

# Storage Networking I/O Guide



LAN/SAN Converged  
(FC/FCoE)

1GbE iSCSI  
and NAS

10GbE iSCSI  
and NAS

Fibre Channel

Storage Array  
Guide

Interoperability  
Guide

Deployment and  
Technical Guides

## I/O Connectivity Options for Dell Storage

February 10, 2016

Saleem Muhammad, Product Management



Dell.com/TechCenter/StorageNetworking



# Storage

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## Storage Networking

STORAGE - WIKI

Modernize and transform your storage network



- LAN/SAN Converged (FC/FCoE)
- 10GbE iSCSI and NAS
- 10GbE iSCSI and NAS
- Fibre Channel
- Storage Array Guide
- Interoperability Guide
- Deployment and Technical Guides

Solutions for traditional Storage Area Networks (SANs) and emerging Software Defined Storage (SDS) Environments

Dell Storage Networking I/O Guide

Today's IT plays a vital role in generating new business value, delivering new services and capturing new

# Storage Networking Wiki

- Product details
- White papers
- Deployment guides
- Solution guides
- And More...



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# Top-of-rack/access and director switches

Quick Reference Guide	LAN/SAN converged	8Gbps FC	16Gbps FC			
						
<b>Models</b>	<b>Dell S5000</b>	<b>Brocade 300</b>	<b>Brocade 6505</b>	<b>Brocade 6510</b>	<b>Brocade 6520</b>	<b>Brocade 8510</b>
Overview	Fully modular converged fabric switch to unify LAN and SAN	Entry-level Gen 4 FC switch	Entry-level Gen 5 FC switch	Mid-market Gen 5 FC switch	High-density Gen 5 FC switch	High-density Gen 5 FC Director switch
<b>Performance</b>						
Switching capacity	1.28Tbps	192Gbps	384Gbps	768Gbps	1536Tbps	8.2Tbps
Latency (micro sec)	0.8µs	0.7µs	0.8µs	0.8µs	0.7µs – 2.1µs	0.8µs – 2.4µs
<b>Ports</b>						
1GbE	Up to 48 using modules	-	-	-	-	-
10GE	48 or 64 (with breakout)	-	-	-	-	-
40GE	4	-	-	-	-	-
8Gbps FC	Up to 12	Up to 24	Up to 24	-	-	-
16Gbps FC	-	-	Up to 24	Up to 48	Up to 96	Up to 384
Expansion modules	4 slots and 2 choices: •12 port 1/10GbE •12 port 10GbE/8Gbps FC	-	-	-	-	8/4 slots and 5 choices •FC16-32, FC16-48, FC16-64 •FC8-64
<b>Power and cooling</b>						
Power options	AC or DC	AC	AC	AC	AC	AC
Redundant power supplies	2 hot-swappable	1, fixed	1+1 hot-swappable	2 hot-swappable	2 hot-swappable	2 hot-swappable
Air flow	F>B/B>F hot-swappable	B>F	B>F	F>B/B>F	F>B/B>F	B>F
<b>Features</b>						
Storage technologies	FC, FCoE, RoCE, iSCSI	FC	FC	FC	FC	FC
Port types	F, E, NPIV N	FL, F, E, M, NPIV N	FL, F, E, M, NPIV N	FL, F, E, M, NPIV N	FL, F, E, M, NPIV N	FL, F, E, M, NPIV N
Domain/fabric	3	56	56	56	56	-
Hops/fabric	2	7	7	7	7	7
Link aggregation	Session based distribution	ISL trunking	ISL trunking	ISL trunking	ISL trunking	ISL trunking
Fabric services	Zoning, FSPF, NPIV, RSCN, SNS	Zoning, FSPF, NPIV, RSCN, SNS, frame filtering	Zoning, FSPF, NPIV, RSCN, SNS, frame filtering	Zoning, FSPF, NPIV, RSCN, SNS, frame filtering	Zoning, FSPF, NPIV, RSCN, SNS, frame filtering	Zoning, FSPF, NPIV, RSCN, SNS, frame filtering



Quick Reference Guide

LAN/SAN converged



Models	Dell MXL	IO Aggregator	FN2210S
Overview	Fully modular converged switch to unify LAN and SAN	Converge infrastructure and connect easily to 3 <sup>rd</sup> party networks	Simplified converged infrastructure
<b>Performance</b>			
Switching capacity	1.28Tbps		240Gbps
Latency (micro sec)	0.8µs		-
<b>Ports</b>			
Internal blade server ports	32 (10GbE)		8
External 1/10GbE	8 or 24 (with breakout)		4
40GE	Up to 6		-
8Gbps FC	Up to 8		2
16Gbps FC	-		-
Expansion modules	2 slots and 4 choices: <ul style="list-style-type: none"> <li>4 port 1/10GbE (RJ-45), maximum of one per switch</li> <li>4 port 1/10GbE (SFP+)</li> <li>2 port 40GbE (QSFP+)</li> <li>4 port 8Gbps FC (SFP+)</li> </ul>	2 slots and 4 choices: <ul style="list-style-type: none"> <li>4 port 1/10GbE (RJ-45), maximum of one per switch</li> <li>4 port 1/10GbE (SFP+)</li> <li>2 port 40GbE (QSFP+)</li> <li>4 port 8Gbps FC (SFP+)</li> </ul>	2 port 1/10GbE (SFP+) and 2 port 8Gbps FC (SFP+)
<b>Features</b>			
Storage technologies	FC, FCoE, RoCE, iSCSI	FC, FCoE, RoCE, iSCSI	FC, FCoE, RoCE, iSCSI
Port types	NPIV N, F	NPIV N, F	NPIV N, F
Domain/fabric	1	1	1
Hops/fabric	1	1	1
Link aggregation	Session based distribution	Session based distribution	Session based distribution
Fabric services	Zoning, F_Port, NPIV	Zoning, F_Port, NPIV	Zoning, F_Port, NPIV





Quick Reference Guide

	8Gbps	16Gbps	
			
<b>Models</b>	<b>Brocade M5424</b>	<b>Dell 8/4Gbps Pass-Through</b>	<b>Brocade M6505</b>
Overview	Advanced 8Gbps FC switch	Basic 8Gb Aggregator	High-performance 16Gbps FC switch
<b>Performance</b>			
Switching capacity	192Gbps	256Gbps	384Gbps
Latency (micro sec)	0.7µs	-	0.7µs
<b>Ports</b>			
Internal blade server ports	16	16	16
External 1/10GbE	-	-	-
40GE	-	-	-
8Gbps FC	8	16	-
16Gbps FC	-	-	8
Expansion modules	-	-	-
<b>Features</b>			
Storage technologies	FC	FC	FC
Port types	FL, F, E, M, NPIV N	N_Port	FL, F, E, M, NPIV N
Domain/fabric	56	Not applicable	56
Hops/fabric	7	Not applicable	7
Link aggregation	ISL trunking	-	ISL trunking
Fabric services	Zoning, FSPF, NPIV, RSCN, SNS, frame filtering	-	Zoning, FSPF, NPIV, RSCN, SNS, frame filtering

Visit

[Dell Storage Networking – definition of terms](#)

page for additional information

- RoCE: RDMA over Converged Ethernet
- ISL Trunking: Brocade proprietary technology for link aggregation
- SNS: Enabled automated discovery, management and configuration of FC devices.
- NPIV: N\_Port ID Virtualization is a Fibre Channel facility allowing multiple N\_Port IDs to share a single physical N\_Port

- RSCN: Registered state change notification (RSCN) is a Fibre Channel fabric's notification sent to all specified nodes in case of any major fabric changes
- Frame filtering: Brocade technology is the foundation of Brocade advanced performance monitoring
- FSPF: Routing protocol used in Fibre Channel networks



Quick Reference Guide

1/10GbE ToR/access





Quick Reference Guide

1/10GbE ToR/access



Models	M6220	M6348
Overview	Flexible layer 2/3 switch with dual expansion slots	Leverage existing Ethernet cabling to enable broader scalability in the data center
<b>Performance</b>		
Switching capacity (Gbps)	128	184
Latency (micro sec)	6.3µs	3.6µs
Buffer size	768KB	4MB
<b>Ports</b>		
10/100/1000BASE-T	4	16
1GbE (SFP) / 1GbE internal	16 Internal	32 internal
10GbE (SFP+)	-	2 SFP+ and 2 CX4
Expansion modules	2 slots and 4 choices: •2 port 1/10GbE SFP+ •2 port 10GBASE-T •2 port CX4 1/10GbE •48Gbps Stacking module	-
<b>Power and cooling</b>		
Power options	N/A	N//A
Redundant power supplies	N/A	N/A
Air flow <sup>2</sup>	N/A	N/A
<b>Features</b>		
Storage technologies	iSCSI aware (detect and prioritize iSCSI traffic into pre-defined QoS); iSCSI Auto-Configuration (switch configuration routine for automated setup and optimal performance with Dell EqualLogic or Compellent arrays)	
Stacking	Up to 6	Up to 12
Jumbo frames	9,216	9,216
Max MAC entries	16K	16K
VLT / MLAG	Not supported	Not supported





Quick Reference Guide

10/40GbE LAN/SAN converged or non-converged



Models	S4048-ON	S4820T	S5000	N4000	S6000
Overview	High-performance switches designed to deliver non-blocking throughput for dense traffic environments			Power-efficient, flexible, and cost effective	Maximum density for large scale environments
Performance					
Switching capacity	1.44Tbps	1.28Tbps		640Gbps (24P) / 1.28Tbps (48P)	2.56Tbps
Latency (micro sec)	0.6µs	3.3µs	0.8µs	0.8µs	0.6µs
Buffer size	12MB	9MB		9MB	12MB
Ports					
1/10GE	48 SFP+	48 10GBASE-T	Up to 48 SFP+	48 SFP / 48 10GBASE-T	-
40GE	6 <sup>3</sup>	4 <sup>3</sup>	4 <sup>3</sup>	4 <sup>3</sup>	32 <sup>3</sup>
Expansion modules	-	-	4 slots and 2 choices: •12 port 1/10GbE •12 port 10GbE or 2/4/8Gbps FC	1 slots and 3 choices: •4 port 10GbE SFP+ module •4 port 10GBASE-T module •2 port 40GbE QSFP+ module	-
Power and cooling					
Power options	AC	AC or DC	AC or DC	AC	AC
Redundant power supplies	2 hot-swappable	2 hot-swappable	2 hot-swappable	2 hot-swappable	2 hot-swappable
Air flow <sup>2</sup>	F>B/B>F hot-swappable	F>B/B>F hot-swappable	F>B/B>F hot-swappable	F>B hot-swappable	F>B/B>F hot-swappable
Features					
Storage technologies	iSCSI aware (detect and prioritize iSCSI traffic into pre-defined QoS); iSCSI Auto-Configuration (switch configuration routine for automated setup and optimal performance with Dell EqualLogic or Compellent arrays)				
DCB	Supported	Supported	Supported	Supported	Supported
DCBX (iSCSI TLV)	Supported	Supported	Supported	Supported	Supported
Stacking	Up to 6	Up to 6	Up to 6	Up to 12	-
VLT/MLAG	Supported	Supported	Supported	Supported	Supported
Jumbo frames	12K	12K	12K		12K





Quick Reference Guide

10/40GbE LAN/SAN converged or non-converged			
Models	MXL	IO Aggregator	FN410S/FN410T
Overview	Fully modular converged switch to unify LAN and SAN	Converge infrastructure and connect easily to 3rd party networks	No fuss installation to converge LAN and SAN
<b>Performance</b>			
Switching capacity	1.28Tbps		240Gbps
Latency (micro sec)	0.68µs		-
Buffer size	9MB		4MB
<b>Ports</b>			
1/10GE	32 internal		8 internal, 4 external
40GE	23		-
Expansion modules	2 slots and 3 choices: <ul style="list-style-type: none"> <li>4 port 1/10GbE (RJ-45), maximum of one per switch</li> <li>4 port 1/10GbE (SFP+)</li> <li>2 port 40GbE (QSFP+)</li> <li>4 port 2/4/8Gbps FC (SFP+)</li> </ul>		<ul style="list-style-type: none"> <li>FN410S: 2 port 1/10GbE (SFP+)</li> <li>FN410T: 2 port 1/10GbE (RJ-45)</li> </ul>
<b>Power and cooling</b>			
Power options	N/A		N/A
Redundant power supplies	N/A		N/A
Air flow	N/A		N/A
<b>Features</b>			
Storage technologies	iSCSI aware (detect and prioritize iSCSI traffic into pre-defined QoS); iSCSI Auto-Configuration (switch configuration routine for automated setup and optimal performance with Dell EqualLogic or Compellent arrays)		
DCB	Supported	Supported	Supported
DCBX (iSCSI TLV)	Supported	Supported	Supported
Stacking	Up to 6	Up to 2 (via cli only)	Up to 6
VLT/MLAG	Supported	Supported	Supported
Jumbo frames	12K	12K	

## Notes

1. Varies depending upon the switch model. Check Dell sales representative for specifics.
2. F>B air flow represents I/O side to utility side airflow. B>F air flow represents utility side to I/O side airflow.
3. 40GbE QSFP+ ports can also be used as 10GbE ports using 40GbE to 4x10GbE breakout cables

# Storage networking products

## LAN/SAN converged (FC/FCoE)

FN2210S

MXL

PowerEdge M I/O Aggregator

S5000



## 1Gb iSCSI & NAS

M6348

M6220

S3048-ON

S3100

N2000

N3000

S60



## 10Gb iSCSI & NAS

FN410S/FN410T

MXL

PowerEdge M I/O Aggregator

S4048-ON

N4000

S4048-ON

S4820T

S5000

S6000



## Fibre Channel

Brocade M6505

Brocade M5424

8Gb FC Pass-Through

Brocade 300

Brocade 6505

Brocade 6510

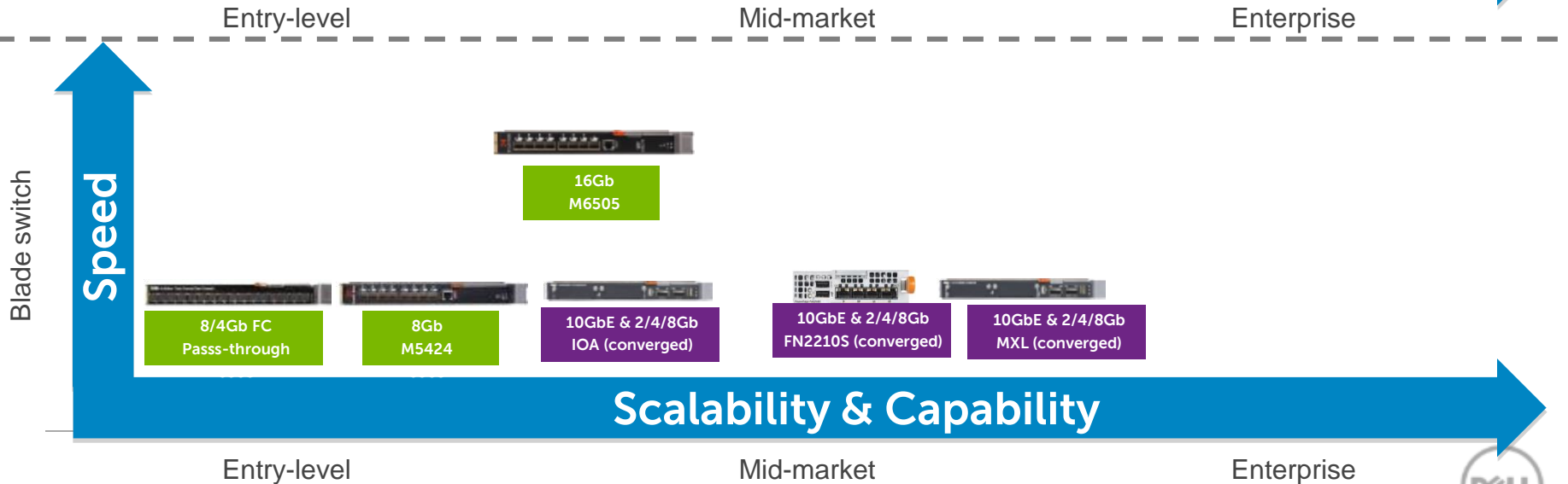
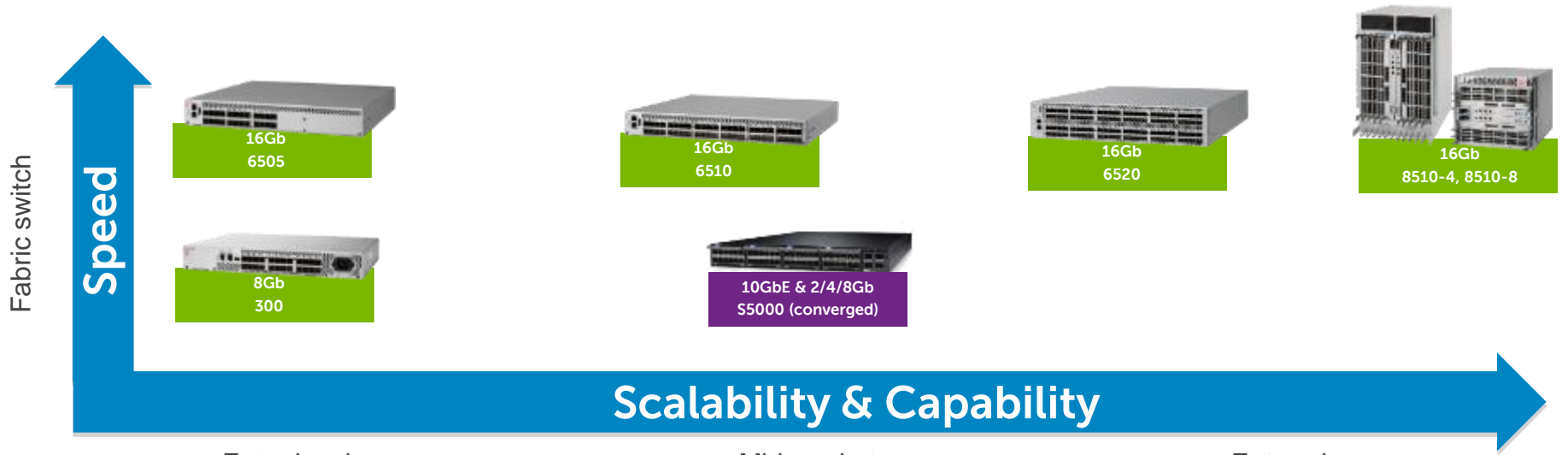
Brocade 6520

Brocade 8510



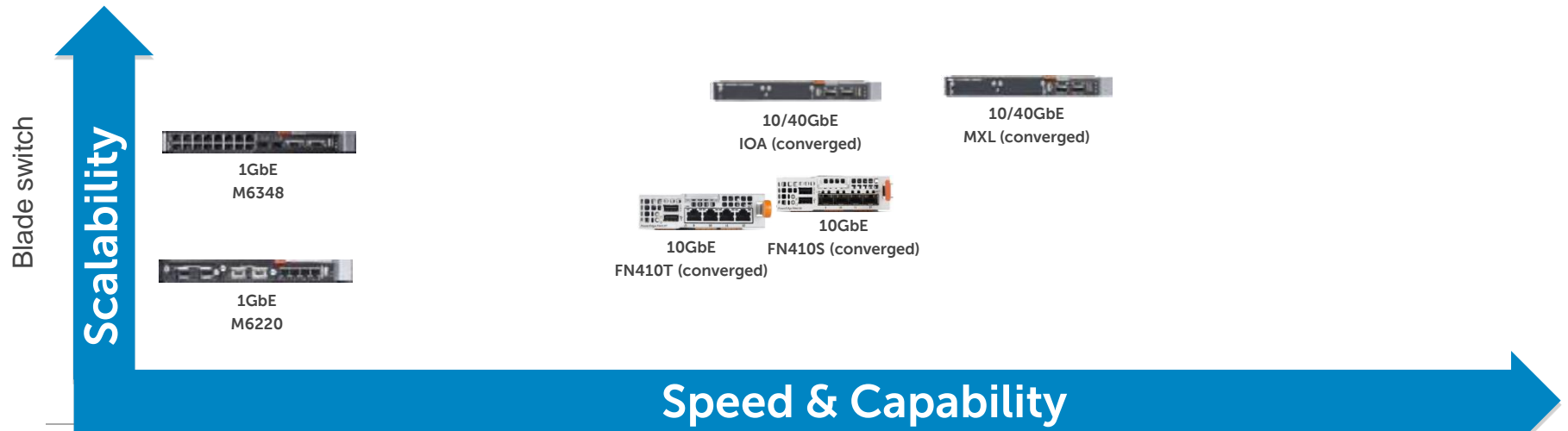
# Storage Networking Portfolio Positioning

## *FC and FCoE*



# Storage Networking Portfolio Positioning

## *iSCSI and NAS*



# LAN/SAN Converged (FC/FCoE\*)



10/40Gb Switch  
S5000



10/40Gb  
Switch  
MXL



10Gb  
Plug & Play  
M-IOA



10Gb  
Switch  
FN2210S



# MXL – 10/40GbE blade

Converged

- Industry leading 56 port design:
  - 32x 10Gb internal server ports
  - Up to 6 external 40Gb ports
  - Up to 24 external 10Gb ports (6 QSFP+ ports with breakout cables)
- Two FlexIO bays enable choice (Modules can be different)
  - 2-port 40GbE QSFP+ module (can convert to 8-port 10GbE SFP+ using breakout cables)
  - 4-port 10GbE SFP+ module
  - 4-port 10GBASE-T module (If running Base-T module then second IO slot must be of different type due to power constraints)
  - 4-port FC module
- Stack up to 6 devices
- VLT
- PVST+ protocol for easy integration into Cisco environments
- Converged
  - Supports DCB (protocols PFC, ETC and DCBx)
  - Converged iSCSI with EqualLogic (supports iSCSI TLV)
  - Two FCoE Options
    - Native Fibre Channel uplinks with FC FlexIO module (FCoE on internal ports to the servers)
    - FCoE transit to top of rack switch with IOM acting as a FIP Snooping Bridge
- Industry standard CLI
- Enterprise class OS (FTOS)



# MXL - 10/40GbE blade



FlexIO modules do not have to be the same

### Adapters

**11G**

- Broadcom 57712-k
- Brocade BR1741M-k
- Intel X520-x/k
- QLogic QME8242-k

**12G**

- Brocade BR1741M-k
- Emulex OCm1402-U2-D
- Emulex OCm1402-U3-D
- Intel X520-x/k
- Qlogic 57810S-k
- Qlogic 57840S-k
- QLogic QME8262-k

**13G**

- Emulex OCm1402-U4-D
- Emulex OCm1402-U5-D
- Intel X710-k
- Mellanox CX-4 DP 10GbE
- Qlogic 57810S-k
- Qlogic 57840S-k

Supports connectivity to 10Gb-KR adapters, all of which are notated with "-k." It does not provide connectivity to legacy 10Gb-XAUI NICs/CNAs

If connected to 1Gb Ethernet Mezzanine cards or LOMs, device will auto-negotiate individual internal ports to 1Gb.

**More details in Adapter Portfolio section**

### Designed for I/O bays

<b>A1/A2</b>	
<b>B1/B2</b>	
<b>C1/C2</b>	



**4 port SFP+ Module**

**Optical Transceivers**  
**SFP+ 10Gb:** SR, LR  
**SFP 1GbE:** SX, LX

**4 port 10GBASE-T Module**  
**Limited to only one 10GBASE-T module. The other module bay can be populated**

**SFP to RJ45 converter**  
 1000Base-T (only capable of 1Gbps)

**SFP+ Direct Attach Cable (Twinax)**  
 (0.5m, 1m, 2m, 3m, 5m, 7m available)  
 Can operate at 10Gb and 1Gb

**RJ45 / Cat6a Copper**  
 10Gb/1Gb  
 (supports auto-negotiation)

**4 port FC Module**

**Optical Transceivers**  
**SFP+ 8Gbps (will connect at 4/2 Gbps)**  
 SW 150m, LW 4km

**2 port QSFP+ Module**

**QSFP+ to 4xSFP+ Breakout Cables**  
 5m Passive Copper  
 40GBASE-CR4 10Gb

**QSFP+ to QSFP+ Direct Attach**  
 1m, and 5m, Passive Copper  
 40GBASE-CR4 40Gb

**Two Integrated QSFP+ ports**  
 Ports are defaulted to stacking mode but mode can be changed

**Secondary Management Serial Port (Cable included)**

**Optical Transceivers**  
**SFP+ 40Gb:** SR only

**QSFP+ to QSFP+ Fiber Cables**

**QSFP+ to 4xSFP+ Fiber Breakout Cables**

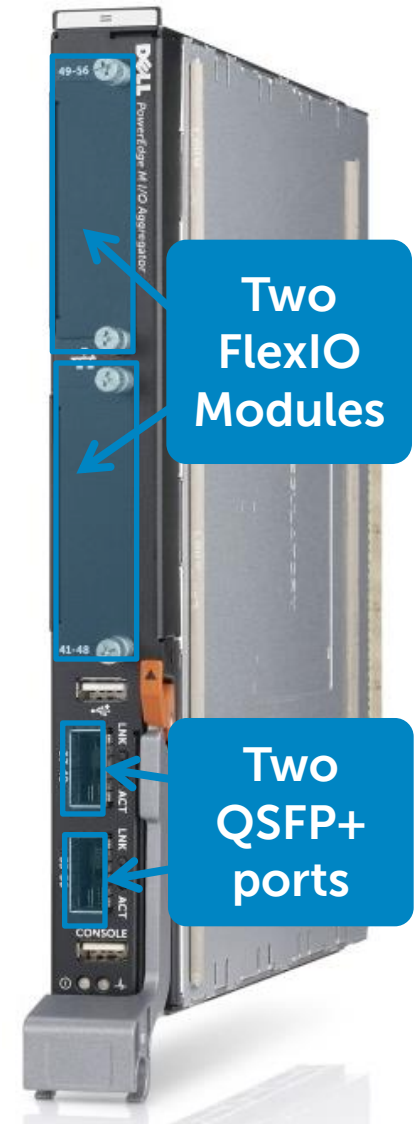
**USB Port**



# PowerEdge M I/O Aggregator

## Plug & Play

- Easy Deployment
  - Simplified layer 2 connectivity (no spanning tree)
  - Faster Deployment: All VLANs on all ports with the option to set VLANs
  - No touch DCB and no touch FCoE
    - › DCB and FCoE settings detected from top of rack switch through DCBx protocol
- Simple GUI Integrated into Chassis Management Controller (CMC)  
(Note: CMC GUI will not function if the IOA is stacked. IOA must be managed through CLI when stacked. Maximum stacking capability is 2)
- High Port Count:
  - 32x 10GbE internal server ports
  - Up to 16 external 10GbE ports (4 QSFP+ ports with breakout cables)
- Two FlexIO bays enable choice
  - 2-port 40GbE QSFP+ module (converts to 8-port 10GbE SFP+ using breakout cables)
  - 4-port 10GbE SFP+ module
  - 4-port 10GBASE-T module  
(If running Base-T module then second IO slot must be of different type due to power constraints)
  - 4-port FC module
- Converged
  - Supports DCB (protocols PFC, ETC and DCBx)
  - Converged iSCSI with EqualLogic and Compellent
  - Two FCoE Options
    - Native Fibre Channel uplinks with FC FlexIO module (FCoE on internal ports to the servers)
    - FCoE transit to top of rack switch with IOM acting as a FIP Snooping Bridge
- Industry standard CLI. Standard troubleshooting commands via CLI
- VLT up to 2 devices



# PowerEdge M I/O Aggregator

## Adapters

**11G**

- Broadcom 57712-k
- Brocade BR1741M-k
- Intel X520-x/k
- QLogic QME8242-k

**12G**

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- Emulex OCm1402-U2-D
- Emulex OCm1402-U3-D
- Intel X520-x/k
- Qlogic 57810S-k
- Qlogic 57840S-k
- QLogic QME8262-k

**13G**

- Emulex OCm1402-U4-D
- Emulex OCm1402-U5-D
- Intel X710-k
- Mellanox CX-4 DP 10GbE
- Qlogic 57810S-k
- Qlogic 57840S-k

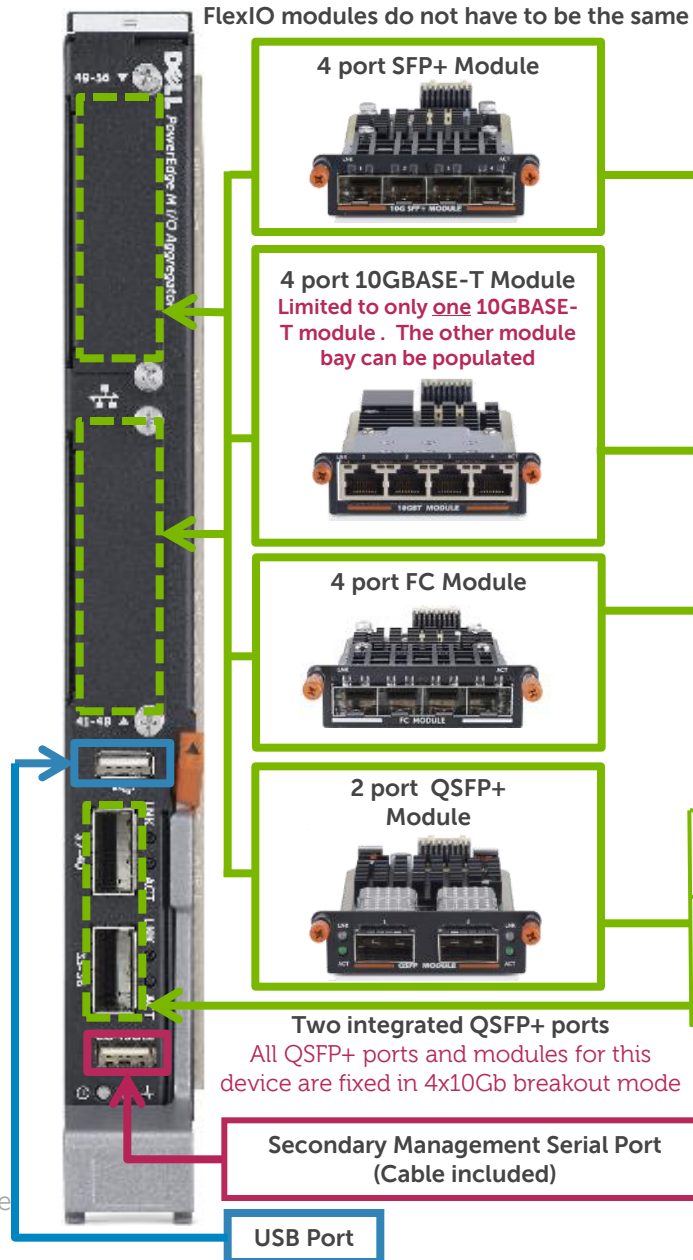
Supports connectivity to 10Gb-KR adapters, all of which are notated with "-k." It does not provide connectivity to legacy 10Gb-XAUI NICs/CNAs

If connected to 1Gb Ethernet Mezzanine cards or LOMs, device will auto-negotiate individual internal ports to 1Gb.

**More details in Adapter Portfolio section**

### Designed for I/O bays

<b>A1/A2</b>	
<b>B1/B2</b>	
<b>C1/C2</b>	



**4 port SFP+ Module**




**Optical Transceivers**  
**SFP+ 10Gb:** SR, LR  
**SFP 1GbE:** SX, LX




**4 port 10GBASE-T Module**  
**Limited to only one 10GBASE-T module. The other module bay can be populated**




**SFP to RJ45 converter**  
 1000Base-T (only capable of 1Gbps)



**SFP+ Direct Attach Cable (Twinax)**  
 (0.5m, 1m, 2m, 3m, 5m, 7m available)  
 Can operate at 10Gb and 1Gb




**RJ45 / Cat6a Copper**  
 10Gb/1Gb  
 (supports auto-negotiation)



**4 port FC Module**




**Optical Transceivers**  
**SFP+ 8Gbps (will connect at 4/2 Gbps)**  
 SW 150m, LW 4km



**2 port QSFP+ Module**



**QSFP+ to 4xSFP+ Breakout Cables**  
 5m Passive Copper  
 40GBASE-CR4 10Gb



**QSFP+ to QSFP+ Direct Attach**  
 1m, and 5m, Passive Copper  
 40GBASE-CR4 40Gb




**Two integrated QSFP+ ports**  
 All QSFP+ ports and modules for this device are fixed in 4x10Gb breakout mode

**Optical Transceivers**  
**SFP+ 40Gb:** SR only



**Secondary Management Serial Port**  
 (Cable included)

**QSFP+ to QSFP+ Fiber Cables**



**QSFP+ to 4xSFP+ Fiber Breakout Cables**



**USB Port**

# PowerEdge FN I/O Module



## Enable LAN/SAN Convergence

- Full DCB, FCoE, and iSCSI optimization, enabling converged data and storage traffic.
- Use NPG mode to connect to Fibre Channel SAN switch or direct connect mode to directly connect to Fibre Channel arrays

## Simplify Network Deployment

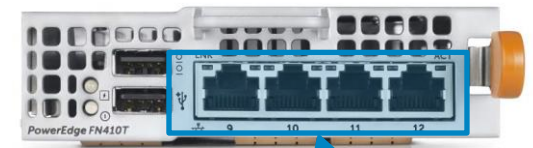
- Simplifying cabling complexity through server port aggregation as much as 8:1
- The unique plug-and-play networking switch gives the server admin access layer ownership.
- Dell Blade IO Manager GUI interface simplifies management for both standalone and full switch modes.

## Optimize FX2 Performance

- High performance 10GbE throughput.
- Optimized "East-West" traffic within the FX2 enclosure, ensuring superior performance.
- OpenFlow 1.3 in full-switch mode for SDN applications

## Features

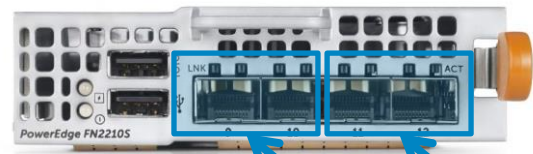
- 2 IOMs per FX2
- 3 SKU options:
  - 4 x 10GbE SFP+
  - 4 x 10GbE Base-T
  - 2 x 10GbE SFP+ and 2 x 2/4/8G Fiber Channel Combo
- All SKUs have 8 x 10GbE internal ports
- Virtual Link Trunking (VLT)
- Automatic/Zero-touch mode supports I/O aggregation
- DCB/FCoE Snooping Bridge (FSB)
- NPIV Proxy Gateway (NPG)
- F\_port capability to directly connect to Fiber Channel array
- iSCSI TLV
- Embedded Dell Blade IO Manager



Four 10GBASE-T ports



Four 10GbE SFP+ ports



2 10GbE SFP+ ports

2 8Gbps FC ports



# FN2210S - 10GbE + 8Gb FC Module

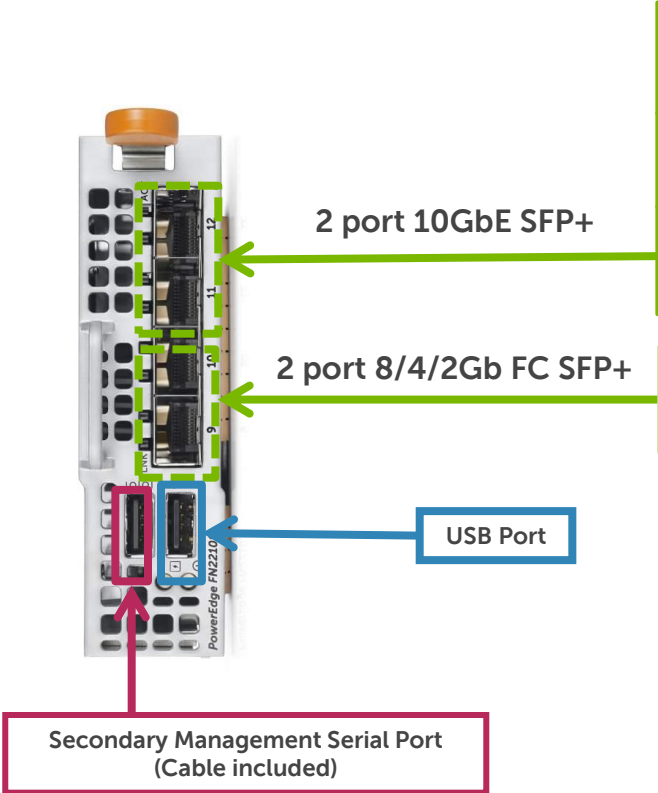


### Adapters

**13G**

- Emulex OCm1402-U4-D
- Emulex OCm1402-U5-D
- Intel X710-k
- Qlogic 57810S-k
- Qlogic 57840S-k

More details in Adapter Portfolio section



- Optical Transceivers**  
SFP+ 10Gb: SR, LR  
SFP 1GbE: SX, LX
- SFP to RJ45 converter**  
1000Base-T (only capable of 1Gbps)
- SFP+ Direct Attach Cable (Twinax)**  
(0.5m, 1m, 2m, 3m, 5m, 7m available)  
Can operate at 10Gb and 1Gb
- Optical Transceivers**  
SFP+ 8Gbps (will connect at 4/2 Gbps)  
SW 150m, LW 4km

# FN410S/FN410T - 10GbE Module

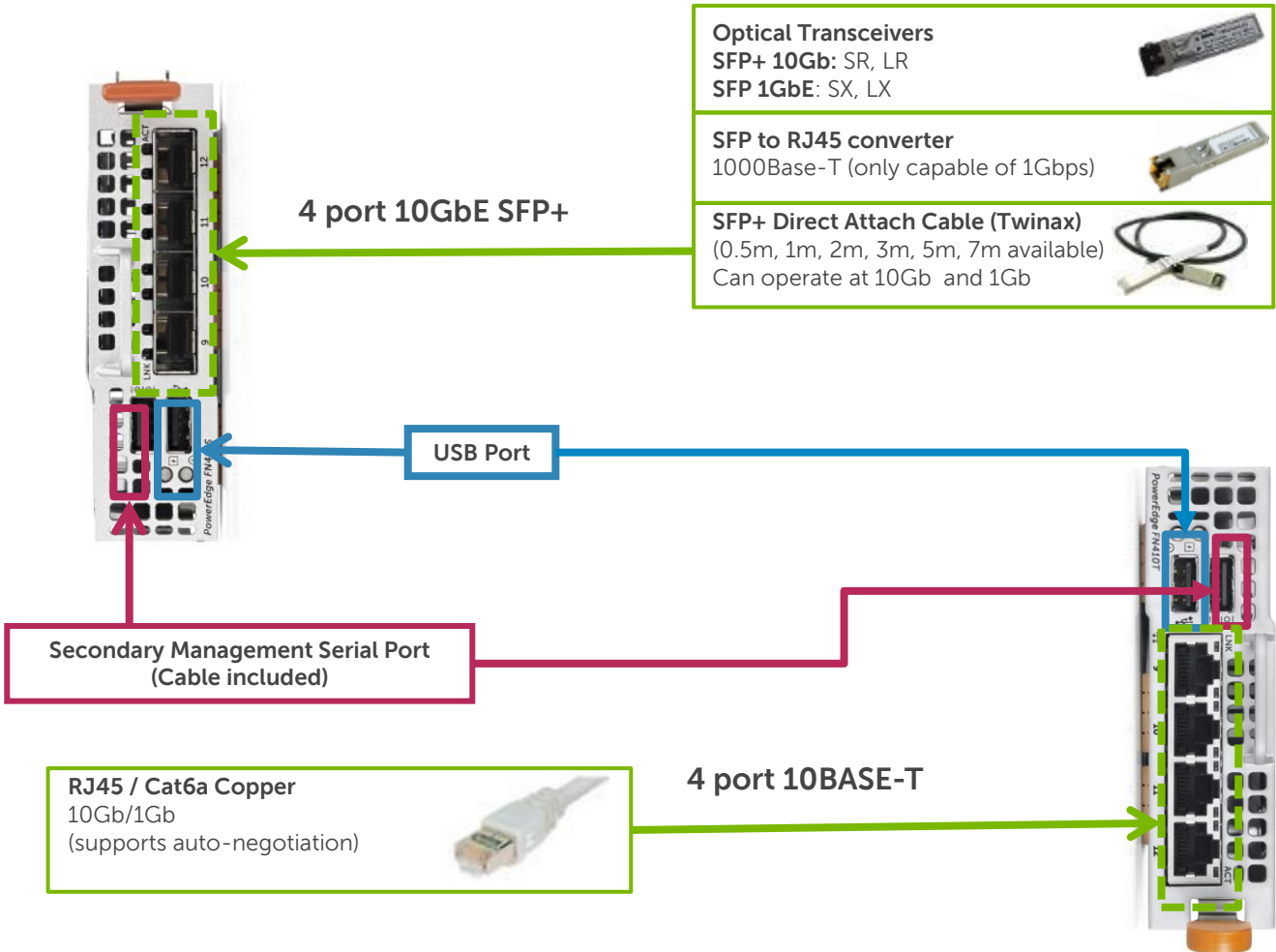


**Adapters**

**13G**

- Emulex OCm1402-U4-D
- Emulex OCm1402-U5-D
- Intel X710-k
- Qlogic 57810S-k
- Qlogic 57840S-k

More details in Adapter Portfolio section



# Dell Networking S5000 unified switch

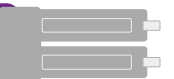
Dell's first fully modular 1RU top-of-rack and fabric switch

- **Pay-as-you-grow**, customizable modular unified switch
  - Up to 64 ports 10GbE; 4x40GbE
  - 2, 4, 8G Fibre Channel
- **Future-ready**, multi-stage design for next-gen I/O without rip & replace
- **Unified storage networking**, with complete support for iSCSI, RoCE, and FCoE with FC fabric services
- **Reduced management complexity**, Integrated automation, scripting and software programmability
- **Easy integration**, strong interoperability with major adapter, switch, & storage solutions



# S5000 - 10/40GbE Top-of-Rack

10/40GbE



## Adapters & storage

- Broadcom 57810S-k 2P NDC
- Broadcom 57840S-k 4P 10G NDC
- Broadcom 57840S 4P SFP+ 10G
- Broadcom 57800S 2P SFP+ 2P BT NDC
- Broadcom 57810S 2P SFP+ NIC
- Broadcom 57810S-k 2P Mezz
- QLogic QMD8262-k KR NDC
- QLogic QME8262-k KR Mezz
- QLogic QLE8262 SFP+ NIC
- QLogic QLE8242 SFP+ NIC
- QLogic QLE8362
- QLogic 2460/2462 4Gb HBA
- QLogic 2560/2562 8Gb HBA
- QLogic 2660/2662 16Gb HBA
- Brocade BR1020 SFP+ NIC
- Brocade BR1741M-k Mezz
- Intel X520-k 2P NDC
- Intel X520 2+2 SFP+ NDC
- Intel X520-k 2P Mezz
- Intel X520 2P SFP+ NIC
- Intel X540-T2
- Emulex OCe 14102
- Emulex OCm 14104
- Emulex LPe12000/12002 8Gb HBA
- Emulex LPe16000/16002 16Gb HBA
- Mellanox ConnectX-3 SFP+ 10G
- Mellanox ConnectX-3 QSFP+ 40G

- Compellent SC8000 (iSCSI, FC)
- Compellent SC4020 (FC)
- EqualLogic PS (iSCSI)
- PowerVault MD (FC)
- Compellent FS8600 (iSCSI, FC)
- EqualLogic FS7610 (iSCSI)
- FluidCache for SAN

More details in Product Sourcebook

**Optical Transceivers**  
**SFP+ 10Gb:** SR, LR, ER, LRM  
**SFP 1GbE:** SX, LX

**Optical Transceivers**  
**SFP+ 10Gb:** SR, LR

**Optical Transceivers**  
**SFP+ 10Gb:** SR, eSR

**SFP to RJ45 converter**  
 1000Base-T (only capable of 1Gbps)

**Optical Transceivers 8Gbps FC**  
 SW 150m, LW 4km

**QSFP+ to 4xSFP+ Breakout Cables**  
 5m Passive Copper  
 40GBASE-CR4 10Gb

**SFP+ Direct Attach Cable (Twinax)**  
 (0.5m, 1m, 3m, 5m, 7m available)  
 Can operate at 10Gb and 1Gb

**QSFP+ to QSFP+ Direct Attach**  
 1m, 5m Passive Copper  
 10m, 50m Active Fiber

**12-port SFP+ Module**  
 Up to four modules.

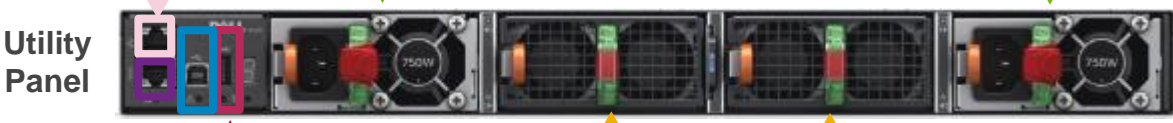
**12-port RJ-45 Module**  
 Up to four modules.

**12-port Unified Port Module**  
 Limited to only one module in a switch.

**4 integrated 40GbE QSFP+ Ports**  
 Each port can be used as 4x10GbE ports (Breakout cable required)



**Management Port (RJ-45 connector)**



**Serial Port (RJ-45 connector)**

**USB Type-A Port**

**USB Type-B Port**

**Two redundant fan modules (I/O to Utility, Utility to I/O air-flow)**

**Two redundant power supplies (AC, AC-R, DC)**

# 1Gb Ethernet iSCSI & NAS



1/10Gb  
High-density  
M6348



1/10Gb  
Basic  
M6220



1/10Gb High-density Dell N3000  
1/10Gb High-density Dell S3048-ON



1/10Gb High-density Dell N2000



1/10Gb High-density Dell S60



1/10Gb High-density Dell S3100



# M6348

1/10GbE

## High-density 1GbE copper with 10GbE uplinks

- Managed Layer 2/3 Gigabit Ethernet switch for M1000e blade enclosure
- Industry leading port availability
  - 32 internal (server) GbE ports; offering support of up to two ports per blade mezz card or Select Network Adapter (i.e. with quad-port 1GbE NICs)
  - 16 external fixed 10/100/1000Mb Ethernet RJ-45 ports
  - Up to four 10Gb uplink ports
    - 2x 10Gb Optical SFP+ (SR/LR) and/or SFP+ DAC
    - 2x 10Gb Copper CX4 or 32Gb stacking for M6348
  - Management console port
- Supports Dell Simple Switch Mode
- Stackable with rack-mount PowerConnect 7000 Series
- For optimized use (full internal-port utilization), pair with: Quad-port GbE mezz cards or Quad-port Fabric A adapters



## Adapters

Works with all 1Gb Mezzanine cards and LOMs. Optimal use is with quad-port 1Gb adapters.

Functions with all 10Gb Mezzanine cards and Select Network Adapters **with the exception of the Qlogic 8242-k, 8262-k, and Brocade BR1741M-k,**

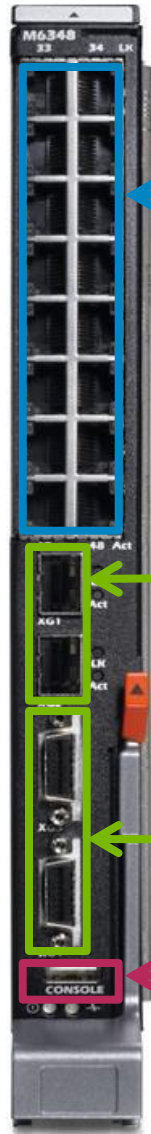
Dual port Mezzanine cards or LOMs/ Select Network Adapters will function and are fully supported with this IO module.

In such configurations, only half of the switch's internal ports will be used since the dual port Mezzanine card only has one port out to each IO module.

### More details in Adapter Portfolio section

#### Designed for I/O bays

The diagram shows three rows of I/O bays labeled A1/A2, B1/B2, and C1/C2. Each row contains two columns of ports. The A1/A2 row has blue ports, B1/B2 has red ports, and C1/C2 has green ports. The ports are arranged in a grid pattern.



**Cables**  
CAT 5



**10Gb Optical Transceivers**  
SR, LR, LRM



**Cables**



**SFP+ Direct Attach Cable (Twinax)**  
(0.5m, 1m, 3m, 5m, 7m available)



**CX4 Cables**  
for 10Gb uplinks or 32Gb M6348 stacking  
(with other M6348 or rack-mount PC 7000 series switches)  
(1m or 3m available)

**Secondary Management Serial Port**  
(Cable included)

# M6220

1/10GbE

## Basic 1GbE copper with FlexIO & 10GbE uplinks

- Gigabit Ethernet Layer 2/3 Switch
- Optional 10Gb uplinks & resilient stacking
- IPv6 support
- 24 port switch
  - 16 internal ports corresponding to 16 blade servers (1Gbps)
  - 4 external fixed RJ-45 connections (10/100/1000Mbps)
  - 2 FlexIO bays for:
    - 4 external 10Gbps uplink ports
    - or –
    - 2 external 10Gbps uplink ports and 2 external stacking ports
- Same software image features as PowerConnect 6224/6248 switches
  - Routing protocols
  - Multicast routing protocols
  - Advanced QoS
  - Advanced Security
  - IPv6
- Supports Dell Simple Switch Mode



4 x fixed  
10/100/1000Mb  
(RJ-45)

2 FlexIO Bays for:



48Gb Stacking  
Module



2 x 10Gb Optical  
SFP+ Uplinks



2 x 10GBASE-T  
Copper Uplinks



2 x 10Gb Copper  
CX-4 Uplinks



# M6220

1/10GbE

## Basic 1GbE copper with FlexIO & 10GbE uplinks

- Gigabit Ethernet Layer 2/3 Switch
- Optional 10Gb uplinks & resilient stacking
- IPv6 support
- 24 port switch
  - 16 internal ports corresponding to 16 blade servers (1Gbps)
  - 4 external fixed RJ-45 connections (10/100/1000Mbps)
  - 2 FlexIO bays for:
    - 4 external 10Gbps uplink ports
    - or –
    - 2 external 10Gbps uplink ports and 2 external stacking ports
- Same software image features as PowerConnect 6224/6248 switches
  - Routing protocols
  - Multicast routing protocols
  - Advanced QoS
  - Advanced Security
  - IPv6
- Supports Dell Simple Switch Mode



4 x fixed  
10/100/1000Mb  
(RJ-45)

2 FlexIO Bays for:



48Gb Stacking  
Module



2 x 10Gb Optical  
SFP+ Uplinks



2 x 10GBASE-T  
Copper Uplinks



2 x 10Gb Copper  
CX-4 Uplinks



# Dell Networking N2000 Series

1 Gigabit Ethernet with Layer 2+ capabilities

1/10GbE

## Key features and innovations

- Up to 220 Gbps switch fabric capacity.
- Supports up to 48 line-rate 1GbE ports per switch and up to 600 1GbE ports in a twelve-unit stack
- Standard N-Series stacking cables and built-in ports for cost-effective high-performance stacking at up to 84 Gbps
- Up to 4,094 VLANs supported
- USB Rapid deployment expedites switch configuration
- Energy Efficient Ethernet (EEE) and lower power PHYs reduce power to inactive ports and idle links
- Fresh Air® compliant for high operating temperature environments

## Energy efficient and cost effective

A powerful and economical 1 Gigabit Ethernet switching solution (with 10GbE uplink ports) for efficient Layer 2+ access for end user devices, entry-level servers, and network devices.



**Dell Networking N2000**



# N2000 - 1GbE Top-of-Rack Switch

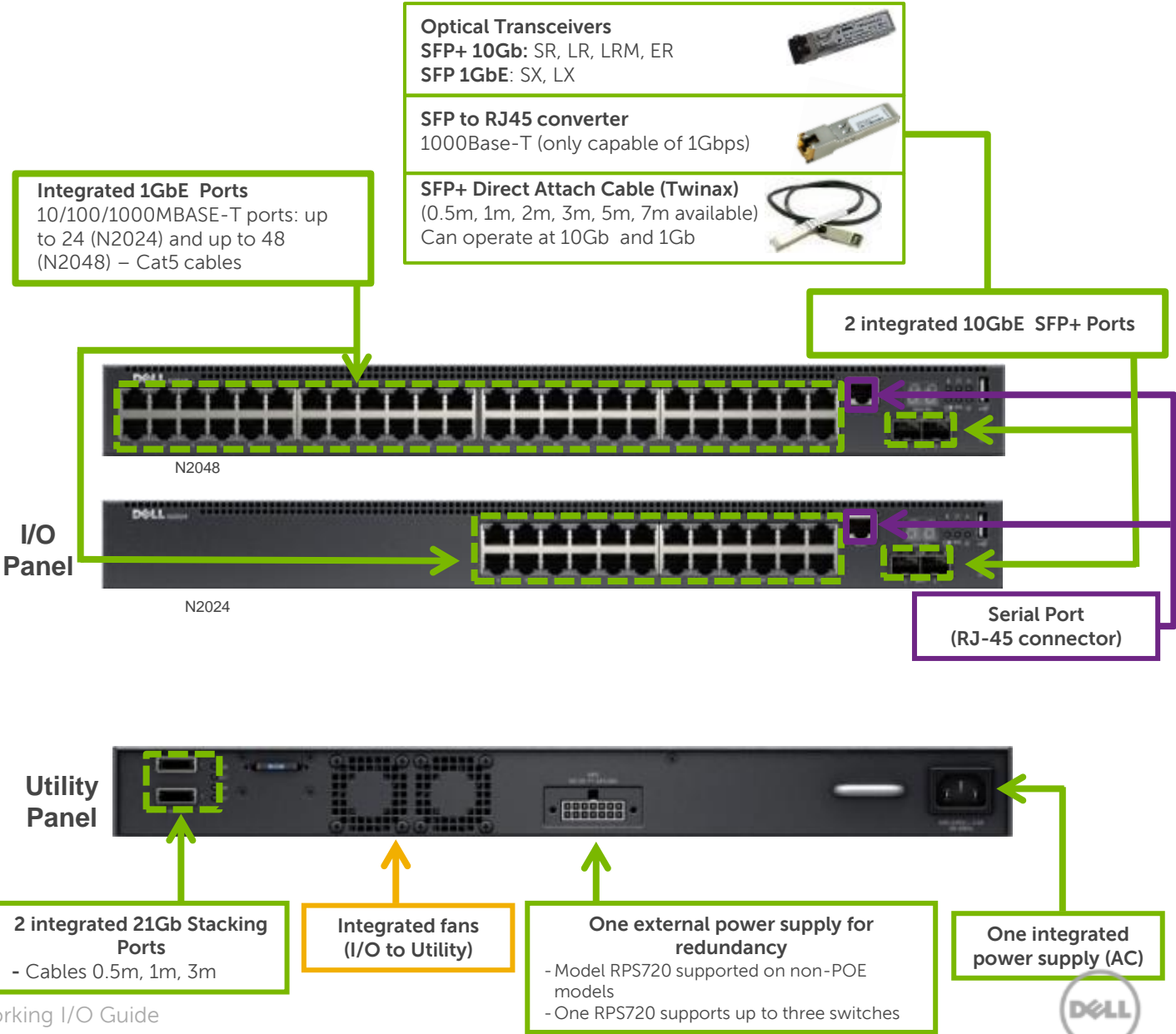
N2024 & N2048

1/10GbE

## Adapters & storage

- Dell Storage PS (iSCSI)  
- Dell Storage SC (iSCSI)  
- Dell Storage MD (iSCSI)

More details in Product Sourcebook



# Dell Networking N3000 Series

1 Gigabit Ethernet with advanced Layer 3 capabilities

1/10GbE



## Key features and innovations

- Up to 260 Gbps switch fabric capacity
- Supports up to 48 line-rate 1GbE ports per switch and up to 624 1GbE ports in a twelve-unit stack
- Hot swap expansion module supporting dual SFP+ and dual 10GBaseT
- Standard N-Series stacking cables and built-in ports for cost-effective high-performance stacking at up to 84 Gbps.
- Advanced Layer 3 functionality included
- Dual 80PLUS-certified hot swappable power supplies, Energy Efficient Ethernet & lower power PHYs reduce power to inactive ports and idle links
- Tool-less ReadyRails™ significantly reduce rack installation time

## Power efficient density for small-scale data center deployments

A power efficient and resilient 1 Gigabit Ethernet switching solution (with 10GbE for uplink ports) for small-scale data center. Dual hot-swappable 80Plus-certified power supplies add resiliency and the capacity to provide up to 48 ports in a 1RU footprint.



**Dell Networking N3000**



# N3000 - 1GbE Top-of-Rack Switch

N3024 and N3024f

1/10GbE

## Adapters & storage

- Dell Storage PS (iSCSI)  
- Dell Storage SC (iSCSI)  
- Dell Storage MD (iSCSI)

More details in Product Sourcebook

**Optical Transceivers**  
SFP 1Gb: SX, LX, ZX, BASE-T  
SFP 100Mb: FX

**24 integrated 1GbE Ports**  
1GbE SFP ports: up to 24 (N3024f)

**24 integrated 1GbE Ports**  
10/100/1000MBASE-T ports: up to 24 – Cat5 cables

**2 integrated 1GbE Combo Ports**  
N3024: 2x 1GbE SFP ports  
N3024f: 2x 1GBASE-T ports  
**(shared with ports 23-24)**

**Management Port**  
(RJ-45 connector)

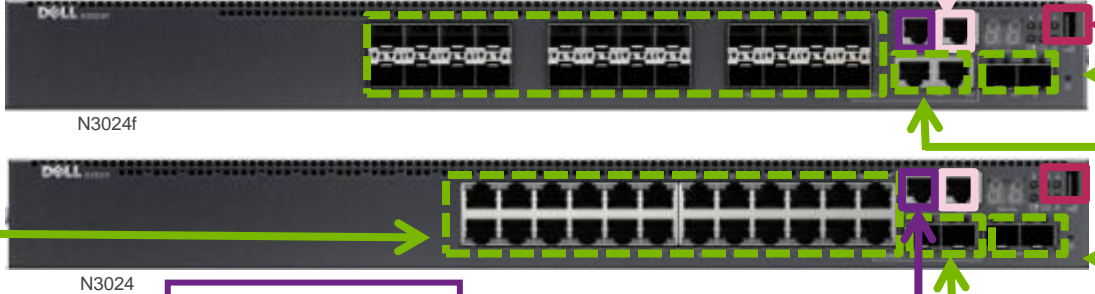
**Optical Transceivers**  
SFP+ 10Gb: SR, LR, LRM, ER  
SFP 1GbE: SX, LX

**SFP to RJ45 converter**  
1000Base-T (only capable of 1Gbps)

**SFP+ Direct Attach Cable (Twinax)**  
(0.5m, 1m, 2m, 3m, 5m, 7m available), Can operate at 10Gb & 1Gb

**2 integrated 10GbE SFP+ Fiber Ports**

**I/O Panel**



**Serial Port**  
(RJ-45 connector)

**USB Type-A Port**

**Utility Panel**



**2 port SFP+ Module**  
- Optics: SR, LR, ER, LRM  
- SFP+ to SFP+ Cables: 0.5m, 1m, 3m, 5m, 7m

**2 port 10GBASE-T Module**  
- Cat6a Cables

**Two redundant fans (I/O to Utility)**

**2 integrated 21Gb Stacking Ports**  
- Cables 0.5m, 1m, 3m

**Two redundant power supplies (AC)**



# N3000 - 1GbE Top-of-Rack Switch

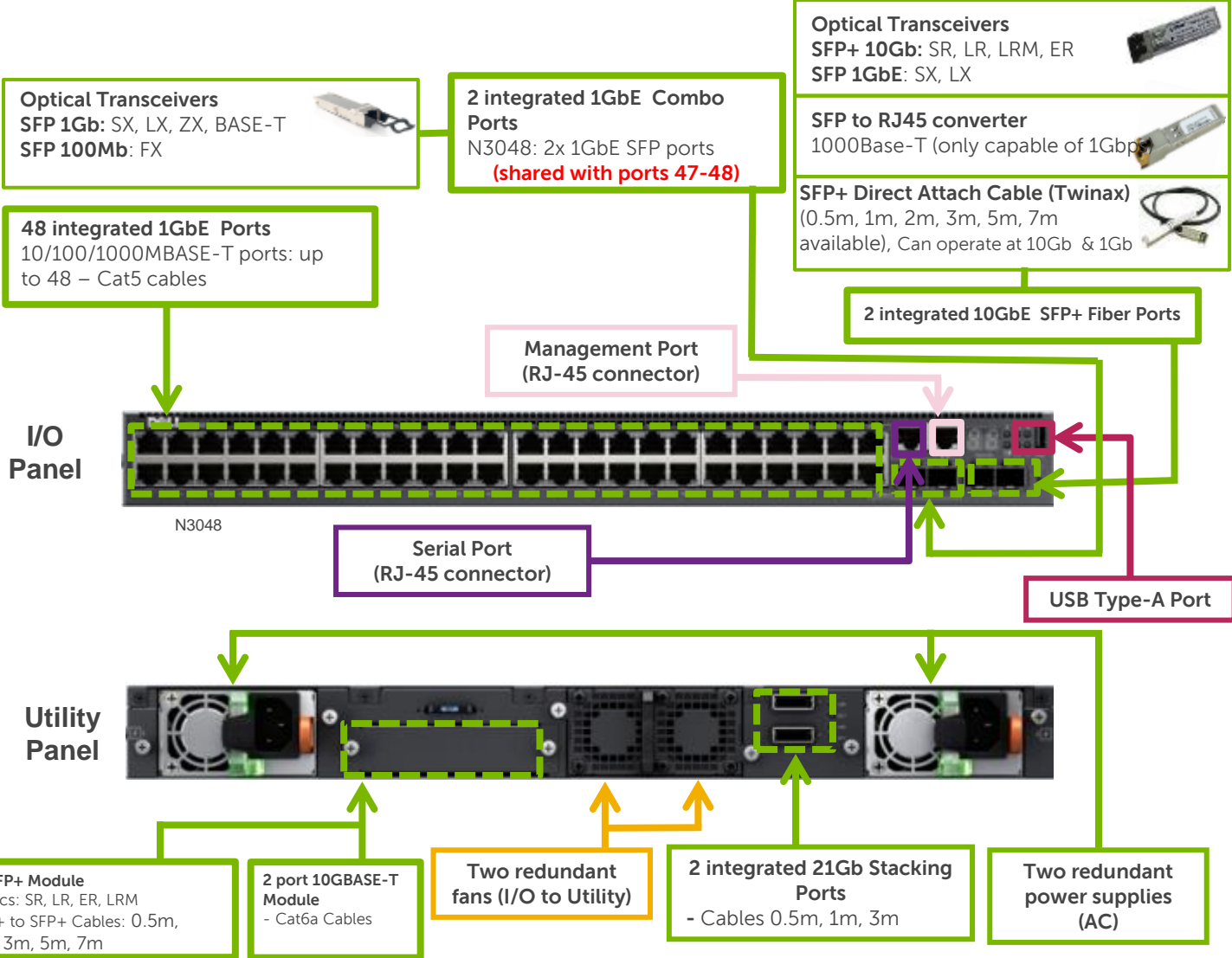
N3048 only

1/10GbE

## Adapters & storage

- Dell Storage PS (iSCSI)
- Dell Storage SC (iSCSI)
- Dell Storage MD (iSCSI)

More details in Product Sourcebook



# Dell Networking S3048-ON Series

Next-generation switch for software defined data center

- Dell's **latest generation** S-Series ultra-efficient 1/10GbE Top-of-Rack (ToR) switch
  - 48x1GBase-T & 4x10G-SFP ports
  - Built with the latest-generation merchant silicon for superior efficiency & performance
- Purpose-built for applications in high-performance data center and computing environments
  - Web/cloud service providers with Linux & OpenSource-heavy environments
  - Complete OS9 feature set including VLT, OpenFlow, Open Automation, Cloud Stack Integration (OpenStack/Microsoft/VMware/Docker) & more
- Key differentiators
  - Supports Open Networking Install Environment (ONIE)
  - Full support for with 3<sup>rd</sup> party OS and network virtualization solutions from Cumulus Networks, Microsoft, VMware and Midokura
  - Dell global support and services



**Dell Networking S3048-ON**



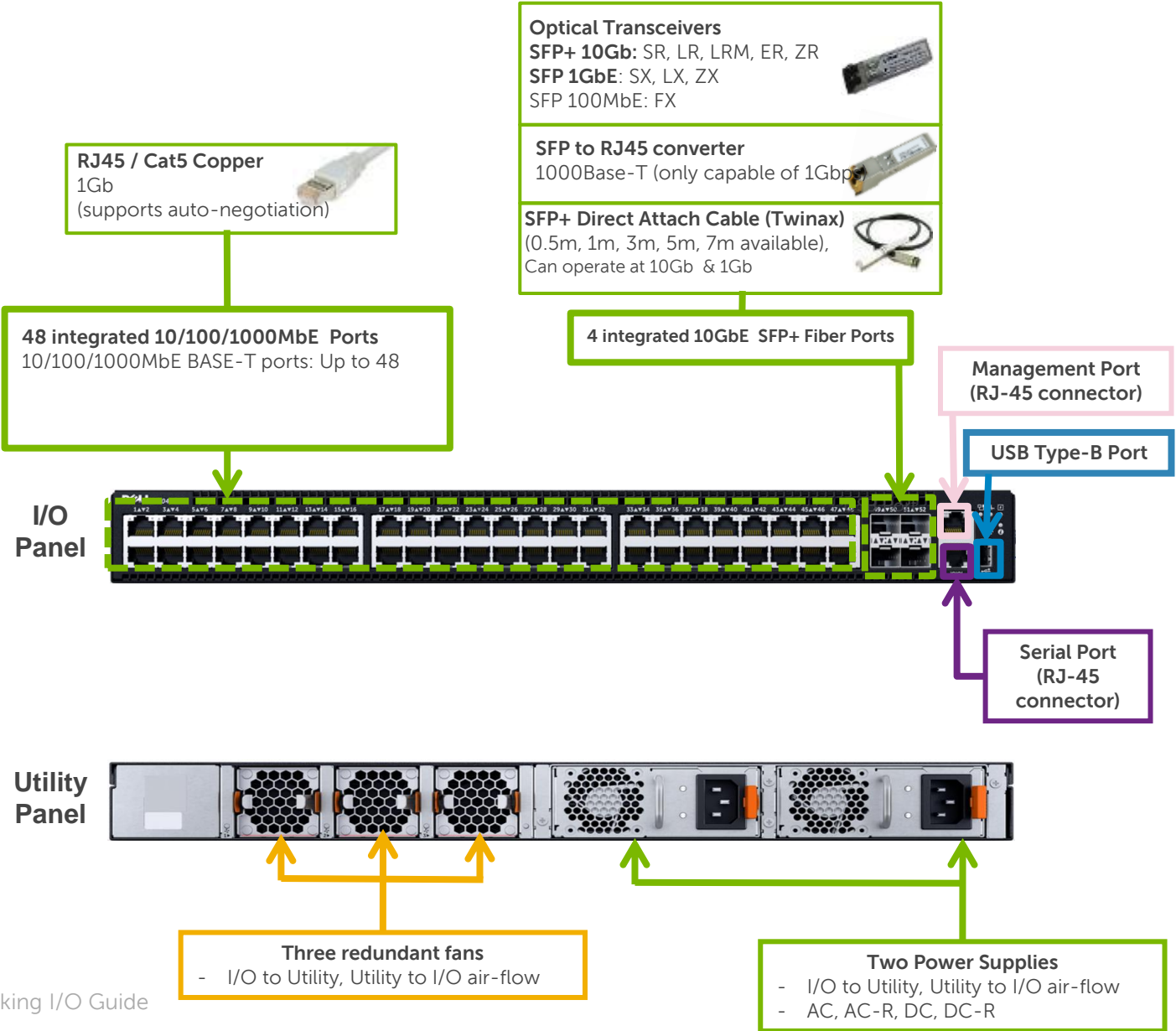
# S3048-ON – 1GbE Layer 3 Switch

1/10GbE

## Adapters & storage

- Dell Storage PS (iSCSI)  
- Dell Storage SC (iSCSI)  
- Dell Storage MD (iSCSI)

More details in Product Sourcebook



# Dell Networking S3100 Series

Advanced 1GbE layer 3 switch

- **Up to 260 Gbps** switch fabric capacity
- Supports up to **48 line-rate 1GbE ports** per switch and up to 312 1GbE ports in a six-unit stack
- **Hot swap expansion module** supporting dual SFP+ and dual 10GBaseT
- Standard N-Series stacking cables and built-in ports for **cost-effective high-performance stacking** at up to 84 Gbps.
- **OS9 Software Base** ensures availability of VLT, VRF, Automation, SDN and L2/L3 features
- Energy Efficient Ethernet and lower power PHYs **reduce power** to inactive ports and idle links
- **Tool-less ReadyRails™** significantly reduce rack installation time



**Dell Networking S3100**



# S3100 - 1GbE Top-of-Rack Switch

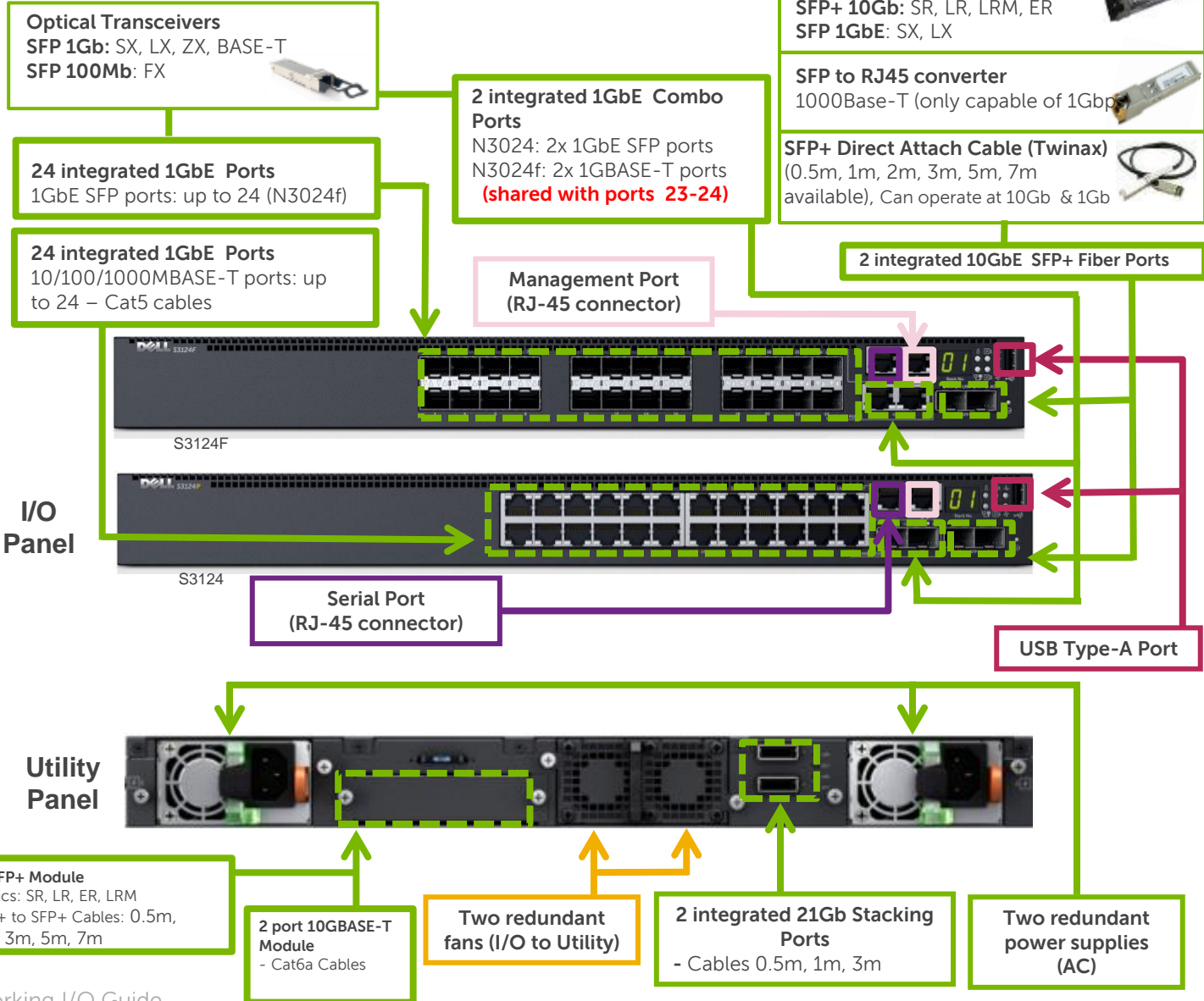
S3124 and S3124F

1/10GbE

## Adapters & storage

- Dell Storage PS (iSCSI)  
- Dell Storage SC (iSCSI)  
- Dell Storage MD (iSCSI)

More details in Product Sourcebook



# S3100 - 1GbE Top-of-Rack Switch

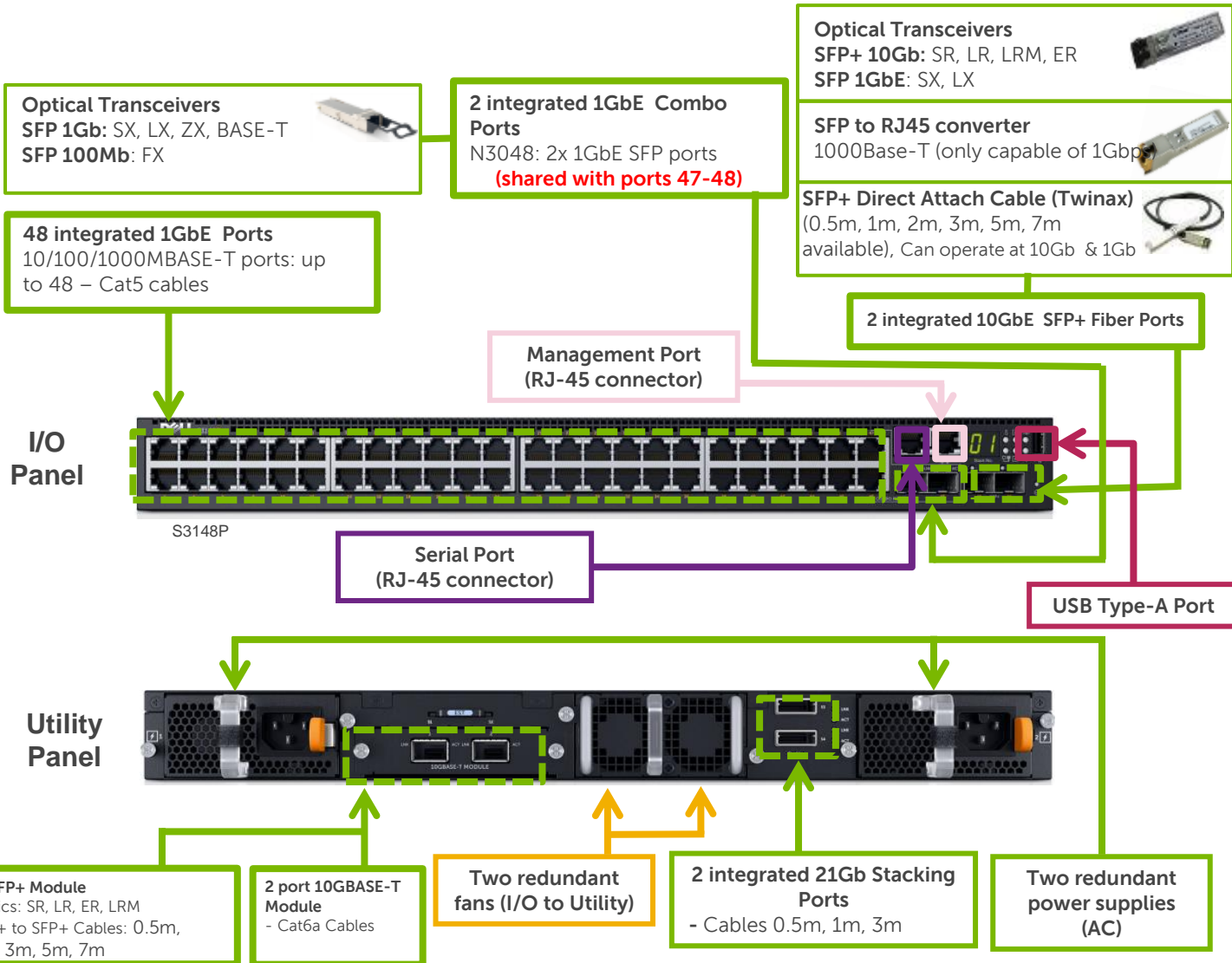
S3148P

1/10GbE

## Adapters & storage

- Dell Storage PS (iSCSI)
- Dell Storage SC (iSCSI)
- Dell Storage MD (iSCSI)

More details in Product Sourcebook



# Dell Networking S60 Series

1 Gigabit Ethernet with advanced Layer 3 capabilities

## Key features and innovations

- Up to 176 Gbps switch fabric capacity
- Low latency switching for high-performance iSCSI SANs
  - S60 offers deep buffer to help further optimize the performance
- Supports up to 48 line-rate 1GbE ports per switch and up to 624 1GbE ports in a twelve-unit stack
- expansion module supporting dual SFP+ and dual/single port 12Gbps Stacking
- Cost-effective high-performance stacking at up to 96 Gbps.
- Advanced Layer 3 functionality included

## Power efficient density for small-scale data center deployments

A power efficient and resilient 1 Gigabit Ethernet switching solution (with 10GbE for uplink ports) for small-scale data center. Dual hot-swappable power supplies add resiliency and the capacity to provide up to 48 ports in a 1RU footprint.



Dell Networking S60



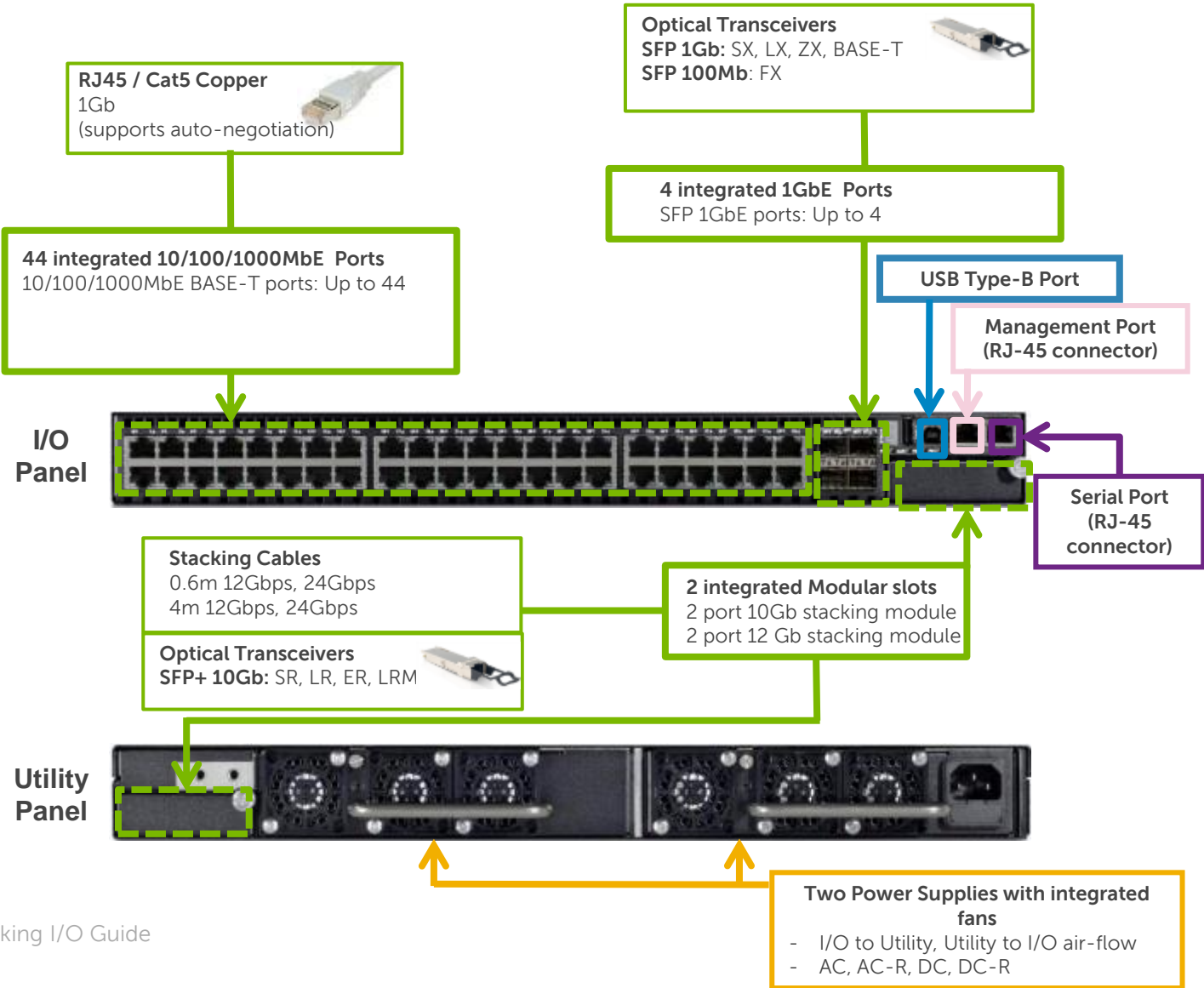
# S60 – 1GbE Layer 3 Switch

1/10GbE

## Adapters & storage

- Dell Storage PS (iSCSI)
- Dell Storage SC (iSCSI)
- Dell Storage MD (iSCSI)

More details in Product Sourcebook





# 10/40Gb Ethernet iSCSI & NAS



10/40Gb Switch N4000



10/40Gb Switch S5000\*



10/40Gb Switch S4048-ON



10/40Gb Switch S6000



10/40Gb  
Switch  
MXL \*



10Gb  
Plug & Play  
M-IOA \*



10/40Gb Switch S4820T



# Dell Networking N4000 Series

10 Gigabit Ethernet with advanced Layer 3 capabilities

## Key features and innovations

- Up to 1.2Tbps switch fabric capacity
- Supports up to 64 line-rate 10GbE ports per switch and up to 672 10GbE ports in a twelve-unit stack with user port stacking at up to 320 Gbps
- Hot swap expansion module supporting dual QSFP+ (8 x 10GbE), Quad 10GBaseT, and Quad SFP+
- Plug-and-Play configuration with Dell EqualLogic™ and validated with Dell Compellent™ iSCSI storage arrays
- Energy Efficient Ethernet (EEE) and lower power PHYs reduce power to inactive ports and idle links
- Tool-less rails significantly reduce rack installation time
- **Converged iSCSI with EqualLogic** (supports iSCSI TLV)



**Dell Networking N4000**

## Deliver more bandwidth in small-scale data center

A high density, power efficient, and flexible 1/10/40 Gigabit Ethernet switching solution for simple scalability and high density. Resilient stacking architecture delivers reliable network performance and amazing density for demanding network environments. Helps future-proof investments as enterprises migrate from 10GbE core deployments to 40GbE.

# N4000 - 10GbE Top-of-Rack Switch

10/40GbE

N4032 and N4032f

## Adapters & storage

- EqualLogic PS (iSCSI)

More details in Product Sourcebook

**Optical Transceivers**  
SFP+ 10Gb: SR, LR, ER, LRM  
SFP 1GbE: SX, LX



**SFP to RJ45 converter**  
1000Base-T (only capable of 1Gbps)



**SFP+ Direct Attach Cable (Twinax)**  
(0.5m, 1m, 2m, 3m, 5m, 7m available)  
Can operate at 10Gb and 1Gb



**QSFP+ to 4xSFP+ Breakout Cable**  
5m Passive Copper  
40GBASE-CR4 10Gb



**QSFP+ to QSFP+ Direct Attach**  
1m, and 5m, Passive Copper  
40GBASE-CR4 40Gb  
1m, 5m, 15m PSM4 MPO Pigtail



**Optical Transceivers**  
QSFP+ 40Gb: SR, ESR, LR4



**24 integrated 10GbE Ports**  
1/10GBASE-T ports: up to 24  
(N4032) – Cat6a cables

**24 integrated 10GbE Ports**  
SFP+ 10GbE: Up to 24  
(N4032f)

4 port SFP+ Module

4 port 10GBASE-T Module  
- Cat6a Cable

2 port QSFP+ Module

I/O Panel



Serial Port (RJ-45 connector)

USB Type-A Port

Utility Panel



Management Port (RJ-45 connector)

Two redundant fan modules  
(I/O to Utility)

Two redundant power supplies (AC)

# N4000 - 10GbE Top-of-Rack Switch

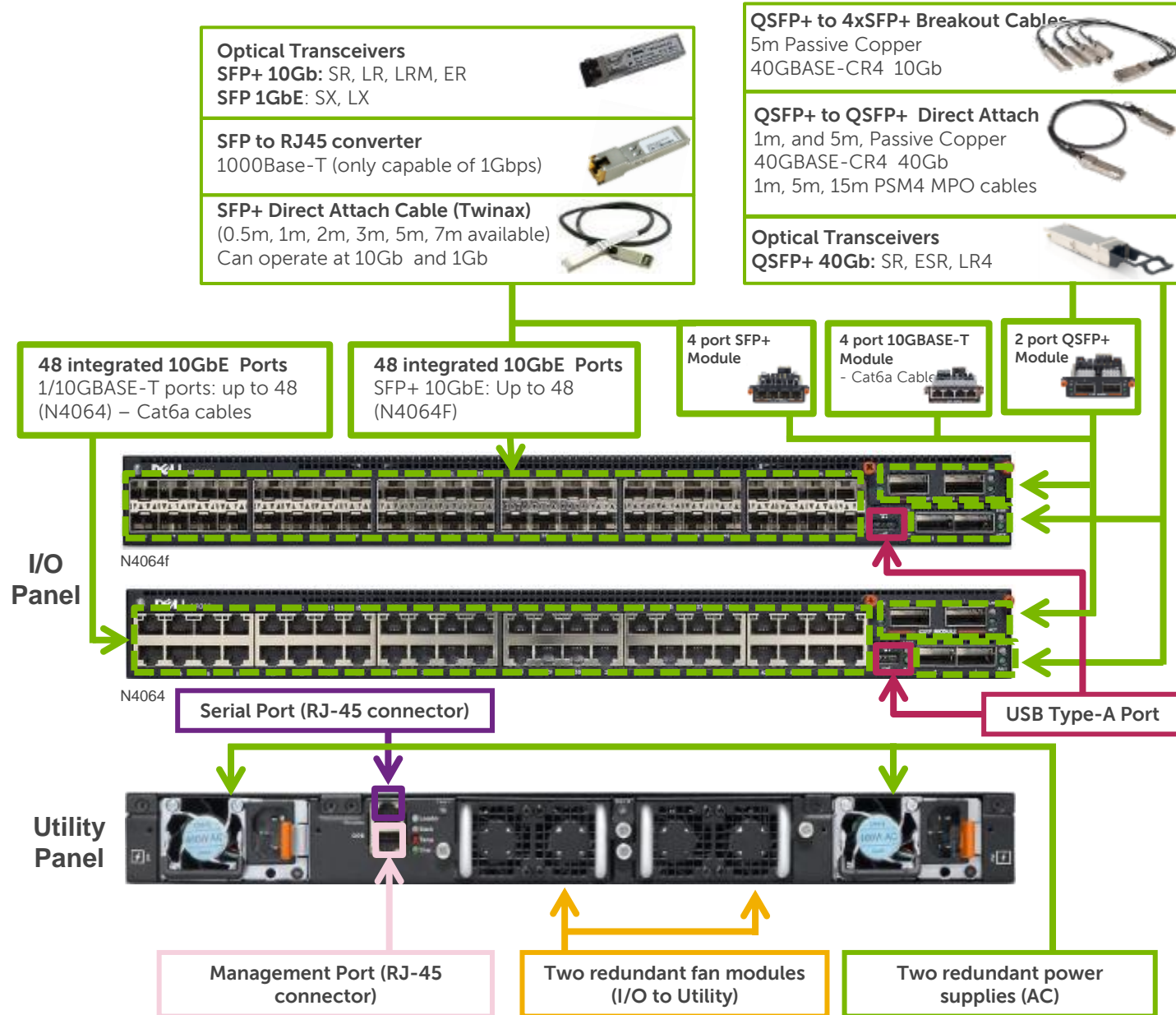
10/40GbE

N4064 and N4064f

## Adapters & storage

- EqualLogic PS (iSCSI)

More details in Product Sourcebook



# Dell Networking S4820T switch

1/10/40GbE top-of-rack switch

## Accelerate 1G to 10GbE migration

- **Dell Networking Operating System 9**
  - 48 x 1/10G
  - 4 x 40G fabric uplinks (or 16 x 10G)
- **Built-in** virtualization support (VMware, Citrix)
- **Open Networking** capable on select models
- **Converged iSCSI with EqualLogic** (supports iSCSI TLV)
- Integrated **Open Automation**, scripting and programmatic management



Dell 4820T



+



Great with Dell servers & storage

# S4820-T - 10GbE Top-of-Rack Switch

10/40GbE



## Adapters & storage

- Intel X540 2P NIC
- EqualLogic PS (iSCSI)
- EqualLogic FS7610 (iSCSI)

More details in Product Sourcebook

RJ45 / Cat6a Copper  
10Gb/1Gb  
(supports auto-negotiation)



48 integrated 10GbE (RJ-45) Ports  
10GBASE-T ports: Up to 48

I/O Panel



Optical Transceivers  
QSFP+ 10Gb: SR, eSR, LR4



QSFP+ to 4xSFP+ Breakout Cables  
5m Passive Copper  
40GBASE-CR4 10Gb



QSFP+ to QSFP+ Direct Attach  
1m, 5m Passive Copper  
10m, 50m Active Fiber  
1m, 5m, 15m PSM MPO Cable



4 integrated 40GbE QSFP+ Ports  
QSFP+ 40GbE: Up to 4

Each port can be used as 4x10GbE ports  
(Breakout cable required)

Serial Port (RJ-45 connector)

Utility Panel



Management Port (RJ-45 connector)

Two redundant fan modules  
(I/O to Utility, Utility to I/O air-flow)

Two redundant power supplies (AC, AC-R, DC)

# Dell Networking S6000 high-density switch

Purpose-built for the Virtual Era

- **High-throughput low-latency performance** for demanding workloads
- **Built-in virtualization** features to scale virtual machine deployment
- **Integrated** automation, scripting and programmatic management with **Open Automation Framework**
- **Energy-efficient**, low power solution, Fresh Air capable for chiller-less operation
- **Converged iSCSI with EqualLogic** (supports iSCSI TLV)

**\*Winner:**

- **2013 Innovative Products & Solutions' award – China Network World**
- **2013 Product of the Year' award - It168.com**



**Dell Networking S6000**

# S6000 - 40GbE Spine / 10GbE High-density ToR



## Adapters & storage

- Broadcom 57840S 4P SFP+ 10G
- Broadcom 57810S 2P SFP+ NIC
- Broadcom 5720 SFP 1G
- Qlogic QLE8262 SFP+ NIC
- Emulex OCe 14102
- Mellanox ConnectX-3 SFP+ 40G
- FluidCache for SAN

More details in Product Sourcebook

**Optical Transceivers**  
SFP+ 10Gb: SR, eSR

**QSFP+ to 4xSFP+ Breakout Cables**  
5m Passive Copper  
40GBASE-CR4 10Gb  
40GBASE-QSA 1Gb

**QSFP+ to QSFP+ Direct Attach**  
1m, 5m Passive Copper  
10m, 50m Active Fiber

**32 integrated 40GbE QSFP+ Ports**  
QSFP+ 40GbE: Up to 32  
SFP+ 10GbE: Up to 104 (26x 40GbE ports with breakout cables)  
**Each port can be used as 4x10GbE ports (Breakout cable required)**

I/O Panel



**USB Type-B Port**

**Serial Port (RJ-45 connector)**

**USB Type-A Port**

**Management Port (RJ-45 connector)**

Utility Panel



**Three redundant fan modules (I/O to Utility, Utility to I/O air-flow)**

**Two redundant power supplies (AC, AC-R, DC)**



# Fibre Channel



8Gb Brocade 300



16Gb Brocade 6505



16Gb Brocade 6510



16Gb Brocade 6520



16Gb Brocade 8510



16Gb  
M6505

8Gb  
M5424

8Gb  
Pass-  
Through

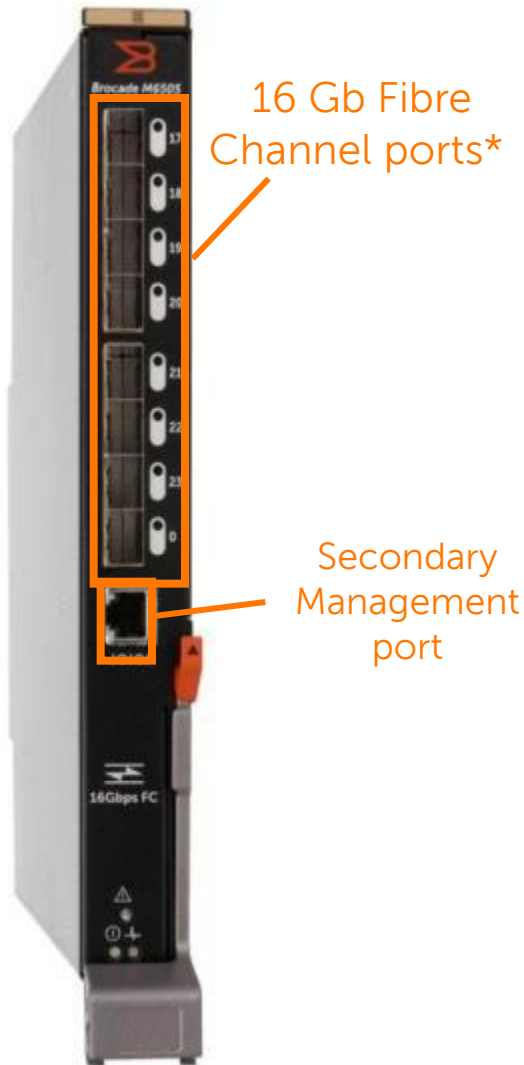
See also the MXL, IOA, FN-IOM, and S5000 in the Converged Ethernet section



# Brocade M6505

## 16Gb switch

Fibre Channel



- 24 Fibre Channel ports
  - Up to 16 internal 16/8Gb server ports\*
  - Up to 8 external 16/8/4Gb SAN ports\*\*

\*The M6505 requires the enhanced midplane 1.1. The M6505 will not function with the original 1.0 midplane.

\*\*For connection to storage devices and/or other FC switches only
- Zero footprint, hot-pluggable design with no additional fans or power supplies
- Complete redundancy, up to 4 switches per chassis
- Dynamic Ports on Demand (PoD) and “pay-as-you-grow” port upgrades for 12-port configurations
- Heterogeneous SAN fabric interoperability
- Access Gateway (NPIV) or fabric switch connectivity
- Auto-sensing and speed-matching connections to 16/8/4 Gbps to Fibre Channel devices



# Brocade M6505

## 16Gb switch

Fibre Channel



### Adapters

#### 12G & 13G

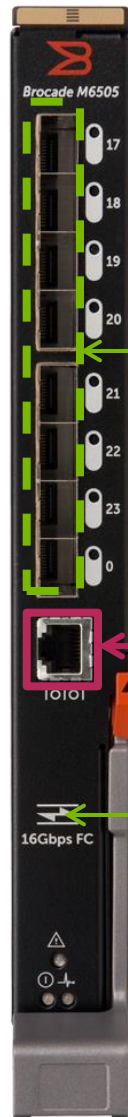
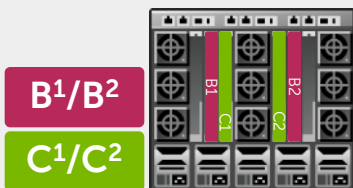
- Emulex LPe1205-M FC8
- Emulex LPm16002B FC16
- Qlogic QME2572 FC8
- Qlogic QME2662 FC16

\*The M6505 requires the enhanced midplane (1.1). The switch will not function with the original midplane (1.0).

Does not support 4Gb Mezzanine cards.

More details in Adapter Portfolio section

### Designed for I/O bays



**Brocade Transceivers**  
Brocade SWL, LWL or ELWL 16Gb SFP+ Optics  
Brocade SWL, LWL or ELWL 8Gb SFP+ Optics  
Brocade SWL, LWL or ELWL 4Gb SFP+ Optics  
  
Note: Requires SFP LC connector



**Secondary Management Serial Port**

**Available Models - Brocade M6505**

- (16) internal and (8) SFP+ external FC16 ports with (8) FC16 SWL transceivers and Enterprise Performance Pack
- (16) internal and (8) SFP+ external FC16 ports with (4) FC16 SWL transceivers
- (8) internal and (4) SFP+ external FC16 ports with (2) FC16 SWL transceivers (12 port model expands to 24 ports with on-demand license)

# Brocade M5424

## 8Gb switch

Fibre Channel



- 8/4 Gbps Fibre Channel SAN solution
- Provides up to 24 8/4Gb FC ports
  - Up to 16 internal 8/4Gb server ports
  - Up to 8 external 8/4Gb SAN ports\*  
\*For connection to storage devices and/or other FC switches only
- One management console port
- Configurable as Brocade full fabric switch or Access Gateway Mode (NPIV) for multi-vendor interoperability
- Auto-negotiates between 4Gbps and 8Gbps based on linked mezzanine cards and top-of-rack switches
- Supports future FOS features and upgrades



# Brocade M5424

## 8Gb switch

Fibre Channel



### Adapters

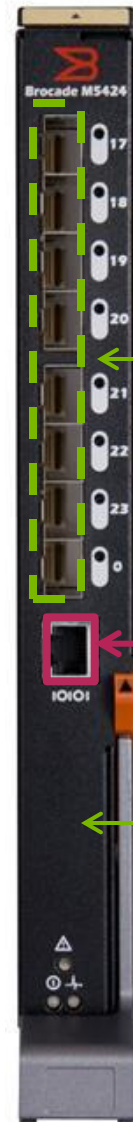
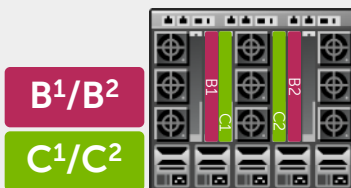
#### 12G & 13G

- Emulex LPe1205-M FC8
- Emulex LPm16002B FC16 (@ FC8 speeds)
- Qlogic QME2572 FC8
- Qlogic QME2662 FC16 (@FC8 speeds)

FC4 Mezzanine cards are also supported with this switch at 4Gbps.

More details in Adapter Portfolio section

#### Designed for I/O bays



#### Brocade Transceivers

- Brocade SWL or LWL 8Gb SFP+ Optics
- Brocade SWL, LWL or ELWL 4Gb SFP+ Optics

Note: Requires SFP LC connector

#### Cables



#### Secondary Management Serial Port

#### Available Models - Brocade M5424

- (16) internal and (8) SFP+ external FC8 ports with (8) FC8 SWL transceivers and Enterprise Performance Pack
- (16) internal and (8) SFP+ external FC8 ports with (4) FC8 SWL transceivers
- (8) internal and (4) SFP+ external FC8 ports with (2) FC8 SWL transceivers (12 port model expands to 24 ports with on-demand license)



# Dell 8/4Gbps FC Pass-Through

- 16 ports correspond to 16 server blades
- 8, 4, or 2 Gbps connections
- Transparent connection between SAN and server blades
- As an alternative to this FC8 Pass-Through, the **M IOA populated with FC Flex IO Modules** (NPIV aggregator) provides the simplicity of a pass-through with the aggregation/redundancy benefits of a switch.





# Dell 8/4Gbps FC Pass-Through

## Adapters



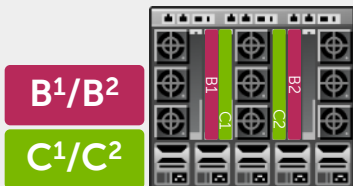
### 12G & 13G

- Emulex LPe1205-M FC8
- Qlogic QME2572 FC8

\*FC4 Mezzanine cards will function with this pass-through. Doing so will cause the pass-through to run at 4Gbps rather than the full-capability 8Gbps.

More details in Adapter Portfolio section

## Designed for I/O bays



**Brocade Transceivers**  
16 pre-installed 8Gbps SWL SFP+ transceivers (one per port)

## Cables



# Brocade 300

## 8Gb switch

Fibre Channel



- Affordable, flexible foundation for entry-level SAN
  - Enables “pay-as-you-grow” scalability from 12 to 24 ports
  - Delivers 40 percent higher performance at a comparable cost compared to 10 GbE
- A simpler way to build your SAN
  - Installs in three easy steps using Brocade EZSwitchSetup
  - Leverages Brocade Access Gateway for simple server connectivity and SAN scalability
- Enterprise features at an entry-level price
  - Leverages Fibre Channel technology that is proven in 90 percent of Fortune 1000 data centers
  - Features enhanced diagnostics and RAS functionality to help minimize downtime
  - Maximizes availability with redundant, hot-pluggable components and non-disruptive software upgrades



**Brocade 300**



# 300 - 8Gbps Fibre Channel Channel Fabric Switch

Fibre Channel



## Adapters

- Brocade 815/825 8GB HBA
- Qlogic 2460/2462 4Gb HBA
- Qlogic 2560/2562 8GB HBA
- Emulex 12000/12002 8Gb HBA
  
- Dell Storage SC9000 (FC)
- Compellent SC8000 (FC)
- Compellent SC4020 (FC)
- Dell Storage SCv2000 (FC)
- PoowerVault MD (FC)

More details in Product Sourcebook

### Cables



### Brocade Transceivers

- Brocade SWL, LWL or ELWL 8Gb SFP+ Optics
- Brocade SWL, LWL or ELWL 4Gb SFP+ Optics

Note: Requires SFP LC connector



### USB Type-A Port

### Management Port (RJ-45 connector)

### 24 integrated 8Gbps FC SFP+ Ports

SFP+ FC: Up to 24 ports, operates at 8Gbps, 4Gbps, 2Gbps, or 1Gbps

- 24 ports, ships with 24 8Gbps SFP+ optics
- 8\* ports, ships with 8 8Gbps SFP+ optics (Expandable to 24 with POD licenses)

### I/O Panel



### Serial Port (RJ-45 connector)

### One integrated power supply (AC)

### Utility Panel



### Integrated fans (Utility to I/O air-flow)



# Brocade 6505

16Gb switch

Fibre Channel



- Flexibility to grow your business on your terms
  - Enables “pay-as-you-grow” scalability from 12 to 24 ports
- A simpler way to build your SAN
  - Installs in three easy steps using Brocade EZSwitchSetup
  - Leverages Brocade Access Gateway for simple server connectivity and SAN scalability
- Enterprise features at an entry-level price
  - Leverages Fibre Channel technology that is proven in 90 percent of Fortune 1000 data centers
  - Features enhanced diagnostics and RAS functionality to help minimize downtime
  - Maximizes availability with redundant, hot-pluggable components and non-disruptive software upgrades



**Brocade 6505**



# 6505 - 16Gbps Fibre Channel Fabric Switch

Fibre Channel



## Adapters

- Brocade 815/825 8GB HBA
- Qlogic 2460/2462 4Gb HBA
- Qlogic 2560/2562 8GB HBA
- Emulex 12000/12002 8Gb HBA
- Emulex 16000/16002 16Gb HBA
  
- Dell Storage SC9000 (FC)
- Compellent SC8000 (FC)
- Compellent SC4020 (FC)
- Dell Storage SCv2000 (FC)
- PowerVault MD (FC)

More details in Product Sourcebook

## Cables



## Brocade Transceivers

- Brocade SWL, LWL or ELWL 16Gb SFP+ Optics
- Brocade SWL, LWL or ELWL 8Gb SFP+ Optics
- Brocade SWL, LWL or ELWL 4Gb SFP+ Optics

Note: Requires SFP LC connector



## 24 integrated 16Gbps FC SFP+ Ports

**SFP+ FC:** Up to 24 ports, operates at 16Gbps, 8Gbps, 4Gbps, or 2Gbps

- 24 ports, ships with 24 16Gbps SFP+ optics
- 12\* ports, ships with 12 16Gbps SFP+ optics
- 12\* ports, ships with 12 8Gbps SFP+ optics (Expandable to 24 with POD licenses)

Management Port (RJ-45 connector)

USB Type-A Port

I/O Panel

Serial Port (RJ-45 connector)

Utility Panel

Two redundant power supplies with integrated fans (AC)

- Utility to I/O air-flow
- Ships with one power supply



# Brocade 6510

16Gb switch

Fibre Channel



- Flexibility to grow your business on your terms
  - Enables “pay-as-you-grow” scalability from 24 to 48 ports
  - Multi-tenancy features such as virtual fabrics, QoS, and zoning
  - Small footprint for flexible deployments
- A simpler way to build your SAN
  - Installs in three easy steps using Brocade EZSwitchSetup
  - Easily connects servers to the fabric with automatic recognition and provisioning
  - Cable and optics diagnostics
- Optimized SAN Performance for CloudApps
  - Optimized for emerging workloads – VDI, shared storage, and SSD arrays
  - Configurable ports for 10Gbps metro optical connectivity
  - Industry-leading 128Gbps ISL Trunk
  - Extended distance support of native Fibre Channel up to 7500km at 2Gbps



**Brocade 6510**



# 6510 - 16Gbps Fibre Channel Fabric Switch

Fibre Channel



## Adapters

- Brocade 815/825 8Gb HBA
- Qlogic 2460/2462 4Gb HBA
- Qlogic 2560/2562 8Gb HBA
- Emulex 12000/12002 8Gb HBA
- Emulex 16000/16002 16Gb HBA
- Dell Storage SC9000 (FC)
- Compellent SC8000 (FC)
- Compellent SC4020 (FC)
- Dell Storage SCv2000 (FC)
- PowerVault MD (FC)

More details in Product Sourcebook

## Cables



### Brocade Transceivers

- Brocade SWL, LWL or ELWL 16Gb SFP+ Optics
- Brocade SWL, LWL or ELWL 8Gb SFP+ Optics
- Brocade SWL, LWL or ELWL 4Gb SFP+ Optics

Note: Requires SFP LC connector

### 48 integrated 16Gbps FC SFP+ Ports

**SFP+ FC:** Up to 48 ports, operates at 16Gbps, 8Gbps, 4Gbps, or 2Gbps

- 48 ports, ships with 48 16Gbps SFP+ optics
- 24\* ports, ships with 24 16Gbps SFP+ optics
- 24\* ports, ships with 24 8Gbps SFP+ optics (Expandable to 48 with POD licenses)

Management Port (RJ-45 connector)

USB Type-A Port

I/O Panel

Serial Port (RJ-45 connector)

Utility Panel

Two redundant power supplies with integrated fans (AC)

-Utility to I/O air-flow, I/O to utility air-flow



# Brocade 6520

## 16Gb switch

Fibre Channel



- Flexibility to grow your business on your terms
  - Enables “pay-as-you-grow” scalability from 48 to 96 ports
- A simpler way to build your SAN
  - Simplifies management through Brocade Fabric Vision technology, reducing operational costs and optimizing application performance
  - Leverages Brocade Access Gateway for simple server connectivity and SAN scalability
- Enterprise features at an entry-level price
  - Leverages Fibre Channel technology that is proven in 90 percent of Fortune 1000 data centers
  - Features enhanced diagnostics and RAS functionality to help minimize downtime
  - Maximizes availability with redundant, hot-pluggable components and non-disruptive software upgrades



**Brocade 6520**



# 6520 - 16Gbps Fibre Channel Fabric Switch

Fibre Channel



## Adapters

- Brocade 815/825 8GB HBA
- Qlogic 2460/2462 4Gb HBA
- Qlogic 2560/2562 8GB HBA
- Emulex 12000/12002 8Gb HBA
- Emulex 16000/16002 16Gb HBA

- Dell Storage SC9000 (FC)
- Compellent SC8000 (FC)
- Compellent SC4020 (FC)
- Dell Storage SCv2000 (FC)
- PoowerVault MD (FC)

More details in Product Sourcebook

## Cables



### Brocade Transceivers

- Brocade SWL, LWL or ELWL 16Gb SFP+ Optics
- Brocade SWL, LWL or ELWL 8Gb SFP+ Optics
- Brocade SWL, LWL or ELWL 4Gb SFP+ Optics

Note: Requires SFP LC connector

### 96 integrated 16Gbps FC SFP+ Ports

**SFP+ FC:** Up to 96 ports, operates at 16Gbps, 8Gbps, 4Gbps, or 2Gbps

- 96 ports, ships with 96 16Gbps SFP+ optics
  - 48\* ports, ships with 48 16Gbps SFP+ optics
  - 48\* ports, ships with 48 8Gbps SFP+ optics
- (Expandable to 96 with POD licenses)

Serial Port (RJ-45 connector)

USB Type-A Port

I/O Panel

Management Port (RJ-45 connector)

Utility Panel



Two redundant power supplies (AC)

Three redundant fans (Utility to I/O air-flow, I/O to utility air-flow)

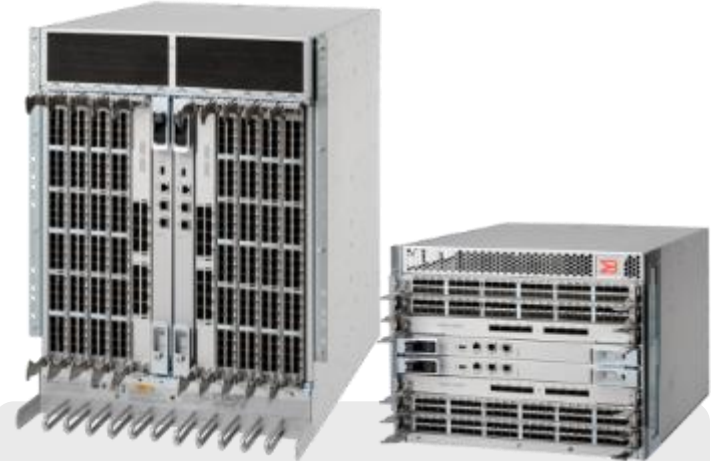
# Brocade 8510

## 16Gb switch

Fibre Channel



- Industry's most powerful SAN infrastructure
  - Reduce network complexity, management, and costs by enabling flatter, low-latency chassis connectivity
  - Integrated metro and global SAN extension enables flexible, high-speed business continuity and disaster recovery solutions
- A simpler way to build your SAN
  - Installs in three easy steps using Brocade EZSwitchSetup
  - Leverages Brocade Access Gateway for simple server connectivity and SAN scalability
- Enterprise features at an entry-level price
  - Leverages Fibre Channel technology that is proven in 90 percent of Fortune 1000 data centers
  - Features enhanced diagnostics and RAS functionality to help minimize downtime
  - Maximizes availability with redundant, hot-pluggable components and non-disruptive software upgrades



**Brocade 8510**



# 8510- 16Gbps Fibre Channel Director

Fibre Channel



## Adapters

### Brocade Transceivers

Brocade SWL, LWL or ELWL 16Gb SFP+ Optics  
 Brocade SWL, LWL or ELWL 8Gb SFP+ Optics  
 Brocade SWL, LWL or ELWL 4Gb SFP+ Optics

Note: Requires SFP LC connector

### Cables



**Cables (operates at 16Gbps, 8Gbps, or 4Gbps)**  
 QSFP (MPO/MTP) to QSFP (MPO/MTP) cable: 1m, 3m, 20m, 50m  
 QSFP (MPO/MTP) to 4x SFP+ (LC): 1m, 3m, 20m, 50m

### Brocade Transceivers

Brocade SWL, LWL or ELWL 8Gb SFP+ Optics  
 Brocade SWL, LWL or ELWL 4Gb SFP+ Optics

### 32 port 16Gbps Blade



### 48 port 16Gbps Blade



### 64 port 16Gbps Blade



### 64 port 8Gbps Blade



- Brocade 815/825 8GB HBA
- Qlogic 2460/2462 4Gb HBA
- Qlogic 2560/2562 8GB HBA
- Emulex 12000/12002 8Gb HBA
- Emulex 16000/16002 16Gb HBA

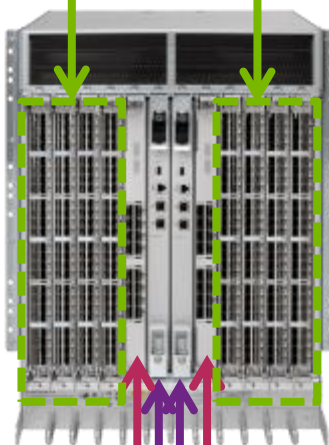
- Dell Storage SC9000 (FC)
- Compellent SC8000 (FC)
- Compellent SC4020 (FC)
- Dell Storage SCv2000 (FC)
- PoowerVault MD (FC)

More details in  
Product Sourcebook



**Three redundant fans**  
 - Two required for operation

**Four redundant power supplies with integrated fans (AC)**  
 - Utility to I/O air-flow  
 - Ships with two

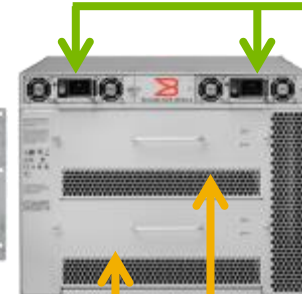
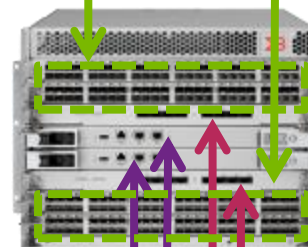


**Two redundant Control Processor (CP) modules**

**Two redundant Control Switching (CR) modules**

8 modular I/O slots

4 modular I/O slots



**Two redundant fans**  
 - Two required for operation

**Two redundant power supplies with integrated fans (AC)**  
 - Utility to I/O air-flow  
 - Ships with two

# Storage Arrays Guide



Dell SC9000



Dell SC8000



Dell SC4020



Dell SC2000



Dell FS8600



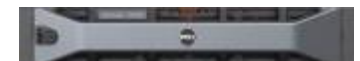
Dell PS6210



Dell PS61x0/41x0



Dell PS6510/6500



Dell FS76x0



Dell XC



Dell MD3



# Dell Storage SC9000



Ultimate in storage performance, efficiency, and scalability

- **Dual controller** system based on a 2U rack chassis with integrated Dell Remote Access Controller (iDRAC)
- Dell 13G server architecture, Dual 3.2GHz eight-core Intel® processors
- 4x system memory<sup>1</sup>, 12G SAS back-end, 40% more IOPS, 110% more throughput<sup>1</sup>
- Modular hot-swap design
- SAN and/or NAS storage from same pool, Multiprotocol networks (FC, iSCSI, FCoE )
- Self-optimizing, virtualized architecture lowers costs, keeps performance high
- RAID tiering and auto-provisioning
- Built-in Live Volume auto-failover and auto-repair
- Multi-array federation, with proactive Volume Advisor
- Compression on SSD or HDD tiers



**Dell Storage SC9000**

# SC9000 – Multi-protocol Storage Array



## Networking

- Brocade 300 (FC)
- Brocade 6505 (FC)
- Brocade 6510 (FC)
- Brocade 6520 (FC)
- Brocade 8510 (FC)
- Brocade M5424 (FC)
- Brocade M6505 (FC)
- Brocade M8428-k (iSCSI, FC)
- Dell S5000 (iSCSI, FC with HBA and CNA)
- Dell S4048-ON (iSCSI)
- Dell S6000 (iSCSI)
- MXL/IOA (iSCSI)
- Dell N3000 (iSCSI)
- Dell S3048-ON (iSCSI)
- Dell N4000 (iSCSI)
- Dell S3100 (iSCSI)

More details in Dell Storage Compatibility Matrix

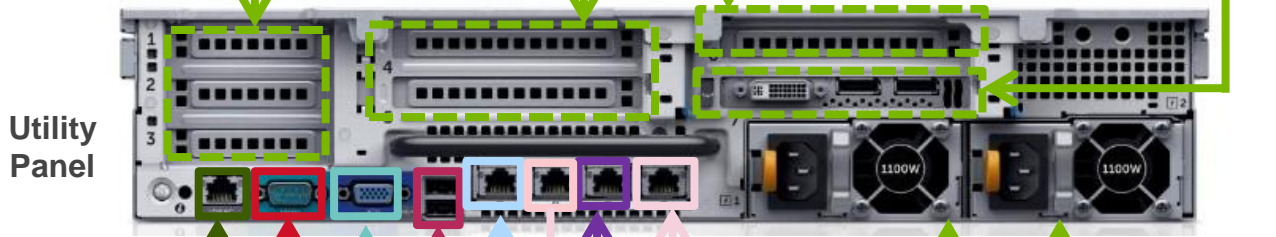
**SAS cards:** 2 port 12Gb mini, 4 port 6Gb mini  
**FC cards:** 2 port 16Gb (SWL SFP+)  
**iSCSI cards:** 2 port 1/10GbE (RJ-45), 2 port 10GbE (SFP+), 2 port 10GbE (RJ-45)

**SAS cards:** 2 port 12Gb, 4 port 6Gb  
**FC cards:** 2 port 16Gb (SWL SFP+), 4 port 8Gb (SWL SFP+)  
**iSCSI cards:** 2 port 1/10GbE (RJ-45), 2 port 10GbE (SFP+), 2 port 10GbE (RJ-45)  
**FCoE cards:** 2 port 10GbE (RJ-45), 2 port 10GbE (SFP+)

Three low-profile PCIe Gen 3 I/O expansion slots

Three full-height PCIe Gen 3 I/O slots

4GB Non-volatile write cache card  
 - Ships factory-installed with the system



Utility Panel

iDRAC Port (RJ45 connector)

Serial Port (RS-232 connector)

VGA Port (DE-15 connector)

Reserved 1GbE and 10GbE ports

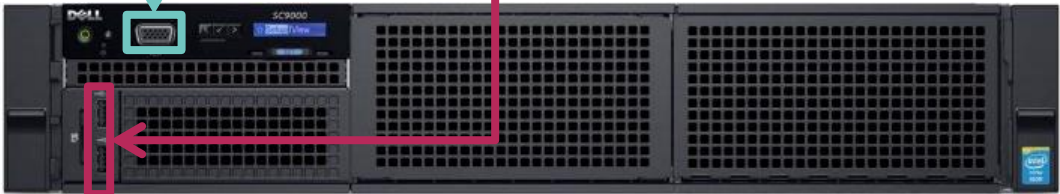
Dual-controller interconnect (IPC) port  
 - One integrated 10GbE RJ-45 port

Two redundant power supplies (AC, AC-R)

Management Port RJ45 connector

Four USB Type-A Ports

Front Panel



# Dell Storage SC8000



Enterprise storage for virtualized data centers and the cloud

- Ultra-efficient, **easy to manage** storage solution optimizes drive utilization dynamically
- **Dual controller** system based on a 2U rack chassis with integrated Dell Remote Access Controller (iDRAC)
- **Scales up** to 960 SAS drives per dual controller system, **scales-out** to multiple systems across multiple sites
- **Dell's auto-tiering** enables multiple high-performance SSD tiers leveraging the best attributes of both right-intensive (SLC) and read-intensive (MLC) drives



**Dell Storage SC8000**

# SC8000 – Multi-protocol Storage Array



## Networking

- Brocade 300 (FC)
- Brocade 6505 (FC)
- Brocade 6510 (FC)
- Brocade 6520 (FC)
- Brocade 8510 (FC)
- Brocade M5424 (FC)
- Brocade M6505 (FC)
- Brocade M8428-k (iSCSI, FC)
- Dell S5000 (iSCSI, FC with HBA and CNA)
- Dell S4048-ON (iSCSI)
- Dell S6000 (iSCSI)
- MXL/IOA (iSCSI)
- Dell N3000 (iSCSI)
- Dell S3048-ON (iSCSI)
- Dell N4000 (iSCSI)
- Dell S3100 (iSCSI)

More details in  
Dell Storage Compatibility  
Matrix

**SAS cards:** 4 port 6Gb mini  
**FC cards:** 2 port 8Gb (SWL SFP+), 2 port 16Gb (SWL SFP+)  
**iSCSI cards:** 2 port 1GbE (RJ-45), 2 port 10GbE (SFP+), 2 port 10GbE (RJ-45)  
**FCoE cards:** 2 port 10GbE (RJ-45), 2 port 10GbE (SFP+)

**FC cards:** 4 port 8Gb (SWL SFP+)

Three low-profile PCIe Gen 3 I/O expansion slots

Three full-height PCIe Gen 3 I/O slots

**512MB Non-volatile write cache card**  
 - Ships factory-installed with the system

Utility Panel

iDRAC Port (RJ45 connector)

Serial Port (RS-232 connector)

VGA Port (DE-15 connector)

Front Panel

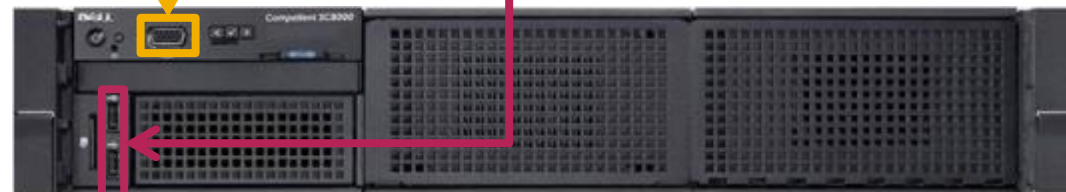
Reserved 10GbE ports

Management Port (RJ-45 connector)

Four USB Type-A Ports

Dual-controller interconnect (IPC) port  
 - One integrated 10GbE RJ-45 port

Two redundant power supplies (AC, AC-R)



# Dell Storage SC4020



Intelligent, self-optimizing array in affordable, all-in-one form factor

- Extends the benefits of **enterprise storage** to small and mid-sized deployments
- Dual redundant controllers, 24 internal drive slots, and **multi-protocol** with support for iSCSI and Fibre Channel
- Expands beyond 24 drives by adding SC200 or SC220 enclosures for **over 400TB total raw capacity**
- **Dell's auto-tiering** enables multiple high-performance SSD tiers leveraging the best attributes of both right-intensive (SLC) and read-intensive (MLC) drives



**Dell Storage SC4020**



# SC4020 – Multi-protocol all-in-one Storage

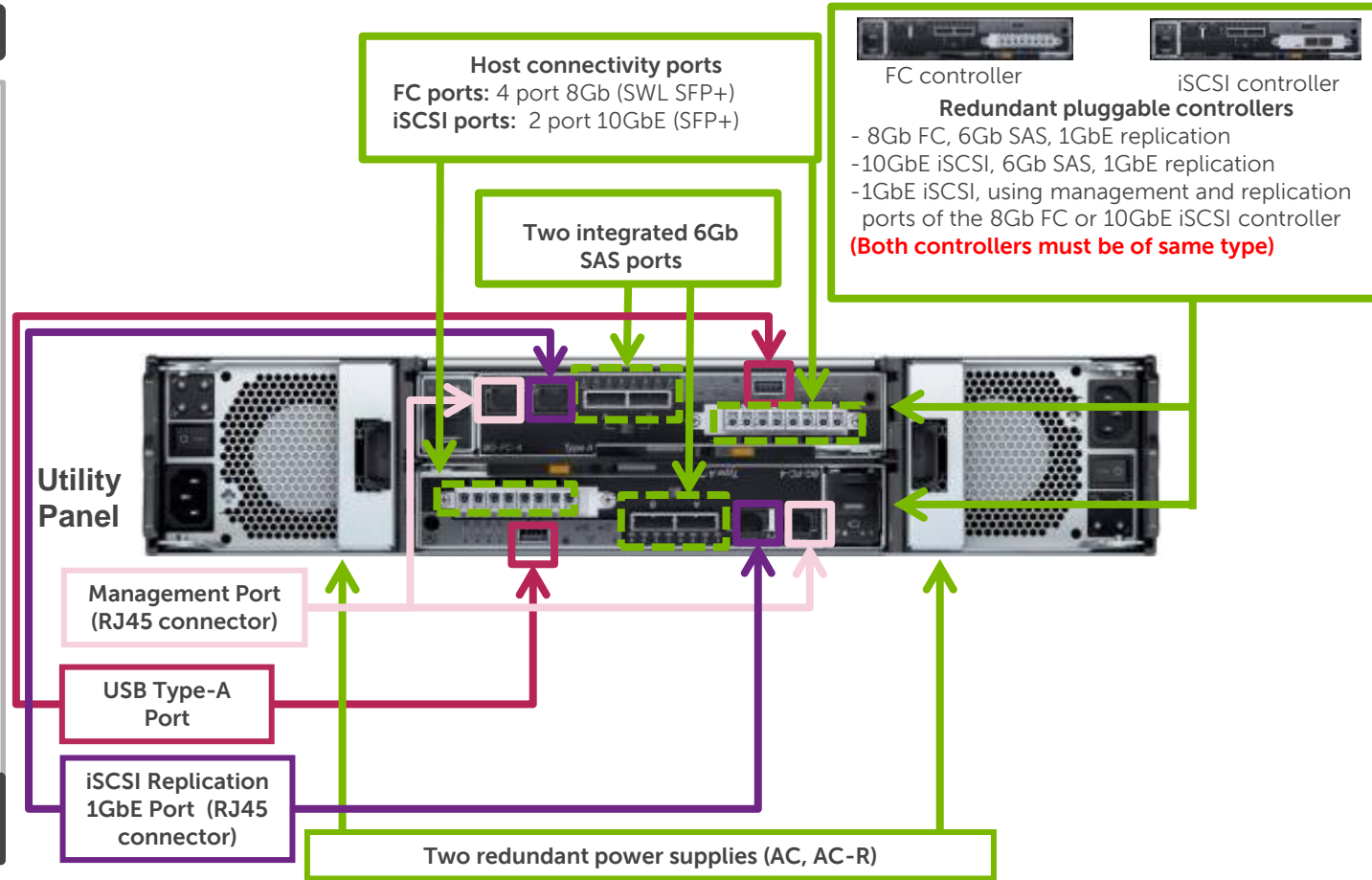


## Networking

- Brocade 300 (FC)
- Brocade 6505 (FC)
- Brocade 6510 (FC)
- Brocade 6520 (FC)
- Brocade 8510 (FC)
- Brocade M5424 (FC)
- Brocade M6505 (FC)
- Brocade M8428-k (iSCSI, FC)

- Dell S5000 (iSCSI, FC with HBA and CNA)
- Dell S4048-ON (iSCSI)
- Dell S6000 (iSCSI)
- MXL/IOA (iSCSI)
- Dell S3048-ON (iSCSI)
- Dell N3000 (iSCSI)
- Dell N4000 (iSCSI)
- Dell S3100 (iSCSI)

More details in  
Dell Storage Compatibility  
Matrix



**Front Panel**





# Dell Storage SCv2000



Intelligent, entry-level solution providing better value in single-tier environments

- Extends the **SC series of SAN arrays** to entry-level customers
- **High performance**, superior performance for entry level storage
- **Future flexibility**, migrate data within SCv2000 series
- **Data protection**, exceptional number of snapshots and replication
- **Common Storage Center Management**, remote and local data protection, & Phone Home Services



**Dell Storage SCv2000**



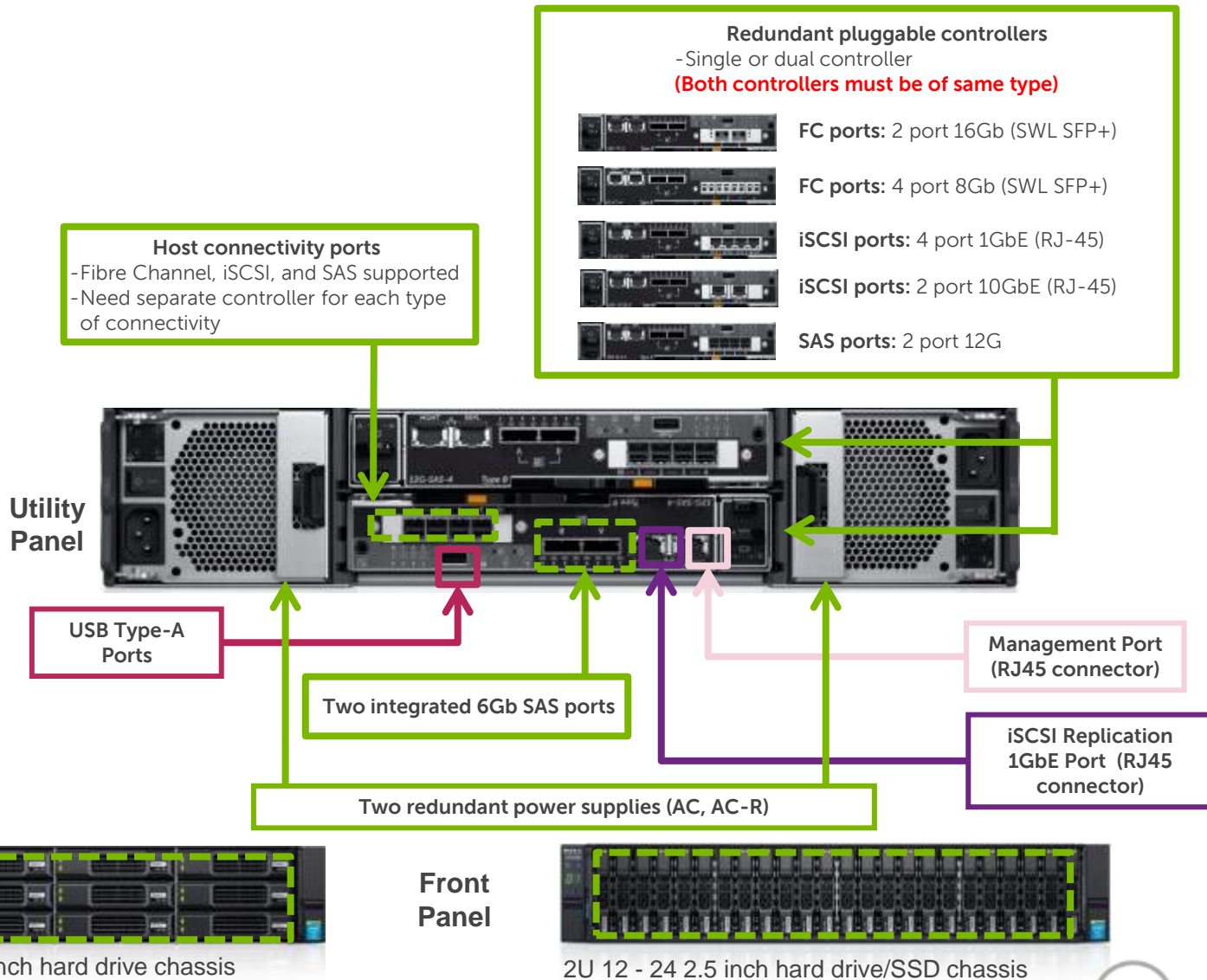
# SCv2000 & SCv2020 – Entry-level SC series storage



## Networking

- Brocade 300 (FC)
- Brocade 6505 (FC)
- Brocade 6510 (FC)
- Brocade 6520 (FC)
- Brocade M6505 (FC)
- PowerConnect M8428-k (FC)
- Dell S5000 (iSCSI, FC with HBA and CNA)
- Dell S4048-ON (iSCSI)
- Dell S4820T (iSCSI)
- MXL/IOA (iSCSI)
- Dell S3048-ON (iSCSI)
- Dell S60
- Dell N2000 (iSCSI)
- Dell N3000 (iSCSI)
- Dell N4000 (iSCSI)
- Dell S3048-ON (iSCSI)
- Dell S3100 (iSCSI)

More details in  
Dell Storage Compatibility  
Matrix



# SCv2080 – Entry-level SC series storage



## Networking

- Brocade 300 (FC)
- Brocade 6505 (FC)
- Brocade 6510 (FC)
- Brocade 6520 (FC)
- Brocade M6505 (FC)
- PowerConnect M8428-k (FC)
  
- Dell S5000 (iSCSI, FC with HBA and CNA)
- Dell S4048-ON (iSCSI)
- Dell S4820T (iSCSI)
- MXL/IOA (iSCSI)
- Dell S3048-ON (iSCSI)
- Dell S60
- Dell N2000 (iSCSI)
- Dell N3000 (iSCSI)
- Dell N4000 (iSCSI)
- Dell S3048-ON (iSCSI)
- Dell S3100 (iSCSI)

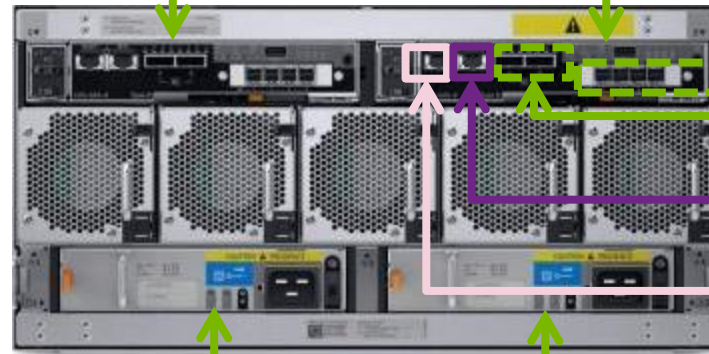
More details in  
Dell Storage Compatibility  
Matrix

**Redundant pluggable controllers**  
- Dual controller only  
**(Both controllers must be of same type)**

	<b>FC ports:</b> 2 port 16Gb (SWL SFP+)
	<b>FC ports:</b> 4 port 8Gb (SWL SFP+)
	<b>iSCSI ports:</b> 4 port 1GbE (RJ-45)
	<b>iSCSI ports:</b> 2 port 10GbE (RJ-45)
	<b>SAS ports:</b> 2 port 12G

**Host connectivity ports**  
- Fibre Channel, iSCSI, and SAS supported  
- Need separate controller for each type of connectivity

Utility  
Panel



Two integrated 6Gb SAS ports

iSCSI Replication 1GbE Port  
(RJ45 connector)

Management Port (RJ45  
connector)

Two redundant power supplies (AC, AC-R)

Front  
Panel



5U, 42 - 84 3.5 inch hard drive chassis



# Dell Storage XC Series



Built on the principles of web-scale

- Converge compute and storage
- **All intelligence in software**
- Distribute everything, Self Healing system
- Automation and rich analytics
- No single point of failure, always-on
- Linear, **predictable scale-out**
- Simple to deploy, maintain and manage
- **Multi-hypervisor support** – ESXi, Hyper-v, KVM
- Web-scale technology built in the Nutanix architecture
  - Apache Casandra – Distributed meta-data store with Paxos
  - Apache Zoo-keeper – Cluster configuration
  - MapReduce – cluster management and clean-up, tiering, deduplication
  - Data-Locality and Flash – Provides high performance



## Dell Storage XC Series



# Dell XC730XD – web-scale converged appliance



## Networking

- Dell S4048-ON
- Dell S5000
- Dell S6000 (10GbE with breakout cables only)
- Dell N4000

### Adapters

- Intel i350 + X520 dual 1G + dual 10G SFP+
- Intel X520 dual 10G SFP+
- Intel i350 + X540 dual 1G + dual 10G Base-T
- Intel X540 dual 10G Base-T

### Optics

- Intel branded SFP+ optics only

### Cables

- All Dell TwinAx cables
- Standard Category 6 Ethernet cables



Intel X520\*



Intel X540

### One optional 2-port 10GbE NIC

- Intel X520\*, 2 port 10GbE SFP+
- Intel X540, 2 port 10G Base-T
- (Low profile or full height in any supporting slot)

\* If using SFP+ optics, please use Intel branded optics only

### Utility Panel

Two USB Type-A Ports

### Integrated adapter (one only)

- Intel i350 + X520\*, 2 port 1GbE + 2 port 10GbE SFP+
- Intel i350 + X540, 2 port 1GbE + 2 port 10G Base-T

\* If using SFP+ optics, please use Intel branded optics only

Two redundant power supplies (AC, DC)

Management port / iDRAC Direct, USB 2.0 compliant Port

### Front Panel

3.5 inch hard drive chassis

2.5 inch hard drive/SSD chassis



# Dell XC630 – web-scale converged appliance



## Networking

- Dell S4048-ON
- Dell S5000
- Dell S6000 (10GbE with breakout cables only)
- Dell N4000

### Adapters

- Intel i350+ X520 dual 1G + dual 10G SFP+
- Intel X520 dual 10G SFP+
- Intel i350 + X540 dual 1G + dual 10G Base-T
- Intel X540 dual 10G Base-T

### Optics

- Intel branded SFP+ optics only

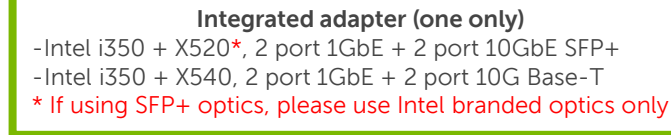
### Cables

- All Dell TwinAx cables
- Standard Category 6 Ethernet cables



### Utility Panel

Two USB Type-A Ports



Two redundant power supplies (AC, DC)

Management port / iDRAC Direct, USB 2.0 compliant Port

### Front Panel



2.5 inch hard drive/SSD chassis



# Dell Storage FS8600



Intelligent, self-optimizing array in affordable, all-in-one form factor

- **Unifies block and file storage** on one Compellent platform
  - Shared back-end infrastructure eliminates need to carve spindles separately
  - Single platform avoids the added cost and complexity of separate solutions
- **Extends efficiency of Compellent architecture** to NAS environment
  - Data Progression lowers costs by migrating inactive data to less expensive drives
  - Dynamic Capacity enables space-efficient over allocation of NAS capacity
  - Policy-driven dedupe and compression
- **Provides customers with a scale-out NAS** solution
  - 2PB Single namespace scales non-disruptively across up to four appliances
  - Load-balancing continually optimizes performance as FS8600 system scales



**Dell Storage FS8600**

# FS8600 – Dell Fluid File System Appliance



## Networking

- Brocade 300 (FC)
- Dell S5000 (iSCSI, FC with HBA and CNA)
- Dell S4048-ON
- Dell S4048-ON (iSCSI)
- Dell N4000 (iSCSI)

More details in  
Dell Storage Compatibility  
Matrix

### Adapters for Frontend and Interconnect connectivity

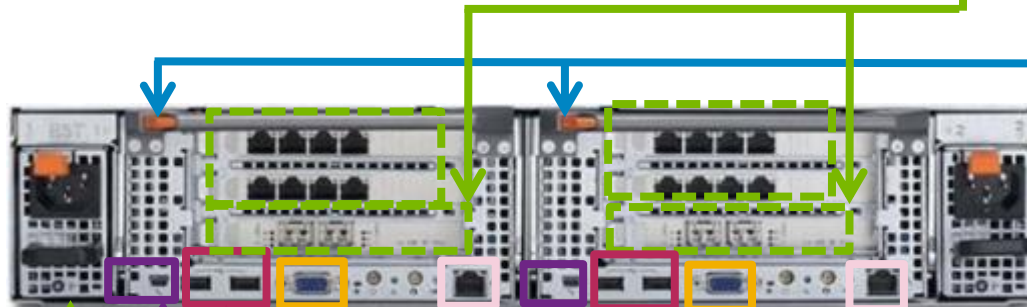
- 1GbE: 2x quad-port (RJ-45) NIC in each controller
- 10GbE: 2x dual-port 10GbE (SFP+) NIC in each controller

### Adapters for Backend connectivity

- Fibre Channel: 1x 2 port 8Gb HBA (SWL SFP+) in each controller (**Direct connect to SAN is not supported**)
- iSCSI: 1x 2 port 10GbE (SFP+) NIC in each controller
- iSCSI: 1x 2 port 10GbE (RJ-45) NIC in each controller

Two active-active,  
hot-swappable  
controllers

Utility  
Panel



Serial Port (mini-  
USB connector)

Two USB Type-A  
Ports

VGA Port  
(DE-15 connector)

Two redundant power  
supplies (AC, AC-R)

Management Port  
(RJ45 connector)

Front  
Panel





# Dell EqualLogic PS6210 arrays



Higher performance for virtual and data-intensive environments

- Next-generation **10GbE arrays**
- Faster, redesigned controller unlocks the power of flash
  - 16GB of memory/controller
  - 2 active 10GbE ports
    - Either SFP+ or 10GBASE-T
    - Can auto-negotiate to 1GbE with 10GBASE-T
- **24 hot-pluggable drives**, including SSD, SAS, NL-SAS and SED (2.5" or 3.5")
- Up to 96TB per array
- **Streamlined management** with Array Software 7.0
- New battery backup for cache-to-flash



**Dell EqualLogic PS6210**



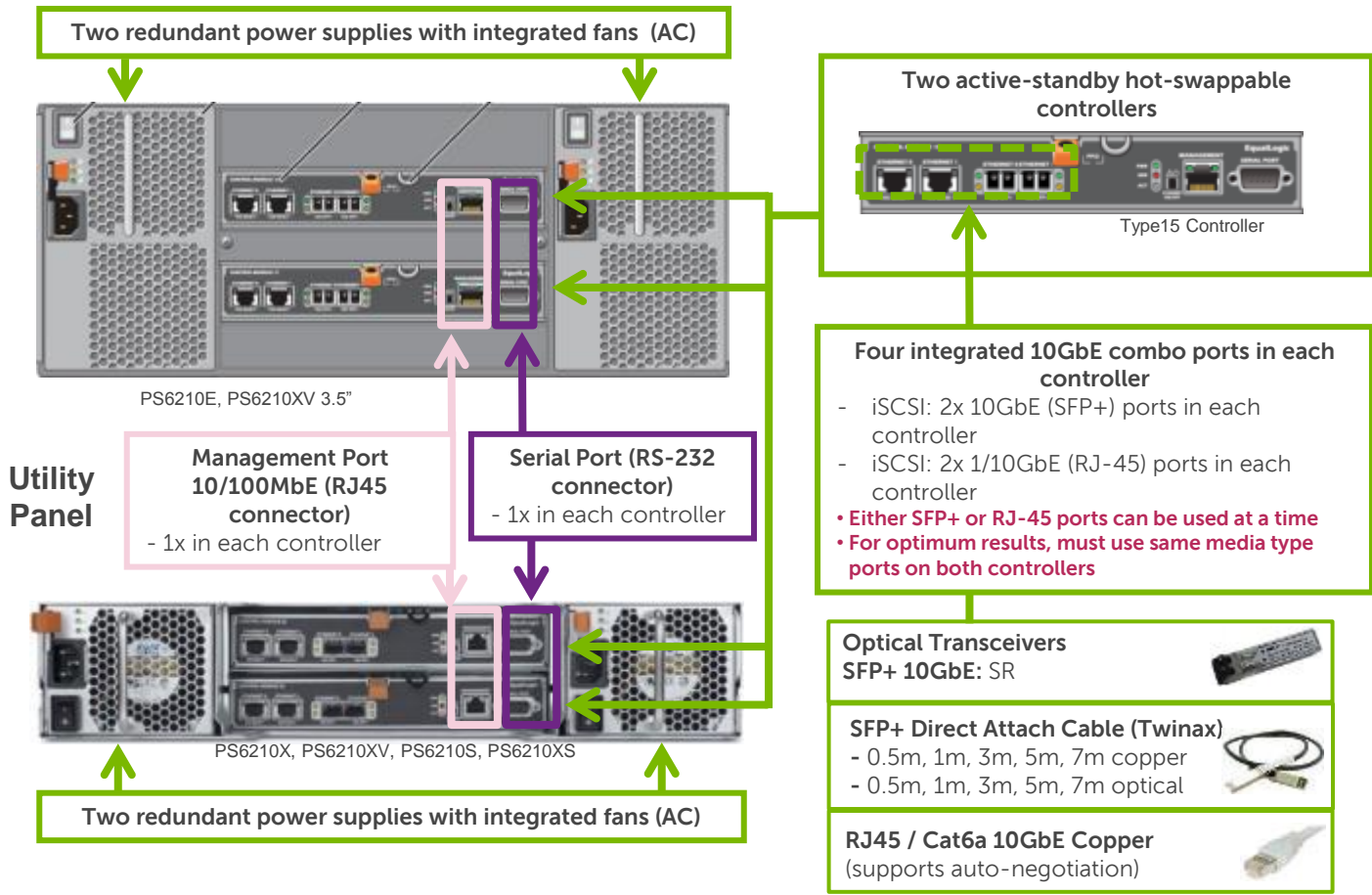
# PS6210 – Dell EqualLogic Arrays



## Networking

- Dell N3000 (1GbE only)
- Dell N2000 (1GbE only)
- Dell S55/S60 (1GbE only)
  
- PowerConnect 8024-k
- PowerConnect 8428-k
- MXL
- Dell S5000
- Dell S4048-ON
- Dell S4820T
- Dell S6000
- Dell Z9500
- Dell N4000

More details in  
Dell Storage Compatibility  
Matrix



Front Panel



PS6210X, PS6210XV, PS6210S, PS6210XS  
Dell Storage Networking I/O Guide



PS6210E, PS6210XV 3.5"



# Dell EqualLogic PS61x0/PS41x0 arrays



Exceptional density and capacity with 10GbE and 1GbE throughput

- Next-generation **10GbE and 1GbE arrays** that make the most of your SAN investment
- Choose either 10GBASE-T or traditional SFP+ port on 10GbE arrays
- **Streamlined management** with Array Software 7.0
- Leverage all-inclusive software, peer scalability and **ease-of-use**
- Scale capacity and performance



**Dell EqualLogic  
PS61x0/PS41x0**

# PS61x0 – Dell EqualLogic Arrays

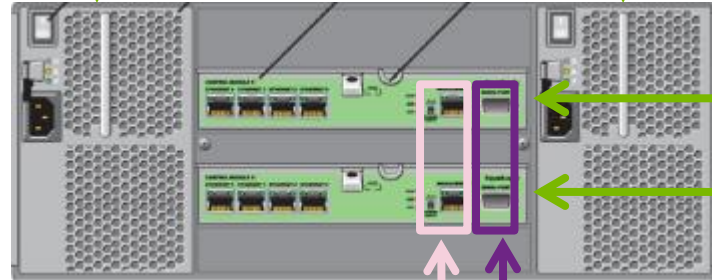


## Networking

- Dell N3000 (PS4100)
- Dell N2000 (PS4100)
- Dell S55/S60 (PS4100)
  
- PowerConnect 8024-k (PS4110)
- PowerConnect 8428-k (PS4110)
- MXL (PS4110)
- Dell S5000 (PS4110)
- Dell S4048-ON
- Dell S4820T (PS4110)
- Dell S6000 (PS4110)
- Dell Z9500 (PS4110)
- Dell N4000 (PS4110)

More details in  
Dell Storage Compatibility  
Matrix

Two redundant power supplies with integrated fans (AC)



PS6100E, PS6100XV 3.5"

Utility Panel

Management Port  
10/100MbE (RJ45  
connector)  
- 1x in each controller

Serial Port (RS-232  
connector)  
- 1x in each controller



PS6100X, PS6100XV, PS6100S, PS6100XS, PS4100E

Two redundant power supplies with integrated fans (AC)

Front Panel



PS6100X, PS6100XV, PS6100S, PS6100XS



PS6100E, PS6100XV 3.5"

Four integrated 1000BASE-T ports in each controller

- iSCSI: 4x 1GbE (RJ-45 connector) ports in each controller

Two active-standby hot-swappable controllers

Type11 Controller

- Same controller is used in all models of PS6100 arrays

Two active-standby hot-swappable controllers

- Same controller is used in all models of PS6110 arrays

Type14 Controller

Two integrated 10GbE combo ports in each controller

- iSCSI: 1x 10GbE (SFP+ connector) ports in each controller
- iSCSI: 1x 10GbE (RJ-45 connector) ports in each controller

- Either SFP+ or RJ-45 ports can be used at a time
- For optimum results, must use same media type ports on both controllers

Optical Transceivers  
SFP+ 10GbE: SR

SFP+ Direct Attach Cable (Twinax)

- 0.5m, 1m, 3m, 5m, 7m copper
- 0.5m, 1m, 3m, 5m, 7m optical

RJ45 / Cat6a 10GbE Copper

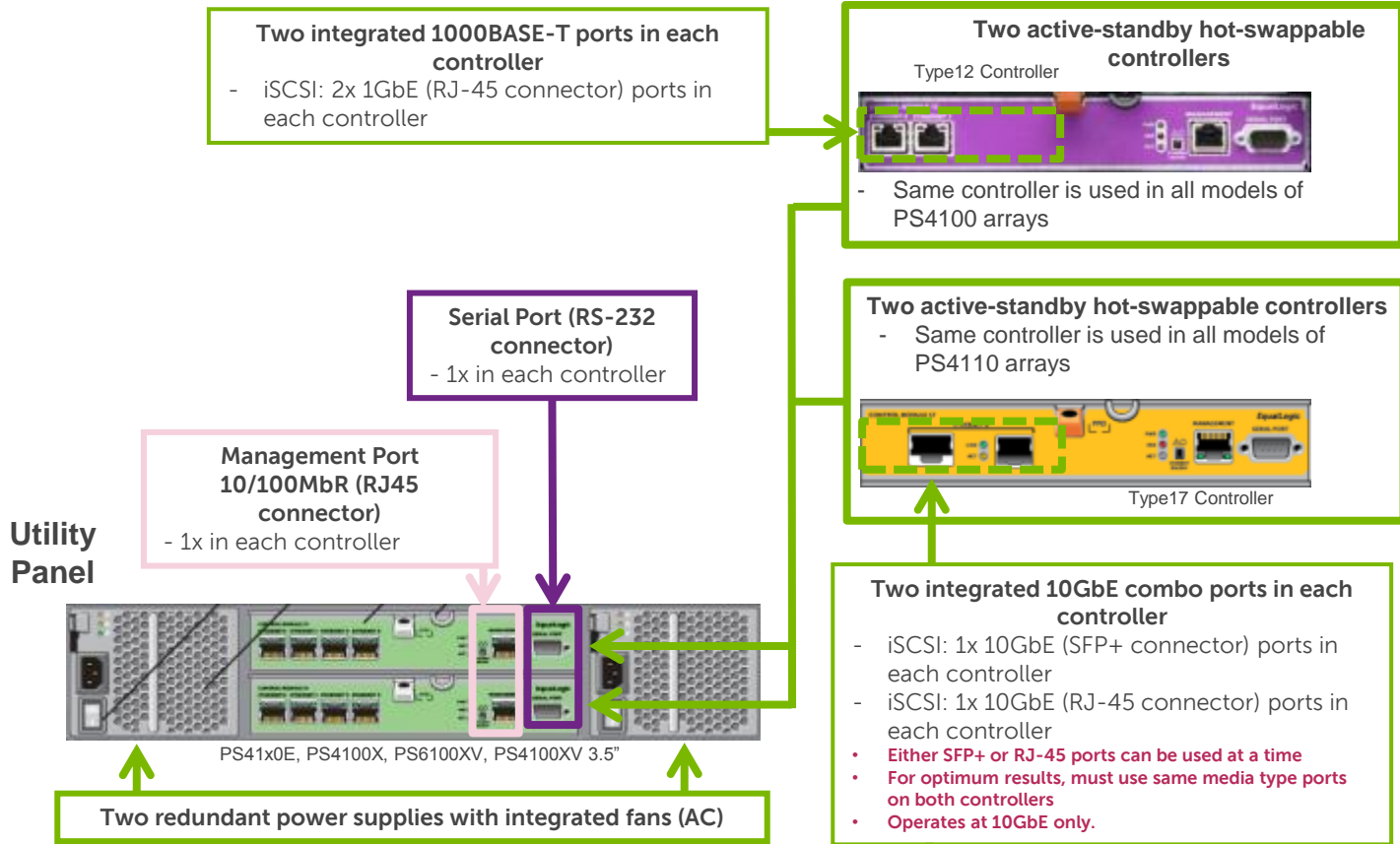
# PS41x0 – Dell EqualLogic Arrays



## Networking

- Dell N3000 (PS4100)
- Dell N2000 (PS4100)
- Dell S55/S60 (PS4100)
  
- PowerConnect 8024-k (PS4110)
- PowerConnect 8428-k (PS4110)
- MXL (PS4110)
- Dell S5000 (PS4110)
- Dell S4048-ON (PS4110)
- Dell S4820T (PS4110)
- Dell S6000 (PS4110)
- Dell Z9500 (PS4110)
- Dell N4000 (PS4110)

**More details in Dell Storage Compatibility Matrix**




**Front Panel**



PS41x0E, PS41x0X, PS41x0XV, PS41x0XV 3.5"


**Optical Transceivers**  
SFP+ 10GbE: SR




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**SFP+ Direct Attach Cable (Twinax)**

- 0.5m, 1m, 3m, 5m, 7m copper
- 0.5m, 1m, 3m, 5m, 7m optical




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**RJ45 / Cat6a 10GbE Copper**



# Dell EqualLogic PS6510/6500 arrays



Consolidate multiple workloads within a single, powerful array

- **Highly available and** reliable storage for capacity-demanding deployments
- Virtualized scale-out architecture, ideal for server virtualization and storage consolidation
- Increased throughput performance from **10GbE technology** on the PS6510
- Robust backup and recovery through application integration and automation
- Scalable, **self-managing storage** that grows your business
- Enhanced security with Self-Encrypting Drives (SEDs)
- **Streamlined management** with Array Software 7.0



**Dell EqualLogic  
PS6510/6500**



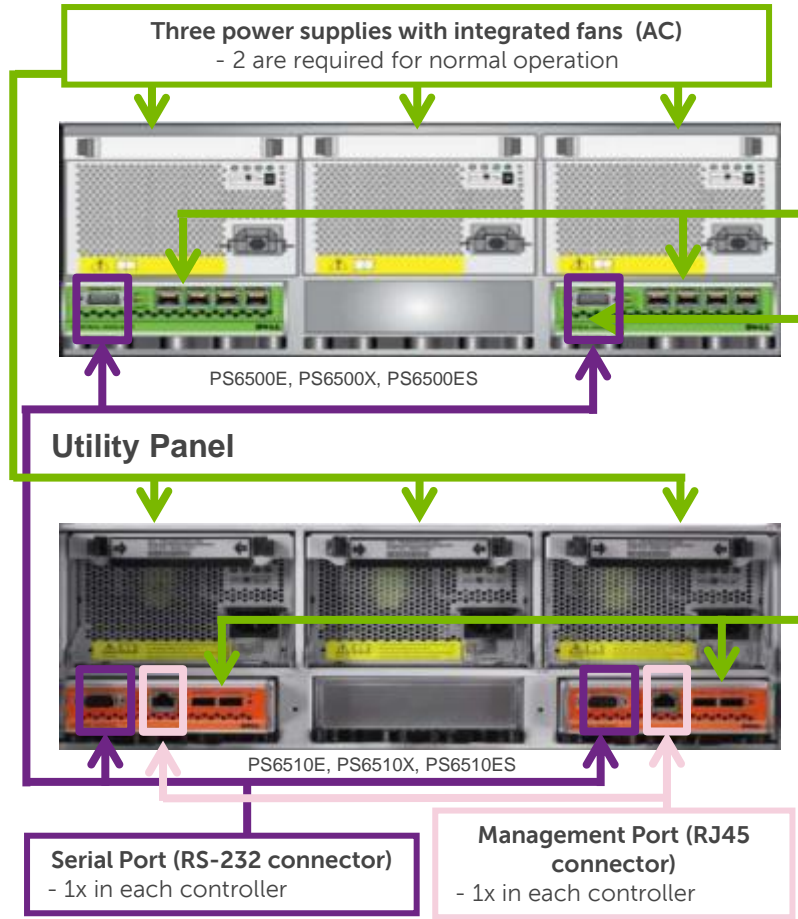
# PS65x0 – Dell EqualLogic Arrays



## Networking

- MXL (PS6510)
- PowerConnect 8024-k (PS6510)
- PowerConnect 8248-k (PS6510)
- Dell N3000 (PS6500)
- Dell N2000 (PS6500)
- Dell S55/S60 (PS6500)
- Dell S5000 (PS6510)
- Dell S4048-ON (PS6510)
- Dell S4820T (PS6510)
- Dell S6000 (PS6510)
- Dell Z9500 (PS6510)

More details in  
Dell Storage Compatibility  
Matrix



## Front Panel



PS6500E, PS6500X, PS6500ES, PS6510E,  
PS6510X, PS6510ES

## Four integrated 1000BASE-T ports in each controller

- iSCSI: 4x 1GbE (RJ-45 connector) ports in each controller

## Two active-standby hot-swappable controllers

Type 7 Controller



- Same controller is used in all models of PS6500 arrays

## Two active-standby hot-swappable controllers

- Same controller is used in all models of PS6510 arrays



Type 10 Controller

## Two integrated 10GbE ports in each controller

- iSCSI: 2x 10GbE (SFP+ connector) ports in each controller
- **Operates at 10GbE only**

## Optical Transceivers

SFP+ 10GbE: SR



## SFP+ Direct Attach Cable (Twinax)

- 0.5m, 1m, 3m, 5m, 7m copper
- 0.5m, 1m, 3m, 5m, 7m optical



## RJ45 / Cat6a 10GbE Copper



# Dell EqualLogic FS76x0 NAS Appliances



Scale-out unified storage

- Consolidates application servers and Windows/Linux file servers on a **single unified storage platform**
- Enables file storage via CIFS/NFS protocols in addition to iSCSI block storage via PS Series arrays
- Expands as your needs grow: **scale capacity and/or performance** without disruption
- Provides management interface to manage file and block storage
- Utilizes **1GbE and 10GbE connectivity**
- Offers deduplication and compression with FluidFS v3, reducing the capacity required for common data by 48%\*
- Growing ecosystem of **third-party certifications**



**Dell EqualLogic FS76x0**





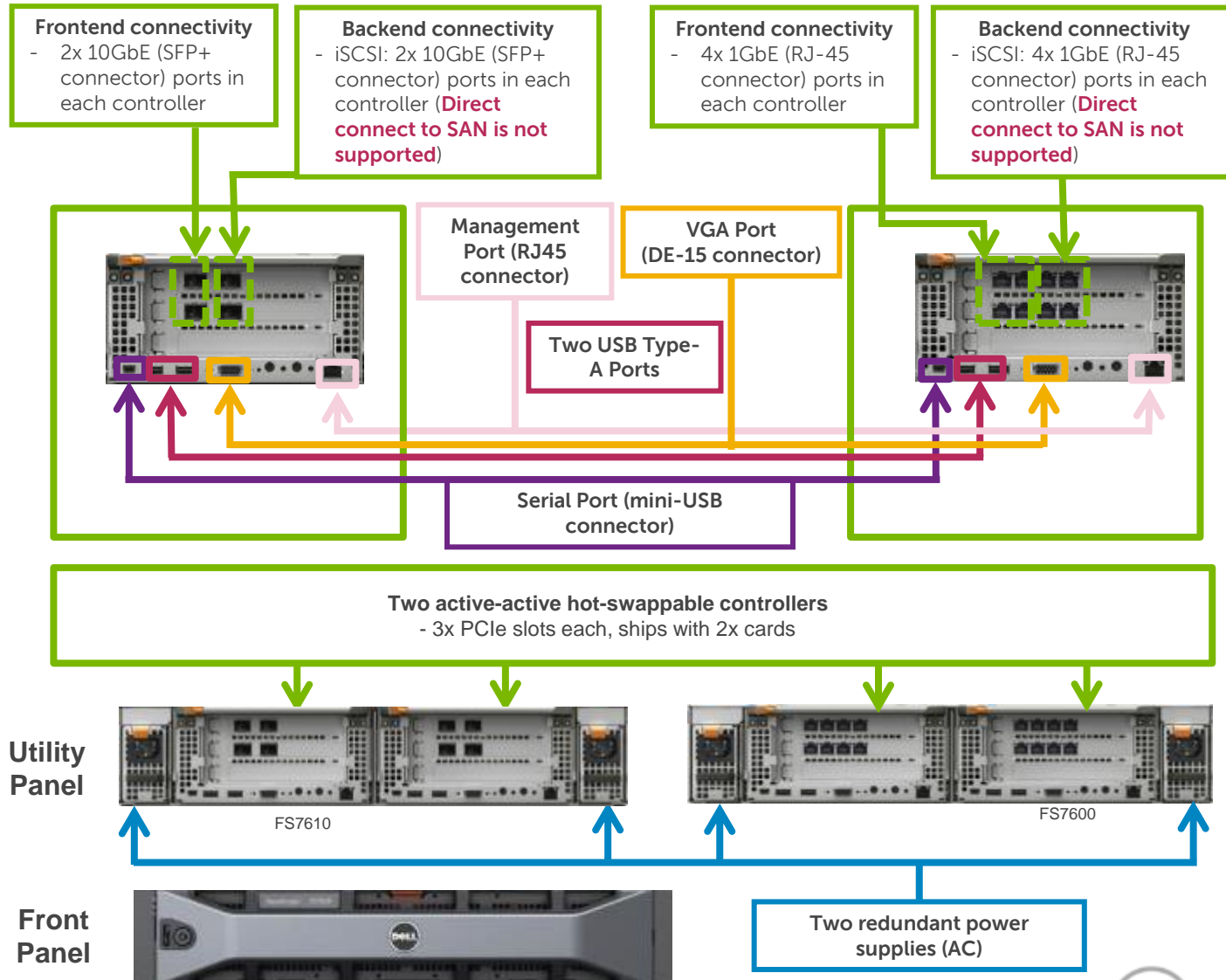
# FS76x0 – Dell Fluid File System Appliance



## Networking

- Dell S4048-ON (FS7610)
- Dell S4820T (FS7610)
- Dell N4000 (FS7610)
- Dell S3048-ON (FS7600)
- Dell N3000 (FS7600)
- Dell S3048-ON (iSCSI)
- Dell S3100 (iSCSI)

More details in  
Dell Storage Compatibility  
Matrix





# Dell PowerVault MD3 storage arrays

Delivering the latest technology

- Affordable storage
  - Modular design allows for flexible and custom design with sacrificing performance
  - Designed to scale as your business grows
  - Enterprise-class capabilities
- Reliable data protection
  - Proven track record of reliable storage
  - Dynamic Disk Pools provides a simple option to standard RAID configuration
  - Premium features offer software and firmware data protection options
- Versatile options
  - Choose what you want, when you want it
  - Non-disruptively scale to meet application demands
  - Software licenses that you can try for 90 days before you purchase



**Dell PowerVault MD3  
Storage**



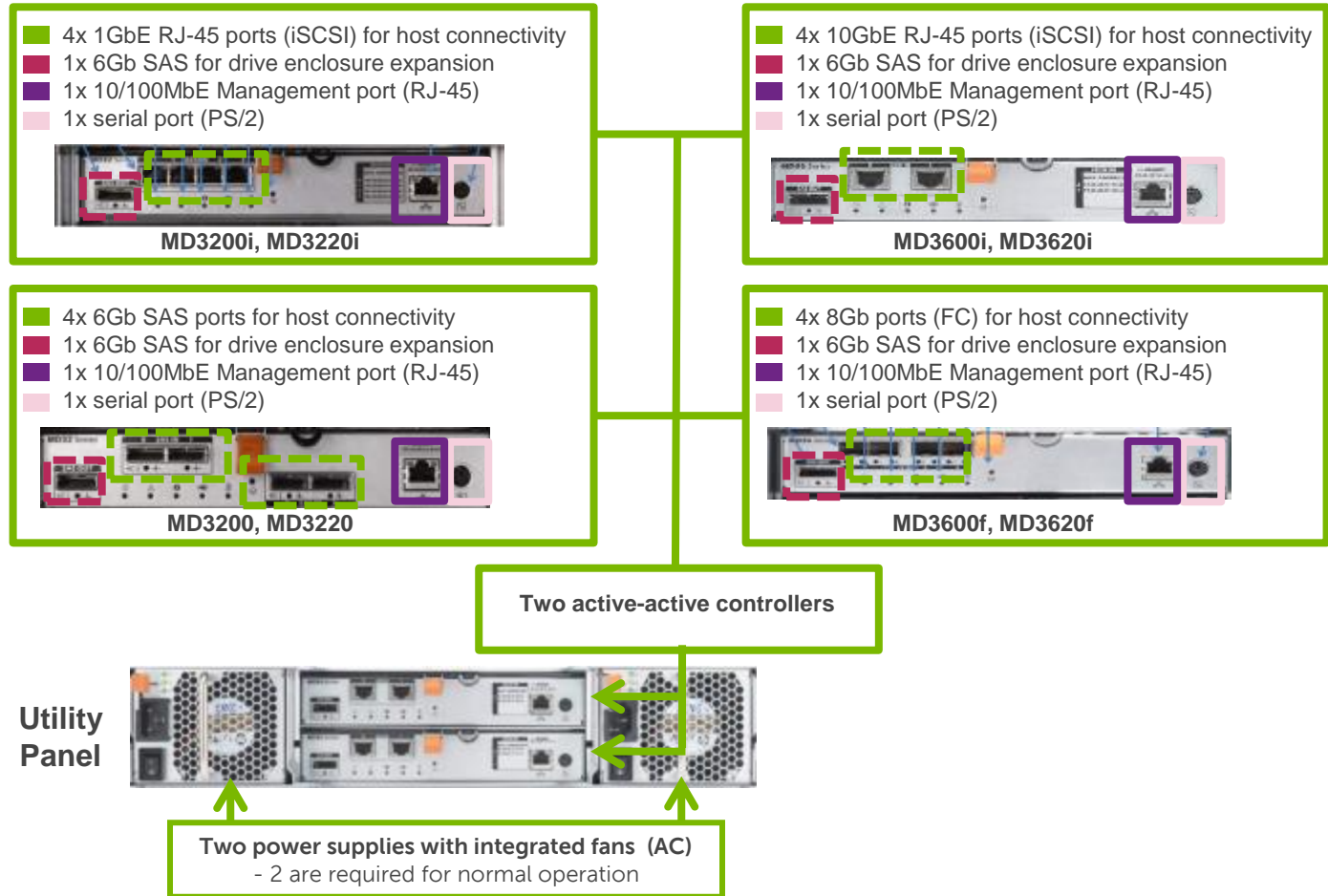
# MD32xx/36xx 2U – Dell PowerVault Arrays



## Networking

- Brocade 300 (FC)
- Brocade 6505 (FC)
- Brocade 6510 (FC)
- Brocade 8510 (FC)
- Brocade M5424 (FC)
- Brocade M6505 (FC)
- Dell 8/4Gbps FC Pass through (FC)
- Dell S5000 (FC)

More details in  
Dell Storage Compatibility  
Matrix



MD3200, MD3200i, MD3600i, MD3600f,  
MD3400, MD3800i, MD3800f

**Front  
Panel**



MD3220, MD3220i, MD3620i, MD3620f,  
MD3420, MD3820i, MD3820f



# MD34xx/38xx 2U – Dell PowerVault Arrays



## Networking

- Brocade 300 (FC)
- Brocade 6505 (FC)
- Brocade 6510 (FC)
- Brocade 6520 (FC)
- Brocade 8510 (FC)
- Brocade M5424 (FC)
- Brocade M6505 (FC)
- Dell 8/4Gbps FC Pass through (FC)
- Dell S5000 (FC)

More details in  
Dell Storage Compatibility  
Matrix

- 4x 12Gb SAS ports for host connectivity
- 2x 12Gb SAS ports for drive enclosure expansion
- 1x 100/1000MbE Management port (RJ-45)
- 1x serial port (PS/2)
- Reserved ports

**MD3400, MD3420**

- 2x 10GbE RJ-45 ports (iSCSI) for host connectivity
- 2x 12Gb SAS ports for drive enclosure expansion
- 1x 100/1000MbE Management port (RJ-45)
- 1x serial port (PS/2)
- Reserved ports
- 2x 12Gb SAS ports for host connectivity

**MD3800i, MD3820i**

- 4x 16Gb ports (FC) for host connectivity
- 2x 12Gb SAS for drive enclosure expansion
- 1x 10/100 Management port (RJ-45)
- 1x serial port (PS/2)
- Reserved ports
- 2x 12Gb SAS ports for host connectivity

**MD3800f, MD3820f**

Two active-active controllers

Utility  
Panel



Two power supplies with integrated fans (AC)  
- 2 are required for normal operation

Front  
Panel



MD3200, MD3200i, MD3600i, MD3600f,  
MD3400, MD3800i, MD3800f

MD3220, MD3220i, MD3620i, MD3620f,  
MD3420, MD3820i, MD3820f



# MD34xx/38xx 4U – Dell PowerVault Arrays



## Networking

- Brocade 300 (FC)
- Brocade 6505 (FC)
- Brocade 6510 (FC)
- Brocade 6520 (FC)
- Brocade 8510 (FC)
- Brocade M5424 (FC)
- Brocade M6505 (FC)
- Dell 8/4Gbps FC Pass through (FC)
- Dell S5000 (FC)

More details in  
Dell Storage Compatibility  
Matrix

- 4x 12Gb SAS ports for host connectivity
- 2x 12Gb SAS ports for drive enclosure expansion
- 1x 100/1000MbE Management port (RJ-45)
- 1x serial port (PS/2)
- Reserved ports

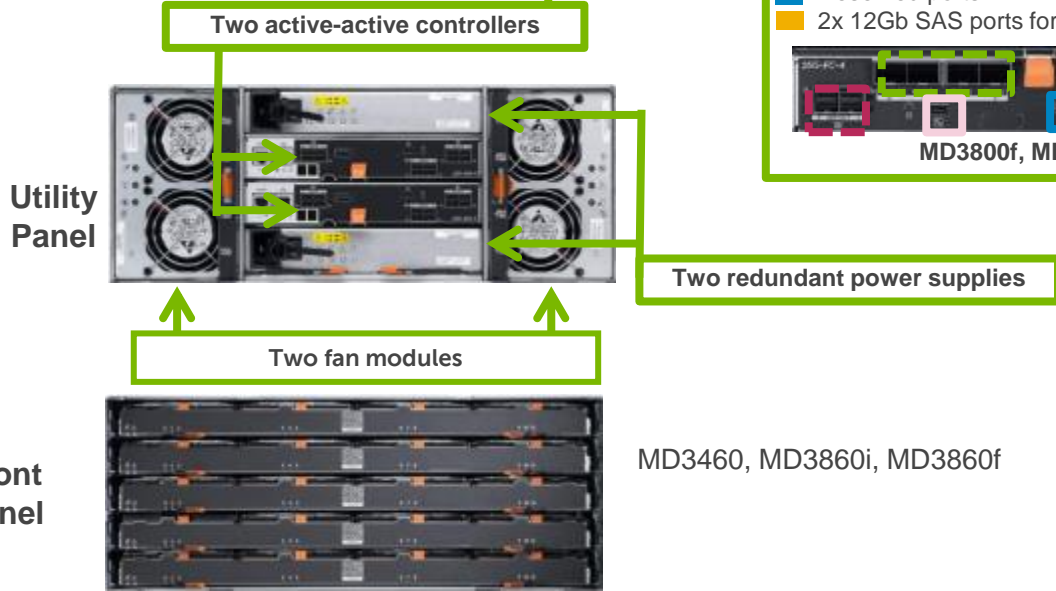
**MD3400, MD3420**

- 2x 10GbE RJ-45 ports (iSCSI) for host connectivity
- 2x 12Gb SAS ports for drive enclosure expansion
- 1x 100/1000MbE Management port (RJ-45)
- 1x serial port (PS/2)
- Reserved ports
- 2x 12Gb SAS ports for host connectivity

**MD3800i, MD3820i**

- 4x 16Gb ports (FC) for host connectivity
- 2x 12Gb SAS for drive enclosure expansion
- 1x 10/100 Management port (RJ-45)
- 1x serial port (PS/2)
- Reserved ports
- 2x 12Gb SAS ports for host connectivity

**MD3800f, MD3820f**



# MD32xx/36xx 4U – Dell PowerVault Arrays



## Networking

- Brocade 300 (FC)
- Brocade 6505 (FC)
- Brocade 6510 (FC)
- Brocade 6520 (FC)
- Brocade 8510 (FC)
- Brocade M5424 (FC)
- Brocade M6505 (FC)
- Dell 8/4Gbps FC Pass through (FC)
- Dell S5000 (FC)

More details in  
Dell Storage Compatibility  
Matrix

■ 4x 6Gb SAS ports for host connectivity  
■ 1x 6Gb SAS ports for drive enclosure expansion  
■ 1x 100/1000MbE Management port (RJ-45)  
■ 1x serial port (PS/2)

**MD3260**

■ 2x 1GbE RJ-45 ports (iSCSI) for host connectivity  
■ 1x 6Gb SAS ports for drive enclosure expansion  
■ 1x 100/1000MbE Management port (RJ-45)  
■ 1x serial port (PS/2)

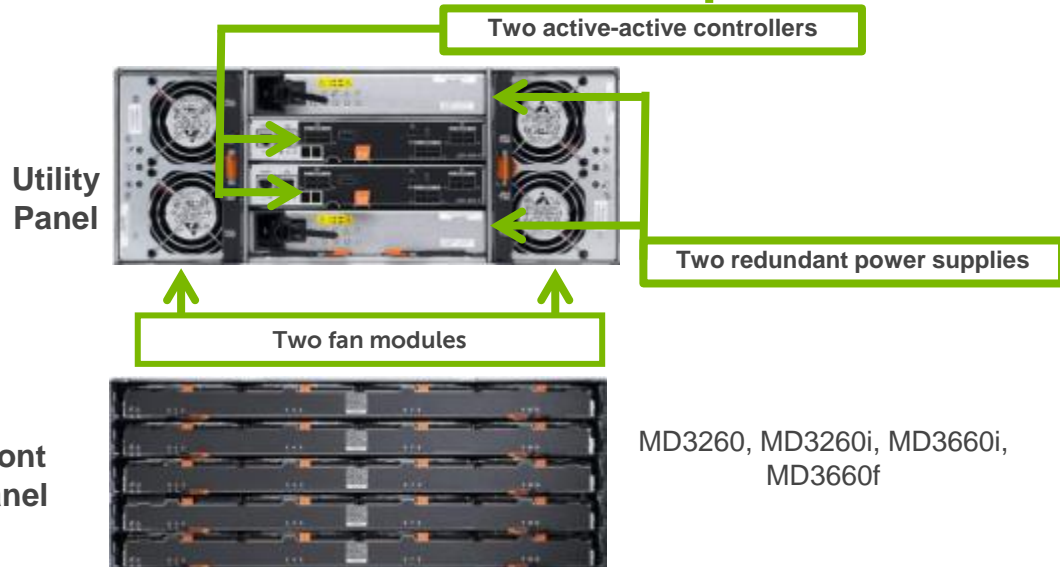
**MD3260i**

■ 2x 10GbE RJ-45 ports (iSCSI) for host connectivity  
■ 1x 6Gb SAS ports for drive enclosure expansion  
■ 1x 100/1000MbE Management port (RJ-45)  
■ 1x serial port (PS/2)

**MD3660i**

■ 4x 8Gb ports (FC) for host connectivity  
■ 1x 6Gb SAS for drive enclosure expansion  
■ 1x 10/100 Management port (RJ-45)  
■ 1x serial port (PS/2)

**MD3660f**



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# Dell Storage Networking I/O Interoperability guide



# Dell Storage Networking I/O Interoperability



		Dell Block Storage Arrays						Dell File Sharing Appliances		Dell FluidCache
Connectivity Type	Product	PowerVault MD3		Compellent		EqualLogic	Compellent	EqualLogic	FCFS	
		iSCSI	FC	iSCSI	FC	iSCSI	FS8600 (Back-end Network)	FS76x0 (Back-end Network)	Cache Network	
40G	S6000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Supported	
10G	Z9500	N/A	N/A		N/A	Supported		Supported	N/A	
	S6000	N/A	N/A	Supported	N/A	Supported		Supported	N/A	
	S5000	N/A	N/A	Supported	N/A	Supported	Supported	Supported	Supported	
	S4048-ON	N/A	N/A	Supported	N/A	Supported	Supported	Supported	Supported	
	S4820T			N/A	N/A	Supported		Supported	N/A	
	N4000			Supported	N/A	Supported		Supported	N/A	
	MXL/IOA			Supported		Supported		Supported	N/A	
	PCT-8100			Supported	N/A	Supported		Supported	N/A	
	FN-IOA	NCV	NCV	NCV	NCV	NCV	N/A	N/A	N/A	
1G	N2000	N/A	N/A	N/A	N/A	Supported	N/A	Supported	N/A	
	N3000	N/A	N/A	Supported	N/A	Supported	N/A	Supported	N/A	
	S3048-ON	N/A	N/A	Supported	N/A	Supported	N/A	Supported	N/A	
	S3100	N/A	N/A	Supported	N/A	Supported	N/A	Supported	N/A	
	S25/S50	N/A	N/A	N/A	N/A	Supported	N/A	Supported	N/A	
	S55	N/A	N/A	N/A	N/A	Supported	N/A		N/A	
	S60	N/A	N/A	N/A	N/A	Supported	N/A	Supported	N/A	
	PCT 6200	N/A	N/A	N/A	N/A	Supported	N/A		N/A	
PCT 7000	N/A	N/A	Supported	N/A	Supported	N/A	Supported	N/A		
8Gbps	S5000	Supported	Supported		Supported		Supported		N/A	





# Dell Storage Networking I/O Interoperability



		Dell Block Storage Arrays					Dell File Sharing Appliances		
Dell Storage Networking Switches	Connectivity Type	Product	PowerVault MD3		Compellent		EqualLogic	Compellent	EqualLogic
			iSCSI	FC	iSCSI	FC	iSCSI	FS8600 (Back-end Network)	FS76x0 (Back-end Network)
	Dell Storage Networking Switches	16Gbps FC	M6505	N/A	Supported	N/A	Supported	N/A	N/A
6505			N/A	Supported	N/A	Supported	N/A	N/A	N/A
6510			N/A	Supported	N/A	Supported	N/A	N/A	N/A
6520			N/A	Supported	N/A	Supported	N/A	N/A	N/A
8510			N/A	Supported	N/A	Supported	N/A	N/A	N/A
8Gbps FC		S5000	N/A	Supported	N/A	Supported	N/A	Supported	N/A
		M5424	N/A	Supported	N/A	Supported	N/A	N/A	N/A
		MXL (FC FlexIO)	N/A	Roadmap	N/A	Roadmap	N/A	N/A	N/A
		IOA (FC FlexIO)	N/A	Roadmap	N/A	Roadmap	N/A	N/A	N/A
		M8428-k	N/A	N/A	N/A	Supported	N/A	N/A	N/A
		300	N/A	Supported	N/A	Supported	N/A	Supported	N/A
8Gbps FC (NPIV Proxy Gateway <sup>1</sup> )		S5000	N/A	Supported	N/A	Supported	N/A	N/A	N/A
		MXL (FC FlexIO)	N/A	Supported	N/A	Supported	N/A	N/A	N/A
		IOA (FC FlexIO)	N/A	Supported	N/A	Supported	N/A	N/A	N/A
		FN-IOM	N/A	Roadmap	N/A	Roadmap	N/A	N/A	N/A

Supported: Certified by Dell storage or Dell networking (in the case of NPIV Proxy Gateways)

N/A: The combination is not possible

NCV: Not a commercially viable solution

Empty cells: Valid connectivity option but not tested

## Notes:

1. NPIV Proxy Gateway (NPG) test and validation is performed by Dell Networking. Dell Storage certification is only applicable to directly connected switches. Since NPG switches typically do not connect to storage arrays directly (there must be a fabric switch between NPG switches and storage array), direct certification of NPG is not mandatory for storage arrays. As long as NPG switch and storage array are certified with the fabric switch, the fabric will be supported.

# Deployment and Technical Guides



**For Additional Information**

**Visit: [Dell.com/TechCenter/StorageNetworking](https://Dell.com/TechCenter/StorageNetworking)**

# Dell Services - Enterprise Storage Networking



# ProSupport Enterprise Suite comparison

	Basic	ProSupport	ProSupport Plus	ProSupport Flex for Data Center
Technical support through tools, online, chat and phone	9x5	24x7	24x7	24x7
Service delivery for hardware repair	Next Business Day	Next Business Day or Mission Critical	Next Business Day or Mission Critical	Flexible
Self-service case management & parts dispatch through TechDirect	✓	✓	✓	✓
Remote monitoring by SupportAssist	✓	✓	✓	✓
Automated issue detection and notification by SupportAssist	✓	✓	✓	✓
Dispatch monitoring and crisis management		✓	✓	✓
Escalation Management		✓	✓	✓
Hypervisor and OS support		✓	✓	✓
Collaborative 3 <sup>rd</sup> party assistance		✓	✓	✓
Support for up to 7 years		✓	✓	✓
Automated case creation for issue resolution by SupportAssist		✓	✓	✓
Case Management API for helpdesk integration		✓	✓	✓
Direct access to elite ProSupport Plus & ProSupport Flex engineers			✓	✓
Dedicated Technical Account Manager			✓	✓
Monthly health check and performance recommendations			✓	
Monthly contract renewal and support history reporting			✓	✓
System maintenance (as needed)			✓	
Dedicated technical and field support teams				✓
Site-wide entitlement and contract				✓

# ProDeploy Enterprise Suite

Get more out of technology starting on day one



## Basic Deployment

- Expert deployment technicians
- Onsite rack, stack cable and label
- Packaging material disposal
- Consistent hardware installation



## ProDeploy

- Single point of project management
- Install and configure system software
- Implementation planning
- Site readiness review



## ProDeploy Plus

- Tool driven environment mapping
- Multivendor integration for networking
- Storage data migration recommendation
- 30-days of post-deployment configuration assistance



## Training and Certification

- Dell Deployment training
- Recognition with online badge
- Industry recognized 3rd party Deployment Certification



Experts



Insights



Ease

# ProDeploy Enterprise Suite feature comparison




		Basic Deployment	ProDeploy	ProDeploy Plus
Pre-deployment	Single point of contact for project management		●	●
	Site readiness review		●	●
	Implementation planning		●	●
	Technical Account Manager engagement for ProSupport Plus entitlement			●
Deployment	Deployment service hours	Business hours	24x7	24x7
	Onsite rack, stack, cable and label	●	●	●
	Packaging materials disposal	●	●	●
	Install and configure operating system, firmware, and hypervisor		●	●
	Tool driven environment mapping and reporting			●
	Data migration analysis and recommendation for storage			●
	Multivendor integration testing for networking			●
	Project documentation with knowledge transfer		●	●
Post-deployment	Deployment verification		●	●
	Configuration data transfer to Dell technical support		●	●
	30-days of post-deployment configuration assistance			●
	Training credits for Dell Education Services			●

# ProDeploy Suite product availability

Product Line	Category	Series	Basic	ProDeploy	ProDeploy Plus
Storage	Tape Libraries	ML Series	●	●	●
		TL Series	●	●	●
	SAN/DAS Arrays	PS Series		●	●
		SC Series		●	●
		MD Series	●	●	●
	Disk Enclosures	SC Disk Series	●	●	●
		MD Disk Series	●	●	●
	Dedicated NAS	FS Series		●	●
	NX Series	●	●	●	
Server	Tower	T Series	●		
	Cloud	DSS or C Series	●		
	Rack	R Series	●	●	●
	Blade	M or FC Series	●	●	●
	M1000e	M1000e		●	●
	VRTX	VRTX		●	●
	FX	FX		●	●
Networking	L2 Fixed Port Switches	X Series	●	●	●
		L2 N Series	●	●	●
	L3 Fixed Port Switches	L3 N Series	●	●	●
		S Series		●	●
	Chassis Switches	C Series		●	●
	Distributed Core Switches	Z Series		●	●
	Blade IO	M Series		●	●

# Storage Networking

## Training and certification learning paths

	Recommended core courses*		Required exam	Badge
SC Series	Dell SC Series Installation <sup>1</sup> (ILT 4 days + 6 hrs online)	Dell SC Series Planning (VILT ½ day + 9 hrs online)	Dell SC Series Storage Professional Deployment exam	
PS Series	Dell PS Series Installation (VILT 3 days + 4 hrs online)	Dell PS Series Planning (VILT ½ day + 9 hrs online)	Dell PS Series Storage Professional Deployment exam	
Networking	Dell Networking Installation and Configuration (VILT 5 days)	Dell Networking Planning (VILT 3 days)	Dell Networking Professional Deployment exam	

\* Recommended core courses are not required.

1- Dell SC Series course only available as instructor-led training in the following locations: Edina, MN; Panama; Bracknell, England; and Singapore. All other courses are delivered as virtual instructor-led training.

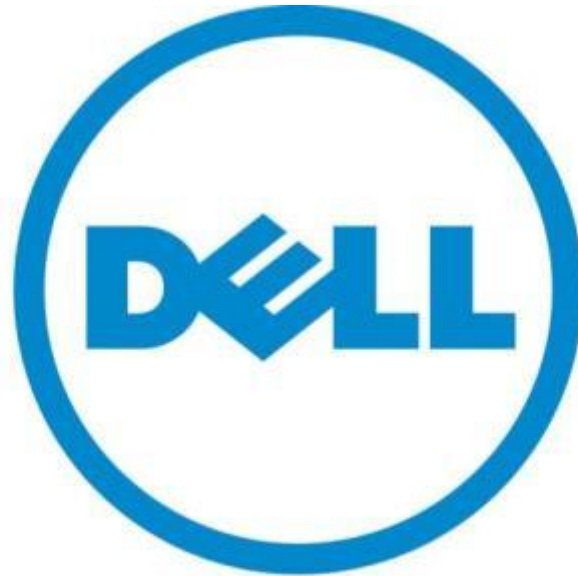




# Feedback

We encourage readers of this publication to provide feedback on the quality and usefulness of this information by sending an email to

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- [Saleem Muhammad](mailto:Saleem_Muhammad@dell.com) (Saleem\_Muhammad@dell.com)



The power to do more