X12 BigTwin™ Overview

Aleksandar Miljković | Product Manager

Better

Better Performance Per Watt and Per Dollar

Faster

Up to 40% Faster Across The Board

Greener

Reduced Environmental Impact and Lower TCO

Optimized Systems for Your Workload
Max Performance, High Volume Cloud, High Efficiency
Multi-Node, Mainstream

First to Market Innovation
Increased System Thermals to Support Increase in Data
Demand

Open Architectures
OpenBMC, OCP v3.0 SFF Cards

Secure
Root of Trust, Total Memory Encryption, Software
Guard Extension

Manageable & Serviceable
New Web IPMI Experience
Tool less Designs
Global Service & Support

CPUs
UP TO 10-15% HIGHER INSTRUCTIONS PER CLOCK (IPC)

Memory
DDR4-3200
1.6x Memory Bandwidth
2.66x Memory Capacity

I/O
PCI-E Gen 4
2x I/O Bandwidth

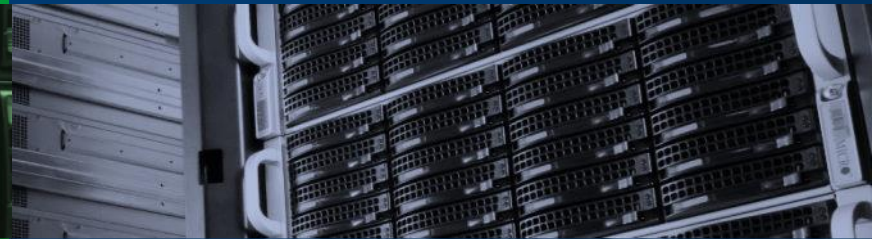**BEST-IN-CLASS WORKLOAD PERFORMANCE**
AI Acceleration
Web Acceleration (Crypto)
Cloud (Speed Step)
Storage
(Direct Data Access – Data Direct IO)

First Intel 10nm Xeon Class Processor

From Free-Air to Water Cooled Solutions for
Maximum Efficiency

Multi-Node: Power Savings & Refresh

Optimized Shared Resources for up to 50%
Reduction in Power and Cooling TCO

Multi-Generation Infrastructure for up to 65%
CAPEX Savings

Modular Upgrades for Maximum Performance and
Efficiency

X12 Server Naming Guidelines

SUPERMICRO

SYS-220BT-HNC8R

Intel SuperServer

HDD Form Factor
2 = 2.5", 6 = 3.5"

Socket Quantity
1 = UP, 2 = DP

Generation
0 = X12

System Platform
BT = BigTwin, TP = TwinPro

# of Nodes
D = 2 Nodes, H = 4 Nodes

Interface / Other
C8 = Broadcom 3808, Broadcom 3816
C9 = Broadcom 3908
N = NVMe, T = SATA, E = EDSFF

Power Type
R = Redundant Power Supplies

X12 BigTwin™

The Ultimate Hyperconverged Platform for Cloud Datacenter

SUPERMICRO

2U4N BigTwin EDSFF

Highest Multi-Node Storage Density

SYS-220BT-HER: 10 NVMe + 2 M.2 SATA

2U 4-Node BigTwin

Compute & Highest Storage Density

SYS-220BT-H Series: 6 NVMe/SAS/SATA
(per node)

SYS-620BT-H Series: 3 NVMe/SAS/SATA
(per node)

2U 2-Node BigTwin

Compute w/ IOPS Optimized Storage

SYS-220BT-D Series: 12 NVMe/SAS/SATA
(per node)

SYS-620BT-D Series: 6 NVMe/SAS/SATA
(per node)

KEY FEATURES

System Design
- Highly modular multi-node (2U4N or 2U2N) systems with tool-less design
- All-hybrid hot-swappable drives bays - NVMe, SAS, or SATA

Compute
- Support future generation Intel Xeon Scalable (Ice Lake) processors
- Optimized thermal design for higher performance
- 16 DRAM DIMMs + 2 PMMs (Intel Optane Persistent Memory 200 Series)

Storage
- Modular mid-plane with PCI-E Next Gen Storage Controller options
- Hardware RAID 1 support for M.2 NVMe drives

Expansion
- Tool-less PCI-E Next Gen add-on cards
- Support for up to 3 GPUs or FPGAs

Networking
- Onboard AIOM or any compliant OCP 3.0 SFF NIC
- Flexible networking options up to 2x 100G Ethernet

Power
- Redundant AC Titanium Level (96%) Power Supplies

KEY APPLICATIONS

- HCI
- HPC
- CDN
- 5G dUPF

- Cloud Computing
- Big Data Analytics
- Back-up and Recovery
- Scale-Out Storage

Form Factor	Processors	Memory	Input/Output	Drives	Power
2U rackmount	Dual future generation Intel® Xeon® Scalable (Ice Lake) processors	20 DIMM slots, up to 5TB Support new Intel Optane™ Persistent Memory 200 Series (Barlow Pass)	2U4N: 1 AIOM + 2x PCI-E 4.0 x16 2U2N: 1 AIOM + 1 PCI-E 4.0 x16 + 2x PCI-E 4.0 x8	Hot-swap 2.5" or 3.5" hybrid drive bays and internal M.2 support (optional RAID)	Redundant 2600W/2200W Titanium Level (96%); Optional 3000W

Quick Comparison: X11 & X12 BigTwin™

New Features for X12 Generation

16+2 DIMMs Optimized for Intel Optane PMEM

Next Gen. SAS RAID Controller Option

Support PCI-E 4.0 AIOM Networking

Improved GPU Support for AI Inferencing
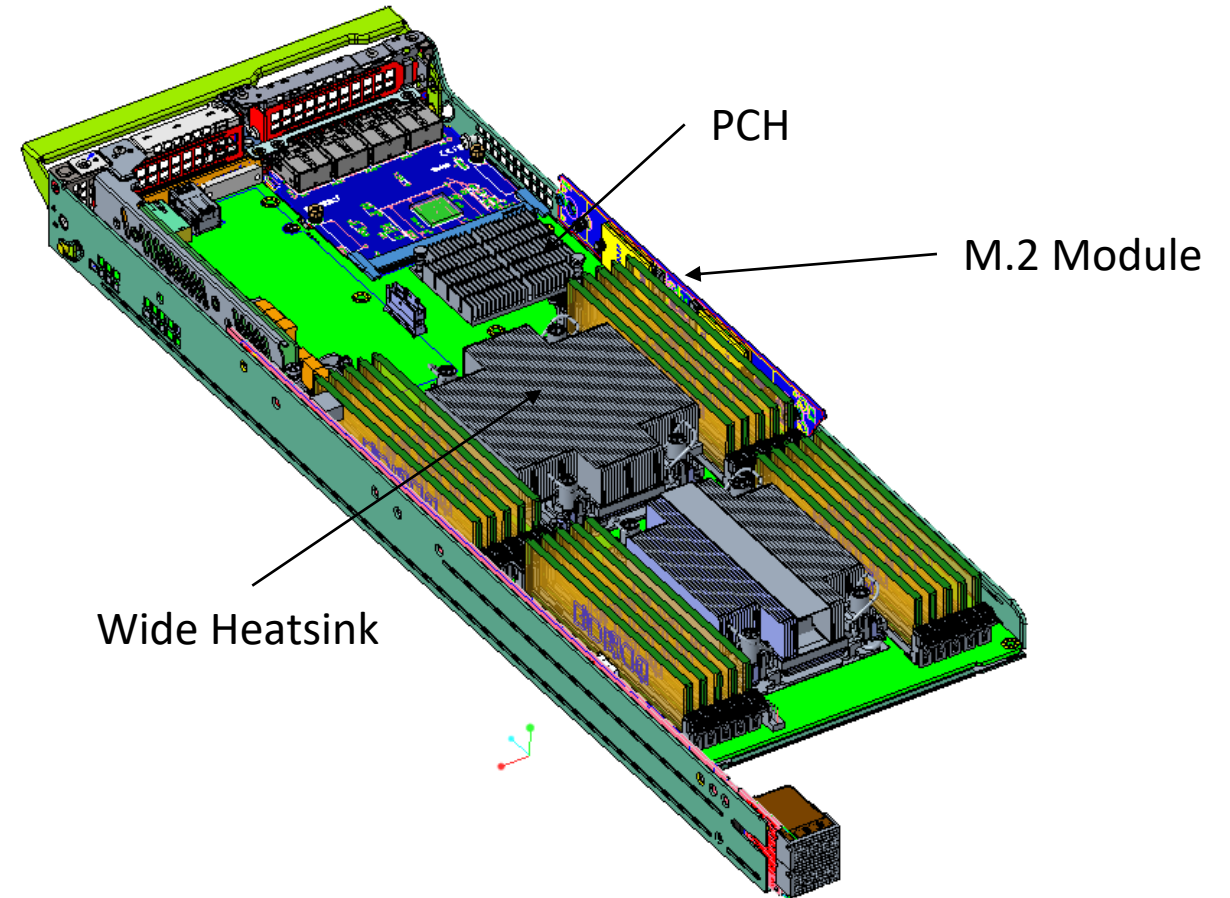
Generation Comparison	X11	X12
CPU Support	Dual Intel Skylake/Cascade Lake CPUs up to 205W (2-3 UPI 10.4 GT/s)	Dual Intel Ice Lake CPUs up to 205W / 270W* (3 UPI 11.2 GT/s)
Memory Support	24 DIMM slots / DDR4-2933 / Intel Optane PMEM	20 DIMM slots (16+2) / DDR4-3200 / Intel Optane PMEM
Storage Support	2U4N: up to 6 Drives (U.2 NVMe / SAS / SATA) per node OR 12 Drives (10 EDSFF NVMe + 2 M.2 SATA) per node 2U2N: up to 12 Drives (U.2 NVMe via PCI-E switch/SAS/SATA) per node	2U4N: up to 6 Drives (U.2 NVMe / SAS / SATA) per node OR 12 Drives (10 EDSFF NVMe + 2 M.2 SATA) per node 2U2N: up to 12 Drives (U.2 NVMe / SAS/SATA) per node
PCI-E Slots	2U4N: 2 PCI-E 3.0 slots + 1 SIOM networking slot 2U2N: 3 PCI-E 3.0 slots + 1 SIOM networking slot	2U4N: 2 PCI-E 4.0 slots + 1 AIOM networking slot (PCI-E 4.0) 2U2N: 4 PCI-E 4.0 slots + 1 AIOM networking slot (PCI-E 4.0)
Security Features	TPM 2.0/Signed Firmware	TPM 2.0/Signed Firmware / HW Root of Trust

Major Improvement for X12 BigTwin

- System
  - Change default fan to 16.5K RPM (80x80x38mm) for 2U-4N/2N 2.5" drive system (SSD/NVMe Drive)
  - Improved airflow management to enhance system flow rate up to 10%

- Backplane
  - Increased open ratio by 20% for LFF/SFF drives

- CPU
  - Offset CPU alignment
  - Fewer DIMMs (24 → 16 + 4 DIMMs)
  - Change default heatsinks to Vapor Chamber
  - Rear HS width increase from 78mm to 96mm

- PCH
  - Re-located to improve airflow rate and reduce preheat
  - Enlarged PCH heatsink

- M.2
  - Re-located to improve airflow rate

PCH

M.2 Module

Wide Heatsink

X12 BigTwin™: 4 or 2 Hot-Swappable Nodes

Storage Adapters

Modular Adapters

Storage Controllers

Node C
Node D
Node B
Node A
Node B
Node A

2600W Redundant Power Supplies

2200W Redundant Power Supplies
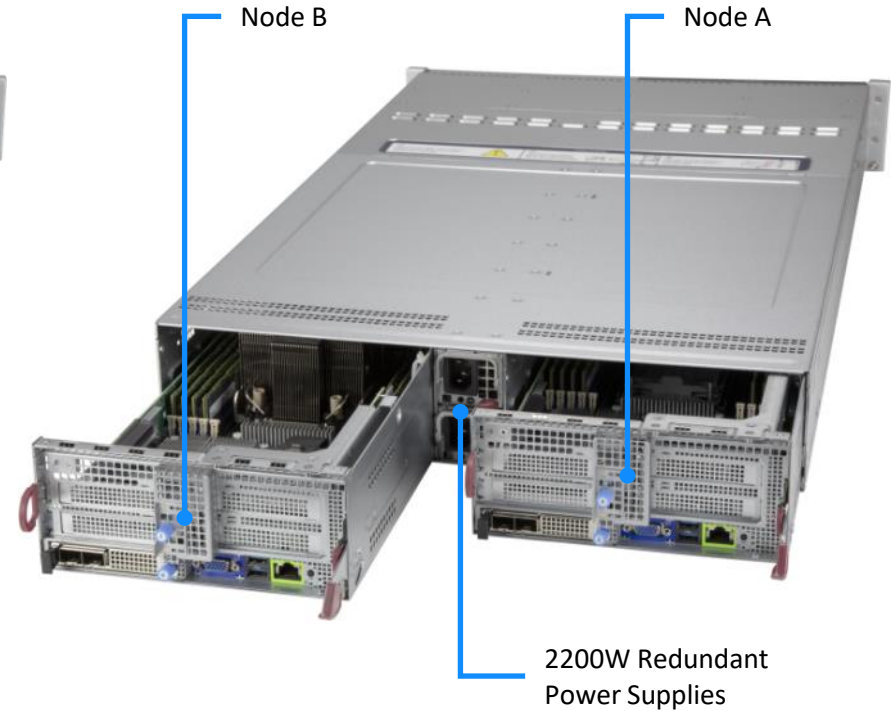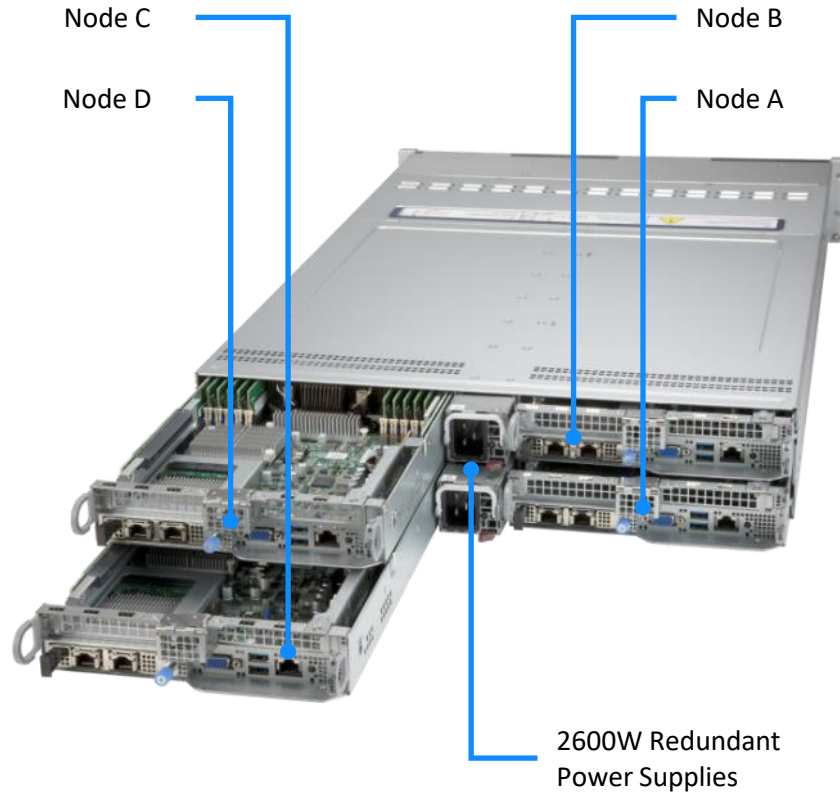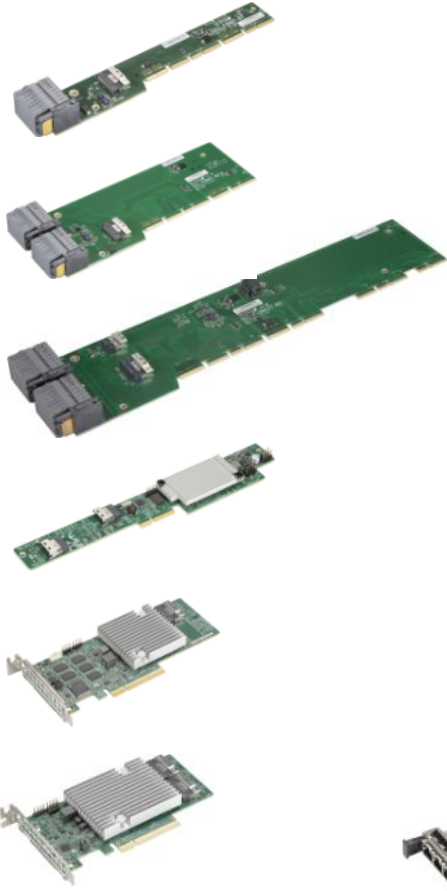
AIOM Networking

| GbE | 10GBase-T | 10GbE SFP+ | 10G+25GbE | 25GbE | 100GbE |

2U4N BigTwin™: Density Optimized System

Node A   Node B   Node C   Node D

Node D
Node C
Slot 2: PCI-E G4 x16 (CPU2)
Slot 1: PCI-E G4 x16 (CPU1)
AIOM - OCP 3.0 (CPU1)
Slot 2: PCI-E G4 x16 (CPU2)
Slot 1: PCI-E G4 x16 (CPU1)
AIOM - OCP 3.0 (CPU1)

Node B
Node A
Slot 2: PCI-E G4 x16 (CPU2)
Slot 1: PCI-E G4 x16 (CPU1)
AIOM - OCP 3.0 (CPU1)
Slot 2: PCI-E G4 x16 (CPU2)
Slot 1: PCI-E G4 x16 (CPU1)
AIOM - OCP 3.0 (CPU1)
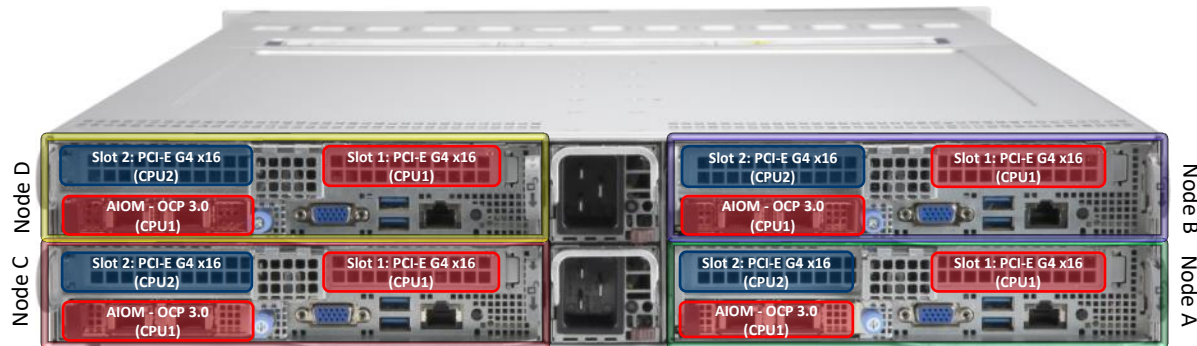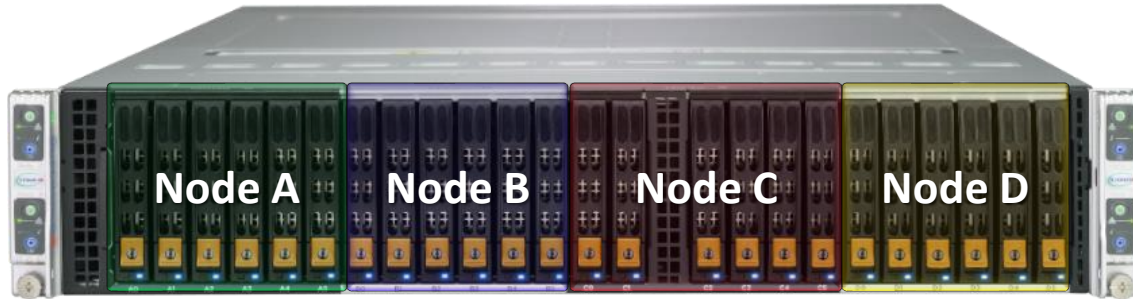
KEY FEATURES

System Design

- Highly modular multi-node systems with tool-less design
- 3 LFF or 6 SFF All-hybrid hot-swappable drives bays - NVMe, SAS, or SATA

Compute

- Support future generation Intel Xeon Scalable (Ice Lake) processors
- Optimized thermal design for higher performance
- 16 DRAM DIMMs + 2 PMMs (Intel Optane Persistent Memory 200 Series)

Storage

- Modular mid-plane: SAS3808 (IT Mode) and SAS3908 (HW RAID)
- Hardware RAID 1 support for M.2 drives
- Support for up to 2 GPUs or FPGAs per Node

Networking

- Onboard AIOM or any compliant OCP 3.0 SFF NIC
- Flexible networking options up to 2x 100G Ethernet

Power

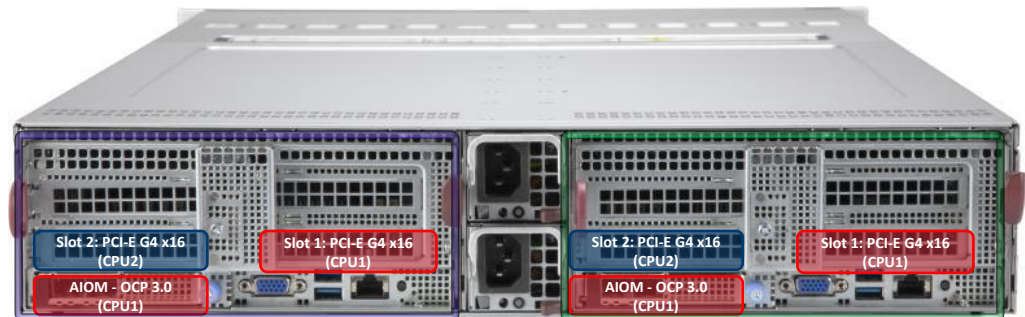- 2600W/3000W Redundant AC Titanium Level (96%) Power Supplies

KEY APPLICATIONS

- HCI
- HPC
- Parallel File Systems
- Object-Storage

2U2N BigTwin™: Storage Optimized System
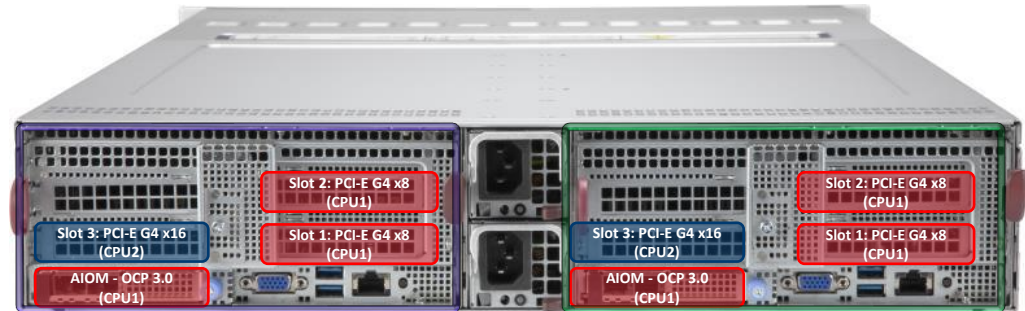
Node A   Node B

Riser Configuration 1

Slot 2: PCI-E G4 x8 (CPU1)
Slot 3: PCI-E G4 x16 (CPU2)
Slot 1: PCI-E G4 x8 (CPU1)
AIOM - OCP 3.0 (CPU1)

Slot 2: PCI-E G4 x8 (CPU1)
Slot 3: PCI-E G4 x16 (CPU2)
Slot 1: PCI-E G4 x8 (CPU1)
AIOM - OCP 3.0 (CPU1)

Riser Configuration 2

Slot 2: PCI-E G4 x16 (CPU2)
Slot 1: PCI-E G4 x16 (CPU1)
AIOM - OCP 3.0 (CPU1)

Slot 2: PCI-E G4 x16 (CPU2)
Slot 1: PCI-E G4 x16 (CPU1)
AIOM - OCP 3.0 (CPU1)

KEY FEATURES

System Design
- Highly modular multi-node systems with tool-less design
- 6 LFF or 12 SFF All-hybrid hot-swappable drives bays - NVMe, SAS, or SATA

Compute
- Support future generation Intel Xeon Scalable (Ice Lake) processors
- Optimized thermal design for higher performance
- 16 DRAM DIMMs + 2 PMMs (Intel Optane Persistent Memory 200 Series)

Storage
- Modular mid-plane: SAS3808 (IT Mode) & SAS3816 (IT Mode)
- Hardware RAID 1 support for M.2 drives
- Support for up to 3 GPUs or FPGAs per Node

Networking
- Onboard AIOM or any compliant OCP 3.0 SFF NIC
- Flexible networking options up to 2x 100G Ethernet

Power
- 2200W Redundant AC Titanium Level (96%) Power Supplies

KEY APPLICATIONS

- CDN
- Software-Defined Storage
- Back-up and Recovery
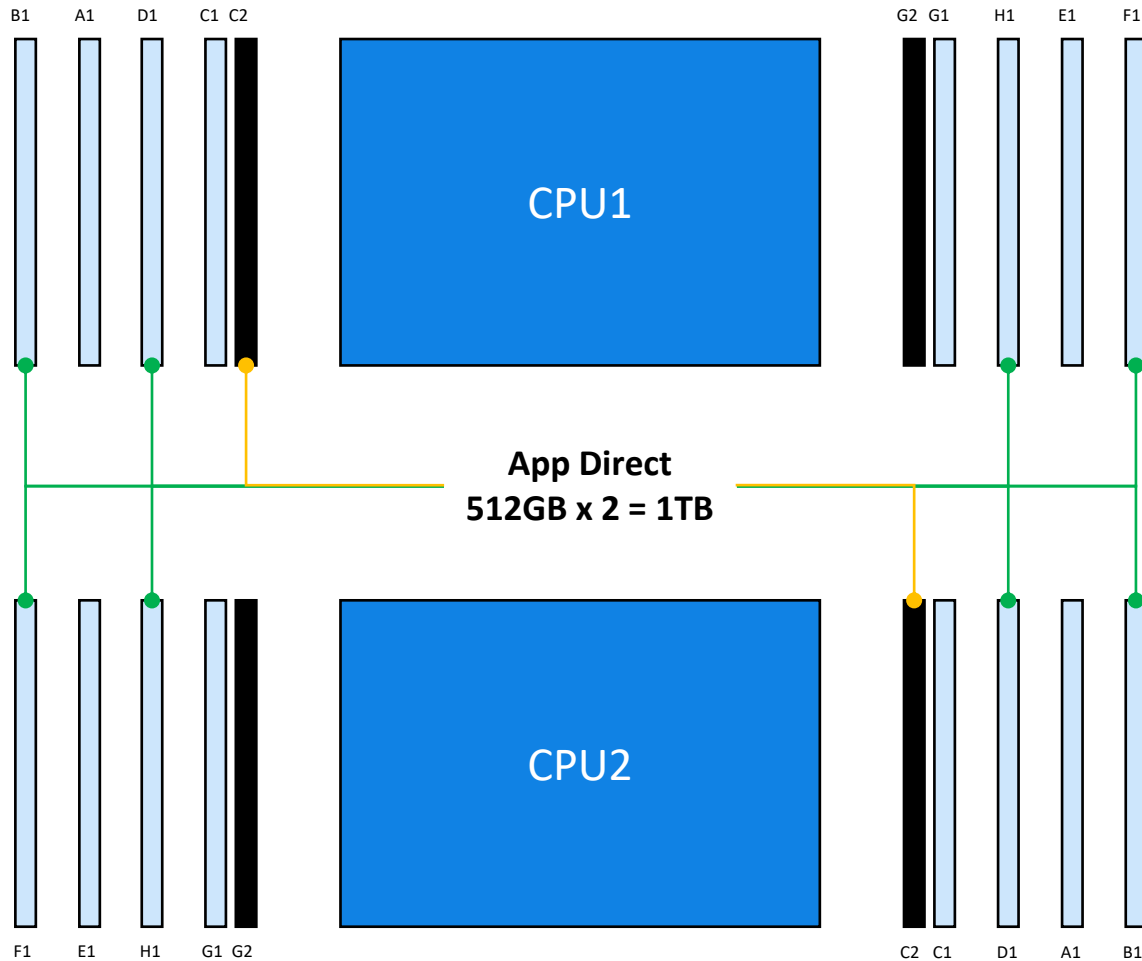- Object-Storage

X12 BigTwin™ Key Features

- Next Gen Platform Support
  - **Dual Ice Lake Xeon Scalable Processors (3 UPI Links)**
  205W on 2U 4-Node, 270W on 2U 2-Node
  - **8 Memory Channels, DDR4 3200 MT/s**
  16 DRAM + 2 PMMs (Intel Optane Persistent Memory 200 Series)

- All-Hybrid Hot-Swappable Drive Bays
  - **2U 4-Node EDSFF**
  40 lanes for 10 NVMe (4 from CPU1 and 6 from CPU2)
  - **2U 4-Node (2.5")**
  24 lanes for 6 NVMe/SAS/SATA (All from CPU2)
  - **2U 2-Node (2.5")**
  48 lanes for 12 NVMe/SAS/SATA (6 from CPU1, 6 from CPU2)

- Internal M.2 devices
  - **2 NVMe/SATA 22x80 M.2**
  Optional HW RAID support for 2 NVMe 22x80 M.2

- Flexible Networking via AIOM
  - **PCI-E 4.0 (OCP 3.0 SFF Compliant)**
  EDR/HDR IB, 100G/25G/10G/1G Ethernet
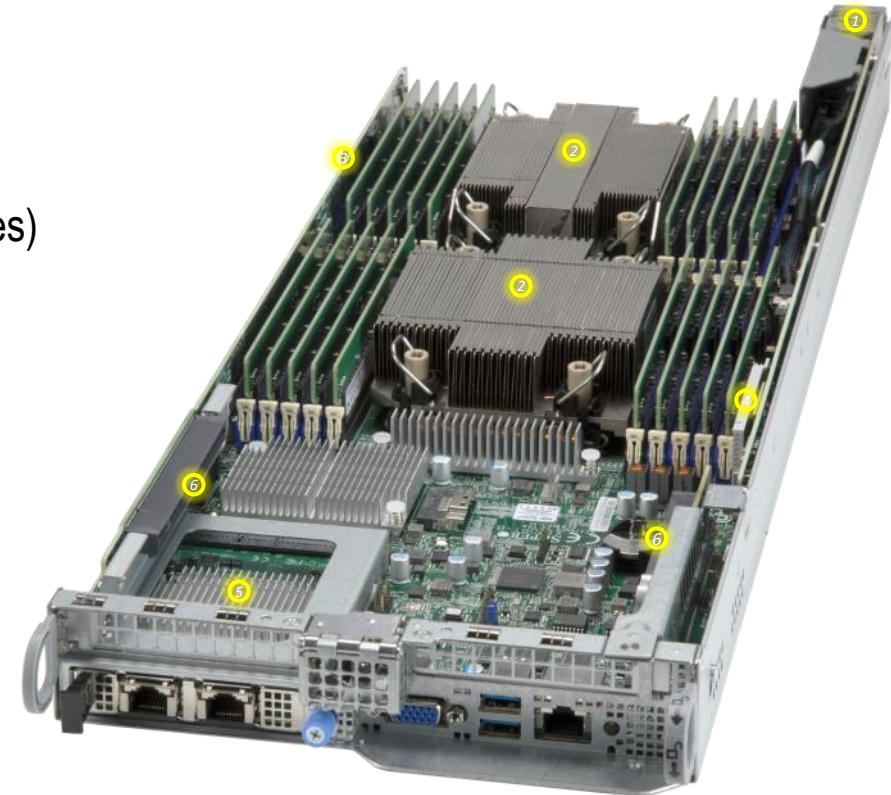
- 1 **Hot-Swappable Node**
- 2 **Staggered CPUs**
- 3 **M.2 Drives**
- 4 **Modular Storage Adapter**
- 5 **Cold-Swappable AIOM**
- 6 **Tool-Less Add-On Cards**

Slot 2: PCIe G4 x16 LP (CPU2)	Slot 1: PCIe G4 x16 LP (CPU1)			
Slot 3: PCIe G4 x16 AIOM (CPU1)	VGA	USB	IPMI	UID

BMC Reset
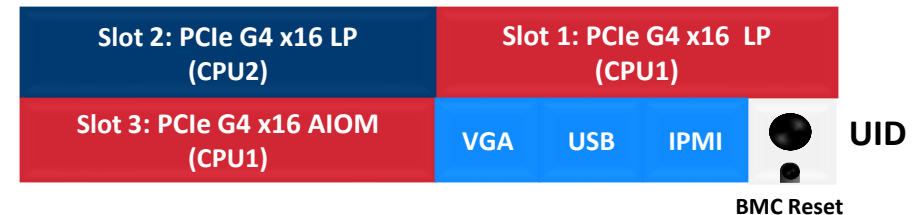
X12 BigTwin Memory Population Guide

App Direct
512GB x 2 = 1TB

CPU1

CPU2

B1 A1 D1 C1 C2

G2 G1 H1 E1 F1

F1 E1 H1 G1 G2

C2 C1 D1 A1 B1

Population per Socket: RDIMMs

	F1	E1	H1	G1	G2	C2	C1	D1	A1	B1
1 DIMM									✓	
2 DIMMs		✓							✓	
4 DIMMs		✓		✓			✓		✓	
6 DIMMs	✓	✓		✓			✓		✓	✓
8 DIMMs*	✓	✓	✓	✓			✓	✓	✓	✓

Population per Socket: PMEM / Storage Class Memory

	F1	E1	H1	G1	G2	C2	C1	D1	A1	B1
4+4	✓	✓	✓	✓			✓	✓	✓	✓
6+1	✓	✓	✓	✓			✓	✓	✓	✓
8+1**	✓	✓	✓	✓		✓	✓	✓	✓	✓

App Direct Mode, Memory, Mixed Mode

App Direct Mode

✓ DDR4
✓ BPS

**Why Storage Class Memory?
- Deliver DRAM performance and persistence of NAND
- Limit costly downtime in the event of a power failure

*Required for Intel SGX (Software Guard Extensions)
Designed to increase security of select application code
and data, protecting it from disclosure or modification.

X12 BigTwin™: Tool-Less I/O Design

	Removing I/O Controllers	Installing I/O Controllers
AOC-AG-i4M AIOM Intel® i350 4p 1GbE		
AOC-653105A-HDAT Low-profile Card Mellanox CX-6 VPI 1p 200GbE/HDR		

NVIDIA T4 Low-Profile Card

- **System Support**
  - 2 per node SYS-220BT-H Series
  - 2 per node on SYS-220BT-D Series
- **Optimized for Edge Use Cases**
  - Rendering, Inferencing and Video Streaming
- **Physical Properties:**
  - Small Form Factor
  - Low Power
  - Lowest Entry Cost
  - Easy to Cool and Deploy

NVIDIA T4	
Design	Optimized for Edge Lowest Entry Cost
Form Factor	x16 PCIe Gen 3 1 Low-Profile Passive Cooling
CUDA Cores	2,560
GPU Memory	16GB GDDR5
Media Acceleration	VP9 Decoder H.265 (HEVC) 4:4:4 encode/decode
Ray Tracing RT Core	Yes
vGPU Profiles	1 GB, 2 GB, 4 GB, 8GB and 16 GB
Max Power	70W
Thermal	Passive

Optional HW RAID Adapter: *AOC-SMG3-2M2-B*

- High Performance NVMe Aggregator and x16 PCI-E Slot Next Gen (CPU2)
- Dual x4 PCI-E Gen3 NVMe Interface
- Supports 2x NVMe M.2 22x80mm Drives
- HW RAID Support: 1
- Target Application: Hypervisors (ESXi, KVM, Hyper-V, etc.)
- Boot Mode Support: UEFI

1st M.2 Slot (PD 0)

Inner Side

Outer Side

2nd M.2 Slot (PD 1)

AOC-SMG3-2M2-B-P **supports only NVMe M.2 Drives**. By default, all X12 systems support NVMe/SATA M.2 Drives.

Slim Advanced I/O Module (AIOM)

New Supermicro Compact Tool-less Networking Module

- Superset of OCP 3.0 SFF NIC

- PCI-E Next Gen

- Optional Speeds: 1GbE, 10GbE, 25GbE, 100GbE

- Tool-less Installation

- PCB Dimensions: 76mm x115mm

- Feature Rich Support, including
  - Asset Management Features
  - Temperature Monitoring
  - Remote Boot Over iSCSI
  - I/O Virtualization
  - RoCE
  - NVMe-oF
  - NC-SI (Sideband Interface)
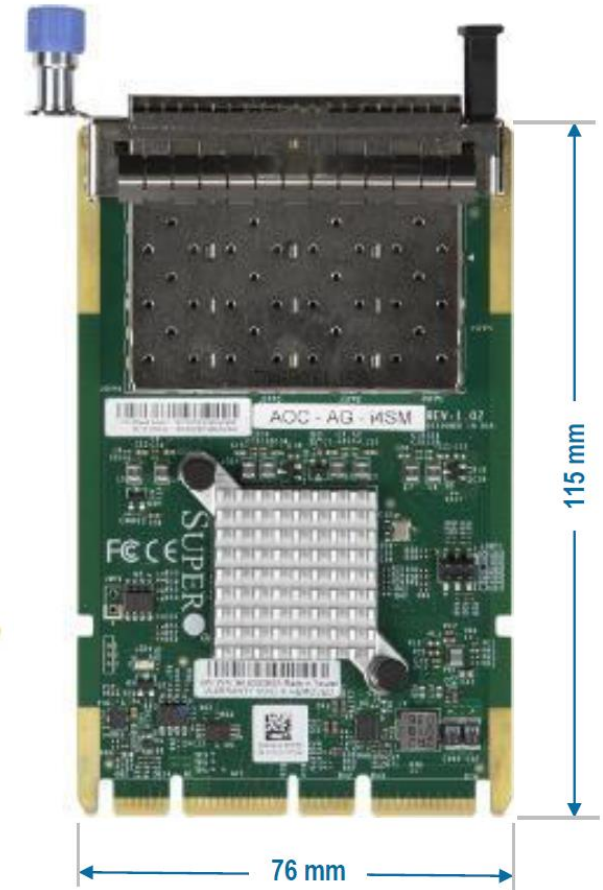
AIOM (Advanced IO Module) for X12 BigTwin™

M SKU
w/ 0.5U bracket

Model	AOC-AG-i4SM	AOC-AG-i2M	AOC-AG-i4M	AOC-ATG-i2TM	AOC-ATG-i2SM	AOC-ATG-i4SM	AOC-ATG-i2T2SM	AOC-A25G-b2SM	AOC-AH25G-m2S2TM	AOC-A25G-m2SM	AOC-A100G-b2CM	AOC-A100G-m2CM
Description	Quad-Port GbE	Dual-Port GbE	Quad-Port GbE	Dual-Port 10GbE	Dual-Port 10GbE	Quad-Port 10GbE	Quad-Port 10GbE	Dual-Port 25GbE	2-Port 25GbE & 2-Port 10GbE	Dual-Port 25GbE	Dual-Port 100GbE	Dual-Port 100GbE
Port	4x SFP	2x RJ45	4x RJ45	2x RJ45	2x SFP+	4x SFP+	2x RJ45 2x SFP+	2x SFP28	2x SFP28 2x RJ45	2x SFP28	2x QSFP28	2x QSFP28
Speed	1Gbps	1Gbps	1Gbps	10Gbps	10Gbps	10Gbps	10Gbps	25Gbps	25Gbps / 10Gbps	25Gbps	100Gbps	100Gbps
Controller	Intel® i350-AM4	Intel® i350-AM2	Intel® i350-AM4	Intel® X550-AT2	Intel® X710-BM2	Intel® XL710-BM1	Intel® X710-TM4	Broadcom® BCM57414	Mellanox® CX-4 Lx EN Intel® X550-AT2	Mellanox® CX-6 LX	Broadcom® BCM57508	Mellanox® CX-6 DX
PCIe	PCIe 2.1 x4	PCIe 2.1 x4	PCIe 2.1 x4	PCIe 3.0 x4	PCIe 3.0 x8	PCIe 3.0 x8	PCIe 3.0 x8	PCIe 3.0 x8	PCIe 3.0 x8 PCIe 3.0 x4	PCIe 4.0/3.0 x8	PCIe 4.0 x16	PCIe 4.0 x16
Power	4.4W	3.7W	4.4W	13W	6.2W	7W	10W	7.7W	25W	15W	20W	20W
Status	Released	Released	Released	Released	Q1 2021	Q1 2021	Released	Released	Released	Q2 2021	Released	Q2 2021

BMC Support: Powered by AST2600

- Multi-Node Management
  - Update BIOS & BMC FW
  - Update BIOS configurations
  - Hardware & FW Inventory

- Power Management & Monitoring
  - Smart Power Support
  - Event Logging

- Storage Management
  - Broadcom SAS3908, SAS3808, & SAS3816
  - Marvell 88NR2241 (UEFI: OS Mirroring)

- RESTful API Support
  - Intel® Node Manager
  - IPMI 2.0
  - Redfish 1.8 Compliance
  - Validated with SuperCloud Composer

BigTwin™: Improved Web IPMI Experience

New Features

New System Dashboard - Optimized UI/UX - Enriched System Management - Storage Monitoring - Advanced Maintenance Tools

BigTwin™: Multi-Node Management

BigTwin™: System Monitoring

BigTwin™: Maintenance Event Logs

BigTwin™: Firmware Management
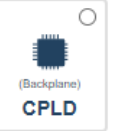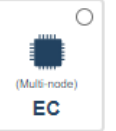
X12 BigTwin™ **2U4N** Roadmap

		Q3'20	Q4'20	Q1'21	Q2'21
All-NVMe		**SYS-220BT-HER** Dual Ice Lake Xeon Scalable Processors 20 DDR4-3200MT/s, Intel Optane DC Persistent Memory 10 NVMe ESDFF + 2 SATA M.2			
		SYS-220BT-HNC8R Dual Ice Lake Xeon Scalable Processors 20 DDR4-3200MT/s, Intel Optane DC Persistent Memory 6 NVMe/SAS via SAS3808			
SAS HBA + NVMe		**SYS-220BT-HNC9R** Dual Ice Lake Xeon Scalable Processors 20 DDR4-3200MT/s, Intel Optane DC Persistent Memory 6 NVMe/SAS HDS via SAS3908			
		SYS-620BT-HNC8R Dual Ice Lake Xeon Scalable Processors 20 DDR4-3200MT/s, Intel Optane DC Persistent Memory 3 NVMe/SAS HDS via SAS3808			
SATA + NVMe		**SYS-220BT-HNTR** Dual Ice Lake Xeon Scalable Processors 20 DDR4-3200MT/s, Intel Optane DC Persistent Memory 6 NVMe/SATA HDS			
PowerStick		**3000W Power Supply (vAC)**			

Early Ship **Launch**

Subject to change without notice

X12 BigTwin™ **2U2N** Roadmap

		Q3'20	Q4'20	Q1'21	Q2'21
SAS HBA + NVMe		**SYS-220BT-DNC8R** Dual Ice Lake Xeon Scalable Processors / 20 DDR4-3200MT/s, Intel Optane DC Persistent Memory / 12 NVMe/SAS HDS via SAS3816			Launch
		SYS-620BT-DNC8R Dual Ice Lake Xeon Scalable Processors / 20 DDR4-3200MT/s, Intel Optane DC Persistent Memory / 6 NVMe/SAS HDS via SAS3808		Launch	
SATA + NVMe		**SYS-220BT-DNTR** Dual Ice Lake Xeon Scalable Processors / 20 DDR4-3200MT/s, Intel Optane DC Persistent Memory / 12 NVMe/SATA HDS		Launch	
		SYS-620BT-DNTR Dual Ice Lake Xeon Scalable Processors / 20 DDR4-3200MT/s, Intel Optane DC Persistent Memory / 6 NVMe/SATA HDS		Launch	

Early Ship   **Launch**

Subject to change without notice

X12 BigTwin Summary

1. Award Winning Twin Design
   - No-compromise Design with up to 4 DP Nodes in a 2U Space
   - 16+2 DIMMs in each Node, Optimized for Intel® Optane™ Persistent Memory 200 Series
   - **Modular** Mid-plane with PCI-E Next Gen Storage Controller Options
   - Up to 3 FPGAs/GPUs in each Node (75W) or Double-width GPU Support per node (OEM)
   - Hot-Swappable and Tool-Less Serviceability

2. Shared Components and **More Cost-Effective** than Standard 1U Servers
   - Supports Multiple Generations of Computing Platforms
   - Helps Reduce E-Waste

3. Meets Key Requirements for Hyperscalers
   - Up to 12 NVMe or All Flash Drives per Node
   - **HW RAID 1** with M.2 Drives (Redundant Boot Device: UEFI)
   - OCP 3.0 Compliant Onboard NIC

Upcoming training sessions

Register for upcoming product deep-dives:

Intel Ice lake Supermicro X12 Channel Training
- Wednesday, April 21
- 10.30 CEST
- Sign up: https://primetime.bluejeans.com/a2m/register/yfkjkbvz

Supermicro Blade Solutions Channel Update
- Tuesday, May 4
- 10.30 CEST
- Sign up: https://primetime.bluejeans.com/a2m/register/wvcydbbg

Supermicro UP Solutions Channel Update
- Tuesday, May 11
- 16.00 CEST
- Sign up: https://primetime.bluejeans.com/a2m/register/fczzugds

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