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VORTEX-2U

Rugged, 20-inch Short Rack, 2U NAS Server with Dual Intel® Scalable Xeon® Processors, 22 SSDs and 5 Removable Cartridges, Dual-Redundant PSUs, 1/10/40 Gigabit Ethernet and 6 Add-in Slots

Dual Intel® CPUs
Scalable Xeon®
Up to 28 Cores Each

Up to 248 TB
20x SSDs
SAS/SATA/NVMe Gen 3

Dual 2000W PSUs
6x PCIe Slots
Dual "B Drive" Custom I/O

16" Deep Rugged Chassis
Superior Shock/Vibe
Optional -20 °C to +75 °C

SYSTEM HIGHLIGHTS

- Dual Intel® Scalable Xeon® CPUs up to 28 cores (Platinum/Gold)
- Compact rackmount NAS: up to 168 TB (20x U.2 plus 2x M.2)
- Air-cooled with COTS or optional 38999 mil-circular connectors
- Only 20-inch deep short rack saves size, weight, power
- Up to 2 TB total DDR4 ECC DRAM
- Up to six PCIe Gen 3 add-in slots
- 20x Removable SSDs (SAS/SATA/NVMe)
- 2x 1/10 GbE and optional dual 10/40 QSFP+
- Optional hardware RAID or Intel VROC software RAID
- CRPS dual-redundant 2000W 220VAC PSUs
- Rack or standalone mounting options
- Optional SecureDNA™ zeroize and SourceSafe™ BIOS

SYSTEM OVERVIEW

Compact, rugged "Vortex-2U" servers are only 16-inches deep and are designed for harsh environment use where rack or free-standing space is at a premium. Ideal for airborne, ship-based, or battlefield-mobile installations, "Vortex-2U" brings exceptional network-attached storage (NAS), rackmount processing and flexibility to defense applications in a very small footprint. Each server uses two of Intel's second-generation Scalable Xeon® processors, up to 28 cores each (embedded, Gold/Platinum SKUs) with up to 2.0 TB total system memory (ECC, 2933 DDR4). 1/10/40 GbE is available (dual 1/10 GbE is standard), and there are up to 22 SSDs in "Goliath". The SAS/SATA/NVMe drives are installed in five removable cartridges for easy, secure transport and system de-classify. Dual internal 2280 M.2 drives are used for OS boot or protected application software. Hardware RAID is standard for all SAS/SATA drives, and Intel VROC or RSTe software RAID is available for all 20 NVMe U.2 SSDs. The front panel drive bays can accommodate four-drive cartridges and one bay can also accept GMS "B Drive" modules for application-specific I/O such as CANbus, ARINIC-429, or HD-SDI video.

Unique features in the overall "Vortex" 1U/2U server family are the short rack depth of only 20-inches, dual GPGPU accelerators such as Nvidia V100 Tesla artificial intelligence / data mining cards (2U only), a DVD R+W or Blu-Ray unit, individual SSDs, dual redundant power supplies in both 1U and 2U, and the GMS zero-charge NRE modification policy. For example, both "Vortex-1U" and "Vortex-2U" (2U) can be lengthened to add

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MIL-STD-704 power hold-up (via supercaps), an auxiliary power unit battery, or an additional two (in 1U) or four (in 2U) extra add-in slots. Alternatively, mil-circular 38999 connectors can be substituted for COTS-style connectors (depth will increase slightly).

Designed for value-conscious rugged applications and built with GMS RuggedDNA™ design methodology, all "Vortex" servers are air-cooled using GMS-proprietary "TwoCool™" fan control. The server uses our proven egg-crate ruggedization technique that stiffens the chassis to provide exceptional shock and vibration for a rackmount server. A 3-year warranty is standard, along with GMS's made-in-America end-of-life component monitoring and long-lifecycle sustainment policy. Custom versions can be developed with full programmatics and certifications.

I/O AND EXPANSION OPTIONS

- COTS connectors or 38999 mil-circular (increases depth)
- 6x PCIe Gen 3 slots
- SAS, SATA or NVMe SSDs up to 20 SSDs
- Two M.2 SSDs (internal)
- Dual 1/10 GbE ports
- Optional dual 10/40 GbE QSFP+ cages (inserts for 1/10/40)
- BMC with IPMI and 1 GbE port
- 2x USB 2.0 and 2x USB 3.0
- VGA for console video
- Dual-redundant 2000 W PSUs (220 VAC)
- DVD or Blu-Ray player
- Front-mount or side rails (fixed or sliding)
- Optional dual GMS "B-Drive" I/O in lieu of SSD(s)
- GMS FlexIO™ panel for user-customized options
- Extended chassis depth for: MIL-STD-704 hold-up/APU and up to 2 more PCIe slots

ENVIRONMENTAL SPECS

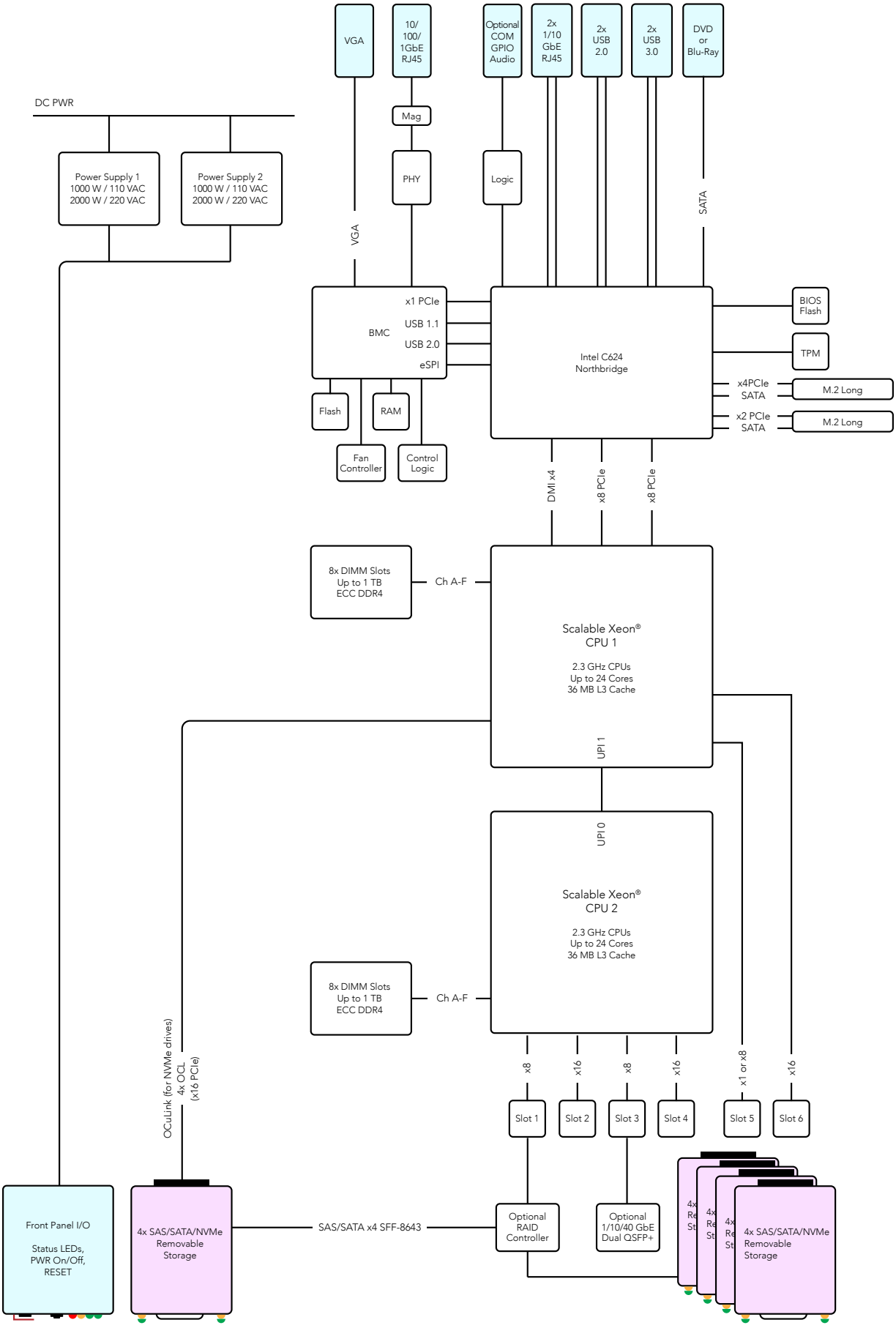
SWaP-E:	Short rack server with unmatched density in one footprint
Size:	2U x 20-inches deep
Weight:	As low as 36 lbs.
Power:	As low as 400 W
MIL-STD:	MIL-STD 810G, MIL-STD-1275D, MIL-S-901D, DO-160D, MIL-STD 461E and IP60 compliant (Optional separate MIL-STD-704F AC PSU with 50 ms hold-up)
Temperature:	0 °C to +55 °C -20 °C to +75 °C (Optional)
Ruggedness:	Available in ruggedization levels R1-R2

RUGGEDIZATION LEVELS

	TEMP	SHOCK	VIBRATION	MAX IP LEVEL
RUGGED 1	0 °C - 55 °C	20G	.0001 g^2/Hz	54
RUGGED 2	-20 °C - 55 °C	20G	.0008 g^2/Hz	64

* Vibration frequency for systems tested between 5Hz – 2000Hz

BLOCK DIAGRAM: VORTEX-2U



	VORTEX-1U	VORTEX-2U
Height	1U	2U
Depth (COTS connectors; deeper by 3" w/ 38999 MIL)	20 inches	
Processors (24C max with "embedded" SKUs 20C max in 1U with dual-red. 500W PSUs)	Intel® Scalable Xeon® Gold/Platinum; Up to 20C max	Intel® Scalable Xeon®, Gold/Platinum, up to 28 cores (non-embedded SKU)
# CPUs	2	
# UPIs	2, between CPUs	
Compute architecture	Workload-balanced, flow-through data: HPC, SMP, NUMA	
Max memory/CPU (2.0 TB/CPU with select SKUs)	1.0 TB/CPU	
# DDR4 DIMM Slots up to 2933 MT/s (w/ECC)	8/CPU	
Add-in cards (RAID requires 1 slot; 40 GbE requires 1 slot)	2 (DVD reduces by 1 slot)	6
# x16 (FLHH) slots (See optional extended chassis below)	1	3
# x8 (FLHH) slots (omit DVD) Note: For AI, Slot 4 can be enabled in lieu of Slot 5 as a factory option	1	3 (x1 slot covers one x8)
PCIe speed: 8 GT/s, Gen 3	PCIe Gen 3	
Max number of SSDs (incl. 2x M.2 2280)	6	22
Removable SSD cartridges w/RAID (RAID reduces one x8 PCIe slot)	1	5
# M.2 slots	2x 2280 (x4 and x2)	
# SSD hot-swap slots, 7 mm max (SAS/SATA/NVMe)	4 (4 in single cartridge)	- 4x in lower tier (4 in single cartridge) - 16x in upper tier (4 cartridges; requires RAID card)
External storage (optional, requires 1 slot)	eSATA, 4x Mini-SAS HD	
Intel VROC software RAID (key is required, RSTe is optional)	Yes (excludes M.2)	
Hardware RAID 0,1,10,50, other (Required for SATA/SAS drives)	Yes (uses FLHH slot)	
Ethernet Service port (copper, 1 GbE)	1 for BMC	
Ethernet (copper, 1/10 GbE)	2	
Ethernet (fiber, 1/10/40 GbE) (add-in card uses one HHFL slot 1/10 GbE requires adapter cable with insert)	2x QSFP+ (copper, fiber inserts)	
Optional Nvidia® co-processing GPGPU for vector apps, AI or data mining (Tesla V100 or Titan V, dual-slot)	0	2 (double-slot, up to 250 W/slot) (requires power management)
USB 2.0 (rear)	2	
USB 3.0 (rear)	2	
DVD/Blu-Ray (front)	1	
VGA, 2D video (rear) (+ KVM video redirection up to 1080p)	1	
BMC with Ethernet port (rear)	1 BMC with dedicated 1 GbE port	
Optional Audio	Mic In/Stereo Out	
Optional General purpose I/O	8 GPIO	
Optional Serial ports (RS232/422/485)	1	
Dual-redundant PSUs; 80_Plus Platinum; For 110VAC, 2U PSUs are 1000 W/110VAC or 2000 W/220VAC each	2x, 500 W each	2x, 2000 W each (Requires 220VAC)
# Optional B Drive I/O modules	2	
Cooling	Convection-cooling GMS TwoCool™ fans	
Connectors	COTS/commercial-style or optional 38999 MIL-SPEC	
Optional SecureDNA™ Zeroize, Status, SourceSafe™ BIOS	Yes	
Temperature, standard	0 °C to +55 °C	
Temperature, optional (excl. add-ins)	-20 °C to +75 °C	
Optional chassis extension options	Increased power supplies; APU hold-up; 2x FHFL add-in slots	Increased power supplies; APU hold-up; 4x FHFL add-in slots
Optional FlexPanel™ I/O customization	Consult factory	