Vertiv™ 360AI

High Density Reference Design for AI

AI Reference Design #014N

2x 1.2MW NVIDIA Blackwell DGX SuperPODs

A full data center environment designed for a 3MW solution with 2N redundancy, using two 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.

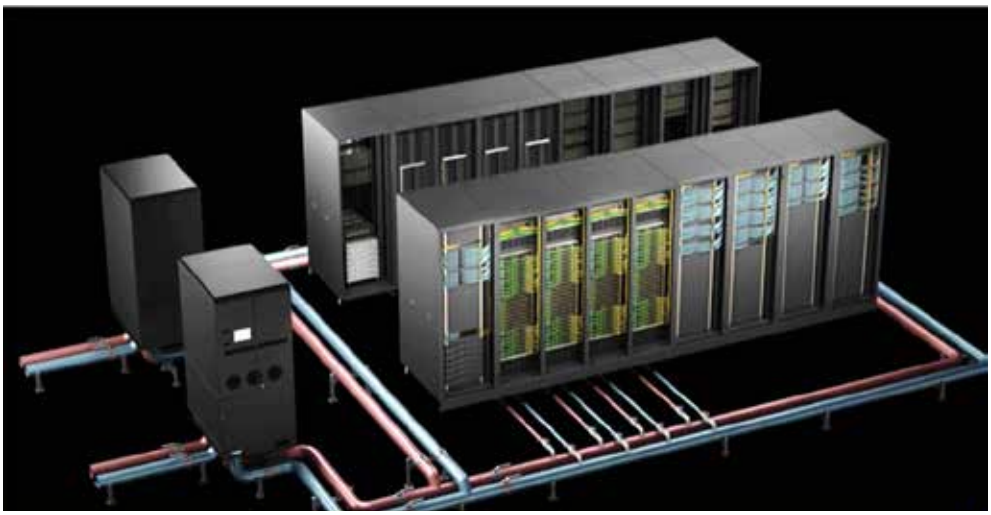


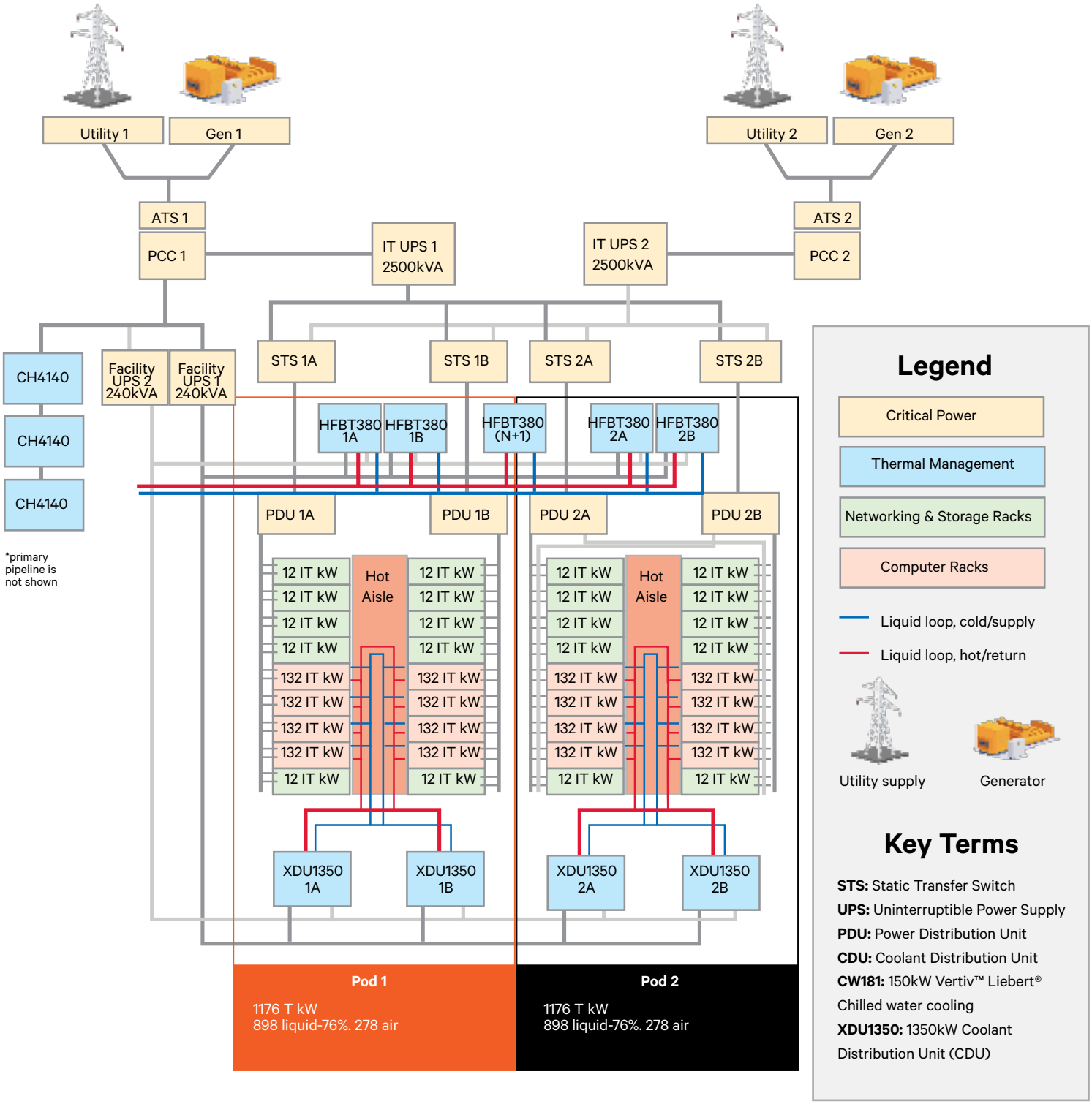
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Design Summary

Solution Capacity	3MW
Redundancy	2N
Total IT Load	2,352kW (1176kW per POD)
Rack Density (IT load)	16 racks at 132kW, 20 racks at 12kW
Rack(s)	36
Cooling Topology	76% Liquid (direct-to-chip) 24% Air (perimeter units)
Coolant Distribution	XDU1350
Perimeter air cooling	HFBT380
Chiller	CH4140
Rack PDU(s)	185A rack PDU, 2 per rack
Busbar	1000A busbar, 2 per POD 185A TOB, 2 per rack
Room/Row PDU	600kVA PDU, 2 per POD
UPS for IT	2500kVA UPS, 2N, supplying both PODs
UPS for Cooling System	240kVA 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/

Vertiv Components of the Design

Component	Details
Facility UPS #1	240kVA Primary UPS for cooling systems (XDU1350 & CW181)
Facility UPS #2	240kVA Secondary UPS for cooling systems (XDU1350 & CW181)
IT UPS #1	2,500kVA Primary UPS for both PODs
IT UPS #2	2,500kVA Secondary UPS for both PODs
STS 1A	Primary STS for POD 1, redundant power from IT UPS #1 and IT UPS #2
STS 1B	Secondary STS for POD 1, redundant power from IT UPS #1 and IT UPS #2
STS 2A	Primary STS for POD 2, redundant power from IT UPS #1 and IT UPS #2
STS 2B	Secondary STS for POD 2, redundant power from IT UPS #1 and IT UPS #2
PDU 1A	600kVA PDU supplies row 1 of POD 1, power from STS 1A
PDU 1B	600kVA PDU supplies row 2 of POD 1, power from STS 1B
PDU 2A	600kVA PDU supplies row 1 of POD 2, power from STS 2A
PDU 2B	600kVA PDU supplies row 2 of POD 2, power from STS 2B
Busbar and Tap-off Boxes (TOB)	2x 900A busbar per POD, 2x 185A TOB per rack
Rack PDUs for network & storage racks	2x 20A rack PDUs per rack
Rack PDUs for compute racks	2x 185A rack PDUs per rack
Chiller	Heat rejection for liquid cooling loop (XDU1350)
Chiller 1, 2 working CH4140	Working CH4140
Chiller	CH4140 Standby
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
XDU1350 3A	Primary coolant distribution unit (CDU) for POD 3, redundant power from facility UPSs
XDU1350 3B	Secondary coolant distribution unit (CDU) for POD 3, redundant power from facility UPSs
HFBT380 1A	Primary air-cooling unit for POD 1, redundant power from facility UPSs
HFBT380 1B	Secondary air-cooling unit for POD 1, redundant power from facility UPSs
HFBT380 2A	Primary air-cooling unit for POD 2, redundant power from facility UPSs
HFBT380 2B	Secondary air-cooling unit for POD 2, redundant power from facility UPSs
HFBT380 (N+1)	Air-cooling unit for N+1 redundant, redundant power from facility UPSs
Rack Enclosures	VSR081422BS, 48U 800x1400

Design Modification Options

Non-redundant in each Pod

Option 1

- 2x 1000A Busbar
- 1x 100Ax2 TOB /Rack
- 2x 100A rPDU /Rack
- 2x 20A rPDU /Rack(network)

Non-redundant in each Pod

Option 2

- 4x 500A Busbar
- 2x 100A TOB /Rack
- 2x 100A rPDU /Rack
- 2x 20A rPDU /Rack(network)

Redundant in each Pod

Option 3

- 4x 1000A Busbar
- 2x 185Ax2 TOB /Rack
- 2x 185A rPDU /Rack
- 2x 20A rPDU /Rack(network)

Vertiv.com | **Vertiv Headquarters,** 505 N Cleveland Ave, Westerville, OH 43082, USA

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