Green Features for SCSI

SCSI and SATA Power Mode Definitions

–Not specific in the Standards – Actual behaviors are vendor specific

- ACTIVE – Normal operation
- IDLE – Lower power than ACTIVE, longer response time than ACTIVE
- STANDBY – Lower power than IDLE, longer response time than IDLE
- SLEEP – Lowest power mode (drive spun down), but can be restarted on command. Response time similar to initial power on

–While typically implemented in SATA desk top and notebook drives, SCSI/FC/SAS drives have typically not implemented these in the past

- Opportunity for more standardized behaviors?

SCSI – SATA Power Mode Mappings

Description	SCSI	SATA
Active	Normal operation	Normal operation
Enter IDLE mode after timer expires	Mode Page 1Ah	IDLE features
Enter IDLE mode on command	START-STOP command, power condition code 2h	IDLE IMMEDIATE
Enter STANDBY mode after timer expires	Mode page 1Ah	STANDBY features
Enter STANDBY mode on command	START-STOP command, power condition code 3h	STANDBY IMMEDIATE
Start/Stop spinning	START-STOP command	Can be include in one of the above modes, APM, or directed by SLEEP command
Reduce Phy power, <10uS recovery	In discussion in T10 for SAS	PARTIAL, independent of other modes, vendor unique policy
Reduce Phy power to min, <10mS recovery	In discussion in T10 for SAS	SLUMBER, independent of other modes, vendor unique policy
Everything shut down except PHY OOB receiver to restart	In discussion in T10 for SAS	
Low power seek modes and multiple operational spin speeds	Could be implemented in vendor unique Mode Page 00h	No direct equivalent, could be included in APM
Advanced Power Mode (APM)	No direct equivalent	Definitions are vendor unique

What needs to be done?

–Need to do a better job of utilizing existing power options

- See White Paper 08-100r0
- Improve alignment of SATA/SAS features (APM?)

–For SAS 2.1

- Addition of Phy power modes 08-015r1

–For consideration in SAS 3

- Turn off Phys between expanders when not in use
- Switch links to lower speeds if utilization is low
- Enable the scaling back of clock speeds internal to expanders and controllers if activity/throughput is low (similar to power savings modes for notebooks)