

## **Proposal of rules for C/H/S and LBA calculation**

**To: X3T13 Technical committee**  
**From: Dan Colgrove, IBM Corporation**  
**Phone: 408-256-1978**  
**Fax: 408-256-1044**  
**Email: colegrove@vnet.ibm.com**

**and**

**Mark Evans, Quantum Corporation**  
**Phone: 408-894-4019**  
**Fax: 408-894-4990**  
**Email: mevans@qntm.com**

**Date: 28 March 1997**  
**Subj: Proposal of rules for C/H/S and LBA calculation**  
**for inclusion in ATA/ATAPI-4**

### **Introduction:**

The following is a proposal for inclusion into ATA/ATAPI-4 of additional explicit rules for determining the cylinder/head/sector and logical block addressing values returned in the IDENTIFY DEVICE data, including the interaction of INITIALIZE DEVICE PARAMETERS and SET MAX ADDRESS.

**Notes for the rules that follow:**

- a) The following is a list of variables and constants from IDENTIFY DEVICE data used in these rules:

C	=	Word 1 (number of default logical cylinders)
H	=	Word 3 (number of default logical heads)
S	=	Word 6 (number of default logical sectors)
Cip	=	Word 54 (number of cylinders in the current translation)
Hip	=	Word 55 (number of heads in the current translation)
Sip	=	Word 56 (number of sectors in the current translation)
I5758	=	Words 57-58 (current capacity in sectors)
I6061	=	Words 60-61 (total number of user addressable sectors in LBA mode)

- b) All results of divisions are integers with the remainder discarded.
- c) If a SET MAX ADDRESS command specifies the C/H/S mode, then the logical cylinder, head and sector values set by the host in the task file for the command specify the maximum ADDRESS to be used by the device for C/H/S. These ARE NOT the specific maximum cylinder, head and sector values to be used by the device.

**1. Rules for IDENTIFY DEVICE information**

- a) At power on  $Cip = C$ ,  $Hip = H$  and  $Sip = S$
- b)  $I5758 = Cip * Hip * Sip$
- c)  $I6061 \geq I5758$
- d)  $(I6061 - I5758) < Hip * Sip$
- e) Only INITIALIZE DEVICE PARAMETERS may change Hip and Sip
- f) Only SET MAX ADDRESS may change C and I6061
- g) Only IDP and SET MAX may change Cip

**2. Rules for after a successful INITIALIZE DEVICE PARAMETERS**

- a) C, H, S and I6061 are unchanged
- b) Hip and Sip are as specified in the IDP command
- c)  $Cip = I6061 / (Hip * Sip)$
- d)  $I5758 = Cip * Hip * Sip$

**3. Rules for after a successful SET MAX ADDRESS using CHS addressing**

- a) H, S, Hip and Sip, are unchanged
- b) Cip is as specified in the SET MAX command
- c)  $I5758 = Cip * Hip * Sip$
- d)  $I6061 = I5758$
- e)  $C = I6061 / (H * S)$

**4. Rules for after a successful SET MAX ADDRESS using LBA addressing**

- a) H and S are unchanged
- b) I6061 is as specified in the SET MAX command
- c)  $C = I6061 / (H * S)$
- d)  $Cip = I6061 / (Hip * Sip)$

**5. Rules for READ NATIVE MAX ADDRESS after a successful INITIALIZE DEVICE PARAMETERS**

- a) Returns Native I6061 in LBA address mode
- b) Returns C, Hip and Sip in CHS address mode, where  $C = (Native\ I6061) / (Hip * Sip)$