Vertiv™ 360AI

High Density Reference Design for AI

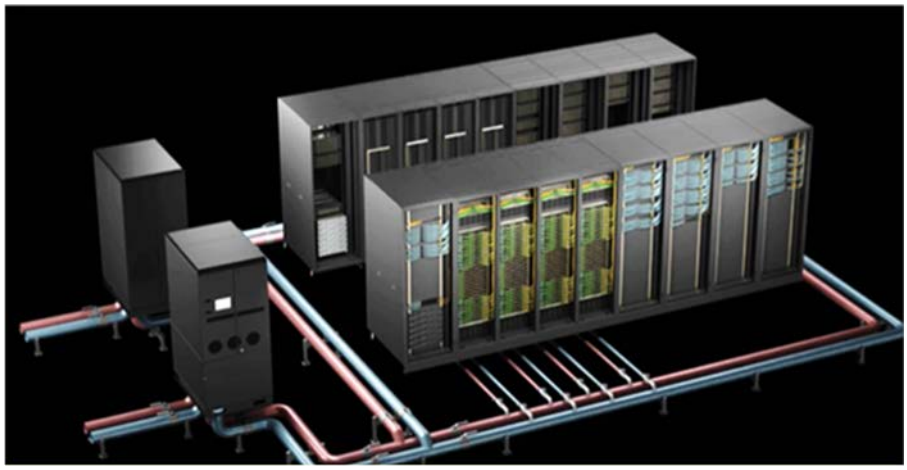
AI Reference Design #007A

5x 1.2MW NVIDIA Blackwell DGX SuperPODs

A full data center environment designed for a 6.2MW solution with distribution redundancy, using three NVIDIA Blackwell DGX SuperPODs.

Vertiv™ AI Infrastructure Design Principles

1. **Design both Power and Cooling together** to optimize AI infrastructure.
2. **Power is at a premium**. Eliminate stranded power by aligning AI clusters to data center 'capacity blocks.'
3. **Consider total cost of ownership, redundancy, and blast radius** in AI power and cooling designs, and the tradeoffs among them.
4. **Handle AI workload surges** though system-level controls and power and cooling buffers.
5. **Design for a mix of liquid and air cooling**, which have a combined and interdependent impact on the ability to remove heat.
6. **Design for the future**. AI power density will rapidly grow toward 500kW per rack.



1 POD shown above, design is for 4 PODs

Design Summary

Solution Capacity	7.5MW
Redundancy	2N
Total IT Load	6,200kW (1240kW per POD)
Rack Density (IT load)	80 racks at 73kW, 30 racks at 12kW
Rack(s)	110
Cooling Topology	80% Liquid (direct-to-chip) 20% Air (perimeter units)
Coolant Distribution	XDU1350
Perimeter air cooling	PH250
Chiller	AFC CIZ4140
Rack PDU(s)	120A rack PDU, 2 per rack
Busbar	1000A busbar, 4 per POD 120A TOB, 2 per rack
Room/Row PDU	650kVA PDU, 2 per POD
UPS for IT	UPS9000 UPS, 2N, supplying each POD
UPS for Cooling System	APM2 UPS, 2N, supplying both cooling loops

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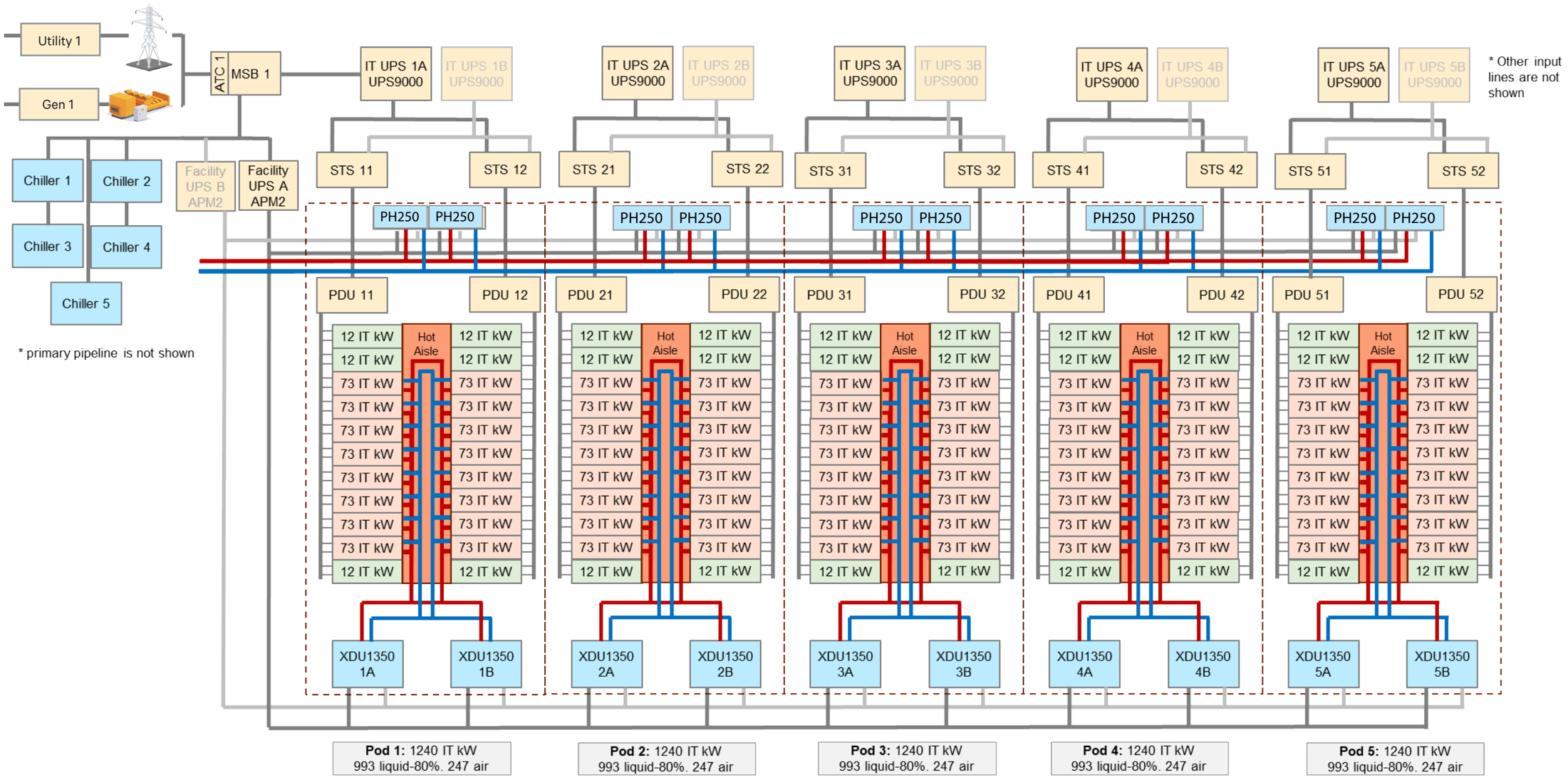
Reference Design Schematic



Legend

- Critical Power
- Thermal Management
- Networking & Storage Racks
- Computer Racks
- Liquid loop, cold/supply
- Liquid loop, hot/return

Utility supply

Generator

Key Terms

STS: Static Transfer Switch
UPS: Uninterruptible Power Supply
PDU: Power Distribution Unit
CDU: Coolant Distribution Unit
CW181: 150kW Vertiv™ Liebert® Chilled water cooling
XDU1350: 1350kW Coolant Distribution Unit (CDU)

References: https://www.nvidia.com/en-us/data-center/dgx-superpod-gb200/

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Vertiv Components of the Design

Component	Details
IT UPS 1A	UPS9000 Primary UPS for POD1
IT UPS 1B	UPS9000 Secondary UPS for POD1
IT UPS 2A	UPS9000 Primary UPS for POD2
IT UPS 2B	UPS9000 Secondary UPS for POD2
Facility UPS A	APM2 Primary UPS for cooling systems (XDU1350 & PH250)
Facility UPS B	APM2 Secondary UPS for cooling systems (XDU1350 & PH250)
STS 11	STS for POD 1, power from IT UPS 1A and UPS 1B
STS 12	STS for POD 1, power from IT UPS 1A and UPS 1B
STS 21	STS for POD 2, power from IT UPS 2A and UPS 2B
STS 22	STS for POD 2, power from IT UPS 2A and UPS 2B
PDU 11	650kVA PDU supplies row 1 of POD 1, power from STS 11
PDU 12	650kVA PDU supplies row 2 of POD 1, power from STS 12
PDU 21	650kVA PDU supplies row 1 of POD 2, power from STS 21
PDU 22	650kVA PDU supplies row 2 of POD 2, power from STS 22
Busbar and Tap-off Boxes (TOB)	4x 1000A busbar per POD, 2x 120A TOB per rack
Rack PDUs for compute racks	2x 120A rack PDUs per rack
Rack PDUs for network & storage racks	2x 20A rack PDUs per rack
Chiller	5x AFC CIZ4140 heat rejection for liquid cooling loop (XDU1350 and PH250), N+1 redundant
XDU1350 1A	Primary coolant distribution unit (CDU) for POD 1, redundant power from facility UPSs
XDU1350 1B	Secondary coolant distribution unit (CDU) for POD 1, redundant power from facility UPSs
XDU1350 2A	Primary coolant distribution unit (CDU) for POD 2, redundant power from facility UPSs
XDU1350 2B	Secondary coolant distribution unit (CDU) for POD 2, redundant power from facility UPSs
PH250	Air-cooling unit for POD, redundant power from facility UPSs
Rack	SR-VE081222SA, 48U 800×1200

Design Modification Options

Non-redundant in each Pod

Option 1

- 2x 1000A Busbar
- 1x 60Ax2 TOB /Rack
- 2x 60A rPDU /Rack
- 2x 20A rPDU /Rack(network)

Non-redundant in each Pod

Option 2

- 4x 500A Busbar
- 2x 60A TOB /Rack
- 2x 60A rPDU /Rack
- 2x 20A rPDU /Rack(network)

Redundant in each Pod

Option 3

- 4x 1000A Busbar
- 2x 120A TOB /Rack
- 2x 120A rPDU /Rack
- 2x 20A rPDU /Rack(network)

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