

Cisco Data Center Network Architecture—At-A-Glance

What Is the Cisco Data Center Network Architecture?

A comprehensive architecture that enables IT executives to:

- Consolidate and virtualize computing, storage and network resources
- Deliver secure and optimized employee, partner and customer access to information and applications
- Protect and rapidly recover IT resources and applications

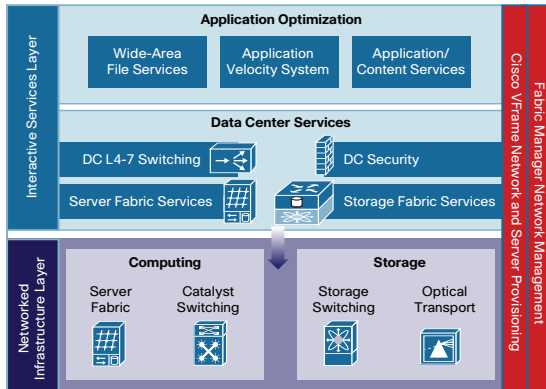
Built with:

- **Networked Infrastructure:** Gigabit/10Gigabit, InfiniBand and storage switching and optical transport
- **Interactive Services:** Storage Fabric Services, computer services, security services, and application optimization services
- **Management:** Fabric manager (element and network management) and Cisco VFrame (server and service provisioning)

Based on:

Cisco Service-Oriented Network Architecture (SONA), the enterprise implementation of the Intelligent Information Network (IIN) technology vision. Cisco SONA emphasizes the value of the interactive services provided in the networked infrastructure, such as application optimization, security, and server and storage fabric switching, to enhance business applications.

Cisco Data Center Network Architecture in Support of SONA



Benefits

- Lower-priced server and storage infrastructure
- Increased business agility and adaptability
- Ability to meet regulatory compliance standards with integrated network security and support for business continuance
- Tested and verified design and extensive service offerings for lower implementation costs and reduced risk
- Investment protection for core data center platforms offering multiyear deployment lifecycles
- Rapid application development and time to market of business-critical services

Why Cisco?

Cisco is the only vendor that delivers a complete architecture with advanced services, support, and industry-leading products. Cisco can help design the optimal end-state data center architecture and meet each tactical deployment phase of network evolution with the best products and services to achieve it.

What Is the Evolution of the Data Center?

- **Consolidation** of the front-end data network and back-end storage network infrastructures achieves greater administrative efficiency and increases utilization, increasing return on investment and lowering total cost of ownership.
- **Virtualization** increases productivity and business agility decoupling the application environment from the constraints of particular hardware. This way, computing, network, and storage resources can be allocated to an application in a way that best meets the needs of the organization.
- **Automation** manages the data center as a cohesive system by facilitating easier provisioning of resources while providing faster troubleshooting and easier recovery from security threats.

Cisco Data Center Network Architecture Overview and Products

Cisco Data Center Network Architecture can be grouped into four key areas:

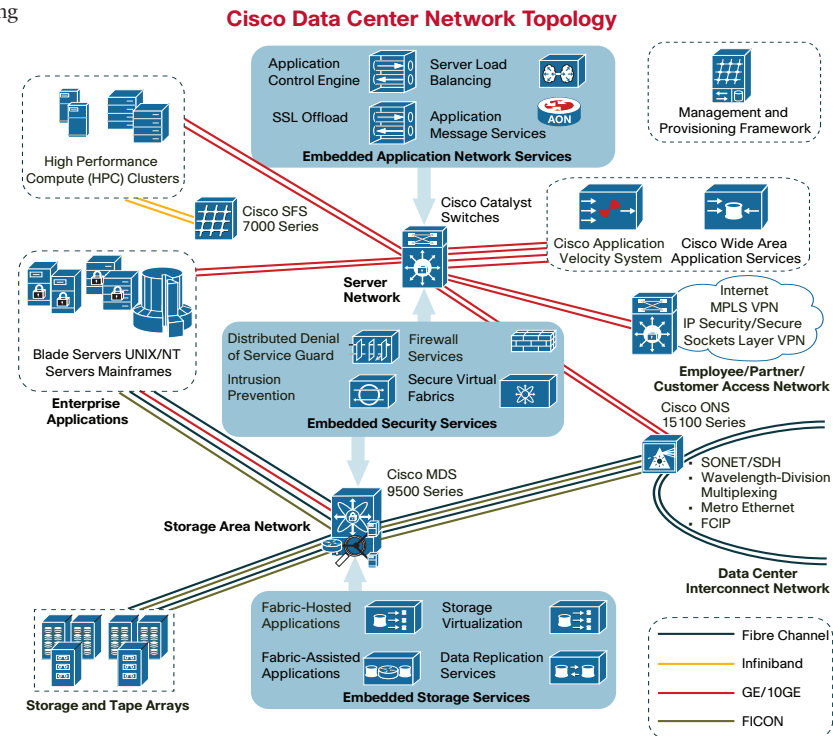
1. **Server Fabric:** Used to interconnect servers to create high-performance cluster computing. Enterprises are starting to use low-latency interconnects to support parallel and tightly coupled applications that provide financial modeling, fluid dynamics and data mining. By using InfiniBand and Remote Direct Memory Access (RDMA) technology, enterprises can reduce complex computing jobs to minutes and hours instead of days and weeks. **Cisco Products:** Cisco SFS 3000 Series Multifabric Server Switches, Cisco SFS 7000 Series InfiniBand Server Fabric Switches. Cisco Infiniband Host Channel Adapters and blade switches integrated into IBM and Dell blade servers.
2. **Storage Area/Fabric:** Used to consolidate and virtualize storage resources, so that they can be shared more effectively, virtual storage area networks (VSANs), and multiprotocol storage access through Fibre Channel, Small Computer System Interface over IP (iSCSI), and IBM Fiber Connection (FICON) enable large, heterogeneous storage networks. Support for advanced storage services like virtualization, serverless backup, data replication, and continuous data protection allow for enhanced business continuance and data migration. **Cisco Products:** Cisco MDS 9000 Multilayer Directors and Fabric Switches
3. **Data Center Interconnect:** Connects the primary data center to a backup or secondary data center over optical or traditional WAN circuits. Data

replication and business continuance best practices mandate the need for high-speed, low-latency connections between data center locations. An optical network's inherent features—low latency, high bandwidth, and high density—are ideal for interconnecting storage area networks (SANs), cluster nodes, and server farms between multiple data centers. When optical networks are not feasible, data center protocols including Fibre Channel can be transported over IP across traditional WANs. **Cisco Products:** Cisco ONS 15302 Multiservice Customer Access Platform, Cisco MDS 9000 and IPS Modules, Cisco Catalyst 6500 Switches

4. **Access Network:** Provides secure access to employees, customers, or partners connected remotely over the intranet, Internet, or extranet. The majority of users are not located close to the data center, so robust, secure connectivity to the data center is mandatory. **Cisco Products:** Cisco Catalyst 6500 Series/7600 Series Supervisor Engine 720-3BXL, Cisco VPN 3000 Series Concentrators.

Business Resilience

The Data Center Network Architecture offers companies the ability to minimize the impact of disaster scenarios through an architecture that helps mitigate risks and also provides tools and technologies that expedite recovery. The Data Center Network Architecture can also be a key part of an organizations' strategy for regulatory compliance and protection and management of company and customer data.



Components of the Data Center

#1 Optimization of Web Applications

| | |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Business Challenges | <ul style="list-style-type: none"> Poor performance of HTTP-based Enterprise Applications. Examples: Portals, Siebel, SAP, Oracle, OWA, inotes |
| Decision Maker | <p>Anyone Responsible for An Application Service Level Agreement (SLA)</p> <ul style="list-style-type: none"> Director of Systems/Applications Director of Operations/Networks |
| Business Benefits | <ul style="list-style-type: none"> Ability to run delay sensitive applications over lower bandwidth links Increased user satisfaction and adoption due to increase web application speed and performance |
| Cisco Solutions | <p>Application Velocity System (AVS) 3100 (FineGround)</p> <ul style="list-style-type: none"> Dynamically caches/transforms/compresses content, secures web w/full proxy functionality Reduces latency and improves responsiveness by handling all redirects |

#2 Business Continuity and Disaster Recovery

| | |
|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Business Challenges | <ul style="list-style-type: none"> Recovering business functions after disruptions and preventing data loss from any failure/attack |
| Decision Maker | <ul style="list-style-type: none"> Storage Manager Business Continuance Planning Manager Risk/Compliance Manager |
| Business Benefits | <ul style="list-style-type: none"> Ensure compliance with industry and other regulatory requirements Overall improve business agility by creating a scalable and resilient solution Improve customer and partner trust with a resilient design for applications and data |
| Cisco Solutions | <ul style="list-style-type: none"> MDS 9500: Synchronous Mirroring and Asynchronous replication Catalyst 6500: High-performance xWDM and 10GB Ethernet ONS 15454/15540/15530: Supports high density, low-latency and high-bandwidth SAN extension solutions between Data Centers, providing native layer 2 extension for server clusters Global Site Selector: Continuous Access with Automatic Site Selection |
| Note about Cisco on Cisco: | <ul style="list-style-type: none"> Cisco synchronously replicates between data centers on Cisco San Jose campus, and asynchronously between San Jose and RTP sites for true fault-tolerant disaster recovery |

#3 Consolidation of Branch File Servers

| | |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Business Challenges | <ul style="list-style-type: none"> High operational cost of managing branch file and print servers |
| Decision Maker | <ul style="list-style-type: none"> Director of Systems/Computing/Server Operations |
| Business Benefits | <ul style="list-style-type: none"> Reduce maintenance delay of having to patch and maintain remote servers Improve user experience with reduction of delay in accessing files over the WAN Reduce cost by consolidating remote file and print servers |
| Cisco Solutions | <ul style="list-style-type: none"> Cisco Wide Area File Services (WAFS) Core and Edge File Engines (formerly Actona and FineGround) |

#4 Consolidate and Simplify Storage Management

| | |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Business Challenges | <ul style="list-style-type: none"> Data backup on primary network exceeds backup window High operational cost of managing underutilized and costly storage devices Inability to dynamically scale servers and storage as business requirements change |
| Decision Maker | <ul style="list-style-type: none"> Storage Manager Data center Manager |
| Business Benefits | <ul style="list-style-type: none"> Separate network for data backup and recovery ensure data availability and improve performance of primary network Reduce capital equipment cost through optimization of existing storage resources Single point of management and automated tasks simplify provisioning of multiple storage devices Allows servers and storage to be scaled independently |
| Cisco Solutions | <ul style="list-style-type: none"> Cisco MDS 9020 fabric switch to connect and consolidate server and storage resources Cisco MDS 9216 Multilayer fabric switch deployed in a core-edge architecture |

Cisco Lifecycle Services for the Data Center Network

Cisco Customer Advocacy (CA) Data Center Networking Services can bring together depth and breadth of expertise across the data center networking technologies to assist customers throughout the prepare, plan, design, implement, operate and optimize (PDIOO) network lifecycle. Cisco CA also advises customers on aligning their data center strategy with their business objectives and operational processes to industry standards and best practices.

Cisco services for data center networking complement those of our partners to form an end-to-end solution.

Programs to Help Implement Cisco Data Center

Cisco Storage Networking CCIE Certification

CCIE certification in Storage Networking indicates expert level knowledge of intelligent storage solutions over extended network infrastructure using multiple transport options such as Fibre Channel, iSCSI, FCIP and FICON.

<http://www.cisco.com/en/US/learning/l3/ccie/san/>

Key Industry Partnerships

Cisco has successful relationships with technology, channel and service partners. Key partnerships include Original Storage Manufacturers (OSMs) such as IBM, EMC and HP that integrate the Cisco product line into their services. Server partners such as IBM, HP, and Dell integrate Cisco Infiniband switching and Gigabit Ethernet Switching technologies into their blade servers to provide a seamless and cohesive solution.

Cisco and IBM have also collaborated on a joint architecture for the data center, offering an end-to-end solution from two industry leaders: <http://www.ciscoibm.com/datacenter>

Resources for Further Information

Data Center Design Guides, ROI and Training

<http://www.cisco.com/go/datacenter>

Storage Services

<http://www.cisco.com/go/storagetworking>