Proposed Draft

Serial ATA International Organization

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Document History

Version	Date	Comments
0	7/1/2015	• Initial presentation. • Two version of v0 were released, this is the latest, and the only one presented. The next version will be v2
2	7/7/2015	• Editorial & format changes requested in 07/06/2015 digital meeting • Editorial changes requested by Harvey Newman • Added changes to 13.7.9.2.19 HARDWARE FEATURE CONTROL SUPPORTED bit
3	7/8/2015	• Editorial changes requested by Harvey Newman • Added 13.3.9 (sigh)
4	7/31/2015	• Editorial changes requested in 07/27 digital meeting • Additional bit/field and smallcap cleanup. Reworded table 104 introduction • Changed multiple IDENTIFY WORD bit descriptions to point to Identify Device Log Page bits • Added 13.7.9.3.12 and 13.7.9.3.13
5	8/3/2015	• Incorporated editorial changes from Harvey Newman. • Renamed Table 104. • Additional field and smallcap cleanup.
6	8/11/2015	• Member review, changed D201 to ECN089.

1 Introduction

There has been some confusion if DSS and DAS may be supported when Hardware Feature Control is not supported.

This lack of clarity is exacerbated by the historical intent of not reporting the enabled condition or the support of DSS and/or DAS. This ECN does not change this.

There are several places where the Serial ATA Revision 3.2 specification and the text of ratified TPR058v3_SATA32 could be clearer that the intent of the SET FEATURES Hardware Feature Control subcommands is that:

a) the SET FEATURES Hardware Feature Control Enable subcommand enables the defined extended behavior of the pin(s); and
b) the SET FEATURES Hardware Feature Control Disable subcommand disables the extended behavior (and does not affect the defined default behavior).

Efforts have been made to only change text, without changes to command names or field names.

2 Technical Specification Changes Documention

The following additions are based on the content of Serial ATA Revision 3.2 and ratified TPR058v3_SATA32. Proposed additions to Serial ATA Revision 3.2 text are marked in blue underline. Proposed deletions to Serial ATA Revision 3.2 text are marked in ~~red strikethrough~~. Black text is the original Serial ATA Revision 3.2 text. Section headers correspond to the section in Serial ATA Revision 3.2 into which the proposed text is to be inserted.

The changes (with context) are:

4.1.1.66 Hardware Feature Control pin(s)

For the LIF-SATA connector, Hardware Feature Control (See 13.10) are connector pins P8 and P21. For the 1.8 inch Micro SATA connector, Hardware Feature Control is connector pin P7. For all other connectors Hardware Feature Control is connector pin P11.

6.13 Hardware Feature Control (optional)

6.13.1 Behavior

6.13.1.1 Behavior overview

Prior to processing a SET FEATURES Enable Hardware Feature Control (see 13.3.9) subcommand, the Hardware Feature Control pin(s) (see 4.1.1.66) operate ~~operates~~ using the default behavior in accordance with 6.13.1.2. Otherwise the Hardware Feature Control pin(s) operate ~~operates~~ using the extended behavior in accordance with 6.13.1.3.

6.13.1.2 Default behavior

There are two hardware control features listed as:

a) Disable Staggered Spinup (DSS); and
b) Device Activity Signal (DAS) (e.g., light emitting diode (LED)).

<Editor's Note: TPR058v3 addition of 'and Table 123' is included in black below.>

Due to various hardware issues, these features are mapped onto different physical pins depending on the connecter type as indicated in Table 41 and Table 123. Not all features are defined for all connecter types.

Table 41 – Default uses of DSS and DAS for various connectors

Standard Connector (3.5 inch & 2.5 inch)	1.8 inch Micro SATA Connector [a]	LIF-SATA Connector
Pin 11: a) DSS; orand b) DAS.	Pin 7: a) DAS.	Pin 8: a) DSS; orand b) DAS.
[a] DSS is not defined for 1.8 inch Micro SATA Connector.		

The A Hardware Feature Control pin, (i.e., pins P11, P7, or P8 depending upon connectorsee Table 41) may be used by the device to provide the host with an activity indication and it may be used by the host to indicate whether staggered spinup should be used. To accomplish both of these goals, the a Hardware Feature Control pin (see Table 41) acts as an input from the host to the device prior to PHYRDY for staggered spinup control and then acts as an output from the device to the host after PHYRDY for activity indication. The activity indication provided is primarily for use in backplane applications. See 13.15 for information on activity LED generation for desktop applications.

<Editor's Note: TPR058v3 addition of 'host or' is included in black below>

A host or device may optionally support activity indication, staggered spinup control, or both features. If neither feature is supported, then pin P11, P7, or P8 depending upon connector is a no connect at the device as specified in Table 5.

6.13.1.3 Extended behavior

The Hardware Feature Control pin(s) may be used by the device for one of the following:

a) default use of the Hardware Feature Control pin(s) (see 6.13.1.2);
b) Direct Head Unload (DHU) (see 6.13.2 , 13.10, and 13.19); or
c) vendor specific use (see 13.10).

13.3.9 Enable Hardware Feature Control

A Count COUNT field (7:0) value of 08h is used by the host to enable the extended uses of the Hardware Feature Control pin(s). See 13.1013.19 for additional information about Hardware Feature Control.

The extended uses of the Hardware Feature Control pin(s) shall be disabled by power-on reset.

LBA(15:0) contains a function identifier (see Table 104)Table 104 defines function identifiers used to enable specific extended uses of the Hardware Feature Control pin(s) in the LBA field (15:0) of the Enable Hardware Feature Control command.

Table 104 – Extended Uses of the Hardware Feature Control pin(s) definitions

LBA(15:0)Function Identifier	Description	Preserved Across Software Reset	Preserved Across COMRESET
0000h	Reserved	na	na
0001h	Direct Head Unload (DHU) (see 13.19)	Y	Yes, regardless of SSP setting
0002h to EFFFh	Reserved	na	na
F000h to FFFFh	Vendor specific	Vendor specific	Vendor specific

On successful completion of this command:

a) the CURRENT HARDWARE FEATURE CONTROL IDENTIFIER Current Hardware Feature Control Identifier field (see 13.7.9) shall be set to the value in the LBA field (15:0);

b) the HARDWARE FEATURE CONTROL ENABLED bit (see 13.7.9.3.6)~~IDENTIFY DEVICE data Word 79, bit 5~~ shall be set to one; and
c) the behavior of Hardware Feature Control pin(s) is specified by Table 104.

The device shall return command aborted if:

a) the HARDWARE FEATURE CONTROL SUPPORTED bit (see 13.7.9.2.19)~~IDENTIFY DEVICE data Word 78 bit 5~~ is cleared to zero;
b) the value in the LBA field (15:0) is not equal to the SUPPORTED HARDWARE FEATURE CONTROL IDENTIFIER field~~Supported Hardware Feature Control Identifier~~ (see 13.7.9.3.13); or
c) the CURRENT HARDWARE FEATURE CONTROL IDENTIFIER field~~Current Hardware Feature Control Identifier~~ (see 13.7.9.3.12) is non-zero.

13.7.9.2.19 HARDWARE FEATURE CONTROL SUPPORTED bit

If the HARDWARE FEATURE CONTROL SUPPORTED bit is set to one, then the device supports the extended uses of the Hardware Feature Control pin(s) ~~(see 6.13)~~ (see 13.10). If the HARDWARE FEATURE CONTROL SUPPORTED bit is cleared to zero, then the extended uses of the Hardware Feature Control pin(s) are ~~is~~ not supported and the HARDWARE FEATURE CONTROL ENABLED bit is ~~shall be~~ cleared to zero (see 13.10).

IDENTIFY DEVICE data Word 78 bit 5 is a copy of this bit~~field~~.

13.7.9.3.6 HARDWARE FEATURE CONTROL ENABLED bit

If the HARDWARE FEATURE CONTROL ENABLED bit is set to one, then device support for the extended uses of the Hardware Feature Control ~~feature~~ pin(s) (see 13.10) ~~is~~ are enabled. If the HARDWARE FEATURE CONTROL ENABLED bit is cleared to zero, then:

a) the extended uses of the Hardware Feature Control pin(s) are~~is~~ disabled; and
b) the default uses of the Hardware Feature Control pin(s) are not affected (see 13.10).

IDENTIFY DEVICE data Word 79 bit 5 is a copy of this bit~~field~~.

13.7.9.3.12 CURRENT HARDWARE FEATURE CONTROL IDENTIFIER ~~bit~~field

If the CURRENT HARDWARE FEATURE CONTROL IDENTIFIER ~~bit~~ field is non-zero, then Table 104 describes the curent Hardware Feature Control behavior. If the CURRENT HARDWARE FEATURE CONTROL IDENTIFIER field is cleared to zero, then the current Hardware Feature Control behavior shall be ~~either~~ DSS, ~~or~~ DAS, or neither.

13.7.9.3.13 SUPPORTED HARDWARE FEATURE CONTROL IDENTIFIER ~~bit~~field

The SUPPORTED HARDWARE FEATURE CONTROL IDENTIFIER ~~bit~~ field (see Table 104) indicates the value that is permitted for the CURRENT HARDWARE FEATURE CONTROL IDENTIFIER ~~Current Hardware Feature Control Identifier~~ field.

13.10 Hardware Feature Control (optional)

In Serial ATA Revision 3.0 and previous specifications, a Hardware Feature Control pin is defined only for these uses:

a) Disable Staggered Spinup (i.e., DSS) (see 6.13.1.2 and 13.11); and
b) Activity indication LED (i.e., DAS) (see 6.13.1.2 and 13.15).

This specification defines additional uses for the Hardware Feature Control pin(s) (see 6.13). Table 123 specifies the pin(s) used by Hardware Feature Control for various connectors.

<Editor's Note: TPR058v3 addition of tablenote b is included in black below>

Table 123 – Pin(s) used by Hardware Feature Control

Standard Connector (3.5 inch & 2.5 inch)	1.8 inch Micro SATA Connector [a]	LIF-SATA Connector
Pin P11: a) DSS; b) DAS [b]; c) DHU [b]; or d) other vendor specific.	Pin P7: a) DAS [b]; b) DHU [b]; or c) other vendor specific.	Pin P8: a) DSS; b) DAS; or c) other vendor specific. Pin P21: a) DHU.
[a] DSS is not defined for 1.8 inch Micro SATA Connector. [b] Concurrent support of both DAS and DHU on the same pin is not permitted.		

If the extended uses of the Hardware Feature Control pin(s) are~~is~~ supported, then:

a) IDENTIFY DEVICE data Word 78 bit 5 (see 13.2.2.19) shall be set to one;
b) the SET FEATURES Enable~~Select~~ Hardware Feature Control subcommand shall be supported (see 13.3.9);
c) page 08h of the Identify Device Data log (see 13.7.9) shall be supported;
d) on processing a power on reset, then:
   A) IDENTIFY DEVICE data Word 79 bit 5 (see 13.2.2.20) shall be cleared to zero;
   B) the CURRENT HARDWARE FEATURE CONTROL IDENTIFIER~~Current Hardware Feature Control Identifier~~ field (see 13.7.9.3.12) in the Identify Device Data log shall be cleared to zero; and
   C) ~~See~~ see 6.13.1.2 for requirements of the default uses of the Hardware Feature Control pin(s);
   and
e) after processing a SET FEATURES Enable Hardware Feature Control subcommand with no error, then:
   A) IDENTIFY DEVICE data Word 79 bit 5 (see 13.2.2.20) shall be set to one;
   B) the CURRENT HARDWARE FEATURE CONTROL IDENTIFIER~~Current Hardware Feature Control Identifier~~ field (see 13.7.9.3.12) in the Identify Device Data log shall be non-zero;
   C) the SUPPORTED HARDWARE FEATURE CONTROL IDENTIFIER~~Supported Hardware Feature Control Identifier~~ field (see 13.7.9.3.13) in the Identify Device Data log shall be non-zero; and
   D) the behavior of the Hardware Feature Control pin(s) are~~is~~ specified by the SET FEATURES Enable Hardware Feature Control subcommand.

If the extended uses of the Hardware Feature Control pin(s) are ~~is~~ not supported, then:

a) IDENTIFY DEVICE data Word 79 bit 5 (see 13.2.2.20) shall be cleared to zero;
b) the SET FEATURES Enable~~Select~~ Hardware Feature Control subcommand shall not be supported (see 13.3.9);
c) the SUPPORTED HARDWARE FEATURE CONTROL IDENTIFIER~~Supported Hardware Feature Control Identifier~~ field (see 13.7.9.3.13) in the Identify Device Data log shall be cleared to zero;
d) the CURRENT HARDWARE FEATURE CONTROL IDENTIFIER~~Current Hardware Feature Control Identifier~~ field (see 13.7.9.3.12) in the Identify Device Data log shall be cleared to zero; and
e) ~~See~~see 6.13.1.2 for requirements of the default uses of the Hardware Feature Control pin(s).