SET FEATURES: Set Profile subcommand

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Revision 7

Technical Editor:

Jim Hatfield
389 Disc Device
Longmont, CO 80503 USA
720-684-2120
James.C.Hatfield@seagate.com

(and)

Marty Stevens
Marty_Stevens@Dell.com
One Dell Way
Round Rock, TX 78682
512-728-9658

Document Status

Revision History		
Rev	**Date**	**Description**
0	February 1, 2007	Initial draft
1	February 2, 2007	Added definition of IDENTIFY DEVICE bits
2	March 28, 2007	Specified interaction with Power Management and Advanced Power Management feature sets
3	June 12, 2007	Incorporate review comments from April plenary; generalized into a facility to grant permissions for vendor-specific behaviours; retitled the proposal.
4	August 22, 2007	Generalized more, retitled the proposal, added a state machine
5	Oct. 03, 2007	Incorporated suggestions from Aug. 2007 plenary
6	August 1, 2008	Eliminated the state diagram, renamed to ‘set profiles’, added use of Enhanced Error Reporting feature set.
7	August 4, 2008	Added Marty Stevens (Dell) as co-author

1 Introduction

The management of device power management and performance may have significant impacts on a system. ACS does not offer the host fine control over these parameters, leaving the details of management mainly to a variety of vendor specific features within the device.

There are situations where a host application would like to influence the device's decision making without actually knowing or controlling the internals of the device operation. For example, a host may want to tell the device that high performance is required now, but that reduced performance is acceptable at other times.

A device may want information from the host as well. Different internal maintenance strategies could be used if the device knows that the host wants it to conserve power (e.g. on battery power) as opposed to if the device knows that it is connected to a plentiful power source (e.g. while charging).

2 Scope

This new feature is intended for inclusion in ACS-2.

3 Overview

A new SET FEATURES subcommand is proposed enabling the host to set profile profiles to the device to perform various types of vendor specific behaviours.

There are several policies defined here where the host informs the device of various profiles that may not be mutually exclusive.

1) Higher performance is preferred, even if the device consumes more energy.
2) Lower energy consumption is preferred, even if lower performance results.

Some examples of how this could be used are:

1) Green-conscious workplace
   a) low-energy state desktops
2) Roadwarrior
   a) At the end of a short flight, has battery life but needs performance to finish work before landing
   b) High energy state notebook
3) Media center
   a) Needs a responsive system, but low energy when playing movies
4) Typical laptop
   a) Low-energy state notebook, with occasional periods of background activity to enhance reliability.

4 Changes to ACS

4.1 Changes to clause 4

4.1.1 Set Profile Feature set

The Set Profile feature set allows the host to specify a usage profile to the device.

The SET FEATURES 'Set Profile' subcommand makes profile selections that are valid until the next power-on reset (see [Editors note: add xref to 7.48.new]). SCT Feature Control allows the host to change the power-on default profile selections (see [Editors note: add xref to 8.3.5]). The IDENTIFY DEVICE command indicates support of this feature, the current selection, and the power-on default selection.

The device shall attempt to satisfy the profiles to the best of its abilities in a vendor specific manner. The device may behave in a non-preferred manner, but shall notify the host on entry to such a mode of operation (see Table 1).

Table 1 - Device Action on entering a non-preferred profile mode

Enhanced Error Reporting feature set	**Device Action**
Supported	Return a Unit Exception error (see Table 3) in response to the next command received from the host. If REQUEST SENSE DATA EXT is the next command, the device shall return the following information in the normal outputs. Sense Key = TBD ASC/ASCQ = TBD
Not supported	Unspecified

4.2 Changes to clause 7

4.2.1 Changes to DCO

None

4.2.2 Changes to SCT Feature Control

4.2.2.1 (Add new row to Table 89)

Table 89 — Feature Code List

Feature Code	State Definition
TBD Z	The value in State sets the power-on defaults for the Set Profile feature set. State shall be set to a value that is valid for the SET FEATURES 'Set Profile' subcommand LBA(7:0) field (see [Editors note: add xref to 7.48.new]).

4.2.3 Changes to IDENTIFY DEVICE data

Word	OM	SP	FV	Description
TBD A	M		F	Supported Selections TBD 1 1=Set Profile feature set is supported
TBD D	O		V	15:8 Default Set Profile Selection 7:0 Current Set Profile Selection

TBD A Supported Selections

If bit TBD1 is set to one, then the Set Profile feature set is supported.

TBD D Default Set Profile Selection

This is the default Set Profile feature set selection after processing a power-on reset (see **Error! Reference source not found.**).

TBD D Current Set Profile Selection

This is the current Set Profile feature set selection (see **Error! Reference source not found.**).

4.3 SET FEATURES - EFh, Non-Data

4.3.1.1 Description

Table 50 - SET FEATURES Feature field definitions

Value	Description
TBD3	Set Profile

7.48.new Set Profile

Subcommand code TBD3 allows the host to specify profiles to the device. Bits (7:0) of the LBA field in the SET FEATURES command specify the profiles requested (See Table 2). If the Set Profile feature is not supported (IDENTIFY DEVICE word TBD A, bit TBD1), the device shall return command aborted.

For Table 3, these definitions apply:

Importance of Low Power	Relative to other profiles, how important is it for the device to minimize power use?
Ave. Command Completion Time	Relative to other profiles, how important is it for the device to minimize average command completion times ?
Max. Command Completion Time	Relative to other profiles, how important is it for the device to minimize maximum command completion times ?
Importance of Best Device Health	Relative to other profiles, how important is it for the device to perform activities to maintain and protect its health, even it is at the expense of power and performance goals ?

Table 2 - System Use Profiles

Profile ID	Profile Name	Importance of Low Power when Idle	Average Command Completion Time	Maximum Command Completion Time	Importance of Best Device Health
00h	Use power on default.	vendor specific or saved by SCT Feature Control			
01h	System is not doing much work for the user.	higher	medium	medium	higher
02h	Active user manipulation of data and storage.	lower	medium	higher	higher
03h	System idle except for playing audio, video files	medium	medium	medium	lower
04h	Media profile, with fastest response to user	lower	higher	higher	higher
05h	Green profile, with short-term exception to quickly and save files and perform reliability	medium	medium	medium	medium
06h	Maximum power reduction at the possible risk of reduced device health	higher	medium	medium	lower
07h	Green profile, with better device health	higher	medium	higher	medium

Profile ID	Profile Name	Importance of Low Power when Idle	Average Command Completion Time	Maximum Command Completion Time	Importance of Best Device Health
08h to FFh	Reserved				

4.4 Changes to Normal and Error Outputs

4.4.1 Changes to Error Outputs

Add new error: Unit Exception Error

Table 3 - Unit Exception Error

Word	Name	Description
00h	Error	**Bit Description** 7:0 7Fh
01h	Count	Reserved
02h-04h	LBA	Reserved
05h	Device	**Bit Description** 15 Obsolete 14 N/A 13 Obsolete 12 Transport Dependent - See 11:8 Reserved
	Status	**Bit Description** 15:8 Reserved 7:6 Transport Dependent - See . 5 Device Fault - See 4 N/A 3 Transport Dependent - See . 2:1 N/A 0 Error - See

4.5 Changes to Annex A - Command Set Summary

4.5.1 Changes to the Historical Set Feature Code Assignments Table

Feature Code	Description	ATA Standard								
		1	2	3	4	5	6	7	8 ACS	ACS-2
TBD3	Set Profile	R	R	R	R	R	R	R	R	C

Key:

C = a defined command.
E = a retired command.
O = Obsolete.
R = Reserved, undefined in current specifications.
V = Vendor specific commands.

A = Reserved for assignment by the CompactFlash? Association.
F = If the device does not implement the CFA feature set, this command code is Vendor specific.
M = Reserved for the Media Card Pass Through Command feature set.
S = Reserved for Serial ATA.
T = Reserved for Technical Report T13/DT1696 (Time-Limited Commands).