Liquid Cooling of Core Switches in Data Centers

AI Overview

Liquid cooling is becoming essential for core switches in high-density data centers, offering superior thermal management, energy efficiency, and support for next-generation AI workloads.Why Liquid Cooling is NeededModern data centers face unprecedented thermal challenges due to high-power switches and AI-optimized servers. Core switches operating at 400G, 800G, and beyond generate significant heat, and traditional air cooling struggles to maintain safe operating temperatures, especially in racks exceeding 30–100 kW workloads . AI GPUs and high-speed optical modules further increase thermal density, with some chips consuming over 1,200 W and projections exceeding 5 kW per chip . Without effective cooling, switches risk throttling, reduced performance, and higher operational costs .Liquid Cooling TechniquesDirect-to-Chip (D2C) Cooling: Cold plates are mounted directly onto ASICs, CPUs, GPUs, memory modules, and voltage regulators. Coolant circulates through these plates, removing 70–80% of heat at the source, reducing the load on facility-level cooling infrastructure . Coolants include water-glycol mixtures or dielectric fluids to prevent corrosion and leakage.Immersion Cooling: Entire servers or switches are submerged in dielectric fluids.Single-phase immersion: Coolant absorbs heat and circulates through heat exchangers.Two-phase immersion: Coolant vaporizes upon heat absorption and re-condenses, offering extremely high thermal efficiency .Adaptive Contact Liquid Cooling: Used in H3C S9827 series switches, this approach employs micro-movement between cold plates and coolant tubes to maintain uniform temperatures across high-density optical modules, keeping variations within 5°C even under full-load operation .Benefits of Liquid CoolingHigher Thermal Efficiency: Liquids transfer heat far more effectively than air, enabling denser switch fabrics an...

Article Content

Deploying liquid cooling in the data center

Adopting Liquid Cooling at Existing Data Centers The future of IT thermal management has arrived, and it''s a hybrid of air and liquid cooling technologies. Enterprises are adopting high-performance

Why data centers are making the switch to liquid cooling

In the article, Swaminathan explains how liquid cooling systems efficiently manage heat from high-density computing environments, enabling improved

101 Guide to Data Center Liquid Cooling: A $14.8 Billion

Why liquid cooling has become a critical requirements in data centers today. What the difference is between immersion and direct-to-chip liquid cooling.

Data Center Liquid Cooling: The AI Heat Solution

Advanced AI chips are generating more heat in data centers, necessitating improved cooling solutions. Liquid cooling is becoming a viable alternative to traditional fan-based systems.

Keeping cool in the data age

Liquid-cooling components can be smaller than their air-cooled counterparts for the same performance rating. This enables the development of data centers with ever greater power

Arista developing liquid-cooled network switches

Networking firm Arista is developing liquid-cooled switches and racks. As reported by NetworkWorld and Converge Digest, the company outlined its plans at the recent Hot Interconnects

Why Liquid Cooling Is the New Standard for Data

Discover why liquid cooling is replacing air systems in modern data centers. Explore its role in AI workloads, energy savings, and sustainability in

The Future of Data Centers: Transitioning to Liquid

Liquid cooled solutions, for instance, typically bring about considerable cost savings. This is due to their superior energy efficiency in a time of higher energy costs. By

Exploring the Future of AI Networking: Liquid-Cooled Switches ...

Imagine a data center where even the most powerful switches run cool and stable—without noise, thermal throttling, or energy waste. Cisco is actively innovating in direct-to-chip liquid cooling for high

4 Types of Liquid Cooling Solutions: Which One is Right

This innovative approach is essential for creating eco-friendly, cost-efficient data centers that are equipped to meet the demands of the future.

Liquid cooling: the future of data center architecture and

Liquid cooling is emerging as a key enabler of sustainable data center operations. By transferring heat directly from servers into a liquid medium –

Redefining liquid cooling from the server to the switch

Liquid cooling, and precision liquid cooling in particular, is at the forefront of this journey. Whether it''s reducing the environmental footprint of data centres,

AWS rolls out liquid cooling in data centers

Last year AWS announced it would be rolling out new data center components designed to support the next generation of artificial intelligence innovation and customers'' evolving needs. The

Liquid cooling: the future of data center architecture and

Cooling the future: How AI is reshaping data center strategy The adoption of liquid cooling marks a decisive shift in how data centers are built and

Exploring the Future of AI Networking: Liquid-Cooled Switches on the ...

Take steps now to modernize your facility and thermal management strategies for tomorrow''s liquid-cooled switches. Meet with your Cisco team or partner to discuss how to design,

Liquid cooling: the future of data center architecture and

Their ability to leverage free cooling further enhances energy savings. Overall, liquid cooling combines energy efficiency, heat recovery, and water

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H3C''s Core Liquid Cooling Breakthrough: Redefining 800G Switch ...

Today, cutting-edge AI computing platforms such as NVIDIA''s Rubin are establishing “high-temperature” liquid cooling as the cooling standard for next-generation green data centers.

Liquid cooling solutions for AI and high-density data

Next-gen cooling for high-density workloads Schneider Electric''s data center liquid cooling solutions are purpose-built for AI workloads, GPU servers, and

Liquid Cooling in Data Centers: Types, Benefits, and

Explore liquid cooling types for data centers—immersion, direct-to-chip, and rear-door heat exchangers—with key benefits and how to support

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Liquid Cooling for Data Centers: What You Need To Know

Explore how liquid cooling for data centers is becoming a strategic necessity to meet the demands of AI and high-density computing. Learn about

Liquid and Immersion Cooling Options for Data Centers

Learn about the future of data center cooling and how liquid cooling solutions support high-density computing and enhance performance and energy efficiency. Explore our solutions now!

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What Does it Take to Make the Switch to Liquid

Hybrid direct and indirect water-cooled - selective cooling of the highest energy-consuming components with direct contact liquid cooling with the balance of the

Liquid cooling of data centers: A necessity facing challenges

Immersion cooling has the potential of reducing infrastructure size by one-third of air cooled data centers. Single-phase immersion cooling, while the most simple to implement, is limited

Data Center Liquid Cooling: Deep Dive | Flexential

The importance of cooling in data centers The heart of a data center''s efficiency is its ability to manage heat. Considered a critical factor in data center tier

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