



# Xyratex F54xxE RAID Systems and FalconStor's® IPStor® 5.1 & VTL 4

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## Notices

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## Introduction

The Xyratex F54xxE systems are based on 4Gb Fibre Channel (FC). It provides the bandwidth needed for high data throughput, video editing to database intensive, online transaction processing. Internally, the Xyratex F54xxE systems leverage SAS full duplex, point-to-point architectures with dedicated connections for maximum data throughput.

FalconStor® IPStor® Enterprise Edition is award-winning network storage infrastructure software that delivers proven data protection with simplified storage management. IPStor removes the complexity and expense from storage management by seamlessly providing SAN and NAS infrastructure and advanced enterprise class storage services for both networked and direct attached storage under a unified management umbrella across Fibre Channel and IP/iSCSI.

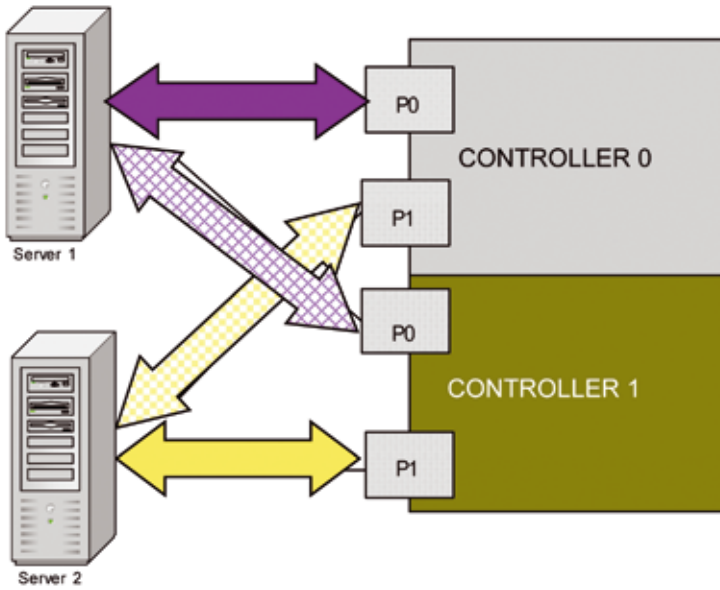
This application note describes the RAID configurations and tests used to qualify Xyratex's F54xxE RAID systems with FalconStor applications. It is intended for System Administrators planning FalconStor IPStor 5.1 or VTL 4 installations using the F54xxE RAID controllers and to provide certain recommended configurations and RAID Controller settings.

## Basic FalconStor Configuration

The basic configuration utilized for FalconStor IPStor takes full advantage of the F54xxE controller's ability to present LUNs to any hosts on any port while maintaining full cache coherency. Each host has a direct connect to one port on each of the RAID controllers. With all LUNs visible on each RAID port, this simple (and default) configuration meets the minimum requirements for FalconStor's built-in multi-path capabilities. System administrators should be aware of this default LUN visibility setting before attaching and powering up any servers attached to the RAID arrays.

The basic setup used is for both RAID controllers and 2 servers each a dual channel Fibre Channel card installed. This Fibre Channel card is direct attached to one port on each of the RAID controllers as shown in the diagram below.

Simple switched and complex SAN infrastructures are also common in FalconStor environments.



The F54xxE must be at the following firmware levels or higher for the functionality and features described below:

<b>RS-1220-F4-54x2E</b>	
F54x2E RAID Controller	3.03.0032
RAID Controller Boot Code	0023
Seagate SATA Hard Drive	3.AEL
Expansion Enclosure IO Module	1.07
StorView™ Software Version	3.07.0002

<b>RS-1220-F4-5404E</b>	
F54x2E RAID Controller	3.03.0032
RAID Controller Boot Code	0006
Seagate SATA Hard Drive	3.AEL
PMC Channel Card	2.09
Expansion Enclosure IO Module	3.06
StorView Software Version	3.07.002
EIP Card Firmware	2.6

# Recommended F54xxE Array Settings for FalconStor

## Target Queue Management

Xyratex recommends that the firmware feature of Target Queue Management (a.k.a. Fairness 2) should be enabled when you are utilizing the Replication, Time Marks and Mirror features in FalconStor.

The queue management function uses the SCSI task management flags to throttle the host back to prevent overload. It does this by limiting the number of commands that can be accepted. This option should be used if system configurations are going to be operated in overload circumstances that mean that host timeout's may be exceeded (typically 10sec).

The process to enable this feature via the RS-232 Text User Interface is listed below. As noted the Maximum Time Out Value should be adjusted to 25. This is a global feature and setting this option on one controller will automatically change this on the other. Changing this setting does require a reboot of both controllers.

From the TUI main menu, enter the menu selections indicated below.

### F5402E Main Menu (C0)

1. Configuration
2. Diagnostics
3. Controller Information
4. Statistics
5. Event Log
6. RS232 Settings
7. Enclosure Information
0. Exit

Please Select Option: 1

### Configuration Menu (1) (C0)

1. Array Configuration
2. Logical Drive Configuration
3. Additional Host Configuration
4. SAN LUN Mapping Configuration
5. Rebuild/Initialization Configuration
6. Data Services Configuration
8. Additional Configuration
9. View Configuration
10. Clear Configuration
0. Exit

Please Select Option: 3

### Additional Host Configuration Menu (1-3) (C0)

1. Host Port Hard Addressing
2. Controller LUN Configuration
3. Host Port Connection Options
4. Host Port Data Rate
5. Host Port Different Node Name
7. Target Queue Management
0. Exit

Please Select Option: 7

### Target Queue Management Configuration Menu (1-3-7) (C0)

1. Enabled Target Queue Management
0. Exit

Please Select Option: 1

### Target Queue Management Configuration Menu (1-3-7-1) (C0)

During a queue full situation, respond with:

1. SCSI Status BUSY
2. CSCSI Status TASK SET FULL
3. Automatically Determine Best Response
0. Exit

Please Select Option: 1

Enter maximum response time in seconds before invoking queue full management, 1--99  
(<CR> to select 4): 25

Target Queue Management Enabled  
Press any key to continue ...

### Additional Host Configuration Menu (1-3) (C0)

1. Host Port Hard Addressing
2. Controller LUN Configuration
3. Host Port Connection Options
4. Host Port Data Rate
5. Host Port Different Node Name
7. Target Queue Management
0. Exit

Please Select Option: 0

## Configuration Menu (1) (C0)

1. Array Configuration
2. Logical Drive Configuration
3. Additional Host Configuration
4. SAN LUN Mapping Configuration
5. Rebuild/Initialization Configuration
6. Data Services Configuration
8. Additional Configuration
9. View Configuration
10. Clear Configuration
15. Quit Without Saving
0. Save and Exit

Please Select Option: 0

## Use Different Node Name for FalconStor Failover

FalconStor IPStor 5.1 requires that the F54xxE RAID controller feature of presenting different Node Names be enabled when using the FalconStor Symmetrical and Asymmetrical Failover Feature.

The "Use Different Node Name" feature can be enabled either through the F54xxE embedded StorView Graphical User Interface or through the controller RS-232 Text User Interface. This is a global feature and setting this option on one controller will automatically change this on the other. Changing this setting does require a reboot of both controllers.

To enable this feature under StorView™ open the "Advanced Settings" window by clicking on the associated radio button on the StorView main screen. A pop-up window will open and the option for "Different Node Name" will have check box to enable this feature.

From the Text User Interface main menu, enter the menu selections indicated below.

## F5402E Main Menu (C0)

1. Configuration
2. Diagnostics
3. Controller Information
4. Statistics
5. Event Log
6. RS232 Settings
8. Enclosure Information
0. Exit

Please Select Option: 1

### Configuration Menu (1) (C0)

1. Array Configuration
2. Logical Drive Configuration
3. Additional Host Configuration
4. SAN LUN Mapping Configuration
5. Rebuild/Initialization Configuration
6. Data Services Configuration
8. Additional Configuration
9. View Configuration
10. Clear Configuration
0. Exit

Please Select Option: 3

### Additional Host Configuration Menu (1-3) (C0)

1. Host Port Hard Addressing
2. Controller LUN Configuration
3. Host Port Connection Options
4. Host Port Data Rate
5. Host Port Different Node Name
7. Target Queue Management
0. Exit

Please Select Option: 5

### Additional Host Configuration Menu (1-3-5) (C0)

1. Enable Host Port Different Node Name

Please Select Option: 1

Host Port Different Node Name Enabled

Press any key to continue...

### Additional Host Configuration Menu (1-3) (C0)

1. Host Port Hard Addressing
2. Controller LUN Configuration
3. Host Port Connection Options
4. Host Port Data Rate
5. Host Port Different Node Name
7. Target Queue Management
0. Exit

Please Select Option: 0

## Configuration Menu (1) (C0)

1. Array Configuration
2. Logical Drive Configuration
3. Additional Host Configuration
4. SAN LUN Mapping Configuration
5. Rebuild/Initialization Configuration
6. Data Services Configuration
8. Additional Configuration
9. View Configuration
10. Clear Configuration
15. Quit Without Saving
0. Save and Exit

Please Select Option: 0

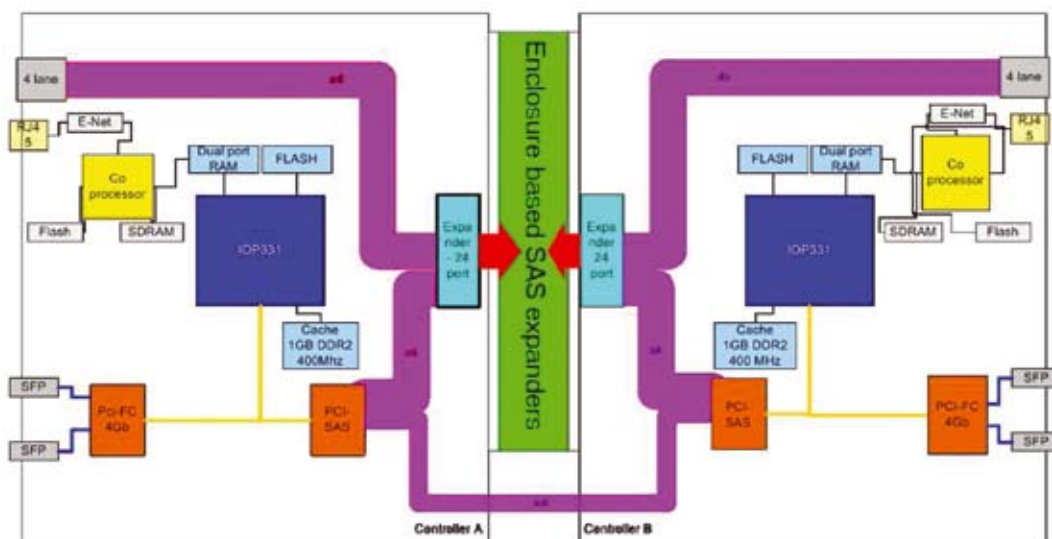
## F5404E Array Configuration When Using a JBOD Expansion Unit

The F5404E can be configured with up to 48 SATA2 drives. During Xyratex testing of the F5404E and JBOD expansion unit it has been observed there are optimal drive selection when creating arrays in the JBOD expansion unit. The drive selection in the F5404E RAID enclosure is not affected by different drive selections.

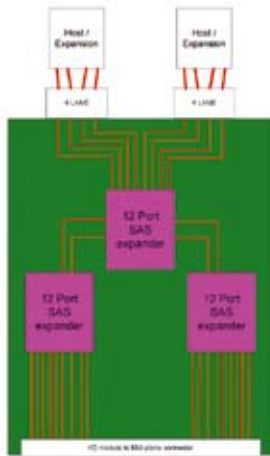
The SAS expanders used on the RAID controller and JBOD expansion are different which affects the performance depending on the drive selection.

The RAID controller has a single 24 port SAS expander on the RAID controller and the JBOD expansion module has 3 x 12 port SAS expanders. Both of these modules then connect to 2 x 36 port SAS expanders on the internal channel cards inside the enclosure. This is how dual path connectivity to 48 drives is achieved.

## F5404E architecture



## F5404E architecture



Depending on how the drives in the JBOD expansion are accessed this will affect the performance of the drives as there are only 2 SAS ports connecting the 2 SAS expanders into the top SAS expander. It is recommended that the drives in the JBOD are selected as shown below:

Recommended Drive Selection Front to Back →



If the drives are selected as per below then the performance will not be optimal.



### Array & LUN Performance Consideration

FalconStor's powerful storage virtualization capability can have unintended effects to overall performance that the user should consider when determining the storage configuration. FalconStor will create virtual LUNs across one or more arrays. To the hosts, the LUN is seen as a unique device, but internal to the "array" it is simply a range of LBAs (Logical Block Addresses). The workload presented to this array might be sequential in respect to individual LUNs, but if these LUNs are hosted within the same "array", the actual workload at the drives requires the RAID controller to interleave the IO's from each LUN into the array. This IO pattern causes additional seek/rotational overhead in disk head movement to service this non-sequential IO and therefore the performance of the LUN's will not be the maximum of the array.

## About Xyratex

Xyratex is the ultimate partner to the storage industry. We are a leading provider of enterprise-class data storage subsystems and storage infrastructure manufacturing equipment & automation solutions. Working with over 50 A-list companies, Xyratex ships over 14% of the world's external storage capacity, and 75% of all 3.5" drives are processed using Xyratex test systems. With unmatched expertise and a history of innovation and technological excellence, Xyratex delivers products which are high-performance, energy-efficient and extremely reliable.

For more information, please visit [www.xyratex.com](http://www.xyratex.com)

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