

High Density Reference Design for AI

AI Reference Design #0018

Prefabricated 90 kW Power per Rack Datacenter

A fully prefabricated data center designed for a 1.1 MW IT load with 90 kW Racks.

Design Principles

- Completely **prefabricated AI direct-to-chip cooled data center**, including complex pipework, power train and heat rejection systems.
- Powered by **Vertiv™ PowerNexus**.
- **Skidded solutions** possible for quick repurposing of existing space.
- Greatly **reduced** on-site deployment and commissioning **complexity**.
- **Liquid cooling** works in **sync with air-cooled technology**, splitting the load to reject all the heat from the rack.
- Solution prepared for **easy preconfigured racks insertion**.

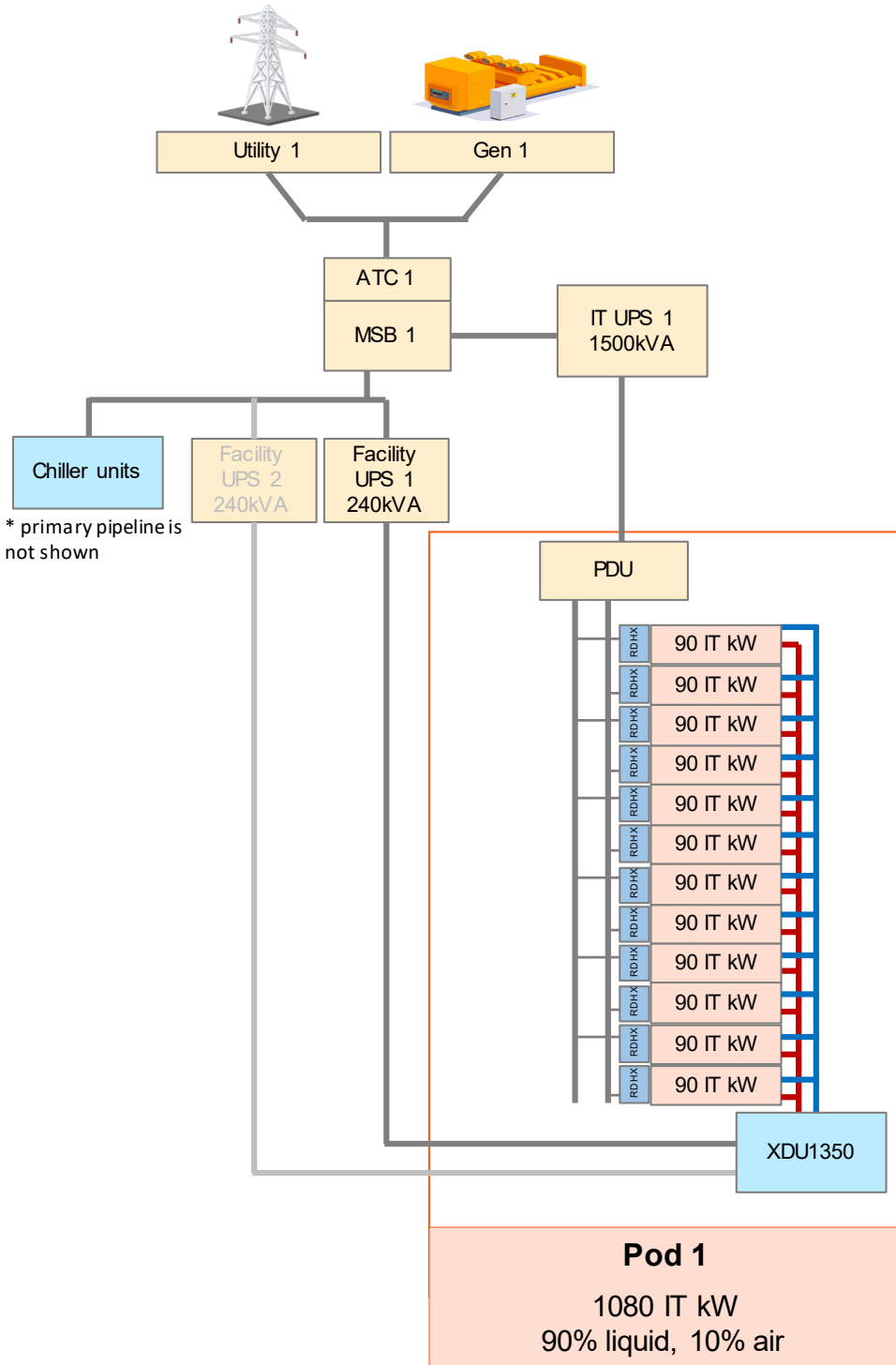


Design Summary

IT Load	1.1 MW
Infrastructure Redundancy	N
Rack IT Load	90 kW
Rack(s)	12
Cooling Topology	90% Liquid (direct-to-chip) 10% Air 76% Liquid (direct-to-chip)
Coolant Distribution	Vertiv XDU1350
Air cooling	Rear Door Heat Exchanger
UPS for IT	1500 kVA UPS

Vertiv™ 360AI

Reference Design Schematic



Legend

Critical Power

Thermal Management

Networking & Storage racks

Compute rack

— Liquid loop, cold/supply

— Liquid loop, hot/return



Utility Supply



Generator

Key Terms

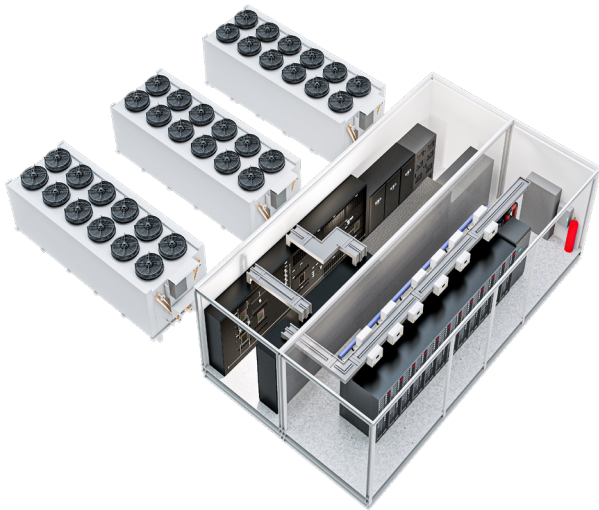
UPS: Uninterruptible Power Supply

PDU: Power Distribution Unit

XDU: Coolant Distribution Unit

Vertiv Components of the Design

Component	Details
Power Supply	Power Nexus (Vertiv Switchgear + 1x 1500 kVA Vertiv Trinergy UPS)
Busbar and Tap-off Boxes (TOB)	2x 800 A Vertiv busbar per row, 1x 160 A TOB per rack
Compute/Network Racks	12x 600 mm Wide, 1200 mm Deep, 42U racks
Rack PDUs for compute racks	Integrated
Rear Door Heat Exchangers	Integrated
Coolant Distribution Unit (CDU)	1x 1350 kVA Liquid-to-Liquid Vertiv XDU1350
Floor Mounted Air Conditioning Units	3x Vertiv PDX029
Chiller Plant	1x Vertiv AFC Chiller or 3x Vertiv HPC Chiller
Prefabricated Modular Units	2x 12 m (40') Vertiv Prefabricated Modular Units



Design Modification Options

480 V Utility Power (NAM)

Option 1a

- 2x PPC, Floor Mounted PDU (2x per row, Vertiv PPC Cabinet 500 kVA (Required for 415 V Servers)
- 2x 50' (15 m) Modules

Option 1b

- 2x 1000 A Busbar
- 1x 60 Ax2 TOB /Rack

Non-redundant in each Pod

Option 2

- 2x 1500 A HPB / Row
- 2x 160 A TOB / Rack
- 4x 750 kVA Floor Mounted PDU
- 3x 50' Modules

Redundant in each Pod

Option 3

- 10x Racks
- 1x EXM 250 kW UPS
- 2x XDU1350

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