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To: X3T9.2 Committee (SCSI)

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Subject: SDA Commands and Mode Pages

1.0 Overview

To control and configure a SCSI-3 Disk Array several new commands and mode pages are required. This proposal defines those commands and mode pages.

<<Editors Note: This pass and only contains an outline of the commands and mode pages GOP>>

2.0 Extents

2.1 P-extent

All P-extents contain the following information:

-Physical Logical Unit Identifier (P-LUI) 2 bytes
-Start P-LBA 4 bytes
-Number of P-LBAs 4 bytes
-Number of Bytes per P-LBA 2 bytes

Note:For variable block length device types the number of bytes per P-LBA field shall be set to zero.

2.2 PS-extent

All PS-extents contain the following information:

-Physical Logical Unit Identifier (P-LUI) 2 bytes
-Start PS-LBA 4 bytes
-Number of PS-LBAs 4 bytes
-Number of Bytes per PS-LBA 2 bytes

Note:For variable block length device types the number of bytes per P-LBA field shall be set to zero.

3.0 Maintenance Operations

3.1 Report P-LUI Command

This command would send the following parameter list:

-Physical Logical Unit Identifier (P-LUI) (R) 2 bytes
-Peripheral Device Type (1 per P-LUI) 1 byte
-Replaceable Unit (1 per P-LUI) 1 bit
| -State of the P-LUI (1 per P-LUI) 1 byte

Note:Any parameters indicated by a (R) may be repeated. Any parameters indicated by a (S) shall only occur once per service request.

3.2 Report P-LUI Geographic Location Command

The CDB would contain the following:

-Physical Logical Unit Identifier (P-LUI) 2 bytes

This command would return the following parameter list:

-Geographic Location Variable

3.3 Set P-LUI Geographic Location Command

The CDB would contain the following:

-Physical Logical Unit Identifier (P-LUI) 2 bytes

This command would send the following parameter list:

-Geographic Location Variable

| 3.4 Report P-Extent Command

The CDB would contain the following:

| -Report assigned/unassigned P-Extents 1 byte

This command would return the following parameter list:

-P-extent (R) 12 bytes
-Peripheral Device Type (1 per P-extent) 1 byte
-State of the P-extent (1 per P-extent) 1 byte

3.5 Exchange P-LUI Command (Immediate bit in CDB)

The CDB would contain the following:

-Old P-LUI (S) 2 bytes
-New P-LUI (S) 2 bytes

3.6 Remove P-LUI Command

The CDB would contain the following:

-P-LUI (S) 2 bytes

3.7 Exchange P-extent Command (Immediate bit in CDB)

This command would send the following parameter list:

-Old P-extent (S) 12 bytes

-New P-extent (S) 12 bytes

3.8 Set Method of Reporting Informational Exception Conditions Mode Page

A SDA mode page would contain the following:

-Method of Reporting Informational Exceptions (S) 1 byte
-Log Informational Exceptions (S) 1 bit

4.0 Redundancy Group Operations

4.1 Create/Modify Redundancy Group Command (Immediate bit in CDB)

This command would send the following parameter list:

-Redundancy Group Logical Unit Identifier (R-LUI) (S) 2 bytes
-Recalculate check data (S) 2 bits
-Granularity of Units (bit, byte, logical block, etc.) (S) 1 byte
-P-Extent (R) 12 bytes
-Preserve protected space (1 per P-extent) 2 bits
-Set protected space to known value (1 per P-extent) 9 bits
-Redundancy Type Identifier (1 per P-extent) 1 byte
-Start check data interleave P-LBA (1 per P-extent) 4 bytes
-Number of units of check data (1 per P-extent) 4 bytes
-Number of units of user data (1 per P-extent) 4 bytes

4.2 Report Redundancy Groups Command

The CDB would contain the following:

-Report all R-LUIs (Yes/No) (S) 1 bit
-Redundancy Group Logical Unit Identifier (R-LUI) (S) 2 bytes

This command would report the following parameter list:

-Redundancy Group Logical Unit Identifier (R-LUI) (R) 2 bytes
-Redundancy Type Identifier (1 per R-LUI) 1 byte
-Granularity of Units (bit, byte, etc.) (1 per R-LUI) 1 byte
-State of the Redundancy Group (1 per R-LUI) 1 byte
-P-Extent (x per R-LUI) 12 bytes
-Start Check Data Interleave P-LBA (1 per P-extent) 4 bytes
-Number of units of check data (1 per P-extent) 4 bytes
-Number of units of user data (1 per P-extent) 4 bytes

4.3 Report Unassigned Redundancy Group Space Command

The CDB would contain the following:

-Report all unassigned R-LUIs (Yes/No) (S) 1 bit
-Redundancy Group Logical Unit Identifier (R-LUI) (S) 2 bytes

This command would report the following parameter list:

-Redundancy Group Logical Unit Identifier (R-LUI) (R) 2 bytes
-Redundancy Type Identifier (1 per R-LUI) 1 byte
-State of the Redundancy Group (1 per R-LUI) 1 byte
-PS-extent (x per R-LUI) 12 bytes

4.4 Delete Redundancy Group Command

The CDB would contain the following:

-Redundancy Group Logical Unit Identifier (R-LUI) (S) 2 bytes

4.5 Recalculate Check Data Command (Immediate bit in CDB)

The CDB would contain the following:

-Redundancy Group Logical Unit Identifier (R-LUI) (S) 2 bytes

4.6 Verify Check Data Command (Immediate bit in CDB)

The CDB would contain the following:

-Redundancy Group Logical Unit Identifier (R-LUI) (S) 2 bytes

4.6.1 Verify Check Data Mode Page

A SDA mode page would contain the following:

-Enable/Disable Continuous Verification (S) 1 bit

4.7 Control Generation of Check Data Mode Page

A SDA mode page would contain the following:

-Redundancy Group Logical Unit Identifier (R-LUI) (S) 2 bytes
-Enable/Disable Check Data (S) 1 bit

4.8 Rebuild P-extent Command (Immediate bit in CDB)

This command would send the following parameter list:

-P-extent (S) 12 bytes
-Redundancy Group Logical Unit Identifier (R-LUI) (R) 2 bytes

4.9 Rebuild P-LUI Command (Immediate bit in CDB)

This command would send the following parameter list:

-P-LUI (S) 2 bytes
-Redundancy Group Logical Unit Identifier (R-LUI) (R) 2 bytes

5.0 Volume Set Operations

5.1 Create/Modify Volume Set Command (Immediate bit in CDB)

This command would send the following parameter list:

-Volume Set Logical Unit Identifier (V-LUI) (S) 2 bytes
-PS-extent Stripe Length (S) 4 bytes
-PS-extent Interleave Depth (S) 4 bytes
-Granularity of Units (bit, byte, logical block, etc.) (S) 1 byte
-PS-extent (R) 12 bytes
-User Data Stripe Depth (1 per PS-extent) 4 bytes
-Increment/Decrement PS-LBA Count (1 per PS-extent) 4 bytes

5.2 Report Volume Sets Command

The CDB would contain the following:

-Report all V-LUIs (Yes/No) (S) 1 bit
-Volume Set Logical Unit Identifier (V-LUI) (S) 2 bytes

This command would report the following parameter list:

-Volume Set Logical Unit Identifier (V-LUI) (R) 2 bytes
-PS-extent Stripe Length (1 per V-LUI) 4 bytes
-PS-extent Interleave Depth (1 per V-LUI) 4 bytes
-Granularity of Units (bit, byte, etc.) (1 per V-LUI) 1 byte
-State of the Volume Set (1 per V-LUI) 1 byte
-PS-extent (x per V-LUI) 12 bytes
-User Data Stripe Depth (1 per PS-extent) 4 byte
-Increment/Decrement PS-LBA Count (1 per PS-extent) 1 bit

5.3 Delete Volume Set Command

The CDB would contain the following:

-Volume Set Logical Unit Identifier (V-LUI) (S) 2 bytes

5.4 Recalculate V-LUI Check Data Command (Immediate bit in CDB)

The CDB would contain the following:

-Volume Set Logical Unit Identifier (V-LUI) (S) 2 bytes

This command would send the following parameter list:

-Start V-LBA (S) 4 bytes
-Number of V-LBAs (S) 4 bytes

5.5 Verify V-LBA Check Data Command (Immediate bit in CDB)

The CDB would contain the following:

-Volume Set Logical Unit Identifier (V-LUI) (S) 2 bytes

This command would send the following parameter list:

-Start V-LBA (S) 4 bytes
-Number of V-LBAs (S) 4 bytes

5.5.1 Verify Check Data Mode Page (Immediate bit in CDB)

A SDA mode page would contain the following:

-Enable/Disable Continuous Verification (S) 1 bit

5.6 Control Generation of Check Data Mode Page

A SDA mode page would contain the following:

-Volume Set Logical Unit Identifier (V-LUI) (S) 2 bytes
-Enable/Disable Check Data (S) 1 bit

5.7 Control Write Operations Mode Page

A SDA mode page would contain the following:

-Volume Set Logical Unit Identifier (V-LUI) (S) 2 bytes
-Enable/Disable Write Operations (S) 1 bit

6.0 Spare Operations

6.1 Create/Modify P-extent Spare Command (Immediate bit in CDB)

This command would send the following parameter list:

-Spare Logical Unit Identifier (S-LUI) (S) 2 bytes
-P-Extent (S) 12 bytes
-Redundancy Group Logical Unit Identifier (R-LUI) (R) 1 bytes
-Associated P-Extent (R) 12 bytes

6.2 Report P-extent Spare Command

The CDB would contain the following:

-Report all P-extent Spares (Yes/No) (S) 1 bit
-Spare Logical Unit Identifier (S-LUI) (S) 2 bytes

This command would send the following parameter list:

-Spare Logical Unit Identifier (S-LUI) (R) 2 bytes
-P-Extent (1 per S-LUI) 12 bytes
-State of the spare (1 per S-LUI) 1 byte
-Redundancy Group Logical Unit Identifier (R-LUI)(x per S-LUI) 2 bytes
-Associated P-Extent (x per S-LUI) 12 bytes

6.3 Create/Modify P-LUI Spare Command (Immediate bit in CDB)

This command would send the following parameter list:

-Spare Logical Unit Identifier (S-LUI) (S) 2 bytes

-P-LUI (S) 2 bytes
-Redundancy Group Logical Unit Identifier (R-LUI) (R) 2 bytes
-Associated P-LUI (R) 2 bytes

6.4 Report P-LUI Spare Command

The CDB would contain the following:

-Report all P-LUI Spares (Yes/No) (S) 1 bit
-Spare Logical Unit Identifier (S-LUI) (S) 2 bytes

This command would send the following parameter list:

-Spare Logical Unit Identifier (S-LUI) (R) 2 bytes
-P-LUI (1 per S-LUI) 2 bytes
-State of the spare (1 per S-LUI) 1 byte
-Redundancy Group Logical Unit Identifier (R-LUI)(x per S-LUI) 2 bytes
-Associated P-LUI (x per S-LUI) 2 bytes

6.5 Delete Spare Command

The CDB would contain the following:

-Spare Logical Unit Identifier (S-LUI) (S) 2 bytes