



Date: March 17, 1994
To: X3T10
From: Jim McGrath (408-894-4504)
Read: SCSI-3 Inquiry command

Background

The multiple documents of SCSI-3 and the creation of even more implementation options threatens to make it impossible to implement true plug and play of SCSI devices. Second sourcing of SCSI devices is difficult unless some reliable mechanism can allow hosts to determine the level of SCSI compliance and the feature set supported. The current SCSI standard revision level and the various bits indicating support of specific features is inadequate.

I suggest we develop a new mechanism based on the power of the paging capability of the INQUIRY command introduced in SCSI-2. At its simplest we can create a "compliance/features profile" page to indicate which standard documents (e.g. SPI, SSP, SIP, Block commands) the device implements. At a more extreme, we could allow the device to report of the level of implementation within each document. For example, which type of SCSI connector is implemented, which optional commands are supported, which options within the commands are supported.

Proposal

Specifically, I propose the following:

All standards claiming compliance with SAM shall decompose their feature set into a set of items. Each item shall be identified as either being mandatory or optional. Groups of optional items may be identified as option sets, where implementation of the set requires implementation of all the options within the set.

A device is in compliance with a standard if it implements all mandatory items. The purpose of the INQUIRY command is to identify which standard(s) the device claims compliance to, and to identify which additional optional items identified by a standard which are implemented by the device.

Towards this end I would suggest we assign one INQUIRY page code for claiming compliance to any of the standards which in turn claim SAM compliance. Each of these standards shall specify which byte position in the page corresponds to their standard, and it is the responsibility of X3T10 to coordinate these assignments. I suggest the following initial assignments:

Page 83h Standard Compliance

Byte	
4	SCSI-3 Primary Commands (X3T9.2-995D) (SPC)
5	SCSI-3 Block Commands (X3T9.2-996D) (SBC)
6	SCSI-3 Stream Commands (X3T9.2-997D) (SSC)
7	SCSI-3 Graphics Commands (X3T9.2-998D) (SGC)
8	SCSI-3 Medium Changer Commands (X3T9.2-999D) (SMC)
9	SCSI-3 Common Access Method (X3.332-199x) (CAM)
10	SCSI-3 Interlocked Protocol (X3T9.2-856D) (SIP)
11	SCSI-3 Serial Bus Protocol (X3T9.2-992D) (SBP)
12	Fibre Channel Protocol (X3T9.2-993D) (FCP)
13	SCSI-3 Serial Storage Protocol (X3T9.2-XXXX) (SSP)
14	SCSI-3 Parallel Interface (X3T9.2-885D) (SPI)
15	Fibre Channel - PH (X3T9.3-XXX)
16	High Performance Serial Bus (IEEE 1394)
17	Serial Storage Architecture - PH (X3T10.1-XXX) (SSA)

For each byte, the bits are implemented as follows:

7	6	5	4	3	2	1	0
RESERVED		Current	Saved	Changable	Default	Capable	

Notice that the bit values are changed by other commands (e.g. CHANGE DEFINITION), and are just reported in INQUIRY. Current, Saved, Changable, and Default are interpreted as usual; Capable is used to indicate the device is

capable of this option. Note that this is required since some options are mutually exclusive (e.g. Soft vs Hard reset).

Further, pages be assigned as follows:

Page	
84h	SCSI-3 Primary Commands (X3T9.2-995D) (SPC)
85h	SCSI-3 Block Commands (X3T9.2-996D) (SBC)
86h	SCSI-3 Stream Commands (X3T9.2-997D) (SSC)
87h	SCSI-3 Graphics Commands (X3T9.2-998D) (SGC)
88h	SCSI-3 Medium Changer Commands (X3T9.2-999D) (SMC)
89h	SCSI-3 Common Access Method (X3.332-199x) (CAM)
8Ah	SCSI-3 Interlocked Protocol (X3T9.2-856D) (SIP)
8Bh	SCSI-3 Serial Bus Protocol (X3T9.2-992D) (SBP)
8Ch	Fibre Channel Protocol (X3T9.2-993D) (FCP)
8Dh	SCSI-3 Serial Storage Protocol (X3T9.2-XXXX) (SSP)
8Eh	SCSI-3 Parallel Interface (X3T9.2-885D) (SPI)
8Fh	Fibre Channel - PH (X3T9.3-XXX)
90h	High Performance Serial Bus (IEEE 1394)
91h	Serial Storage Architecture - PH (X3T10.1-XXX) (SSA)

The byte assignments within these pages are defined within each of the standard documents, and the bits interpreted as:

7	6	5	4	3	2	1	0
RESERVED			Current	Saved	Changable	Default	Capable

To allow the (optional) selection between options, I propose modifying the CHANGE DEFINITION command as follows:

Table 32 - CHANGE DEFINITION command

Bit	7	6	5	4	3	2	1	0
0	Operation code (40h)							
1	Logical unit number			Reserved				
2	Reserved					EVPD	Save	
3	Reserved	Definition parameter						
4	Page Code							
5	Reserved							
6	Reserved							
7	Reserved							
8	Parameter data length							
9	Control							

What has been added is an EVPD bit similar to INQUIRY to activate a paging mechanism. The page is specified in the Page Code field. The recommended procedure for changing options is to RESERVE the unit, perform an INQUIRY of the appropriate page, change the SAVED and/or CURRENT bits as appropriate, and send back the page using the CHANGE DEFINITION command. Note that we may have to defer activation of the changes until all suitable pages have been changed (perhaps when the unit is RELEASED).

I believe it is essential for all standards to implement the INQUIRY changes, and that these changes be made mandatory for device level implementations. This will allow a comprehensive reporting capability throughout the SCSI interconnects. For the time being I see the CHANGE DEFINITION command as being mandatory at the SAM level (all protocols must support this function) but not being mandatory for implementations of specific standards.