SYMBIOS
LOGIC

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To: T10 Membership

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Subject: Discovering If This Is SES Port A or Port B

FC-AL drives are being implemented with the ability to have redundant loops. To utilize this redundancy systems are configured with redundant host adapters or adapters with dual ports. Let's label the redundant loops from the host's point of view as loop X and loop Y.

Using the Device element entry in the SES Enclosure Control page, an application client may independently manage the bypass circuits found on dual port disk drives by setting the ENABLE BYP A (enable bypass on port A) and/or the ENABLE BYP B bits. The physical connection from the drive's port A (or B) to the host's loop X (or Y) is an FC cable, often installed by the user. So, the association between A and B and X and Y is unpredictable and must be detected automatically by the application client. If the association is not detected correctly, use of the SES Enclosure Control page ENABLE BYP X bits could easily render device access impossible.

An application client might detect a configuration by trial and error. It could enable the bypass on port A and scan loops X and Y to discover where the path to the device disappeared. This is unacceptable due to its disruptive nature, especially in multiple-host environments.

For years, SCSI provided an acceptable means for the application client to learn the identity of the port being used for communications, but that capability was expunged from SCSI recently based on the idea that a standard covering only two-port devices must be insufficient. The problem was further complicated by lack of an agreed mechanism for identifying obsolete definitions, which resulted in the port identifying mechanism being labeled vendor-specific when it should have been labeled obsolete.

The goal of this proposal is the reinstatement of the long-standing mechanism for identifying the port being used for communications. The history of the capability will be reviewed, showing that the capability was on record much longer than it has been absent. Then, a specific proposal for reinstating the capability will be presented. Lastly, future possibilities for devices with more than two ports will be discussed in light of the specific proposal made here.

History

In December, 1990, Gerry Houlder presented X3T9.2/90-136r2 (Extensions for dual port SCSI) to the plenary and received approval for inclusion of a revised proposal (r3) in the applicable SCSI-3 documents (see minutes in X3T9.2/90-193). The revised proposal was reviewed at the January, 1991 working group meeting without modification (see minutes in X3T9.2/91-004) and 90-136r3 had its final document distribution at the February, 1991 plenary (see minutes in X3T9.2/91-026).

The approved proposal (r3) included the following new bit definitions in byte 6 of the Standard Inquiry data.

Bit Byte	7	6	5	4	3	2	1	0
6	Reserved		Port	DualP	Reserved			

The meanings of the two bits were as follows:

The Port bit is only defined when the DualP bit is set to one. In this case a Port bit of zero indicates that the current nexus connects to port A and a Port bit of one indicates that the current nexus connects to port B. When the DualP bit is zero, the Port bit must also be zero.

A Dual Port (DualP) bit of one indicates that this is a dual port device and conforms to the dual port requirements in this standard. A value of zero indicates that this device has a single port and doesn't implement the dual port requirements.

In July, 1994, Gerry's proposal was incorporated in SPC revision 1. The bit definitions were modified to remove the SCSI-2 nomenclature, and became:

The Port bit is only defined when the DualP bit is set to one. A Port bit of zero shall indicate that the device server received the INQUIRY command on port A. A Port bit of one shall indicate that the device server received the INQUIRY command on port B. When the DualP bit is zero, the Port bit also shall be zero.

A Dual Port (DualP) bit of one shall indicate that this is a dual port device and conforms to the SCSI-3 dual port requirements found in the various applicable standards. A value of zero indicates that this device has a single port and does not implement the dual port requirements.

The bits and their definitions remained unchanged in SPC until revision 8a (December, 1995). At that time, only the DualP bit definition was changed, to:

A Dual Port (DualP) bit of one shall indicate that this is a multi-port (2 or more ports) device and conforms to the SCSI-3 multi-port device requirements found in the various applicable standards. A value of zero indicates that this device has a single port and does not implement the multi-port requirements.

In January, 1996, the working group changed the DualP (Dual Port) bit to the MultiP (Multi-Port) bit but left the definition unchanged (from revision 8a). The working group also changed the Port bit to Vendor-Specific. These changes and others produced SPC revision 9, which was the subject of a X3T10 letter ballot. Four revisions later, SPC revision 11a was approved as an ANSI National Standard.

There was no concept of "obsolete" is SPC in revision 9. The word "obsolete" appears only once in the entire document, in a description of the DEC vendor id (part of an informational annex) as follows: "Digital Equipment (Obsolete: New products use 'Digital')." The working group had no mechanism for making the Port bit obsolete, and it could not make the bit reserved, so it took the only available alternative, making the Port bit Vendor-Specific, to allow the long-standing usage of the bit to continue.

In summary, from December, 1990 to January, 1996 the committee approved definitions for bits 4 and 5 in byte 6 of the Standard Inquiry data were as follows:

Bit Byte	7	6	5	4	3	2	1	0
6	not interesting		Port	MultiP	not interesting			

Taking some liberties with the actual wording, the meanings of the two bits can be characterized as follows:

Port/MultiP	Meaning
00b	Multiple SCSI ports not implemented.
01b	Multiple SCSI ports implemented and this is port 0 (or A).
11b	Multiple SCSI ports implemented and this is port 1 (or B).
10b	Illegal combination of bits.

From January 1996 to the present (less than half the time the previous definitions were approved), the bits 4 and 5 in byte 6 of the Standard Inquiry data have been defined as follows:

Bit Byte	7	6	5	4	3	2	1	0
6	not interesting		VS	MultiP	not interesting			

VS means Vendor-Specific, MultiP=0 means 'multiple SCSI ports not implemented', and MultiP=1 means 'multiple SCSI ports implemented'.

The Proposal

It is proposed that SPC-2 reclaim the "obsolete" Port bit by extending the MultiP field to encompass both bits 4 and 5 as follows:

Bit Byte	7	6	5	4	3	2	1	0
6	not interesting		MultiP		not interesting			

It is further proposed that the following table of definitions be provided for the MultiP field:

MultiP	Description
00b	This device has only one port or does not conform to the SCSI multiple-port device requirements found in this standard, SAM-2, and the applicable SCSI protocol standard.
01b	This device has two or more ports conforming to the SCSI multiple-port device requirements found in this standard, SAM-2, and the applicable SCSI protocol standard(s). The device server received the INQUIRY command on port 0 (or A).
11b	This device has two or more ports conforming to the SCSI multiple-port device requirements found in this standard, SAM-2, and the applicable SCSI protocol standard(s). The device server received the INQUIRY command on a port other than port 0 (or A).
10b	Reserved

Discussion of the Proposal

First, it must be noted that this proposal effects no changes for dual port devices, even though the wording looks different from that found in X3T9.2/90-136r3. If a device has only two ports, then the port that is not port A must be port B, and the long-standing description is still valid.

However, the wording changes are more than gratuitous. They address the issues that caused the Port bit to be made obsolete (vendor specific). The 01b code allows identification of the 0 port, potentially an interesting condition even for devices with more than two ports.

When there are more than two ports, the 11b code identifies the case when the application client must look beyond the currently defined Standard Inquiry data to determine which port received the INQUIRY command. Many mechanisms might be used to standardize the port identification process. A field might be added to the Standard Inquiry data. However, there is no sufficiently large collection of contiguous bits before byte 56, which puts usage of the Standard Inquiry data in previously uncharted territory. A VPD (Vital Product Data) page might be added or a current VPD page extended. A Log or Mode page might be added or extended. Lacking knowledge of specific requirements for identifying multiple ports beyond two, it is prudent to postpone proposing how to accomplish the task to a time when more solid needs exist. It must also be noted that, in the 2.5 years since the Port bit was made obsolete, no proposal has been made to provide for identifying more than two ports.

Finally, the 10b code is available for future standardization for identifying multiple ports, should some capability not envisioned here be needed.