

T10/05-233r2 SAT - ATA Errors to SCSI Errors - Translation Map

To: T10 Technical Committee
From: Wayne Bellamy (wayne.bellamy@hp.com), Hewlett Packard
Date: June 30, 2005
Subject: T10/05-233r2 SAT - ATA Errors to SCSI Errors - Translation Map

Revision History

Revision 0 (June 08, 2005) first revision

Revision 1 (June 27, 2005) second revision

Changes: (per 6-20-05 W.G.)

- 1) Removed ILI, C/D, I/O, BBK, and CHK bits (per 6-20-05 W.G. T13 recommendations) from Table 1.
- 2) A table, similar to Table 2, preferred with the words for sense key asc/ascq (not the hex values). (Two choices provided – pick one.)
- 3) Removed DRDY, DSC, IDX bit lines from Table 2.
- 4) For CORR bit error put “Not an error” under SCSI side in Table 2.
- 5) Removed 03/13/00 from IDNF row in Table 2.
- 6) The W.G. shall decide before next meeting the appropriate SCSI error for the ABRT bit and IDNF bit from the values presented.
- 7) Noted: All other bit mapping communicated to be correct in Table 2.

Revision 2 (June 30, 2005) third revision

- 1) Moved ATA bits acronym table and all additional related information to the end of the proposal (to be deleted later).
- 2) Changed ATA “ABRT” bit map to SCSI “0Bh/00h/00h” (ABORTED COMMAND – NO ADDITIONAL SENSE INFORMATION).
- 3) ATA “IDNF” bit mapped to SCSI “03h/14h/01h” (MEDIUM ERROR – RECORD NOT FOUND).

Related Documents

(T10) sat-r04 – SCSI to ATA Translation (SAT), Revision 4

(T10) spc-3 r22 – SCSI Primary Commands - 3, Revision 22

(T13) ata7v1r4b – AT Attachment with Packet Interface -7 Volume1, Revision 4b

Overview

1. All ATA errors must be properly translated to appropriate SCSI errors.
2. Incorrect error translations can result in improper responses from the SCSI application client. As a result, drastically incorrect actions may be taken by a data center storage manager (device removal, etc.).
3. **CLOSE SCRUTINY OF THIS PROPOSAL BY THE ATA COMMUNITY IS REQUESTED.**

Suggested Changes

[Note to editor: Currently, information does not exist in section 12 relating to error reporting. This first proposal revision is an error “map” of the ATA register set bits that pertain to error conditions to the SCSI error reporting methodology of sense key, additional sense code, and additional sense code qualifier. It is not the purpose of this proposal, at least at this time, to provide a map of this data into a SAS SSP Response IU or define how that is done.]

12.2 Error Translation – ATA (non-packet device) to SCSI error map

“ATA” non-packet device errors must be mapped (or translated) to the appropriate SCSI errors. The ATA Status register and Error register bit settings provide the information to be translated into SCSI sense key, additional sense code, and additional sense code qualifier for error reporting. **Error! Reference source not found.** provides the translation map of all ATA non-packet device errors to SCSI errors.

[NOTE to Editor and W.G.: Additional tables are provided to present the same information in several different ways. Everything after Table 1 provides exactly the same data but in different formats/layouts. Any not selected for use shall be deleted.]

Table 1: ATA Errors to SCSI Errors

ATA Error		SCSI Error
Register		Sense Keys - Additional Sense Codes – Additional Sense Code Qualifiers
Status	Error	
CORR	-	(This is not considered to be an error.)
DF	-	HARDWARE ERROR - INTERNAL TARGET FAILURE
ERR	NM	NOT READY – MEDIUM NOT PRESENT
ERR	UNC	MEDIUM ERROR - UNRECOVERED READ ERROR
ERR	AMNF	MEDIUM ERROR - ADDRESS MARK NOT FOUND FOR DATA FIELD
ERR	IDNF	MEDIUM ERROR - RECORD NOT FOUND
ERR	ABRT	ABORTED COMMAND - NO ADDITIONAL SENSE INFORMATION
ERR	MC	UNIT ATTENTION - NOT READY TO READY CHANGE, MEDIUM MAY HAVE CHANGED
ERR	MCR	UNIT ATTENTION - OPERATOR MEDIUM REMOVAL REQUEST
ERR	ICRC	ABORTED COMMAND - INFORMATION UNIT iuCRC ERROR DETECTED

[NOTE to Editor and W.G.: All of the following information is for reference only for the editor and W.G. It shall be deleted after its use, prior to proposal incorporation.]

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ATA Registers and bits – “All old and new bit definitions”

Register	bit	7	6	5	4	3	2	1	0
Status		BSY	DRDY	DWF / SE / DF	DSC / #	DRQ	CORR Obs	IDX Obs	ERR
Error		ICRC	UNC / WP	MC / TAG	IDNF	MCR	ABRT / REL	TKONF / NM / EOM	AMNF / MED / CCTO / Obs

SCSI Sense key/asc/ascq & ATA Status register and Error register bits - Map

SCSI			ATA									
KEY	ASC	ASCQ	bit reg	7	6	5	4	3	2	1	0	
04h	44h	00h	Status	-	-	DF	-	-	-	-	-	
			Error	-	-	-	-	-	-	-	-	
Not an error			Status	-	-	-	-	-	CORR	-	-	
			Error	-	-	-	-	-	-	-	-	-
03h	13h	00h	Status	-	-	-	-	-	-	-	ERR	
			Error	-	-	-	-	-	-	-	-	AMNF
02h	3Ah	00h	Status	-	-	-	-	-	-	-	ERR	
			Error	-	-	-	-	-	-	-	NM	-
0Bh 0Bh 05h 05h 05h 05h 05h	00h 4Ah 20h 22h 24h 26h 26h	00h 00h 00h 00h 01h 02h	Status	-	-	-	-	-	-	-	ERR	
			Error	-	-	-	-	-	-	ABRT	-	-
				-	-	-	-	-	-	-	-	-
				-	-	-	-	-	-	-	-	-
				-	-	-	-	-	-	-	-	-
				-	-	-	-	-	-	-	-	-
				-	-	-	-	-	-	-	-	-
06h	5Ah	01h	Status	-	-	-	-	-	-	-	ERR	
			Error	-	-	-	-	-	MCR	-	-	
03h 03h	12h 14h	00h 01h	Status	-	-	-	-	-	-	-	ERR	
			Error	-	-	-	IDNF	-	-	-	-	
06h	28h	00h	Status	-	-	-	-	-	-	-	ERR	
			Error	-	-	MC	-	-	-	-	-	
03h	11h	00h	Status	-	-	-	-	-	-	-	ERR	
			Error	-	UNC	-	-	-	-	-	-	
0Bh	47h	03h	Status	-	-	-	-	-	-	-	ERR	
			Error	ICRC	-	-	-	-	-	-	-	

[Note to SAT W.G.: ABRT (especially), CORR, and IDNF need to be very closely scrutinized for reporting the appropriate SCSI error. ABRT in particular needs to be discussed due its “multiplicity” of applications to ATA errors (abort means several things in ATA which does not resolve to a specific error to map to SCSI’s key/asc/ascq).

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SCSI			Definitions
KEY	ASC	ASCQ	
07h	47h	00h	RECOVERED ERROR - RECOVERED DATA WITH NO ERROR CORRECTION APPLIED
07h	47h	01h	RECOVERED ERROR - RECOVERED DATA WITH RETRIES
07h	48h	00h	RECOVERED ERROR - RECOVERED DATA WITH ERROR CORRECTION APPLIED
02h	3Ah	00h	NOT READY - MEDIUM NOT PRESENT
03h	11h	00h	MEDIUM ERROR - UNRECOVERED READ ERROR
03h	42h	00h	MEDIUM ERROR - ADDRESS MARK NOT FOUND FOR ID FIELD
03h	13h	00h	MEDIUM ERROR - ADDRESS MARK NOT FOUND FOR DATA FIELD
03h	14h	01h	MEDIUM ERROR - RECORD NOT FOUND
03h	24h	00h	MEDIUM ERROR - LOGICAL BLOCK ADDRESS OUT OF RANGE
04h	44h	00h	HARDWARE ERROR - INTERNAL TARGET FAILURE
05h	20h	00h	ILLEGAL REQUEST - INVALID COMMAND OPERATION CODE
05h	22h	00h	ILLEGAL REQUEST - ILLEGAL FUNCTION
05h	24h	00h	ILLEGAL REQUEST - INVALID FIELD IN CDB
05h	26h	00h	ILLEGAL REQUEST - INVALID FIELD IN PARAMETER LIST
05h	26h	01h	ILLEGAL REQUEST - PARAMETER NOT SUPPORTED
05h	26h	02h	ILLEGAL REQUEST - PARAMETER VALUE INVALID
06h	28h	00h	UNIT ATTENTION - NOT READY TO READY CHANGE, MEDIUM MAY HAVE CHANGED
06h	5Ah	01h	UNIT ATTENTION - OPERATOR MEDIUM REMOVAL REQUEST
0Bh	00h	00h	ABORTED COMMAND - NO ADDITIONAL SENSE INFORMATION
0Bh	47h	03h	ABORTED COMMAND - INFORMATION UNIT iuCRC ERROR DETECTED
0Bh	4Ah	00h	ABORTED COMMAND - COMMAND PHASE ERROR

ATA Error		SCSI Error
Register		Sense Keys- Additional Sense Codes - Additional Sense Code Qualifiers
Status	Error	
04h	00h	(This is not considered to be an error.)
20h	00h	HARDWARE ERROR - INTERNAL TARGET FAILURE
01h	02h	NOT READY - MEDIUM NOT PRESENT
01h	40h	MEDIUM ERROR - UNRECOVERED READ ERROR
01h	01h	MEDIUM ERROR - ADDRESS MARK NOT FOUND FOR DATA FIELD
01h	40h	MEDIUM ERROR - ADDRESS MARK NOT FOUND FOR ID FIELD
01h	10h	MEDIUM ERROR - RECORD NOT FOUND
01h	40h	MEDIUM ERROR - LOGICAL BLOCK ADDRESS OUT OF RANGE
01h	04h	ILLEGAL REQUEST - INVALID COMMAND OPERATION CODE
01h	04h	ILLEGAL REQUEST - ILLEGAL FUNCTION
01h	04h	ILLEGAL REQUEST - INVALID FIELD IN CDB
01h	04h	ILLEGAL REQUEST - INVALID FIELD IN PARAMETER LIST
01h	04h	ILLEGAL REQUEST - PARAMETER NOT SUPPORTED
01h	04h	ILLEGAL REQUEST - PARAMETER VALUE INVALID
01h	04h	ABORTED COMMAND - COMMAND PHASE ERROR
01h	04h	ABORTED COMMAND - NO ADDITIONAL SENSE INFORMATION
01h	20h	UNIT ATTENTION - NOT READY TO READY CHANGE, MEDIUM MAY HAVE CHANGED
01h	08h	UNIT ATTENTION - OPERATOR MEDIUM REMOVAL REQUEST
01h	80h	ABORTED COMMAND - INFORMATION UNIT iuCRC ERROR DETECTED

ATA Error		SCSI Error
Register		Sense Keys - Additional Sense Codes - Additional Sense Code Qualifiers
Status	Error	
CORR	-	(This is not considered to be an error.)
DF	-	HARDWARE ERROR - INTERNAL TARGET FAILURE
ERR	NM	NOT READY - MEDIUM NOT PRESENT
ERR	UNC	MEDIUM ERROR - UNRECOVERED READ ERROR

T10/05-233r2 SAT - ATA Errors to SCSI Errors - Translation Map

ERR	AMNF	MEDIUM ERROR - ADDRESS MARK NOT FOUND FOR DATA FIELD
ERR	IDNF	MEDIUM ERROR - ADDRESS MARK NOT FOUND FOR ID FIELD
ERR	IDNF	MEDIUM ERROR - RECORD NOT FOUND
ERR	IDNF	MEDIUM ERROR - LOGICAL BLOCK ADDRESS OUT OF RANGE
ERR	ABRT	ILLEGAL REQUEST - INVALID COMMAND OPERATION CODE
ERR	ABRT	ILLEGAL REQUEST - ILLEGAL FUNCTION
ERR	ABRT	ILLEGAL REQUEST - INVALID FIELD IN CDB
ERR	ABRT	ILLEGAL REQUEST - INVALID FIELD IN PARAMETER LIST
ERR	ABRT	ILLEGAL REQUEST - PARAMETER NOT SUPPORTED
ERR	ABRT	ILLEGAL REQUEST - PARAMETER VALUE INVALID
ERR	ABRT	ABORTED COMMAND - COMMAND PHASE ERROR
ERR	ABRT	ABORTED COMMAND - NO ADDITIONAL SENSE INFORMATION
ERR	MC	UNIT ATTENTION - NOT READY TO READY CHANGE, MEDIUM MAY HAVE CHANGED
ERR	MCR	UNIT ATTENTION - OPERATOR MEDIUM REMOVAL REQUEST
ERR	ICRC	ABORTED COMMAND - INFORMATION UNIT iuCRC ERROR DETECTED

...and...the following is a different presentation if this format is preferred...

bit reg	ATA								SCSI		
	7	6	5	4	3	2	1	0	KEY	ASC	ASCQ
Status	-	-	DF	-	-	-	-	-	04h	44h	00h
Error	-	-	-	-	-	-	-	-			
Status	-	-	-	-	-	CORR	-	-	Not an error		
Error	-	-	-	-	-	-	-	-			
Status	-	-	-	-	-	-	-	ERR	03h	13h	00h
Error	-	-	-	-	-	-	-	AMNF			
Status	-	-	-	-	-	-	-	ERR	02h	3Ah	00h
Error	-	-	-	-	-	-	NM	-			
Status	-	-	-	-	-	-	-	ERR	0Bh	00h	00h
Error	-	-	-	-	-	ABRT	-	-	0Bh	4Ah	00h
									05h	20h	00h
									05h	22h	00h
									05h	24h	00h
									05h	26h	00h
									05h	26h	01h
									05h	26h	02h
Status	-	-	-	-	-	-	-	ERR	06h	5Ah	01h
Error	-	-	-	-	MCR	-	-	-			
Status	-	-	-	-	-	-	-	ERR	03h	12h	00h
Error	-	-	IDNF	-	-	-	-	-	03h	14h	01h
									03h	14h	01h
									03h	21h	00h
Status	-	-	-	-	-	-	-	ERR	06h	28h	00h
Error	-	-	MC	-	-	-	-	-			
Status	-	-	-	-	-	-	-	ERR	03h	11h	00h
Error	-	UNC	-	-	-	-	-	-			
Status	-	-	-	-	-	-	-	ERR	0Bh	47h	03h
Error	ICRC	-	-	-	-	-	-	-			

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