To: T10 Technical Committee
From: Rob Elliott, HP (elliott@hp.com)
Date: 28 January 2008
Subject: 08-094r0 Minutes of UAS (USB Attached SCSI) WG teleconference 080128

Revision history

Revision 0 (28 January 2008) First revision

Attendance

The following people attended the teleconference, which ran from 5pm-6pm Central Time:

> Curtis Stevens, WD (UAS editor)
> Mike Fitzpatrick, Fujitsu
> Rob Elliott, HP
> Steve McGowen, Intel
> Jim Bovee, Microsoft
> Tim Symons, PMC-Sierra
> John Geldman, Lexar Media
> Michael George, Lexar Media
> Donald Rich, SanDisk
> Yoni Shternhell, SanDisk
> Martin Furuhjelm, Seagate
> Gerry Houlder, Seagate

Meeting results

1. USB MSC Bulk-Only Transport overview

Curtis Stevens (WD) reviewed the Universal Serial Bus Mass Storage Class Bulk-Only Transport, available at http://www.usb.org/developers/devclass_docs/usbmassbulk_10.pdf.

1) the SCSI CDB is wrapped in a Command Block Wrapper (CBW) and sent to the device;
2) after processing, data is transferred to or from the device; and
3) finally, transport status is returned in a Command Status Wrapper (CSW). This only reports Command Passed (i.e., GOOD status), Command Failed, or Phase Error; it does not return a full SCSI status byte or SCSI sense data.

2. Goals for UAS

Curtis reviewed the goals for the project. They were originally set out in:

a) 07-461r1 T10 USB Queuing Transport study group introduction (Rob Elliott, HP)
b) 07-400r1 USB Attached SCSI (UAS) project proposal (Curtis Stevens, WD)

The key goals are to add support for multiple commands outstanding (i.e., **queuing**) and return **full SCSI status and sense data**.

Jim Bovee (Microsoft) requested that **asychronous notification** be included. If media is reported as removable, the Microsoft Windows USB storage stack sends a TEST UNIT READY command to the device every second. It would be better to let the device provide notification. Serial ATA offers this feature.

Gerry Houlder (Seagate) noted that asynchronous event notification was removed from the SCSI Architecture Model a few years ago due to lack of support by SCSI transport protocols and usage by devices. Serial Attached SCSI - 2 (SAS-2), however, recently added Broadcast (Asynchronous Event) which restores this capability.

There are two events requiring notification to the SCSI application layer:

a) the USB disconnect event (e.g., for a USB drive that is removed). The device itself cannot report this (it's disconnected) but the initiator needs to notify the application somehow; and
b) a card reader needs to report that a card being removed (but the card reader is still present). The device can report this.

John Geldman (SanDisk) asked that **performance** be added to the list. The WG should investigate why current USB 2.0 devices cannot reach a significant percentage of 48 MBps. If that is not understood, then we might not improve things.

Steve Bovee (Intel) theorized that software involvement between every step is probably the main impediment. Early on in USB 2.0 development, test devices were created that were able to hit 45 MBps. Martin Furuhjelm (Seagate) has discussed this with Rahman Ismail from Microsoft, and has heard of measurements of 600 microsecond overhead for each 10 millisecond data transfer. With USB 3.0, if the data transfer drops to 1 millisecond but the overhead remains 600 microseconds, it will become very significant.

John Geldman replied that he's seem traces with 250 microseconds for command + status transfers and 2.6 milliseconds for read data transfers. This 8% overhead means the bus should be able to run at be at about 41 MBps. Writes increase the overhead to 14%.

Curtis Stevens suggested that UAS be designed so the HBA drivers can fit into **standard SCSI stacks** (e.g., Microsoft Windows StorPort) to take advantage of normal SCSI performance and error handling. There was no disagreement with that assertion.

Gerry Houlder asked for confirmation that UAS is just a **transport protocol**, not a new command set like RBC. There was no disagreement with that assertion.

Martin Furuhjelm suggested that devices must be able to implement **both the current and the new protocol**. There was no disagreement with that assertion (the project proposal uses the phrase "[UAS] does not interfere with the USB MSC bulk-only transport").

3. UAS organization

Curtis discussed the major sections of the standard.

a) backward compatibility
b) command delivery (e.g., IU formats)
c) data transfers
d) status delivery

The WG added:

e) Asynchronous notification
f) Model section (e.g., covering addressing)
g) Virtualization. The WG discussed multiple initiators and virtualization without concluding what we want yet. John Geldman reported that the IEEE 1669 Standard Protocol for Authentication in Host Attachments of Transient Storage Devices" (device locking) ran into some "fun" problems with features like this.

4. Meeting schedule

As authorized by the January 2008 T10 plenary (08-062r0), there will be a meeting in Atlanta, GA on Wednesday 6 February 2008 from 1pm-3pm at the DoubleTree Hotel Atlanta Buckhead. Curtis Stevens will host the meeting. A conference phone may or may not be available.

> NOTE 1 - This is scheduled to follow the USB Implementer's Forum (USB-IF) Device Working Group (DWG) Mass Storage meeting (which is scheduled for 10am-12pm and is only open to USB-IF members).