior generation[3] helps drive up the number of zero-trust-based connections that an individual server can support.

Increased connection density helps reduce infrastructure requirements and server footprints for lower capital expense and maintenance costs. The highly integrated SoC design lowers solution TCO further by means of extensive component integration, including integrated crypto acceleration and Intel® Ethernet. Integration streamlines the server bill of materials compared to systems built with discrete components and contributes to higher performance per watt that reduces energy expense. The Intel Xeon 6 SoC creates a compelling refresh opportunity with improvements across the balanced platform architecture:

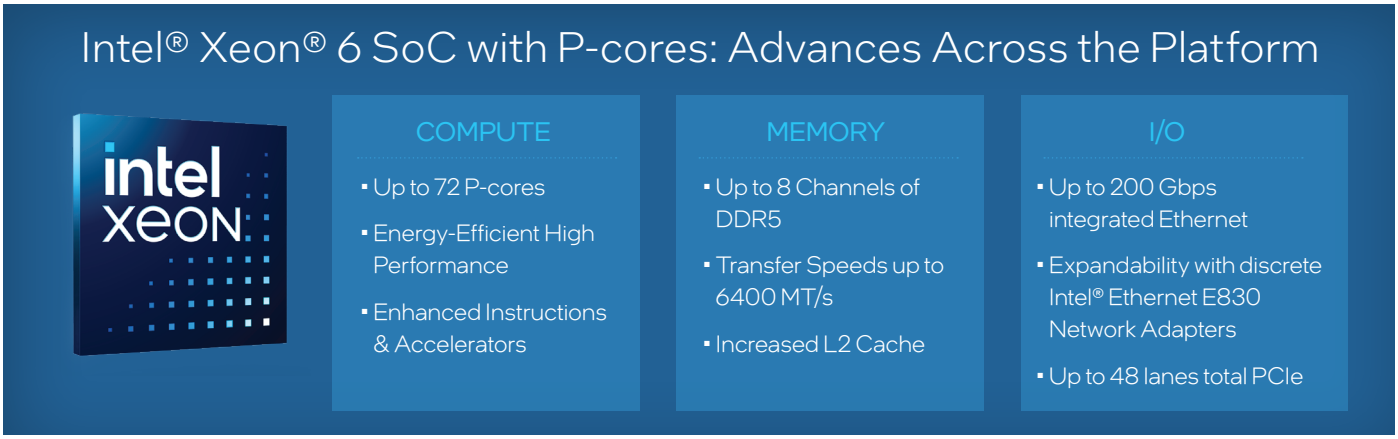
- **Expanded compute resources**, including up to 72 P-cores with high performance per-core and per-watt, complemented by enhancements to instructions and built-in accelerators.
- **Memory subsystem innovations**, with up to eight channels of DDR5 memory operating at up to 6400 MT/s and an increased L2 cache, to help improve CPU utilization by keeping data close to the execution resources.
- **Enhanced I/O throughput and latency**, up to 200 Gbps of integrated Intel Ethernet with 100 Mbps to 25 Gbps ports and up to 32 lanes of PCIe 5.0 and up to 16 lanes of PCIe 4.0, for 48 lanes total.

Crypto and compression offload: Intel® QuickAssist Technology

Intel QuickAssist Technology (Intel® QAT) is a built-in hardware accelerator that offloads encryption and compression operations from the processor cores. Hardware-based Intel QAT is much faster than the software-only implementations on previous platforms, and performing those calculations on purpose-built hardware instead of on the processor cores is also inherently more power-efficient. In addition, offloading compute-intensive encryption and compression functions from the cores frees up those resources for other business critical workloads, helping improve business outcomes.

Optimize and expand network connectivity: 200GbE Integrated Ethernet and Intel® Ethernet E830 Network Adapters

The Intel Xeon 6 SoC with P-cores integrates up to eight Intel Ethernet ports, delivering up to 200 Gbps throughput to provide robust platform connectivity without the added cost of discrete network adapters. The integrated 200GbE Ethernet is fully programmable, with a packet-processing pipeline that helps accelerate SASE workloads without requiring additional PCIe lanes, potentially reducing both power consumption and latency for an improved user experience.



For increased performance, reliability and port counts, adding dedicated Ethernet connectivity products such as the Intel Ethernet E830 Network Adapters with up to 200 Gbps maximum data rate, PCIe 5.0x8 host interconnect support and comprehensive security and manageability features can support higher bandwidth workload requirements. It can help enhance edge network functions with its fully programmable and offloaded packet processing pipeline that can parse and steer specific network packets to individual cores of the Xeon 6 SoC for access control or shaping.

Intel Ethernet technologies deliver advanced integrations and rigorous qualifications with industry leading network data processing frameworks such as DPDK and XDP that support high performance and highly customizable security and firewall implementations. They can also provide flexibility, redundancy and network isolation for improved security and network stability, all with common software drivers for ease of expansion.

Accelerated AI inference: Intel® Deep Learning Boost

Intel Deep Learning Boost (Intel® DL Boost) is enhanced in the Intel Xeon 6 SoC, to improve AI throughput and offload calculations to reduce burden on the processor cores. Intel® Advanced Matrix Extensions (Intel® AMX), a component of Intel DL Boost, provides key functionality by accelerating the matrix multiplication operations at the heart of AI inference. The Intel Xeon 6 SoC adds Intel AMX support for FP16 datatypes, enhancing the efficiency of calculations including those associated with models that have been trained on GPUs. Enhanced Intel DL Boost enhances AI outcomes across SASE and other business-critical workloads.

View the latest performance data at
www.intel.com/PerformanceIndex

Conclusion

The Intel Xeon 6 SoC with P-cores offers compelling innovation as the foundation for SASE PoP servers. As private PoPs and PoPs in private edge locations become more integral to SASE operations, this SoC helps address the rising demands for advanced networking and security functions, including those based on AI inference. Hardware-based crypto offload, integrated Intel Ethernet and AI acceleration provide energy-efficient performance to deploy next-generation services.

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[1] Precedence Research, September 2024. "Secure Access Service Edge Market Size, Share and Trends 2024 to 2034." https://www.precedenceresearch.com/secure-access-service-edge-market.

[2] Dell'Oro Group, August 7, 2024. "SASE Growth Diverging: SSE to Outpace SD-WAN Revenue Nearly Two to One, According to Dell'Oro Group." https://www.delloro.com/news/sase-growth-diverging-sse-to-outpace-sd-wan-revenue-nearly-two-to-one/.

[3] See [7ND23] at intel.com/processorclaims: Intel® Xeon® 6. Results may vary.

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