Force Unit Access Proposal

To: **T13 Technical committee**
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Date: **December 12, 2001**

1.0 Introduction

The purpose of this proposal is to add support for Force Unit Access in ATA disk drives. Force Unit Access refers to writing directly to the media, bypassing the device write cache. This feature is required to ensure data integrity. Any piece of data written with FUA enabled is guaranteed to be on the media even if the device is powered off before issuing a FLUSH CACHE command. The alternative to FUA would be to issue a FLUSH CACHE command after the data is written. This would be a big performance hit since the flush cache would usually invalidate the entire write cache. With FUA, we could avoid the repetitive cache flushes and boost overall performance.

2.0 Proposed Changes

The following changes are proposed in the current ATA/ATAPI specification.

8.13 Identify Data

Table 20 – IDENTIFY DEVICE Information (continued)

Word	F/V	
84	F	x 1=Force unit access supported
87	V	x 1=Force unit access supported

8.13.45 Features/command sets supported
If bit x of word 84 is set to one, the device supports force unit access.

8.13.46 Features/command sets enabled
if bit x of word 87 is set to one, the device supports force unit access.

8.53 Write DMA FUA

8.53.4 Inputs

Register	7	6	5	4	3	2	1	0
Features	na	na	na	na	na	na	na	na
Sector Count	Sector count							
Sector Number	Sector number or LBA							
Cylinder Low	Cylinder low or LBA							
Cylinder High	Cylinder high or LBA							
Device/Head	obs	LBA	obs	DEV	Head Number or LBA			
Command	XXh							

8.54 Write DMA EXT FUA

8.54.4 Inputs

Register		7	6	5	4	3	2	1	0
Features	Current	na	na	na	na	na	na	na	na
	Previous (see note)	Reserved							
Sector Count	Current	Sector count (7:0)							
	Previous (see note)	Sector count (15:8)							
Sector Number	Current	LBA (7:0)							
	Previous (see note)	LBA (31:24)							
Cylinder Low	Current	LBA (15:8)							
	Previous (see note)	LBA (39:32)							
Cylinder High	Current	LBA (23:16)							
	Previous (see note)	LBA (47:40)							
Device/Head		obs	LBA	obs	DEV	Reserved			
Command		XXh							

8.55 Write DMA Queued FUA

8.55.4 Inputs

Register	7	6	5	4	3	2	1	0
Features	Sector Count							
Sector Count	Tag					na	na	na
Sector Number	Sector number or LBA							
Cylinder Low	Cylinder low or LBA							
Cylinder High	Cylinder high or LBA							
Device/Head	obs	LBA	obs	DEV	Head Number or LBA			
Command	XXh							

8.56 Write DMA Queued EXT FUA

8.56.4 Inputs

Register		7	6	5	4	3	2	1	0
Features	Current	Sector Count (7:0)							
	Previous	Sector Count (15:8)							
	(see note)								
Sector Count	Current	Tag					na	na	na
	Previous	Reserved							
	(see note)								
Sector Number	Current	LBA (7:0)							
	Previous	LBA (31:24)							
	(see note)								
Cylinder Low	Current	LBA (15:8)							
	Previous	LBA (39:32)							
	(see note)								
Cylinder High	Current	LBA (23:16)							
	Previous	LBA (47:40)							
	(see note)								
Device/Head		obs	LBA	obs	DEV	Reserved			
Command		XXh							

8.57 Write Multiple FUA

8.57.4 Inputs

Register	7	6	5	4	3	2	1	0
Features	na	na	na	na	na	na	na	na
Sector Count	Sector count							
Sector Number	Sector number or LBA							
Cylinder Low	Cylinder low or LBA							
Cylinder High	Cylinder high or LBA							
Device/Head	obs	LBA	obs	DEV	Head Number or LBA			
Command	XXh							

8.58 Write Multiple EXT FUA

8.58.4 Inputs

Register		7	6	5	4	3	2	1	0
Features	Current	na	na	na	na	na	na	na	na
	Previous	Reserved							
	(see note)								
Sector Count	Current	Sector count (7:0)							
	Previous	Sector count (15:8)							
	(see note)								
Sector Number	Current	LBA (7:0)							
	Previous	LBA (31:24)							
	(see note)								
Cylinder Low	Current	LBA (15:8)							
	Previous	LBA (39:32)							
	(see note)								
Cylinder High	Current	LBA (23:16)							

	Previous (see note)	LBA (47:40)				
Device/Head		obs	LBA	obs	DEV	Reserved
Command		XXh				

8.59 Write Sector(s) FUA

8.59.4 Inputs

Register	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
Features	na	na	na	na	na	na	na	na
Sector Count	Sector count							
Sector Number	Sector number or LBA							
Cylinder Low	Cylinder low or LBA							
Cylinder High	Cylinder high or LBA							
Device/Head	obs	LBA	obs	DEV	Head Number or LBA			
Command	XXh							

8.60 Write Multiple EXT FUA

8.60.4 Inputs

Register		**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
Features	Current	na	na	na	na	na	na	na	na
	Previous (see note)	Reserved							
Sector Count	Current Previous (see note)	Sector count (7:0) Sector count (15:8)							
Sector Number	Current Previous (see note)	LBA (7:0) LBA (31:24)							
Cylinder Low	Current Previous (see note)	LBA (15:8) LBA (39:32)							
Cylinder High	Current Previous (see note)	LBA (23:16) LBA (47:40)							
Device/Head		obs	LBA	obs	DEV	Reserved			
Command		XXh							