Maxtor Corporation
500 McCarthy Boulevard
Milpitas, CA 95035 USA

To: **T10 CAP Working Group**
Contact: **Mark Evans**
Phone: 408-894-5310
Email: mark_evans@maxtor.com
Date: **19 December 2003**

Subject: **SPC-3 and SBC-2 power conditions clarifications**

Introduction

The following clarifies issues with power conditions for logical units and how these affect target devices. This proposal is based on SPC-3 revision 16 and SBC-2 revision 11.

1) In SPC-3: Update the first part of clause 5.9.1 to be as follows:

5.9.1 Power conditions overview

The optional Power Condition mode page (see 7.4.12) allows an application client to ~~modify the behavior~~ control the power condition of a ~~target port and/or~~ logical unit in a manner that may reduce power consumption of the SCSI target device. This ~~behavior modification~~ control is invoked by enabling and setting the idle condition timer and/or the standby condition timer using the mode page. A change in the power condition of any logical unit in a target device may result in a change in the target device's power consumption.

In addition to the Power Condition mode page, the power condition of a ~~target port and/or~~ logical unit may be controlled by the START STOP UNIT command (see SBC-2 or RBC). If both the Power Condition mode page and the START STOP UNIT command methods are being used to control the power condition of the same ~~target port and/or~~ logical unit, then any START STOP UNIT command's power condition specification shall override the Power Condition mode page's power control and may disable the idle condition and standby condition timers.

There shall be no notification to the application client that a ~~target port and/or~~ logical unit has transitioned from one power condition to another. An application client may determine the current power condition of a logical unit by issuing a REQUEST SENSE command (see 6.25).

No power condition shall affect the supply of any power required for proper operation of the service delivery subsystem.

Logical units that contain cache memory shall write all cached data to the medium for the logical unit (as a logical unit would do in response to a SYNCHRONIZE CACHE command as described in SBC-2) prior to entering into any power condition that prevents accessing the media (e.g., before a hard drive stops its spindle motor during transition to the standby power condition).

Table 35 describes the power conditions.

Table 35 — Power condition description

Power condition	Description
active	While in the active power condition: a) a device server is capable of responding to all of its supported commands including media access requests; b) a logical unit completes processing of operations in the shortest time when compared to the time required for completion while in the idle or standby power conditions; and c) ~~a logical unit~~ the SCSI target device may consume more power than when ~~in~~ the logical unit is in the idle or standby power conditions (e.g., a disk drive's spindle motor may be active).
idle	While in the idle power condition: a) a device server is capable of responding to all of its supported commands including media access requests; b) a logical unit may take longer to complete processing a command than it would while in the active power condition (e.g., the device may have to activate some circuitry before processing a command); and c) ~~a logical unit~~ the SCSI target device may consume less power than when ~~in~~ the logical unit is in the active power condition.
standby	While in the standby power condition: a) device server is not capable of processing media access commands; and b) ~~a logical unit~~ the SCSI target device may consume less power than when ~~in~~ the logical unit is in the idle power condition (e.g., a disk drive's spindle motor is stopped).

.....

2) In SPC-3: Update the first four paragraphs in clause 7.4.12 to be as follows:

7.4.12 Power Condition mode page

The Power Condition mode page provides an application client methods to control the power condition of a ~~target port and/or~~ logical unit (see 5.9). These methods include ~~causing~~ :

a) specifying that the ~~target port and/or~~ logical unit ~~to~~ transition to a ~~specified~~ power condition without delay; and
b) activating and setting of idle condition and standby condition timers to specify that the logical unit wait for a period of inactivity before transitioning to a specified power condition.

When a device server receives a command while in a power condition based on a setting in the Power Condition mode page, the logical unit shall transition to the power condition that allows the command to be processed. If either the idle condition timer or the standby condition timer has been set, they shall be reset on receipt of the command. On completion of the command, the timer(s) shall be started.

Logical units that contain cache memory shall write all cached data to the medium for the logical unit (as a logical unit would do in response to a SYNCHRONIZE CACHE command as described in SBC-2) prior to entering into any power condition that prevents accessing the media (e.g., before a hard drive stops its spindle motor during transition to the standby power condition).

The logical unit shall use the values in the Power Condition mode page to control its power condition after a power on or a hard reset until a START STOP UNIT command setting a power condition is received.

.....

3) In SBC-2: Update the first paragraph in clause 4.2.4.1 to be as follows:

4.2.4.1 START STOP UNIT and power conditions overview

The START STOP UNIT command (see 5.2.22) allows an application client to control the power condition of a logical unit in a manner that may reduce power consumption of the SCSI target device. Th~~ise behavior modification~~control methods include~~s~~ specifying that the device server enable or disable the block device for media access operations by controlling certain power conditions and timers. A change in the power condition of any logical unit in a target device may result in a change in the target device's power consumption.

.....

4) In SBC-2: Update the first paragraph in clause 5.2.22 to be as follows:

5.2.22 START STOP UNIT command

The START STOP UNIT command provides an application client a method to control the power condition of a logical unit (see 4.2.4). This method includes specifying that the logical unit to transition to a power condition~~device server enable or disable the block device for media access operations by controlling certain power conditions and timers~~.

.....

4) In SBC-2: Change the description of LU_CONTROL in table 59 in clause 5.2.22 (POWER CONDITIONS field) to be as follows:

7h	LU_CONTROL	Transfer control of power conditions to the ~~block device~~ logical unit.