

## What is the Cisco Data Center Network Architecture?

A comprehensive architecture that enables IT executives to:

- Consolidate and virtualize compute, 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

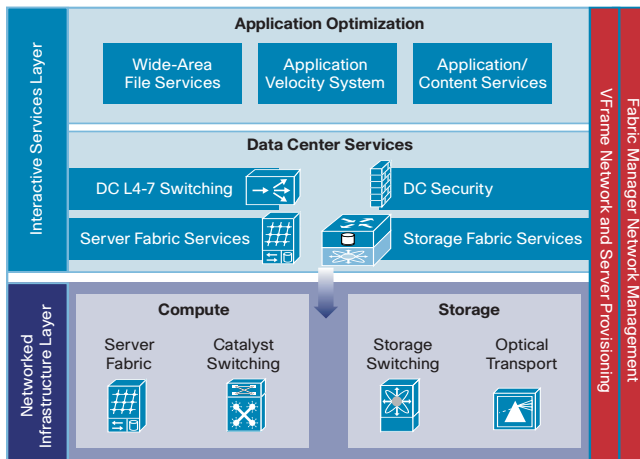
Built with:

- **Networked Infrastructure:** Gigabit/10Gigabit, Infiniband and storage switching and optical transport
- **Interactive Services:** Storage Fabric Services, Compute Services, Security Services, and Application Optimization Services
- **Management:** Fabric Manager (element and network management) and 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 within 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

- Investment in the network enables lower-priced server and storage infrastructure
- Increased business agility and adaptability
- 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 multi-year deployment lifecycles
- Cisco SONA enables rapid application development and time-to-market of business-critical services

## Why Cisco?

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

## What is the Evolution of 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 assets and lowering total cost of ownership.
- **Virtualization** increases productivity and business agility de-coupling the application environment from the constraints of and particular hardware. This way, compute, 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.

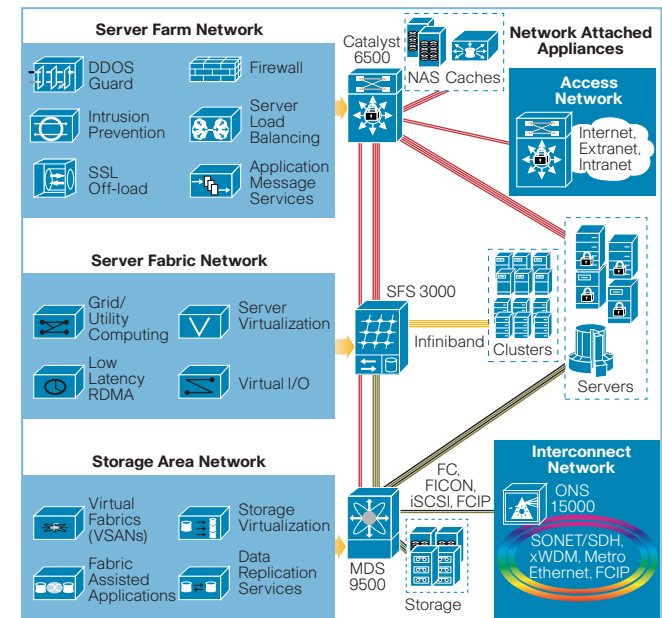
## Cisco Data Center Network Architecture Overview and Products

Cisco's Data Center Network Architecture can be grouped into five key areas:

- 1. Server Farm:** Used to interconnect computing resources and campus users via Gigabit and 10 Gigabit Ethernet. Both top-of-rack and end-of-rack modular platforms are supported. Integrated services like firewalling, denial of service protection, intrusion prevention, server load balancing and content and file caching are applied to secure and optimize access to applications. **Cisco Products:** Catalyst 6500, Catalyst 4948, Blade Server Switches and Catalyst 6500 Services Modules including SSL, Firewall, IPS, and CSM appliances including CSS, GSS, WAFS and AVS.
- 2. Server Fabric:** Used to connect clusters, enable server virtualization, and lower application latencies. Enterprises are starting to utilize low-latency server interconnect technologies to support High Performance Computing (HPC) applications, standardize on low cost server platforms such as 1RU and blade servers and reduce the cost of supporting multiple I/O channels. **Cisco Products:** [Formerly Topspin] SFS 7000, SFS 3000, V-Frame Software, Blade Server Switch, Infiniband HCA (Host Channel Adapters)
- 3. Storage Area/Fabric:** Used to consolidate and virtualize storage resources, so that they can be shared more effectively, VSANs and multiprotocol storage access via Fiber Channel, iSCSI, and FICON enable large, heterogeneous storage networks. Support for advanced storage services like virtualization, server-less backup, data replication, and continuous data protection allow for enhanced business continuance and data migration.

**Cisco Products:** MDS 9x00 Series Multilayer Fabric Switches and Directors

- 4. 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. Optical networks' inherent features—low latency, high bandwidth and high density—are ideal for interconnecting SAN, cluster nodes and server farms between multiple data centers. When Optical networks are not feasible, data center protocols including FC can be transported over IP across traditional WAN. **Cisco Products:** Cisco ONS Optical Switches, MDS-9x00 and IPS Modules, Catalyst 6500
- 5. 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 in close proximity to the data center, so robust, secure connectivity to the data center is mandatory. **Cisco Products:** Catalyst 7600/6500, VPN 3000.



## 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 with regards to the protection and management of company and customer data.



# Cisco Data Center Network Architecture—At-A-Glance

## Components of the Data Center

### #1 Consolidation of Server I/O Connections

<b>Business Challenges</b>	<b>High TCO of Traditional Server I/O Model</b> <ul style="list-style-type: none"> <li>Cable management headaches</li> <li>Costly NICs and Host Bus Adapters (HBA)</li> <li>Need for increased compute density</li> </ul>
<b>Decision Maker</b>	<ul style="list-style-type: none"> <li>Data Center Architect</li> <li>Director of Open Systems</li> <li>Director of Computing</li> </ul>
<b>Business Benefits</b>	<ul style="list-style-type: none"> <li>Lower cost of wiring with only a single I/O connection</li> <li>Improved cooling capabilities, thus lower facilities costs with reduced cabling</li> <li>Reduced switch port costs with reduced I/O connections, improve density</li> </ul>
<b>Cisco Solutions</b>	<ul style="list-style-type: none"> <li>SFS-7000: high density/performance, low latency InfiniBand switch</li> <li>SFS-3000: Infiniband gateway switch with Fibre Channel and Ethernet</li> <li>IB HCA (NIC): Infiniband server adapter. Supports Linux and Windows</li> <li>IB Blade Switches: IB switches for IBM blade center, Dell 1855, HP Blade System</li> </ul>

### #2 Optimization of Web Applications

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

### #3 Business Continuity and Disaster Recovery

<b>Business Challenges</b>	<ul style="list-style-type: none"> <li>Recovering business functions after disruptions and preventing data loss from any failure/attack</li> </ul>
<b>Decision Maker</b>	<ul style="list-style-type: none"> <li>Storage Manager</li> <li>Business Continuance Planning Manager</li> <li>Risk/Compliance Manager</li> </ul>
<b>Business Benefits</b>	<ul style="list-style-type: none"> <li>Ensure compliance with industry and other regulatory requirements</li> <li>Overall improve business agility by creating a scalable and resilient solution</li> <li>Improve customer and partner trust with a resilient design for applications and data</li> </ul>
<b>Cisco Solutions</b>	<ul style="list-style-type: none"> <li>MDS 9500: Synchronous Mirroring and Asynchronous replication</li> <li>Catalyst 6500: High-performance xWDM and 10GB Ethernet</li> <li>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</li> <li>Global Site Selector: Continuous Access with Automatic Site Selection</li> </ul>
<b>Note about Cisco on Cisco:</b>	<ul style="list-style-type: none"> <li>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</li> </ul>

### #4 Consolidation of Branch File Servers

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

### 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/1e3/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>