To:         Membership of X3T10  
From:       Ralph O. Weber - Digital Equipment Corporation  
Date:       September 15, 1994  
Subject:    Proposed INQUIRY command enhancements (a.k.a TEST SUPPORT)  

This document proposes a mechanism by which an application client can  
determine what SCSI commands are supported by a device server and what  
capabilities within those commands can be used. Access to the data is  
patterned after the vital product data pages in the INQUIRY command.  
The proposal takes the form of additions to the INQUIRY command.  

If approved, these additions would appear in the SCSI-3 Primary  
Commands standard. Per direction from the X3T10 general working  
group, support for these additions to the INQUIRY command shall be  
optional.  

This proposal is a response to the decision to eliminate the require-  
ment that device servers test all reserved fields for zeros. Said  
requirement is present in the SCSI-1 and SCSI-2 standards, but has  
been dropped from the SCSI-3 standard, via a X3T10 approved change  
to the SCSI-3 Architecture Model.  

This proposal has the following advantages:  
+  No need to validate received reserved fields on main-line device  
   server code paths,  
+  No mode page bits to manage device server checking/non-checking  
   of reserved fields, and  
+  No complex version-to-feature conversion tables (which eliminates  
   a significant source of errors in both the application client and  
   the device server)  

Generally speaking, this proposal is modelled on the changeable  
parameters mode pages.  

The following text is proposed for inclusion in the SPC. Where clause  
and table numbers are used, they are taken from SPC revision 2 (dis-  
tributed in the August X3T10 mailing). The author believes that the  
clause and table numbers will not change in SPC revision 3. However,  
SPC revision 3 has not been constructed yet and the correctness of the  
clause and table numbers used here cannot be guaranteed.  

Modify clause 7.5 to read (changes are marked with change bars):  

7.5 INQUIRY command  

The INQUIRY command (see table 18) requests that information regarding  
parameters of the target and its attached peripheral device(s) be sent  
to the application client. Options allow the application client to  
request additional information about the target or logical unit (see  
7.5.3) and information about SCSI commands supported by the device  
server (see 7.5.4).  

Table 18 - INQUIRY command  

+-----------------+-----------------+-----------------+-----------------+-----------------+-----------------+-----------------+-----------------+ 
| Bit | 7   | 6   | 5   | 4   | 3   | 2   | 1   | 0   | 
+-----------------+-----------------+-----------------+-----------------+-----------------+-----------------+-----------------+ 

1
An enable vital product data (EVPD) bit of one specifies that the device server shall return the optional vital product data specified by the page code field. If the target does not support vital product data and this bit is set to one, the device server shall return CHECK CONDITION status with the sense key set to ILLEGAL REQUEST and an additional sense code of INVALID FIELD IN CDB.

A command support data (CmdDt) bit of one specifies that the device server shall return the optional command support data specified by the operation code field. If the device server does not support returning command data and this bit is set to one, the device server shall return CHECK CONDITION status with the sense key set to ILLEGAL REQUEST and an additional sense code of INVALID FIELD IN CDB. Details of the command support data can be found in clause 7.5.4.

If both the EVPD and CmdDt bits are zero, the device server shall return the standard INQUIRY data (see clause 7.5.1). If the page or operation code field is not zero when both EVPD and CmdDt are zero, the device server shall return CHECK CONDITION status with the sense key set to ILLEGAL REQUEST and an additional sense code of INVALID FIELD IN CDB. If both the EVPD and CmdDt bits are one, the device server shall return CHECK CONDITION status with the sense key set to ILLEGAL REQUEST and an additional sense code of INVALID FIELD IN CDB.

When the EVPD bit is one, the page or operation code field specifies which page of vital product data information the device server shall
return (see 8.4). When the CmdDt bit is one, the page or operation code field specifies the SCSI operation code for which device server shall return command support data (see 7.5.4).

The remainder of clause 7.5 needs no changes.

Add the following as clause 7.5.4.

7.5.4 Command support data

Implementation of command support data is optional. The application client requests the command support data information by setting the CmdDt bit to one and specifying the SCSI operation code of the desired CDB.

If the device server implements the requested SCSI operation code, it shall return the data shown in table t1. If the device server does not implement the requested SCSI operation code it shall return 4 zero bytes.

The device server may store its command support data on the media. If command support data is unavailable due to media access considerations, the device server shall return 1 byte containing 03h (both VSop and StdOp set).

Table t1 - command support data format

<p>| Bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|-----+-----------------------------------------------------+--------|
| Byte | | | | | | | | |
| 0   |                           Reserved                  |  VSop  | StdOp |
|-----|-----------------------------------------------------------------------|
| 1   |   ISO version   |         Reserved         |  ANSI-approved version |
|-----|-----------------------------------------------------------------------|</p>
<table>
<thead>
<tr>
<th>2</th>
<th>Reserved</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>CDB size (m - 3)</td>
</tr>
<tr>
<td>-----</td>
<td>-----------------------------------------------------------------------</td>
</tr>
<tr>
<td>4</td>
<td>CDB usage bit mask</td>
</tr>
<tr>
<td>-----</td>
<td>-----------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
If the operation code being tested is supported as defined in a SCSI standard, the StdOp bit shall be one, the VSop bit shall be zero, and the ISO and ANSI-approved version fields shall contain standard INQUIRY data naming the standard that defines the SCSI command. (Information about standard INQUIRY data can be found in clause 7.5.1.) If the operation code being tested is supported in a vendor-specific way, the StdOp bit shall be zero, the VSop bit shall be one, and the contents of the ISO and ANSI-approved version fields shall be vendor-specific. If the operation code being tested is not supported, both the StdOp and VSop bits shall be zero.

The CDB size field shall contain the number of bytes in the CDB for the operation code being tested, and the size of the CDB bit mask field in the return data.

The CDB usage bit mask field shall contain a usage map for all the bits in the CDB for the operation code being tested. The bits in the usage map shall have a one-for-one correspondence to an actual CDB for the operation code being tested. If the device server evaluates a bit as all or part of a field in the CDB for the operation code being tested, the usage map shall contain a one in the corresponding bit position. If the device server ignores a bit in the CDB for the operation code being tested, the usage map shall contain a zero in the corresponding bit position.

Thus, the CDB usage bit map for the INQUIRY command for a device server that implements command support data but not vital product data would be: FFh, 02h, FFh, 00h, FFh, 07h. This example assumes that the SAM defines uses for only the low-order three bits of the Control byte.

--------------- Headers ------------------------