



# Dell PowerEdge FN I/O Module

## For the Dell PowerEdge FX2 converged-infrastructure platform

Simplify FX2 cabling plus experience plug-and-play converged I/O and Fiber Channel connectivity with full L2/L3 capability while leveraging new PowerEdge servers for enhanced data center performance.

The FN I/O Module (FN IOM) is designed specifically for the PowerEdge FX2 converged-infrastructure platform, part of the PowerEdge FX architecture. Its simplified network management and configuration enable instant plug-and-play connectivity to the FX2. The FX2 converged infrastructure supports up to two FN IOMs. The FN IOMs include eight internal ports with the ability to reduce and simplify cabling to a single external port. The FN IOM also has a number of zero-touch and pre-configured features enabling easy network deployment. Through the Dell Blade IO Manager, users can utilize an intuitive GUI interface to configure and manage FN IOM switch functions without the complexity of a CLI.

### Simplify I/O connectivity

The FN IOM simplifies FX2 connectivity by as much as 8-to-1, greatly reducing cabling complexity. It provides simplified connectivity with your choice of external port configurations including four ports of SFP+, 10GBase-T, or a combination FN IOM with two ports of native Fiber Channel and two ports of SFP+. The combination Fiber Channel/SFP+ FN IOM allows for convergence directly in the FX2 platform, enabling native Fiber Channel connection directly to a Fiber Channel switch or direct connection F\_port to a Fiber Channel storage array. The FN IOM includes eight 10GbE internal ports and supports uplink-port link aggregation group (LAG) and virtual link trunking (VLT).

### Enable converged I/O and Fiber Channel connectivity

Full data center bridging (DCB) support with zero-touch FCoE activation enables an automated LAN/SAN converged system that connects server nodes to upstream switches. The solution can reduce adapters up to 50%, reduce cabling up to 75%, and decrease the number of switches needed for LAN and SAN by up to 75%. In addition, the FN IOM easily connects to the Dell Networking S5000 10/40GbE unified storage switch. The S5000 switch features up to 64 SFP+ 10GbE ports and up to 12 Fiber Channel ports, providing Fiber Channel Forwarding (FCF). The FN IOM is also able to directly connect to a Fiber Channel storage array.

### Optimize FX2 performance

The FN IOM enhances east-west traffic flows within the FX2 enclosure for superior network performance and increased server-to-server communication, important for today's virtualized environments. The FN IOM takes full advantage of high-performance 10GbE throughput, and next-generation PowerEdge servers and converged solutions for easy connection to high-density network architectures.

The FN I/O Module simplifies cabling for the FX Architecture system while optimizing Dell next-generation server performance and bringing plug-and-play converged I/O.

### Full Layer 2/Layer 3 switching and SDN ready

The FN IOM provides both Layer 2 and advanced Layer 3 IPv4 and IPv6 switching capabilities. In addition, the FN IOM includes OpenFlow 1.3, providing the ability to separate the control plane from the forwarding plane for Software Defined Networking (SDN) traffic management.

### Simple Management:

Each PowerEdge FN IOM device includes the Dell Blade I/O Manager, an embedded web GUI which allows detailed provisioning and monitoring of the device. The Blade I/O Manager offers administrators the flexibility to easily change the mode of the device, enable and disable ports and set up TACACS+/RADIUS and also displays detailed information including port status, VLAN, LAG, VLT, stacking, fabric, alerts and logs. FX2 CMC GUI links the Blade I/O Manager to the FN IOM devices. FN IOM devices in full-switch mode are managed through CLI.

| Model                 | FN2210S                                                                                                                                                                                                                                                                                                                     | FN410S                                                                                                                                                                                                                                  | FN410T                                                                              |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                       |                                                                                                                                                                                                                                            |                                                                                                                                                       |  |
| Module differentiator | <p>Two native Fiber Channel ports and two SFP+ ports</p> <p>Four SFP+ ports with reboot</p> <p>Fiber Channel NPIV Proxy Gateway* (NPG) with gateway capabilities to existing SAN fabrics</p> <p>F-port capability providing Fiber Channel fabric services allowing direct connection to a Fiber Channel storage array**</p> | <p>Four SFP+ ports</p> <p>Supports optical and DAC cable media</p>                                                                                                                                                                      | <p>Four 10GBASE-T ports</p> <p>Supports copper media up to 100m</p>                 |
| Port speed            | 2/4/8/Gb and 1/10GbE                                                                                                                                                                                                                                                                                                        | 1/10GbE                                                                                                                                                                                                                                 | 100Mb/1/10GbE (supports auto negotiation)                                           |
| Protocol support      | Native Fiber Channel and Ethernet                                                                                                                                                                                                                                                                                           | Ethernet                                                                                                                                                                                                                                | Ethernet                                                                            |
| Media types           | 2/4/8GbE FC SFP+ optics                                                                                                                                                                                                                                                                                                     | <p>Optical Transceivers SFP+ 10Gb:</p> <ul style="list-style-type: none"> <li>SR, LR</li> <li>SFP 1 GbE: SX, LX</li> <li>SFP to RJ45 converter 1000Base-T (only capable of 1Gbps)</li> <li>SFP+ Direct Attach Cable (Twinax)</li> </ul> | RJ45/Cat6a copper                                                                   |

\*The Dell PowerEdge FN2210S I/O Module has 2 FC ports and 2 Ethernet ports. The Ethernet ports allow connectivity to LAN and the FC ports support NPG (NPIV Proxy Gateway) mode to connect to SAN switch.

\*\*The FN2210S supports F-port capability that enables direct connection to Fiber Channel storage arrays without the need to connect through a Fiber Channel switch.

## Specifications: Dell PowerEdge FN I/O Module

| Dell SKU descriptions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Environmental                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Max. of 12 lag groups can be created.<br>In full-switch mode: max. of 24 LAG groups and multiple uplink LAG groups<br><b>Queues per port:</b> 4 queues<br><b>VLANS:</b> 4094<br><b>Line-rate Layer 2 switching:</b> All protocols, including IPv4<br><b>Line-rate Layer 3 routing:</b> IPv4 and IPv6<br><b>Packet buffer memory:</b> 4MB<br><b>CPU memory:</b> 2GB<br><b>ACLs:</b> Ingress egress in full switch mode                   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Dell FN I/O Module</b></p> <p><b>FN2210S</b>, 2 line-rate fixed 2/4/8Gb Fiber Channel ports with 2 line-rate 1GbE/10GbE SFP+ ports (Default Mode) or 4 line-rate fixed 1GbE/10GbE SFP+ ports (Ethernet Mode)</p> <p><b>FN410S</b>, 4 line-rate fixed 1GbE/10GbE SFP+ ports</p> <p><b>FN410T</b>, 4 line-rate fixed 100Mb/1Gb/10Gb BASE-T ports (supports auto negotiation)</p> <p><b>Optics</b></p> <p>Transceiver, SFP+, 10GbE, SR, 850nm Wavelength, 300m Reach</p> <p>Transceiver, SFP+, 10GbE, LR, 1310nm Wavelength, 10km Reach</p> <p>Transceiver, SFP+, 10GbE, DWDM, ITU Channel 17–61, 40km Reach</p> <p>Transceiver, SFP, 1000Base-SX, 850nm Wavelength, 550m Reach</p> <p>Transceiver, SFP, 1000Base-LX, 1310nm Wavelength, 10km Reach</p> <p>Transceiver, SFP, 1000Base-T</p> <p><b>Cables</b></p> <p>Cable, 40GbE QSFP+ to 4xSFP+, Direct Attach Breakout Cable, 0.5m, 1m, 3m, 5m, 7m, 10m</p> <p>Cable (optics not included)</p> <p>Cable, SFP+, CU, 10GbE, Direct Attach Cable, 0.5m, 1m, 3m, 5m, 7m, 10m</p> <p><b>Software</b></p> <p>Software, Networking, Full-switch mode, FNIOM*</p> <p><b>Additional port attributes:</b></p> <p>Up to 8 line-rate 10GbE KR ports</p> <p>1 USB (Type A) port for storage</p> <p>1 USB (Type A) port for console/management</p> <p><b>FN I/O Module Modes supported:</b></p> <p>Standalone mode: I/O aggregation, default automated mode</p> <p>Stacking mode: I/O aggregation while stacked</p> <p>VLT mode: I/O aggregation while VLT'd</p> <p>PMUX mode: I/O aggregation with limited CLI</p> <p>Full-switch mode: L2/L3 switch mode with CLI</p> | <p><b>Max. thermal output:</b> 214.9 BTU/h</p> <p><b>Max. current draw per IOM:</b></p> <p>FN410S: 5.5A @ 12V DC</p> <p>FN410T: 6.5A @ 12V DC</p> <p>FN2210S: 6.6A @ 12V DC</p> <p><b>Max. power consumption per IOM:</b></p> <p>FN410S: 66W</p> <p>FN410T: 77W</p> <p>FN2210S: 79W</p> <p><b>ISO 7779 A-weighted sound pressure level:</b></p> <p>59.6dBA at 73.4°F (23°C)</p> <p><b>Operating temperature:</b> 32° to 140°F (0° to 60°C)</p> <p><b>Operating humidity:</b> 10 to 85% (RH), non-condensing</p> <p><b>Max. non-operating specifications:</b></p> <p>Storage temperature: –40° to 158°F (–40° to 70°C)</p> <p>Storage humidity: 5 to 95% (RH), non-condensing</p> <p><b>Performance</b></p> <p><b>MAC addresses:</b> 64K</p> <p><b>Switch fabric capacity:</b> 240Gbps (Full-Duplex)</p> <p><b>Forwarding capacity:</b> 179Mpps</p> <p><b>Link aggregation:</b></p> <p>Max 4 members per group and 1 uplink LAG group 1 default mode. Max of 1 LAG group with 12 members or 12 LAG groups with one member each in case of 6 unit stacking</p> <p><b>In standalone mode:</b></p> <p>Max. 4 members per group and 1 uplink LAG group (Port-channel 128 default mode)</p> <p><b>In stacking mode:</b></p> <p>Max. of 12 members per group and 1 uplink LAG group (only supported in FN410S and FN410T)</p> <p><b>In Pmux standalone:</b></p> <p>Max. of 24 LAG groups and multiple uplink LAG groups</p> <p><b>In Pmux stacking mode:</b></p> | <p><b>Stacking</b></p> <p>Stacked units: Up to 6 IOMs (using 10GbE ports deployed via CLI)</p> <p>Stacking bandwidth: Up to 40Gbps (using 1 x 10GbE ring)</p> <p>Stacking topology: Ring and daisy chain</p> <p>Virtual Link Trunking (VLT): mVLT and L2 over VLT (deployed via CLI)</p> <p>VLT supported in VLT, PMUX and Full-switch mode</p> <p>Stacking supported in stacking, PMUX and Full-switch mode with FN410S and FN410T</p> |

\*Available with full-switch mode.



# Specifications: Dell PowerEdge FN I/O Module

## IEEE compliance

802.1AB LLDP  
802.1p L2 Prioritization  
802.2 LLC  
802.3ab Gigabit Ethernet (1000Base-T)  
802.3ad Link Aggregation with LACP  
802.3ae 10GbE (10GBase-X)  
802.3u Fast Ethernet (100Base-TX)  
802.3x Flow Control  
802.3z Gigabit Ethernet (1000Base-X)  
ANSI/TIA-1057 LLDP-MED  
MTU 12KB

## VLAN and Spanning Tree

802.1Q VLAN Tagging  
802.3ac Frame extensions for VLAN Tagging  
Native VLAN  
802.1D Bridging, STP\*  
802.1s MSTP\*  
802.1w RSTP\*  
Force10 PVST+\*  
2338 VRRP\*

## Layer 3 Routing - full switch mode

1058 RIPv1  
2453 RIPv2  
2154 MD5 (OSPF)  
1587 NSSA (OSPF)  
2328 OSPFv2  
2740 OSPFv3  
4222 Prioritization and congestion avoidance  
4552 OSPFv3 IPsec authentication

## BGP

1997 BGP Communities  
2385 BGP MD5  
2439 BGP Route Flap Damping  
2796 BGP Route Reflection  
2918 BGP Route Refresh  
3065 BGP Confederations  
4360 BGP Extended Communities  
4893 BGP 4-byte ASN  
5396 BGP 4-byte ASN representations  
draft-ietf-idr-restart-06 BGP Graceful Restart  
1195 Routing IPv4 with IS-IS  
5308 Routing IPv6 with IS-IS

## FCoE

INCITS FC-BB-5 Ver 2.00 (FSB, NPIV & F-Port only; FN2210S only)  
Fibre Channel Generic Services (FC-GS, FC-GS2, GC-GS3; FN2210S only)  
FC-FG (F\_PORT only; FN2210S only)  
FC-VI (FN2210S only)  
FCoE Initialization Protocol (FIP) v1  
FCoE Transit (FIP Snooping Bridge) supported with FN410S, FN410T  
Native FCoE forwarding  
NPIV Proxy Gateway (NPG) supported with FN2210S  
FCoE-FC forwarding / FPORT – Supported only with FN2210S  
Dynamic FCoE to FC Load balancing

## Data Center Bridging

IEEE 802.1Qbb Priority-Based Flow Control (PFC)  
IEEE 802.1Qaz Enhanced Transmission Selection (ETS)  
Data Center Bridging eXchange (DCBx)  
DCBx Application TLV (iSCSI, FCoE)

## Security options

854 Telnet  
959 FTP  
1321 MD5  
1350 TFTP  
2474 Differentiated Services  
2856 RADIUS  
3164 Syslog

4254 SSHv2  
draft-grant-tacacs-02 TACACS+  
4807 IPsec SPD MIB  
4301 IPsec

## General IPv4 protocols

768 UDP  
791 IPv4  
792 ICMP  
793 TCP  
826 ARP  
1027 Proxy ARP\*  
1035 DNS (client)\*  
1042 Ethernet Transmission  
1191 Path MTU Discovery\*  
1305 NTPv3  
1519 CIDR  
1542 BOOTP (relay)\*  
1812 Routers\*  
1858 IP Fragment Filtering\*  
2131 DHCP (relay, client, server)\*  
3021 31-bit Prefixes  
3046 DHCP Option 82\*  
3069 Private VLAN\*  
3128 Tiny Fragment Attack Protection

## General IPv6 protocols

2460 IPv6\*  
1858 IP Fragment Filtering\*  
2461 Neighbor Discovery\*  
2675 Jumbograms (partial)\*  
3587 Global Unicast Address Format\*  
2462 Stateless Address Autoconfiguration (partial)\*  
4291 Addressing\*  
2463 ICMPv6\*  
4861 IPv6 Host for management port  
1981 IPv6 Path MTU discovery\*

## Multicast protocols

1112 IGMPv1\*  
3569 SSM for IPv4\*  
2236 IGMPv2\*  
4541 IGMPv1/v2 Snooping  
3376 IGMPv3 draft-ietf-pim-sm-v2-

## SDN/Openflow

Openflow 1.0 with extensions\*

## Network management

1155 SMIv1\*  
1156 Internet MIB\*  
1157 SNMPv1  
1212 Concise MIB Definitions\*  
1215 SNMP Traps\*  
1493 Bridges MIB\*  
1850 OSPFv2 MIB\*  
1901 Community-based SNMPv2  
2011 IP MIB\*  
2012 TCP MIB\*  
2013 UDP MIB\*  
2096 IP Forwarding Table MIB\*  
2570 SNMPv3\*  
2571 Management Frameworks\*  
2572 Message Processing and Dispatching\*  
2575 SNMPv3 VACM\*  
2576 Coexistence Between SNMPv1/v2/v3  
2578 SMIv2\*  
2579 Textual Conventions for SMIv2\*  
2580 Conformance Statements for SMIv2\*  
2618 RADIUS Authentication MIB\*  
2665 Ethernet-like Interfaces MIB\*  
2787 VRRP MIB 2819 RMON MIB (groups 1, 2, 3, 9)\*  
2863 Interfaces MIB\*

3273 RMON High Capacity MIB\*  
3416 SNMPv2  
3418 SNMP MIB  
3434 RMON High Capacity Alarm MIB\*  
ANSI/TIA-1057 LLDP-MED MIB\*  
IEEE 802.1AB LLDP MIB\*  
IEEE 802.1AB LLDP DOT1 MIB\*  
IEEE 802.1AB LLDP DOT3 MIB\*  
sFlow.org sFlowv5\*  
FORCE10-IF-EXTENSION-MIB  
FORCE10-LINKAGG-MIB\*  
FORCE10-COPY-CONFIG-MIB\*  
FORCE10-MON-MIB\*  
FORCE10-PRODUCTS-MIB\*  
FORCE10-MS-CHASSIS-MIB\*  
FORCE10-SMI FORCE10-SYSTEM-COMPONENT-MIB\*  
FORCE10-TC-MIB\*  
FORCE10-TRAP-ALARM-MIB\*  
FORCE10-FIPSNOOPING-MIB  
FORCE10-DCB-MIB\*  
LLDP-EXT-DOT1-DCBX-MIB\*  
IEEE8021-PFC-MIB\*  
DELL\_ITA.REV\_1\_1.MIB  
F10-JUMPSTART-MIB\*  
IEEE8021-PFC-MIB\*  
DELL\_ITA.REV\_1\_1.MIB  
F10-JUMPSTART-MIB\*  
FORCE10-MSTP-MIB\*  
F10-FPSTATS.MIB  
f10-VirtualLinkTrunk.MIB  
F10-DCBX.MIB  
F10-MS-PLATFORM.MIB

## Regulatory and environment compliance

UL/CSA 60950-1, Second Edition  
EN 60950-1, Second Edition  
IEC 60950-1, Second Edition Including all National Deviations and Group Differences  
EN 60825-1 Safety of Laser Products Part 1: Equipment Classification Requirements and User's Guide Optical Fiber Communication Systems  
FDA Regulation 21 CFR 1040.10 and 1040.11 Emissions  
Australia/New Zealand: AS/NZS CISPR 22: 2006, Class A  
Canada: ICES-003, Issue-4, Class A  
Europe: EN 55022: 2006+A1:2007 (CISPR 22: 2006), Class A  
Japan: VCCI V3/2009 Class A  
USA: FCC CFR 47 Part 15, Subpart B:2009, Class A  
  
EN 300 386 V1.4.1:2008 EMC for Network Equipment  
EN 55024: 1998 + A1: 2001 + A2: 2003  
EN 61000-3-2: Harmonic Current Emissions  
EN 61000-3-3: Voltage Fluctuations and Flicker  
EN 61000-4-2: ESD  
EN 61000-4-3: Radiated Immunity  
EN 61000-4-4: EFT  
EN 61000-4-5: Surge  
EN 61000-4-6: Low Frequency Conducted Immunity

All components are RoHS compliant

\*Available with full-switch mode.

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