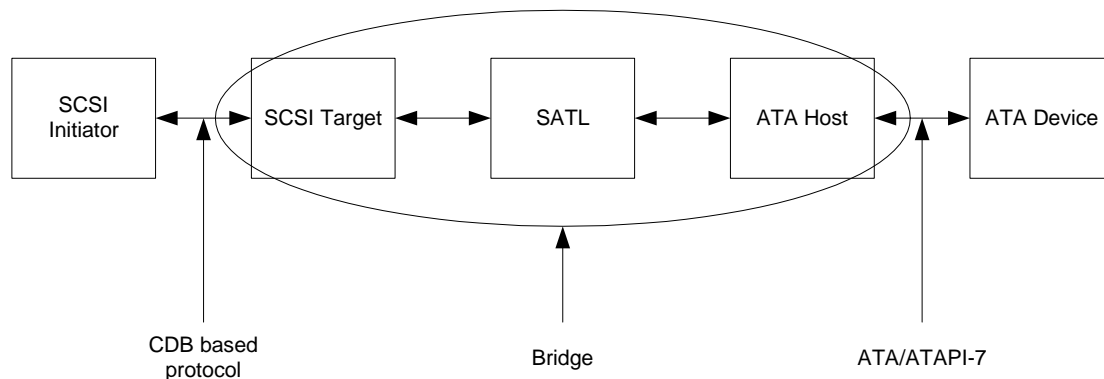# Command Mapping Format

August 26, 2004

This is a proposal on how to present a command mapping from SCSI CDB's to an ATA/ATAPI-7 device. This proposal is for a table format that provides the ability to directly translate, emulate, or not implement each field of a SCSI CDB. This is a sample using READ(12).

1   Overview

A translator has 3 parts as diagramed below:

SCSI Initiator ↔ SCSI Target ↔ SATL ↔ ATA Host ↔ ATA Device

CDB based protocol   Bridge   ATA/ATAPI-7

The bridge is composed of a SCSI Target, an ATA Host, and a SCSI to ATA Translation Layer (SATL). The translator receives CDB's, converts them to ATA/ATAPI-7 commands, and issues them to the device using the ATA Host. The SCSI Target may conceptual, possibly only existing in software. The ATA Host shall be a standard SATA or PATA ATA/ATAPI-7 compliant host.

2   Keywords/Glossary

2.1 Not Implemented

The SCSI field has no matching ATA capability and Emulation capability is not specified in this standard. Fields marked Not Implemented are beyond the scope of this standard. An example of a Not Implemented field is the READ (12) DPO bit. DPO is an advisory bit the gives the drive some hints about cache management, ATA does not expose an interface for controlling cache at this level. Therefore, advisory fields associated with controlling cache are not implemented.

2.2 Emulated

Emulated means that acceptable functionality of a SCSI field can be achieved, but the translator has to help. This help may be in the form of:
1.   Issuing multiple ATA commands to complete the CDB
2.   Mapping information from existing ATA commands and reformatting the data for SCSI, possibly supplementing the data with additional data from the translator
3.   Storing or providing additional information or functionality not found in the ATA device.

For example, the SCSI Inquiry command has a field for Product Identification that is 16 bytes long whereas ATA has a Model Number that is 40 bytes long.

2.3 Implemented

The SCSI field has a matching ATA capability. Implemented fields shall not be Emulated. For example, the SCSI READ(10) command has a 32 bit address, and a 16 bit transfer length. This enables the translator to, under the right conditions, to issue a single ATA READ DMA EXT command without providing additional information or capability (eg. The FUA bit is cleared)

3 Command Set

3.1 READ (12) – A8h

3.1.1 Description

The READ (12) command shall be emulated using the ATA READ DMA EXT (25h) Command. If the FUA or FUA_NV bit is set, then FLUSH CACHE EXT (EAh) shall also be issued. Table 1 describes the mapping from SCSI to ATA.

Table 1 – READ (12) Field Mapping

Field	Type	Description
RDProtect	N	
DPO	N	
FUA	E	See clause 3.1.2
FUA_NV	E	See clause 3.1.3
LBA	I	The LBA field is a 32 bit value and the ATA READ DMA EXT command accepts up to 48 address bits. Bits 0-31 of the LBA field map to ATA LBA bits 0-31. ATA bits 32-47 shall be set to zero.
Transfer Length	E	See clause 3.1.4
Group Number	E	See clause 3.1.5

Types -
  N - Not Implemented
  E - Emulated
  I - Implemented		

3.1.2 FUA

When the FUA bit is set to one, the host is requesting that the drive cache be bypassed for this read command. The bridge shall issue FLUSH CACHE EXT (EAh) prior to issuing the ATA READ DMA EXT command.

3.1.3 FUA_NV

When the FUA_NV bit is set to one, the host is requesting that the volatile drive cache be bypassed for this read command. The bridge shall issue FLUSH CACHE EXT (EAh) prior to issuing the ATA READ DMA EXT command. ATA devices do not have standard mechanisms for differentiating between volatile and non-volatile cache.

3.1.4 Transfer Length

The Transfer Length is a 32 bit field.

If bits 16-31 are 0 then READ(12) maps to a single ATA READ DMA EXT command. Bits 0-15 are the sector count, bits 16-31 are ignored.

If bits 16-31 are not 0 then READ(12) maps to multiple ATA READ DMA EXT commands. The bridge shall issue as many ATA READ DMA EXT commands as necessary to transfer the amount of data requested in Transfer Length. This could result in a maximum of 65535 ATA READ DMA EXT commands being generated. if FUA or FUA_NV are set to 1, FLUSH CACHE EXT need only be issued once.

3.1.5 Group Number

There are no ATA commands to provide this capability. However, the translator can group attributes based on group number. This information can be stored in the translator and then returned when the host requests the data.