



High Density Reference Design for AI

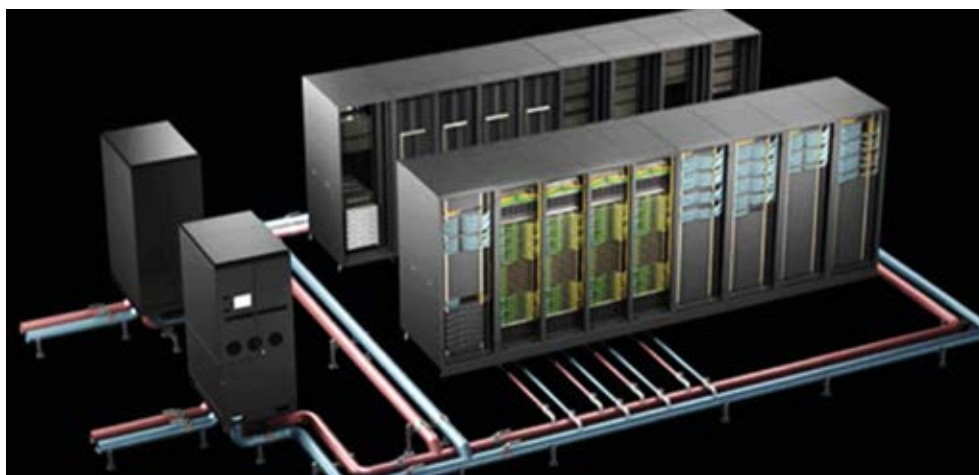
AI Reference Design #027

2x NVIDIA Blackwell DGX SuperPOD

A full data center environment designed for a 2.5 MW solution with 4 to make 3 redundancy, utilizing the latest NVIDIA GB300 NVL72 architecture.

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 1MW per rack.

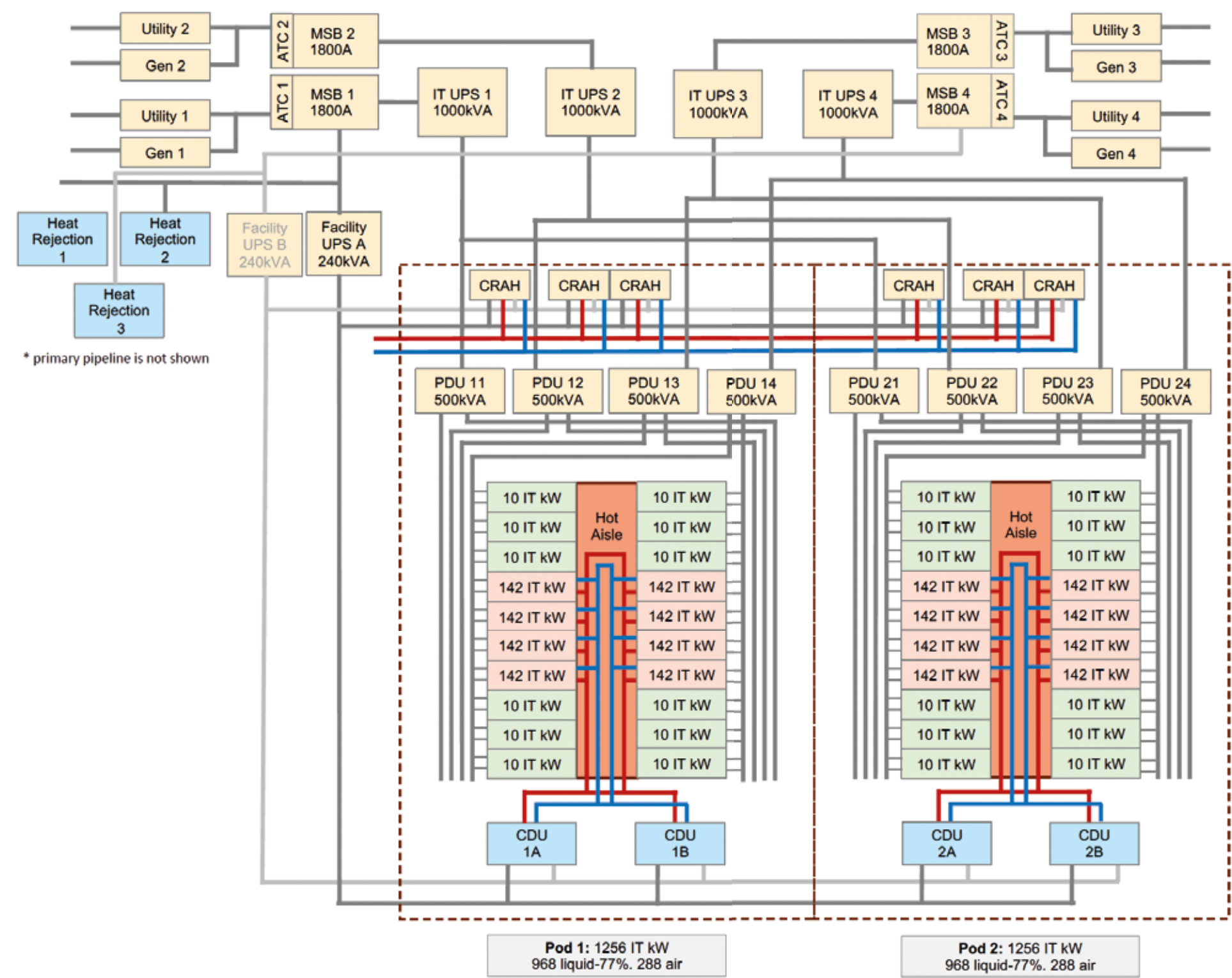


1 POD shown above, design is for 2 PODs

Design Summary

Solution Capacity	2.5 MW
Redundancy	4 to make 3 for power, N+1 for cooling
Total IT Load	2,512kW (1,256kW per POD)
Rack Density (IT load)	16 racks at 142kW, 24 racks at 10kW
Rack(s)	40
Cooling Topology	77% Liquid (direct-to-chip) 23% Air (perimeter units)
Coolant Distribution	XDU1350
Perimeter air cooling	CW205
Chiller	FF3135
Rack Power Distribution	33kVA DC power shelf, 8 per compute rack, 2 per support rack
Busbar	400A busbar, 8 per POD 60A TOB, 2 per rack
Room/Row PDU	500kVA PDU, 8 for 2 PODs
UPS for IT	1000kVA UPS, 4 for 2 PODs
UPS for Facility	240kVA UPS, 2N, supplying both cooling loops

Reference Design Schematic



4 to make 3 configuration for 2 Pod

- 4x 1800A MSB for IT and facility
- 4x 1000kVA IT UPS system for two pod, 4 to make 3
- 2x 240kVA facility UPS system for two pod, 2N
- 8x 500kVA PDU

- 8x 400A 240/415V Busbar for each pod
- 2x 60A TOB per computing rack for each Busbar
- 8x 33kVA DC power shelf per computing rack
- 2x 60A TOB per support rack
- 2x 33kVA DC power shelf per support rack, 2N

Thermal OP1

- 2x XDU1350 for each pod, N+1
- 3x CW205 for each pod, N+2 for two pod
- 3x FH3135 with 30% propylene glycol, N+1

2x 240kVA facility UPS(n+1) system, 2N

- For XDU1350 and CW205 power consumption:
 $(20.5 \times 2 + 17 \times 3) \times 2 = 184 \text{ kW}$

Thermal OP2

- To Chip: 9x XDM300 with MCV430 liquid cooling for two pod, N+1, 23.8C (75F) supply fluid temperature
- To Room: 4x DA265 with MCV430 air cooling(283kW) for two pod, N+1

Thermal OP3

- To Chip: 6x DH400 liquid cooling(within UPS) for two pod, N+1, 23.8C (75F) supply fluid temperature
- To Room: 3x DH400 air cooling for two pod, N+1

Note: Schematic above is representative of Thermal Option #1

Vertiv Components of the Design

Component	Details
MSB	4x 1800A MSB for IT and facility
UPS for IT	4x 1000kVA IT UPS system for two pod, 4 to make 3
UPS for Facility	2x 240kVA facility UPS system for two pod, 2N
PDU	8x 500kVA PDU
Busway	8x 400A 240/415V Busbar for each pod
Tap-off Boxes for computing racks	2x 60A TOB per computing rack for each Busbar
Rack power for computing racks	8x 33kVA DC power shelf per computing rack
Tap-off Boxes for support racks	2x 60A TOB per support rack
Rack power for support racks	2x 33kVA DC power shelf per support rack, 2N
Free Cooling Chiller	3x FF3135 with 30% propylene glycol, N+1
CDU	2x XDU1350 for each pod, N+1
CRAH	3x CW205 for each pod, N+2 for two pod
Racks for computing racks	16x OCP ORV3 racks, 8x per POD
Racks for support racks	24x 48U 600x1200mm, 12x per POD

Design Modification Options

Thermal Option #1

Chilled Water System (perimeter air + chiller) with liquid-to-liquid CDU.

- 2x XDU1350 for each pod, N+1
- 3x CW205 for each pod, N+2 for two pod
- 3x FF3135 with 30% propylene glycol, N+1

Thermal Option #2

Direct Expansion System (perimeter air + condenser) with liquid-to-refrigerant CDU.

- 9x XDM300 liquid cooling for two pod, N+1, 23.8C (75F) supply fluid temperature
- 4x DA265 air cooling (283kW) for two pod, N+1
- 13x MCV430 for liquid and air cooling loops, N+1 each

Thermal Option #3

Direct Expansion System (packaged air and liquid) with liquid-to-liquid CDU.

- 6x DH400 liquid cooling for two pod, N+1, 23.8C (75F) supply fluid temperature
- 2x XDU1350 for each pod, N+1
- 3x DH400 air cooling for two pod, N+1