

To: T10 Technical Committee
From: Rob Elliott, HP (elliott@hp.com)
Date: 8 April 2004
Subject: 04-082r1 SBC-2 Obsolete Notch and Partition mode page

Revision history

Revision 0 (5 March 2004) First revision (split off from 04-075r0)

Revision 1 (8 April 2004) Incorporated feedback from March 2004 CAP WG. Just obsolete the page for now rather than define a READ CAPACITY replacement. If a need for it still exists when 2 TB disk drives hit the market, a replacement can be added at that time.

Related documents

sbc2r13 - SCSI Block Commands - 2 revision 13

Overview

The **Notch and Partition mode page** contains these fields:

- a) NOTCHED DEVICE bit - 1 means the medium is notched
- b) LOGICAL OR PHYSICAL NOTCH bit - 0 means boundaries use cylinder and head, 1 means they use LBAs
- c) MAXIMUM NUMBER OF NOTCHES field - 2 bytes (unchangeable)
- d) ACTIVE NOTCH field - 2 bytes - defines the notch to which all mode page accesses apply
- e) STARTING BOUNDARY field - 4 bytes (unchangeable) - 4 byte LBA if LPB=1, 3 byte cylinder and 1 byte head if LPB=0
- f) ENDING BOUNDARY field - 4 bytes (unchangeable) - 4 byte LBA if LPB=1, 3 byte cylinder and 1 byte head if LPB=0
- g) PAGES NOTCHED field - 8 bytes (unchangeable) - bit map of mode pages that may be different for different notches

Issues:

- a) Cylinder/head/sector values are rapidly becoming obsolete in the rest of SBC-2. If LOGICAL OR PHYSICAL NOTCH bit is set to 0, the STARTING BOUNDARY field and ENDING BOUNDARY field are not big enough to contain real values for a >2 TB medium and would contain fake values.
- b) The STARTING BOUNDARY field and ENDING BOUNDARY field do not support 8 byte LBAs
- c) The PAGES NOTCHED field introduces the possibility that mode pages don't apply to the whole logical unit, just the "active notch," a mode page policy not comprehended by SPC-3. It doesn't support mode subpages. The usefulness for this field seems to be gone. The Format Device mode page, particularly the SECTORS PER TRACK field, used to be the key mode page affected by ACTIVE NOTCH field, but that mode page is obsolete in SBC-2. Some parallel SCSI drives also marked the Disconnect-Reconnect mode pages so the READ BUFFER FULL RATIO and WRITE BUFFER EMPTY RATIO fields could be zone specific; those fields are not very useful any more.
- d) The industry calls these zones, not notches
- e) When 2 TB drives exist, this whole concept may be obsolete as they become able to vary recording densities at smaller granularities and for different reasons than just basic geometry

For SBC-2, the page is proposed to be made obsolete. If need for such information arises in the future, it can be defined (e.g., 04-082r0 suggested a new READ CAPACITY option to return a list of zone boundaries).

Suggested changes

~~3.1.28 notch: All or part of the medium having a consistent set of geometry parameters. Notches are used to increase storage capacity by optimizing the number of bytes per track between the inner and outer tracks.~~

~~4.11 Notched devices~~

~~A notched (also known as zoned) device has areas of the medium with geometry changes. In the simplest case, the entire medium consists of a single notch. Multiple notches are often used to increase capacity of the device. On a disk, the inner tracks are physically shorter than the outer tracks. As a result, if each track is made to store the same number of data bits, the data is packed more densely on the inner tracks than the~~

outer tracks. By using notches, the outer tracks may contain a different number of sectors than the inner tracks, while balancing the data density. This results in increased capacity.

6.3.1 Mode parameters overview

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The mode page codes for direct-access devices are shown in table 1.

Table 1 — Mode page codes for direct-access devices

Mode page code	Description	Reference
00h	Vendor-specific (does not require page format)	
01h	Read-Write Error Recovery mode page	6.3.4
02h	Disconnect-Reconnect mode page	SPC-3
03h	Obsolete (Format Device mode page)	
04h	Obsolete (Rigid Disk Geometry mode page)	
05h	Obsolete (Flexible Disk mode page)	
06h	Reserved	
07h	Verify Error Recovery mode page	6.3.5
08h	Caching mode page	6.3.2
09h	Obsolete	
0Ah	Control mode page	SPC-3
0Bh	Obsolete (Medium Types Supported mode page)	
0Ch	Obsolete (Notch And Partition mode page)	6.3.3
0Dh	Obsolete	
0Eh - 0Fh	Reserved	
10h	XOR Control mode page	6.3.6
11h - 17h	Reserved	
18h	Protocol-Specific LUN mode page	SPC-3
19h	Protocol-Specific Port mode page	SPC-3
1Ah	Power Condition mode page	SPC-3
1Bh	Reserved	
1Ch	Informational Exceptions Control mode page	SPC-3
1Dh - 1Fh	Reserved	
20h - 3Eh	Vendor-specific (does not require page format)	
3Fh	Return all mode pages (valid only for the MODE SENSE command)	SPC-3

In some cases the mode pages do not apply to the entire logical unit. This is controlled by the Notch And Partition mode mode (see 6.3.3).

6.3.3 Notch And Partition mode page

The Notch And Partition mode page (see table 91) contains parameters for direct access devices that implement a variable number of blocks per cylinder and support this mode page. Each section of the block device with a different number of blocks per cylinder, than other sections, is referred to as a notch.

The parameters savable (PS) bit is only used with the MODE SENSE command. This bit is reserved with the MODE SELECT command. A PS bit set to one indicates that the device server is capable of saving the modepage in a non-volatile vendor-specific location.

A notched device (ND) bit set to zero indicates that the block device is not notched and that all other parameters in this mode page shall be returned as zero by the device server. A ND bit set to one indicates that the block device is notched. For each supported active notch value this mode page defines the starting and ending boundaries of the notch.

A logical or physical notch (LPN) bit set to zero specifies that the boundaries are based on the physical parameters of the block device. The cylinder is considered most significant, the head least significant. A LPN bit set to one specifies that the notch boundaries are based on logical blocks of the block device.

The MAXIMUM NUMBER OF NOTCHES field indicates the maximum number of notches supported by the logical unit. This field shall be reported as unchangeable.

The ACTIVE NOTCH field indicates the notch to which this and subsequent MODE SELECT and MODE SENSE commands shall refer, until the active notch is changed by a subsequent MODE SELECT command. The value of the active notch shall be greater than or equal to 0000h and less than or equal to the maximum number of notches. An active notch value of zero indicates that this and subsequent MODE SELECT and MODE SENSE commands refer to the parameters that apply across all notches.

The STARTING BOUNDARY field indicates the beginning of the active notch or, if the active notch is zero, the beginning boundary of the logical unit. If the LPN bit is set to one, then the four bytes represent an LBA. If the LPN bit is set to zero, then the three most significant bytes shall represent the cylinder number and the least significant byte shall represent the head number. This field shall be reported as unchangeable. When used with the MODE SELECT command this field is ignored.

The ENDING BOUNDARY field indicates the ending of the active notch or, if the active notch is zero, the ending of the logical unit. If the LPN bit is set to one, then the four bytes represent an LBA. If the LPN bit is set to zero, then the three most significant bytes shall represent the cylinder number and the least significant byte shall represent the head number. This field shall be reported as unchangeable. When used with the MODE SELECT command this field is ignored.

Each notch shall span a set of consecutive logical blocks on the block device, the notches shall not overlap, and no logical block shall be excluded from a notch.

The PAGES NOTCHED field is a bit map of the mode page codes that indicates mode pages that contain parameters that may be different for different notches. The most significant bit of this field corresponds to PAGE CODE 3Fh and the least significant bit corresponds to PAGE CODE 00h. If a bit is set to one, then the corresponding mode page contains parameters that may be different for different notches. If a bit is set to zero, then the corresponding mode page contains parameters that are constant for all notches. This field shall be reported as unchangeable.