T10 Meeting Week at: Antlers Hilton Hotel
4 South Cascade Avenue
Colorado Springs, Colorado 80903
Hosted by LSI Logic (John Lohmeyer)

1.0 Opening Remarks

The Mt Fuji organization met on Monday (11 July) and did not complete all discussions. The MMC WG offered the morning of 12 July for Mt Fuji to finish business.
The MMC WG meeting convened at 1PM, 12 July.

2.0 Introductions

The following people were present at the meeting:

HLDS	Kenji Tokumitsu
HP	David Hanes
LITE-ON IT	Renee Chen
Microsoft	Emily Hill
Microsoft	David Walp
NEC	Akio Yamazaki
NEC	Motofumi Ninomiya
Nero	David Burg
Panasonic	Takaharu Ai
Philips	Bill McFerrin
Pioneer	Keiji Katata
Pioneer	Toshiro Tanikawa
Pioneer	Takeshi Kohda
Ricoh	Masaetsu Takahashi
Software Architects	Delroy E. Miller
Sonic Solutions	Ben Morrelli
Sony	Norichika Mine
Toshiba	Hideki Takahashi
Toshiba	Shunsuke Kimura
Toshiba	Atsushi Ishihara
Seagate	Gerry Houlder
Ulead	Alex Huang

3.0 Document Distribution

Bill McFerrin distributed the following:

4.0 Call for Patents

None.

5.0 Approval of Agenda

No changes

6.0 Old Business

6.1 Unspecified Behavior

During May and June there have been some e-mail discussion of drive behavior under certain corner cases. We have simply made the questions known to the membership, listed the possibilities for specification in each case. The WG has requested proposals for resolution.

Question 1: The description of the READ TRACK INFORMATION Command for the case where Track Number = 0 is described in MMC-2, 3, and 4 for the CD case. For other discs, what is the preferred behavior?

A. Respond with CHECK CONDITION and set SK/ASC/ASCQ to ILLEGAL REQUEST/INVALID FIELD IN CDB.

B. Return a Track Information Block...what is the specificationof the contents?

Question 1 remains unresolved.

Question 2. A new feature of the READ TRACK INFORMATION Command provides for locating Open Logical Tracks. When the CDB specifies Track Number = T and the new Open bit = 1, the drive should report the TIB for the track, TO, where TO is the smallest track number such that TO is open and TO >= T. What happens if TO does not exist?

This question has already been resolved, but MMC-5 does not document it clearly.

Correct behavior: The Drive shall return TIB with Track Number set to 0xFFFF, Session Number set to 0xFFFF and all other fields set to zeros.

Question 3: Is permitted to create the condition where no track is incomplete./invisible? One case: Is it permitted to issue RESERVE TRACK for all of the remaining disc capacity?

The general consensus of those present at the meeting is that this is permitted on all media types that implement a track/session model. Additional questions persist about permanence:

A. Does the CD track become specified in PMA? i.e. Is reservation permanent?

B. Does DVD+R fragment become specified in TOC zone? i.e. Is reservation permanent?

C. Does DVD-R/HD DVD-R rzone become specified in RMD? i.e. is the reservation permanent?

Question 4: If the incomplete/invisible track is completely written, does it attain "closed" status?

Testing done by David Hanes on various existing drives (CD-R, DVD+R, and DVD-R) suggests that this the track does indeed become closed. Since David's testing is not all inclusive, we wish to collect more testresults from our membership.

Question 5: How is current/not current determined for various features and profiles?

Detailed specification is needed. For example:

A. The BD Write Feature is current when some writable media of a class and version supported by the drive is present and ready. A WRITE command may be rejected because the media has not been formatted, but the BD Write Feature is still current.

B. When Write Protect is active, the features that go "not current" are those that are affected by the Write Protect.

6.2 Comments on BD Commands ver 0.55

Comment 1: BD commands ver 0.55, table 58 shows READ DISC INFO response called TRACK IRESOURCES INFO BLOCK is only 12 bytes. Remove the 4 extra bytes and set length field to 10.

Comment 2: BD commands ver 0.55, table 59 length field should be 14 rather than 18.

Comment 3: BD commands ver 0.55, table 46, row labeled "Max Possible Allocatable Spares" should be sums of all area maximums. Need to correct the arithmetic.

6.3 Line-by-line review of MMC-5 Rev 1c, Clause 1: Scope

No changes were identified.

6.4 Line-by-line review of MMC-5 Rev 1c, Clause 2: References

1. Keiji Katata provided the document bookcon.pdf that lists the most recent version references from the DVD forum. This applies to both DVD and HD DVD. MMC-5 will be corrected according to that document.
2. Takeshi Kohda provided the reference information for Mt Fuji: Latest version is INF-8090i, revision 5.5, June 2003.
3. CSS is licensed by DVD-CCA. Editor will research.
4. AACS - (to be) Published by AACS-LA. Editor will research.
5. Are there newer versions of MRW documents? Editor will research.

   Results: CD-MRW, rev 1.2 was published in June 2004,
   DVD+MRW, rev 1.2 was published in October 2004.

6.5 Line-by-line review of MMC-5 Rev 1c, Clause 3: Definitions, etc.

1. Editor needs to check for improperly categorized terms. e.g. 3.1.20.
2. 3.1.24 Replace the current definition with:
3. "A dual layer disc has two separate optically sensitive layers that are accessible from one side of the disc at two different focal depths. This is sometimes referred to as double layer."
4. 3.1.17 The sentence with "apparently" in it needs to be rewritten.
5. See Mt Fuji 0.93. for correct definition of AACS (3.1.3).
6. 3.1.5 insert the word "See" in front of AT Attachment ... to complete the sentence.
7. 3.1.6 remove "or a device with the ATAPI" phrase.
8. 3.1.7 "key exchange handle" is a better description.
9. Challenge - "A challenge" not "the challenge".
10. 3.1.14 Closed Session definition is old. Need a new definition that permits newer use. Address the generic track/session model and not any specific media.
11. Proposal: "A Complete Session is a session into which the Host is not permitted to write new user data."
12. 3.1.37 Change definition to include BD-R SRM....
13. Proposal: "An Incomplete Session is a session into which the Host is permitted to write new user data."
14. De-icing includes CD-RW. The definition is unclear. Reword. Applies only to CD-MRW, DVD+RW, and DVD+MRW. Is this not generic...move to CD specific and DVD specific.

15. 3.1.20 must move to the BD specific terms.
16. 3.1.22 change the word "disc accessing unit" to device.
17. 3.1.23 word "able" in first line should be "unable". The reference on last line must be filled in from Device Busy event description. Drive Busy is not the correct term. It should be Device Busy.
18. 3.1.25 The term pairs are "pits and lands" or "marks and spaces". Choose "pits and lands".
19. 3.1.31 First line: remove "on a medium". Remove "and applies only to rewritable media". Consider changing the verb "format" to "format operation" in order to avoid confusion.
20. 3.1.32 change "in each of the Data Zones" to "the LBA space and all spare areas".
21. 3.1.38 Incremental recording may be a CD only term...to be investigated.
22. 3.1.40 Change definition of Lead-in to ....
23. The Lead-in on a MM disc is an initial part of the physical track spiral that provides for outer to inner radius seek overshoot protection. On dual layer discs, the lead-in is always at the inner radius of its residence layer. The data content within the lead-in is different for different disc types. Editor should Remove all media specific statements.
24. 3.1.41 line 4 of definition change "spiral for that" to "spiral that". PTP and OTP are swapped.
25. 3.1.45 HD DVD-RW does not define the Track/Session model. Capitalize the word "fragment". Change SRN to SRM.
26. 3.1.51 Last occurance of "operation" should be "operations".
27. INVESTIGATE: Shall we obsolete/legacy the Analog Audio Play Feature and all associated commands and mode pages? Legacy seems OK. Also remove all associated definitions, e.g. output port.
28. 3.1.54 "A parallel track path disc". "The ID sector number" --> "The physical sector number".
29. 3.1.55 is BD only and must move.
30. 3.1.56 Physical Sector Number
31. Each physical address space of each media type has a media specific physical sector numbering system such that each sector is numbered and the number for a given sector is unique.
32. As defined, Quick Certification and Quick Reformat should be moved to the BD section.
33. Does this apply in some way to other media: e.g. DVD-RAM?
34. 3.1.60 DVD and HD DVD sectors also contain header and ID info.
35. 3.1.62 Session...Typically, a session is a collection of Logical Tracks with contiguous track numbers.
36. <u>In CD Audio tracks recorded on CD-R, it is possible that the track numbers are not contiguous.</u>
37. 3.1.64 Software Defect Management
38. Defect Management in which the defect mappings are performed in the host.
39. 37. 3.1.66 UDF (Universal Disk Format)
40. The description of a file system designed for MM recordables and based upon the ECMA 167, June 1997 (see also ISO/IEC 13346:1995).
41. 38. 3.1.67 Define uninterrupted recording to be identical to DAO.
42. 39. 3.1.68 give additional examples of the writable unit: DVD ECC block, HD DVD ECC block, etc.

Skipped CD unique definitions, review independently, search for legacy removals associated with analog audio play.

43. Global - replace Logical Unit with Drive when reasonable.
44. Border Zone is the border-out of "Session" N and the border-in of "session N+1". Bordered Area is the part in the middle.
45. Translate Bordered Recording to the DVD-R equivalent of Multi-session Recording.
46. HD DVD-RW does not implement the track/session model. Remove all Border references, remove all rzone references, remove all session references.
47. 3.3.10 HD DVD discs also have a control data zone. See fuji.91 for HD DVD control data zone size.
48. 3.3.15 DVD-RAM is rewritable DVD media. A DVD-RAM spiral has stamped headers, thereby negating the need for full format.
49. DVD-ROM...DVD-Read Only Memory (DVD-ROM) is a standardized medium defined by the “DVD-Book” for recording digital data, including Digital Video Movie data.
50. 3.3.18 DVD-Video....DVD-Video is a DVD format defined for video applications as specified in the DVD Books.
51. HD DVD ECC block is 32 sectors and layered product code. All fields have the same description as in DVD, but the total size is different. Note that in he MMC, ECC block refers only to the user blocks within the physical ECC block.
52. EFM is not important to the CD model section. Remove EFM. EFM-plus is never referenced. Remove EFM-plus.
53. 3.3.21 Disc Key - defined as code 3 in MMC4 READ DVD STRUCTURE. Works only on DVD-ROM. Disk Key is also defined as a term for VCPS and BD-CPS. Some adjustment must be made.
54. 3.3.24 and 3.3.25 apply to both DVD and HD DVD.
55. 3.3.26 Regional Playback Control (RPC).....RPC limits the playback of DVD-video content on DVD-ROM discs to specific regions of the world.
56. 61. 3.3.27 Region Code.....The regional code is used to identify one or more regions of the world for use by RPC.
57. 62. 3.3.25 Data Identification Data (ID).... The data ID field of a DVD sector is a 4-byte field that contains sector information and a physical sector number.
58. 63. Definitions of RMZ and RMD need to be clarified for DVD and HD DVD. RMA - DVD-R TOC equivalent only found in pre-lead-in and post-lead-out RMZ - HD DVD-R TOC equivalent
59. L-RMZ is in the lead-in (primary), U-RMZ is in user area (expand after L-RMZ is used completely - host's selection), B-RMZ is in a border-in (expand after L-RMZ is used completely - host's selection)
60. Rzone is also applicable to HD DVD-R.
61. 3.3.32 Title Key....The Title Key is a value used during the encryption/decryption process of user data on DVD media.
62. 3.3.11 Blu-ray Disc.....Blu-ray Disc is a family of related optical storage media and drives.
63. 3.4.7 Disc Definition Structure (DDS)....The DDS is contained within a sector of the DMS . The DDS contains basic format information about the disc: the physical location of LSN 0, the physical location of the last LSN, and the sizes of the spare areas. On BD-R, the DDS also contains recording mode and TDMA information.
64. 3.4.11 Outer Spare Area (OSA0, OSA1)....When defect management is used on BD-R or BD-RE, a spare area may be allocated in the outer radius of each layer. Each of these areas is an Outer Spare Area (OSA). The OSA on layer 0 is referenced as OSA0, while the OSA on layer 1 is referenced as OSA1.
65. 3.4.16 Sequential Recording Range Information (SRRI).....Information about the location and status of all SRRs is stored in the Sequential Recording Range Information (SRRI) structures. While the disc is not finalized, the SRRI shall be recorded in the

Temporary Disc Management Areas (TDMAs). At finalization, the most recent version of the SRRI is recorded in the Disc Management Area (DMA).

66. 3.4.21 next to last line of definition....remove last 2 sentences.

6.6 Line-by-line review of MMC-5 Rev 1c, Clause 4

1. 4.1.2.1 line 3....Data is stored in a layer within the disc that has known reflective properties.
2. All DL drawings must show L0 below L1.
3. Figures 3, 4 & 5: remove Inner Zone box and show limits of inner zone with double arrow line. Do the same for outer zone. Figure 2 maybe.
4. 4.1.2.4 "shows the appropriate..." please insert the cross reference.
5. 4.1.2.5.1 "When a laser is focused on a recorded layer, the returned light can change based upon the state of the recorded layer at the focal point. Recording changes some physical characteristic of the layer, such as changing the reflectivitiy. An unrecorded area is detected as a "space", while a recorded area is detected as a "mark". Data is stored on the spiral in a binary representation where a "mark" is one of the binary states and a "space" is the other binary state. A bit thus recorded is called a channel bit. At high read-out speeds, bytes of data to be stored are first encoded to ensure that the number of sequentially recorded channel bit is neither too long nor too short for optimal detection mechanisms. This is a modulation code."
6. 4.1.2.5.2 MM user data is created as a group of bytes that are to be stored as asingle recordable unit. These recordable units of data have error correction coding included in order to maximize data reliability. These are typically byte base Reed-Solomon block codes that are typically layered similar to product coding. The precise mechanisms are media type dependent. In order to maximize the integrity of the stored data unit, error detection codes may be included prior to appending ECC symbols.
7. Review "an h...." for strange sounding cases.
8. 4.1.3.1 The physical location of a logical block on the medium is not required to have a specific relationship to the location of any other logical block. The time to access the logical block at address X and then the logical block at address X+1 may not be less than time to access X and then any other block on the medium.
9. 4.1.3.2.1 remove the extraneous "it".
10. "on DVD -R, the linking loss can be as low as zero and as high as 16 sectors.
11. 4.1.3.2.2.1 Format 4 Rzone on DL DVD-R can consist of multiple non-contiguous chunks. Need to include in the general descriptions of Logial Track.
12. table 1 must also include HD DVD-R.
13. 12 Each Logical Track may be written only sequentially. ---> Each Logical Track may be written only in a pre-defined recording sequence.
14. Each MM media type has at least one Logical Track. The maximum number of Logical Tracks permitted is media type dependent.
15. Each of the other MM media types that do not support multiple Logical Tracks are
16. always viewed to have exactly one Logical Track consisting of the LBA space of the disc.
17. 15. PROBLEM: We are permitting all media types to have at least one Logical Track. BUT many do not support the track/session model.

7.0 New Business

None.

8.0 Review of Action Items

All members of the MMC WG should address the questions in 6.1 - Unspecified Behavior.
The editor will address the comments in 6.2 in both MMC-5 and the BD commands document.
The editor will address each issue 6.3, 6.4, and 6.5 in a new, reduced version of MMC-5 (rev 1d).
The editor will address each issue 6.6 in a follow-on, reduced version of MMC-5 (rev 1e).

9.0 Future Meeting Schedule:

9.1 September MMC-WG meeting:

Tuesday and Wednesday 13, 14 September 2005 during T10 week at:

Vancouver Marriott Pinnacle Downtown

1128 West Hastings Street

Vancouver, British Columbia Canada V6E 4R5

HOSTED BY: PMC-Sierra Inc.

Please make Reservations by August 19, 2005. See www.t10.org for reservation details.

9.2 Ad Hoc MMC WG meeting

Bill McFerrin will host a line-by-line MMC-5 document review November 1-4, in Llano, Texas (near Austin). The MMC WG meeting is during the following week in Austin. We expect to review the ad hoc meeting actions in detail. We hope to end this meeting with a proposal to T10 for a letter ballot.