To: X3T9.2 Committee (SCSI)

From: Gerry Houlder   Imprimis

Subject: New COPY Segment Descriptors for Wide SCSI-3

Document X3T9.2/89-94 proposes a single connector, 16 bit wide data bus version of SCSI. It also adds rules for allowing up to 32 devices on a 32 bit wide bus. These additional devices cause problems for the COPY command because the segment descriptors only have 3 bit fields for the source and destination device addresses. This is a problem if 32 addresses are allowed; these device address fields need to be 5 bits or some devices cannot be the source or destination of a COPY operation.

This proposal defines new COPY Function Codes that do the same operation as the existing codes but use different segment descriptors. These newly defined descriptors contain 5 bit fields for the source and destination device addresses plus all of the other information needed to perform the operation.

By using new COPY function codes, backward compatibility with the existing function codes is kept. They can still be used when only the first 8 addresses exist in the system. Also, old devices that don't implement the new function codes can tell immediately that an illegal request has been made without looking past the first byte of the COPY parameter list.

There is no change at all to the COPY command bytes or the field definitions in the 4 byte COPY parameter list header.

The rest of this proposal points out the changes that are needed to incorporate this into the SCSI standard. Page numbers and section numbers referred to are taken from Rev. 10 of the SCSI-2 draft standard. Text shown in brackets [] are explanations; text not in brackets should go directly into the SCSI standard.

[The editor shall assign appropriate table numbers for tables
7-new1, 7-new2, 7-new3, and 7-new4.]

[Changes to page 7-10:]

Table 7-7: COPY Function Codes

Peripheral Device Type		COPY Function Code	Segment Descriptor Table	Comments
Source	Destination			
Direct-Access (0,4,5,7)	Sequential-Access (1,2,3,9)	0	7-8	
Sequential-Access (1,3,9)	Direct-Access (0,4,7)	1	7-8	
Direct-Access (0,4,5,7)	Direct-Access (0,4,7)	2	7-9	
Sequential-Access (1,3,9)	Sequential-Access (1,2,3,9)	3	7-10	
Sequential-Access (1)	Sequential-Access (1)	4	7-11	Image Copy
Direct-Access (0,4,5,7)	Sequential-Access (1,2,3,9)	5	7-new1	32 address
Sequential-Access (1,3,9)	Direct-Access (0,4,7)	6	7-new1	32 address
Direct-Access (0,4,5,7)	Direct-Access (0,4,7)	7	7-new2	32 address
Sequential-Access (1,3,9)	Sequential-Access (1,2,3,9)	8	7-new3	32 address
Sequential-Access (1)	Sequential-Access (1)	9	7-new4	Image Copy; 32 address

The numbers in parenthesis are the peripheral device type codes
(see Table 7-17).

COPY function code:

00h		Direct-access to sequential-access
01h		Sequential-access to writable direct-access
02h		Direct-access to writable direct-access
03h		Sequential-access to sequential-access
04h		Sequential-access image copy
05h		Direct-access to sequential-access
06h		Sequential-access to writable direct-access
07h		Direct-access to writable direct-access
08h		Sequential-access to sequential-access
09h		Sequential-access image copy
0Ah - 0Fh		Reserved
10h - 1Fh		Vendor specific

For the COMPARE command the destination direct-access device does
not have to be a writable device.

[There are no changes to 7.2.3.1 and 7.2.3.2.]

[Changes to 7.2.3.3, starting at page 7-11.]

7.2.3.3. COPY Function Codes 00h, 01h, 05h, and 06h
   The format of the segment descriptors for COPY transfers
between direct-access and sequential-access devices is specified
in Table 7-8 for COPY function codes 00h and 01h; it is
specified in Table 7-new1 for COPY function codes 05h and 06h.
The segment descriptor may be repeated up to 256 times within the
parameter list length specified in the command descriptor block.

Table 7-8: Segment Descriptor for COPY Function Codes 00h and 01h

   [Table 7-8 is unchanged, so it is not shown here]

Table 7-new1: Segment Descriptor for Function Codes 05h and 06h

Bit Byte	7	6	5	4	3	2	1	0
0	CAT	Reserved			Source Address			
1	Reserved					Source LUN		
2	Reserved			Destination Address				
3	Reserved					Destination LUN		
4	Reserved							
5	Reserved							
6	(MSB)							
7	Sequential-Access Device Block Length							(LSB)
8	(MSB)							
11	Direct-Access Device Number of Blocks							(LSB)
12	(MSB)							
15	Direct-Access Device Logical Block Address							(LSB)

[No other changes required for 7.2.3.3.]

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[Changes to 7.2.3.4, starting at page 7-13.]

7.2.3.4. COPY Function Codes 02h and 07h
  The format of the segment descriptors for COPY transfers among
direct-access devices is specified in Table 7-9 for COPY function
code 02h and is specified in Table 7-new2 for COPY function code
07h. The segment descriptor may be repeated up to 256 times
within the parameter list length specified in the command
descriptor block.

Table 7-9: Segment Descriptor for COPY Function Code 02h

    [Table 7-9 is unchanged, so it is not shown here]

Table 7-new2: Segment Descriptor for Function Code 07h

Bit Byte	7	6	5	4	3	2	1	0
0	CAT	Reserved			Source Address			
1	Reserved					Source LUN		
2	DC	Reserved			Destination Address			
3	Reserved					Destination LUN		
4 ... 7	(MSB) Number of Blocks (LSB)							
8 ... 11	(MSB) Source Logical Block Address (LSB)							
12 ... 15	(MSB) Destination Logical Block Address (LSB)							

[No other changes required for 7.2.3.4.]

[Changes to 7.2.3.5, starting at page 7-14.]

7.2.3.4. COPY Function Codes 03h and 08h
    The format of the segment descriptors for COPY transfers among
sequential-access devices is specified in Table 7-10 for COPY
function code 03h and is specified in Table 7-new3 for COPY
function code 08h.   The segment descriptor may be repeated up to
256 times within the parameter list length specified in the
command descriptor block.

Table 7-10: Segment Descriptor for COPY Function Code 03h

    [Table 7-10 is unchanged, so it is not shown here]

Table 7-new3: Segment Descriptor for Function Code 08h

Bit Byte	7	6	5	4	3	2	1	0
0	CAT	Reserved			Source Address			
1	Reserved					Source LUN		
2	DC	Reserved		Destination Address				
3	Reserved					Destination LUN		
4	(MSB)							
5			Source Block Length					(LSB)
6	(MSB)							
7			Destination Block Length					(LSB)
8	(MSB)							
11			Number of Blocks					(LSB)

[No other changes required for 7.2.3.5.]

[Changes to 7.2.3.6, starting at page 7-15.]

7.2.3.4. COPY Function Codes 04h and 09h

The format of the segment descriptors for image COPY transfers among sequential-access devices is specified in Table 7-11 for COPY function code 04h and is specified in Table 7-new4 for COPY function code 09h. The segment descriptor may be repeated up to 256 times within the parameter list length specified in the command descriptor block.

Table 7-11: Segment Descriptor for COPY Function Code 04h

[Table 7-11 is unchanged, so it is not shown here]

Table 7-new4: Segment Descriptor for Function Code 09h

Bit Byte	7	6	5	4	3	2	1	0
0	Reserved			Source Address				
1	Reserved					Source LUN		
2	Reserved			Destination Address				
3	Reserved					Destination LUN		
4	(MSB)	Count						
5								(LSB)
6 7	Reserved							
8 11	Vendor Specific							

[No other changes required for 7.2.3.6.]

[End of changes needed.]