

Applications Note

Configuring Fibre Channel Initiators to Dell EqualLogic Storage Using the QLogic iSR6200 Router

Products Affected

QLogic Storage Router	Part Number
iSR6240	6240-C12-X
iSR6250	6250-C12-X

1 Introduction

This applications note provides instructions for connecting Fibre Channel hosts to iSCSI Dell[®] EqualLogic[®] targets using the QLogic iSR6200 Intelligent Storage Routers listed in the Products Affected table. These routers are collectively referred to as the *iSR6200* throughout this applications note.

2 Prerequisites

Before connecting the Fibre Channel hosts to the EqualLogic targets:

1. Configure the router iSCSI ports. There is no IP domain in this case.
2. Allow access from the Dell EqualLogic volume to the router, based on the iSCSI qualified name (iqn) or the IP address.
3. Set the `Time To Target Device Offline` system parameter to 60, using either the `set system` command in the CLI or the Basic Information page in SANsurfer iSCSI/FC Router Manager.

For access control information, refer to Dell EqualLogic documentation.

3 Configuration

After connecting the router Fibre Channel ports in the SAN and the gigabit Ethernet (GbE) ports in the LAN, follow these five basic steps:

Step 1: Discover the iSCSI Targets:

- Using the iSCSI Discover Command
- Using iSNS Server Connectivity

Step 2: Log into the iSCSI Targets

Step 3: Zone the Fibre Channel Host and iSR6200 Router

Step 4: Map the iSCSI Target into the SAN and Provide Host Access to the Storage LUN

Step 5: View the Newly Mapped Global Target Zoned to the Fibre Channel Host

These steps are described in detail in the following sections.

Step 1: Discover the iSCSI Targets

There are two ways to discover the iSCSI targets:

- [Using the iSCSI Discover Command](#)
- [Using iSNS Server Connectivity](#)

Using the iSCSI Discover Command

1. Issue the `show targets` command. For example:

```
iSR6200 <1> (admin) #> show targets  
No Targets found.
```

2. Issue the `iscsi discover` command. For example:

```
iSR6200 <1> (admin) #> iscsi discover  
A list of attributes with formatting and current values will follow.  
Enter a new value or simply press the ENTER key to accept the current value.  
If you wish to terminate this process before reaching the end of the list  
press 'q' or 'Q' and the ENTER key to do so.  
IP Address (IPv4 or IPv6)          [0.0.0.0      ] 192.168.95.105  
TCP Port No.                      [3260        ]  
Outbound Port (1=GE1, 2=GE2, ...) [GE1         ]  
Target CHAP (0=Enable, 1=Disable) [Disabled    ]
```

3. To see the target attributes, issue the `show targets` command. For example:

```
iSR6200 <1> (admin) #> show targets  
Target Information  
-----  
iSCSI Name  iqn.2001-05.com.equallogic:0-8a0906-7e33e0d06-83c835550264bede-demo1  
Alias  
State              Offline  
IP Address         192.168.95.105 (Logged Out)
```

Using iSNS Server Connectivity

1. Allow the Dell EqualLogic volume access to the iSNS server iSCSI port and router iSCSI ports. This access can be either IP based or iqn based. See the Dell EqualLogic documentation for access control information.
2. Configure the iSCSI ports on the router in the same domain as the iSNS server iSCSI port and array.
 - In the CLI, issue the `set iscsi` command to set the iSCSI attributes.
 - In SANsurfer Router Manager, select the appropriate iSCSI port in the left pane, and then change the port attributes on the Information page in the right pane.
3. Check connectivity amongst the router iSCSI port, the iSNS server port, and the array port.
 - In the CLI, issue the `ping` command.
 - In SANsurfer Router Manager, use the Ping Remote System dialog box.

4. Connect to the iSNS server.

- In the CLI, follow these steps:

- a. Issue the `set isns` command. For example:

```
iSR6200 <1> (admin) #> set isns
```

The first attribute appears with the current value (in brackets).

- b. Type a new value, or press the ENTER key to accept the current value.

The next attribute with the current value appears.

To stop this process before reaching the end of the list, press the Q+ENTER keys.

In the following example, all the attributes are shown:

```
isns (0=Enable, 1=Disable) [Disabled ] 0
isns Address (IPv4 or IPv6) [0.0.0.0 ] 192.168.95.100
TCP Port No. [3205 ]
```

All attribute values that have been changed will now be saved.

- In SANsurfer Router Manager, follow these steps:

- a. Select the blade in the SANsurfer Router Manager left pane, and then click the **Information** tab.
- b. On the Information page (Figure 3-1), select the **Enable iSNS** check box, enter the iSNS server details, and then click **Save**.

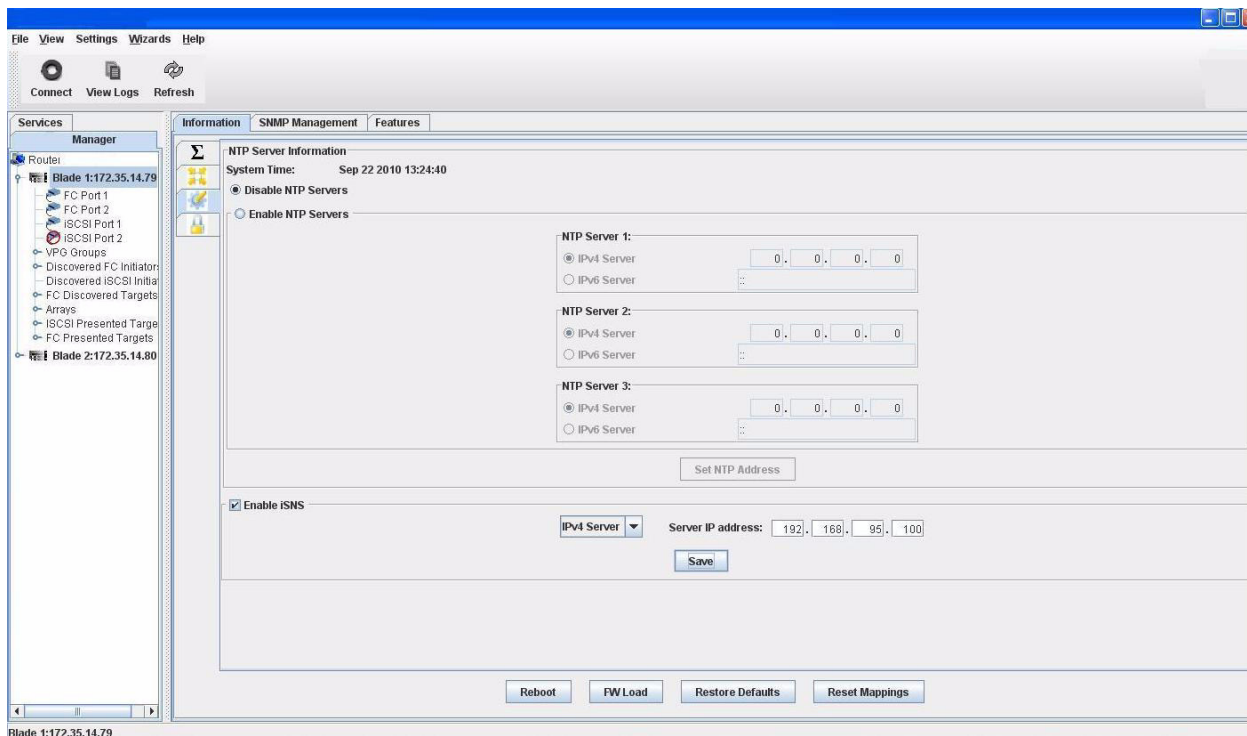


Figure 3-1. Creating a Discovery Domain in SANsurfer Router Manager

5. Create, add, and enable a discovery domain and set as follows:
 - a. Log in to the server where the iSNS server is installed.
 - b. Refresh and confirm that both initiator (router) and target (array) iqn names are discovered.
 - c. Create a discovery domain and add to it both the initiator (router) and target (array), as shown in [Figure 3-2](#).

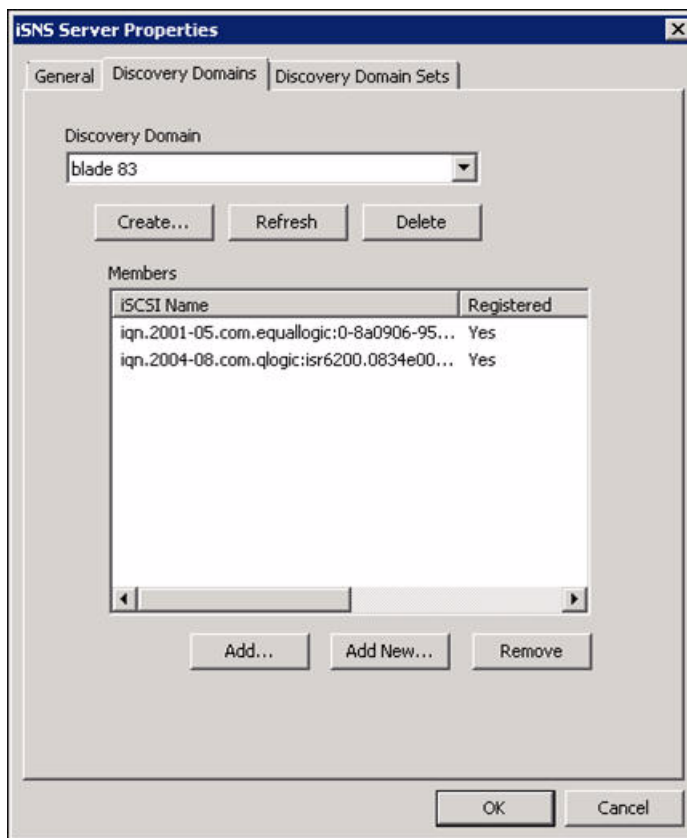


Figure 3-2. iSNS Server Properties: Creating a Discovery Domain

- d. Add this discovery domain to a set, and then enable this discovery domain set, as shown in [Figure 3-3](#).

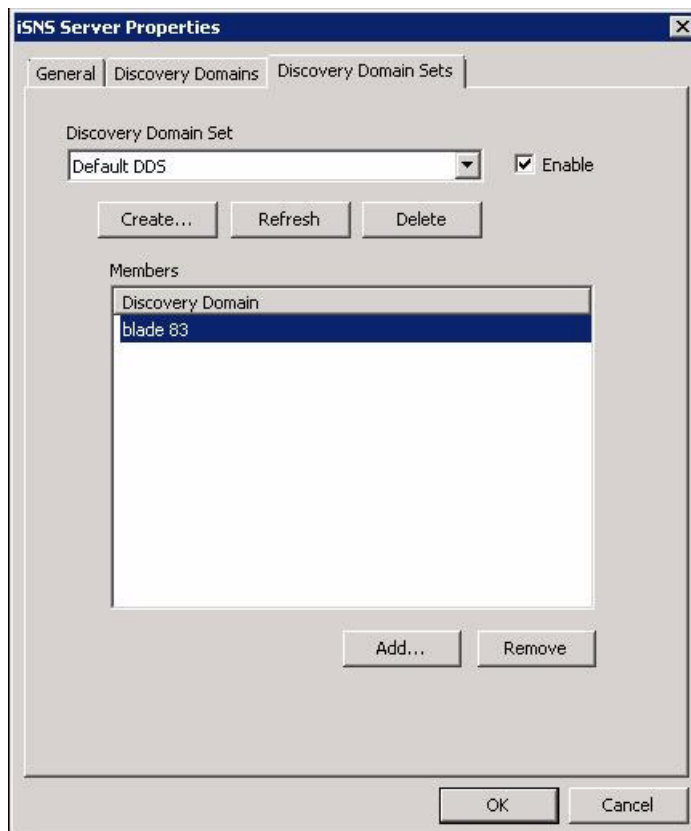


Figure 3-3. iSNS Server Properties: Enabling a Discovery Domain Set

6. List the discovered targets.
- In the CLI, issue the `show targets` command.
 - In SANsurfer Router Manager, refresh the window twice, and then check the iSCSI Discovered Targets list in the left pane.

Step 2: Log into the iSCSI Targets

1. In the CLI, issue the `iscsi login` command, and then follow the prompts.

A list of attributes appear with the current value (in brackets). At the prompts, select the target and IP address, and then specify additional target attributes as needed. For example:

```
iSR6200 <1> (admin) #> iscsi login
Index      (WWNN,WWPN/iSCSI Name)
-----
0          iqn.2001-05.com.equallogic:0-8a0906-7e33e0d06-83c835550264bede-demo1

Please select a Target from the list above ('q' to quit): 0

Index      IP Address
-----
0          192.168.95.48

Please select an IP Address from the list above ('q' to quit):

TCP Port No.                [3260      ]
Outbound Port (1=GE1, 2=GE2, ...) [GE1      ] 3
Header Digest (0=Enable, 1=Disable) [Disabled  ]
Data Digest (0=Enable, 1=Disable)   [Disabled  ]
iSCSI Login for selected target was successful
```

To stop this process before reaching the end of the list, press the Q+ENTER keys.

Step 3: Zone the Fibre Channel Host and iSR6200 Router

Get the following information to configure the iSR6200 to the Fibre Channel SAN and the connection to the EqualLogic array.

For the Fibre Channel SAN, create a list of fabric zones that contain the world wide port name (WWPN) associated with the servers by entering their values in [Table 3-1](#).

Table 3-1. Zone Host with Router—Fibre Channel-Based Ports

Fibre Channel Switch and IP Address	Fibre Channel Zone Name	Zone Members (WWPNs)	Server, iSR6200, Storage Name

Figure 3-4 shows a zone configured with the router to see the targets.

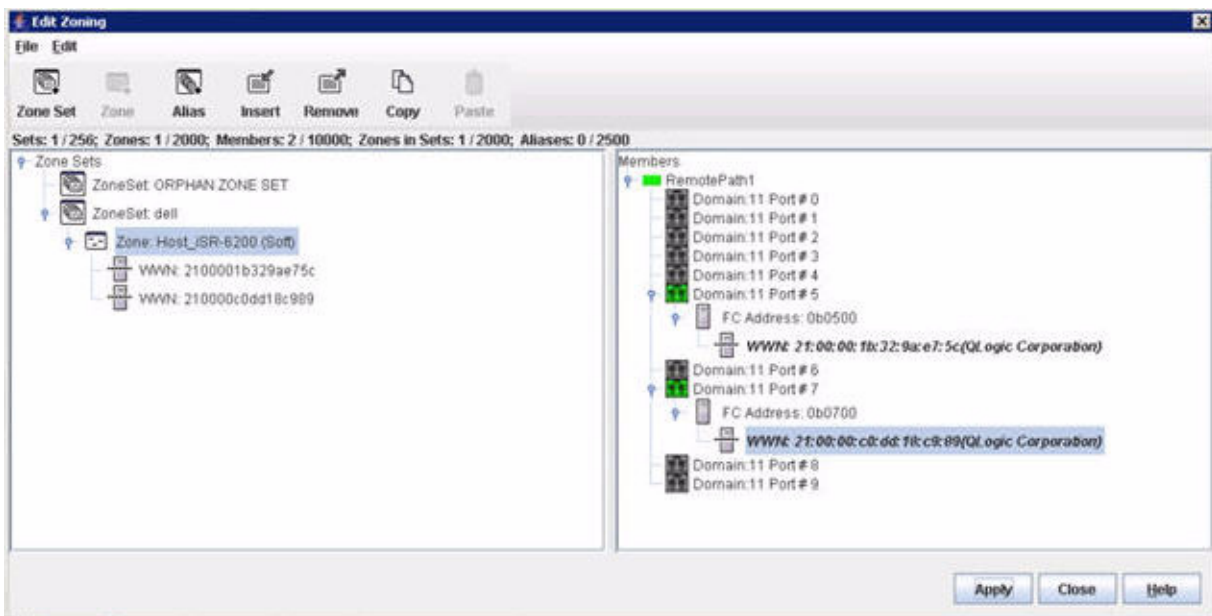


Figure 3-4. Zone Configured with Router

Step 4: Map the iSCSI Target into the SAN and Provide Host Access to the Storage LUN

This step maps the iSCSI target into the Fibre Channel SAN, and provides LUN access from the host to the storage. Be sure you select the correct iSR6200 Fibre Channel port to present to the target.

1. Issue the `show initiators` command. For example:

```
iSR6200 <1> (admin) #> show initiators
Initiator Information
-----
WWNN          20:00:00:1b:32:9a:e7:5c
WWPN          21:00:00:1b:32:9a:e7:5c
Port ID       0b-05-00
Status        Logged Out
Type          FC
OS Type       Windows
```

2. Issue the `lunimap add` command, and then follow the prompts. For example:

```
iSR6200 <1> (admin) #> lunimap add
WARNING
-----
This command should be used to present iSCSI targets that present one LUN per
target.
```

Index	Type	Mapped	(WWNN,WWPN/iSCSI Name)
0	FC	No	20:00:00:1b:32:9a:e7:5c,21:00:00:1b:32:9a:e7:5c

Step 5: View the Newly Mapped Global Target Zoned to the Fibre Channel Host

```

Please select an Initiator from the list above ('q' to quit): 0
Index   (WWNN,WWPN/iSCSI Name)
-----
0       iqn.2001-05.com.equallogic:0-8a0906-7e33e0d06-83c835550264bede-demo1
Please select a Target from the list above ('q' to quit): 0
Index   (LUN/VpGroup)      Serial Number/WWULN
-----
0       0/VPGROUP_1        6090A018D001E74DE3CED4D0D34E9D8B
                                60:90:a0:18:d0:01:e7:4d:e3:ce:d4:d0:d3:4e:9d:8b
Please select a LUN to present to the initiator ('q' to quit): 0
Please Assign a ID which maps the initiator to the LUN: [0 ]: 1
All attribute values that have been changed will now be saved.

```

3. Present the target by issuing the `targetigmap add` command with a global virtual port group (VPG). Perform this step once for each Fibre Channel port through which LUNs will be exposed to Fibre Channel hosts.

```

iSR6200 <1> (admin) #> targetigmap add
Index   (IP/WWNN)                (MAC/WWPN)                (Portal)
-----
0       20:00:00:c0:dd:13:2c:60    21:00:00:c0:dd:13:2c:60    FC1
1       20:00:00:c0:dd:13:2c:61    21:00:00:c0:dd:13:2c:61    FC2
2       20:00:00:c0:dd:13:2c:62    21:00:00:c0:dd:13:2c:62    FCOE1
3       20:00:00:c0:dd:13:2c:63    21:00:00:c0:dd:13:2c:63    FCOE2
Please select a portal from the list above ('q' to quit): 0
Do you want to automap the selected target (Yes/No)      [Yes ]
All attribute values that have been changed will now be saved.

```

Step 5: View the Newly Mapped Global Target Zoned to the Fibre Channel Host

This step identifies the mapping between a virtual iSCSI target and a Fibre Channel or FCoE presented target. This step determines the correct Fibre Channel device to zone with the Fibre Channel host.

1. Issue the `show presented_targets` command to view the targets:

```

iSR6200 <1> (admin) #> show presented_targets fc
Presented Target Information
-----
FC/FCOE Presented Targets
-----
WWPN      21:04:00:c0:dd:13:2c:60
WWNN      20:04:00:c0:dd:13:2c:60
Port ID   82-0b-08
Port      FC1
<MAPS TO>
Name      iqn.2004-08.com.qlogic:isr6200.0834e00021.b1 <Virtual>

```

Figure 3-5 shows that the zone of the newly mapped target is configured with the iSR6200 router to the Fibre Channel SAN.

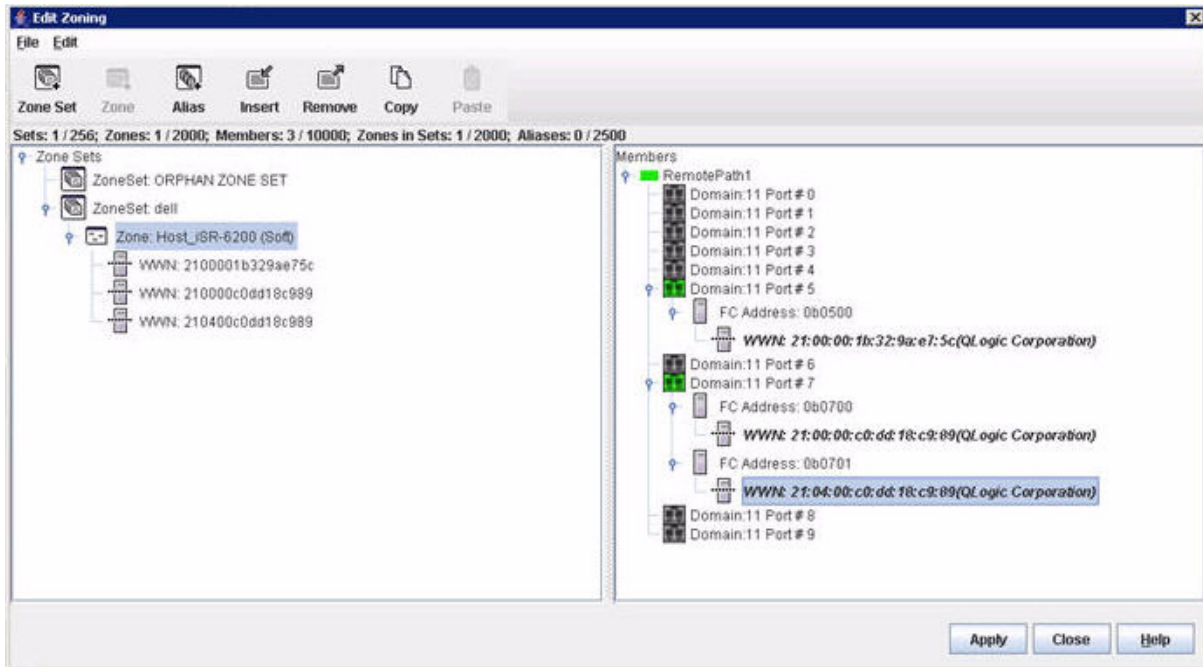


Figure 3-5. iSCSI Configured with Router to Fibre Channel SAN

- After the server discovers the storage and I/O has started, issue the `show perf byte` command to determine what I/O is operational on the selected ports. For example:

```
iSR6200 <1> (admin) #> show perf byte
WARNING: Valid data is only displayed for port(s) that are not
associated with any configured FCIP routes.
Displaying bytes/sec (total)... (Press any key to stop display)
GE1      GE2      10GE1   10GE2   FC1      FC2      FC3      FC4
-----
0         0        102M    0        0         109M    0         0
0         0        106M    0        0         104M    0         0
```

Appendix A

Dell EqualLogic iSCSI Array Deployment on AIX Through iSR6200

This appendix provides the following information for deploying a Dell EqualLogic iSCSI array on AIX server through the iSR6200 router:

- [Overview](#)
- [Supported AIX Versions](#)
- [AIX Configuration—MPIO](#)
- [Detecting New Dell EqualLogic Volumes Connected Through the iSR6200 Router](#)
- [Changing the Attributes of Devices Connected Through the iSR6200 Router](#)
- [Removing the MPIO Profile](#)
- [Troubleshooting: Multipathing Not Working Properly](#)
- [Troubleshooting: Failover Causing I/O Failures](#)
- [Optimizing LUN Performance and Availability](#)

Overview

The iSR6200 router operates with multiple SAN switches, host platforms, and storage devices. This appendix provides recommendations for connecting a Dell EqualLogic iSCSI storage array (through an iSR6200 Intelligent Storage Router) to an IBM® AIX® server in a Fibre Channel SAN environment.

Supported AIX Versions

The iSR6200 supports the following AIX versions:

- AIX 5.2 (Technology Level 5200-10, Service Pack 5200-10-04)
- AIX 5.3 (Technology Level 5300-06, Service Pack 5300-06-05)
- AIX 5.3 (Technology Level 5300-07, Service Pack 5300-07-02)
- AIX 6.1 (Technology Level 6100-00, Service Pack 6100-00-02)

High availability (HA) configurations are supported using multipath I/O (MPIO), which is included with AIX 5.2 and later. Older AIX releases are not supported.

AIX Configuration—MPIO

To detect a Dell EqualLogic volume as an MPIO disk, you must add an entry in the original design manufacture (ODM) database. If there is no entry in the database, the Dell EqualLogic volumes will be discovered, but will not have multipathing enabled.

To add an entry to the ODM database:

1. Run the following shell script at the AIX command prompt:

```
# cat eql_odmadd.sh

#!/bin/ksh
odmadd << \!
PdAt:
    uniquetype = "disk/fcp/mpioosdisk"
    attribute = "mpio_model_map"
    deflt = "0808EQLOGIC "
    values = "081083"
    width = ""
    type = "R"
    generic = ""
```

```
rep = "s"  
nls_index = 0  
!
```

2. Rebuild the boot image and reboot the system by issuing the following commands:

```
# bosboot -a  
# reboot
```

Detecting New Dell EqualLogic Volumes Connected Through the iSR6200 Router

Issue the following commands to discover new volumes and to display the available paths:

```
# cfgmgr  
# lsdev -C -c disk  
# lspath -l hdiskX (where X is the logical number of the newly configured device)
```

Changing the Attributes of Devices Connected Through the iSR6200 Router

Issue the following commands to change the attributes of devices that are connected through the iSR6200:

1. Issue the following command:

```
# chdev -l hdiskX -a hcheck_interval=60 -a queue_depth=16 -a reserve_policy=no_reserve -P
```

(where `hdiskX` is the device connected through the iSR6200)

2. Verify that the device is an EqualLogic device by issuing the `lscfg -vl hdiskX` command. For example:

```
# lscfg -vl hdisk2  
hdisk2 U78A0.001.DNWHMN1-P1-C4-T2-W210400C0DD131627-L0  MPIO Other FC SCSI Disk Drive  
  
Manufacturer.....EQLOGIC  
Machine Type and Model.....100E-00  
ROS Level and ID.....342E3320  
Serial Number.....8c447083  
Device Specific.(Z0).....000005323D100002  
Device Specific.(Z1).....
```

3. Reboot the system to make the change effective.

4. Validate the device attributes by issuing the `lsattr -El hdiskX` command. For example:

```
# lsattr -El hdisk2
PCM                PCM/friend/fcpothier          Path Control Module           False
algorithm          fail_over                     Algorithm                      True
clr_q              no                             Device CLEARS its Queue on error True
dist_err_pcmt     0                             Distributed Error Percentage   True
dist_tw_width     50                             Distributed Error Sample Time  True
hcheck_cmd        test_unit_rdy                 Health Check Command           True
hcheck_interval   60                             Health Check Interval          True
hcheck_mode       nonactive                     Health Check Mode              True
location          Location Label                 Location Label                  True
lun_id            0x0                           Logical Unit Number ID         False
lun_reset_spt     yes                           LUN Reset Supported            True
max_retry_delay   60                             Maximum Quiesce Time           True
max_transfer      0x40000                       Maximum TRANSFER Size          True
node_name         0x200400c0dd131627           FC Node Name                   False
pvid              00cc5555a9e0748b0000000000000000 Physical volume identifier      False
q_err             yes                           Use QERR bit                   True
q_type            simple                         Queuing TYPE                   True
queue_depth       16                             Queue DEPTH                    True
reassign_to       120                           REASSIGN time out value        True
reserve_policy    no_reserve                     Reserve Policy                  True
rw_timeout        30                             READ/WRITE time out value      True
scsi_id           0x30401                       SCSI ID                         False
start_timeout     60                             START unit time out value      True
unique_id         3A2136090A018D001E7CC81C444D0190D7D2A07100E-0007EQLOGICfcpc Unique device identifier       False
ww_name           0x210400c0dd131627           FC World Wide Name             False
```

NOTE:

Ensure that the `reserve_policy` attribute is set to `no_reserve`. This setting is required if login on the Dell EqualLogic is done through 1Gb router ports. To set the attribute, issue the following command:

```
# chdev -l hdisk2 -a reserve_policy=no_reserve -P
```

Removing the MPIO Profile

If the AIX server is no longer using Dell EqualLogic volumes connected through an iSR6200 router, remove the MPIO profile by doing one of the following:

- Issue the following command:

```
# odmdelete -o PdAt -q "deflt='0808EQLOGIC '"
```

- Run the following shell script:

```
# cat eql_odmdel.sh
#!/bin/ksh
odmdelete -o PdAt -q "deflt='0808EQLOGIC '"
```

Troubleshooting: Multipathing Not Working Properly

When using MPIO, storage volumes should be identified as `MPIO Other FC SCSI Disk Drive` devices, with multiple paths for each device (as indicated by the `lspath` command).

To view the storage volumes and paths, issue the following commands:

```
# lsdev -Cc disk

hdisk0 Defined    06-08-01-5,0 16 Bit LVD SCSI Disk Drive
hdisk1 Available 06-08-01-8,0 16 Bit LVD SCSI Disk Drive
hdisk2 Available 02-08-01      MPIIO Other FC SCSI Disk Drive
```

If the disks appear as `Other FC SCSI Disk Drive`, the entry in the ODM database may be incorrect.

To view the paths, issue the following command:

```
# lspath -l hdisk2
Enabled hdisk2 fscsi0
Enabled hdisk2 fscsi1
```

To view the MPIIO entries in the ODM database, issue the following command:

```
# odmget -q attribute=mpio_model_map PdAt | grep deflt

...

deflt = "0808EQLOGIC "
```

This output indicates that the MPIIO entry in the ODM database is correct.

Troubleshooting: Failover Causing I/O Failures

If failover is causing I/O to fail, ensure that the `hdisk` attribute `reserve_policy` is set to `no_reserve`.

Optimizing LUN Performance and Availability

iSCSI targets or LUNs should be balanced across two iSCSI ports of the same router blade. For multipathing, the target or LUN is attached through a second blade for availability.

For best performance and availability, the iSCSI targets (LUNs) should be balanced across two iSCSI ports and Fibre Channel ports of each router blade. For example, connect two iSCSI targets (LUNs) as follows (refer to [Figure A-1](#)):

Blade 1

- LUN 0 (target 1)—iSCSI login using 10GE1, and then present the target through FC1
- LUN 1 (target 2)—iSCSI login using 10GE2, and then present the target through FC2

Blade 2

- LUN 0 (target 1)—iSCSI login using 10GE2, and then present the target through FC2
- LUN 1 (target 2)—iSCSI login using 10GE1, and then present the target through FC1

The rest of the logins occur through two different iSCSI ports of the router blade. MPIIO login to the same targets occurs through the second blade. FC1 from both blades connects to the same fabric zone, and FC2 connects to either the same or a second fabric zone. These connections ensure that the loads across all four iSCSI and Fibre Channel ports are balanced, which optimizes the LUNs for availability and performance.

Figure A-1 identifies the base configuration and the connection of Fibre Channel servers to the iSCSI Dell EqualLogic targets.

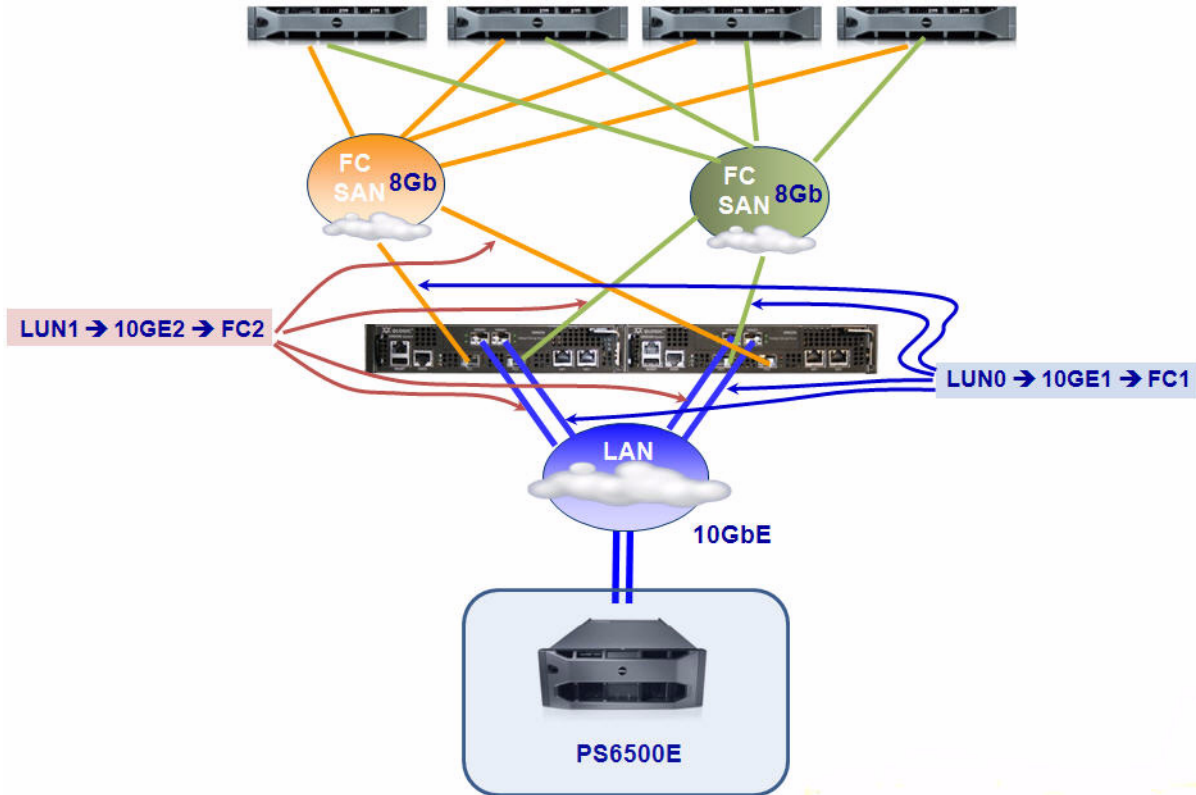


Figure A-1. One iSR6200 Configured for Fibre Channel SAN to EqualLogic Storage

Document Revision History	
Revision A, October 25, 2010	
Revision B, August 9, 2011	
Changes	
<p>Updated document to the latest QLogic template.</p> <p>Replaced the <code>iscsi discover</code> command example in substep 2 under “Using the iSCSI Discover Command.”</p> <p>Replaced the <code>lunmask add</code> command in substep 2 with the new <code>lunigmap add</code> command and removed the note regarding index numbers and ports.</p> <p>Added new substep 3 for issuing the new <code>targetigmap add</code> command with a global VPG.</p> <p>Renamed Step 5 section title and updated the introductory paragraph.</p> <p>Replaced the <code>show presented_targets</code> command output in substep 1.</p>	<p>All sections.</p> <p>“Step 1: Discover the iSCSI Targets” on page 2</p> <p>“Step 4: Map the iSCSI Target into the SAN and Provide Host Access to the Storage LUN” on page 7</p> <p>“Step 5: View the Newly Mapped Global Target Zoned to the Fibre Channel Host” on page 8</p>