

To: T10 Technical Committee
From: Rob Elliott, HP (elliott@hp.com)
Date: 12 December 2005
Subject: 06-020r1 SAT Clarify error handling for PIO data-in commands

Revision history

Revision 0 (11 December 2005) First revision

Revision 1 (12 December 2005) Revised by the December 12 SAT Working Group (R. Weber, editor).

Basically, the proposed changes were modified to restrict them to exactly those commands listed in the r0 proposal and to restrict them to data where a checksum is available to be checked. References to ATA-8 were changed to ATA/ATAPI-7 in the normative text. All discussion of ATA registers was deferred to Clause 11.

Related documents

sat-r07 - SCSI to ATA Translation (SAT) revision 7

ISO/IEC 14776-971 - ATA/ATAPI-7

Overview

Commands using the PIO data-in protocol like IDENTIFY DEVICE return status before they return the last DRQ data block. This means that errors that occur during the final DRQ data block might go unreported (depending on the nature of the error, the design of the HBA, and many other things). These commands are usually designed to include some sort of checksum field so the application can verify that the data is correct. Since SATLs use data from some of these commands for things like determining write cache status, SAT should state that SATLs must check the checksum, if any, before using any data from a PIO data-in command.

The PIO data-in commands defined in ATA8-ACS are: READ SECTOR(S) [EXT], READ MULTIPLE [EXT], READ STREAM EXT, READ LOG EXT, CFA TRANSLATE SECTOR, IDENTIFY PACKET DEVICE, SMART READ DATA, SMART READ LOG, DEVICE CONFIGURATION IDENTIFY, READ BUFFER, and IDENTIFY DEVICE.

SAT-2 could go into more detail about defining how the SATL should respond if an error happens - e.g., retry a fixed or programmable number of times.

Suggested changes**5.3 Handling errors in ATA ~~multi-command sequences~~ commands**

~~Emulation of several SCSI commands involves issuing multiple ATA commands to the attached ATA device. Errors may be reported by any of these ATA commands.~~

~~Unless otherwise specified in the subclause describing the translation for a particular SCSI command, when an error is returned by an ATA device processing a given ATA command that is part of a series of commands required to emulate the behavior of a SCSI command, the SATL shall terminate processing of the SCSI command and return CHECK CONDITION status and additional sense data as specified in Clause 11.~~

When a SCSI command is translated into one or more ATA commands and one of the ATA commands completes with an error, the SATL shall terminate processing of the SCSI command and report the error as described in Clause 11.

When interpreting data from an ATA command, the SATL shall use the data only if no error was reported for the command. In addition:

- a) when interpreting IDENTIFY DEVICE data and IDENTIFY PACKET DEVICE data, the SATL shall use the data only if the integrity word (word 255) contains the signature defined in ATA/ATAPI-7 and the checksum is correct;
- b) when interpreting SMART READ DATA data for the Summary SMART error log (i.e., log address 01h), the Comprehensive SMART error log (i.e., log address 02h), the SMART self-test log (i.e., log address 06h), or the Selective self-test log (i.e., log address 09h) (see ATA/ATAPI-7), the SATL shall use the data only if the data structure checksum byte (byte 511) is correct; and
- c) when interpreting READ LOG EXT data for Extended Comprehensive SMART error log (i.e., log address 03h) or Extended SMART self-test log (i.e., log address 07h) (see ATA/ATAPI-7), the SATL shall use the data only if the data structure checksum byte (byte 511) is correct.