

## COM-HPC Modules by Congatec Leverage Intel® Xeon® D Processor for Server-Level Performance at the Edge

Three new computer-on-modules for high performance computing (COM-HPC) products from congatec bring the power of a server from the data center to the edge, including industrial environments and outdoor applications. These COM-HPC products take advantage of the Intel® Xeon® D processor to provide powerful, scalable solutions with variable core counts, expanded memory, and high-speed connectivity.



*“Our goal was to bring server capabilities out of the secure data center environment and into edge servers. Intel® Xeon® D processors in COM-HPC server size E and D modules achieve that goal with the performance, security, and connectivity that our customers need to power their next-gen use cases.”*

—Martin Danzer, director of product management, congatec

As emerging AI, ruggedization, and time-sensitive workloads become increasingly common at the edge, businesses need data center levels of compute power and performance to run today’s advanced applications. The challenge of integrating and updating high performance computing technology has led equipment manufacturers to rely on computer-on-module (COM) products. COMs are available in standard sizes, so the modules can be installed and easily replaced in proprietary carrier boards within a larger system.

### Challenge: Industrial systems need server-level compute power

Original equipment manufacturers (OEMs) often require server-level performance and flexible configuration options for advanced solutions such as robotic systems used in surgery or collision-avoidance systems in modern vehicles. However, legacy systems may not be powerful enough to perform the massive calculations needed to run modern artificial intelligence (AI) programs in near-real time. Embedded COM modules are an excellent choice to maintain flexibility and scalability in legacy systems. COM-HPC server modules with the latest high-performance processors, powerful connectivity and memory access, and support for real-time hypervisors are needed to keep up with the most demanding use cases.

### Solution: High-performance COM-HPC server modules for embedded solutions

To reduce the potential for bottlenecks and bring the full power of a data center server to embedded systems at the edge, congatec has introduced three new COM-HPC modules. The new modules—in server size E, size D, and COM Express Type 7—are ruggedized to handle real-time microserver workloads in challenging environments. The new modules operate in a range of -40 to 85 degrees Celsius (-40 to 185 degrees Fahrenheit), relying on active or passive cooling options, including heat spreaders, heat sinks, and heat pipes.

Based on the Intel® Xeon® D processor, the new COM-HPC products include up to 20 cores, up to 1 TB of RAM, and up to 48 PCIe lanes with up to Gen 4 speed. The modules also provide up to 100GbE connectivity and support for Intel® Time Coordinated Computing (Intel® TCC) and Time-Sensitive Networking (TSN).



The new COM-HPC modules are well suited to consolidation of demanding industrial workloads in automation, robotics, and medical imaging. Ruggedized modules can also be deployed in outdoor installations for utilities and infrastructure, including oil and gas, smart

grids, and communications networks. Transportation settings can also benefit from COM-HPC, including rail traffic control and vision-enabled applications such as crash-avoidance systems, autonomous vehicle control, and machine vision solutions that promote safety and security.

### Use cases for Intel Xeon D processor-enabled COM-HPC modules



#### Workload consolidation

Workload consolidation for automation, robotics, and medical imaging



#### Ruggedized for outdoor use

Outdoor servers for critical infrastructure, including smart grids for utilities, transportation, and communications



#### AI and machine vision

Vision-enabled applications such as autonomous vehicles and video surveillance infrastructures

### How it works

Server-level performance in a COM module enables embedded devices at the edge to achieve results that previously required data center servers. Three COM-HPC offerings provide scalable performance across the product line, with size E, size D, and Express Type 7 modules all based on the Intel Xeon D processor. The conga-HPC/sILH server module (size E) features an Intel® Xeon® D-2700 processor—a fully integrated system-on-chip (SoC) with up to 20 processor cores—eight DIMM sockets for up to

1 TB DRAM, and up to 48 PCIe lanes. (The conga-HPC/sILH module is also available in a size D form factor.) The size D conga-HPC/sILL integrates an Intel® Xeon® D-1700 processor with up to 10 cores, up to 4 DIMM sockets, and up to 32 PCIe lanes. A more compact conga-B7XI COM Express Type 7 module is based on the Intel Xeon D-1700 processor, with up to 32 PCIe lanes and up to 128 GB DDR4 2666 MT/s memory.

### COM-HPC modules from congatec



#### conga-HPC/sILH COM-HPC server size E module

- Intel® Xeon® D-2700 processor with up to 20 cores
- Eight DIMM sockets for up to 1 TB of DDR4 memory (2933 MT/s) with support for error-correcting code (ECC)
- 32x PCIe Gen 4 lanes and 16x PCIe Gen 3 lanes
- 100GbE throughput plus real-time-capable 2.5 Gbit/s Ethernet with TSN and Intel® TCC support
- Processor base power of 65W to 118W



#### conga-HPC/sILH COM-HPC server size D module

- Intel® Xeon® D-1700 processor with up to 10 cores
- Four DIMM sockets for up to 512 GB of DDR4 memory (2933 MT/s) with support for ECC
- 32x PCIe Gen 4 lanes and 16x PCIe Gen 3 lanes
- 100GbE throughput plus real-time-capable 2.5 Gbit/s Ethernet with TSN and Intel TCC support
- Processor base power of 40W to 67W



#### conga-HPC/sILL COM-HPC size D module

- Intel Xeon D-1700 processor with up to 10 cores
- Four DIMM sockets for up to 256 GB of DDR4 memory (2933 MT/s)
- 16x PCIe Gen 4 and 16x PCIe Gen 3 lanes
- Up to 100GbE throughput
- TSN and Intel TCC support via 2.5 Gbit/s Ethernet
- Processor base power of 40W to 67W



#### conga-B7XI COM Express Type 7 module

- Intel Xeon D-1700 processor with up to 10 cores
- Up to 128 GB DDR4 (2666 MT/s) memory via up to four SODIMM sockets
- 16x PCIe Gen 4 and 16x PCIe Gen 3 lanes
- Up to 4x 10GbE throughput
- TSN and Intel TCC support via 2.5 Gbit/s Ethernet
- Processor base power of 40W to 67W

New congatec COM-HPC server modules are based on the Intel® Xeon® D processor and supported by high-performance components drawn from a broad ecosystem of providers.

### Server-level performance for ruggedized system design

Intel Xeon D processors offer server-class computing and accelerated AI in compact packages for soldered-down, embedded, and rugged edge computing. Designed for IoT in challenging environments, select SKUs of the Intel Xeon D-1700 and D-2700 processors are ideal for always-on, high-performance, ruggedized equipment and sealed, fanless devices. With a variety of SKUs and configurations, Intel Xeon D processors bring the power of a data center server to a broad range of embedded solutions.

### Robust support for AI

To support AI and other advanced workloads, Intel Xeon D-1700 and D-2700 processors include Intel® Deep Learning Boost (Intel® DL Boost) and Intel® Advanced Vector Extensions 512 (Intel® AVX-512) Vector Neural Network Instructions (VNNI) that accelerate deep learning inference processing within the CPU cores. Developers can convert trained models from most popular frameworks to optimize inference and run it on any mix of Intel® architectures using the Intel® Distribution of OpenVINO™ toolkit. With these integrated capabilities, the Intel Xeon D processor provides a flexible, adaptable platform for innovative AI-enabled system design.

Per-core performance and high core counts, combined with integrated acceleration, help improve edge AI, analytics, and edge-to-cloud workload convergence. For example, the Intel® Xeon® D-1746TER processor delivers up to 2.32x faster performance over the previous generation<sup>1</sup> with up to 5.7x gains in AI inference,<sup>2</sup> while the Intel® Xeon® D-2796TE processor is up to 2.97x faster<sup>3</sup> and improves AI inferencing by up to 7.4x.<sup>4</sup>

### Built-in security capabilities for the edge

Intel Xeon D-1700 and D-2700 processors include hardware-based security features that can help reduce the system's potential attack surface and help prevent threats to data at rest, in transit, and in use in edge deployments.

- **Intel® Boot Guard** helps to prevent unauthorized software and malware takeover of boot blocks that are critical to a system's function.
- **Intel® Total Memory Encryption (Intel® TME)** helps to shield data that resides in physical memory, enhancing protection against attacks on the hardware.
- **Intel® Software Guard Extensions (Intel® SGX)** isolates applications in trusted enclaves during runtime.

### Support for high-bandwidth networks and peripherals

With up to 100 Gb wired Ethernet and up to 56 high-speed PCIe lanes—32 PCIe Gen 4 and 24 configurable PCIe Gen 3 lanes—Intel Xeon D-1700 and D-2700 processors bring true server-class connectivity to the edge. The 24 PCIe Gen 3 lanes can be configured as 24 SATA 3.0 ports or four USB 3.0 ports. The 32 PCIe Gen 4 lanes can support large video camera systems, robot manufacturing lines, and high-speed local storage.

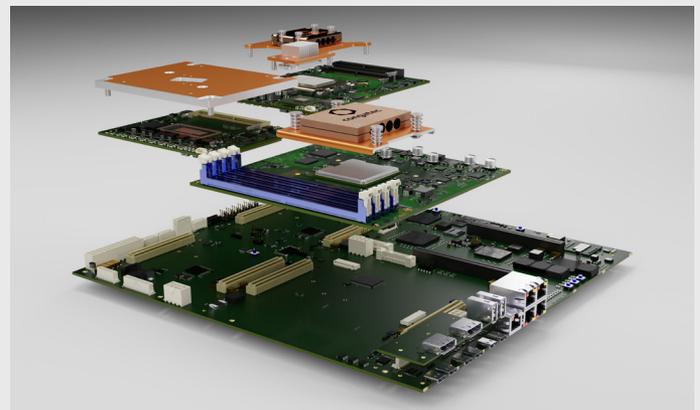
### Real-time support with integrated Intel TCC

Intel TCC improves performance for latency-sensitive applications at the system level. Developers can use Intel TCC tools to tune the system and enable precise time and task management for systems running real-time hypervisors like ACRN or RTS and real-time operating systems like Yocto Linux with PREEMPT\_RT or Wind River VxWorks. Separate, discrete TSN solutions—a switch and endpoint—complement the Intel TCC offering by providing synchronization and timeliness across networked devices.

## University of Bielefeld and Christmann IT expand congatec COM-HPC configuration for real-time workloads

A single COM-HPC module can support multiple operating systems in a versatile configuration to enhance flexibility and performance. In partnership with the University of Bielefeld and software company Christmann IT, congatec is developing an edge server design that can run real-time workloads on a multisystem consolidation.

The resulting configuration is designed to accommodate demanding AI workloads, including clustering of high-dimensional data that is driven by active learning. This powerful COM-HPC configuration can be used by medical device manufacturers to improve the accuracy and speed of disease detection and diagnosis while geologic researchers expect to adopt the new model to assist in the discovery and extraction of mineral resources. In more general applications, the modules can be swapped in for a quick processor upgrade on larger-scale server configurations that include COM modules in standard sizes D or E.



A new edge server from congatec, designed in partnership with the University of Bielefeld and software company Christmann IT, can run real-time workloads on a multisystem consolidation.

## Summary: Congatec COM-HPC brings data center power to the edge

Intel Xeon D processor-based COM-HPC modules from congatec offer the performance of a data center server with up to 20 cores, high-speed connectivity, and expanded memory bandwidth for real-time applications and workloads in a range of demanding environments. Select COM-HPC SKUs and configurations are designed to accommodate extended temperature and humidity ranges for use outdoors, in vehicles, and in other challenging conditions, giving OEMs an extra measure of flexibility in system design.

### COM basics

Computer-on-module (COM) products play a key role in the design and implementation of embedded systems and solutions for modern medicine, manufacturing, communications, and transportation, among other applications. COMs are designed as small circuit boards that include the processor. The COM plugs into standard connectors on a carrier board that is embedded in a larger application-specific system. Because the COM conforms to size and connectivity standards, a new module can be swapped into an existing system for a smooth upgrade of the CPU, memory, or other components. Unique application-specific circuits are usually incorporated into the carrier board itself.

### About Intel® Xeon® D processors

Intel Xeon D processors deliver workload-optimized performance in space- and power-constrained environments, from the data center to the intelligent edge. These innovative, system-on-chip processors support high-density, single-socket network, storage, and cloud edge computing solutions with a range of integrated security and network acceleration capabilities.

[intel.com/xeond](https://intel.com/xeond)

### About congatec

Congatec is a rapidly growing technology company focusing on embedded computing products. Their COM-HPC modules are used in a wide range of applications and devices in industrial automation, medical technology, transportation, telecommunications, and other vertical markets. Congatec is a global market leader in the COM segment with an extensive customer base made up of organizations of all sizes.

[congatec.com](https://congatec.com)

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COM-HPC server size E module [conga-HPC/sILH](#) ›

COM-HPC server size D module [conga-HPC/sILL](#) ›

COM Express Type 7 module [conga-B7XI](#) ›



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