

Minutes of T11.1 HIPPI Ad Hoc Working Group  
December 9-10, 1997  
Orlando, Florida

**1. Opening remarks and introductions**

The Chairman, Don Tolmie of Los Alamos National Laboratory, opened this meeting and thanked Roger Cummings and DPT for hosting this meeting. This group is constituted as both the HIPPI Working Group under T11.1, and the HIPPI Networking Forum (HNF) - Technical Committee (TC).

Don lead a round of introductions. The list of attendees is at the end of these minutes.

**2. Review / modify the draft agenda**

Draft agendas were distributed via e-mail before the meeting and hard copies were distributed at the meeting. An item to discuss the HIPPI-6400-PH connector was added as 5.1.1.

**3. Review minutes of previous meeting**

The minutes of the November 5-6, 1997, working meeting in Albuquerque, were reviewed. Bob Willard moved, and Greg Chesson seconded, to approve the November 5-6 working meeting minutes as written. Motion passed unanimously.

**4. Review old action items**

1. Everyone to review the HIPPI-800 Switch MIB and pass comments to Marck Doppke. (Carryover)
2. Von Welch to contact HIPPI-6400 MIB users and developers for comments on the current draft, and to prepare a presentation on the MIB for a future meeting. (Carryover)
3. Von Welch to look at developing a HIPPI-6400 host system MIB (for a NIC), to be done now as an annex of the present MIB with the possibility of splitting it out as a separate document at a later date. (Carryover)
4. Everyone to review the HIPPI-6400 MIB. (Carryover)

5. Kevin Lahey, Jeff Young, Jean-Michel Pittet, and Greg Chesson to begin an IP and ARP over HIPPI-6400 RFC. (In process)
  6. Jean-Michel Pittet to develop an RFC for ARP over HIPPI-800. (In process)
  7. Jeff Young to pulse Mark Kelley about the HIPPI end-point MIB and report the status on the reflector. (Mark Kelley has left Cray Research. The action item was carried over and reassigned to Jeff Young.)
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8. Don Tolmie to submit letter ballot comments against HIPPI-6400-PH concerning the editorial errors of 50 m vs. 40 m, and errors in figures 4 and table 12. (Done)
  9. Roger Ronald to submit a letter ballot comment against HIPPI-6400-PH concerning the suggested changes in figure 23. (Done)
  10. Roger Ronald to submit letter ballot comments against HIPPI-6400-SC concerning the broadcast server's ULA, and the error in figure 2. (Done)
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11. Greg Chesson to contact Bob Snively of Sun about material and format for an IEEE tutorial on HIPPI-6400 ULA usage, and the ULAs special to HIPPI-6400. (Carryover)
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12. Greg Chesson and Jeffrey Chung to consider developing "reason codes" to explain why a particular ST Operation was rejected. (Carryover)
  13. Jeffrey Chung to develop state tables for inclusion as an ST annex. (In process)
  14. Greg Chesson to send e-mail detailing reasons for not doing a queue for client/server applications, and suggesting how they could be done in ST. (Carryover)
  15. Jerry Leitherer to continue work on the ST over Fibre Channel mapping with special attention as to whether Class 2 or Class 3 is appropriate, and if the FC TCP/IP profile should be used instead of FC-LE. (In process)
  16. Jim Pinkerton to do a rewrite of ST Annex C. (Carryover)
  17. Bob Willard to write up something on big/little endian issues for inclusion in the document. (Carryover)

18. Greg Chesson to collect text for a "folklore" annex in the document. (In process)
19. Greg Chesson to draft text describing how you differentiate duplicate operations from legal operations. (In process)
20. Greg Chesson to further study ST checksums and report at a future meeting. (Done)
21. Don Tolmie to update ST Rev 1.2 with the changes agreed to at the October meeting. (Done)

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22. Everyone to review HIPPI-6400-PH Rev 1.9, HIPPI-6400-SC Rev 1.7, and HIPPI-FP Rev 4.7, and submit, in electronic form, any comments against them to Don Tolmie by November 21. (Done)

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23. Michael McGowen to collect and tabulate everyone's requirements for HIPPI-800 and HIPPI-6400 translation environments. (Carryover)

## **5. Review T11 Letter Ballot comments and draft responses**

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### **5.1 HIPPI-6400-PH (ref: Rev 2.1, December 2, 1997)**

HIPPI-6400-PH Rev 1.9 passed its T11 Letter Ballot on November 21 with a vote of 68 for, 0 opposed, and 16 not voting. Comments were received with three of the "for" votes.

A letter ballot comment from Matt Wakeley of Hewlett-Packard concerning the use of HP patents was resolved; Haluk Aytac signed the ANSI patent forms and Don Tolmie forwarded them to ANSI for their records. HP had previously provided a letter releasing the patents for use in HIPPI-6400, but alas they were not on the proper form. Now everything is complete for these patents.

A comment from Roger Ronald of Raytheon/E-Systems was accepted. The issue had been discussed at the November meeting and Roger agreed to submit it. The comment had to do with layout dimensions on the driver side; and was accepted.

Comments from Don Tolmie of Los Alamos were also accepted. They had also been discussed at a previous meeting. Three issues were addressed: (1) changing the distance in the Abstract, Introduction, etc. from 50 m to 40 m to match the rest of the

document, (2) fixing figure 4 with the correct amount of payload in the first micropacket, and (3) dropping the word "CLOCK" when referring to a Training sequence in table 12. All of these comments were accepted.

Additional changes to the document were adding the NCITS membership list, adding the constant values for the LLC/SNAP parameters, and changing another layout dimension in figure 23. Editorial changes were made to the notice on the front cover, and the page heading. These changes were reviewed and accepted as written.

No additional changes were suggested or made.

#### **5.1.1 HIPPI-6400-PH connector**

Greg Chesson reported that SGI was having trouble laying out the connector on the PC board. The problem was that the pin spacing and manufacturing tolerances, only allowed for one trace between pins; not sufficient to bring out all of the signals. Three options were suggested: (1) a straddle mount connector (but it presented mechanical interference problems with components on a adjacent board), (2) extend the right-angle connector pins further into the PCB (allowing traces around the periphery of the pin array), and (3) adopt a wider pitch to the pins. It was noted that a board "via" created a 2pf discontinuity. With the close pin spacing, getting good power and ground traces in the connector area is also difficult, further affecting signal quality.

A possibility for today is to see what we can actually do with the current connectors and shorten the cable distance as needed. While we could probably live with the current setup for our 500 MHz signals, Greg was pushing for something that could be extended by 4X in speed to 2GHz.

It was noted that HIPPI-6400-PH calls out the connector dimensions as "examples", so adopting a different connector geometry (that kept the same mating face), would not constitute a technical change to the document. It was also stated that it would be desirable to fix the connector drawings in the document to match whatever we end up with so as not to give implementers misleading information.

**5.2 HIPPI-6400-SC (ref: Rev 1.8, December 1, 1997)**

HIPPI-6400-SC Rev 1.7 passed its T11 Letter Ballot on November 21 with a vote of 69 for, 0 opposed, and 15 not voting. Comments were received with two of the "for" votes.

Two letter ballot comments from Earl Rydell of Rockwell-Collins concerned definitions. His proposal for "fabric" was accepted and the document changed accordingly. His proposal for "Message" was rejected – the group felt that the definition was correct as is.

Two comments from Roger Ronald of Raytheon/E-Systems were accepted (no surprise). The issues had been discussed at the November meeting and Roger agreed to submit them. One comment involved fixing figure 2 to be compatible with the changes in HIPPI-6400-PH. The changes involving the other comment had been reviewed at a previous meeting, and were again accepted.

Additional changes to the document involved adding the NCITS membership list, and editorial changes to the notice on the front cover, and the page heading. These changes were reviewed and accepted as written.

A few new words were added to clause 8 to point out that the broadcast servers discussed were directly connected.

**5.3 HIPPI-FP (ref: Rev 4.8, December 2, 1997)**

HIPPI-FP Rev 4.7 passed its T11 Letter Ballot on November 21 with a vote of 69 for, 0 opposed, and 15 not voting. Comments were received with two of the "for" votes.

Bill Main of DEC (through Bob Willard), commented that they would like to have a "Source ULP-id" as well as the current "Destination ULP-id". After some e-mail exchanges, Don Tolmie determined that what Bill had in mind was essentially using the ULP-id fields as Source and Destination Port numbers. Don noted that the current ULP-id seemed equivalent to the EtherType parameter in a LLC/SNAP header, and there is only one EtherType in a header, it is peer-to-peer, and if anything is directed towards the Destination. TCP/IP "Ports" are an entirely different function from EtherType. Hence, Bill Main's comment was rejected on the grounds that: (1) we needed the current ULP-id, (2)

a Source ULP-id didn't make sense, (3) if needed then "Port" numbers should be implemented with Scheduled Transfer or some other protocol, and (4) adding another ULP-id parameter at this time may well invalidate current implementations that have been working for years.

Earl Rydell of Rockwell-Collins provided five editorial comments. The ones about adding a glossary, and incorrect font size in one paragraph, were accepted and the document changed accordingly. A comment asking to change terms to "dublet", "quadlet", "oclet" and "hexlet" was rejected as being too late in the game. A comment about making the bit and byte order consistently big-endian or little-endian was rejected for similar reasons and it was pointed out that it had been done this way originally to be compatible with HIPPI-PH. Earl's last comment was a question about the meaning of "bits" in a figure.

Additional changes to the document involved adding the NCITS membership list, and editorial changes to the notice on the front cover, and the page heading. Don also found some format goofs that occurred when the document was moved from a Mac to a PC, i.e., some word breaks and indents – these were corrected. In addition, Don added another ULP-id. An earlier change added a ULP-id for "HIPPI-6400 Encapsulation", but was really pointed towards Scheduled Transfer. Don proposed adding another ULP-id for using HIPPI-6400-PH without Scheduled Transfer, i.e., just using the HIPPI-6400 MAC and LLC/SNAP headers. These changes were reviewed and accepted.

No additional changes were suggested or made.

**5.4 Forwarding for 1st public review now ?**

SGI has received the first SuMAC chips (implementing HIPPI-6400-PH), and along with Raytheon/E-Systems and Harris are testing them. The testing to date has been preliminary, and concern was expressed that further testing may show up fundamental flaws in the HIPPI-6400-PH document. Don noted that all three documents passed the T11 Letter Ballot, all of the comments to date have been answered, and the next step was to have NCITS start the first public reviews. If we start public review and discover a flaw that needs fixing in one of the documents, then we can submit a comment ourselves to pull the document back, but

this may well add 6-10 months in the processing time.

Carl Pick questioned when the final approval would come if we forwarded in February, i.e., in relation to Supercomputing'98 which is in November. Roger Cummings (T11 Chairman) estimated that if we forwarded in February '98, then we could possibly have approved standards in November '98. Roger also noted that HIPPI-FP was approaching its 5-year sunset date, and would probably need to be forwarded now or he would need to send a letter to NCITS asking for an extension.

Joe Parker moved, and Gordon Boyd seconded, to delay forwarding HIPPI-6400-PH and HIPPI-6400-SC until February, 1998, and to resolve any necessary changes at the January meeting. Motion passed, 9 for, 0 opposed, and 0 abstentions.

Roger Ronald moved, and Bob Willard seconded, to forward HIPPI-FP Rev 4.8 immediately. Motion passed, 9 for, 0 opposed, and 0 abstentions.

## **6. Scheduled Transfer (ref: Rev 1.3, November 19, 1997)**

### **6.1 Review changes in Tables 3-7**

The table changes were reviewed, and no suggestions for additional changes were made.

### **6.2 Review other document changes**

Editorial changes were agreed to for the definitions of "Data operation" and "Memory Index". Editorial changes were agreed to in 4.2. The title of figure 5 was changed to "A data structure model" and the  $B_{id_n}$  parameters in the "Transfer Descriptor" box were changed to  $Mx_n$ . The first paragraph in 5.1 was split into two paragraphs.

Global changes include changing "F flags..." to "F bits..."; changing "D flags..." to "D bits"; changing "...supports out of order Block delivery..." to "...can send and receive Blocks in any order..."; changing "R-id echoes the Responder's Transfer identifier to specify a specific Transfer..." to "R-id specifies the Responder's Transfer identifier..."; changing "...a Virtual Connection must exist..." to "...a Virtual Connection shall exist..."; and changing "...they must

obey the Slot accounting..." to "...by the Slot accounting...".

Some of the operations that were listed as "...may be issued..." were changed to "...shall be issued...". In many places changed "...may be delayed..." to "...has been accepted but may be delayed..." or something similar. There were some places where "...assigns..." was changed to "...specifies..." to more correctly represent the operation.

6.6.2 about the Memory Index had quite a few changes, including moving some of the text from 6.2.11 to this clause. The text in 6.2.4 was changed to clarify retransmission, and the open issue about both ends needing to support Out\_of\_Order was closed. In clause 7 and 7.4, it was agreed to delete some of the text about "reliable data movement" and to include references to clause 10.

The possibility of adding an optional Request\_Answer after a Request\_Connection was explored, and finally rejected. The intent was to allow an end device to say that it had received the Request\_Connection, but couldn't answer immediately. It was decided that there was no compelling reason to add the optional operation, so it was dropped.

During a read-through of the "Error processing" clause it was noted that there were several places that had not been updated to track recent changes. Don will review the text for the next revision and try to bring it up to date. A new bullet was added to 10.1 to account for a control message getting queued behind a long message and taking longer than expected. The table 8 operation pairs guarded by Op\_timeout was changed to specify mandatory retry.

While discussing 10.5.1 about discarding operations with invalid Key or Port parameters, it was noted that the teardown operations would not function as desired in all cases, e.g., one end power cycles (losing its state) and then receives a Disconnect operation. What you would like is for the end that lost its state to reply so that the good end will complete the teardown sequence. It was agreed to add appropriate I-Key and R-Key parameters to the Disconnect operations to make them self contained, and hence avoid the problem.

Jim Pinkerton asked if T\_len (specifying the size of the persistent memory region - in a

Request\_Memory\_Region operation) had to be less than or equal to the Max\_Block established during the connection setup, and the answer was no. We will have to examine the rest of the document to see if there are other cases of similar text.

Scattered through the document were more changes made and agreed to (mostly editorial changes) – check the next revision for a complete list.

### **6.3 End-to-end check sum**

At the November meeting, Ian Philp of Los Alamos had requested that an end-to-end checksum be added to ST, and Greg Chesson agreed to investigate it and how it would affect the SGI SHAC chip. Greg felt that a checksum was warranted, but stated that the capability would not be available in the first SHAC chips. A capability bit, or some other method, would be needed to allow operation with and without a checksum. Greg stated that the SHAC chip already supported TCP checksums.

For long messages, a data trailer might be used, with the STU containing the checksum having a unique Op value (i.e., we needed some way to split out the checksum from the data since you would probably not want the checksum stored in the user's memory). A checksum in the header is not practical for long messages since you must buffer the whole message before transmission. It was noted that trailers have their own problems, e.g., associating it with the correct Block, finding it in a variable length message, storing partial checksums, and what to do if it is delayed or lost and the data has already been placed in the user's memory. The possibility of checksums only on the data messages (using part of the Opaque data field), was discussed but dismissed as only a partial solution. It was felt that all operations, not just the data messages, needed checksums since an error in a control message could put or get data from a wrong location.

Jim Pinkerton proposed that the checksum be on an STU basis rather than a Block basis. Since the STU is smaller and is contiguous, then it is practical to put the checksum in the header. It was noted that there is presently no room in the ST Header in all of the operations for a 16-bit checksum (the ST Headers for Get and FetchOP operations are already full).

It was agreed that the checksum, like the TCP checksum, is intended to be a disaster check, not a bit-level check. It was also agreed to use a 16-bit

checksum, and use the TCP algorithm as the starting point. Jeff Young stated that the ISO checksum, also 16 bits, may have better coverage and be as simple to calculate. Jeff took an action item to investigate the relative merits of the TCP and ISO checksums.

To make room for a 16-bit checksum in a consistent place in all operations, it was agreed to change the length parameter in Get and FetchOP operations from 32 to 16 bits. The I-Bufx parameter was then moved from the Bufx\_2 field to the B\_num field. Then the Bufx\_2 field was split into two separate fields, the left half called "Cksum" and the right half called "Op\_len". The last change necessary was to move the "Max\_Block" parameters in the Request\_Connection and Connection\_Answer operations to the Offset\_2 field. The Opaque data changed from 64 bits to 48 bits. Now all of the operations will have a 16-bit Cksum.

To differentiate between devices that support checksums, and those that don't, it was proposed that Cksum = x'0000' indicates non-support. If the transmitting device supports checksums and the calculated checksum equals x'0000', then transmit Cksum = x'FFFF'. This is an initial proposal, an alternative would be to use a capability bit during connection setup or Transfer setup.

### **6.4 Inclusion of CCI in the document**

Ian Philp questioned whether or not the CCI parameter and text should be in the document. His points include: (1) the CCI is not included in the ST Header, and (2) the CCI does not affect ST, and (3) similar protocols, e.g., TCP/IP, do not include CCI type of information. The CCI is in figure 5 and 5.3.

While not absolutely necessary for ST operation, inclusion of the CCI information was felt to aid the user. It was agreed to move the text in 5.3 to annex A, remove the "shall", and put the text in more of a bullet list format. The CCI parameter in the figure 5 Virtual Connection Descriptors was removed. A note reading "Additional parameters may be required for control of lower layers (see Annex A)." was added at the bottom of figure 5.

### **6.5 Intermediate devices operating on Max\_STU and Max\_Block**

Ian Philp questioned having intermediate devices change the Max\_STU and Max\_Block parameter values during connection setup. One problem was

the Max\_Block name; Ian felt that it was more of an available buffer size parameter than a maximum Blocksize parameter. Ian also pointed out that when you are striping, the connection setup only goes through one path while the parameter values affect all paths (and they may not all be the same).

Ian stated that another problem that may arise involves the proposed checksum for ST. If ST allows an intermediate device to change some ST parameters, the device must also change the checksum value. Thus, ST's checksum will no longer be a true end-to-end checksum (i.e., one that is only set and checked by the end devices). The problem with this is that once ST allows gateways to start changing fields and checksums, the end systems need to worry about whether the gateways always do it correctly.

The discussion led into a long description by Roger Ronald of the HIPPI-6400 to HIPPI-800 translation boxes being designed by Raytheon/E-Systems. The end result was that while equivalents to the Max\_STU and Max\_Block parameters are not present in today's legacy networks, they provide a valuable hook for the future. It was agreed to leave the parameters in the document.

### **6.6 ST over ATM as the lower layer**

Robert Hyerle of Hewlett-Packard had provided ST over ATM, Rev 2.0, dated September 24, 1997 previously, but had not been available to present it at the October meeting. Robert was not present at this meeting either. Don Tolmie distributed a draft that he had done based on Robert's proposal. It supported three different variants from the ATM LANE (LAN Emulation) document as proposed by Robert. The variants are DIX (Digital/Intel/Xerox) Ethernet, 802.3, and 802.5.

Padding out the DIX variant to make a full-size Ethernet packet was viewed with disdain, but felt to be necessary to be compliant with LANE. The funny use of the length value in the 802.3 variant (at the 1536 byte value) was also noted. It was also noted that there was no way to differentiate between the three variants; that was left up to other protocols to set up externally (the LECID parameter did not provide any differentiation). After review, it was felt that this whole proposal was a can of worms. We either need more help from people knowledgeable in LANE, or some other ATM protocol. It was pointed out that we had initially

picked LANE to leverage other features, e.g., mapping between 48-bit ULA's and ATM addresses.

Jeff Young suggested that we investigate the ATM Forum's CLIP (Classical IP) protocol as an alternative to LANE. No one had a good feel for the market share for LANE vs. CLIP, or the weighted use of the three variants under LANE.

### **6.7 ST over Fibre Channel as the lower layer**

In November '97: Jerry Leitherer of Genroco provided ST over Fibre Channel, Rev 2.0, dated October 28, 1997. The proposal was based on FC-LE. There were questions about the appropriate use of Fibre Channel Class 2 or Class 3. Class 1 was deemed not appropriate since it cannot multiplex. It was agreed that we need to look at the TCP/IP profile to see if it is more appropriate than FC-LE. Jerry was to continue the investigation.

Jerry was not at the December meeting, but Carl Pick said that they were now working towards allowing ST to use any of the Fibre Channel transmission classes.

## **7. Other HIPPI items**

### **7.1 ARP over HIPPI-800**

Jean-Michel Pittet from SGI is working on the RFC. Nothing new was reported at this meeting.

### **7.2 HIPPI end-point MIB**

Mark Kelley of Cray Research had previously said that he would start working on the end-point MIB again. Jeff Young had taken an action item to pulse Mark and report the status on the reflector. Mark has now left Cray Research. Jeff will see what he can find.

### **7.3 HIPPI switch MIB**

Marck Doppke of Essential Communications has a draft document out for comment. Marck was not at this meeting and nothing new was reported.

### **7.4 HIPPI-6400 MIB**

Von Welch of NCSA has a draft document out for comment. Von was not at this meeting and nothing new was reported.

**7.5 HIPPI-6400 ARP and IP RFC**

Greg Chesson said that Kevin Lahey, Jeff Young, Jean-Michel Pittet are developing an RFC for HIPPI-6400 ARP and IP. Greg said that Jean-Michel is currently working on the RFC.

**7.6 IEEE Tutorial for HIPPI-6400 ULA usage**

Greg Chesson is drafting an IEEE Tutorial for HIPPI-6400 ULA use. Nothing new was reported at this meeting.

**8. Future meeting schedule**

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**8.1 Interim meeting, January 13-14, Mountain View, CA**

The next interim working meeting will be hosted by Greg Chesson and SGI in Mountain View, CA. No venue details were available at this meeting – watch the e-mail for the announcement. Since there is no specific meeting hotel, and hotel rooms in Silicon Valley are scarce, people were encouraged to make their hotel reservations as soon as possible.

We had planned for a 3-day meeting based on the assumption that there would be a considerable number of HIPPI-6400 Letter Ballot comments to resolve. Now that the ballots have closed, and the comments were minimal and already taken care of, the January meeting was cut back to two days.

Tuesday - January 13 : 1 PM - 9 PM  
 Wednesday - January 14 : 8 AM - 9 PM

**8.2 Plenary week, February 10-11, San Diego, CA**

The next working meeting will be at the Hyatt Islandia (Mission Bay), 1441 Quivira Road, San Diego, CA 92109, phone (619) 224-1234. Skip Jones and QLogic are the host. The group name for reservations is American National Standards Institute and the group room rate is \$123 plus 10.5% tax. The reservation cutoff date is January 9, 1998. (See the meeting announcement on the web page at <http://www.cic-5.lanl.gov/~det/> for further details.)

Tuesday - February 10 :  
 9 AM – 6 PM : HIPPI working meeting  
 6 PM – 9 PM : HIPPI-6400 Optical

Wednesday - February 11 :  
 9 AM – 6 PM : HIPPI working meeting  
 6 PM – 8 PM : T11.1 Plenary

**8.3 Future meeting dates and locations**

The T11.1 ( i.e., HIPPI), Plenary meeting will be on Wednesday evening of the T11 Plenary week, following the HIPPI working meetings.

The 1998 schedule is firm. Note that T11 schedules the plenary meetings. Hopefully HIPPI-6400 will be far enough along that we will not continue to need interim working meetings after March; the May date is tentative and will be firmed up as we see the need. Recent additions and changes are underlined and bold.

**1998** –

Mar 10-12	Interim	Minneapolis	Cray
Apr 21-22	Plenary	Palm Springs, CA	Brocade
<b><u>May 12-13</u></b>	<b><u>Interim</u></b>	<b><u>Mt. View, CA</u></b>	<b><u>SGI</u></b>
Jun 9-10	Plenary	St. Petersburg Beach, FL	AMP
Aug 11-12	Plenary	Portsmouth, UK	Xyratex
Oct 6-7	Plenary	Ft. Lauderdale, FL	Adaptec
Dec 14-18	Plenary	Tucson	FSI

All of the 1999 schedule is new, and just includes the Plenary weeks; no interim working meetings are scheduled yet. Meeting locations and hosts marked with (?) are tentative at this time. The meetings in bold underline without a (?) have been firmed up. Note that the HIPPI and T11.1 meeting days are not specified; they will be somewhere within the Plenary week.

**1999** –

Feb 8-12	Plenary	<b><u>San Diego, CA</u></b>	Qlogic
Apr 5-9	Plenary	<b><u>Palm Springs, CA</u></b>	Brocade
Jun 7-11	Plenary	<b><u>Minneapolis, MN (?)</u></b>	<b><u>Ancor</u></b>
Aug 2-6	Plenary	<b><u>Rochester, MN (?)</u></b>	<b><u>ENDL</u></b>
Oct 4-8	Plenary	<b><u>Ft. Lauderdale, FL</u></b>	Adaptec
Dec 6-10	Plenary	Lake Tahoe, CA (?)	Solution

**12. Review action items**

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*(The action items are grouped by project or category to hopefully make them easier to find.)*

1. Everyone to review the HIPPI-800 Switch MIB and pass comments to Marck Doppke.

2. Von Welch to contact HIPPI-6400 MIB users and developers for comments on the current draft, and to prepare a presentation on the MIB for a future meeting.
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9. Greg Chesson and Jeffrey Chung to consider developing "reason codes" to explain why a particular ST Operation was rejected.
  10. Jeffrey Chung to develop state tables for inclusion as an ST annex.
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  12. Jerry Leitherer to continue work on the ST over Fibre Channel mapping with special attention as to whether Class 2 or Class 3 is appropriate, and if the FC TCP/IP profile should be used instead of FC-LE.
  13. Jim Pinkerton to do a rewrite of ST Annex C.
  14. Bob Willard to write up something on big/little endian issues for inclusion in the document.
  15. Greg Chesson to collect text for a "folklore" annex in the document.
  16. Greg Chesson to draft text describing how you differentiate duplicate operations from legal operations.
  17. Jeff Young to evaluate the relative merits of the TCP and ISO checksums.
  18. Jeff Young to investigate CLIP instead of LANE as the method for ST over ATM.
  19. Don Tolmie to update ST Rev 1.3 with the changes agreed to at the December meeting.
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20. Michael McGowen to collect and tabulate everyone's requirements for HIPPI-800 and HIPPI-6400 translation environments.

### 13. Adjournment

The meeting adjourned at 6:00 PM on December 10.

### Attendance

Jeff Young .....	Cray Research Inc. ....	612-683-5536 .....	jsy@cray.com
Gordon Boyd .....	Digital Equipment Corp.....	603-884-1309 .....	boyd@solvit.enet.dec.com
Bob Willard.....	Digital Equipment Corp.....	978-493-5482 .....	bob.willard@digital.com
Nicolas Droux .....	Essential Communications.....	505-344-0080 .....	droux@esscom.com
Chris Good .....	Genroco Inc. ....	414-644-2502 .....	chris@genroco.com
Carl Pick.....	Genroco Inc. ....	414-644-2500 .....	carl@genroco.com
Tom Gilbert .....	Harris Corp. ....	407-984-6403 .....	tgilbe99@hisd.harris.com
Greg Huff.....	Hewlett-Packard.....	972-497-4530 .....	huff@convex.hp.com
Ian Philp.....	Los Alamos National Lab ..	505-667-4305 .....	philp@lanl.gov
Don Tolmie.....	Los Alamos National Lab ..	505-667-5502 .....	det@lanl.gov
Joe Parker.....	Optivision Inc.....	650-855-1775 .....	parker@optivision.com
Quentin Tan.....	Optobahn Corp.....	310-782-9500 x123 ..	qtan@optobahn.com
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