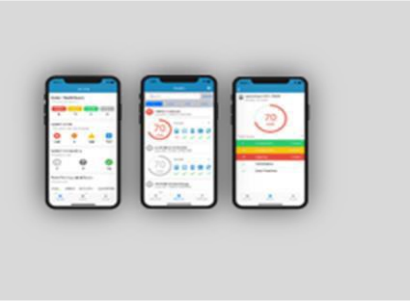
Data Sheet

Dell Connectrix Fibre Channel Storage Networking

The Connectrix™ family of Fibre Channel directors and switches move your vital business information to where it's needed securely, with the highest performance, the highest availability and unsurpassed reliability.

APEX AIOps Infrastructure Observability

Provides cloud-based analytics and monitoring for Connectrix switches and directors.



Infrastructure Observability combines proactive monitoring, machine learning and predictive analytics so you can take quick action from a browser or mobile app.

Connectrix Enables Business Applications

Connectrix products can connect physical or virtual servers through Fibre Channel Storage Area Networks (SAN) technology. Connectrix enables all application environments from Oracle, Microsoft, and SAP to local backup/restore, and business continuity/disaster recovery solutions over distance. Connectrix offers Dell Technologies E-Lab™ interoperability testing. All tested configurations can be accessed by E-Lab Navigator via a browser or mobile app.

Connectivity Matters for Data Storage

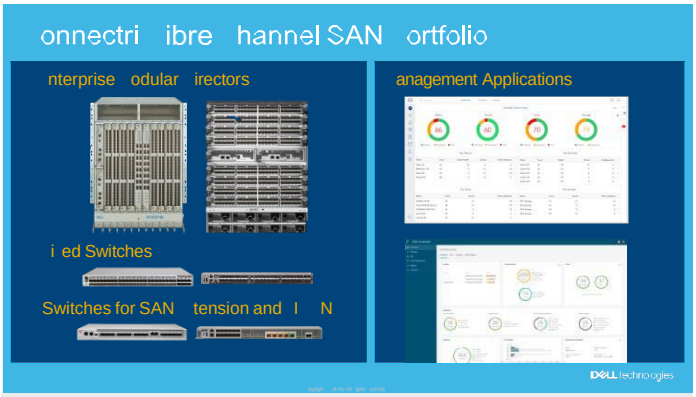
All-flash storage environments require a network that is deterministic, and easy to manage with low latencies. Connectrix has always delivered low latency, deterministic behavior, scalability, and reliability. As you move to Solid State Drives (SSD) make sure your storage network can keep pace. Today's storage networks deliver up to 64 Gigabit per second (Gb/s) Fibre Channel speeds. The latest Connectrix systems include exclusive diagnostic and error-collection capabilities, as well as the ability to monitor, analyze and identify specific data to avoid errors, reduce bottlenecks and automate your networking resources.

Seamlessly Transition to Non-Volatile Memory Express over Fibre Channel (NVMe/FC)

Connectrix models allow seamless transition to NVMe/FC workloads without any hardware upgrade in the SAN. In addition, Connectrix platforms support the concurrent use of both traditional SCSI-based Fibre Channel and NVMe/FC traffic, allowing organizations to easily integrate Fibre Channel networks with NVMe-based data storage.

High Performance, Availability, Scalability and Reliability

The Connectrix offering allows you to start small and scale as you grow—whether you begin by implementing a small SAN for one department or a large configuration for an enterprise-wide application. With Connectrix you can concurrently support multiple hosts and operating systems as well as accommodate storage environments from other suppliers. This extensible connectivity frees you to consolidate more information onto fewer storage systems.



Connectrix Director, Switch and Management Options

Live Optics with SAN Health

If you're thinking about upgrading your storage environment, make sure your SAN isn't a bottleneck by running Live Optics with SAN Health. This is a free tool that creates comprehensive analysis about your storage network including performance graphs, detailed spreadsheets, and topology diagrams. Once you run SAN Health, you can ask your Sales Rep for a free SAN Modernization Assessment, which provides more detail at no cost.

Why Buy SAN from Dell Technologies?

There are three main reasons customers choose Dell Connectrix for their Fibre Channel Storage Network:

Single-vendor support – eliminate multi-vendor complexity with single-vendor support for your entire environment including servers, storage, networking, software and more.

Insights with APEX AIOps Infrastructure Observability - Dell provides access to a cloud-based monitoring software to give IT administrators the intel they need to easily manage your environment allowing you to make better, faster decisions and save time and costs.

Dell Technologies E-Lab proven interoperability - the industry's premier and trusted testing lab provides end-to-end interoperability assurance across servers, HBAs, storage networks, storage systems, solutions and more. All tested solutions are found via the E-Lab Navigator which is available online or you can download the app to your smart phone.

Choice of SAN Solutions

To meet your storage networking requirements, we offer you two Connectrix product lines. The Connectrix B-Series and Connectrix MDS product lines include enterprise directors, switches, and multi-purpose switch offerings. Enterprise directors are ready for the most demanding mission-critical environments, providing immediate, non-disruptive and automatic failover.

Connectrix Management Offerings

Connectrix B-Series SANnav

SANnav empowers IT administrators to be more efficient and productive by providing comprehensive visibility into the SAN environment. These tools transform information about SAN behavior and performance into actionable insights, allowing administrators to quickly identify, isolate and correct problems before they impact the business.

Connectrix MDS Nexus Dashboard Fabric Controller

Data Center Network Manager has been the management program for years but today, DCNM customers on maintenance can migrate to a new, modern user interface called Nexus Dashboard Fabric Controller (NDFC) for free. For day-to-day operations, NFDC provides configurable dashboards and dashlets that display an assortment of information, including health scores, topology views, utilization, alarms and events for links, switches and fabrics. Through SAN Insights, NDFC also provides reports derived from the integrated MDS SAN Analytics telemetry data.

*Run **Live Optics with SAN Health**, then ask your Dell Sales Rep about the new no cost **SAN Modernization Assessment***

Connectrix Director and Switch Models

All Connectrix models listed in the tables below support auto-sensing speeds for backward compatibility, non-disruptive code upgrades and redundant hot-swappable components for high availability. All Connectrix 16Gb/s, 32Gb/s and 64Gb/s Fibre Channel switches and directors support NVMe/FC.

Table 1: Switch Models

Connectrix 64Gb/s Fibre Channel Switch Models	Minimum - Maximum Ports	Specification Sheets
DS-7710B	8 to 24 ports	
DS-7720B	24 to 64 ports	B-Series 64Gb/s Switches
DS-7730B	48 to 128 ports	
MDS-9124V	24 ports	MDS Series 64Gb/s Switches
MDS-9148V	48 ports	
MDS-9396V	96 ports	
Connectrix 32Gb/s Fibre Channel Switch Models	**Minimum - Maximum Ports**	
DS-6610B-L	8 to 24 ports	B-Series 32Gb/s Switches
DS-6620B and DS-6620B-V2	24 to 64 ports	
DS-6630B and DS-6630B-V2	48 to 128 ports	
MDS-9132T	8 to 32 ports	MDS Series 32Gb/s Switches
MDS-9148T	24 to 48 ports	
MDS-9396T	48 to 96 ports	

Table 2: Multi-purpose SAN Extension Switch Models

Connectrix Multi-Purpose Switch Models	Port Count and Maximum Speeds	Use Cases and Protocols
MP-7810B	Twelve 32Gb capable Fibre Channel ports and six 1/10GbE SFP+ ports	Distance Extension with FCiP, Fibre Channel Protocol (FCP) and IP Extension (IPEX)
MP-7850B MP-7800B Spec Sheet	Eight 64Gb/s SFP+ ports, plus eight 64Gb/s Double Density SFP ports which yields a total of twenty-four 64Gb/s ports. In addition, there are sixteen 25 Gigabit Ethernet SFP+ ports and two 100 Gigabit Ethernet QSFP Ethernet ports. Base SKU includes sixteen 64Gb SFP+ optics, four 10GigE optics, four 25GigE optics, two 100GigE optics and a rack mount kit. Additional ports can be configured.	Distance Extension with FCiP, Fibre Channel Protocol (FCP), IP Extension (IPEX)
MDS-9220i MDS-9220i Spec Sheet	Up to twelve 32-Gbps Fibre Channel ports, four 1/10-, two 25-, and one 40- Gigabit Ethernet IP storage services ports	Distance Extension with FCiP and Fibre Channel support. Mainframe FICON support.

Table 3: Enterprise 64Gb/s Fibre Channel Director Models

Connectrix Director Models	Maximum Ports	64G Switching Modules	FICON Support	Specification Sheets
ED-DCX7-8B	Up to 512 ports	48-port and 64-port	√	ED-DCX7
ED-DCX7-4B	Up to 256 ports		√	
MDS-9718-V3	Up to 768 ports	48-port		MDS-9700
MDS-9710-V2	Up to 384 ports		√	
MDS-9706-V2	Up to 192 ports		√	

Director Notes: The ED-DCX7 director models include the Enterprise Software Bundle which contains the optional features listed in Table 4. Please see the MDS optional features described below in Table 5. The Connectrix MDS-9700 director models include updated internal components known as Supervisors and Fabric Cards to support 64 Gigabit per second (Gb/s) Fibre Channel.

Table 4: Connectrix B-Series Optional Features

Feature	Description
Fabric Vision	Provides visibility and insight across storage networks through the Monitoring and Alerting Policy Suite (MAPS), Fabric Performance Impact (FPI) Monitoring, ClearLink Diagnostics, Flow Vision and Single Bulk Configurations.
ISL Trunking	Provides the ability to aggregate multiple physical links to one logical link for enhanced network performance and fault tolerance.
Extended Fabrics	Provides greater than 10 kilometers of switched fabric connectivity at full bandwidth over long distances depending on the platform this can be up to 3000 kilometers. Extended Fabric is required for any Inter-Switch Link (ISL) that is greater than 10 kilometers.
Mainframe FICON CUP	Includes FICON management features required for mainframe environments. FICON supports high speed connectivity between mainframes and I/O devices. Control Unit Port (CUP) allows mainframe tools to manage connectivity between ports, monitor fabric performance and collect critical diagnostic information
Enterprise Software Bundle	Enterprise Bundle includes Fabric Vision, ISL Trunking, and Extended Fabrics.

Table 5: Connectrix MDS Series Optional Features

Standard features for the Connectrix MDS product line include Port Channel, VSAN, VSAN Trunking, Inter-VSAN Routing, NPV, ISL and HBA Diagnostics, Port Monitoring, Slow Drain (Congestion) Detection, Virtual machine transparency, hardware-enforced zoning, ACLs, per VSAN Role-based Access Control (RBAC), QoS policies, sophisticated diagnostics, Dynamic Ingress Rate Limiting (D.I.R.L.) and much more.

The optional features described below provide a way to purchase the features you need.

Feature	Description	Features
Enterprise Package	Includes advanced traffic engineering and advanced security features for enterprise SANs	Advanced traffic management includes Inter-VSAN Routing, Quality of Service (QoS) features, Extended credits. Security features include switch-to-switch and host-to-switch authentication, DH-CHAP, LUN zoning, read-only zones, port security, VSAN based access control, IP Sec for iSCSI and FCiP, IKE Digital Certificates, Cisco TrustSec and fabric binding for Fibre Channel
SAN Extension over IP	Provides integrated, cost-effective and reliable business continuance solutions that use the existing IP infrastructure	Supports SAN Extension Tuner, Inter-VSAN Routing for FCiP and FCiP protocol support, FCiP compression, FCiP Write Acceleration, FCiP Read/Write Tape Acceleration
I/O Acceleration (IOA)	IOA capability is available on MDS 9700 series directors from NX-OS 8.2(1) release. It can be enabled using the I/O acceleration package license which is available to configure separately on a module	Transport and speed-independent acceleration that accelerates disk and tape traffic over any 2/4/8/16/32G Fibre Channel port. Works over Metropolitan Area Networks (MANs) and WANs. Data compression in conjunction with FCIP ISLs. High availability using Port-Channels with acceleration over Fibre Channel and FCIP ISLs. Transport Independent Write Acceleration (WA) of Disk Replication traffic and Tape Acceleration (TA) of Tape Replication Traffic.
Mainframe Package **Note**: Effective with the release of NX-OS 9.4(1a), FICON capability is embedded in the OS. Previous NX-OS releases that include FICON support will still require a separate license.	Includes features required for mainframe environments. FICON supports high-speed connectivity between mainframe servers and I/O devices	VSAN for FICON and FCP Intermixing, FICON Control Unit Port (CUP), Fabric Binding, Switch Cascading, FICON Native Mode Channel-to channel operation, persistent FICON FCID assignment, Port Swapping for host channel cable connections, FICON tape acceleration.
SAN Analytics	The 32- and 64Gb director switching modules and switch platforms support SAN Analytics	SAN Insights was designed for customers that would like to leverage the data gathering, computation and end-to-end visualization of data provided by the analytics engine that resides on the MDS 32Gb/s switching module through DCNM. SAN Telemetry Streaming is for customers who use Virtual Instruments (VI) or another 3rd party or custom solution to display the data provided by the MDS analytics engine.

Smart Licensing: With the Dell introduction of Connectrix MDS NX-OS version 9.3(1), Dell has been working with our partner Cisco to introduce Smart Licensing. Smart Licensing makes it easier for our joint customers to manage their MDS software licenses. Smart Licensing is subscription-based and is available from Dell in 1-, 3-, or 5- year options. The Premier subscription license includes the Enterprise Package, Nexus Dashboard Fabric Controller (NDFC) and SAN Analytics. The Advantage subscription license includes the Enterprise Package and NDFC licenses.

Dell Technology Services for Connectrix

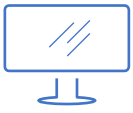
Technology presents infinite paths forward, each with distinct risks and rewards. Forrester found that 62% IT decision makers surveyed felt they lacked the IT skills in house to realize the full potential of technology purchases. Customers rely on Dell Technologies Services' deep e pertise to help them navigate their choices inside the world's most powerful technology and services ecosystem as follows:

- Consulting Services helps you define your corporate networking strategy by assessing your network environment and building a transformation plan that achieves measurable and secure outcomes aligned to your corporate and technology vision.
- Deployment Services helps your organization embrace new technologies by accelerating network deployment and adoption so you can execute digital strategies and drive business outcomes.
- Support Services utilize our networking experts as well as AI, machine learning and deep learning to optimize performance while predicting, preventing and proactively resolving issues.
- Managed and Residency Services helps you offload day to day networking IT operations by combining on-site and remote end-to-end management and operation of your infrastructure allowing your resources to focus on driving innovation.
- Education services to help you upskill your teams by identifying knowledge and skills gaps and define a continuous learning strategy skills are up to date.
- Data Sanitization services helps your organization secure data on networking and infrastructure systems in the data center—Protect IP, the environment and brand reputation.

Why Dell Technologies Services?

- Robust insights with APEX AIOps Infrastructure Observability and support services
- 96% technical support CSAT rating
- 58% fewer support calls in first 90 days from deployment
- Customers trust Dell Technologies
- Global reach and certified experts specially trained
- Experience and knowledge - done right the first time
- Single vendor support
- Multivendor integration expertise – We understand how to truly unify the Data Center

Services Central for Networking



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