

To: T10 Technical Committee
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Date: 10 March 2008
Subject: T10/07-328r2 SAT-2: ATAPI Translation

Revision History

Revision 0 - Initial draft of document
Revision 1 - Updates from Feb. WG meeting
Revision 2 - Further updates from Mar. WG meeting

Related Documents

SAT-2 (T10/1865-D rev 02a)

1 Overview

This proposal define an Annex to SAT-2 to facilitate the transmission of SCSI commands to a packet device. It is intended that this be a standalone annex that describes the limitations and method for transmitting a SCSI command to an ATAPI device.

2 Document Changes

2.1 Changes to SAT-2

Annex B (normative)

SCSI to ATAPI Command Transmission

B.1 Introduction

This annex specifies the method of transmission of SCSI commands to an [ATAPI device](#).

B.2 ATAPI Device Model

An ATAPI device operates by using an ATA command, the PACKET command, in order to transmit a SCSI CDB to the device. In addition to the SCSI command set supported by the device, the ATAPI device also supports a limited subset of the ATA command set to facilitate the identification and control of the device. The device supports its primary function through the SCSI command set that the device supports (e.g., read or write operations). A packet device may implement any command set reportable through the SCSI INQUIRY command peripheral device type field.

ATAPI devices may be identified through the issuance of the IDENTIFY DEVICE command. If the device is an ATAPI device, the device aborts the IDENTIFY DEVICE command and returns a specific signature in the ATA register set. The SATL can then obtain the correct identification information about the ATA specific configuration of the ATAPI device by issuing an IDENTIFY PACKET DEVICE command.

B.3 SCSI CDB Transmission

A SCSI CDB is transmitted by a SATL to an ATAPI device by the following sequence:

- 1) Issuing the PACKET command to the device;
- 2) Transmitting the SCSI CDB to the device (the command packet phase); and
- 3) Transmitting or receiving any data, if appropriate, necessary for the completion of the SCSI CDB

Some ATAPI devices do not permit the Byte Count Limit parameter of the PACKET command to be zero, even if the CDB requires no data transmission. This restriction, or the lack of such a restriction, is specified for each device in IDENTIFY PACKET DEVICE data, word 125 (see ATA8-ACS). If the device places a restriction, the SATL should place a value of 512 in the Byte Count Limit parameter of the PACKET command when transmitted if the CDB being processed requires no data transfer to or from the device.

Within the IDENTIFY PACKET DEVICE data returned by the device is a command size requirement for any SCSI CDB transmitted to the device through the packet command. This restriction is located in word 0 of the IDENTIFY PACKET DEVICE data, bits 1:0. This field specifies either a 12 byte or 16 byte CDB restriction. CDBs of a smaller size may be transmitted by the SATL to the device, however any additional bytes beyond the length of the CDB shall be transmitted as zero.

For example, if an ATAPI device reports that 12 byte command packets are required and the SATL issues an INQUIRY command to the device, the SATL would transmit the six bytes of the INQUIRY command, followed by six bytes set to zero.

If an application client issues a CDB to the SATL, where the size is greater than the maximum command packet size supported by the ATAPI device, then the SATL shall complete the command with error and a sense key of ILLEGAL REQUEST and an additional sense code of INVALID COMMAND OPERATION CODE.

During data transfers, ATAPI devices transmit or receive data on word boundaries. If a SATL transmits a data buffer whose length is not a multiple of a word, the SATL shall pad the transmitted data with an additional byte set to zero. During data reception, the SATL shall allocate its receive buffers to accommodate an additional byte if the data length is not a multiple of a word.

In addition to the word alignment requirements, ATAPI devices may have additional requirements imposed on them for padding based on the underlying transport (e.g., SATA ATAPI devices are required to transmit all data aligned to a 32-bit dword. Therefore, a SATL in that environment allocates sufficient receive or transmit buffers to transmit or receive data that has been padded with zeros to a dword boundary).

If the ATAPI device completes a packet command with an error, the SATL shall issue a SCSI REQUEST SENSE command to the device through the command transmission mechanism described in this subclause to obtain sense data before completing the CDB to the application client as ATAPI devices do not support any form of autosense. In addition SATL error handling does not use the error translation specified elsewhere in this standard.

ATAPI devices do not support any form of queued command transmission and SATL implementations shall either maintain an internal queue of received commands for the device or return TASK SET FULL status to the application client if there is already a PACKET command sequence in process or pending for the ATAPI device.

B.4 ATAPI Task Management

The ATAPI protocol does not have a mechanism for transmission of task management functions to an ATAPI device. Translation of task management functions by a SATL is unspecified.

B.5 SATL ATAPI Implementations

If a SATL supports attachment of ATAPI devices, the SATL shall not use the translations described elsewhere in this standard for the generation of INQUIRY data and instead shall return the INQUIRY data directly from the ATAPI device. In addition, the SATL shall transmit all SCSI CDBs that are permissible within the command packet data length restrictions (see B.3).

B.6 ATAPI Logical Unit Numbers

In order to comply with ATA8-ACS, ATAPI devices only support a single logical unit. ATAPI devices often do not implement the REPORT LUNS command. A SATL may need to implement the REPORT LUNS command to ensure compatibility of the ATAPI device with application clients.