VERTIV

Building Tomorrow's Data Centre:

Exploring Prefabricated Infrastructure Solutions for AI and HPC

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Liquid Cooled Data Centers Profile

Profile

- Critical computing – latency, security, & performance
- Increasing power and performance – Hotter chips, faster processing and computing
- Minimizing footprint – installing more IT in smaller spaces increases densities

Applications

- Artificial Intelligence and Generative AI
- Smart Factories
- Healthcare
- Finance
- IoT (Internet of Things)
- Media & Entertainment

Environments

- Limited space to deploy infrastructure to manage high loads
- Maintain cable lengths and equipment distances to minimize latency
- Building architectures are not always designed with IT in mind
- Transition to liquid cooled solutions to manage heat load properly

Market Drivers

"We are starting to see acceleration in the demand for AI-ready data center construction via the PMDC market. Driven by AI server configurations, we continue to see a significant increase in rack power density, particularly at cloud service providers as they ramp deployments of clusters of highly configured servers to train and fine-tune LLMs."

Siraj Aziz
Analyst, Cloud & Data Center Research Practice
Source: OMDIA– Prefabricated Modular Data Center Market Analysis – 2025

Affected Markets

High Performance Compute, AI, and R&D
- Facial recognition, security, UAV, cutting edge R&D, generative AI, machine learning, and more. High density HPC / AI pods deployed across various industries are driving higher processing capabilities, resulting in higher densities

Colocation and Cloud Providers
- Customers demand for higher compute and processing capabilities are driving colocation and cloud providers to minimize their footprint and increase densities

Hyperscale
- Large scale data centers housing business-critical processes, driving the need for high density deployments, on-demand scalability, and cutting-edge performance

Finance and Government
- High computing demands, data security requirements, and mission critical operations are driving processing power to increase

Media and Entertainment
- For high-definition video / media streaming and gaming, low latency requirements and high availability are major requirements

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The AI Acceleration

AI is accelerating demand!

Capacity demand of AI data centers is surging.
- AI demand is forcing a capacity step-change.
- Delivery must move to repeatable manufacturing

Power availability and grid timelines are the bottleneck
- Electricity demand from data centers is projected to more than double
- Planned data centers could face grid-connection delays

AI densities are making liquid cooling mainstream
- Cooling architecture is shifting to 100% liquid.

1 GW

Scaling vs Prefabrication

AI data centers / factories are scaling faster than ecosystems can respond.

The winning strategy is to industrialize deployment with repeatable, factory-integrated building blocks that accelerate time-to-capacity.

The Challenges

Speed & schedule certainty

- Traditional delivery models can't keep pace because global AI buildout requires unprecedented capacity additions.

Design certainty aligned to technology roadmaps

- AI infrastructure is changing (density, liquid cooling, power delivery)
- Owners/consultants need a referenceable, proven baseline that can evolve.

Scale without redesign (MW → GW)

- AI demand is now measured in multi site programs, and repeating standardized blocks beats tailor-made one offs.

The Solution

Compress and predictable schedule

- Off-site modular construction has demonstrated ~20–50% schedule reduction
- Prefabricated modular approaches are enabling time savings by building/testing off-site in parallel with site preparation.
- This approach emphasizes repeatable factory integration and reduced on-site work, aiming for deployment cycle compression

Reduce labor + integration risk

- Shifting critical work to controlled factory conditions, reducing on site labor, rework, and logistical complexity.

Improve design quality & commissioning outcomes

- Modular programs provide an end-to-end integrated solution with a single point of contact, reducing multi-vendor coordination risk and supporting turnkey deployment.

Aligning benefits during a period of uncertainty

At a time when the requirement volatility is in effect, and we see AI densities / cooling interfaces evolve quickly, designs can become obsolete mid-project

Design certainty:

Start from a referenceable, engineered platform instead of inventing a one-off custom design each time.

AI ready with liquid cooling capabilities, targeting high density rack environments.

Fewer interface headaches:

A single integrator reduces coordination and liability across power/thermal/IT infrastructure interfaces

Repeatable compliance path:

Standardization supports faster review cycles and more consistent commissioning readiness (critical when schedules compress).

Scalable program design:

AI Factories with scalable units from 10 – 250 MW per block, where the platform is designed to be scalable with no size limitations – it enables easy replication of blocks across sites and regions as capacity grows.
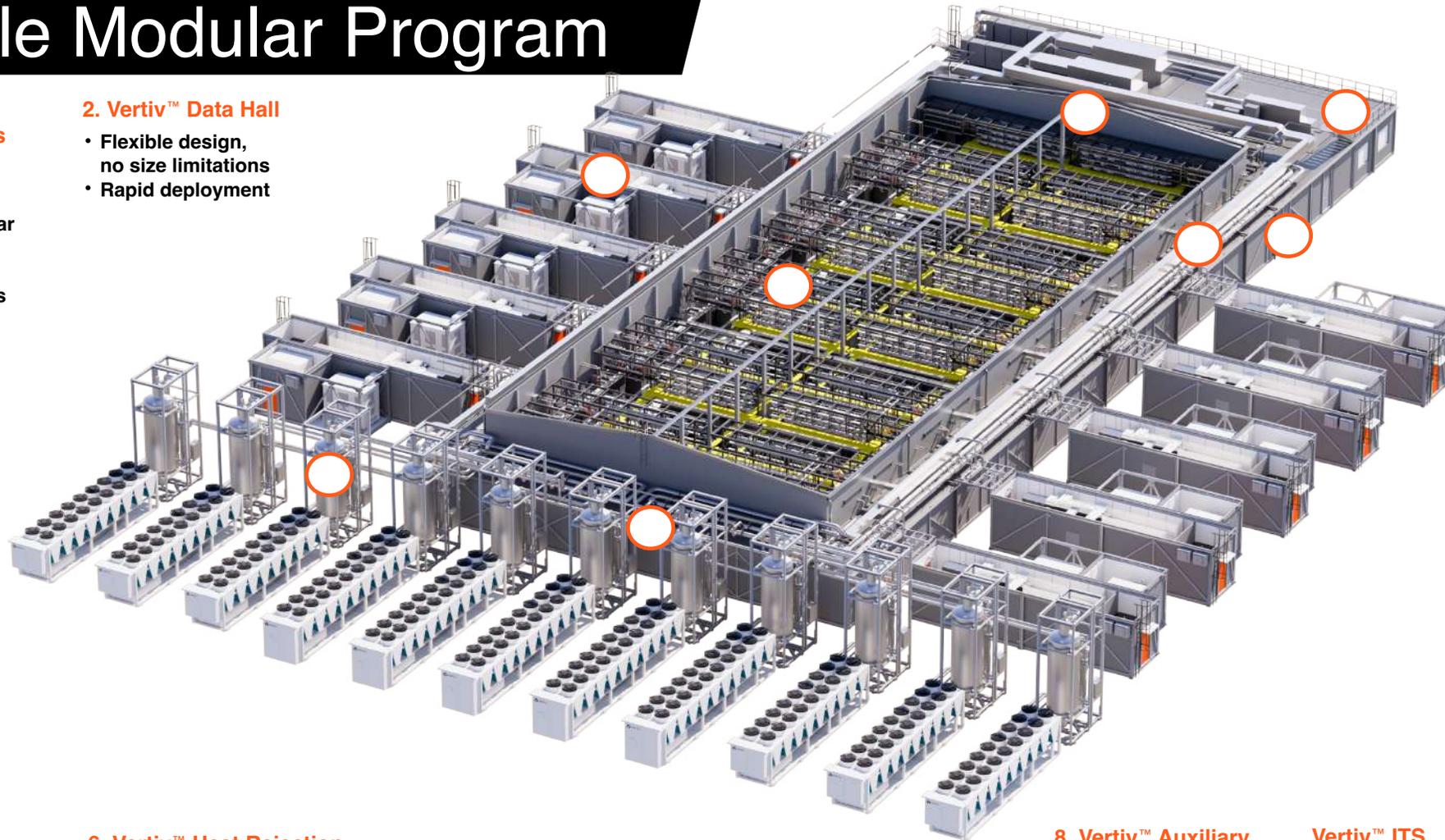

250 MW

125 MW

50 MW

25 MW

12 MW

1 GW

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Sample Modular Program

1. Vertiv™ Power Modules and Skids

- Vertiv™ RMU
- MV Transformer
- Vertiv™ LV Switchgear
- Vertiv™ UPS
- Vertiv™ Batteries
- Vertiv™ HPB Busbars

2. Vertiv™ Data Hall

- Flexible design, no size limitations
- Rapid deployment

3. Vertiv™ Service Modules

- Vertiv™ Remote Power Panels
- Step-down transformer
- Vertiv™ Cooling units
- Fire suppression detection and suppression system

4. Vertiv™ Cooling Modules and Skids

- Cooling skid
  - Vertiv™ cooling units
  - Vertiv™ CoolChip CDU
  - PFN piping
  - External AHU unit
- Piping skid
  - PFN piping

5. Vertiv™ SmartRun IT superstructure

- TCS/SFN Piping
- Vertiv™ Power bar iMPB busbars
- Vertiv™ CoolChip CDU
- Optical and Mesh trays
- Containment

6. Vertiv™ Heat Rejection

- Vertiv™ CoolLoop Trim Cooler
- Vertiv™ Liebert® FIZ chiller
- Vertiv™ Liebert® AFC chiller
- Buffer tanks

7. Vertiv™ Hydro Modules

- Water treatment for PFN
- Filtration
- Water Softening & Conditioning
- Chemical Dosing
- Monitoring & Control

8. Vertiv™ Auxiliary Modules

- Office rooms
- Security room
- Unloading area
- Storage area
- Staging area
- NOC room
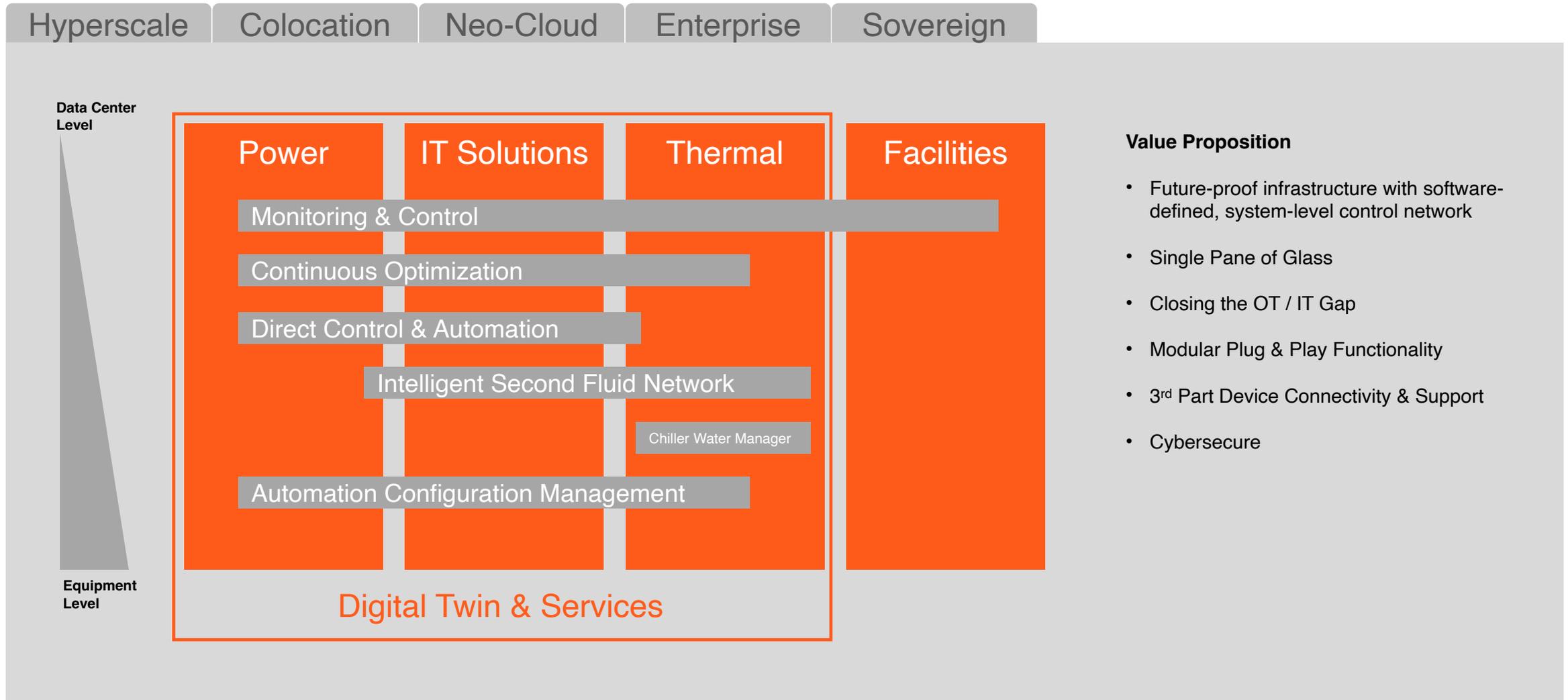- MeetMe room

Vertiv™ ITS

- Vertiv™ racks
- Vertiv™ rPDU
- Vertiv™ DC Power shelf
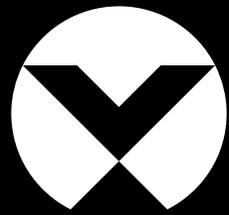- Vertiv™ manifold
- Vertiv™ RDHx
- Vertiv™ in-rack CDU

Vertiv™ Monitoring & Control

Vertiv™ Unify
- Unified Interface
- Real-Time
- Plug-and-Play
- Open Protocol
- Scalable Architecture

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Property of Vertiv.

Vertiv Unify – Control & Automation at Every Level

| Hyperscale | Colocation | Neo-Cloud | Enterprise | Sovereign |

Data Center Level

Equipment Level

| Power | IT Solutions | Thermal | Facilities |

- Monitoring & Control
- Continuous Optimization
- Direct Control & Automation
- Intelligent Second Fluid Network
- Chiller Water Manager
- Automation Configuration Management

Digital Twin & Services

Value Proposition

- Future-proof infrastructure with software-defined, system-level control network
- Single Pane of Glass
- Closing the OT / IT Gap
- Modular Plug & Play Functionality
- 3rd Part Device Connectivity & Support
- Cybersecure