Date: Mar 22,1994

To: X3T9.2 Committee (SCSI)

From: George Penokie (IBM)

Subject: SDA Commands and Mode Pages

1 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. All the listed commands and mode pages are only valid for the Base Device Address (P-LUI LUN zero) on SDA device types.

An Inquiry command addressed to a volume set shall indicate a Peripheral device type equivalent to the devices that makeup the volume set (e.g. direct-access device, sequential-access device, etc.).

A bit will be added to the Standard Inquiry data format to indicate the LUN is a Volume Set. The name of the bit should be SDAVol. The following text should be added to the Inquiry command description: A SDA Volume Set Addressed (SDAVol) bit of one indicates the addressed device is a volume set that is configured within a SDA device.

2 SCSI Disk Array Commands

Table 1 - Commands for SCSI disk array devices

Command Name	Operation code	Type	Subclause
MAINTENANCE (IN)	A3h	O	3
MAINTENANCE (OUT)	A4h	O	4
REDUNDANCY GROUP(IN)	BAh	O	5
REDUNDANCY GROUP(OUT)	BBh	O	6
SPARE(IN)	BCh	O	9
SPARE(OUT)	BDh	O	10
VOLUME SET(IN)	BEh	O	7
VOLUME SET(OUT)	BFh	O	8
Key: M = Command implementation is mandatory. O = Command implementation is optional.			

3 Maintenance (In) Command

3.1 Maintenance (In) Command Service Actions

Table 2 - Service Actions for maintenance (in) command

Service Name	Service Actions	Type	Subclause
REPORT ASSIGNED/UNASSIGNED P-EXTENT	00h	O	3.2
REPORT C-LUI	01h	O	3.3
REPORT C-LUI ATTACHMENTS	02h	O	3.4
REPORT P-LUI	03h	O	3.5
REPORT P-LUI ASSOCIATIONS	04h	O	3.6
REPORT P-LUI/C-LUI IDENTIFIER	05h	O	3.7
REPORT STATES	06h	O	3.8
RESERVED	07h-17h		
VENDOR SPECIFIC	18h-1Fh		
Key: M = Service Action implementation is mandatory. O = Service Action implementation is optional.			

3.2 Report Assigned/Unassigned P-Extent Service Action

Table 3 - Report Assigned/Unassigned P-Extent Service Action

Bit Byte	7	6	5	4	3	2	1	0
0	Operation code (xxh)							
1	Reserved			Service Action (xxh)				
2	Reserved							
3	Reserved							
4	(MSB)	Physical Logical Unit Identifier						
5								(LSB)
6	(MSB)	Allocation Length						
7								
8								
9								(LSB)
10	Reserved					ASSIGN	Reserved	RPTSEL
11	Control							

RPTSEL - If set to 0 report all. If set to one report selected C-LUIs.

ASSIGN - If set to 0 report unassigned P-Extents. If set to 1 report assigned P-Extents.

Table 4 - Report Assigned/Unassigned P-Extent parameter list

Bit / Byte	7	6	5	4	3	2	1	0
0	(MSB)							
1				Assigned/Unassigned P-extent(s) List Length				
2								
3								(LSB)
	Assigned/Unassigned P-extent(s) (If Any)							
0				Assigned/Unassigned P-extent Descriptor 0				
15								
	. . .							
0				Assigned/Unassigned P-extent Descriptor x				
15								

Table 5 - Data format of Assigned/Unassigned P-extent Descriptor

Bit / Byte	7	6	5	4	3	2	1	0
0				P-extent Descriptor				
11								
12	Reserved							
13	Reserved							
14	Peripheral Device Type							
15	Reserved	P-extent State						

Table 6 - Data format P-extent Descriptor

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB)							
1				Physical Logical Unit Identifier				(LSB)
2	(MSB)							
3								
4				Start P-LBA				
5								(LSB)
6	(MSB)							
7								
8				Number of P-LBAs				
9								(LSB)
10	(MSB)							
11				Number of Bytes per P-LBA				(LSB)

3.3 Report C-LUI Service Action

Table 7 - Report C-LUI Service Action

Bit / Byte	7	6	5	4	3	2	1	0
0	Operation code (xxh)							
1	Reserved			Service Action (xxh)				
2	Reserved							
3	Reserved							
4	(MSB)			Component Logical Unit Identifier				
5								(LSB)
6	(MSB)			Allocation Length				
7								
8								
9								(LSB)
10	Reserved							RPTSEL
11	Control							

RPTSEL - If set to 0 report all. If set to one report selected C-LUIs

Table 8 - Report C-LUI parameter list

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB)							
1				C-LUI List Length				
2								
3								(LSB)
	C-LUI(s) (If Any)							
0				C-LUI Descriptor 0				
3								
	. . .							
0				C-LUI Descriptor x				
3								

Table 9 - Data format of C-LUI Descriptor

Bit Byte	7	6	5	4	3	2	1	0
0	Component Device Type							
1	Replace	C-LUI State						
2	(MSB)			Component Logical Unit Identifier				
3								(LSB)

Replace - If set to 0 the P-LUI is not a replaceable unit. If set to 1 the P-LUI is a replaceable unit.

Table 10 - Component Device Types

Code	Description
00h	Controller Electronics that contain a DACL
01h	Non-volatile cache
02h	Power Supply
03h	Uninterruptable Power Supply
04h	Display
05h	Key Pad Entry
06h-7Fh	Reserved
80h-FFh	Vendor Specific

3.4 Report C-LUI Attachments Service

Table 11 - Report C-LUI Attachments Service Action Service Action

Bit Byte	7	6	5	4	3	2	1	0
0	Operation code (xxh)							
1	Reserved			Service Action (xxh)				
2	Reserved							
3	Reserved							
4	(MSB)	Component Logical Unit Identifier						
5								(LSB)
6	(MSB)	Allocation Length						
7								
8								
9								(LSB)
10	Reserved							RPTSEL
11	Control							

RPTSEL - If set to 0 report all. If set to one report selected C-LUIs

Table 12 - Report C-LUI Attachments parameter list

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB)							
1				C-LUI Attachments List Length				
2								
3								(LSB)
	C-LUI Attachment(s) (If Any)							
0				C-LUI Attachments Descriptor 0				
n								
	. . .							
0				C-LUI Attachments Descriptor x				
n								

Table 13 - Format of C-LUI Attachments Descriptor

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB)			C-LUI Attachments Descriptor List Length				
1								(LSB)
2	(MSB)			Component Logical Unit Identifier				
3								(LSB)
	LUI(s) (If Any)							
0				LUI Descriptor 0				
3								
	. . .							
0				LUI Descriptor x				
3								

See “Data format of C-LUI Descriptor” on page 7 for the format of the LUI Descriptor field.

3.5 Report P-LUI Service Action

Table 14 - Report P-LUI Service Action

Bit / Byte	7	6	5	4	3	2	1	0
0	Operation code (xxh)							
1	Reserved			Service Action (xxh)				
2	Reserved							
3	Reserved							
4	(MSB)			Physical-Logical Unit Identifier				
5								(LSB)
6	(MSB)			Allocation Length				
7								
8								
9								(LSB)
10	Reserved							RPTSEL
11	Control							

RPTSEL - If set to 0 report all. If set to one report selected P-LUIs.

Table 15 - Report P-LUI Parameter List

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB)							
1				P-LUI List Length				
2								
3								(LSB)
	P-LUI(s) (If Any)							
0				P-LUI Descriptor 0				
3								
	. . .							
0				P-LUI Descriptor x				
3								

Table 16 - Format of P-LUI Descriptor

Bit Byte	7	6	5	4	3	2	1	0
0	Peripheral Device Type							
1	Replace	P-LUI State						
2	(MSB)			Physical Logical Unit Identifier				
3								(LSB)

Replace - If set to 0 the P-LUI is not a replaceable unit. If set to 1 the P-LUI is a replaceable unit.

3.6 Report P-LUI Associations Service Action

Table 17 - Report P-LUI Associations Service Action

Bit Byte	7	6	5	4	3	2	1	0
0	Operation code (xxh)							
1	Reserved			Service Action (xxh)				
2	Reserved							
3	Reserved							
4	(MSB)	Physical Logical Unit Identifier						
5								(LSB)
6	(MSB)	Allocation Length						
7								
8								
9								(LSB)
10	Reserved							RPTSEL
11	Control							

RPTSEL - If set to 0 report all. If set to one report selected P-LUIs.

Table 18 - Report P-LUI Associations parameter list

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB)							
1				P-LUI Associations List Length				
2								
3								(LSB)
	P-LUI Association(s) (If Any)							
0				P-LUI Associations Descriptor 0				
n								
	. . .							
0				P-LUI Associations Descriptor x				
n								

Table 19 - Format of P-LUI Associations Descriptor

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB)			P-LUI Associations Descriptor List Length				
1								(LSB)
2	(MSB)			Physical Logical Unit Identifier				
3								(LSB)
	LUI(s) (If Any)							
0				LUI Descriptor 0				
3								
	. . .							
0				LUI Descriptor x				
3								

See “Data format of C-LUI Descriptor” on page 7 for the format of the LUI Descriptor field.

3.7 Report P-LUI/C-LUI Identifier Service Action

Table 20 - Report P-LUI/C-LUI Identifier Service Action

Bit Byte	7	6	5	4	3	2	1	0
0	Operation code (xxh)							
1	Reserved			Service Action (xxh)				
2	Reserved							
3	Reserved							
4	(MSB)			Logical Unit Identifier				
5								(LSB)
6	(MSB)			Allocation Length				
7								
8								
9								(LSB)
10	Reserved						PorCID	Reserved
11	Control							

PorCID - If set to 0 report P-LUI Identifier. If set to one report C-LUI Identifier.

Logical Unit Identifier - If PorCID is set to 0 this field shall contain the address of a P-LUI. If PorCID is set to 1 this filed shall contain the address of a C-LUI.

Table 21 - Report P-LUI/C-LUI Identifier parameter list

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB)			Identifier List Length				
1								
2								
3								(LSB)
0				Identifier				
n								

3.8 Report States Service Action

Table 22 - Report States Service Action

Bit / Byte	7	6	5	4	3	2	1	0
0	Operation code (xxh)							
1	Reserved			Service Action (xxh)				
2	Reserved							
3	Reserved				LUI Type			
4	(MSB)	Logical Unit Identifier						
5								(LSB)
6	(MSB)	Allocation Length						
7								
8								
9								(LSB)
10	Reserved		Report States		Reserved			
11	Control							

Table 23 - LUI Types

Codes	Description
0h	Physical Logical Unit Identifier
1h	Volume Logical Unit Identifier
2h-3h	Reserved
4h	Component Logical Unit Identifier
5h	Redundancy Group Logical Unit Identifier
6h	Spare Logical Unit Identifier
7h-Bh	Reserved
Ch-Fh	Vendor Specific

Table 24 - Report States

Codes	Description
00h	Report all states for all logical units within the selected SCSI Disk Array. The LUI Type and the LUI fields shall be ignored if this option is selected.
01h	Report all states for all of the LUI(s) of the type listed in the LUI Type field within the selected SCSI Disk Array. The LUI field shall be ignored if this option is selected.
10h	Report all states for the selected logical unit. The LUI Type and the LUI field shall determine the address of the logical unit if this option is selected.
11h	Reserved

Table 25 - Report States parameter list

Bit / Byte	7	6	5	4	3	2	1	0
0	(MSB)							
1				Logical Unit States List Length				
2								
3								(LSB)
	Logical Unit States(s) (If Any)							
0				Logical Unit State(s) Descriptor 0				
n								
	. . .							
0				Logical Unit State(s) Descriptor x				
n								

Table 26 - Format of Logical Unit States Descriptors

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB)			State List Length				
1								(LSB)
2	Reserved							
3	Reserved							
4	Reserved							
5	Reserved				LUI Type			
6	(MSB)			Logical Unit Identifier				
7								(LSB)
	State Descriptors(s) (If Any)							
0	Replace	State of the Logical Unit						
	. . .							
n	Replace	State of the Logical Unit						

The LUI Type field shall define the type of logical unit. See “LUI Types” on page 15 for a description of the LUI Types filed.

Replace - If set to 0 and the LUI Type is P-LUI or C-LUI that logical unit is not a replaceable unit. If set to 1 and the LUI Type is P-LUI or C-LUI that logical unit is a replaceable unit. The Target shall not set the Replace value to 1 unless the LUI Type is either P-LUI or C-LUI.

Editors Note 1 - GOP: All the state information should go here.

4 Maintenance (Out) Commands

4.1 Maintenance (Out) Command Service Actions

Table 27 - Service s for maintenance (out) command

Service Name	Service Actions	Type	Subclause
ADD P-LUI/C-LUI	00h	O	4.2
ATTACH C-LUI	01h	O	4.3
EXCHANGE P-EXTENT	02h	O	4.4
EXCHANGE P-LUI/C-LUI	03h	O	4.5
INSTRUCT C-LUI	04h	O	4.6
REMOVE P-LUI/C-LUI	05h	O	4.7
SET P-LUI/C-LUI IDENTIFIER	06h	O	4.8
RESERVED	07h-17h		
VENDOR SPECIFIC	18h-1Fh		
Key: M = Service Action implementation is mandatory. O = Service Action implementation is optional.			

4.2 Add P-LUI/C-LUI Service Action

Table 28 - Add P-LUI/C-LUI Service Action

Bit Byte	7	6	5	4	3	2	1	0
0	Operation code (xxh)							
1	Reserved			Service Action (xxh)				
2	Reserved							
3	Reserved							
4	(MSB)			Logical Unit Identifier				
5								(LSB)
6	Reserved							
7	Reserved							
8	Reserved							
9	Reserved							
10	Reserved						PorCAd	Reserved
11	Control							

PorCAd - If set to 0 add the addressed P-LUI to the SDA. If set to one add the addressed C-LUI to the SDA.

4.3 Attach C-LUI Service Action

Table 29 - Attach C-LUI Service Actions

Bit Byte	7	6	5	4	3	2	1	0
0	Operation code (xxh)							
1	Reserved			Service Action (xxh)				
2	Reserved							
3	Reserved							
4	(MSB)			Component Logical Unit Identifier				
5								(LSB)
6	(MSB)			List Length				
7								
8								
9								(LSB)
10	Reserved							
11	Control							

Table 30 - Attach C-LUI parameter list

Bit Byte	7	6	5	4	3	2	1	0
	LUI(s) (If Any)							
0	LUI Descriptor 0							
3								
	. . .							
0	LUI Descriptor x							
3								

Table 31 - Data format of LUI Descriptor

Bit Byte	7	6	5	4	3	2	1	0
0	Reserved							
1	Reserved				LUI Type			
2	(MSB)	Logical Unit Identifier						
3								(LSB)

The LUI Type field shall define the type of logical unit to attach to the selected C-LUI. See “LUI Types” on page 15 for a description of the LUI Types filed.

4.4 Exchange P-extent Service Action

Table 32 - Exchange P-extent Service Action

Bit Byte	7	6	5	4	3	2	1	0
0	Operation code (xxh)							
1	Reserved			Service Action (xxh)				
2	Reserved							
3	Reserved							
4	Reserved							
5	Reserved							
6	Reserved							
7	Reserved							
8	Reserved							
9	Reserved							
10	Reserved							Immed
11	Control							

Immed - This is the normal immediate bit.

Table 33 - Exchange P-extent Parameters List

Bit Byte	7	6	5	4	3	2	1	0
0	Old P-extent Descriptor							
11								
12	New P-extent Descriptor							
23								

See “Format of P-LUI Descriptor” on page 11 for the format of the Old P-extent descriptor and New P-extent descriptor fields.

4.5 Exchange P-LUI/C-LUI Service Action

Table 34 - Exchange P-LUI/C-LUI Service Action

Bit Byte	7	6	5	4	3	2	1	0
0	Operation code (xxh)							
1	Reserved			Service Action (xxh)				
2	Reserved							
3	Reserved							
4	(MSB) Old Logical Unit Identifier							
5								(LSB)
6	Reserved							
7	Reserved							
8	(MSB) New Logical Unit Identifier							
9								(LSB)
10	Reserved						PorCEx	Immed
11	Control							

Immed - This is the normal immediate bit.

PorCEx - If set to 0 exchange P-LUIs. If set to one exchange C-LUIs.

4.6 Instruct C-LUI Service Action

Table 35 - Instruct C-LUI Service Action

Bit / Byte	7	6	5	4	3	2	1	0
0	Operation code (xxh)							
1	Reserved			Service Action (xxh)				
2	C-LUI Instruction							
3	Reserved							
4	(MSB)	Component Logical Unit Identifier						
5								(LSB)
6	(MSB)	List Length						
7								
8								
9								(LSB)
10	Reserved							
11	Control							

A list length of 0000h shall to indicate the C-LUI Instruction contains no parameter list.

Table 36 - C-LUI Instruction

Codes	Description
00h	Turn selected C-LUI off
01h	Turn selected C-LUI on
02h-7Fh	Reserved
80h-FFh	Vendor Specific

Table 37 - Instruct C-LUI parameter list

Bit / Byte	7	6	5	4	3	2	1	0
0	Vendor Specific							
n								

4.7 Remove P-LUI/C-LUI Service Action

Table 38 - Remove P-LUI/C-LUI Service Action

Bit / Byte	7	6	5	4	3	2	1	0
0	Operation code (xxh)							
1	Reserved			Service Action (xxh)				
2	Reserved							
3	Reserved							
4	(MSB) Logical Unit Identifier							
5								(LSB)
6	Reserved							
7	Reserved							
8	Reserved							
9	Reserved							
10	Reserved						PorCRm	Reserved
11	Control							

PorCRm - If set to 0 remove the addressed P-LUI. If set to one remove the addressed C-LUI.

4.8 Set P-LUI/C-LUI Identifier Service Action

Table 39 - Set P-LUI/C-LUI Identifier Service Action

Bit Byte	7	6	5	4	3	2	1	0
0	Operation code (xxh)							
1	Reserved			Service Action (xxh)				
2	Reserved							
3	Reserved							
4	(MSB)			Logical Unit Identifier				
5								(LSB)
6	(MSB)			List Length				
7								
8								
9								(LSB)
10	Reserved							PorCID
11	Control							

PorCID - If set to 0 report P-LUI Identifier. If set to one report C-LUI Identifier.

Logical Unit Identifier - If PorCID is set to 0 this field shall contain the address of a P-LUI. If PorCID is set to 1 this filed shall contain the address of a C-LUI.

Table 40 - Set P-LUI/C-LUI Identifier parameter list

Bit Byte	7	6	5	4	3	2	1	0
0				Identifier				
n								

5 Redundancy Group (In) Command

5.1 Redundancy Group (In) Command Service Actions

Table 41 - Service Actions for redundancy group (in) command

Service Name	Service Actions	Type	Subclause
REPORT REDUNDANCY GROUPS	00h	O	5.2
REPORT UNASSIGNED REDUNDANCY GROUP SPACE	01h	O	5.3
RESERVED	09h-17h		
VENDOR SPECIFIC	18h-1Fh		
Key: M = Service Action implementation is mandatory. O = Service Action implementation is optional.			

5.2 Report Redundancy Groups Service Action

Table 42 - Report Redundancy Groups Service Action

Bit Byte	7	6	5	4	3	2	1	0
0	Operation code (xxh)							
1	Reserved			Service Action (xxh)				
2	Reserved							
3	Reserved							
4	(MSB)	Redundancy Group Logical Unit Identifier						
5								(LSB)
6	(MSB)	Allocation Length						
7								
8								
9								(LSB)
10	Reserved							RPTSEL
11	Control							

RPTSEL - If set to 0 report all. If set to one report selected R-LUI.

Table 43 - Report Redundancy Groups parameter list

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB)							
1				R-LUI List Length				
2								
3								(LSB)
	Report Redundancy Group Descriptors(s) (If Any)							
0				Report Redundancy Group Descriptor 0				
n								
	. . .							
0				Report Redundancy Group Descriptor x				
n								

Table 44 - Format of Report Redundancy Group Descriptor

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB)	Report Redundancy Group Descriptor List Length						
1								(LSB)
2	(MSB)	Redundancy Group Logical Unit Identifier						
3								(LSB)
4	Reserved							
5	Redundancy Group Identifier							
6	Reserved				Granularity of Units			
7	Reserved	State of the Redundancy Group						
	Redundancy Group P-Extent Descriptor(s)							
0	Redundancy Group P-Extent Descriptor 0							
23								
	. . .							
0	Redundancy Group P-Extent Descriptor x							
23								

See “Redundancy Type Identifiers” on page 34 for a description of the Redundancy Group Identifier field.

See “Granularity of Units” on page 35 for a description of the Granularity of Units field.

Table 45 - Redundancy Group P-extent Descriptor

Bit Byte	7	6	5	4	3	2	1	0
0	P-extent Descriptor							
11								
12	(MSB)	Start check data interleave P-LBA						
13								
14								
15								(LSB)
16	(MSB)	Number of units of check data						
17								
18								
19								(LSB)
20	(MSB)	Number of units of user data						
21								
22								
23								(LSB)

See “Data format P-extent Descriptor” on page 5 for a description of the P-Extent Descriptor field.

5.3 Report Unassigned Redundancy Group Space Service Action

Table 46 - Report Unassigned Redundancy Group Space Service Action

Bit Byte	7	6	5	4	3	2	1	0
0	Operation code (xxh)							
1	Reserved			Service Action (xxh)				
2	Reserved							
3	Reserved							
4	(MSB)	Redundancy Group Logical Unit Identifier						
5								(LSB)
6	(MSB)	Allocation Length						
7								
8								
9								(LSB)
10	Reserved							RPTSEL
11	Control							

RPTSEL - If set to 0 report the unassigned PS-Extents for all R-LUIs. If set to one report the unassigned PS-Extents for the selected R-LUI.

Table 47 - Report Unassigned Redundancy Group Space parameter list

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB)							
1				R-LUI List Length				
2								
3								(LSB)
	Report Unassigned Redundancy Group Space Descriptors(s) (If Any)							
0				Report Unassigned Redundancy Group Space Descriptor 0				
n								
	. . .							
0				Report Unassigned Redundancy Group Space Descriptor x				
n								

Table 48 - Format of Report Unassigned Redundancy Group Space Descriptor

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB)	Report Unassigned Redundancy Group Space Descriptor List Length						
1								(LSB)
2	(MSB)	Redundancy Group Logical Unit Identifier						
3								(LSB)
4	Reserved							
5	Redundancy Group Identifier							
6	Reserved							
7	Reserved	State of the Redundancy Group						
	PS-Extent Descriptor(s)							
0	PS-Extent Descriptor 0							
11								
	. . .							
0	PS-Extent Descriptor x							
11								

See “Redundancy Type Identifiers” on page 34 for a description of the Redundancy Group Identifier field.

Table 49 - Data format PS-extent Descriptor

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB)							
1				Physical Logical Unit Identifier				(LSB)
2	(MSB)							
3								
4				Start PS-LBA				
5								(LSB)
6	(MSB)							
7								
8				Number of PS-LBAs				
9								(LSB)
10	(MSB)							
11				Number of Bytes per PS-LBA				(LSB)

6 Redundancy Group (Out) Command

6.1 Redundancy Group (Out) Command Service Actions

Table 50 - Service Actions for redundancy group (out) command

Service Name	Service Actions	Type	Subclause
CONTROL GENERATION OF CHECK DATA	00h	O	6.2
CREATE/MODIFY REDUNDANCY GROUP	01h	O	6.3
DELETE REDUNDANCY GROUP	02h	O	6.4
REBUILD P-EXTENT	03h	O	6.5
REBUILD P-LUI	04h	O	6.6
RECALCULATE CHECK DATA	05h	O	6.7
VERIFY CHECK DATA	06h	O	6.8
RESERVED	09h-17h		
VENDOR SPECIFIC	18h-1Fh		
Key: M = Service Action implementation is mandatory. O = Service Action implementation is optional.			

6.2 Control Generation of Check Data Service Action

Table 51 - Control Generation of Check Data Service Action

Bit Byte	7	6	5	4	3	2	1	0
0	Operation code (xxh)							
1	Reserved			Service Action (xxh)				
2	Reserved							
3	Reserved							
4	(MSB) Redundancy Group Logical Unit Identifier							
5								(LSB)
6	Reserved							
7	Reserved							
8	Reserved							
9	Reserved							
10	Reserved					DisChk	AllRLUI	Reserved
11	Control							

Immed - This is the normal immediate bit.

AllRLUI - If set to 0 only control the generation of check data on the selected R-LUI. If set to 1 control the generation of check data on all R-LUIs within the SCSI Disk Array.

DisChk - If set to 0 enable generation of check data on the selected R-LUI(s). If set to 1 disable generation of check data on the selected R-LUI(s).

6.3 Create/Modify Redundancy Group Service Action

Table 52 - Create/Modify Redundancy Group Service Action

Bit Byte	7	6	5	4	3	2	1	0
0	Operation code (xxh)							
1	Reserved			Service Action (xxh)				
2	Redundancy Type Identifier							
3	Reserved				Granularity Of Units			
4	(MSB)	Redundancy Group Logical Unit Identifier						
5								(LSB)
6	(MSB)	List Length						
7								
8								
9								(LSB)
10	Reserved							Immed
11	Control							

Immed - This is the normal immediate bit.

Table 53 - Redundancy Type Identifiers

Codes	Description
00h	No Redundancy
01h	Copy Redundancy
02h	XOR Redundancy
03h	P+Q Redundancy
04h-7Fh	Reserved
80h-FFh	Vendor Specific

Table 54 - Granularity of Units

Codes	Description
0h	Bit
1h	Byte
2h	2-Byte Word
3h	4-Byte Word
4h	Logical Block
5h-Bh	Reserved
Ch-Fh	Vendor Specific

Table 55 - Create/Modify Redundancy Group parameter list

Bit Byte	7	6	5	4	3	2	1	0
	Create/Modify P-extent Descriptors(s) (If Any)							
0 27	Create/Modify P-extent Descriptor 0							
	. . .							
0 27	Create/Modify P-extent Descriptor x							

Table 56 - Data format of Create/Modify P-extent Descriptor

Bit Byte	7	6	5	4	3	2	1	0
0	P-extent Descriptor							
11								
12	SetPat	Reserved		Preserve	Reserved			RecalIm
13	Reserved							
14	Reserved							
15	Protected Space Pattern							
16	(MSB)	Start check data interleave P-LBA						
17								
18								
19								(LSB)
20	(MSB)	Number of units of check data						
21								
22								
23								(LSB)
24	(MSB)	Number of units of user data						
25								
26								
27								(LSB)

See “Data format P-extent Descriptor” on page 5 for a description of the P-Extent Descriptor field.

RecalIm - If set to 0 check data shall be recalculated before the Create/modify Redundancy Group Service Action has completed. If set to 1 check data shall be recalculated after status has been returned for the Create/modify Redundancy Group Service Action.

Preserve - If set to 1 the all information contained within the protected space shall be preserved. If set to 0 the information contained within the protected space shall be vendor specific.

SetPat - If set to 0 the information contained within the protected space shall be vendor specific. If set to 1 the pattern contained within the Protected Space Pattern field shall be place within the protected space.

6.4 Delete Redundancy Group Service Action

Table 57 - Delete Redundancy Group Service Action

Bit / Byte	7	6	5	4	3	2	1	0
0	Operation code (xxh)							
1	Reserved			Service Action (xxh)				
2	Reserved							
3	Reserved							
4	(MSB) Redundancy Group Logical Unit Identifier							
5								(LSB)
6	Reserved							
7	Reserved							
8	Reserved							
9	Reserved							
10	Reserved							
11	Control							

6.5 Rebuild P-extent Service Action

Table 58 - Rebuild P-Extent Service Action

Bit / Byte	7	6	5	4	3	2	1	0
0	Operation code (xxh)							
1	Reserved			Service Action (xxh)				
2	Reserved							
3	Reserved							
4	Reserved							
5	Reserved							
6	(MSB)							
7				List Length				
8								
9								(LSB)
10	Reserved		Rebuild		Reserved			Immed
11	Control							

Immed - This is the normal immediate bit.

Table 59 - Rebuild Types

Codes	Description
00h	All assigned space associated with the selected P-Extent shall be rebuilt. Any Redundancy Group(s) listed in the Rebuild P-Extents parameter list shall be ignored. Note 1 Protected space associated with overlapping Redundancy Groups must be successfully rebuilt multiple times for a successful completion of the Rebuild P-Extent Service Action. The order of the rebuilds is vender specific.
01h	The selected P-Extent shall be rebuilt using any associated Redundancy Group. Any Redundancy Group(s) listed in the Rebuild P-Extents parameter list shall be ignored. Note 2 Any protected space associated with overlapping Redundancy Groups must only be successfully rebuilt one time for the successful completion of the Rebuild P-Extent Service Action. There is no indication of a failure if an overlapped Redundancy Group fails to rebuild.
10h	All assigned space associated with the selected P-Extent shall be rebuilt. Any Redundancy Group(s) listed in the Rebuild P-Extent parameter list shall not by used to rebuild any part of the selected P-Extent. Note 3 Any protected space associated with overlapping Redundancy Groups must be successfully rebuilt at least one time for a successful completion of the Rebuild P-Extent Service Action.
11h	Reserved

Table 60 - Rebuild P-Extent parameter list

Bit Byte	7	6	5	4	3	2	1	0
0	P-extent Descriptor							
11								
	R-LUI(s) (If Any)							
0	Reserved							
1	Reserved							
2	(MSB) Redundancy Group Logical Unit Identifier 0							
3								(LSB)
	. . .							
0	Reserved							
1	Reserved							
2	(MSB) Redundancy Group Logical Unit Identifier x							
3								(LSB)

See “Data format P-extent Descriptor” on page 5 for a description of the P-Extent Descriptor field.

6.6 Rebuild P-LUI Service Action

Table 61 - Rebuild P-LUI Service Action

Bit Byte	7	6	5	4	3	2	1	0
0	Operation code (xxh)							
1	Reserved			Service Action (xxh)				
2	Reserved							
3	Reserved							
4	Reserved							
5	Reserved							
6	(MSB)							
7				List Length				
8								
9								(LSB)
10	Reserved							Immed
11	Control							

Immed - This is the normal immediate bit.

Table 62 - Rebuild Types

Codes	Description
00h	All assigned space associated with the selected P-LUI shall be rebuilt. Any Redundancy Group(s) listed in the Rebuild P-LUIs parameter list shall be ignored. Note 4 Protected space associated with overlapping Redundancy Groups must be successfully rebuilt multiple times for a successful completion of the Rebuild P-LUI Service Action. The order of the rebuilds is vender specific.
01h	The selected P-LUI shall be rebuilt using any associated Redundancy Group. Any Redundancy Group(s) listed in the Rebuild P-LUIs parameter list shall be ignored. Note 5 Any protected space associated with overlapping Redundancy Groups must only be successfully rebuilt one time for the successful completion of the Rebuild P-LUI Service Action. There is no indication of a failure if an overlapped Redundancy Group fails to rebuild.
10h	All assigned space associated with the selected P-LUI shall be rebuilt. Any Redundancy Group(s) listed in the Rebuild P-LUI parameter list shall not by used to rebuild any part of the selected P-LUI. Note 6 Any protected space associated with overlapping Redundancy Groups must be successfully rebuilt at least one time for a successful completion of the Rebuild P-LUI Service Action.
11h	Reserved

Table 63 - Rebuild P-LUI parameter list

Bit Byte	7	6	5	4	3	2	1	0
0	Reserved							
1	Reserved							
2	(MSB) Physical Logical Unit Identifier							
3								(LSB)
	R-LUI(s) (If Any)							
0	Reserved							
1	Reserved							
2	(MSB) Redundancy Group Logical Unit Identifier 0							
3								(LSB)
	. . .							
0	Reserved							
1	Reserved							
2	(MSB) Redundancy Group Logical Unit Identifier x							
3								(LSB)

6.7 Recalculate Check Data Service Action

Table 64 - Recalculate Check Data Service Action

Bit / Byte	7	6	5	4	3	2	1	0
0	Operation code (xxh)							
1	Reserved			Service Action (xxh)				
2	Reserved							
3	Reserved							
4	(MSB) Redundancy Group Logical Unit Identifier							
5								(LSB)
6	Reserved							
7	Reserved							
8	Reserved							
9	Reserved							
10	Reserved						AllRLUI	Immed
11	Control							

Immed - This is the normal immediate bit.

AllRLUI - If set to 0 only recalculate the selected R-LUI range. If set to 1 recalculate all R-LUIs within the SCSI Disk Array.

6.8 Verify Check Data Service Action

Table 65 - Verify Check Data Service Action

Bit Byte	7	6	5	4	3	2	1	0
0	Operation code (xxh)							
1	Reserved			Service Action (xxh)				
2	Reserved							
3	Reserved							
4	(MSB) Redundancy Group Logical Unit Identifier							
5								(LSB)
6	Reserved							
7	Reserved							
8	Reserved							
9	Reserved							
10	Reserved					ContVer	AllRLUI	Immed
11	Control							

Immed - This is the normal immediate bit.

AllRLUI - If set to 0 only verify the selected R-LUI. If set to 1 verify all R-LUIs within the SCSI Disk Array.

ContVer - If set to 0 disable continuous verification of check data on the selected R-LUI. If set to 1 enable continuous verification of check data on the selected R-LUI.

Editors Note 2 - GOP: Need a bit in the Identify command to indicated if the SDA supports continuous verification of check data.

---

7 Volume Set (In) Command

7.1 Volume Set (In) Command Service Actions

Table 66 - Service Actions for volume set (in) command

Service Name	Service Actions	Type	Subclause
REPORT VOLUME SETS RESERVED VENDOR SPECIFIC	00h 01h-17h 18h-1Fh	O	7.2
Key: M = Service Action implementation is mandatory. O = Service Action implementation is optional.			

7.2 Report Volume Sets Service Action

Table 67 - Report Volume Sets Service Action

Bit Byte	7	6	5	4	3	2	1	0
0	Operation code (xxh)							
1	Reserved			Service Action (xxh)				
2	Reserved							
3	Reserved							
4	(MSB)	Volume Set Logical Unit Identifier						
5								(LSB)
6	(MSB)	Allocation Length						
7								
8								
9								(LSB)
10	Reserved							RPTSEL
11	Control							

RPTSEL - If set to 0 report all. If set to one report selected V-LUI.

Table 68 - Report Volume Set parameter list

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB)							
1				V-LUI List Length				
2								
3								(LSB)
	Report Volume Set Descriptors(s) (If Any)							
0				Report Volume Set Descriptor 0				
n								
	. . .							
0				Report Volume Set Descriptor x				
n								

Table 69 - Format of Report Volume Set Descriptor

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB)			Report Volume Set Descriptor List Length				
1								(LSB)
2	(MSB)			Volume Set Logical Unit Identifier				
3								(LSB)
4	Reserved							
5	Reserved							
6	Reserved				Granularity of Units			
7	Reserved	State of the Volume Set						
8	(MSB)			PS-Extent Stripe Length				
9								
10								
11								(LSB)
12	(MSB)			PS-Extent Interleave Depth				
13								
14								
15								(LSB)
	Volume Set PS-Extent Descriptor(s)							
0				Volume Set PS-Extent Descriptor 0				
19								
	. . .							
0				Volume Set PS-Extent Descriptor x				
19								

See “Granularity of Units” on page 35 for a description of the Granularity of Units field.

Table 70 - Volume Set PS-extent Descriptor

Bit Byte	7	6	5	4	3	2	1	0
0	PS-extent Descriptor							
11								
12	Reserved							IncDec
13	Reserved							
14	Reserved							
15	Reserved							
16	(MSB)							
17				User Data Strip Depth				
18								
19								(LSB)

See “Data format PS-extent Descriptor” on page 32 for a description of the PS-Extent Descriptor field.

IncDec - If set to 0 then the PS-LBA Count shall be incremented. If set to 1 then the PS-LBA Count shall be decremented.

8 Volume Set (Out) Command

8.1 Volume Set (Out) Command Service Actions

Table 71 - Service Actions for volume set (out) command

Service Name	Service Actions	Type	Subclause
CONTROL GENERATION OF CHECK DATA	00h	O	8.2
CONTROL WRITE OPERATIONS	01h	O	8.3
CREATE/MODIFY VOLUME SET	02h	O	8.4
DELETE VOLUME SET	03h	O	8.5
RECALCULATE V-LUI CHECK DATA	04h	O	8.6
VERIFIY V-LBA CHECK DATA	05h	O	8.7
RESERVED	06h-17h		
VENDOR SPECIFIC	18h-1Fh		
Key: M = Service Action implementation is mandatory. O = Service Action implementation is optional.			

8.2 Control Generation of Check Data Service Action

Table 72 - Control Generation of Check Data Service Action

Bit Byte	7	6	5	4	3	2	1	0
0	Operation code (xxh)							
1	Reserved			Service Action (xxh)				
2	Reserved							
3	Reserved							
4	(MSB)			Volume Set Logical Unit Identifier				
5								(LSB)
6	Reserved							
7	Reserved							
8	Reserved							
9	Reserved							
10	Reserved				DisChk	Reserved	AllVLUI	Immed
11	Control							

Immed - This is the normal immediate bit.

AllVLUI - If set to 0 only control the generation of check data associated with the selected V-LUI. If set to 1 control the generation of check data associated with all V-LUIs within the SCSI Disk Array.

DisChk - If set to 0 enable generation of check data associated with the selected V-LUI(s). If set to 1 disable generation of check data associated with the selected V-LUI(s).

8.3 Control Write Operations Service Action

Table 73 - Control Write Operations Service Action

Bit Byte	7	6	5	4	3	2	1	0
0	Operation code (xxh)							
1	Reserved			Service Action (xxh)				
2	Reserved							
3	Reserved							
4	(MSB) Volume Set Logical Unit Identifier							
5								(LSB)
6	Reserved							
7	Reserved							
8	Reserved							
9	Reserved							
10	Reserved				DisWr	Reserved	AllVLUI	Immed
11	Control							

Immed - This is the normal immediate bit.

AllVLUI - If set to 0 only control the write operations on the selected V-LUI. If set to 1 control the write operations on all V-LUIs within the SCSI Disk Array.

DisWr - If set to 0 enable write operations to the selected V-LUI(s). If set to 1 disable write operations to the selected V-LUI(s).

8.4 Create/Modify Volume Set Service Action

Table 74 - Create/Modify Volume Set Service Action

Bit Byte	7	6	5	4	3	2	1	0
0	Operation code (xxh)							
1	Reserved			Service Action (xxh)				
2	Reserved							
3	Reserved				Granularity Of Units			
4	(MSB)	Volume Set Logical Unit Identifier						
5								(LSB)
6	(MSB)	List Length						
7								
8								
9								(LSB)
10	Reserved							Immed
11	Control							

Immed - This is the normal immediate bit.

See “Granularity of Units” on page 35 for a description of the Granularity Of Units field.

Table 75 - Create/Modify Volume Set parameter list

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB)							
1				PS-Extent Stripe Length				
2								
3								(LSB)
4	(MSB)							
5				PS-Extent Interleave Depth				
6								
7								(LSB)
	Create/Modify PS-extent Descriptors(s) (If Any)							
0				Create/Modify PS-extent Descriptor 0				
15								
	. . .							
0				Create/Modify PS-extent Descriptor x				
15								

Table 76 - Data format of Create/Modify PS-extent Descriptor

Bit Byte	7	6	5	4	3	2	1	0
0				PS-extent Descriptor				
11								
12	(MSB)							
13				User Data Stripe Depth				
14								
15								(LSB)

See “Data format PS-extent Descriptor” on page 32 for a description of the PS-Extent Descriptor field.

8.5 Delete Volume Set Service Action

Table 77 - Delete Volume Set Service Action

Bit / Byte	7	6	5	4	3	2	1	0
0	Operation code (xxh)							
1	Reserved			Service Action (xxh)				
2	Reserved							
3	Reserved							
4	(MSB) Volume Set Logical Unit Identifier							
5								(LSB)
6	Reserved							
7	Reserved							
8	Reserved							
9	Reserved							
10	Reserved							
11	Control							

8.6 Recalculate V-LUI Check Data Service Action

Table 78 - Recalculate V-LUI Check Data Service Action

Bit / Byte	7	6	5	4	3	2	1	0
0	Operation code (xxh)							
1	Reserved			Service Action (xxh)				
2	Reserved							
3	Reserved							
4	(MSB)	Volume Set Logical Unit Identifier						
5								(LSB)
6	(MSB)	List Length						
7								
8								
9								(LSB)
10	Reserved							Immed
11	Control							

Immed - This is the normal immediate bit.

Editors Note 3 - GOP: I was asked to all a recalculate all bit to this service action, however, it is not possible to recalculate an entire volume set. You must give a range to recalculate.

Table 79 - Recalculate V-LUI Check Data parameter list

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB)							
1				Start V-LBA				
2								
3								(LSB)
4	(MSB)							
5				Number of V-LBAs				
6								
7								(LSB)

8.7 Verify V-LBA Check Data Service Action

Table 80 - Verify V-LBA Check Data Service Action

Bit Byte	7	6	5	4	3	2	1	0
0	Operation code (xxh)							
1	Reserved			Service Action (xxh)				
2	Reserved							
3	Reserved							
4	(MSB)			Volume Set Logical Unit Identifier				
5								(LSB)
6	Reserved							
7	Reserved							
8	Reserved							
9	Reserved							
10	Reserved				Contver	Verify Range		Immed
11	Control							

Immed - This is the normal immediate bit. If the Immed bit is set to 0 the selected verify range shall be successfully verified at least one time before completion is indicated regardless of the ContVer field value.

ContVer - If set to 0 disable continuous verification of check data on the selected V-LUI range. If set to 1 enable continuous verification of check data on the selected V-LUI range.

Editors Note 4 - GOP: Need a bit in the Identify command to indicated if the SDA supports continuous verification of check data.

Table 81 - Verify Range

Codes	Description
00h	Verify all Volume Sets within the selected SCSI Disk Array.
01h	Verify the entire selected Volume Set.
10h	Only verify the selected LBA range within the selected Volume Set.
11h	Reserved

If any part of the selected Volume Set(s) is protected with a redundancy type of No Redundancy the Verify V-LBA Check Data Service Action shall terminate in error.

Table 82 - Verify V-LUI Check Data parameter list

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB)							
1				Start V-LBA				
2								
3								(LSB)
4	(MSB)							
5				Number of V-LBAs				
6								
7								(LSB)

9 Spare (In) Command

9.1 Spare (In) Command Service Actions

Table 83 - Service Actions for spare (In) command

Service Name	Service Actions	Type	Subclause
REPORT P-EXTENT SPARE	00h	O	9.2
REPORT P-LUI/C-LUI SPARE	01h	O	9.3
RESERVED	02h-17h		
VENDOR SPECIFIC	18h-1Fh		
Key: M = Service Action implementation is mandatory. O = Service Action implementation is optional.			

9.2 Report P-extent Spare Service Action

Table 84 - Report P-Extent Spare Service Action

Bit Byte	7	6	5	4	3	2	1	0
0	Operation code (xxh)							
1	Reserved			Service Action (xxh)				
2	Reserved							
3	Reserved							
4	(MSB)			Spare Logical Unit Identifier				
5								(LSB)
6	(MSB)			Allocation Length				
7								
8								
9								(LSB)
10	Reserved							RPTSEL
11	Control							

RPTSEL - If set to 0 report all. If set to one report selected S-LUI.

Table 85 - Report P-Extent Spare parameter list

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB)							
1				S-LUI List Length				
2								
3								(LSB)
	Report P-Extent Spare Descriptors(s) (If Any)							
0				Report P-Extent Spare Descriptor 0				
n								
	. . .							
0				Report P-Extent Spare Descriptor x				
n								

Table 86 - Format of Report P-Extent Spare Descriptor

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB)							
1				Report P-Extent Spare Descriptor List Length				(LSB)
2	(MSB)							
3				Spare Logical Unit Identifier				(LSB)
4								
15				P-extent Descriptor				
16	Reserved							
17	Reserved							
18	Reserved							
19	Reserved	State of the Spare						
	P-Extent Spare Descriptor(s)							
0								
15				P-Extent Spare Descriptor 0				
	. . .							
0								
15				P-Extent Spare Descriptor x				

See “Data format P-extent Descriptor” on page 5 for a description of the P-Extent Descriptor.

\

Table 87 - P-Extent Spare Descriptor

Bit Byte	7	6	5	4	3	2	1	0
0	Associated P-extent Descriptor							
11								
12	Reserved							
13	Reserved							
14	(MSB)	Redundancy Group Logical Unit Identifier						
15								(LSB)

See “Data format P-extent Descriptor” on page 5 for a description of the Associated P-Extent Descriptor.

9.3 Report P-LUI/C-LUI Spare Service Action

Table 88 - Report P-LUI/C-LUI Spare Service Action

Bit Byte	7	6	5	4	3	2	1	0
0	Operation code (xxh)							
1	Reserved			Service Action (xxh)				
2	Reserved							
3	Reserved							
4	(MSB)	Spare Logical Unit Identifier						
5								(LSB)
6	(MSB)	Allocation Length						
7								
8								
9								(LSB)
10	Reserved						PorCCM	RPTSEL
11	Control							

RPTSEL - If set to 0 report all. If set to one report selected S-LUI.

PorCCM - If set to 0 report on the addressed P-LUI. If set to one report on the addressed C-LUI.

Table 89 - Report P-LUI/C-LUI Spare parameter list

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB)							
1				S-LUI List Length				
2								
3								(LSB)
	Report P-LUI/C-LUI Spare Descriptors(s) (If Any)							
0				Report P-LUI/C-LUI Descriptor 0				
n								
	. . .							
0				Report P-LUI/C-LUI Descriptor x				
n								

Table 90 - Format of Report P-LUI/C-LUI Spare Descriptor

Bit Byte	7	6	5	4	3	2	1	0
0	(MSB)	Report P-LUI/C-LUI Spare Descriptor List Length						
1								(LSB)
2	(MSB)	Spare Logical Unit Identifier						
3								(LSB)
4	(MSB)	Component or Physical Logical Unit Identifier						
5								(LSB)
6	Reserved							
7	Reserved	State of the Spare						
	Associated LUI Descriptor(s)							
0	Associated LUI Descriptor 0							
3								
	. . .							
0	Associated LUI Descriptor x							
3								

See “Data format of Associated LUI Descriptor” on page 67 for information of the Associated LUI Description.

10 Spare (Out) Command

10.1 Spare (Out) Command Service Actions

Table 91 - Service Actions for spare (out) command

Service Name	Service Actions	Type	Subclause
CREATE/MODIFY P-EXTENT SPARE	00h	O	10.2
CREATE/MODIFY P-LUI/C-LUI SPARE	01h	O	10.3
DELETE SPARE	02h	O	10.4
RESERVED	03h-17h		
VENDOR SPECIFIC	18h-1Fh		
Key: M = Service Action implementation is mandatory. O = Service Action implementation is optional.			

10.2 Create/Modify P-extent Spare Service Action

Table 92 - Create/Modify P-Extent Spare Service Action

Bit Byte	7	6	5	4	3	2	1	0
0	Operation code (xxh)							
1	Reserved			Service Action (xxh)				
2	Reserved							
3	Reserved							
4	(MSB)			Spare Logical Unit Identifier				
5								(LSB)
6	(MSB)			List Length				
7								
8								
9								(LSB)
10	Reserved							Immed
11	Control							

Immed - This is the normal immediate bit.

Table 93 - Create/Modify P-Extent Spare parameter list

Bit Byte	7	6	5	4	3	2	1	0
0	Spare P-extent Descriptor							
11								
	Covered P-Extent Descriptors(s) (If Any)							
0	Covered P-Extent Descriptor 0							
15								
	. . .							
0	Covered P-Extent Descriptor x							
15								

Table 94 - Data format of Covered P-Extent Descriptor

Bit Byte	7	6	5	4	3	2	1	0
0	Associated P-extent Descriptor							
11								
12	Reserved							
13	Reserved							
14	(MSB) Redundancy Group Logical Unit Identifier							
15								(LSB)

See “Data format P-extent Descriptor” on page 5 for a description of the Associated P-Extent Descriptor.

10.3 Create/Modify P-LUI/C-LUI Spare Service Action

Table 95 - Create/Modify P-LUI/C-LUI Spare Service Action

Bit Byte	7	6	5	4	3	2	1	0
0	Operation code (xxh)							
1	Reserved			Service Action (xxh)				
2	(MSB) Component or Physical Logical Unit Identifier							
3								(LSB)
4	(MSB) Spare Logical Unit Identifier							
5								(LSB)
6	(MSB) List Length							
7								
8								
9								(LSB)
10	Reserved						PorCCM	Immed
11	Control							

Immed - This is the normal immediate bit.

PorCCM - If set to 0 create/modify the addressed P-LUI. If set to one create/modify the addressed C-LUI.

Table 96 - Create/Modify P-LUI/C-LUI Spare parameter list

Bit Byte	7	6	5	4	3	2	1	0
	Associated LUI(s) (If Any)							
0	Associated LUI Descriptor 0							
3								
	. . .							
0	Associated LUI Descriptor x							
3								

Table 97 - Data format of Associated LUI Descriptor

Bit Byte	7	6	5	4	3	2	1	0
0	Reserved							
1	Reserved				LUI Type			
2	(MSB) Logical Unit Identifier							
3								(LSB)

The LUI Type field shall define the type of logical unit to attach to the selected C-LUI.

Table 98 - LUI types

Codes	Descriptions
0h	Physical Logical Unit Identifier
1h	Reserved
2h-3h	Reserved
4h	Component Logical Unit Identifier
5h	Redundancy Group Logical Unit Identifier
6h	Reserved
7h-Bh	Reserved
Ch-Fh	Vendor Specific

10.4 Delete Spare Service Action

Table 99 - Delete Spare Service Action

Bit Byte	7	6	5	4	3	2	1	0
0	Operation code (xxh)							
1	Reserved			Service Action (xxh)				
2	Reserved							
3	Reserved							
4	(MSB)							
5	Spare Logical Unit Identifier							(LSB)
6	Reserved							
7	Reserved							
8	Reserved							
9	Reserved							
10	Reserved							
11	Control							

11 Mode parameters

Table 100 - Device specific parameter

Bit	7	6	5	4	3	2	1	0
	Reserved							

Table 101 - Mode page codes

Page Code	Description	Subclause
	SCSI Disk Array control page	

11.1 SCSI Disk Array control page

Table 102 - SCSI Disk Array Control page

Bit Byte	7	6	5	4	3	2	1	0
0	PS	Reserved	Page Code (xxh)					
1	Page length (0Ah)							
2	Reserved							LogErr
3	Reserved				Method of Reporting Informational Exceptions			
4	Reserved							
5	Reserved							
6	Reserved							
7	Reserved							
8	Reserved							
9	Reserved							
10	Reserved							
11	Reserved							

LogErr - If set to 0 the logging to of exception conditions is vendor specific. If set to 1 the SCSI Disk Array shall log exception conditions.

Table 103 - Format of Method of Reporting Informational Exceptions

Code	Description
0h	No indications of exception condition
1h	Asynchronous Event Reporting
2h	Generate Unit Attention
3h	Periodic Check Condition
4h-Bh	Reserved
Ch-Fh	Vendor Specific