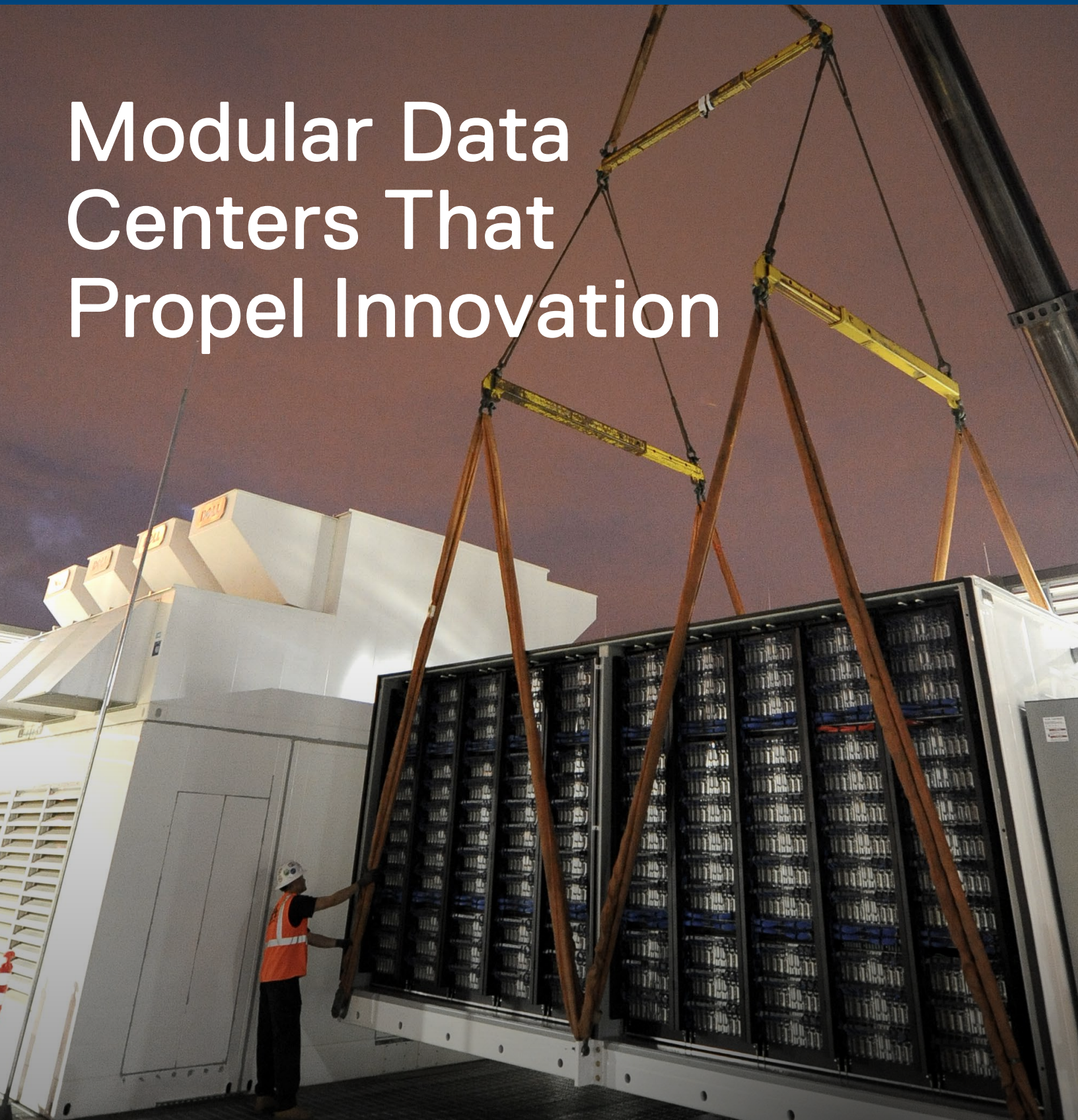


Modular Data Centers That Propel Innovation



The traditional data center tipping point

A yellow crane is lifting a large, rectangular server rack unit from a truck. The unit is suspended by a metal frame and cables. The crane's arm extends from the top right towards the center. The background is a clear blue sky. The truck is partially visible at the bottom right.

While advancements in artificial intelligence, edge and high-performance computing help drive innovation across industries, they also put the squeeze on traditional data centers. The new requirements are multifaceted; from more capacity, more power density to the need for the latest cooling technologies and to bring compute closer to data sources.

Addressing these challenges is clearly not as straightforward as it may have been some years ago.

In this climate of demand-driven innovation, time-to-market is key. To build or expand an existing data center takes planning and time, and the distinct phases of a build don't always line up with ideal launch plans. Retrofitting new capacity onto an existing data center can get very costly, very fast and can bring more risk to operations when non-IT personnel are in the IT space. What's more, the data center would need the flexibility to adapt to changing cooling or network requirements. These ever-rising power demands coupled with less-than-ideal density is pushing the efficiency footprint of traditional data centers to a tipping point.

Solving the capacity and sustainability challenge: modular data centers

Modular Data Centers (MDCs) can solve those challenges in an economical, fast and energy-efficient manner. When built and implemented correctly, they can greatly contribute to sustainability goals. MDCs optimize time-to-market with their pre-fabrication and assembly process, significantly reducing the time from order to deployment. Additionally, modular, roll-out ready designs reduce the resources needed onsite and because they are deployed in configurable components, strategic changes are easier to achieve and pose less of a financial risk. MDCs are inherently flexible. They can be refitted and redeployed with ease. Components can be added when needed and can easily be placed closer to data creation points including those in extreme environments. In short, MDCs support sustainable construction and operation of a data center that's ready for whatever's next.

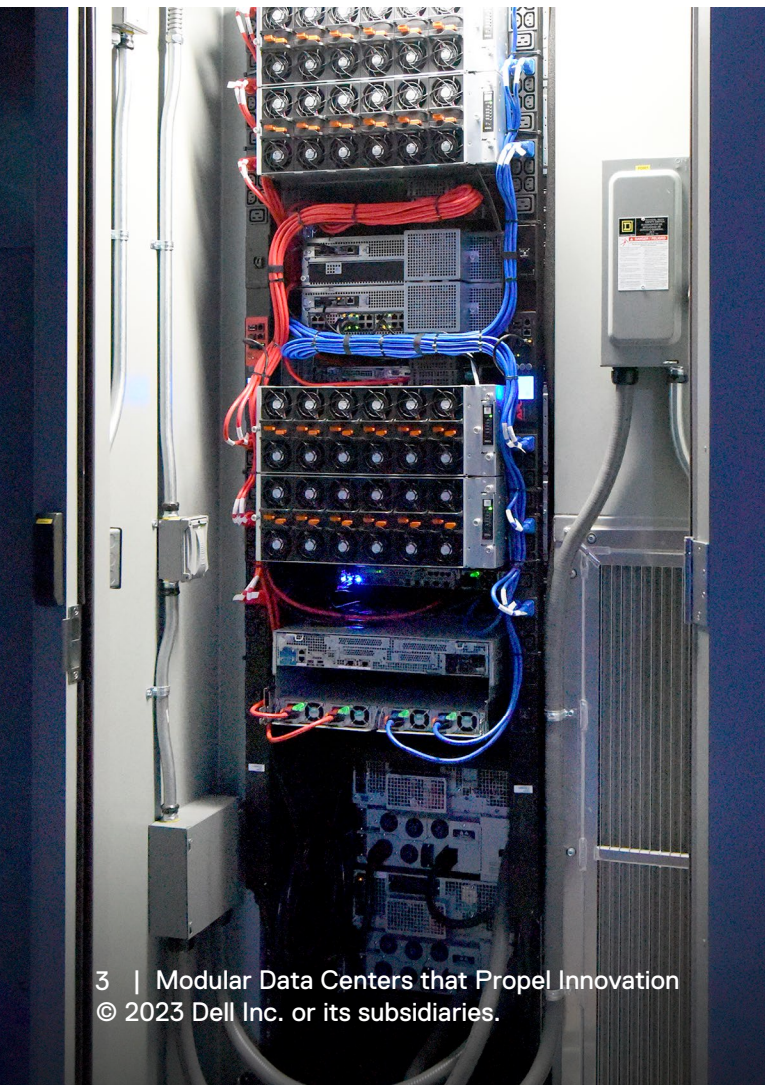
Dell Technologies modular data center solutions

What makes our MDCs different than the rest is that we take an IT-centric approach and leverage our deep understanding of technology requirements and operations to create what's best for the customer and their business needs. We focus on efficiency, not only for advancing sustainability but also to lower OPEX and give the power back to IT. Our goal is to ensure the most optimal life and performance of your IT and deliver it in a way that makes consumption easy and streamlined.

Our purpose-engineered modules and components deliver scalable, long-term, and sustainable data center capacity anywhere compute is needed. As we've been building these solutions for decades, we've set the standard for rugged, reliable, long-lasting MDCs. We specialize in tailoring to specific use case needs ranging from AI/ML/HPC to SCIF/FISMA/FIPS compliance for FED. We also offer further customization including monitoring and management options with integrated security and fire/smoke detection and suppression. Once shipped to the site, our MDCs can be fully operational in a matter of weeks with minimal disruption to the customer.

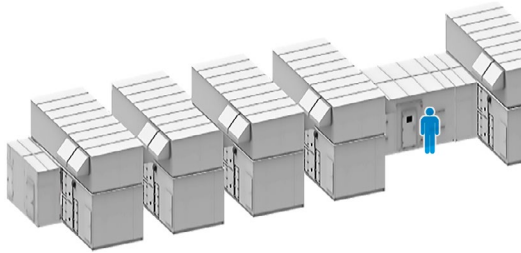
From design to deployment and beyond, we make sure all the solutions work well together. To expedite deployment time, we manage the end-to-end procurement of your IT needs (servers, storage, network) with a focus on reducing capital costs and maintaining long-term sustainability. Our MDCs feature 4th Gen Intel® Xeon® Scalable processors—featuring built-in accelerators to improve performance across the fastest-growing workloads in AI, data analytics, networking, storage, and HPC. By making the best use of CPU core resources, built-in accelerators can result in more efficient utilization and power efficiency advantages, helping businesses achieve their sustainability goals.

Our standard portfolio includes a variety of solutions, ranging from a half rack edge/micro data center to 5-100 rack modular data centers of which multiple can be tied together, to cover the unique needs of the customer.



Portfolio overview:

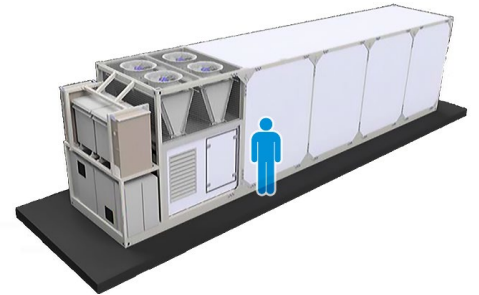
Flex



Simplified shared infrastructure with large, connected IT space and the most configurable options.

- Flexible scale-out: Configure IT space with choice of 5 to 100, 48RU racks supporting 5 to 115 kW per rack
- Option to be delivered with pre-integrated IT with easy refresh of full racks
- Supports Direct Liquid Cooling (DLC) to IT
- Field-expandable and great for footprint restricted sites

Click



Easily expand your data center footprint with fully integrated, highly reliable, configurable MDCs.

- Factory-configurable: Minimize site work with all-in-one design; inclusive of power, cooling and security
- Configure IT space with choice of 5 to 20, 48RU racks supporting 5 to 115 kW per rack
- Supports DLC to IT
- Discrete sizes and capacities for scalable buildouts



Micro 815

Single 48RU IT Rack solution with 10, 20, or 30kW integrated best-in-class power and cooling

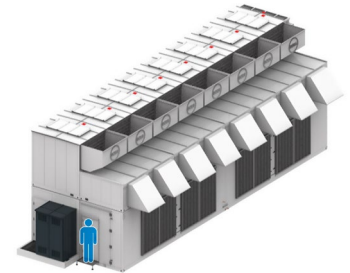
- 48RU 600mm Rack with 40RU (typical) allocated for IT
- 10/20/30kW Power and Cooling options
- Ready for the far edge: -40°C to 50°C external operating range
- UL Listed and CE Marked
- Standard IT in Telco environments



Micro 415

Rugged IP65-rated enclosure with 8kW integrated best-in-class cooling

- Industry-leading nominal cooling capacity designed with next generation IT in mind
- 8kW nominal cooling capacity
- 17RU allocated for IT
- IP65 / NEMA 4 Rated – Dust tight and weather hardened
- Ready for the far edge: ETSI300 / GR487 compliant
- Maintains 10°C to 35°C internal operating range (ASHRAE A2)



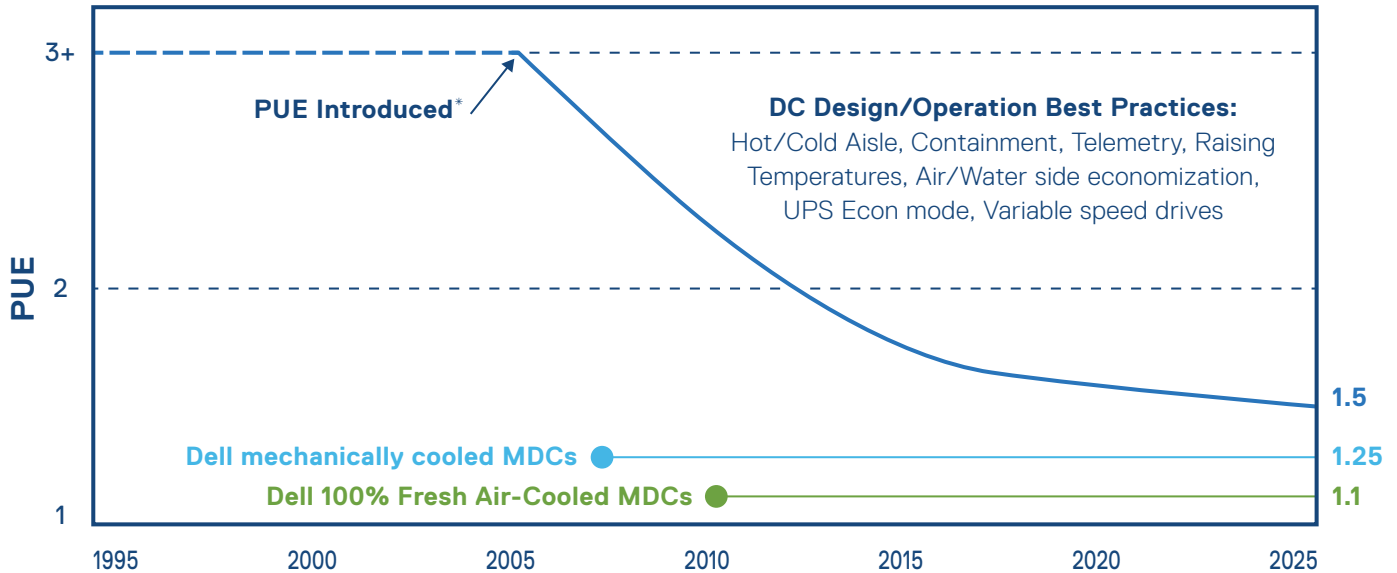
Custom

Need an MDC that's even more customized to your needs? Talk to us about a custom-built solution.

- Optimized for your exact needs
- UL2755 Certification
- Requires large order quantities or acceptance of other customer solutions

Average PUE

$$\text{Power Usage Effectiveness (PUE)} = \frac{\text{Total Facility Energy}}{\text{IT Equipment Energy}}$$



*Typical Data Center per UPTIME INSTITUTE GLOBAL SURVEY OF IT AND DATA CENTER MANAGERS 2007-2021 (n=566)

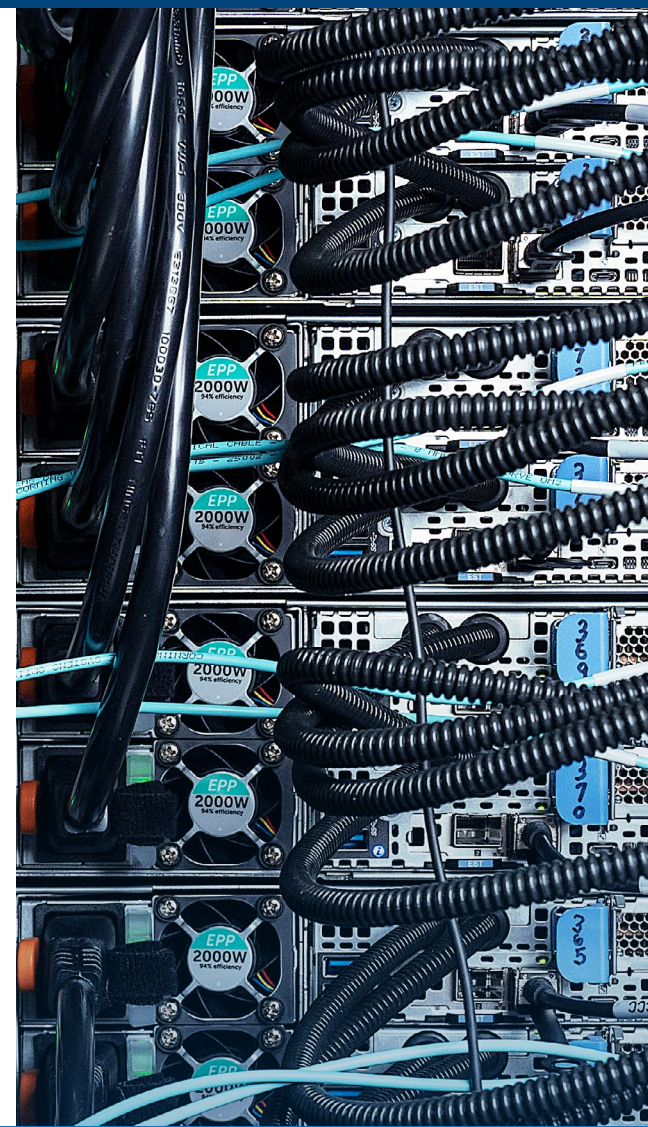
Intentionally sustainable

Sustainability is at the heart of every design and engineering decision we make. From the latest cooling technologies to reducing overall data center costs, our focus is consistently on what's next for the customer. Dell Technologies MDCs aren't just built to meet rigorous green requirements but to also protect the future of your business. More efficient practices and sustainable strategies will be the differentiator for modern organizations and there's quite a lot of progress to be made. The good news is that while traditional data center PUE averages are slightly above 1.5, our MDC innovations are set to bring a number only reserved for the most efficient data center on earth.

Liquid cooling options

For companies capitalizing on emerging technologies such as AI, blockchain, HPC and telcos, Dell Technologies Liquid cooling solutions can deliver transformative benefits. We work with various customers to enable Direct Liquid Cooling (DLC), Immersion Cooling and Air Cooling depending on their needs.

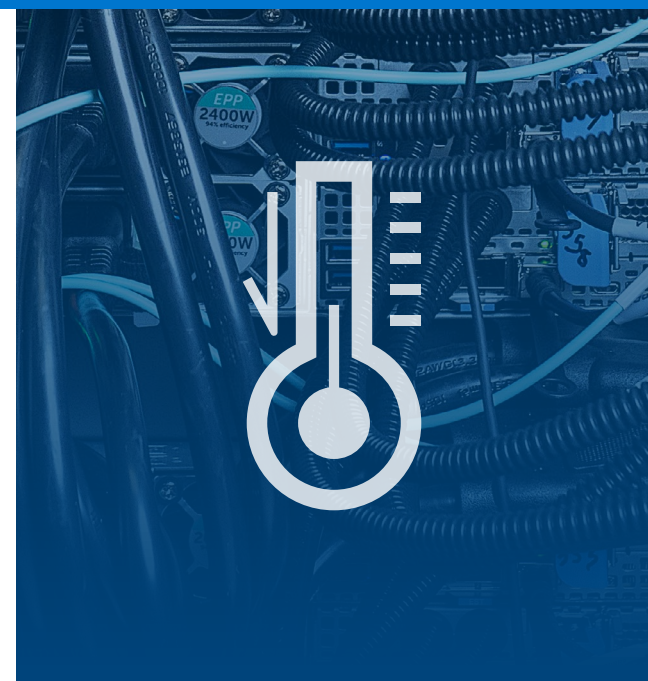
DLC uses the exceptional thermal capacity of liquid to absorb and remove the heat created by new high-power processors. Cold plates are attached directly to the processors and other heat generating components. This enables the coolant to capture and remove the heat from the system, sending it to a heat exchanger located in the rack or row. This heat load is removed from the data center via a warm water loop or any cool water supply, potentially bypassing the expensive chiller system.



Data center liquid cooling solutions reduce cooling energy consumption by **40–50%** and improve power usage effectiveness (PUE).¹

Liquid cooling is an effective way to cool extremely dense server solutions. High density CPU and GPU require liquid cooling but adding it to an existing data center would require a costly and time-consuming retrofit. Dell Technologies and our partners work with customers to design second generation liquid cooling solutions, making them available factory direct in our MDC offerings. MDCs with integrated liquid cooling can be deployed faster at a reduced cost, including edge or research facilities closer to data creation points.

¹ MarketsandMarkets™ Data Center Liquid Cooling Global Forecast to 2027, May 2023.



A legacy of MDC innovations

When space, time and costs are at a premium, MDCs can be a game-changing solution, but not all MDCs are created equal. Dell Technologies OEM solutions, in collaboration with Intel®, has over 14 years of experience designing, building, deploying, and maintaining MDCs. We've installed over 750,000 servers in over 500 global deployments (including those in extreme conditions) with about 1/2 Gigawatt of compute in operation today. We're in nearly every vertical from cloud, online retail, telco, financial, automotive, federal and more.

We design MDCs in close coordination with IT departments and offer custom deployment services. We also support IT pre-integrations and our "Rack and Roll" solutions allow field integration of racks into existing MDCs.

Our clients can take advantage of Dell Technologies innovative proprietary technology and proven effectiveness. With over 100 patents designed to support industry-leading rack power density, waste heat energy reclamation and optimization of IT environments, our solutions deliver consistent operational efficiency for sustainable and long-lasting compute power wherever and whenever it's needed.

4th Gen Intel® Xeon® Scalable Processors



- Perf/watt improvements from the most built-in accelerators ever offered in an Intel® processor
- Built in advanced telemetry enables monitoring and control of electricity consumption and carbon emissions
- Available immersion cooling warranty rider for Intel® Xeon® skus
- Scope 3 GHG emissions benefits due to manufacturing with 90-100% renewable electricity

Contact your Dell Technologies salesperson for more information.



Contact a Dell Technologies Expert



Learn more about Dell Modular Data Centers solutions



Join the conversation with #ModularDataCenters