

Write Wrong EXT / Read Wrong EXT Proposal

To: T13 Technical committee
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1 Introduction

This proposal defines two new commands titled 'Write Wrong EXT' and 'Read Wrong EXT'.

Write Wrong EXT is a 48-bit non-data command which will create a hard error at the target location. The primary usage would be for testing of h/w and s/w.

Read Wrong EXT is a 48-bit DMA command that will cause the drive to transfer the raw contents of a given sector to the host without applying ECC correction. The primary usage would be for diagnostic purposes.

2 Write Wrong EXT

2.1.1 Command code

??h

2.1.2 Feature set

General feature set

- Optional for devices not implementing the PACKET Command feature set.
- Use prohibited for devices implementing the PACKET Command feature set.

2.1.3 Protocol

Non-data

2.1.4 Inputs

Register		7	6	5	4	3	2	1	0
Features	Current Previous	Large Physical Sector 00h							
Sector Count	Current Previous	01h 00h							
LBA Low	Current Previous	LBA (7:0) LBA (31:24)							
LBA Mid	Current Previous	LBA (15:8) LBA (39:32)							
LBA High	Current Previous	LBA (23:16) LBA (47:40)							
Device		obs	1	obs	DEV	na	na	Log	na
Command		??h							
NOTE – The value indicated as Current is the value most recently written to the register. The value indicated as Previous is the value that was in the register before the most recent write to the register.									

Features register –

Large Physical Sector (see command description)

Device register -

DEV shall indicate the selected device.

LOG set to one shall indicate that reading of wronged sectors shall be logged as errors in standard error logs. LOG cleared to zero shall indicate that reading of wronged sectors shall not be logged as an error in any standardized error logs.

Status register -

BSY shall be cleared to zero indicating command completion.

DRDY shall be set to one.

DF (Device Fault) shall be cleared to zero.

DRQ shall be cleared to zero.

ERR shall be cleared to zero.

2.1.5 Normal outputs

Register		7	6	5	4	3	2	1	0
Error		na							
Sector Count	HOB = 0	Reserved			Reserved				
	HOB = 1	Reserved			Reserved				
LBA Low	HOB = 0	Reserved			Reserved				
	HOB = 1	Reserved			Reserved				
LBA Mid	HOB = 0	Reserved			Reserved				
	HOB = 1	Reserved			Reserved				
LBA High	HOB = 0	Reserved			Reserved				
	HOB = 1	Reserved			Reserved				
Device		obs	na	obs	DEV	Reserved			
Status		BSY	DRDY	DF	na	DRQ	na	na	ERR
NOTE – HOB = 0 indicates the value read by the host when the HOB bit of the Device Control register is cleared to zero. HOB = 1 Indicates the value read by the host when the HOB bit of the Device Control register is set to one.									

Device register -

DEV shall indicate the selected device.

Status register -

BSY shall be cleared to zero indicating command completion.

DRDY shall be set to one.

DF (Device Fault) shall be cleared to zero.

DRQ shall be cleared to zero.

ERR shall be cleared to zero.

2.1.6 Error outputs

The device shall return command aborted if the command is not supported.

Register		7	6	5	4	3	2	1	0
Error		na	WP	MC	IDNF	MCR	ABRT	NM	na
Sector Count	HOB = 0	Reserved							
	HOB = 1	Reserved							
LBA Low	HOB = 0	LBA (7:0)							
	HOB = 1	LBA (31:24)							
LBA Mid	HOB = 0	LBA (15:8)							
	HOB = 1	LBA (39:32)							
LBA High	HOB = 0	LBA (23:16)							
	HOB = 1	LBA (47:40)							
Device		obs	na	obs	DEV	Reserved			
Status		BSY	DRDY	DF	na	DRQ	na	na	ERR
NOTE – HOB = 0 indicates the value read by the host when the HOB bit of the Device Control register is cleared to zero. HOB = 1 Indicates the value read by the host when the HOB bit of the Device Control register is set to one.									

Error register -

ABRT shall be set to one if this command is not supported. ABRT may be set to one if the device is not able to complete the action requested by the command.

WP shall be set to one if the media in a removable media device is write protected.

MC shall be set to one if the media in a removable media device changed since the issuance of the last command. The device shall clear the device internal media change detected state.

IDNF shall be set to one if a user-accessible address could not be found. IDNF shall be set to one if an address outside of the range of user-accessible addresses is requested if command aborted is not returned.

MCR shall be set to one if a media change request has been detected by a removable media device. This bit is only cleared by a GET MEDIA STATUS or a media access command.

NM shall be set to one if no media is present in a removable media device.

Device register -

DEV shall indicate the selected device.

Status register -

BSY shall be cleared to zero indicating command completion.

DRDY shall be set to one.

DF (Device Fault) shall be set to one if a device fault has occurred.

DRQ shall be cleared to zero.

ERR shall be set to one if an Error register bit is set to one.

2.1.7 Prerequisites

DRDY set to one.

2.1.8 Description

When the Features register contains a value of 55h the Write Wrong EXT command shall cause the device to write data that is uncorrectable by the ECC capabilities of the drive to all sectors contained in the physical block that has shared ECC with the specified sector which will cause the device to indicate a failure when reads to any of the sectors that are contained in physical block of the specified sector are performed. These sectors are referred to as ‘wronged’ sectors. In this case whenever a wronged sector is accessed via a read command the drive shall perform normal error recovery and then set the UNC and ERR bits to indicate the sector is bad.

When the Features register contains a value of AAh the Write Wrong EXT command shall cause the device to flag the specified sector as ‘flagged wronged’ which will cause the device to indicate a failure when reads to the specified sector are performed. These sectors are referred to as ‘flagged wronged’ sectors. In this case whenever a wronged sector is accessed via a read command the drive shall set the UNC and ERR bits to indicate the sector is bad

Commands that return UNC and ERR when a wronged or flagged wrong sector is read include: READ DMA, READ DMA EXT, READ DMA QUEUED, READ DMA QUEUED EXT, READ MULTIPLE, READ MULTIPLE EXT, READ SECTOR (S), READ SECTOR (S) EXT, READ VERIFY SECTOR (S), READ VERIFY SECTOR (S) EXT. If the host writes to a wronged or flagged wrong sector, the drive shall attempt to write the data to the sector. The write shall clear the wronged status of the sector and make the sector good, if possible. It is possible that a wronged sector location has actual physical errors. In this case read commands and/or write commands shall return ERR status information that is consistent with the error.

If the LOG bit is set to one, sectors that have been wronged shall be listed as failed in the standard error logs and shall cause SMART utilities to indicate failure if too many sectors are wronged.

2.2 Read Wrong EXT

2.2.1 Command code

??h

2.2.2 Feature set

General feature set

- Optional for devices not implementing the PACKET Command feature set.
- Use prohibited for devices implementing the PACKET Command feature set.

2.2.3 Protocol

DMA

2.2.4 Inputs

Register		7	6	5	4	3	2	1	0
Features	Current	Reserved							
	Previous	Reserved							
Sector Count	Current	01h							
	Previous	00h							
LBA Low	Current	LBA (7:0)							
	Previous	LBA (31:24)							
LBA Mid	Current	LBA (15:8)							
	Previous	LBA (39:32)							
LBA High	Current	LBA (23:16)							
	Previous	LBA (47:40)							
Device		obs	1	obs	DEV	na	na	na	na
Command		??h							
NOTE – The value indicated as Current is the value most recently written to the register. The value indicated as Previous is the value that was in the register before the most recent write to the register.									

Device register -

DEV shall indicate the selected device.

2.2.5 Normal outputs

Register		7	6	5	4	3	2	1	0
Error		na							
Sector Count	HOB = 0				Reserved				
	HOB = 1				Reserved				
LBA Low	HOB = 0				Reserved				
	HOB = 1				Reserved				
LBA Mid	HOB = 0				Reserved				
	HOB = 1				Reserved				
LBA High	HOB = 0				Reserved				
	HOB = 1				Reserved				
Device		obs	na	obs	DEV	Reserved			
Status		BSY	DRDY	DF	na	DRQ	na	na	ERR
NOTE – HOB = 0 indicates the value read by the host when the HOB bit of the Device Control register is cleared to zero. HOB = 1 Indicates the value read by the host when the HOB bit of the Device Control register is set to one.									

Device register -

DEV shall indicate the selected device.

Status register -

BSY shall be cleared to zero indicating command completion.

DRDY shall be set to one.

DF (Device Fault) shall be cleared to zero.

DRQ shall be cleared to zero.

ERR shall be cleared to zero.

2.2.6 Error outputs

The device shall return command aborted if the command is not supported.

Register		7	6	5	4	3	2	1	0
Error		ICRC	na	MC	IDNF	MCR	ABRT	NM	na
Sector Count	HOB = 0	Reserved							
	HOB = 1	Reserved							
LBA Low	HOB = 0	LBA (7:0)							
	HOB = 1	LBA (31:24)							
LBA Mid	HOB = 0	LBA (15:8)							
	HOB = 1	LBA (39:32)							
LBA High	HOB = 0	LBA (23:16)							
	HOB = 1	LBA (47:40)							
Device		obs	na	obs	DEV	Reserved			
Status		BSY	DRDY	DF	na	DRQ	na	na	ERR
NOTE – HOB = 0 indicates the value read by the host when the HOB bit of the Device Control register is cleared to zero. HOB = 1 Indicates the value read by the host when the HOB bit of the Device Control register is set to one.									

Error register –

ICRC shall be set to one if an interface CRC error has occurred during an Ultra DMA data transfer. The content of this bit is not applicable for Multiword DMA transfers.

ABRT shall be set to one if this command is not supported. ABRT may be set to one if the device is not able to complete the action requested by the command.

MC shall be set to one if the media in a removable media device changed since the issuance of the last command. The device shall clear the device internal media change detected state.

IDNF shall be set to one if a user-accessible address could not be found. IDNF shall be set to one if an address outside of the range of user-accessible addresses is requested if command aborted is not returned.

MCR shall be set to one if a media change request has been detected by a removable media device. This bit is only cleared by a GET MEDIA STATUS or a media access command.

NM shall be set to one if no media is present in a removable media device.

Device register -

DEV shall indicate the selected device.

Status register -

BSY shall be cleared to zero indicating command completion.

DRDY shall be set to one.

DF (Device Fault) shall be set to one if a device fault has occurred.

DRQ shall be cleared to zero.

ERR shall be set to one if an Error register bit is set to one.

2.2.7 Prerequisites

DRDY set to one.

2.2.8 Description

The Read Wrong EXT command shall cause the device to transfer one sector (512 bytes) of data to the host without applying any ECC correction. Other forms of error recovery such as off track recovery would be allowed.

Changes to DCO

Need to add a WRITE WRONG / READ WRONG bit to the Device Configuration Identify data structure.

WRITE WRONG / READ WRONG – If set to one indicates that the device is capable of supporting the WRITE WRONG / READ WRONG commands.

Changes to Identify Device information

Need to add a bit in Identify Device information to indicate WRITE WRONG EXT / READ WRONG EXT commands are supported.