THUNDER S422
Rugged, Fully Sealed, Intel® Xeon® E5 CPU Server with Removable Drive(s), 40/100 Gb Ethernet, 10 Gb Ethernet Switch, and Add-in I/O

SYSTEM HIGHLIGHTS
- Intel® Xeon® E5 v4 CPU each with up to 22 cores (E5-2699RV4)
- Hyper-Threading on each core for total system with 44 logical cores
- Supports up to 512 GB of DDR4 memory with ECC
- Up to two fixed M.2 for OS boot or storage (Optional for I/O)
- Optional 30 port x 10 GbE ports configured as enterprise switch or segregated subnets
- Two removable 2.5” SATA or NVMe SSDs behind EMI/IP-rated door
- GMS FlexIO™ x16 PCIe Gen 3.0 8 Gbits/s fabric expansion architecture for inter-chassis co-processor sub-rack
- GMS SecureDNA™ security suite with Secure Erase (“zero”) and Anti-Tamper
- Optional x8 PCIe add-in card slot for GPGPU, co-processor, I/O (FHFL size)
- Optional PCIe-over-cable bus extension for chassis expansion to external PCIe co-processors
- Optional MXM AMD® Radeon® GPU E8860, up to 768 GFLOPS
- Optional MXM NVIDIA® Quadro® GPU M2200M, up to 1.32 TFLOPS
- Optional MXM NVIDIA® Pascal GP104, over 8 TFLOPS
- BMC system management monitors temperatures, system status via IPMI 2.0 for out-of-band server management
- Dual 40 GbE ports directly coupled to CPU/FlexIO™ PCIe fabric for non-blocking data movement
- 100 W PoE to drive sensors and remote nodes

SYSTEM OVERVIEW
The S422-LC/SW/RT/AI is a fan-less fully rugged, low cost Intel® Xeon® E5 server family available in four variants. It is designed to provide the highest level of server-class performance possible in a fully ruggedized, conduction-cooled system, operating up to -40 °C to +85 °C. “Thunder” simplifies local data processing tasks that require an ultra-fast, Xeon®-class server with vast amounts of high-speed, ECC-protected RAM and storage in one ultra-rugged chassis.

Thunder is ideal for the application that requires the horsepower of a high-performance server, enterprise-class multi-port LAN or a NAS subsystem appliance, while deployed into a rugged platform with no fans required. When equipped with the router or intelligent Layer 2/3/4 Ethernet switch, Thunder becomes a rugged compact server, with a dedicated switch or router capabilities to offer maximum network flexibility.

Networking capability starts with four 1 GbE and two 40 GbE fiber ports on the Low Cost (LC) variant and expands to an additional two 40 GbE ports and thirty 10 GbE ports (in variants SW, RT and AI). The 10 GbE ports can be configured with a Broadcom® Layer 2/3/4 enterprise class switch (SW) or as segregated and secure port connections each with their own subnet mask to avoid data crossover (RT). In the RT every Ethernet port is directly coupled to the CPU(s), an architecture that is ideal for secure communications or dedicated hypervisor/virtual environments.

Network routing technology includes software-defined networking (SDN) on various operating systems and virtual machine (VM) hypervisor environments. Each of the 10 GbE ports support power-over-Ethernet (POE+) to directly power remote nodes while simplifying wiring requirements, up to 100 W maximum total power sourced.
ENVIRONMENTAL SPECS

SWaP-E: The industry's highest computing density in a server (cores & RAM)


Temperature: Operates up to extended temp -40° C to +85° C (Optional)

Ruggedness: Available in ruggedization levels R1-R5

S422 VARIANTS

<table>
<thead>
<tr>
<th>P/N</th>
<th>Purpose</th>
<th>Max Memory</th>
<th>10 Gbe ports</th>
<th>40 Gbe ports</th>
<th>MMX Video</th>
<th>PCIe Add-in</th>
<th>XMC Add-in</th>
<th>Z Height (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S422-LC</td>
<td>Low Cost</td>
<td>256 GB</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2.25</td>
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<tr>
<td>S422-SW</td>
<td>Switch</td>
<td>512 GB</td>
<td>30</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>3.6</td>
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<tr>
<td>S422-RT</td>
<td>Router</td>
<td>512 GB</td>
<td>30</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>3.6</td>
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<tr>
<td>S422-AI</td>
<td>Artificial Intelligence</td>
<td>512 GB</td>
<td>30</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4.25</td>
</tr>
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</table>

MODEL BREAKDOWN

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Model</th>
<th>Power</th>
<th>Height</th>
<th>Length</th>
<th>Width</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>S422-LC</td>
<td>Low Cost</td>
<td>240W</td>
<td>2.25”</td>
<td>11.6”</td>
<td>7.75”</td>
<td>12 lbs</td>
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<tr>
<td>S422-SW</td>
<td>Switch</td>
<td>650W</td>
<td>3.6”</td>
<td>11.6”</td>
<td>7.75”</td>
<td>16 lbs</td>
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<tr>
<td>S422-RT</td>
<td>Router</td>
<td>650W</td>
<td>3.6”</td>
<td>11.6”</td>
<td>7.75”</td>
<td>21 lbs</td>
</tr>
<tr>
<td>S422-AI</td>
<td>Artificial Intel.</td>
<td>925W</td>
<td>4.25”</td>
<td>11.6”</td>
<td>7.75”</td>
<td>21 lbs</td>
</tr>
</tbody>
</table>

I/O AND EXPANSION OPTIONS

- Four 1 Gbe Ethernet ports (all variants)
- Two 40/100 Gbe ports directly coupled to CPU fiber (all variants)
- Optional Layer 2/3/4 Switch with thirty 10 Gbe ports and two 40 Gbe ports (SW variant only)
- Optional 30 segregated and secure 10 Gbe ports for individual subnets (RT variant only)
- Up to two fixed mSATA SSD or SAM I/O™
- Optional XMC/FMC site or third SAM I/O™ site
- Optional MXM site for add-in GPU
- Optional PCIe module for GPGPU or other FHFL PCIe add-in card (AI variant only)
- Optional PCIe-over cable bus expansion
- Two M.2 sites optionally used for I/O
- Six USB 2.0 ports
- Dual serial ports: RS-232/422/485
- Eight TTL GPIO/DIO
- High-def 2-channel audio output with 5 W amplifier, plus mic input
- Panic support for system zeroize and Secure Erase
- Optional active cooling “radiator” assembly with smart fan control