Minutes of T11.1 Ad Hoc meeting on HIPPI-6400 Optics
February 10, 1998
San Diego, CA

1. Opening remarks and introductions

The Chairman, Don Tolmie of Los Alamos National Laboratory, opened this meeting at 6 PM and thanked Skip Jones and QLogic for hosting this meeting. Don lead a round of introductions. The list of attendees is at the end of these minutes.

2. Selection of secretary

Don Tolmie thanked Joe Parker for taking the meeting notes for the December meeting, and solicited a volunteer to take the meeting notes for this meeting. Greg Chesson volunteered. Don Tolmie will produce the final HIPPI-6400 Optical minutes separate from the other HIPPI minutes.

3. Review / modify the draft agenda

Draft agendas were distributed via e-mail before the meeting and hard copies were distributed at the meeting. At the meeting, agenda items were added for the following presentations:

7.2 Jacques Rene, W.L. Gore – Ribbon Fiber
7.3 Dan Brown, AMP – Transceiver Functionality

These minutes represent the approved agenda.

4. Document distribution

Don described the HIPPI web page at http://www.cic-5.lanl.gov/~det/, stated that the appropriate documents would be placed there, and encouraged people to pick up the documents before the meeting as extra documents would not be available at the meeting.

5. Review minutes of previous meeting

The minutes of the December 9 meeting in Orlando were reviewed. Michael Griffin moved, and Dan Brown seconded, to approve the October 7 minutes as written. Motion passed unanimously.

6. Review of old action items

The action items from the December meeting were reviewed:

1. Greg Chesson, Steve Joiner, and Dan Schwartz to come up with a pulse width distortion number for HIPPI-6400-PH table 9, or something equivalent, e.g., jitter. (Carryover)
2. Dan Brown to provide new text for the signals used in OFC. (Done)
3. Greg Chesson to provide text for pulse width distortion and jitter, and what they include. (In process)
4. Dan Schwartz to provide new text specifying the optical receptacle and optical plug. (Carryover, reassigned to John Keesee)
5. John Keesee to provide a connector drawing in electronic format. (Done)
6. Greg Chesson to send SuMAC jitter spread sheet to Steve Joiner, Dan Schwartz, Dan Brown, and Schelto van Doorn. (Carryover)
7. Ribbon cable manufacturers to provide recommendations on bandwidth, and to a lesser extent, skew. (Carryover)
8. Robert Clarkson to provide Don Tolmie with an electronic copy of Raytheon E-System October presentation for posting on the HIPPI web site. (Carryover)
9. Don Tolmie to update the copy of October 7, 1997, minutes on the web page. (Done)
10. Don Tolmie to add Dan Brown's optical modulation amplitude measurement technique material to the next revision of HIPPI-6400-OPT. (Done)
11. Dan Schwartz to provide copies of minutes, notes, or other presentation material from the November OFC meeting in Phoenix to Don Tolmie for posting on the web page. (Done)
12. Everyone to come prepared to defend the Transmitter-Enable OFC signal at the February meeting or it will be removed. (Done)
13. Quentin Tan to provide a separate table for the 1300-nm parameters. (Done)

14. Don Tolmie to update HIPPI-6400-OPT Rev 0.2 with the changes agreed to at the December meeting. (Done)

7. Presentations

7.1 MTP connector issues

John Keesee of US Conec gave and MTP connector update, with a summary of the previous meeting and some new information.

John asked if there was interest in a hermaphroditic connector, i.e., one alignment pin in each mating face. It was agreed that both alignment pins (male) would be in the modules and the connectors would not have alignment pins (female). There had been problems with the alignment pins falling out. Now the MTP connectors have a groove in the alignment pins with an internal retaining clip, which retains the pins to a 3 lb pull-out force. The pins can be pulled out with a greater force, but this damages the retaining clip. This configuration has been shipping since 1996.

There had also been questions about the side-load performance, i.e., pull the cable to the side when connected. US Conec conducted tests with a 90-degree side load in two orientations. Less than 0.5 dB loss was associated with a 5 pound side load during operation. Less than 0.2 dB loss was associated with applying, and then removing a 10 pound side load. The connectors meet IEC 1754-7 specifications after a minor mechanical redesign (connectors available 2nd half 1998).

Color-coding is being used to distinguish between multi-mode and single-mode, with green SM housings, and beige MM housings. The colors are applied to the slider part of the housing. No one had heard of any plans to color code the transmitter modules.

John asked if there was a need for a duplex connector, and showed a mechanical prototype clip used to hold two MTPs to form a duplex connector. If a duplex connector isn't used, then how do you identify the connectors? Several answers were proposed. One method avoided crossing the cables at the endpoint. Other suggestions included color coding the pigtails, or a flexible tether. Michael Griffin suggested that we shouldn't require duplex pairing because some users may want to have banks of transmitters or receivers, while others may need HIPPI-6400 -like duplex connections. A potted pair may be possible, but the it might be quite wide to accommodate module spacing.

7.2 Flex-Lite Ribbon Fiber

Jacques Rene of W.L. Gore discussed the bandwidth capabilities of Gore fiber cables. He was looking at the eye pattern at 1.25 Gbit/s with FDDI-class fibers. About 15 sample fibers were tested, and the bandwidth*distance measurements agreed with the cable vendor's numbers. The measurements used a sampling of FDDI fibers with an overfilled launch with a 850-nm laser source and special patch cord. Near-field and far-field distributions were measured 'ala FOTP-54. It was noted that the technique did not show up differential modal delay (DMD) problems.

200 MHz*km seemed to be a good value for FDDI-class fiber from Lucent or Spectran, with the lowest common denominator being about 160 MHz*km. The manufacturers claim that 500 MHz*km fiber is available at about 2X the price (for the raw fiber, assembled cable should be less than 2X).

It was asked how the skew properties of a parallel fiber cable related to the bandwidth*distance differences. Explicit measurements were not made but the group believes that skew buildup is not directly related to the bandwidth*distance values, or possibly even distance.

Robert Clarkson asked if a rating of xxx MHz*km implied that a fiber can pass 2 * xxx MBaud using NRZ or other biphase coding. Dan Brown answered "yes". Chris Karaguleff asked that if some of the fibers in a 12-fiber ribbon had a greater bandwidth*distance product than others, could the link design take advantage of this? The answer was "not really".

Jacques said that they want to continue the studies to see if the fiber bandwidth*distance product changes as a result of the cable manufacturing process. They also want to do the tests using 1300-nm lasers.

7.3 Transceiver Functionality

Dan Brown proposed some text for clause 5.3. He proposed changing the name "Light_present" to "Loss_of_signal" because it is a more common term in the optics industry, and also because signal conventions are positive. Some editorial discussions followed. The idea is to provide an ac-coupled active signal that would not give erroneous readings for a stuck-at-fault. The group response was generally positive and it was agreed to incorporate the text.

Dan proposed to change the name "Transmit_enable" to "Transmit_disable". The signal seemed to be useful as a diagnostic or service function, but may not really be needed. Examples were given of the CD player that shuts off when the door is opened. Since the parallel devices are supposed to be Class 1 eye safe, then there does not seem to be a compelling argument for inclusion in the standard for interoperability. It was agreed that Transmit_disable would be optional, and Loss_of_signal would be mandatory.

8. Jitter discussion

Greg Chesson has an action item to provide the SuMAC spread sheets to the optical guys. This item was passed over due to lack of progress.

Schelto van Doorn noted that a IEEE Gigabit Ethernet group is studying differential mode delay (DMD) problems and how they affect jitter. Schelto did not know if DMD would be a problem for our parallel cables. There may be ways to control the transmitter launch conditions so that the DMD effect is not aggravated. One experimental technique is to use an external single-mode patch cable physically mounted off-center to the multi-mode fiber plant. It was felt that we should track the Gigabit Ethernet group rather than start an independent investigation.

9. Open Fiber Control (OFC)

Open-fiber-control (OFC) support seems to be decreasing. With Motorola dropping out of the parallel fiber business, OFC lost one of its main champions. Unless someone comes forward to support OFC by the April meeting it was agreed that we will drop it from the specification.

10. Review HIPPI-6400-OPT Rev 0.3

Rev 0.3 contained the changes from the Orlando meeting. All of the new and revised text was accepted as drafted, with exceptions listed below.

Roger Ronald pointed out that the 1300-nm table specifies a 10 km capability, and this was reflected in the document's abstract, foreword, and scope. This was somewhat misleading in that it could give the impression that HIPPI-6400 would operate at full speed over 10 km, while in fact the HIPPI-6400 flow-control protocol limits it to 1 km at full speed. It was agreed to change the text in the abstract, foreword, scope, and add a note to table 5, that HIPPI-6400 is limited to 1 km, but the optical link is capable of operation up to 10 km.

In 7.1, second paragraph, the first sentence was changed from "For purposes of specifying a parallel..." to "For purposes of specifying a short wavelength parallel...".

Optobahn was asked if they plan to use the same component to couple to both SM and MM fiber. They said they needed a different transmitter, but the receiver could be the same. The question arises because the Gigabit Ethernet group has a requirement to use the same optical module for both kinds of cable. In table 5, it was agreed to change the "Transmitter: Launched power" to "Transmitter: Launch power". The SM receiver sensitivity was changed from –20 dBm to –18 dBm.

In clause 8, the first sentence was changed from "...shall consist of ribbons of 12 fibers..." to "...shall consist of 12 fibers...". In 8.3, the "...≤ 20 dB..." was changed to "...≥ 20 dB..." in the last sentence.

A discussion to clarify cable / connector polarities resulted in a decision that the cables will have female (no guide pins) connectors on both ends. The text will be changed to state this. Figure 4 should be updated also.

John Keesee of US Conec was thanked for providing the connector drawing for the document. John and Schelto van Doorn discussed whether / how to specify different connectors for SM and MM. The idea is to eliminate air-gap connectors as was done for Fibre Channel. Conclusion: 20db return loss is a requirement for multi-mode. Discussion ensued about needing to specify the type of polish on the

connector. A "flat-polish with protruded fiber" specification eliminates the possibility of an air-gap. Another conclusion / proposal: can specify a "flat-polish with protruded fiber" for both SM and MM and still meet the back-reflection spec of 20db for both types.

The Annex B text and figures supplied by Dan Brown were reviewed and accepted. It was suggested that an example calculation would be useful, and Dan agreed to draft one.

Robert Clarkson passed around a prototype PC board for the E-Systems HIPPI-6400 fiber extender.

The existing "Open Issues" in the document were then reviewed with the intent to have someone take responsibility for getting them resolved.

The jitter on parallel signals definitions in 3.1.20 and 3.1.21 are already being worked by Dan Brown, Schelto van Doorn, and Greg Chesson (with an upcoming conference call planned). The open issues in Figure 1, 5.2 and 5.3 were taken care of by the text that Dan Brown supplied (see agenda item 7.3). Dan Brown also volunteered to tackle the open issues concerning the eye mask in 7.1.

Schelto van Doorn stated that the need for an annex equivalent to Fibre Channel annex E (concerning mode selective loss) depends on launch conditions. Since launch conditions are not specified, we're not sure if we need it. Dan Brown volunteered to study this question.

John Keesee had a copy of FOTP-107 with him and was able to verify that it was the appropriate reference in clause 8.3 (removing another open issue). John also volunteered to assume the open issue in 9.2 (previously assigned to Dan Schwartz), for text describing the connector.

Annex A had an open issue noting that this would be a good place to include a description of how to calculate connector loss. Another open issue addressed the need for an annex describing test methods for channel-to-channel skew and jitter. Mark Donhowe volunteered to provide a test procedure using a pulse technique for testing cable. Chris Keller volunteered to explain Optobahn's test procedures at the next meeting, and to provide text for testing channel-to-channel skew.

11. Call for patents

Don issued a call for disclosure of the existence of patents required to implement any and all HIPPI standards. It is necessary for the patent holders to agree to license those patents in conformance with the ANSI patent policy if the project on which they apply is to proceed. T11 and its Task Groups are not involved in this process at all other than to issue the call and forward paperwork.

The contact at ANSI is the General Counsel, Ms. Amy Marasco - (212) 642-4954 or amarasco@ansi.org. A patent policy description is at www.ansi.org / proctbl.html, section 1.2.11.

No new patent claims were made at this meeting.

12. Planning for future work

Dan Brown stated that next to jitter, the fiber bandwidth is the most critical issue to decide at the 850-nm window. Dan asserted that 160 MHz*km would get us about 200m. We may need 400 MHz*km to implement a 300m link. Dan said that he (and the other vendors), should provide detailed numbers for the 160 MHz*km cable with a 850-nm laser transmitter. A group consensus was that 160 MHz*km is the lower bound for available cable. There was discussion, but no resolution, on the minimum distance acceptable to the HIPPI community. It was noted that none of the vendors had determined the distance for a 1 GHz or 1.25 GHz system using 160 MHz*km cable, although this would be an important result for Gigabit Ethernet.

13. Future meeting schedule

The HIPPI Optical group will continue to meet only during plenary weeks for the foreseeable future.

The next meeting will be on Tuesday, April 21, from 6 PM to 9 PM. The location is the Hyatt Regency Suites Palm Springs, 285 North Palm Canyon Drive, Palm Springs, CA 92262, phone 760-322-9000 or 800-233-1234. Jeff Stai and Brocade Communications Systems are the host. The group name for reservations is "Brocade", and the group room rate is $122 per night including tax and parking. The reservation cutoff date is March 20, 1998. (See the meeting announcement on the web page at http://www.cic-5.lanl.gov/~det/ for further details.)

The agenda will be essentially the same as the agenda for this meeting.

Dan Brown will facilitate an interim conference call with Greg Chesson and Schelto van Doorn to resolve the jitter and pulse width distortion terminology questions.

14. Review action items

1. Greg Chesson, Steve Joiner, and Dan Schwartz to come up with a pulse width distortion number for HIPPI-6400-PH table 9, or something equivalent, e.g., jitter.
2. Greg Chesson to provide text for pulse width distortion and jitter, and what they include.
3. John Keesee to provide new text specifying the optical receptacle and optical plug.
4. Greg Chesson to send SuMAC jitter spread sheet to Steve Joiner, Dan Schwartz, Dan Brown, and Schelto van Doorn.
5. Ribbon cable manufacturers to provide recommendations on bandwidth, and to a lesser extent, skew.
6. Robert Clarkson to provide Don Tolmie with an electronic copy of the Raytheon E-Systems October presentation for posting on the HIPPI web site.
7. Dan Brown to provide an updated copy of his 5.2 and 5.3 text to Don Tolmie for inclusion in the next revision.
8. Don Tolmie to update HIPPI-6400-OPT Rev 0.3 with the changes agreed to at the February meeting.
9. John Keesee to provide an updated connector drawing with the alignment pins in the adapter.
10. Dan Brown to address the open issues concerning the eye mask in 7.1.
11. Dan Brown to study the need for an annex concerning mode selective loss.
12. Mark Donhowe to provide a cable test procedure that uses a pulse technique.
13. Chris Keller to explain Optobahn's test procedures at the next meeting.
14. Chris Keller to provide text describing channel-to-channel skew testing.
15. Dan Brown (and other vendors) to provide detailed numbers for distance achievable with 160 MHz*km cable and a 850-nm laser transmitter.
16. HIPPI system vendors and users to determine if 200 m is an adequate distance.

13. Adjournment

The meeting adjourned at 9:25 PM.

Attendance

Michael E. Griffin	3M Co.	612-733-6004	megriffin@msmail.mmmg.com
Daniel Brown	AMP	717-986-7812	dan.brown@amp.com
Dan Harres	Boeing Corp.	314-233-3302	daniel.n.harres@boeing.com
Gordon Boyd	Digital Equipment Corp.	603-884-1309	boyd@solvit.enet.dec.com
David Hyer	Digital Equipment Corp.	978-493-6139	david.hyer@digital.com
Bob Willard	Digital Equipment Corp.	978-493-5482	bob.willard@digital.com
Don Tolmie	Los Alamos National Lab	505-667-5502	det@lanl.gov
John Suzuki	NGK-Locke Inc.	408-986-9255	jsuzuki@ngklocke.com
Chris Keller	Optobahn Corp.	310-782-9500 x115	ckeller@optobahn.com
Toshi Uchida	Optobahn Corp.	310-782-9500	tkuchida@optobahn.com
Robert Clarkson	Raytheon E-Systems	972-205-6475	robertc@esy.com
Roger Ronald	Raytheon E-Systems	972-205-8043	rronald@esy.com
Schelto Van Doorn	Siemens Fiber Optic Components	408-725-3436	schelto.van-doorn@smi.siemens.com
Greg Chesson	Silicon Graphics	650-933-3496	greg@sgi.com
Jean-Michel Pittet	Silicon Graphics	650-933-6149	jmp@sgi.com
Ali Ghiasi	Sun Microsystems	650-786-3310	ghiasi@eng.sun.com
Albert F. Kelley	Tensolite Co.	904-829-5600 x281	akelley@tensolite.com
John Keesee	US Conec	704-323-8883	johnkeesee@usconec.com
Mark Donhowe	W. L. Gore and Associates	302-368-2575	mdonhowe@wlgore.com
Chris Karaguleff	W. L. Gore and Associates	302-368-2575	karaguleff@wlgore.com
Richard Kriese	W. L. Gore and Associates	512-458-6349	rkriese@wlgore.com
Jacques Rene	W. L. Gore and Associates	602-414-5860	jrene@wlgore.com