

To: T10 Technical Committee  
From: Bob Sheffield(robert.l.sheffield@intel.com)  
Date: 23 November 2005  
Subject: 06-005r0: SAT - Make ATA Status Return Descriptor optional

**Revision history**

Revision 0 (23 November 2005) First revision

**Related documents**

sat-r07 - SCSI / ATA Translation revision 07

**Overview**

In the ATA PASSTHROUGH command, a `PROTOCOL` set to 15 instructs the SATL to return an ATA Status Return Descriptor containing the last ATA response from the ATA device used to emulate the specified SCSI LUN. In a SAS domain, a SATL in an HBA using STP protocol to access SATA devices must provide the emulation for several devices. This can result in a requirement for the SATL to store an ATA Status Return Descriptor for the most recent response FIS for up to as many SATA drives as it can access in the domain. This can amount a significant memory burden on the SATL in a domain with a large number of SATA disks attached.

A desired solution (not being proposed in this document, but perhaps for SAT-2) is to add a capability for a SAS STP/SATA bridge in a SAS expander device to always store the last response FIS in the STP/SATA bridge, and provide an SMP command to fetch the last response. Under these conditions, a SATL could honor an ATA PASSTHROUGH command specifying a value of 15 in the protocol field by using an SMP command to fetch the requested Response Information, and avoid the need to maintain this information locally for every SATA device in the domain. This solution also has the advantage of allowing the Response Information to be accessed by a SATL associated with any STP initiator in the domain, whether it is the one that received the last ATA response or not.

But, the change suggested in *this* proposal (for SAT) is to define a `PROTOCOL` value of 15 to be optionally supported rather than being mandatory. This relieves the SATL from the burden of storing the last ATA response received from each ATA device in the domain if it so chooses.

**Suggested changes****12.2.2 ATA PASS-THROUGH (12) command**

Table 1 shows the CDB for the ATA PASS-THROUGH (12) command.

**Table 1 — ATA PASS-THROUGH (12) command**

Byte\Bit	7	6	5	4	3	2	1	0
0	OPERATION CODE (A1h)							
1	MULTIPLE_COUNT			PROTOCOL				Reserved
2	OFF_LINE	CK_COND	Reserved	T_DIR	BYTE_BLOCK	T_LENGTH		
3	FEATURES (7:0)							
4	SECTOR_COUNT (7:0)							
5	LBA_LOW (7:0)							
6	LBA_MID (7:0)							
7	LBA_HIGH (7:0)							
8	DEVICE							
9	COMMAND							
10	Reserved							
11	CONTROL (see 6.4)							

If the SATL receives an ATA PASS-THROUGH (12) command it shall check the PROTOCOL field (see table 2) to determine the type of action requested.

**Table 2 — PROTOCOL field**

Code	Description
0	Hard Reset
1	SRST
2	Reserved
3	Non-data
4	PIO Data-In
5	PIO Data-Out
6	DMA
7	DMA Queued
8	Device Diagnostic
9	DEVICE RESET
10	UDMA Data In
11	UDMA Data Out
12	FPDMA <sup>a</sup>
13, 14	Reserved
15	Return Response Information
<sup>a</sup> See SATA 2.5.	

The PROTOCOL field specifies the protocol to use when the ATA device executes the command. ATA/ATAPI-7 defines the meaning of protocol values ranging from 0 to 11.

A PROTOCOL value in the range from 3 to 12 requests the SATL to send an ATA command to the ATA device.

If the PROTOCOL field contains 15 (Return Response Information) the SATL shall not access the ATA device, ~~but shall and should~~ return the ATA Status Return Descriptor as defined in ~~subclause~~ 12.2.5. The SATL shall ignore all other fields in the CDB. If the SATL does not support a protocol of 15 then the SATL shall terminate the command with CHECK CONDITION status with the sense key set to ILLEGAL REQUEST and the sense code set to INVALID FIELD IN CDB.

If the value in the PROTOCOL field is inappropriate for the command specified in the COMMAND field (see ATA/ATAPI-7 and SATA 2.5) the SATL may lose communication with the ATA device, and this standard does not specify the SATL behavior if this occurs.

If the value in the PROTOCOL field is set to zero (i.e., Hard Reset) and the attached device is a PATA device then the SATL shall issue a pin 1 reset to the PATA device (see ATA/ATAPI-7). If the value in the PROTOCOL field is set to zero (~~Hard Reset~~) and the attached device is a SATA device then the SATL shall issue a COMRESET to SATA device. When this protocol is selected, only the PROTOCOL and OFF\_LINE fields are valid. ~~and the~~ The SATL shall ignore all other fields in the CDB.

If the PROTOCOL field is set to one the SATL shall issue a soft reset to the attached ATA device (see ATA/ATAPI-7). When this protocol is selected, only the PROTOCOL and OFF\_LINE fields are valid. ~~and the~~ The SATL shall ignore all other fields in the CDB.

Some PROTOCOL values cause the SATL to reset the ATA device or to return information about the ATA device.

If the value in the PROTOCOL field requests the SATL to send a command to the ATA device the SATL shall use the FEATURES (7:0), SECTOR\_COUNT (7:0), LBA\_LOW (7:0), LBA\_MID (7:0), LBA\_HIGH (7:0), DEVICE and the COMMAND fields to initiate a command in the ATA device. These fields correspond to the registers defined in ATA/ATAPI-7 ~~volume-2~~ with the same names, and also to the FIS fields defined in ATA/ATAPI-7 ~~volume-3~~ with the same names.

**<The remainder of subclause 12.2.2 is unchanged>**