



High Density Reference Design for AI

AI Reference Design #006

2x 1.28MW NVIDIA Blackwell DGX SuperPODs

A full data center environment designed for a 2.56MW solution with four to make three 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.

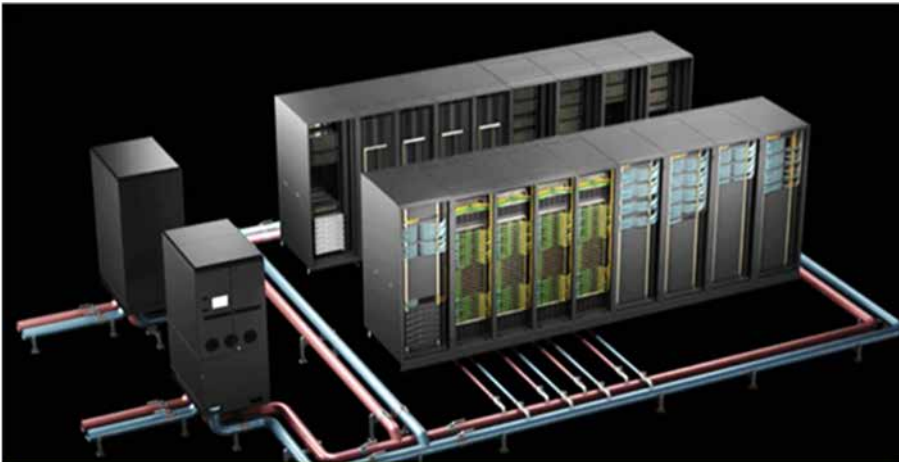
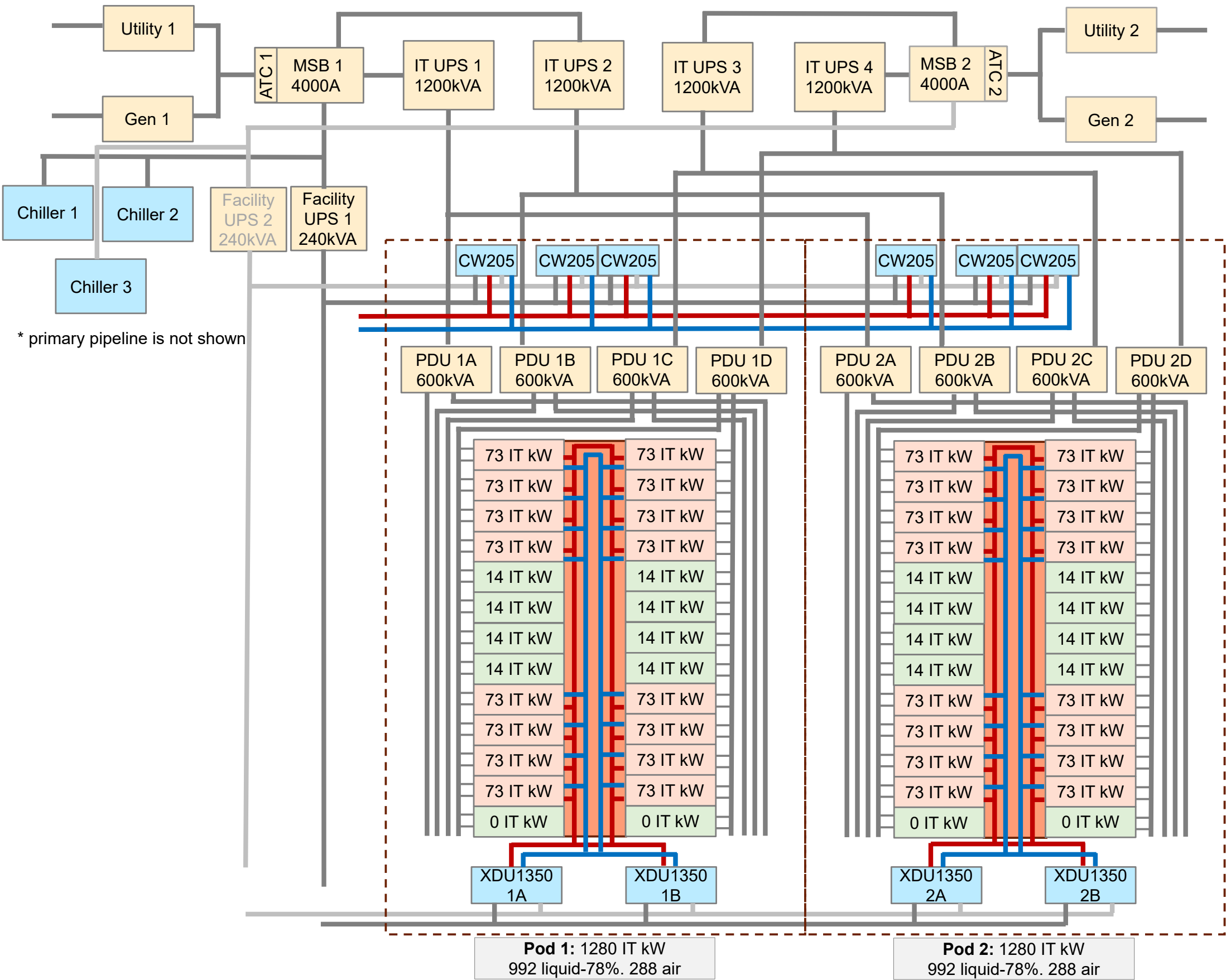


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Design Summary

Solution Capacity	2.6MW
Redundancy	4 to make 3 for power, N+1 for cooling
Total IT Load	2,560kW (1280kW per POD)
Rack Density (IT load)	32 racks at 73kW, 16 racks at 14kW, 4 cabling racks
Rack(s)	52
Cooling Topology	78% Liquid (direct-to-chip) 22% Air (perimeter units)
Coolant Distribution	XDU1350
Perimeter air cooling	CW205
Chiller	FH3135
Busway	400A busway, 8 per POD 60A tap-off box, 2 per rack per busway
Power Shelf	33kVA OCP DC power shelf , 6 per rack
Room/Row PDU	600kVA PDU, 4 per POD
UPS for IT	1200kVA UPS, 4 per 2 PODs
UPS for Cooling System	240kVA UPS, 2N, supplying both cooling loops

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)



Vertiv Components of the Design

Component	Details
Medium Switchboard	2x 4,000A for IT and facility
UPS for IT	4x 1,200kVA UPS for both PODs, power from MSB1
UPS for Facility	2x 240kVA UPS for cooling systems
PDU	8x 600kVA PDU
Busway and Tap-off Boxes (TOB)	8x 400A busway per POD, 2x 60A TOB per rack per busway
Rack power shelf for compute racks	6x 33kVA OCP HPR DC power shelves per computing rack
Rack PDUs for support racks	2x 30A rack PDUs per support rack
Chiller	3x FH3135 heat rejection for liquid cooling loop (XDU1350 and CW205), N+1
Rack Manifolds	32x OCP blind-mate OCP rack manifold sets
CDU	4x 1,368kW CDU (N+1 pumps), two per POD, N+1
CRAH	6x 205kW perimeter cooling
Racks for support racks	20x 48x 800x1200mm, 10x per pod
Racks for computing racks	32x OCP ORV3 racks, 16x per pod