

Date: May. 1, 1996  
To: X3T10 Committee  
From: Gerry Houlder, Seagate Technology  
Subj: Change action for zero in programmable capacity feature

Someone has pointed out that the current programmable capacity algorithm (which was accepted for inclusion in SPC at the January 1996 X3T10 plenary) causes big problems for devices that always return zeros in the Number of Blocks field. The problem goes like this:

- 1) The drive is set to a capacity lower than the maximum possible because the customer desires that capacity.
- 2) The initiator does MODE SENSE to get current settings for a mode page. The returned data includes the block descriptor (with zeros in the Number of Blocks field).
- 3) The initiator clears the reserved bits in bytes 0, 1, 2 of the header and the PS bit in the page code byte. It also changes the desired parameter in the mode page.
- 4) The initiator sends MODE SELECT with the new mode page data. This results in the new mode data being set, but it also results in the capacity changing to its maximum. This change is not desired by the customer.

If the drive returns zeros in the Number of Blocks field regardless of its actual capacity, it is troublesome to do any MODE SELECT commands that don't alter the capacity. One method is to use the DBD bit in MODE SENSE so the block descriptor isn't returned. The other method is to do a READ CAPACITY command and use the returned Last LBA information to fill in the Number of Blocks field of the MODE SELECT data (I don't recommend this, but it does work). Of course, any change at all is bad for the customer because a large amount of software already in the field would need to be replaced.

A better solution is to change the programmable capacity algorithm so that the current capacity is retained when zero is sent in the Number of Blocks field. This also means that a value of 0xFFFFFFFF must be specified as the way to force the drive to its maximum capacity.

The next page shows the existing wording and the proposed wording changes to accomplish this.

The existing wording (which has been accepted for SCSI-3) is as follows:

*If the device supports changing its capacity by changing the number of blocks field, then the number of blocks field is interpreted as follows:*

- a) If the number of blocks is set to zero, the device shall be set to its maximum capacity. If the block size has not changed, the device shall not become format corrupted. This capacity setting shall be retained through reset events or power cycles.*
- b) If the number of blocks is greater than zero and less than or equal to its maximum capacity, the device shall be set to that number of blocks. If the block size has not changed, the device shall not become format corrupted. This capacity setting shall be retained through reset events or power cycles.*
- c) If the number of blocks field is set to a value greater than the maximum capacity of the device then the command is terminated with a CHECK CONDITION status, the sense key is set to ILLEGAL REQUEST.*

The new proposed wording will be as follows (changes are in bold):

If the device supports changing its capacity by changing the number of blocks field, then the number of blocks field is interpreted as follows:

- a) If the number of blocks is set to zero, **the device shall retain its current capacity if the block size has not changed. If the number of blocks is set to zero and the block size has changed the device shall be set to its maximum capacity when the new block size takes effect.**
- b) If the number of blocks is greater than zero and less than or equal to its maximum capacity, the device shall be set to that number of blocks. If the block size has not changed, the device shall not become format corrupted. This capacity setting shall be retained through reset events or power cycles.
- c) If the number of blocks field is set to a value greater than the maximum capacity of the device **and less than FFFFFFFFh** then the command is terminated with a CHECK CONDITION status, the sense key is set to ILLEGAL REQUEST.
- d) If the number of blocks field is set to FFFFFFFFh, the device shall be set to its maximum capacity. If the block size has not changed, the device shall not become format corrupted. This capacity setting shall be retained through reset events or power cycles.**