Cloud Computing Data Center Interconnection

Overview

This white paper explains the need for multi-layer data center interconnection networks and how they need to support dynamic access to cloud applications and services.

Key Takeaways

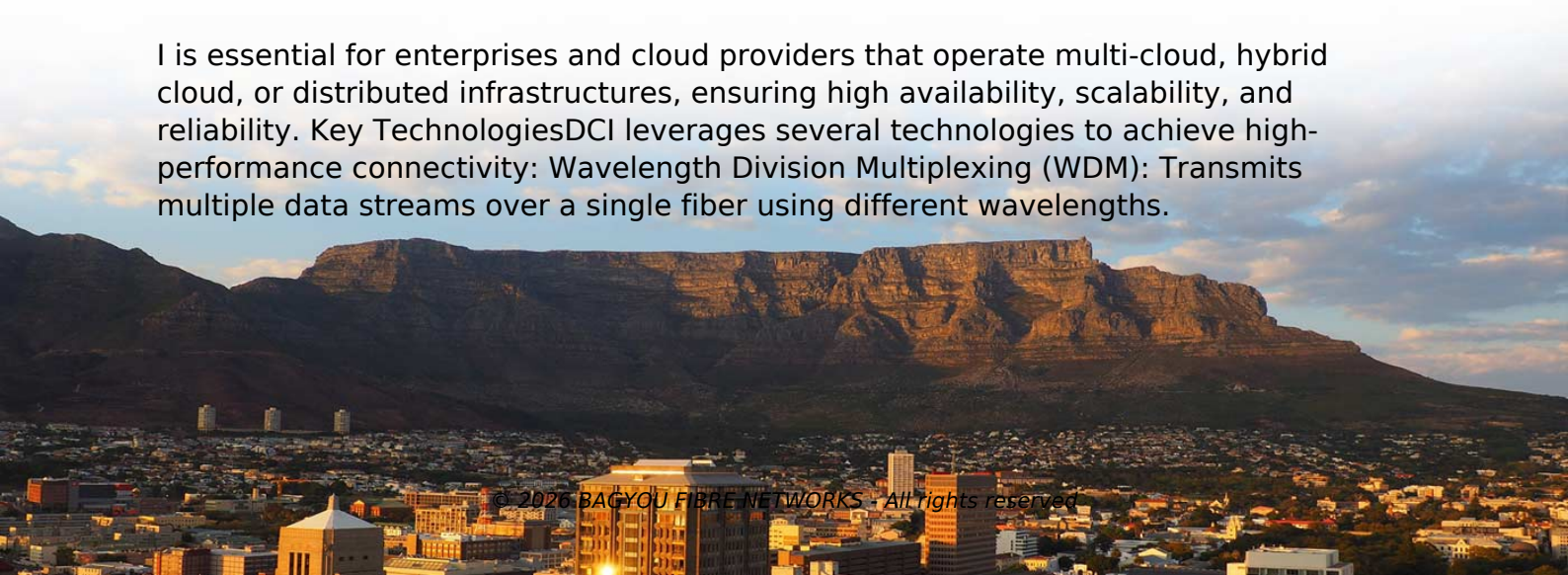
Data Center Interconnection (DCI) enables seamless, high-speed connectivity between multiple data centers, supporting cloud applications, disaster recovery, and distributed workloads.

Overview of DCI

Data Center Interconnection (DCI) refers to the networking solutions that connect two or more data centers over short, medium, or long distances using high-speed packet-optical connectivity. This connectivity allows geographically separated data centers to operate as a unified infrastructure, enabling resource sharing, workload balancing, and disaster recovery.

DC

I is essential for enterprises and cloud providers that operate multi-cloud, hybrid cloud, or distributed infrastructures, ensuring high availability, scalability, and reliability. Key TechnologiesDCI leverages several technologies to achieve high-performance connectivity: Wavelength Division Multiplexing (WDM): Transmits multiple data streams over a single fiber using different wavelengths.



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Dense WD

M (DWDM) supports long-haul, high-capacity links, while Coarse WDM (CWDM) is suitable for shorter distances. Coherent Optics: Provides ultra-high-speed transmission, with speeds up to 800 Gb/s per wavelength, ideal for large-scale cloud and enterprise networks. Dedicated Circuits: Dark fiber, Ethernet circuits, and MPLS networks offer private, low-latency, and secure connections between data centers.

Subsea Cables: Connect data centers across continents, enabling global cloud and content delivery. Emerging trends include Software-Defined Networking (SDN) and Network-as-a-Service (NaaS), which allow real-time, automated control of network connectivity, bandwidth allocation, and performance monitoring.

Benefits of DCI

High Availability and Disaster Recovery: DCI enables database replication, backup, and failover between sites, ensuring continuous uptime. Scalability and Resource Optimization: Workloads can be dynamically migrated between data centers to optimize compute and storage resources. Low Latency and High Bandwidth: Dedicated connections provide predictable performance for latency-sensitive applications, such as real-time analytics, AI, and IoT services.

Security: Private circuits reduce exposure to internet-based attacks and ensure secure data transfer. Cost Efficiency: NaaS and automated DCI reduce operational complexity and egress charges when connecting to cloud providers.

Role in Modern Cloud Infrastructure

The growth of cloud computing, edge computing, 5G, AI, and Industry 4. 0 has increased traffic volumes and dynamic connectivity requirements.

DC

I supports: Edge-to-Core Connectivity: Latency-sensitive applications are processed closer to users in edge clouds, while non-real-time workloads remain in core data centers.

Multi-

Cloud Integration: Enterprises can connect to multiple cloud providers and colocation facilities seamlessly. Automation and Elasticity: Modern DCI networks are evolving into automated, multi-layer fabrics that dynamically adjust to changing workloads and traffic patterns.

Conclusion

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Cloud Computing Data Center Interconnection is a critical enabler for modern digital infrastructure. By providing high-speed, secure, and scalable connectivity between data centers, DCI supports distributed cloud applications, disaster recovery, and efficient resource utilization. With the adoption of SDN and NaaS, DCI is becoming more flexible, automated, and cost-effective, meeting the demands of enterprise digital transformation and the growing global data ecosystem.

Article Content

Data center interconnection for the cloud era

This white paper explains the need for multi-layer data center interconnection networks and how they need to support dynamic access to cloud applications and services. Today''s multiple, costly, static

Data Center Interconnect: A Guide to DCI and Connectivity

Explore how data center interconnect works, and what to consider when connecting facilities, clouds, carriers, and network partners.

Understanding Interconnection in Colocation Data Centers

Explore key interconnection approaches in colocation data centers to boost connectivity, agility, and business performance with real-world examples.

Data center interconnection for the cloud era

The data centers that make up the cloud form an ecosystem that enables digital transformation and the digital economy. This cloud ecosystem requires a highly interconnected data center infrastructure to

Data Center Interconnect Solution Overview

The term DCI (Data Center Interconnect) is relevant in all scenarios where different levels of connectivity are required between two or more data center locations in order to provide flexibility for deploying

What is Data Center Interconnect (DCI) and Why Optical Modules Are ...

Data Center Interconnect (DCI) is the backbone of today''s digital economy. By enabling secure, high-capacity, and low-latency connectivity between data centers, DCI supports everything

Data center interconnect

Recent developments in data center interconnect (DCI) are strongly driven by the rapid growth of artificial intelligence (AI), cloud computing, and global data traffic.

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What is Data Center Interconnect (DCI)?

DCI technology sits at the center of the cloud-centric world, providing the network capacity for users and applications to connect to storage, compute, and content resources.

A Complete Guide to Data Center Network Architecture

What Is Data Center Network Architecture? As the name suggests, data center network architecture deals with the physical and logical arrangement of systems that interconnect servers, storage

What Is an Interconnection Hub? It''s Where Digital Ecosystems Connect

By placing data and infrastructure in Equinix-based interconnection hubs, organizations can achieve the best possible performance and lowest possible latency with their cloud applications.

Data Center Market Size, Share & Forecast Report, 2034

The market is dynamic and competitive, with continuous innovation in designs, operational practices, and technologies, such as cloud computing and edge computing, to meet the

Orbital Data Center Race 2026 | Introl Blog

Blog The Orbital Data Center Race: Every Major Player, Timeline, and Economic Reality in 2026 Eight companies now compete to build data

Digital Realty | Data Center Services & Colocation

With Digital Realty, you can leverage our full interconnection capabilities across our global ecosystem including data centers, connectivity and cloud services.

Brookhaven Lab, Amazon Web Services Partner to Connect AI Data Centers ...

Brookhaven Lab and AWS announced a partnership that will accelerate the development of the GridSearch project to connect data centers to the grid.

$VNET +9%. A China AI data center gem I think yes. Now it looks like

Its carrier-neutral model also allows it to connect with virtually every major cloud, telecom and hyperscale customer without being tied to a single ecosystem. Management is targeting 10 GW

Data Center Company & Enterprise Network Technologies | Equinix

Equinix is the largest global data center and colocation provider for enterprise network and cloud computing. Secure datacenter management technologies and systems.

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2025 in Review: Top 10 Data Centre Companies

Through its advanced network and cloud computing capabilities, CyrusOne facilitates direct interconnection, which aims to boost efficiency and performance. The company continues to

Senate GRID Act: $100B Data Center Energy Rules

The GRID Act could add $100B in energy costs to AI data centers. What it means for AWS, Google, and Microsoft cloud pricing.

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