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Accelerate Industry 4.0 Outcomes with 4th Gen Intel® Xeon® Scalable Platform Performance

Enabled by 4th Gen Intel® Xeon® Scalable processors for IoT, the Siemens SIMATIC IPC RS-717A brings a new AI engine, DDR5 memory, PCIe 5.0 connectivity, and embedded security features to challenging IoT environments.

SIEMENS

The Industry 4.0 revolution promises dramatic gains in productivity and output through innovations in AI automation and the ability to process increasing volumes of data at the edge. In 2022, the global market for industrial automation is valued at USD 205B and is expected to increase consistently at a compound annual growth rate (CAGR) of 9.8 percent to reach a valuation of USD 395B by 2029.[1] Production lines that embrace automation are poised to drive more value from their data, enabling them to succeed in a more demanding and competitive global economy.

"With the 4th Gen Intel® Xeon® Scalable platform, customers have more possibilities and benefit from data center levels of performance and equipment directly in the harsh production environment of a factory, without the need for data center air-conditioning."

—Sebastian Drosdek, product manager at Siemens

Challenge: The need for data center performance at the industrial edge

In a typical factory floor, each machine in the product line may have its own industrial PC (IPC) to control machine behavior through human-machine interfaces (HMIs) or collect data to support diagnostics, simulations, or AI. As data grows from more sensors in the environment and types of data ingested, these IPCs need increasing levels of performance to keep up, and it becomes harder for the IT department to maintain each machine with routine updates to software, firmware, and BIOS. Manufacturers need a solution to drive system convergence, tolerate harsh conditions, and enable data center levels of performance with quick signal response times to ensure production lines run smoothly.

Solution: The Intel-enabled Siemens SIMATIC IPC RS-717A amplifies performance on the factory floor

The Siemens SIMATIC IPC RS-717A is a scalable 1U rack server platform enabled by 4th Gen Intel® Xeon® Scalable processors for IoT. This platform supports multiple connected sensors and appliances and drives more virtual machines (VMs) and workloads on fewer machines while also offering industrial-grade reliability for harsh environments.[2] 4th Gen Intel Xeon Scalable processors in the solution stack deliver incredible performance gains over previous-generation processors,[3] with hardware-accelerated AI and security capabilities.

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The Siemens 1U rack fits into a standard server cabinet and condenses as much compute power into as little space as possible. With this solution, businesses can deploy an Industry 4.0 compute solution for advanced AI or operational technology (OT) convergence or even as a private 5G base station for an entire production area.

How it works

Typically, Intel® Xeon® Scalable processors are designed for data center environments that are tightly controlled inside air-conditioned and secured facilities. The SIMATIC IPC RS-717A integrates the IoT version of Intel Xeon Scalable processors that provide data center−grade performance with up to 52 cores.[3] Drosdek says, "This is the very first time Siemens is deploying scalable processors from Intel's data center line in industrial computers. The pure compute power will be beneficial well into the future." Select SKUs of the 4th Gen platform also feature long-use and high-reliability capability for up to 10 years at 100 percent uptime.[2] These platform enhancements culminate in a server rack solution with built-in electromagnetic vulnerability (EMV) shielding, ambient heat tolerance of 5°C to 45°C, and the ability to support tens or hundreds of sensors and devices with fast signal processing over a private 5G network or integrated gigabit Ethernet LAN.

Intel-enabled Siemens SIMATIC IPC RS-717A platform advantages
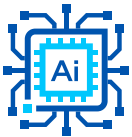
Advanced AI engine

4th Gen introduces Intel® Advanced Matrix Extensions for even faster AI inferencing[3] and support for the Intel® Distribution of OpenVINO™ toolkit for fast AI model development.

Built for harsh conditions

Electromagnetic interference (EMI) shielding helps protect data and operations from nearby machinery or appliances, while the 1U system tolerates ambient temperatures of 5°C to 45°C with 100 percent uptime.[2]

Highly scalable

The 1U rack server can serve as a private 5G gateway, drive OT convergence with typical deployments of 10 to 20 IPCs, or scale to 100+ servers.

High-capacity storage

Up to eight storage drives per processor support massive data for digital twin simulations or six or more months of system log data for archival and defect remediation.

Configurable connectivity

PCIe 5.0 with DDR5 memory supports faster data transfers with more concurrent workloads, while the 1U rack server offers 2x 16-pin PCIe 5.0 slots for more accelerators and more network cards.

Embedded security

Hardware-enabled security helps prevent data loss from system tampering (memory removal), and below-OS protections help safeguard the system during remote system access sessions.

Support the latest and future AI use cases with a new AI engine

AI is driving key automation processes such as defect detection and assembly validation or emerging use cases such as using sound detection to monitor product line stability. As AI becomes more important to Industry 4.0 applications, Intel and Siemens are making it easier for businesses to deploy AI on the shop floor. 4th Gen Intel Xeon Scalable processors in the SIMATIC IPC RS-717A deliver a new engine in Intel® Deep Learning Boost (Intel® DL Boost) called Intel® Advanced Matrix Extensions (Intel® AMX). Intel AMX introduces extensive hardware and software optimizations with int8 and BF16 data-type support to drive fast AI inference. AI builders can quickly train and deploy new AI models to the factory floor while enabling data center−grade AI in the production line.

4th Gen Intel® Xeon® Scalable processors	**1.33x** higher performance[4]	**3.01x** higher AI inference performance with Intel® AMX for image classification[5]	**4.25x** higher AI inference performance with Intel® AMX for object detection[6]
Performance compared to 3rd Gen Intel® Xeon® Scalable processors.			

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

Drive customer choice with PCIe 5.0 connectivity

The SIMATIC IPC RS-717A features up to 2x 16-pin PCIe 5.0 slots to support two add-in AI accelerator cards or network interface cards for faster 10GbE connections. This expansion is driven by the 4th Gen platform's support for PCIe 5.0, along with the introduction of Compute Express Link (CXL) 1.1 that supports coherent interconnects between CPUs and accelerators working on the same data. Drosdek comments, "The SIMATIC IPC is a configurable solution. Some AI cards and network cards can be configured directly when ordering. In the end, it's an open system, so customers can choose what they want, as long as they stay in spec." Customers can add in preferred expansion cards when they need to enable specific use cases in their environments, such as sensor-specific data capture cards to support cameras, microphones, and other environmental condition meters on the production line.

Handle larger workloads with DDR5 memory and expansive storage

4th Gen Intel Xeon Scalable processors support up to eight channels of DDR5 memory and up to 16 DIMMs per socket, with up to 4,800 MT/s at one DIMM per CPU (DPC) or 4,400 MT/s at two DPC. Higher memory capacity at faster frequencies supports more concurrent applications on the industrial server and supports more VMs for denser software-defined environments.

The SIMATIC IPC RS-717A also brings in support for up to eight storage drives to handle a massive amount of data recording. Data growth is a pain point across many industries, but for Industry 4.0, storage needs are essential to support the latest use cases that the Siemens server is designed to enable.

- **Digital twin simulation:** The Siemens solution takes advantage of hardware-enabled AI acceleration in Intel® processors to run simulations on-site with real-world data inputs, allowing operations managers to test new floor configurations and optimize their layouts for higher efficiency.

- **OT convergence:** More drives allow for more cameras and sensors to store the data they collect on fewer IPCs and edge servers.

- **Data archives:** IPCs and servers can hold system log data for the entire technology infrastructure for six or more months at a time, supporting retroactive investigation and remediation into the occurrence of product defects due to system faults.

Help safeguard IP and operational data with chip-based security features

In some situations, technicians need to remotely access systems, or edge servers on the factory floor need to be locked down to prevent attacks along physical vectors. The 4th Gen platform delivers hardware-enabled security capabilities that businesses have come to expect and rely on to help protect their IP and digital assets. Intel® Software Guard Extensions (Intel® SGX) isolates data in use within trusted memory enclaves, while Intel® Total Memory Encryption (Intel® TME) provides full physical memory encryption. Intel® Platform Firmware Resilience (Intel® PFR) enhances below-OS protection and verifies platform firmware integrity even for connected peripherals, helping safeguard the entire configuration. IT departments will have more control over platform behaviors and can quickly authenticate and recover hardware if systems become compromised.

Get more tools to support software-defined automation

Virtualized functions and software-defined automation are becoming a cornerstone to Industry 4.0 implementations, allowing for better resource consolidation and utilization. Intel® Speed Select Technology (Intel® SST) in the 4th Gen platform gives IT departments more-granular control over CPU resources, while Intel® Resource Director Technology (Intel® RDT) provides deeper visibility into compute resources to support telemetry and optimization efforts on the shop floor.

## Platform strengths drive success across multiple industries

Although designed to prioritize industrial environments, the SIMATIC IPC RS-717A is well suited to many markets that depend on IoT capabilities and are also challenged by data growth and higher performance demands:
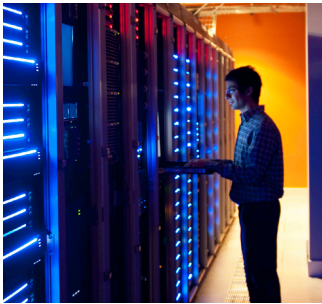
Telecommunications gateways and edge servers

Health and life sciences, including pharmaceutical manufacturing and testing
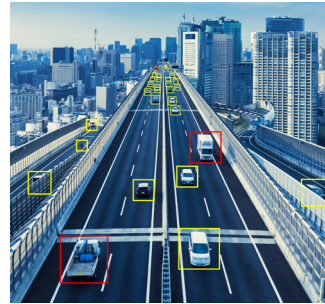
Smart city, smart grid, and smart transportation solutions

Retail edge, including AI computer vision

Extend the value of investments with long-term platform stability

Long-life availability helps businesses drive more value from their investments by lengthening the time between new deployments or certification cycles. This is especially crucial for regulated industries such as pharmaceutical or medical equipment manufacturing, which can take two to three years to obtain certification. The SIMATIC IPC RS-717A with 4th Gen Intel Xeon Scalable processors offers long-life availability,[7] so businesses can plan on a five-year life span from deployments, with the possibility of an additional three to five more years with a stable supply chain for replacements and repairs.

Conclusion: Performance means possibility for edge IoT

The ultimate benefit to having 4th Gen Intel Xeon Scalable platform performance in the SIMATIC IPC RS-717A solution is flexibility. Businesses will get the flexibility to support more use cases, more virtualization, and more sensors in challenging industrial environments. With this platform, Intel and Siemens are boldly going where typical data center processors can't go, and they're delivering the performance that the industrial edge needs now and for future challenges.

Learn more

Browse the full portfolio of Siemens premium IPCs and IoT gateways at siemens.com/ipc.

Explore the capabilities of 4th Gen Intel Xeon Scalable processors for IoT at intel.com/4thgenxeoniot.

About Siemens

Munich-based Siemens is a renowned technology provider of industrial, infrastructure, transport, and healthcare solutions. Siemens is devoted to transforming the everyday for billions of people by delivering more efficient factories, more resilient supply chains, more advanced healthcare, more comfortable transportation, and smarter buildings and grids.

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