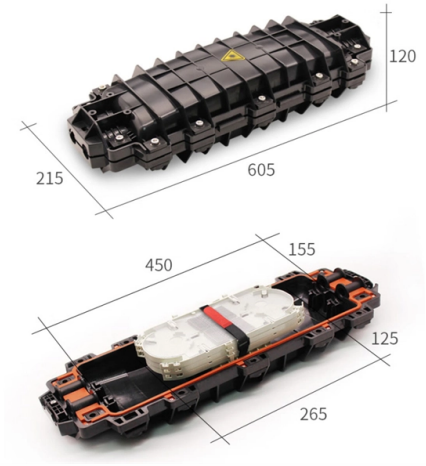
Data Center Industrial Interconnection



Overview

Data center interconnections, enabled by robust interconnection solutions, are a direct driver of business agility.

Key Takeaways

Data Center Industrial Interconnection (DCI) enables high-bandwidth, low-latency connectivity between data centers and within their components, supporting AI, cloud, and hyperscale workloads.Overview

A data center interconnect (DCI) is a network infrastructure that links multiple data centers or components within a data center to provide high-capacity, long-distance communication. DCIs are critical for large cloud providers, hyperscalers, and AI-driven workloads, where massive data volumes must be synchronized across sites in real time ( ). Modern DCIs rely heavily on optical fiber technologies, particularly single-mode fiber, to achieve low attenuation and long-distance transmission ( ).

Key Technologies
• Dense Wavelength Division Multiplexing (DWDM): Allows multiple data channels to be transmitted simultaneously over a single fiber using different wavelengths of light, supporting data rates of 400 Gbps, 800 Gbps, and beyond ( ). DWDM is essential for hyperscale AI workloads and long-haul interconnects.

• Coherent Optical Transmission: Enhances signal integrity over long distances, enabling high-throughput links without frequent signal regeneration ( ).

• Photonic Switching and Software-Defined Control: Modern DCIs increasingly integrate programmable optical networks and automation tools to dynamically allocate bandwidth and optimize latency for AI and cloud workloads ( ).

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• On-Chip High-Bandwidth Networking: AI accelerators like NVIDIA GPUs and Intel Xe Link integrate networking directly on-chip to reduce communication bottlenecks ( ).
AI and Workload Implications

AI workloads, particularly large language models and multimodal AI systems, require extreme bandwidth and low-latency interconnects. Distributed training can involve 10,000+ accelerators communicating terabytes per second, making network performance a critical factor in infrastructure ROI ( ). Poor interconnection design can render expensive AI hardware underutilized, while optimized DCI architectures accelerate training, reduce costs, and enable new AI capabilities.

Market Trends

The DCI market is rapidly expanding, driven by AI, cloud computing, and edge deployments. Key trends include ( ):

• Market size projected to grow from USD 18.62 billion in 2026 to USD 42.45 billion by 2032, at a CAGR of 14.73%.

• Shift from monolithic enterprise links to AI-optimized, low-latency fabrics.

• Adoption of 400 Gbps and 800 Gbps links in metropolitan corridors, replacing legacy 100 Gbps waves.

• Investment in co-packaged optics and 1.6 Tbps coherent engines for long-term scalability.

• Regional focus: Asia-Pacific leads in capacity additions, North America dominates R&D, and Europe emphasizes green interconnect designs.
Strategic Considerations
• Onsite Power Integration: As AI workloads grow, data centers increasingly rely on onsite power solutions to mitigate grid delays and ensure predictable time-to-power ( ).

• Latency and Bandwidth Optimization: DCIs must handle bursty, phase-dependent AI traffic, requiring dynamic resource allocation and high reliability.

• Cross-Site Coordination: Federated learning, edge AI, and multi-modal AI systems demand sub-millisecond response times across distributed infrastructure ( ).
Conclusion

Data Center Industrial Interconnection is a foundational component of modern data center architecture, enabling hyperscale AI, cloud, and edge computing. By leveraging DWDM, coherent optics, software-defined control, and on-chip networking, DCIs provide the high-bandwidth, low-latency connectivity required for next-generation workloads. Market growth is robust, with investments focused on AI-optimized fabrics, energy efficiency, and global interconnect expansion.

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DOE directs FERC to accelerate interconnection of data

DOE attached an Advanced Notice of Proposed Rulemaking (ANOPR), entitled “Ensuring

AI Data Center Power: Grid Limits Reshape Energy in 2026

AI data center power demand is breaking the grid in 2026. See how grid constraints fuel trillions in on-site energy investments.

Presentation

Types of Large Loads Data center loads constitute 80+% of load growth across the Western Interconnection

Senate Bill 6 Reforms Interconnection and Co-Location Rules for

Senate Bill 6 (“SB6”), recently signed into law in Texas and effective immediately, will significantly impact data center

Load Interconnection Queues: The Key to Data Center Growth

Traditionally, energy developers and utilities have focused on generation interconnection queues, which track new

What is Data Centre Interconnection? – Telehouse

What is data centre interconnection? Data centre interconnection is where two or more data centres are linked together to share

Texas Senate Bill 6 Update: What Data Centers and Large Load

This GT Alert summarizes the key provisions of the draft rule and highlights important considerations for data centers

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Data Center Interconnect (DCI) is the technology that connects two or more data centers together over short, medium, or long

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These connections allow organizations to exchange data and access services with low latency, high speed, robust

The Data Center Water Problem Is Soluble

Technology exists, and policy instruments are available, to develop a new, state-led model of water governance for data

Interconnection: The Next-generation Data Center Business Model

CEO of DE-CIX International explains how data center operators can create competitive advantages through

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