Date: Jan. 5, 1999
To: T10 Committee
From: Gerry Houlder, Seagate Technology
Subj: Large LBA address using variable length CDB structure

This is a counter proposal to document T10/99-259 [Beyond 2 TBytes, by George Penokie]. The need for larger address is proven but the 99-259 proposal has some disadvantages:

(1) It consumes all of the available 16 byte CDB op codes. This could force use of the variable length CDB format for new functions that might otherwise be able to use a smaller CDB.
(2) Some commands (e.g., READ LONG and WRITE LONG) are not proposed for large LBA structure because of lack of available op codes.
(3) Some commands (e.g., some XOR commands) are not proposed because they will not fit within the 16 byte CDB structure.

I propose creating a 32 byte CDB structure using the variable length CDB mechanism specified in Clause 4.3 of SPC-2. This structure is large enough to accommodate the longest of the XOR commands. I also propose using the same structure for the standard READ, WRITE, etc. commands. Using the same structure for all 8 byte LBA commands should make automating command decoding easier for all of the commands. The basic structure needed for the commands is shown in table 1.

I am also including specific tables for XOR commands. I have not assigned service action codes – this is left to the appropriate editor. The standard commands listed in document 99-259r2 can fit into the structure shown in table 1.

Table 1 – Large LBA Address CDB Structure

Bit / Byte	7	6	5	4	3	2	1	0
0	OPERATION CODE (7Fh)							
1	CONTROL							
2	Reserved							
3	Reserved							
4	Reserved							
5	ENCRYPTION IDENTIFICATION							
6	Reserved							
7	ADDITIONAL CDB LENGTH (18h)							
8	(MSB)	SERVICE ACTION (xxxxh)						
9								(LSB)
10				DPO	FUA			
11	Reserved							
12	(MSB)	LOGICAL BLOCK ADDRESS (8 bytes)						
19								(LSB)
20	(MSB)	COMMAND SPECIFIC FIELDS (8 bytes)						
27								(LSB)
28	(MSB)	TRANSFER LENGTH or ALLOCATION LENGTH or PARAMETER LIST LENGTH						
29								
30								
31								(LSB)

Table 2 – REBUILD (Large LBA version)

Bit / Byte	7	6	5	4	3	2	1	0
0	OPERATION CODE (7Fh)							
1	CONTROL							
2	Reserved							
3	Reserved							
4	Reserved							
5	ENCRYPTION IDENTIFICATION							
6	Reserved							
7	ADDITIONAL CDB LENGTH (18h)							
8	(MSB)	SERVICE ACTION (xxxxh)						
9								(LSB)
10	Resvd			DPO	FUA	IDATA	PORT	CTRL
11	Reserved							
12	(MSB)	LOGICAL BLOCK ADDRESS (8 bytes)						
19								(LSB)
20	(MSB)	Reserved (4 bytes)						
23								(LSB)
24	(MSB)	REBUILD LENGTH (4 bytes)						
27								(LSB)
28	(MSB)	PARAMETER LIST LENGTH (4 bytes)						
31								(LSB)

Table 3 – REBUILD and REGENERATE source descriptor format (Large LBA version)

Bit / Byte	7	6	5	4	3	2	1	0
0	(MSB)	SOURCE DEVICE ADDRESS (8 bytes)						
7								(LSB)
8	(MSB)	SOURCE STARTING LOGICAL BLOCK ADDRESS (8 bytes)						
15								(LSB)

Table 4 – REGENERATE (Large LBA version)

Bit / Byte	7	6	5	4	3	2	1	0
0	OPERATION CODE (7Fh)							
1	CONTROL							
2	Reserved							
3	Reserved							
4	Reserved							
5	ENCRYPTION IDENTIFICATION							
6	Reserved							
7	ADDITIONAL CDB LENGTH (18h)							
8	(MSB)	SERVICE ACTION (xxxxh)						
9								(LSB)
10	Resvd			DPO	FUA	IDATA	PORT	CTRL
11	Reserved							
12	(MSB)	LOGICAL BLOCK ADDRESS (8 bytes)						
19								(LSB)
20	(MSB)	Reserved (4 bytes)						
23								(LSB)
24	(MSB)	REGENERATE LENGTH (4 bytes)						
27								(LSB)
28	(MSB)	PARAMETER LIST LENGTH (4 bytes)						
31								(LSB)

Table 5 – XDREAD (Large LBA version)

Bit / Byte	7	6	5	4	3	2	1	0
0	OPERATION CODE (7Fh)							
1	CONTROL							
2	Reserved							
3	Reserved							
4	Reserved							
5	ENCRYPTION IDENTIFICATION							
6	Reserved							
7	ADDITIONAL CDB LENGTH (18h)							
8	(MSB)	SERVICE ACTION (xxxxh)						
9								(LSB)
10	Rsvd			Rsvd	Rsvd	Rsvd		
11	Reserved							
12	(MSB)	LOGICAL BLOCK ADDRESS (8 bytes)						
19								(LSB)
20	(MSB)	Reserved (8 bytes)						
27								(LSB)
28	(MSB)	TRANSFER LENGTH (4 bytes)						
31								(LSB)

Table 6 – XDWRITE (Large LBA version)

Bit / Byte	7	6	5	4	3	2	1	0
0	OPERATION CODE (7Fh)							
1	CONTROL							
2	Reserved							
3	Reserved							
4	Reserved							
5	ENCRYPTION IDENTIFICATION							
6	Reserved							
7	ADDITIONAL CDB LENGTH (18h)							
8	(MSB)	SERVICE ACTION (xxxxh)						
9								(LSB)
10	Rsvd			DPO	FUA	Disable Write	Rsvd	
11	Reserved							
12	(MSB)	LOGICAL BLOCK ADDRESS (8 bytes)						
19								(LSB)
20	(MSB)	Reserved (8 bytes)						
27								(LSB)
28	(MSB)	TRANSFER LENGTH (4 bytes)						
31								(LSB)

Table 7 – XDWRITE EXTENDED (Large LBA version)

Bit / Byte	7	6	5	4	3	2	1	0
0	OPERATION CODE (7Fh)							
1	CONTROL							
2	Reserved							
3	Reserved							
4	Reserved							
5	ENCRYPTION IDENTIFICATION							
6	Reserved							
7	ADDITIONAL CDB LENGTH (18h)							
8	(MSB)	SERVICE ACTION (xxxxh)						
9								(LSB)
10	Table Address	Resvd		DPO	FUA	Disable Write	PORT	CTRL
11	SECONDARY ADDRESS							
12	(MSB)	LOGICAL BLOCK ADDRESS (8 bytes)						
19								(LSB)
20	(MSB)	SECONDARY LOGICAL BLOCK ADDRESS (8 bytes)						
27								(LSB)
28	(MSB)	TRANSFER LENGTH (4 bytes)						
31								(LSB)

Table 8 – XPWRITE (Large LBA version)

Bit / Byte	7	6	5	4	3	2	1	0
0	OPERATION CODE (7Fh)							
1	CONTROL							
2	Reserved							
3	Reserved							
4	Reserved							
5	ENCRYPTION IDENTIFICATION							
6	Reserved							
7	ADDITIONAL CDB LENGTH (18h)							
8	(MSB)	SERVICE ACTION (xxxxh)						
9								(LSB)
10	Rsvd			DPO	FUA	Rsvd		
11	Reserved							
12	(MSB)	LOGICAL BLOCK ADDRESS (8 bytes)						
19								(LSB)
20	(MSB)	Reserved (8 bytes)						
27								(LSB)
28	(MSB)	TRANSFER LENGTH (4 bytes)						
31								(LSB)