Vertiv™ 360AI

High density reference design for AI

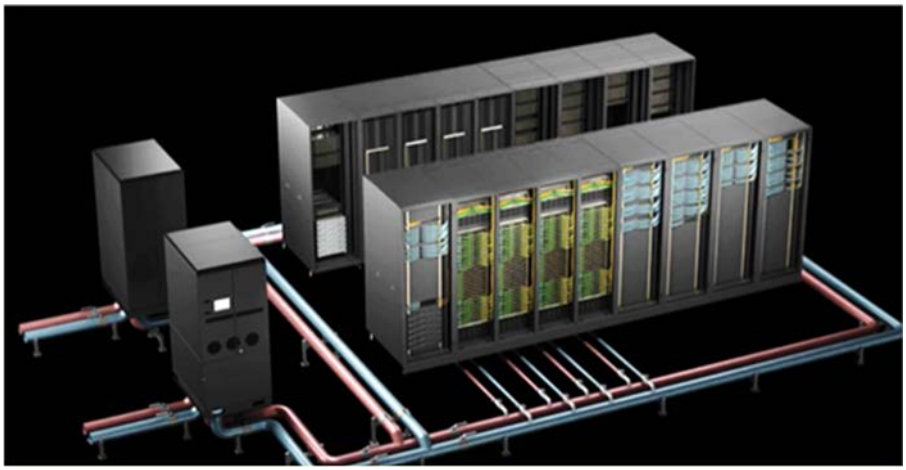
AI Reference Design #016

4x 1.2MW NVIDIA Blackwell DGX SuperPODs

A full data center environment designed for a 5MW solution with distribution redundancy, using three NVIDIA Blackwell DGX SuperPODs.

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.



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Design Summary

Solution Capacity	4.8MW
Redundancy	Non-Redundancy
Total IT Load	4,704kW (1176kW per POD)
Rack Density (IT load)	32 racks at 132kW, 40 racks at 12kW
Rack(s)	72
Cooling Topology	76% Liquid (direct-to-chip) 24% Air (perimeter units)
Coolant Distribution	XDU1350
Perimeter air cooling	CW181
Chiller	FH3135
Rack PDU(s)	100A rack PDU, 2 per rack
Busbar	1000A busbar, 2 per POD 100A TOB, 2 per rack
Room/Row PDU	600kVA PDU, 2 per POD
UPS for IT	2500kVA UPS, supplying both PODs
UPS for Cooling System	420kVA UPS, 2N, supplying both cooling loops

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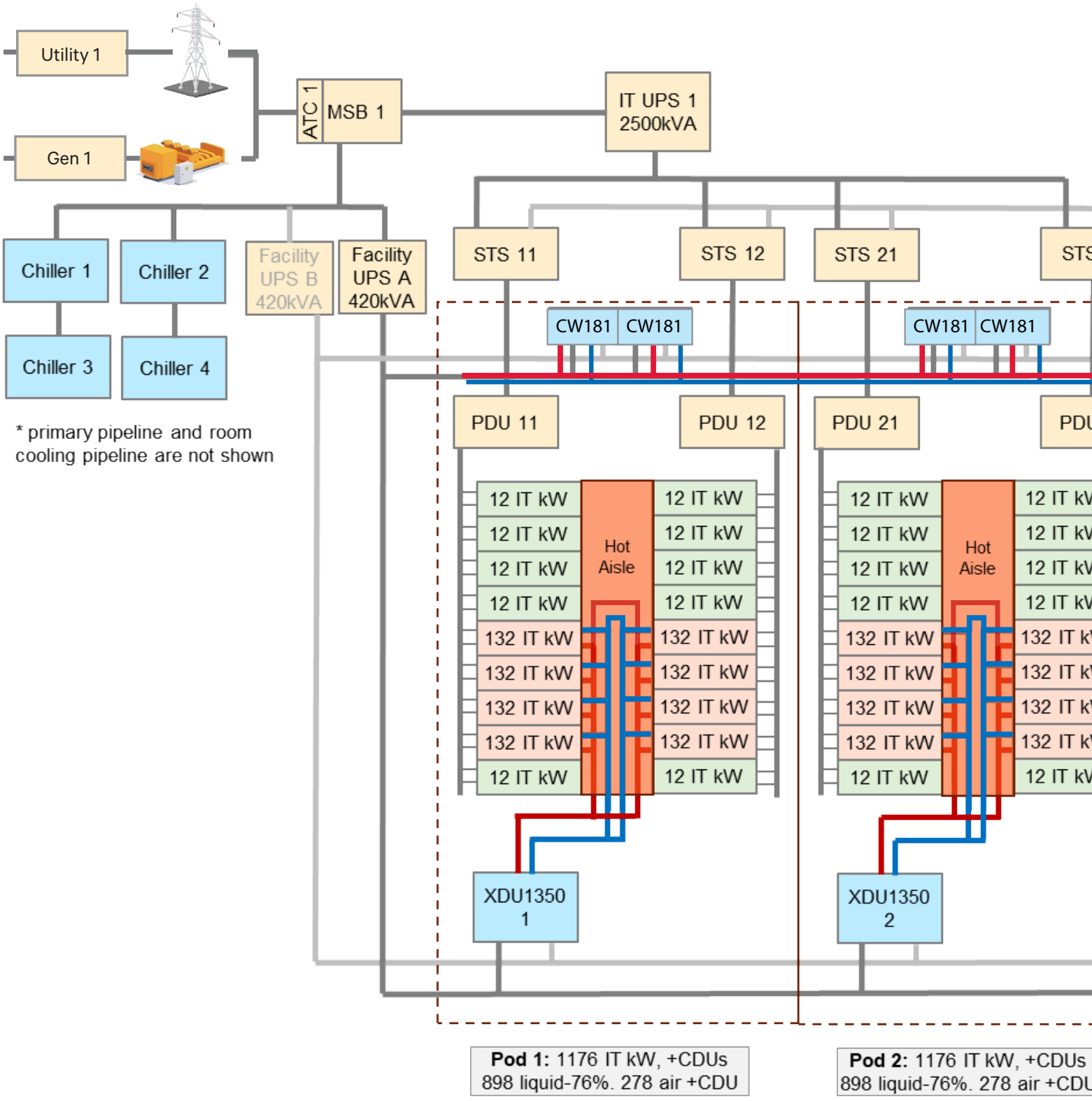
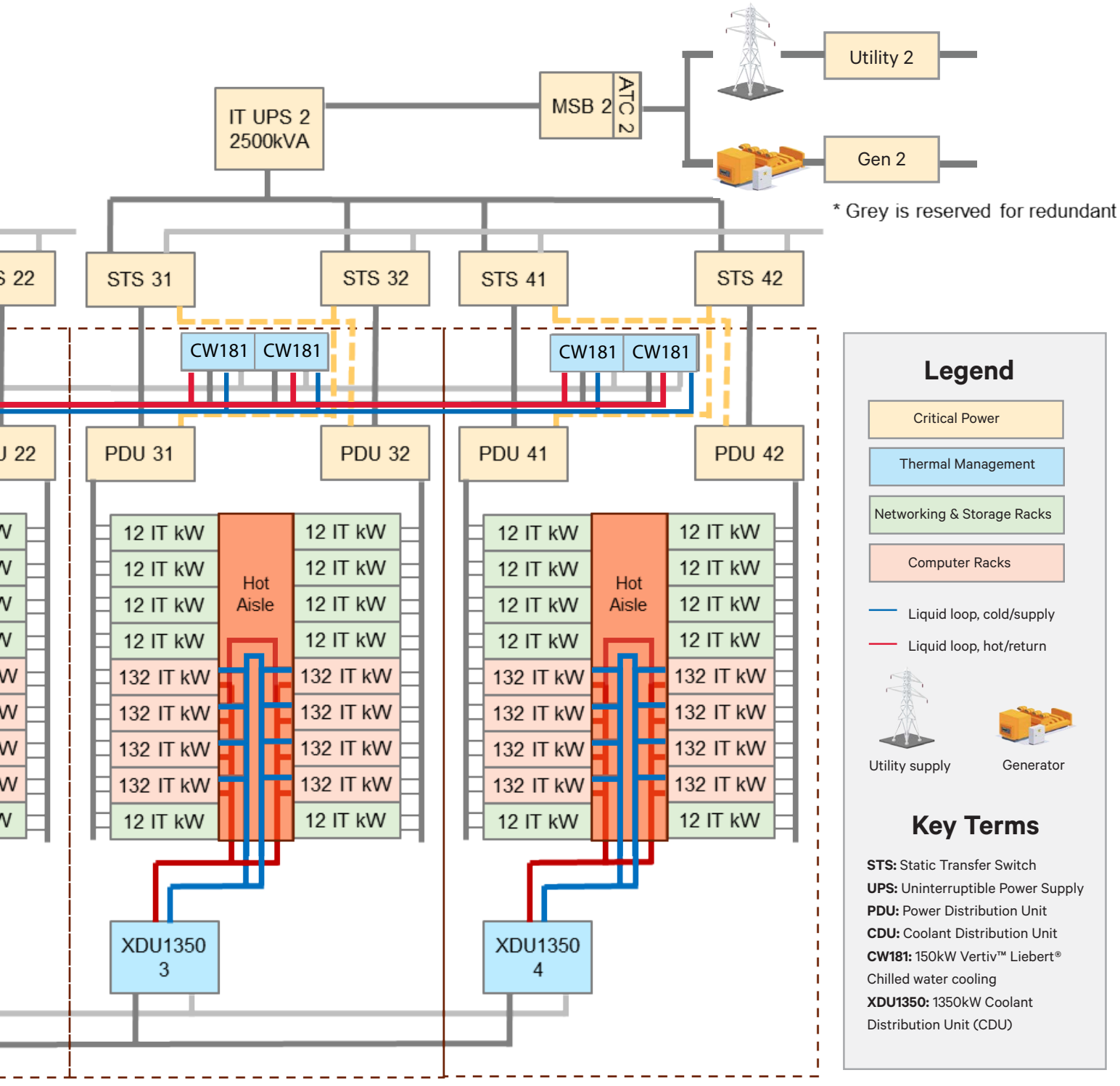
Reference Design Schematic



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



Pod 3: 1176 IT kW, +CDUs 898 liquid-76%. 278 air +CDU

Pod 4: 1176 IT kW, +CDUs 898 liquid-76%. 278 air +CDU

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Vertiv Components of the Design

Component	Details
IT UPS 1	2,500kVA UPS for two PODs
IT UPS 2	2,500kVA UPS for two PODs
Facility UPS A	420kVA Primary UPS for cooling systems (XDU1350 & CW181)
Facility UPS B	420kVA Secondary UPS for cooling systems (XDU1350 & CW181)
STS 11	STS for POD 1, power from IT UPS 1
STS 12	STS for POD 1, power from IT UPS 1
STS 31	STS for POD 3, power from IT UPS 2
STS 32	STS for POD 3, power from IT UPS 2
PDU 11	600kVA PDU supplies row 1 of POD 1, power from STS 11
PDU 12	600kVA PDU supplies row 2 of POD 1, power from STS 12
PDU 31	600kVA PDU supplies row 1 of POD 3, power from STS 31
PDU 32	600kVA PDU supplies row 2 of POD 3, power from STS 32
Busbar and Tap-off Boxes (TOB)	2x 1000A busbar per POD, 2x 100A TOB per rack
Rack PDUs for compute racks	2x 100A rack PDUs per rack
Rack PDUs for network & storage racks	2x 32A rack PDUs per rack
Chiller	4x FH3135 heat rejection for liquid cooling loop (XDU1350 and CW181)
XDU1350 1	Coolant distribution unit (CDU) for POD 1, redundant power from facility UPSs
XDU1350 2	Coolant distribution unit (CDU) for POD 2, redundant power from facility UPSs
XDU1350 3	Coolant distribution unit (CDU) for POD 3, redundant power from facility UPSs
XDU1350 4	Coolant distribution unit (CDU) for POD 4, redundant power from facility UPSs
CW181	Air-cooling unit for POD, redundant power from facility UPSs
Rack	48U 800×1200

Design Modification Options

Non-redundant in each Pod

Option 1

- 2x 1000A Busbar
- 1x 100Ax2 TOB /Rack
- 2x 100A rPDU /Rack
- 2x 32A rPDU /Rack(network)

Non-redundant in each Pod

Option 2

- 4x 500A Busbar
- 2x 100A TOB /Rack
- 2x 100A rPDU /Rack
- 2x 32A rPDU /Rack(network)

Redundant in each Pod

Option 3

- 4x 1000A Busbar
- 2x 185A TOB /Rack
- 2x 185A rPDU /Rack
- 2x 32A rPDU /Rack(network)