



High Density Reference Design for AI

3x 1.13MW NVIDIA Blackwell DGX SuperPOD

A full data center environment designed for a 3.4MW solution with four to make three redundancy, using three NVIDIA Blackwell DGX SuperPODs.

AI Reference Design #015

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.

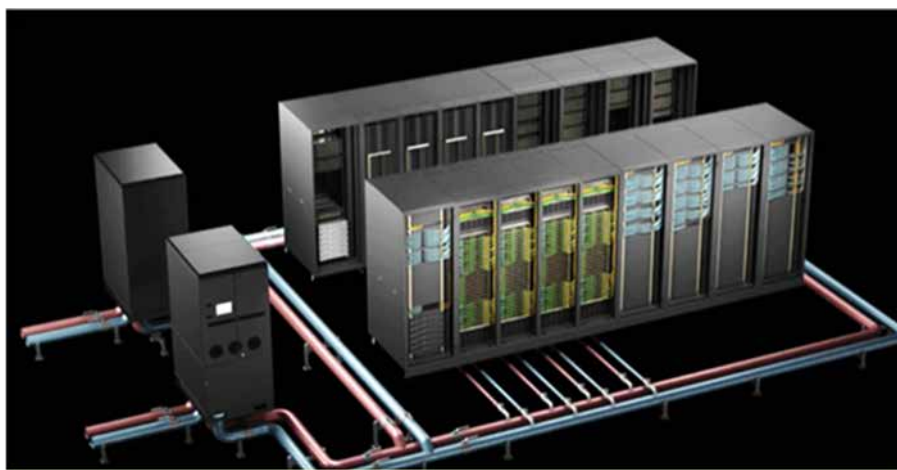
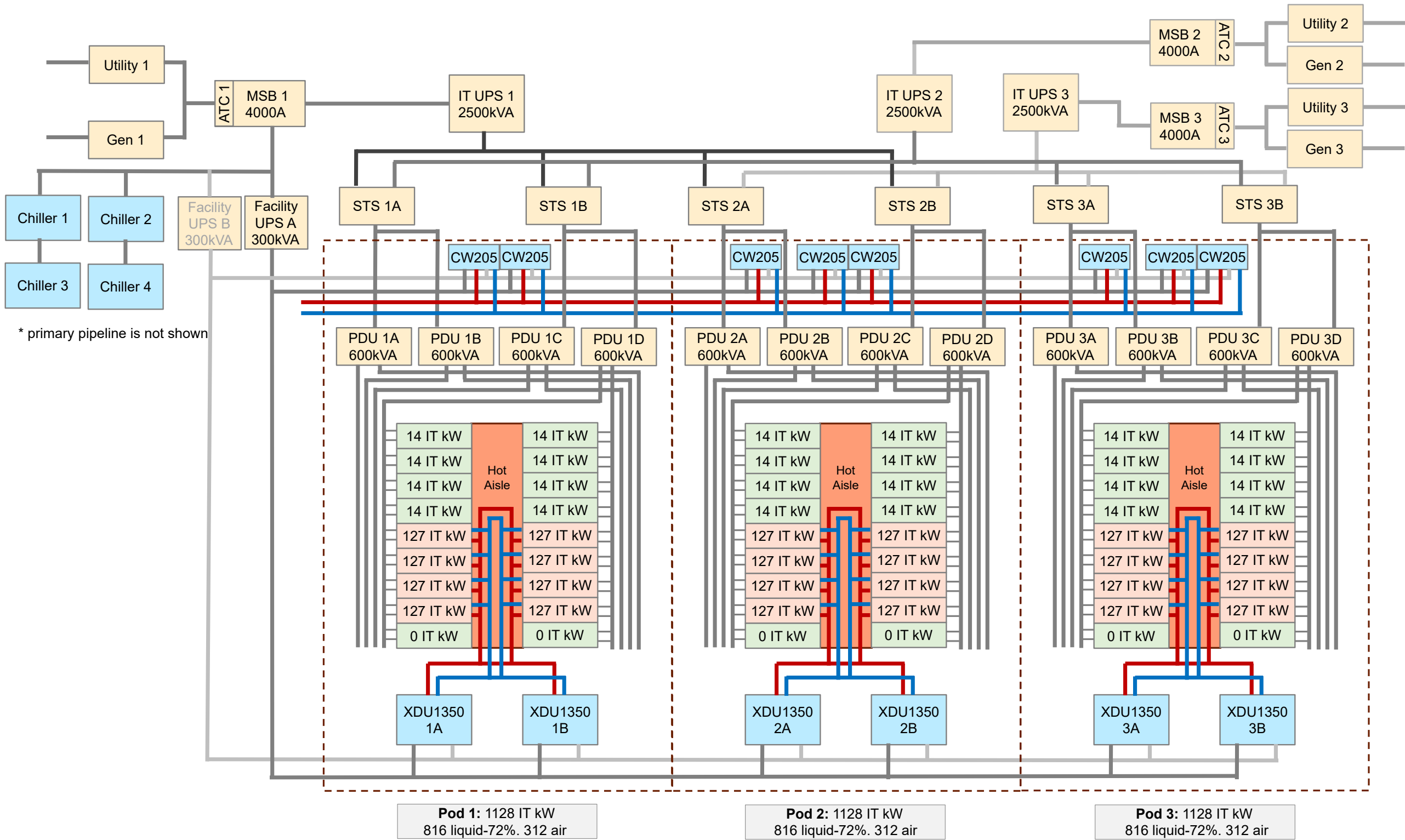


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Design Summary

Solution Capacity	3.4MW
Redundancy	4 to make 3 for power, N+1 for cooling
Total IT Load	3,384kW (1,128kW per POD)
Rack Density (IT load)	24 racks at 127kW, 24 racks at 14kW, 6 cabling racks
Rack(s)	54
Cooling Topology	72% Liquid (direct-to-chip) 28% Air (perimeter units)
Coolant Distribution	XDU1350
Perimeter air cooling	CW205
Chiller	FH3135
Busway	400A busway, 8 per POD 60A TOB, 2 per rack per busway
Power Shelf	33kVA OCP DC power shelf , 8 per rack
Room/Row PDU	600kVA PDU, 4 per POD
UPS for IT	2500kVA UPS, 3 per three PODs
UPS for Cooling System	300kVA 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



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
MSB	3x 4,000A main switch board input for IT and facility
UPS for IT	3x 2,500kVA UPS for three PODs
UPS for Facility	2x 300kVA Primary UPS for cooling systems
STS	6x STS for PODs
PDU	12x 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	8x 33kVA OCP HPR DC power shelves per compute rack
Rack PDUs for network & storage racks	2x 30A rack PDUs per support rack
Chiller	4x FH3135 heat rejection for liquid cooling loop, N+1
Rack Manifolds	24x OCP blind-mate OCP rack manifold sets
CDU	6x 1,368kW CDU (N+1 pumps), two per POD, N+1
CRAH	8x 205kW perimeter cooling
Racks for support racks	30x 48U 800×1200mm, 10x per POD
Racks for compute racks	24x OCP ORV3 racks, 8x per POD