

High Density Reference Design for AI

AI Reference Design #004

360kW Cluster at up to 41kW per rack with rear-door heat exchangers (RDHX)

A full data center environment designed for a 360kW solution with 2N redundancy, using NVIDIA DGX H100 System.

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.

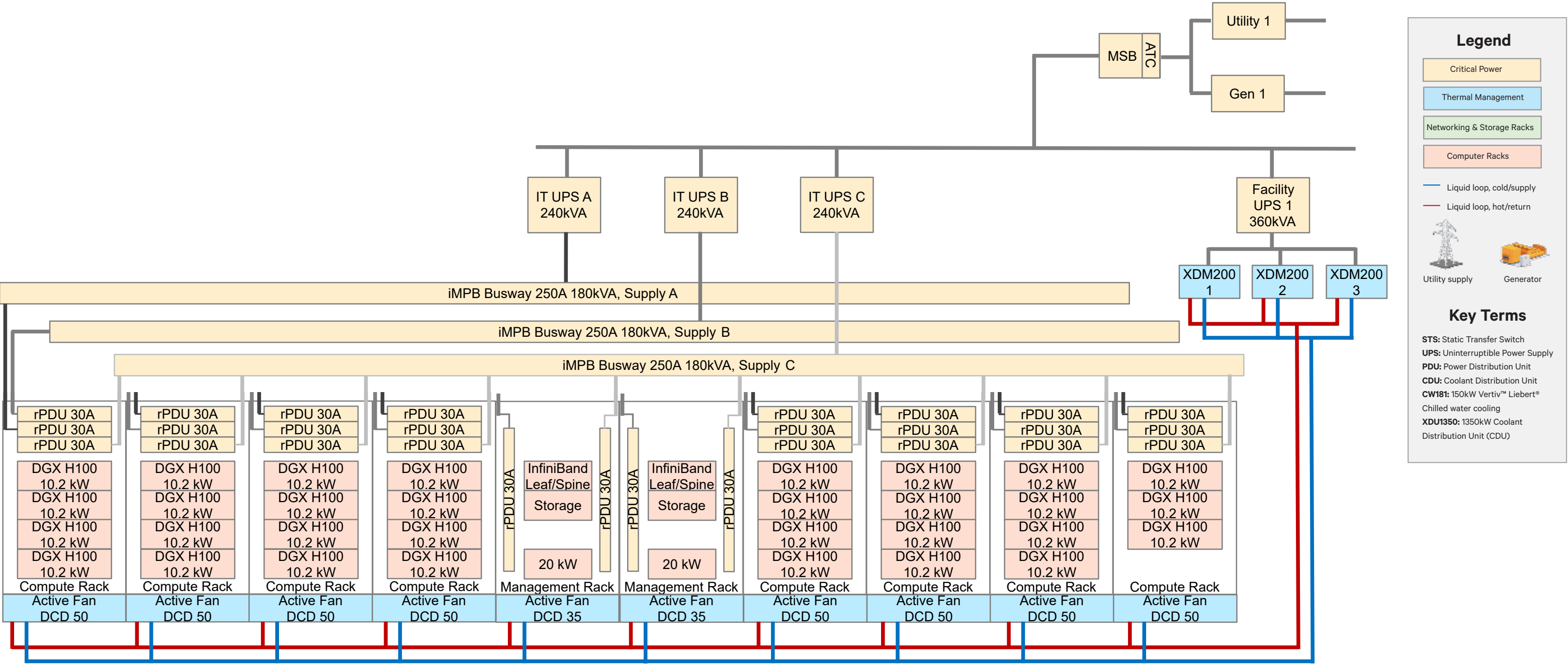


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Design Summary

Solution Capacity	360kW
Redundancy	Enhanced N+1 for power, N+1 for cooling
Total IT Load	358kW
Rack Density (IT load)	7 racks at 41kW, 1 rack at 30kW, 2 racks at 20kW
Rack(s)	10
Cooling Topology	100% Air (RDHx units)
Cooling Equipment	Split Indoor Chiller XDM200
Rack PDU(s)	30A horizontal rack PDU, 3 per rack 30A vertical rack PDU, 2 per rack
Busway	250A busway, 3 per POD 30A tap-off box, 3 per rack
UPS for IT	240kVA UPS, Enhanced N+1, 3 per POD
UPS for facility	360kVA UPS, supplying three XDM200

Reference Design Schematic



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



Vertiv Components of the Design

Component	Details
UPS for IT	3x 240kVA Enhanced N+1 UPS for POD
UPS for Facility	1x 360kVA UPS for XDM200 room cooling
Busway and Tap-off Boxes (TOB)	3x 250A busways for each row, 3x 30A TOB per compute rack, 2x 30A TOB per management rack
Rack PDUs for compute racks	3x 30A horizontal rack PDUs per rack
Rack PDUs for management racks	2x 30A vertical rack PDUs per rack
Indoor Split Chiller	3x cooling units for POD
DCD50	Rear door heat exchanger for each compute rack
DCD35	Rear door heat exchanger for each management rack
Compute Rack	8x VR9357, 48U 800×1200
Management Rack	2x VR9357, 48U 800×1200