DELL™ POWERVAULT™ ML6000

The Fibre Channel I/O Blade for the Dell PowerVault ML6000

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SECTION 1
INTRODUCTION

One of the new and exciting features being introduced to the Dell PowerVault ML6000 Tape Library is the Fibre Channel I/O Blade. This intelligent Blade has the convenience of an integrated Fibre Channel (FC) switch with additional features and benefits that will help customize and optimize the ML6000's connectivity into a customer's existing FC SAN. Integrated management allows for configuration, control, and maintenance of the Blade(s) and the library through either the front panel touch-screen interface or a remote web interface. The ML6000 is a modular library that can support up to eighteen tape drives and 402 tape cartridge slots; additionally, it can accommodate up to four Fibre Channel I/O blades. Each blade can support up to four Fibre Channel tape drives, yielding a total of sixteen FC tape drives that can be managed through the blades.

SECTION 2
PRINCIPLE FEATURES AND BENEFITS

Channel Zoning – The idea for zoning in a SAN is to control which hosts (systems) can see which targets (devices). Much like switch zoning in a SAN, the ML6000 FC I/O blade has the capability to zone particular initiator ports (drives) with either target port 1 or 2 (on the I/O Blade). This feature, in combination with the partitioning capabilities of the ML6000, creates a robust zoned solution that can be shared between two or more separate hosts depending on the fabric setup. Additionally, Channel Zoning can be used to load balance the target ports. By zoning the initiator ports to the target ports, administrators can insure that saturation of the HBA channel can be minimized if not eliminated altogether.

Unlike complicated switch zoning setup routines, the ML6000 incorporates a simple checkbox scheme that can be enabled from either the remote web interface or the front panel operator control pad.

	Target 1	Target 2
Initiator A	☑	☐
Initiator B	☐	☑
Initiator C	☐	☑
Initiator D	☑	☐

In the Channel Zoning configuration shown above, the drives attached to initiator port B & C are only visible to target 2; similarly drives on initiator port A & D can only be seen by target 1.

Host Port Failover – Failing a scheduled backup or missing one altogether is a constant worry for any backup administrator. In the complex setup of current Storage Area Networks lie multiple points for potential failure. With dual host ports attaching to the SAN fabric, the Fibre Channel I/O blade can be setup in a port failover configuration, insulating up to 4 drives per blade from a link failure. Any failure that occurs to the primary link will automatically trigger the failover to the secondary link insuring that any currently running or scheduled backup will complete successfully; the IT professional is then notified via a Reliability, Availability, and Serviceability (RAS) ticket that the Failover executed and offers an extensive Help section to assist in repairing the primary path.

Important Host Port Failover considerations of the FC I/O Blade:

1. If the Blade will be installed in an existing Library (i.e. an upgrade purchase), one must remove the control path from the drive, meaning before the FC Blade is installed, the Control Path to the Drive(s) must be disabled. After installing the blade, the Control Path must then be set to the FC Blade(s).

2. The Host Port Failover feature must be enabled in the library to utilize this option, (Host Port Fail over is disabled by default.

3. Once the FC Blade is installed, Channel Zoning must be set so all Ports can see all targets (drives).

4. Both ports must reside in the same zone.

5. Failover occurs automatically, and the failover event will generate a RAS ticket (Host Port Failover has Occurred T102).

Control Path Connectivity – In a LUN-based tape library, one tape drive has the responsibility of acting as the control path to access the medium changer for the library. If that tape drive experiences a hardware failure, then the ability to communicate with the medium changer is lost, in effect crippling the entire library. The fibre I/O blade has eliminated this dependency on one drive and placed the control path logically at the I/O blade itself. Thus, the failure of one drive no longer is a limiting factor toward maintaining connectivity and control over the medium changer robot in the library.

LUN Mapping a.k.a. LUN Masking, Host Mapping, Host Masking – LUN mapping is a powerful feature that can allow access to individual hosts on the SAN. Two drives behind the Fibre Channel I/O blade that are both present on the same SAN fabric could have different host mappings. Thus, despite being on the same SAN fabric, the group of hosts able to view each drive could be completely different and optimized to any number of configurations. Host mapping is a flexible feature that allows an administrator to allow access to drives on a per-host basis. This can allow a configuration where, in a shared fibre channel SAN environment, the fibre channel I/O blade can dictate the visibility of drives and logical libraries on an output port to individual drives connected to the fibre channel blade. Following are three practical applications of LUN Mapping:

Example 1.

When one sets up the library to enable Failover, Channel Zoning must be set so all Initiators are visible to all Targets. This effectively disables Channel Zoning, i.e. if all boxes MUST be checked, you can't zone out any channels. LUN Mapping is a fix for this problem by allowing you to mask targets from different initiators.

Example 2.

A heterogeneous environment is one where multiple Operating Systems (O/S) can access the same library; in a heterogeneous environment, interoperability conflicts can occur. This is not due to a malfunction of the library, but more to limitations of the O/Ses. To prevent such potential conflicts, one can create a Virtual Private SAN (VPS) through LUN mapping for each O/S. The VPS creates a logical distinction between the O/Ses and eliminates interoperability issues while still allowing each O/S access to the full physical library.

Example 3.

LUN mapping can also be used to effectively eliminate contention of a shared medium changer in an environment where multiple hosts have access to a drive with the control path. When it is desired that only one host has access to the medium changer, but all hosts have access to the drive itself, LUN mapping can be used to allow visibility of the medium changer only to the host that requires access.

Host mapping, used in accordance with channel zoning, create a powerful combination that can give an administrator complete control on the access and usage of drives on the ML6000.

SECTION 3
ADDITIONAL FEATURES AND BENEFITS

Integrated Hardware and Management – The Fibre Channel I/O Blade is installed directly at the rear of an expansion module for the ML6000. This allows for the seamless integration of the features of a Fibre Channel switch into the ML6000. Not only is the hardware embedded, but management of the blade is also integrated with the library management. Blade information and setup can be conveniently retrieved when accessing either the touch-panel interface or web interface.

Cable Management – As the ML6000 expands up to 18 tape drives, cable management can become an issue. The Fibre Channel I/O Blade helps alleviate cable clutter by aggregating the output of four drives into one target port output, also freeing up valuable SAN switch ports.

Monitoring and Error Reporting – The ML6000 makes extensive use of its Reliability, Availability, and Serviceability (RAS) ticket system, which is designed to inform the end user about warnings, errors, and failures in the library. This allows the user to proactively correct issues before a Customer Support call is needed. The Fibre Channel I/O blade has been integrated with this system. Connectivity issues, host port failover events, temperature levels, voltage levels for the Fibre Channel I/O Blade can all be monitored by the user.

Hot Swappability – Because there is always a potential for failure of different pieces of equipment, being able to quickly recover from a stoppage and reduce downtime is very important. The Fibre Channel I/O Blade has been designed to be hot swappable, so changes in hardware configuration for the blade can be done in real-time and without requiring a power cycle of the library.

Use of Existing Redundant Power Supply – As the Fibre Channel I/O blade is installed on the backside of an ML6000 expansion module, the blade shares the same power supply as the expansion module. If the expansion module has been populated with a second power supply, the blade has the added benefit of having redundant power to minimize potential downtime.

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