

Dell PowerVault™ 50F 8-Port Fibre Channel Switch User's Guide

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Preface: Dell PowerVault™ 50F 8-Port Fiber Channel Switch User's Guide

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Overview

About This Guide

This guide is intended for anyone who uses a Dell PowerVault™ 50F Fibre Channel Switch. It can be used by experienced users who want to learn about the features and operation of the switch. The chapters and appendixes are summarized as follows:

- Chapter 1, "Introduction" provides an overview of the switch including features, system components, and interface cards.
 - Chapter 2, "Technical Specifications," is intended primarily as reference material for users interested in learning more about the details of the switch.
 - Appendix A, "Regulatory Notices," is for users who are interested in which regulatory agencies have tested and approved the Dell PowerVault™ 50F switch.
 - Appendix B, "Warranties, Return Policy, and Year 2000 Statement of Compliance," describes the warranty for your Dell switch, the "Total Satisfaction" Return Policy, and the year 2000 statement of compliance for Dell-branded hardware products.
 - The "Glossary" provides definitions for some of the terms used in this guide.
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Warranty and Return Policy Information

Dell Computer Corporation ("Dell") manufactures its hardware products from parts and components that are new or equivalent to new in accordance with industry-standard practices. For information about the Dell warranty for your switch, see "[Warranties, Return Policy, and Year 2000 Statement of Compliance](#)."

Other Documents You May Need

Besides this *User's Guide*, the following documentation is included with your switch:

- The *Dell PowerVault™ 50F 8-Port Fibre Channel Switch Installation and Troubleshooting Guide* provides information on installing and managing a PowerVault™ 50F Switch.

You may also have one or more of the following documents.



NOTE: Documentation updates are sometimes included with your switch to describe changes to your switch or software. Always read these updates **before** consulting any other documentation because the updates often contain the latest information.

- Technical information files — sometimes called "readme" files — may be installed on your hard-disk drive to provide last-minute updates about technical changes to your switch or advanced technical reference material intended for experienced users or technicians.
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Notational Conventions

The following subsections describe notational conventions used in this document.

Notes, Cautions, and Warnings

Throughout this guide, blocks of text may be accompanied by an icon and printed in bold type or in italic type. These blocks are notes, cautions, and warnings, and they are used as follows:

 **NOTE:** A NOTE indicates important information that helps you make better use of your switch.

 **CAUTION:** A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

 **WARNING:** A WARNING indicates the potential for bodily harm and tells you how to avoid the problem.

Typographical Conventions

The following list defines (where appropriate) and illustrates typographical conventions used as visual cues for specific elements of text throughout this document:

- *Interface components* are window titles, button and icon names, menu names and selections, and other options that appear on the monitor screen or display. They are presented in bold.
- *Keycaps*, the labeling that appears on the keys on a keyboard, are enclosed in angle brackets.

Example: <Enter>

- *Key combinations* are series of keys to be pressed simultaneously (unless otherwise indicated) to perform a single function.

Example: <Ctrl><Alt><Enter>

- *Commands* presented in lowercase bold are for reference purposes only and are not intended to be typed when referenced.

Example: "Use the **format** command to . . . "

In contrast, commands presented in the Courier New font are part of an instruction and intended to be typed.

Example: "Type `format a:` to format the diskette in drive A."

- *Filenames* and *directory names* are presented in lowercase bold.

Examples: **autoexec.bat** and **c:\windows**

- *Syntax lines* consist of a command and all its possible parameters. Commands are displayed in lowercase bold; variable parameters (those for which you substitute a value) are displayed in lowercase italics; constant parameters are displayed in lowercase bold. The brackets indicate items that are optional.

Example: **del** [*drive:*] [*path*] *filename* [/p]

- *Command lines* consist of a command and may include one or more of the command's possible parameters. Command lines are presented in the Courier New font.

Example: del c:\myfile.doc

- *Screen text* is text that appears on the screen of your monitor or display. It can be a system message, for example, or it can be text that you are instructed to type as part of a command (referred to as a *command line*). Screen text is presented in the Courier New font.

Example: The following message appears on your screen:

```
No boot device available
```

Example: "Type md c:\programs and press <Enter>."

- *Variables* are placeholders for which you substitute a value. They are presented in italics.

Example: DIMM*x* (where *x* represents the DIMM socket designation).

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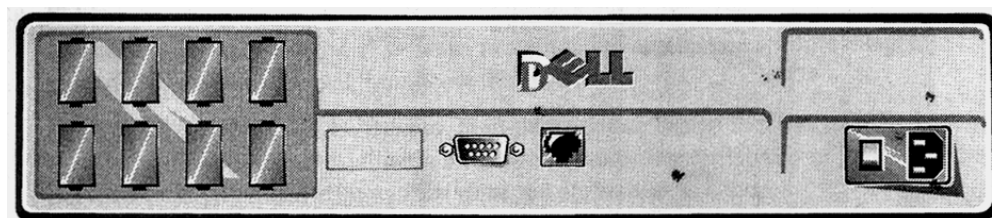
Introduction: Dell PowerVault™ 50F 8-Port Fibre Channel Switch User's Guide

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Overview

The Dell PowerVault™ 50F is an 8-port Fibre Channel switch that consists of a system board, microprocessor board, connectors for supporting up to four dual-port interface cards, and firmware for building and managing a Fabric. A *Fabric* is an active, intelligent, nonshared interconnect scheme for Fibre Channel server and storage nodes. One or more switches interconnected create a Fibre Channel Fabric. Figure 1-1 shows the switch view of a PowerVault™ 50F.

Figure 1-1. Switch View of PowerVault™ 50F



This chapter discusses:

- PowerVault™ 50F Switch features
 - Performance
 - Manageability
 - Reliability
 - Serviceability
 - System Components
 - Switching Function
 - Embedded Port
 - System Firmware
 - Interface cards
 - Dual Channel G_Port Interface Card
 - Dual Channel FL_Port Interface Card
 - SWL Fiber-Optic GBIC Module
 - Copper GBIC Module
-

PowerVault™ 50F Switch Features

The PowerVault™ 50-F Switch includes the following features:

- **Simple** — Easy setup and configuration. After power-on self-test (POST), you needed only to add the switch's Internet Protocol (IP) address. The remainder of the switch's setup is automated.
- **Intelligent** — The switch's firmware allows discovery of all connected devices and determines optimum data paths without intervention, supporting up to 32 interconnected switches.
- **Flexible** — Modular design with multiple interface cards, supporting G_Port (F_Port and E_Port), FL_Port cards, gigabit interface connector (GBIC) modules supporting both, and copper and optical media. The switch's modular construction gives the switch a range of flexibility in creating, upgrading, maintaining, and configuring a Fabric.
- **Reliable** — Highly integrated, reliable, multifunction application specific integrated circuit (ASIC) devices are used throughout the switch.
- **High performance** — Low-latency, high-performance design requires no microprocessor data path interaction, resulting in a worst-case, data transfer latency of less than 2 microseconds. The latency may differ when the destination is a loop.
- **Automated congestion management** — Virtual channels lets the switch use sophisticated congestion management techniques that are performed automatically by the switch.

Table 1-1 describes additional PowerVault™ 50F Switch technical features:

Table 1-1. PowerVault™ 50F Switch Technical Features

Feature	Description
Login (FC)	Explicit Fabric login is supported (public and private).
Probing	Automatic discovery of devices and auto registration with the Fabric Simple Name Service (SNS). For private devices, translation mode is set so that other Fabric-attached devices can communicate with them.
Virtual channels	<p>The switch has eight virtual channels and four priority levels supporting each switch port. Different virtual channels are automatically assigned with different priority levels to accommodate various types of data flow, different communications protocols, and user applications. Virtual channels provide a flexible congestion management that is also used to separate traffic among:</p> <ul style="list-style-type: none"> • Fibre Channel Link Control frames and Data frames • Class 2, Class 3, and Class F frames • E_Port, F_Port, and FL_Port destined traffic
Data Field Size	The Fibre Channel frame's data field size is up to 2112 bytes.
Buffer-to-buffer credit	<p>Buffer-to-buffer credit for each F_Port can be up to 16 credits. For the E_Port, buffer-to-buffer credit can be a total of 62 credits distributed among all eight virtual channels.</p> <p>The FL_Port uses the alternate buffer-to-buffer credit management model. Each FL_Port may be configured to Open and supports a BB_Credit of 0 or 1. Up to 16 credits can be made available when opened. Open transmit credit can be 0 or 1 on a per-destination NL_Port basis.</p>
Time Out Values	Both Resource Allocation Time Out Value (R_A_TOV) and Error Detect Time Out Value (E_D_TOV) are adjustable in 1-millisecond increments via Telnet.
Fabric Name	An automatic Fabric Name assignment method is used in a multiswitch configuration.
Frame Delivery	The switch delivers the frames via the destination F_Port in the same order received by the source F_Port. The in-order frame delivery is maintained within a Fabric of multiple interconnected switches.
Address Assignment	The switch follows the addressing hierarchy defined in the Fibre Channel Standard. The switch port address identifiers are selected using an automatic address assignment protocol. All ports within the switching Fabric (F_Ports, FL_Ports, and E_Ports) are assigned address identifiers. Each switch maintains its own address pool. The management of address identifiers and assignment of the address pool to the individual switches are performed by the designated address managers within the Fabric.
Broadcast and	The system supports up to 32 multicast groups, one is reserved for broadcast. Any port can be a member of

Multicast	multiple groups. In addition to the unicast routing table, each port has its own multicast routing table. The Alias Server is responsible for setting up and removing multicast groups.
Frame Routing	Self-routing of frames between the communicating ports is supported. The path selection in a multiswitch configuration is based on a self-routing protocol.
Management	The switch may be managed via Telnet and the PowerVault™ 50F Fibre Channel Switch Manager. These tools are accessible via the IP over RJ45 10BASE-T Ethernet port. You can use Dell OpenManage™, version 1.4 or higher, to access the PowerVault™ 50F Switch Manager. However, you may use any supported Web browser to use the PowerVault™ 50F Switch Manager. The only Web browser supported under Dell OpenManage™ is Internet Explorer, version 4.0 or higher.
Name Server	The Name Server function is based on the Simple Name Server model defined in the Fibre Channel Standard. This function is provided by the embedded N_Port with the alias address, FFFFFCh, to register address mapping between the Nx_Port 24-bit Fibre Channel physical address (Nx_Port identifier) and the logical addresses such as Worldwide Names, IP addresses, FC-4 device types, and Initial Process Associators. The Name Server also provides the deregistration and query functions from other nodes or Nx_Ports for logical address translations to the corresponding Nx_Port identifiers.
Alias Server	The Alias Server is based on the Fibre Channel Standard. The function is provided by the embedded N_Port with the alias address, FFFFFAh. It manages multicast groups.

Performance

A minimum aggregate routing capacity of 4,000,000 frames/sec is specified for Class 2, and Class F frames. Non-blocking throughput of up to 8 x 100 MB/sec is provided.

A maximum switch latency of less than two microseconds is specified for Class 2, Class 3, and Class F frames when the output port is free.

Manageability

The unit may be managed locally using the RS232 port. You can also manage the switch remotely via Telnet, Dell OpenManage™, or PowerVault™ 50F Switch Manager.

Modularity

The modularity built into the PowerVault™ 50F Switch allows:

- Support of two G (F or E) ports and six FL ports.
- Each card accommodates two 1-Gbps ports (2 Gbps total per card). Each port is full-duplex (bidirectional at this rated throughput).
- GBIC interface allows support for different transmission media for each port.

Reliability

The PowerVault™ 50F Switch has the following features, ensuring reliability:

- POST
- Error monitoring
- Temperature and fan-speed monitoring
- Low component count

Serviceability

The PowerVault™ 50F Switch has the following features, enhancing serviceability:

- Simple enclosure
 - Loopback test modes for service
 - User-friendly diagnostics
 - No jumpers or switch settings
-

System Components

The switch architecture separates the switching function from the ports, resulting in three basic system board modules: the system board, its microprocessor board, and plug-in interface cards.

Components are enclosed in an air-cooled chassis which may be either mounted in a standard rack or used as a stand-alone unit. The chassis includes a serial port and an RJ45 Ethernet connection for switch set up and management.

Switching Function

The switching function is based on a central memory bank associated with its data path control. Each switch port stores received frames in this memory, passing a buffer pointer to the forwarding port's transmitter. The switch uses *cut-through* routing to route frames from the receiving port to the transmitting port, providing the transmit port is free, without waiting for the end of the frame to be received. This provides a low-latency data path within the switch. The frame can be temporarily stored in the memory bank but only if the transmit port is busy.

Embedded Port

The embedded port, which is a logical N_Port, is based on a microcontroller and is responsible for:

- Fibre Channel link control
- Switch management
- Routing table management
- Address assignment and management functions
- Management of Class F services and the related protocols as defined in the Fibre Channel Standard

The embedded port also functions as a Simple Network Management Protocol (SNMP) agent, a Fibre Channel Name Server, and an Alias Server to manage multicast and broadcast functions.

System Firmware

Included with the switch is firmware that can be customized and tuned for each installation. Dell has provided a standard set of commands and interfaces described in "PowerVault™ 50F Commands" of the *Dell PowerVault™ 50F 8-Port Fibre Channel Switch Installation and Troubleshooting Guide* for switch monitoring, control, and management.

Interface Cards

The switch is manufactured in a fixed configuration with one dual G_Port and three dual FL_Port interface cards. Ports 0, 1, 2, 3, 4, and 5 are FL_Ports and ports 6 and 7 are G_Ports.

All interfaces have status lights visible from the switch panel giving a quick, visual check of the interface card's status and activity.

The Fibre Channel standards-compliant G_Ports and FL_Ports operate in both half- and full-duplex mode. Table 1-2 explains the interface card terminology.

Table 1-2. Interface Card Terminology

Term	Definitions
G_Port	Generic switch port that operates in either E_Port or F_Port modes.
E_Port	An E_Port is an interswitch expansion port used to connect to an E_Port of another switch to build a larger Fabric.
F_Port	The F_Port is the Fabric access port used to connect an N_Port.
Fx_Port	An Fx_Port is either a N_Port or a FL_Port.
FL_Port	The FL_Port is the Fabric access port used to connect NL_Ports to the switch in a loop configuration.
N_Port	The N_Port is an equipment port connected to the Fabric via an F_Port.
NL_Port	The NL_Port is an equipment port connected to the Fabric in a loop configuration via an FL_Port.

A switch is scalable and future releases will allow interconnecting multiple switches in flexible topologies building medium to large Fibre Channel switching Fabrics. Topologies are automatically changed as new switches or links are added and as the Fabric grows. Additionally, the switches in the Fabric automatically reconfigure the Fabric as switches or links fail or are removed.

Dual Channel G_Port Interface Card

Each dual-channel G_Port interface card supports two G_Ports when two interchangeable GBIC modules are installed. Currently, the GBIC modules supported are the Short Wave Length (SWL) fiber-optic and copper versions.

CRC checking in both the receiving and transmitting sections of the G_Port assures the data integrity of the path within the switch.

If your installation requires installing a single GBIC module, the unused port position is protected by a metal, spring-loaded door.

Dual Channel FL_Port Interface Card

Each dual-channel FL_Port interface card supports two FL_Ports when two interchangeable GBIC modules are installed for connecting to Fibre Channel Arbitrated Loops. Currently, the GBIC modules supported are the SWL fiber-optic and copper versions.

The FL_Port may be attached to either private NL_Ports or public NL_Ports. The FL_Port manages loop communication and initialization. NL_Ports realize the same benefits as N_Ports directly connected to the Fabric.

If your installation requires installing a single GBIC module on this card, the unused port position is protected by a metal, spring-loaded door.

SWL Fiber-Optic GBIC Module

The SWL fiber-optic GBIC module is based on short wavelength CD lasers supporting 1.0625 Gbps link speeds. This GBIC module supports 50-micrometer and 62.5-micrometer multimode fiber and is supported only in non-OFC (Open Fibre Connection) mode. 50/125-micrometer cables up to 500 meters (m) in length and 62.5/125-micrometer cables up to 175 m in length are supported.



NOTE: *The SWL GBIC module uses a Class 1 CD laser, which complies with the 21 CFR, subpart (J) as of the date of manufacture.*

Copper GBIC Module

The copper GBIC module is based on the High-Speed Serial Data Connection (HSSDC) interface standards. The GBIC provides a female HSSDC connector.

HSSDC-to-HSSDC cables of 6 and 12 m have been qualified. Standard cables with HSSDC-to-DB9 male connectors are also available in lengths of 3, 6, and 12 m.

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Technical Specifications: Dell PowerVault™ 50F 8-Port Fiber Channel Switch User's Guide

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Overview

Table 2-1 shows the Dell PowerVault™ 50F Switch general specifications.

Table 2-1. Dell PowerVault™ 50F Switch Specifications

Specifications	Description
Fibre Channel protocol	Fibre Channel ANSI standard (FC-PH)
Fabric initialization	complies with FC-SW 3.2
System architecture	nonblocking shared-memory switch
System processor	superscalar 25-MHz Intel i960JF
Number of Fibre Channel Ports	8 ports
Fibre Channel port speed	1.0625 Gbps full duplex
Modes of operation	Fibre Channel Class-2 service and Fibre Channel Class-3 connectionless service
Aggregate switch I/O bandwidth	8 Gbps, full duplex
Frame buffers	16 buffers per port at 2112 bytes per frame
Fabric latency	<2 microseconds with no contention
Data transmission range	up to 500 m (1,625 ft) for short-wave optical link
Chassis types	back-to-front airflow (power supply out front)

Fabric Management Specifications

Table 2-2 shows Fabric management specifications.

Table 2-2. Fabric Management Specifications

Standard Features	Description
Fabric management	Simple Name Server, Alias Server, SNMP, Telnet, World Wide Web
User interface	RJ45 front panel connector for 10BASE-T Ethernet or in-band
Maintenance port	local front panel RS-232 port, LED indicators

Optical Port Specifications

PowerVault™ 50F Fibre Channel interfaces use a shortwave (780 to 850 nm) laser transmitter. The laser is Class-1 and complies with the requirements of 21 CFR, subpart (J) as of the date of manufacture.

A duplex-SC connector is used to connect to the optical port.

Copper GBIC Module

The copper gigabit interface card (GBIC) module is based on the High-Speed Serial Data Connection (HSSDC) interface standards. The GBIC provides a female HSSDC connector. Cables of 1, 6, and 12 m have currently been qualified. Standard cables with HSSDC-to-DB9 male connectors are also available.

FL_Port Specifications

Table 2-3 shows FL_Port specifications.

Table 2-3. FL_Port Specifications

Specifications	Description
Fibre Channel protocol	Fibre Channel ANSI Standard (FC-AL for FL_Port); Fibre Channel Fabric Loop-Attachment Profile (FC-FLA for FL_Port)
Service classes	Fibre Channel Class 2 and 3
Ports per card	2 (maximum of 8 ports per PowerVault™ 50F)
Operation modes	public-loop mode and translativ mode
Port connection	full-duplex
Transfer speed	1.0625 Gbps
Total Collection buffer size	4 MB
Buffer Collection Methods	FL_Port supports piling and bundling collection methods
Decoding logic	8bits (b)/10b
Optical media	50/125 micrometers (mm) or 62.5/125 mm multimode fiber SWL
Media type	GBIC with short wave length laser (non-OFC) and copper
Diagnostics	one LED per port reports port status via colors and a blinking pattern

Environmental Specifications

The PowerVault™ 50F Switch's primary operating environments are server rooms, network equipment closets, and office environments. The acceptable environmental conditions for a PowerVault™ 50F Switch are shown in Table 2-4.

Table 2-4. Environmental Specifications

Specification	Value
Temperature (operating)	0° C to 35° C

Temperature (non-operating)	-35° C to 65° C
Operating humidity	5% to 85% noncondensing at 40° C
Nonoperating humidity	95% RH noncondensing at 40° C
Operating altitude	up to 3 km (9,800 ft)
Nonoperating altitude	up to 4 km (13,080 ft)
Operating shock	4 g for 11 ms, half-sine wave shape, low impulse
Nonoperating shock	20 g for 11 ms, half-sine wave shape, low impulse
Operating vibration	5 g, 0 to 3 kHz
Nonoperating vibration	10 g, 0 to 3 kHz

Dimensions

The PowerVault™ 50F Switch may be configured for either rack mount or tabletop use.

Rack Mount Dimensions

The follow dimensions are for the rack mount configuration:

- 2U, 19-inch rack mount (EIA compliant)
- Height: 8.7 cm (3.438 inches)
- Width: 42.9 cm (16.88 inches)
- Depth (rack sides): 72.4 cm to 73.9 cm (28.5 to 29.1 inches)
- Weight: 13.5 kg (29.6 lb)

Table Top Dimensions

The follow dimensions are for the table top configuration:

- Height: 8.7 cm (3.438 inches)
- Width: 42.9 cm (16.88 inches)
- Depth: 42.9 cm (16.88 inches)
- Weight: 8.6 kg (19 lb)

Power Supply

The following power ratings are required:

- Input voltage: 100/240 volts alternating current (VAC)
- Total input power:
 - 65 watts (W) typical with 8 G_ports
 - 130 W typical with 8 FL_ports
- Input line frequency: 50 to 60 Hz

Local country power cord supplied.

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Regulatory Notices: Dell PowerVault™ 50F 8-Port Fibre Channel Switch User's Guide

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Overview

Electromagnetic Interference (EMI) is any signal or emission, radiated in free space or conducted along power or signal leads, that endangers the functioning of a radio navigation or other safety service or seriously degrades, obstructs, or repeatedly interrupts a licensed radio communications service. Radio communications services include but are not limited to AM/FM commercial broadcast, television, cellular services, radar, air-traffic control, pager, and Personal Communication Services (PCS). These licensed services, along with unintentional radiators such as digital devices, including computer systems, contribute to the electromagnetic environment.

Electromagnetic Compatibility (EMC) is the ability of items of electronic equipment to function properly together in the electronic environment. While this computer system has been designed and determined to be compliant with regulatory agency limits for EMI, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference with radio communications services, which can be determined by turning the equipment off and on, you are encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna.
- Relocate the computer with respect to the receiver.
- Move the computer away from the receiver.
- Plug the computer into a different outlet so that the computer and the receiver are on different branch circuits.

If necessary, consult a Technical Support representative of Dell Computer Corporation or an experienced radio/television technician for additional suggestions. You may find the *FCC Interference Handbook, 1986*, to be helpful. It is available from the U.S. Government Printing Office, Washington, DC 20402, Stock No. 004-000-00450-7 or on the World Wide Web at <http://www.fcc.gov/Bureaus/Compliance/WWW/tvibook.html>.

Dell computer systems are designed, tested, and classified for their intended electromagnetic environment. These electromagnetic environment classifications generally refer to the following harmonized definitions:

- Class A is for business or industrial environments.
- Class B is for residential environments.

Information Technology Equipment (ITE), including peripherals, expansion cards, printers, input/output (I/O) devices, monitors, and so on, that are integrated into or connected to the system should match the electromagnetic environment classification of the computer system.

A Notice About Shielded Signal Cables: Use only shielded cables for connecting peripherals to any Dell device to reduce the possibility of interference with radio communications services. Using shielded cables ensures that you maintain the appropriate EMC classification for the intended environment. For parallel printers, a cable is available from Dell Computer Corporation. If you prefer, you can order a cable from Dell Computer Corporation on the World Wide Web at <http://www.dell.com/products/dellware/index.htm>.

Most Dell computer systems are classified for Class B environments. To determine the electromagnetic classification for your system or device, refer to the following sections specific for each regulatory agency. Each section provides country-specific EMC/EMI or product safety information.

FCC Notices (U.S. Only)

Most Dell computer systems are classified by the Federal Communications Commission (FCC) as Class B digital devices. However, the inclusion of certain options can change the rating of some configurations to Class A. To determine which classification applies to your computer system, examine all FCC registration labels located on the bottom or back panel of your computer, on card-mounting brackets, and on the cards themselves. If any one of the labels carries a Class A rating, your entire system is considered to be a Class A digital device. If *all* labels carry an FCC Class B rating as distinguished by either an FCC ID number or the FCC logo, (FC), your system is considered to be a Class B digital device.

Once you have determined your system's FCC classification, read the appropriate FCC notice. Note that FCC regulations provide that changes or modifications not expressly approved by Dell Computer Corporation could void your authority to operate this equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

Class A

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the manufacturer's instruction manual, may cause harmful interference with radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case you will be required to correct the interference at your own expense.

The following information is provided on the device or devices covered in this document in compliance with FCC regulations:

- Product name: PowerVault™
- Model number: 50F
- Company name: Dell Computer Corporation
EMC Engineering Department
One Dell Way

Round Rock, Texas 78682 USA
512-338-4400

IC Notice (Canada Only)

Most Dell computer systems (and other Dell digital apparatus) are classified by the Industry Canada (IC) Interference-Causing Equipment Standard #3 (ICES-003) as Class B digital devices. To determine which classification (Class A or B) applies to your computer system (or other Dell digital apparatus), examine all registration labels located on the bottom or the back panel of your computer (or other digital apparatus). A statement in the form of "IC Class A ICES-3" or "IC Class B ICES-3" will be located on one of these labels. Note that Industry Canada regulations provide that changes or modifications not expressly approved by Dell Computer Corporation could void your authority to operate this equipment.

This Class B (or Class A, if so indicated on the registration label) digital apparatus meets the requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la Classe B (ou Classe A, si ainsi indiqué sur l'étiquette d'enregistrement) respecte toutes les exigences du Règlement sur le Matériel Brouilleur du Canada.


CE Notice (European Union)

Marking by the symbol **CE** indicates compliance of this Dell system to the EMC Directive and the Low Voltage Directive of the European Union. Such marking is indicative that this Dell system meets the following technical standards:

- EN 55022 — "Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment."
- EN 50082-1: 1992 — "Electromagnetic compatibility—Generic immunity standard Part 1: Residential, commercial, and light industry."
- EN 60950 — "Safety of Information Technology Equipment."

 **NOTE:** EN 55022 emissions requirements provide for two classifications:

- Class A is for typical commercial areas.
- Class B is for typical domestic areas.

 **WARNING:** This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

A "Declaration of Conformity" in accordance with the preceding directives and standards has been made and is on file at Dell Products Europe BV, Limerick, Ireland.

EN 55022 Compliance (Czech Republic Only)

This device belongs to Class B devices as described in EN 55022, unless it is specifically stated that it is a Class A device on the specification label. The following applies to devices in Class A of EN 55022 (radius

of protection up to 30 meters). The user of the device is obliged to take all steps necessary to remove sources of interference to telecommunication or other devices.

Pokud není na typovém štítku pořízeno uvedeno, úe spadá do třídy A podle EN 55022, spadá automaticky do třídy B podle EN 55022. Pro zařazení zařazení do třídy A (ochranné pásmo 30m) podle EN 55022 platí následující. Dojde-li k rušení telekomunikačních nebo jiných zařazení, je uživatel povinen provést takové opatření, aby rušení odstranil.

VCCI Notice (Japan Only)

Most Dell computer systems are classified by the Voluntary Control Council for Interference (VCCI) as Class B information technology equipment (ITE). However, the inclusion of certain options can change the rating of some configurations to Class A. ITE, including peripherals, expansion cards, printers, input/output (I/O) devices, monitors, and so on, integrated into or connected to the system, should match the electromagnetic environment classification (Class A or B) of the computer system.

To determine which classification applies to your computer system, examine the regulatory labels/markings (see Figures A-1 and A-2) located on the bottom or back panel of your computer. Once you have determined your system's VCCI classification, read the appropriate VCCI notice.

Class A ITE

この装置は、情報処理装置等電波障害自主規制協議会 (VCCI) の基準に基づくクラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

This is a Class A product based on the standard of the Voluntary Control Council for Interference (VCCI) for information technology equipment. If this equipment is used in a domestic environment, radio disturbance may arise. When such trouble occurs, the user may be required to take corrective actions.

Figure A-1. VCCI Class A ITE Regulatory Mark

VCCI-A

Class B ITE

この装置は、情報処理装置等電波障害自主規制協議会 (VCCI) の基準に基づくクラス B 情報技術装置です。この装置は家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用させると、受信障害を引き起こすことがあります。取扱説明書に従って正しい取り扱いをして下さい。

This is a Class B product based on the standard of the Voluntary Control Council for Interference (VCCI) for information technology equipment. If this equipment is used near a radio or television receiver in a domestic environment, it may cause radio interference. Install and use the equipment according to the instruction manual.

Figure A-2. VCCI Class B ITE Regulatory Mark



MOC Notice (South Korea Only)

To determine which classification (Class A or B) applies to your computer system (or other Dell digital device), examine the South Korean Ministry of Communications (MOC) registration labels located on your computer (or other Dell digital device). The MOC label may be located separately from the other regulatory marking applied to your product. The English text, "EMI (A)," for Class A products, or "EMI (B)" for Class B products, appears in the center of the MOC label (see Figures A-3 and A-4).

 **NOTE:** MOC emissions requirements provide for two classifications:

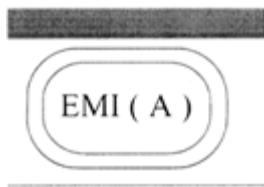
- Class A devices are for business purposes.
- Class B devices are for nonbusiness purposes.

Class A Device

この装置は、情報処理装置等電波障害自主規制協議会 (VCCI) の基準に基づくクラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

Please note that this device has been approved for business purposes with regard to electromagnetic interference. If you find that this device is not suitable for your use, you may exchange it for a nonbusiness device.

Figure A-3. MOC Class A Regulatory Mark

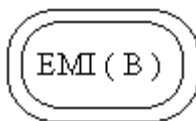


Class B Device

この装置は、情報処理装置等電波障害自主規制協議会 (VCCI) の基準に基づくクラス B 情報技術装置です。この装置は家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用させると、受信障害を引き起こすことがあります。取扱説明書に従って正しい取り扱いをして下さい。

Please note that this device has been approved for nonbusiness purposes and may be used in any environment, including residential areas.

Figure A-4. MOC Class B Regulatory Mark



Polish Center for Testing and Certification Notice

The equipment should draw power from a socket with an attached protection circuit (a three-prong socket). All equipment that works together (computer, monitor, printer, and so on) should have the same power supply source.

The phasing conductor of the room's electrical installation should have a reserve short-circuit protection device in the form of a fuse with a nominal value no larger than 16 amperes (A).

To completely switch off the equipment, the power supply cable must be removed from the power supply socket, which should be located near the equipment and easily accessible.

A protection mark "B" confirms that the equipment is in compliance with the protection usage requirements of standards PN-93/T-42107 and PN-89/E-06251.

Wymagania Polskiego Centrum Badań i Certyfikacji

Urządzenie powinno być zasilane z gniazda z przyłączonym obwodem ochronnym (gniazdo z kołkiem). Współpracujące ze sobą urządzenia (komputer, monitor, drukarka) powinny być zasilane z tego samego źródła.

Instalacja elektryczna pomieszczenia powinna zawierać w przewodzie fazowym rezerwową ochronę przed zwarciami, w postaci bezpiecznika o wartości znamionowej nie większej niż 16A (amperów).

W celu całkowitego wyłączenia urządzenia z sieci zasilania, należy wyjąć wtyczki kabla zasilającego z gniazdka, które powinno znajdować się w pobliżu urządzenia i być łatwo dostępne.

Znak bezpieczeństwa "B" potwierdza zgodność urządzenia z wymaganiami bezpieczeństwa użytkownika zawartymi w PN-93/T-42107 i PN-89/E-06251.

Pozostałe instrukcje bezpieczeństwa

- Nie należy używać wtyczek adapterowych lub usuwać kołka obwodu ochronnego z wtyczki. Jeżeli konieczne jest użycie przedłużacza to należy użyć przedłużacza 3-żyłowego z prawidłowo połączonym przewodem ochronnym.
- System komputerowy należy zabezpieczyć przed nagłymi, chwilowymi wzrostami lub spadkami napięcia, używając eliminatora przepięć, urządzenia dopasowującego lub bezzakłócenowego źródła zasilania.
- Należy upewnić się, aby nic nie leżało na kablach systemu komputerowego, oraz aby kable nie były umieszczone w miejscu, gdzie można byśoby na nie nadeptywać lub potykać się o nie.
- Nie należy rozlewać napojów ani innych płynów na system komputerowy.
- Nie należy wpychać żadnych przedmiotów do otworów systemu komputerowego, gdyż może to spowodować pożar lub porażenie prądem, poprzez zwarcie elementów wewnętrznych.

- System komputerowy powinien znajdować się z dala od grzejników i urządzeń ciepła. Ponadto, nie należy blokować otworów wentylacyjnych. Należy unikać kłócenia luźnych papierów pod komputer oraz umieszczania komputera w ciasnym miejscu bez możliwości cyrkulacji powietrza wokół niego.

NOM Information (Mexico Only)

The following information is provided on the device(s) described in this document in compliance with the requirements of the official Mexican standards (NOM):

Exporter:	Dell Computer Corporation One Dell Way Round Rock, TX 78682
Importer:	Dell Computer de México, S.A. de C.V. Rio Lerma No. 302 - 4° Piso Col. Cuauhtemoc 16500 México, D.F.
Ship to:	Dell Computer de México, S.A. de C.V. al Cuidado de Kuehne & Nagel de México S. de R.I. Avenida Soles No. 55 Col. Peñon de los Baños 15520 México, D.F.
Supply voltage:	100/240 VAC
Frequency:	60/50 Hz
Current consumption:	3.0/1.5 A

Información para NOM (únicamente para México)

La información siguiente se proporciona en el dispositivo o en los dispositivos descritos en este documento, en cumplimiento con los requisitos de la Norma Oficial Mexicana (NOM):

Exportador:	Dell Computer Corporation One Dell Way Round Rock, TX 78682
Importador:	Dell Computer de México, S.A. de C.V. Rio Lerma No. 302 - 4° Piso Col. Cuauhtemoc 16500 México, D.F.
Embarcar a:	Dell Computer de México, S.A. de C.V. al Cuidado de Kuehne & Nagel de México S. de R.I. Avenida Soles No. 55

Col. Peñon de los Baños
15520 México, D.F.

Tensión
alimentación: 100/240 VAC
Frecuencia: 60/50 Hz
Consumo de
corriente: 3.0/1.5 A

BCIQ Notice (Taiwan Only)

警告使用者：這是甲類的資訊產品，在居住的環境中使用時，可能會造成無線電干擾，在這種情況下，使用者會被要求採取某些適當的對策。

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Warranty, Return Policy, and Year 2000 Statement of Compliance: Dell PowerVault™ 50F 8-Port Fibre Channel Switch User's Guide

[Overview](#) • [Limited Three-Year Warranty \(U.S. and Canada Only\)](#) • ["Total Satisfaction" Return Policy \(U.S. and Canada Only\)](#) • [Year 2000 Statement of Compliance for Dell-Branded Hardware Products](#)

Overview

Limited Three-Year Warranty (U.S. and Canada Only)

Dell Computer Corporation ("Dell") manufactures its hardware products from parts and components that are new or equivalent to new in accordance with industry-standard practices. Dell warrants that the hardware products it manufactures will be free from defects in materials and workmanship. The warranty term is three years beginning on the date of invoice, as described in the following text.

Damage due to shipping the products to you is covered under this warranty. Otherwise, this warranty does not cover damage due to external causes, including accident, abuse, misuse, problems with electrical power, servicing not authorized by Dell, usage not in accordance with product instructions, failure to perform required preventive maintenance, and problems caused by use of parts and components not supplied by Dell.

This warranty does not cover any items that are in one or more of the following categories: software; external devices (except as specifically noted); accessories or parts added to a Dell system after the system is shipped from Dell; accessories or parts added to a Dell system through Dell's system integration department; accessories or parts that are not installed in the Dell factory; or DellWare™ products. Monitors, keyboards, and mice that are Dell-branded or that are included on Dell's standard price list are covered under this warranty; all other monitors, keyboards, and mice (including those sold through the DellWare program) are not covered. Batteries for portable computers are covered only during the initial one-year period of this warranty.

Coverage During Year One

During the one-year period beginning on the invoice date, Dell will repair or replace products covered under this limited warranty that are returned to Dell's facility. To request warranty service, you must call Dell's Customer Technical Support within the warranty period. Refer to the chapter titled "Getting Help" in your system's troubleshooting documentation or, for some systems, the section titled "Contacting Dell" in your system's online guide to find the appropriate telephone number for obtaining customer assistance. If warranty service is required, Dell will issue a Return Material Authorization Number. You must ship the products back to Dell in their original or equivalent packaging, prepay shipping charges, and insure the shipment or accept the risk of loss or damage during shipment. Dell will ship the repaired or replacement products to you freight prepaid if you use an address in the continental U.S. or Canada, where applicable. Shipments to other locations will be made freight collect.



NOTE: Before you ship the product(s) to Dell, back up the data on the hard-disk drive(s) and any other storage device(s) in the product(s). Remove any removable media, such as diskettes, CDs, or PC Cards. Dell does not accept liability for

lost data or software.

Dell owns all parts removed from repaired products. Dell uses new and reconditioned parts made by various manufacturers in performing warranty repairs and building replacement products. If Dell repairs or replaces a product, its warranty term is not extended.

Coverage During Years Two and Three

During the second and third years of this limited warranty, Dell will provide, on an exchange basis and subject to Dell's Exchange Policy in effect on the date of the exchange, replacement parts for the Dell hardware product(s) covered under this limited warranty when a part requires replacement. You must report each instance of hardware failure to Dell's Customer Technical Support in advance to obtain Dell's concurrence that a part should be replaced and to have Dell ship the replacement part. Dell will ship parts (freight prepaid) if you use an address in the continental U.S. or Canada, where applicable. Shipments to other locations will be made freight collect. Dell will include a prepaid shipping container with each replacement part for your use in returning the replaced part to Dell. Replacement parts are new or reconditioned. Dell may provide replacement parts made by various manufacturers when supplying parts to you. The warranty term for a replacement part is the remainder of the limited warranty term.

You will pay Dell for replacement parts if the replaced part is not returned to Dell. The process for returning replaced parts, and your obligation to pay for replacement parts if you do not return the replaced parts to Dell, will be in accordance with Dell's Exchange Policy in effect on the date of the exchange.

You accept full responsibility for your software and data. Dell is not required to advise or remind you of appropriate backup and other procedures.

General Provisions

THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS WHICH VARY FROM STATE TO STATE (OR JURISDICTION TO JURISDICTION). DELL'S RESPONSIBILITY FOR MALFUNCTIONS AND DEFECTS IN HARDWARE IS LIMITED TO REPAIR AND REPLACEMENT AS SET FORTH IN THIS WARRANTY STATEMENT. ALL EXPRESS AND IMPLIED WARRANTIES FOR THE PRODUCT, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF AND CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO THE WARRANTY PERIOD SET FORTH ABOVE AND NO WARRANTIES, WHETHER EXPRESS OR IMPLIED, WILL APPLY AFTER SUCH PERIOD.

SOME STATES (OR JURISDICTIONS) DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE PRECEDING LIMITATION MAY NOT APPLY TO YOU.

DELL DOES NOT ACCEPT LIABILITY BEYOND THE REMEDIES SET FORTH IN THIS WARRANTY STATEMENT OR LIABILITY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION ANY LIABILITY FOR PRODUCTS NOT BEING AVAILABLE FOR USE OR FOR LOST DATA OR SOFTWARE.

SOME STATES (OR JURISDICTIONS) DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE PRECEDING EXCLUSION OR LIMITATION MAY NOT APPLY TO YOU.

These provisions apply to Dell's limited three-year warranty only. For provisions of any service contract covering your system, refer to your invoice or the separate service contract that you will receive.

If Dell elects to exchange a system or component, the exchange will be made in accordance with Dell's Exchange Policy in effect on the date of the exchange. In any instance in which Dell issues a Return Materials Authorization Number, Dell must receive the product(s) for repair prior to the expiration of the warranty period in order for the repair(s) to be covered by the warranty.



NOTE: *If you chose one of the available warranty and service options in place of the standard limited three-year warranty described in the preceding text, the option you chose will be listed on your invoice.*

"Total Satisfaction" Return Policy (U.S. and Canada Only)

If you are an end-user customer who bought new products directly from a Dell company, you may return them to Dell within 30 days of the date of invoice for a refund or credit of the product purchase price. If you are an end-user customer who bought reconditioned or refurbished products from a Dell company, you may return them to Dell within 14 days of the date of invoice for a refund or credit of the product purchase price. In either case, the refund or credit will not include any shipping and handling charges shown on your invoice. If you are an organization that bought the products under a written agreement with Dell, the agreement may contain different terms for the return of products than specified by this policy.

To return products, you must call Dell Customer Service to receive a Credit Return Authorization Number. Refer to the chapter titled "Getting Help" in your system's troubleshooting documentation or, for some systems, the section titled "Contacting Dell" in your system's online guide to find the appropriate telephone number for obtaining customer assistance. To expedite the processing of your refund or credit, Dell expects you to return the products to Dell in their original packaging within five days of the date that Dell issues the Credit Return Authorization Number. You must also prepay shipping charges and insure the shipment or accept the risk of loss or damage during shipment. You may return software for refund or credit only if the sealed package containing the diskette(s) or CD(s) is unopened. Returned products must be in as-new condition, and all of the manuals, diskette(s), CD(s), power cables, and other items included with a product must be returned with it. For customers who want to return, for refund or credit only, either applications software or an operating system that has been installed by Dell, the whole system must be returned, along with any media and documentation that may have been included in the original shipment.

This "Total Satisfaction" Return Policy does not apply to DellWare products, which may be returned under DellWare's then-current return policy. In addition, reconditioned parts purchased through Dell Spare Parts Sales in Canada are nonreturnable.

Year 2000 Statement of Compliance for Dell-Branded Hardware Products

Dell-branded hardware products shipped on or after January 1, 1997, are eligible to carry the "NSTL Hardware Tested Year 2000 Compliant" logo by virtue of formal testing with, and successful completion of, the National Software Testing Laboratories (NSTL) YMARK2000 test.* Dell will treat a failure to pass the YMARK2000 test as a covered event under Dell's warranty for the product, subject to the normal warranty limitations.** For a complete copy of Dell's warranty, see the product's documentation. Dell-branded hardware products will also recognize the year 2000 as a leap year.

*The YMARK2000 standard tests the ability of system hardware and firmware to support the transition to the year 2000 (and to recognize leap years, when appropriate, for years 2000 through 2009 inclusive) and not that of options, operating systems, or applications software. Dell-branded hardware products that pass the YMARK2000 test conform to BSI-DISC PD 2000-1.

** Except for this clarification of Dell's warranty for NSTL logo hardware, all other warranties, conditions and remedies, express or implied, relating to year 2000 readiness or compliance are disclaimed. To make a claim under this warranty for NSTL logo hardware, customers must contact Dell prior to January 1, 2001. Despite a system's ability to pass the YMARK2000 test, actual rollover results in specific operating environments may vary depending on other factors including, but not limited to, other hardware, operating systems, and applications software.

Previous Products

For Dell-branded hardware products shipped prior to January 1, 1997, that have an upgradable basic input/output system (BIOS), Dell makes available a BIOS upgrade. Although these products may not have been tested under the YMARK2000 test, Dell believes that the hardware would pass the YMARK2000 test, provided the appropriate BIOS upgrade is properly loaded.

For Dell-branded hardware products that do not have an upgradable BIOS, Dell has made available, as a convenience to customers, the Dell Program Patch, a software utility designed to assist customers in managing the year 2000 rollover.

Software

Dell specifically excludes all non-Dell-developed software from this compliance statement. All software run on Dell-branded hardware products should be independently verified by customers to be year 2000-compliant.

Additional Information

For additional information on year 2000 compliance of Dell-branded hardware products, refer to Dell's Year 2000 Web site at <http://www.dell.com/year2000> or contact a Dell customer service representative in your area.

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Glossary: Dell PowerVault™ 50F 8-Port Fibre Channel Switch User's Guide

alias server

A Fabric software facility that supports multicast group management.

ANSI

American National Standards Institute.

arbitrated loop

The FC arbitrated loop (FC-AL) is a standard defined on top of the FC-PH standard. It defines the arbitration on a loop where several FC nodes share a common medium.

bit

The smallest unit of information interpreted by your computer.

community (SNMP)

An SNMP community is a relationship between an SNMP agent and a set of SNMP managers that defines authentication, access control, and proxy characteristics.

credit

Credit, applied to a switch, is a numeric value that represents the maximum number of receive buffers provided by an F_Port or FL_Port to its attached N_Port or NL_Port respectively, such that the N_Port or NL_Port may transmit frames without over-running the F_Port or NL_Port.

Class 2

In Class-2 service, the Fabric and destination N_Port provide connectionless service with notification of delivery or nondelivery between the two N_Ports.

Class 3

Class-3 service provides a connectionless service without notification of delivery between N_Ports. The transmission

GBIC

Gigabit Interface Converter. A removable serial transceiver module designed to provide gigabaud capability for Fibre Channel and other protocols that use the same physical layer.

G_Port

A port is designated as a G_Port when it has not assumed a specific function. A G_Port is a generic switch port that can operate either as an E_Port. A port is defined as a G_Port, for example, when it is not connected or has not yet assumed a specific function in the Fabric.

interswitch link (ISL)

ISL is a fiber link between two switches.

loop

A loop is a configuration of devices (for example, JBODs) connected to the Fabric via an FL_Port interface card.

multicast

Multicast is used when multiple copies of data are to be sent to designated multiple destinations.

N_Port

The N_Port is the designation of an equipment port connected to the Fabric.

NL_Port

The NL_Port is the designation of an equipment port connected to the Fabric in a loop configuration via an FL_Port.

power-on self-test

The POST is a series of self-tests which run each time the unit is booted or reset.

and routing of Class-3 frames is the same as for Class-2 frames.

domain_ID

The domain number uniquely identifies the switch in a Fabric. This switch domain ID is normally automatically assigned by the switch and may be any value between 0 and 31. This number may also be assigned manually.

E_Port

A port is designated an E_Port when it is used as an interswitch expansion port to connect to the E_Port of another switch to build a larger switch Fabric.

E_D_TOV

E_D_TOV (Error-Detect Time-Out Value) defines the time the switch waits for an expected response before declaring an error condition. The error detect time out value is adjustable in 1 ms increments from 2 seconds up to 10 seconds.

Fabric

The name applied to a network resulting from the interconnection of switches and devices comprised of high-speed fiber connections. A Fabric is an active, intelligent, nonshared interconnect scheme for nodes.

FL_Port

The FL_Port is the Fabric access port used to connect NL_Ports to the switch in a loop configuration.

F_Port

The F_Port is the Fabric access port used to connect an N_Port.

FSPF

Fibre-Channel shortest path first.

R_A_TOV

R_A_TOV (Resource Allocation Time Out Value) used to time out operations that depend on the maximum possible time that a frame could be delayed in a Fabric and still be delivered. The value of R_A_TOV is adjustable in 1-microsecond increments over a range from 10 to 120 seconds.

Isolated E_Port

ISL is online but not operational between switches because of overlapping domain ID or nonidentical parameters such as E_O_TOVs.

Simple Network Management Protocol

SNMP is a TCP/IP protocol that generally uses the User Datagram Protocol (UDP) to exchange messages between a management information base and a management client residing on a network. Because SNMP does not rely on the underlying communication protocols, it can be made available over other protocols, such as UDP/IP.

SNMPv1

The original standard for SNMP is now referred to as SNMPv1.

trap (SNMP)

A trap is a mechanism for SNMP agents to notify the SNMP management station of significant events.

unicast

Unicast routing provides one or more optimal path(s) between any of two switches that make up the Fabric. This is for a single copy of the data to be sent to designated destinations.

World Wide Name (WWN)

A WWN uniquely identifies a switch on local and global networks.

Dell PowerVault™ 50F 8-Port Fibre Channel Switch User's Guide

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