IEEE P1494a Meeting
December 3-4, 1997
Fort Lauderdale, Florida

Meeting started at 8:37 am with introductions. The following agenda was
accepted with the items of new business noted.

1. Introductions and procedures
2. Review of minutes
3. Old action items
    3.1 Single- and dual-phase retry protocol revalidation [Johansson]
    3.2 Multi-speed packet concatenation *vs*. token-style arbitration
        [Duckwall / Johansson]
    3.3 Update and publish SCAT [Whitby-Strevens]
    3.4 Apple patent letter [Johansson]
    3.5 Revise 4-pin cable / connector, isolation [Bassler *et al*]
    3.6 SCAT 7, 35, 51, 70, 76, 86, 89, 92, 93
        and other agreed changes into draft [Johansson]
    3.7 PHY designer SCAT items 3, 36, 52, 59, 74, 82, 83, 87, 88
    3.8 Annex K modifications [Brunker]
    3.9 Suspend / resume editorial [Johansson]
    3.10 International Participation Fee mechanism [Johansson]
    3.11 Voltage drop constants [Bard]
4. Other old business
    4.1 Suspend / resume review
    4.2 Changes to tree ID [Nyu]
    4.3 LPS timing [Baker]
    4.4 PHY register interface (integrated designs) [Finch]
    4.5 Compliance (mandatory *vs*. optional, PHY *vs*. link)
    4.6 Per port speed information and the SPEED_MAP [Brown]
    4.7 Cycle accelerate / decelerate [Hauck]
    4.8 CYCLE_TIME mandatory?
    4.9 Arbitrated short reset
5. SCAT Review and Closure
6. New Business
    6.1 Capacitative isolation barriers [Hannah]
    6.2 500 KHz LPS [Fasano]
    6.3 FIFO Centering [Whitby-Strevens]
    6.4 Continuous SClk [Whitby-Strevens]
    6.5 Priority arbitration for PHY packets [Hauck]
    6.6 Mandatory isolation [Prouty]
    6.7 Timing computation errors in 1394-1995 [Karasudani]
    6.8 NODE_IDS and request/response matching [Johansson]
    6.9 Deadlock in link state machines [Sighireanu]
    6.10 AC measurement points [Bennett]
    6.11 PHY/link interface Figure 5-6 *vs*. text [Finch]
    6.12 DC Specifications [Whitby-Strevens]
    6.13 Per port speed information [Zhang]
    6.14 Remove token-style arbitration from scope [Johansson]
7. Meeting schedule
8. Review of action items
9. Adjournment

2. Review of minutes
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Colin moved and David Wooten seconded to approve the minutes for the previous meeting. Motion passed unanimously.

3. Action items
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Completed: 3.3, 3.6, 3.7 and 3.9 - 3.11

Carried-over: 3.1, 3.2, 3.4, 3.5 and 3.8

See more information on 3.11 below.

3.11 Voltage Drop Constant (Steve Bard / Paul Wiener)
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Steve and Paul presented cable power distribution recommendations based on their analysis cable IR drop etc. His presentation can be found in document 97-076r0 on the web site. Steve's spreadsheet will be posted to web site as well. Colin pointed out that the maximum hop count / cable lengths will also be determined by the signal quality issues. Typical network configurations were analyzed to determine what type of devices would be power consumers in a realistic environment. A "camera" device was identified as being a common power consumer but Steve was still waiting to receive some power consumption numbers. Peter suggested that we have an informative annex that includes this analysis. This annex amongst other things could offer guidance on cable power distribution. David Wooten mentioned that the 1394-1995 spec. specifies a maximum cable resistance of 1/3 ohm (including contact and cable resistance) to maintain no more than 0.5V drop on the ground wire regardless of cable lengths. So any analysis on maximum hops should only be done based on this particular spec regardless of cable lengths. Colin pointed out that the original action item was to define two new constants: 1) maximum power loss on the cable and 2) maximum power loss through a node. The consensus was that we already have a spec for the cable resistance and we should have another spec for the maximum node resistance. Steve and Paul will come back with a recommendation for these two specs. Peter Johansson will add a statement that the current measurements are taken at the PCB side of the connector.

Connector working group: Max Bassler
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Max presented the status from the working group. The drawings are complete and Peter will include them in the next draft. An editorial review and closure meeting will be held during the next P1394B meeting on January 7.

4.1 Suspend Resume Document (Peter Johansson)
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97-086r0 will be reviewed in a smaller group session in the second day of the meeting. See below.

4.2 Changes to Tree ID (Nyu)
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There seemed to be insufficient interest in this issue. So this item
will be taken off the list of new business items.

4.3 and 4.4 LPS timing (Peter Johansson/Richard Baker)
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Peter presented and reviewed the changes resulting from the last sub-
working group meeting in San Jose. Richard Baker suggested that this
document be kept separate from the main P1394a in order to expedite the
release of the P1394a spec. Colin opposed the suggestion on the grounds
that the document is close to being completed and more importantly,
omitting it from the spec will create more confusion similar to the one
caused by the Annex J from the existing spec. Consensus was to continue
to work on this issue and include it in the main document.

A question was raised as to whether the PHY/Link interface as defined
in Section 5 is mandatory in order to claim compliance to the 1394a
draft standard. There was a lot of discussion on this issue and the
consensus was that Peter should add a comment in the beginning of
section 5 clarifying this particular issue.

Keith Heilman presented Lou Fasano's proposal on LPS timing as
described in document 97-078R0. The group agreed to accept the proposed
TLPS_RESET (min), TLPSL (max) and TLPSH (max) values of 1 us, 1us and
1.2 us respectively.

Peter will create R1 draft of this document to be reviewed at the next
PHY designer's review.

4.5 Compliance (mandatory vs. optional, PHY vs. Link)
===

Closed. Peter to add language indicating that compliance will be
measured at the cable interface the PHY/Link interface and the
cable/connector specifications.

4.6 Per port speed information and SPEED_MAP: (Mike Brown)
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Carried over to the next meeting.

4.7 Cycle Accelerate / Decelerate (Jerry Hauck)
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Jerry presented another restriction that should be placed on the link
between the time cycle synch event is detected and the cycle start
packet is received. The link should not be allowed to concatenate
unrelated responses or new requests using the "hold" mechanism on the
PHY link interface. The consensus was to include in the draft.

4.8 CYCLE_TIME mandatory
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This item was brought up in the last meeting at Maui as new business
but no one was available to present this issue so it is now closed.

4.9 Arbitrated short reset
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This item was brought up in the last meeting at Maui as new business
but no one was available to present this issue so it is now closed.

5. SCAT Review (Colin Whitby-Strevens)
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Please refer to 97-035r6.

3. PHY/Link interface - PHY status reporting: Stable
35. Power Distribution Voltages: Stable
52. Max Bus Hold: Stable
59. -- This item was not included in the handout: Stable

74. 500 ps minimum rise and fall time: Stable
76. Annex C modifications: Stable
83. Data Prefix: Stable
86. Split timeout: Stable
92. LREQ Rules: Stable
93. All nodes on the bus shall have same bus id: Stable

56. Open
56. Open
63. Open

78. Mandatory Vs Optional: Agreed
79. Tree ID: Closed. Not adopted.
80. Isochronous bandwidth allocation: Open
88. LinkOn spec: Agreed in principle; 97-079r2.
90. Voltage drop through nodes: Agreed in principle
91. Patent release for ACK acceleration: Open
94. Timing constants: Open
95. ACK_GAP and ISOCH_GAP missing from C code. Open

1. 4-pin cable and connector: Agreed in principle
7. Cable PHY enhancements: Agreed in principle
31. Agreed in principle, subject to review.
36. Speed signal sampling requirements. Agreed in principle.
51. Token style arbitration: Agreed in principle
55. Ping timer: Agreed in principle
87. S100 Self ID- Agreed in principle:
89. Retries on requests: Stable

6.1 500 Volt Capacitive Isolation (Eric Hannah)
===

Eric gave a presentation on capacitive isolation, 97-077r0. He sited
examples of 1394 devices being used in environments that may have high
potential difference between the green wires for two different devices

which could cause very high currents to flow through the cable and
thereby cause severe damage. Eric's analysis showed that capacitive
isolation with two capacitors in series will work fine and the delays
caused by this circuit are insignificant.

6.3 FIFO Centering (Colin Whitby-Strevens)
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Colin presented corrections to the current draft as it pertains to the
receive FIFO elasticity buffer. He proposed changes to clean up some
discrepancies in the C-code. His proposal will be reviewed at the next
PHY designer's review.

6.4 Continuous SCLK proposal (Colin Whitby-Strevens)
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Colin presented a new proposal for SCLK behavior with respect to the
LPS input to the PHY. The new proposal enables applications that prefer
to have a single clock domain. He proposed the following changes:
1. "Tighter" spec for SCLK duty cycle.
2. Change PHY/Link interface spec to distinguish between interface
   reset and interface disable.
3. Keep SCLK running during PHY/Link interface reset.
4. SCLK "goes away" on disable
5. Better definition for interface initialization.

There were some questions about driving SCLK into a link that has been
powered down. Jerry Hauck suggested that this problem could be
alleviated if a programmable bit was used to enable

Peter suggested that we split up this proposal into two: One would be
to change the timing constants and the other that re-defines

Motion to define two new constants TLPS_RESET and TLPS_DISABLE: Colin
moved, Jim Busse seconded.

After some discussion Colin withdrew his motion and moved to bring a
proposal into scope to allow single clock-domain devices. John Fuller
seconded.

Discussion: Jim Busse spoke against the motion since it was aimed at a
specific subset of the 1394 applications.

Yes: 25
No: 2
Abstentions: 2
Opposing comments: It is unnecessary.

Colin asked for a straw poll to see how the group felt about the
following two topics:

New duty cycle for SCLK to 47.5%/52.5%: No poll taken.

Continuous SCLK during RESET: Considerable support, no negatives and
eight abstentions.

Colin will present revised proposal for final vote in Houston.

6.5 Fairness policy for PHY Packets (Jerry Hauck)
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Jerry pointed out that the current draft specifies the fairness policy
for response and request packets but does not specify a policy for the
PHY packets. Jerry proposed that PHY packets be exempt from the
priority request budget. Agreed by consensus and changes to go into
next draft.

6.6 Galvanic Isolation (Bill Prouty)
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Bill gave a presentation on the need for isolation (document 97-085r0).
He discussed examples of various network configurations and potential
problems that could occur due to the potential difference between two
green wire ground points. He also presented test results that showed
that the RFI emissions can be controlled even when galvanic isolation
is used. He recommended that all products implementing 1394 bus
standard shall have the 1394 bus isolated from the Green Ground. David
Wooten mentioned that in most cases, we may not see any potential
difference between the green grounds and it will be an undue cost
burden for device manufacturers if isolation is made mandatory. There
was a lot of discussion on this topic. Colin asked if there was any
signal line voltage drop when two green wire ground points are
connected together. Bill took the action to measure and report this
data.

Straw poll: Is 1394 a local bus or a (wider area) network?
Local bus: 16
Network: 13

So the poll was inconclusive. Peter suggested that anyone who wanted
more information from Bill Prouty should send such requests to him
ASAP.

6.7 Timing Computation Errors in 1394-1995 (Akira Karasudani)
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Peter Johansson presented Akira Karasudani's analysis of the errors in
the timing calculations as described in IEEE 1394-1995. There was
consensus that there are several errors in the document. Peter
suggested that it would be valuable to have a descriptive annex
describing ways of calculating gap counts. Dave LaFollette took the
action of describing the way(s) to calculate and set the gap count.
Steve Bard took the action to write the section on power distribution
including power loss over the cable.

6.8 Node Ids and request/response matching (Peter Johansson)
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After a discussion of how a requester matches responses with
outstanding requests (source_ID, destination_ID and tlabel) it was
agreed that there should be no requirement on the responder to use the
destination_ID from the request as the source_ID in its response. The

requester is responsible to understand that a bus ID of 0x3FF and the bus ID from the NODE_IDS register are equivalent.

In order for the requester to equate the two bus ID's, the most significant 10 bits of all the NODE_IDS registers for a single bus must be identical. This has already been agreed by the working group and is reflected in the current draft.

Peter suggested that only broadcast write requests be used to modify the NODE_IDS register, but no conclusion was reached.

6.10 PHY/Link I/O buffer measurement points: (Joe Bennett)
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Joe proposed that the rise and fall time measurement points be 10% and 90% of Vcc. The proposal was accepted by consensus.

6.11 PHY/Link interface diagram 5.4 (Steve Finch)
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Steve pointed out a discrepancy between the text and diagram in fig 5.4 in the current draft. He mentioned that the diagram is correct and Peter agreed to change the text to reflect the diagram.

6.12 DC Specifications
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Colin mentioned that the DC specs are subject to change pending review in the PHY designer's review next week.

6.13 Per Port Speed Mapping (Peng Zhang)
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Peng presented a proposal on how to report a per port speed field for the case where the PHYs may have ports with different speeds or if the maximum link speed is different from the maximum speed of the PHY. There was a lot of discussion on this topic but Peter mentioned that since this proposal was under the two week rule, we should have more discussion on it over the reflector and bring it up again in the next meeting.

6.14 Proposal to remove token-style arbitration
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Peter mentioned that without a champion, perhaps the incomplete specification of token-style arbitration should be removed from the draft. This will be voted at Houston.

Review of open items:
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Peter reviewed the open SCAT items and wanted the group's opinion on whether it was essential to close these items before the standard goes for ballot.

33: Dual Phase retry: Desirable but not essential
56: Connector and cable testing: Desirable and doable by next meeting.

63: 1394-1995 / P1394a interoperability: Deleted
80: Isochronous bandwidth allocation: Desirable
91: Patent release for ACK acceleration: Essential to inform Apple and
    get a response form Apple
94: Timings on the bus vs. timing on the PHY Link interface:
95: ACK_GAP and ISOCH_GAP in C code: Not essential but doable.
55: Topology management:
96: DC Specs: Essential
1 4-pin cable and connector: Essential and doable.
31: Sleep mode / suspend resume: Essential
36: Speed signal sampling requirements: Essential
51: Token style: Deferred.
82: Link ON specification: Essential
88: Isolated interface spec: Essential
90: Voltage drop through nodes: Not essential

John Fuller moved not to consider any new proposals after the January
meeting (subject to the two week rule) and any work considered in that
meeting can only be voted up or down. David Wooten seconded

Passed unanimously.

Meeting schedule:
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December 16-17 PHY designers review (Albuquerque, NM)
January 7 Houston 4-pin connector review
January 8-9 (Houston, TX)
February 11-12 (Monterey, CA)

ADJOURNMENT
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ATTENDEES
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Oleg Awsienko   (602) 554-9666 oleg_awsienko@ccm.intel.com.ch
Richard Baker   (512) 425-6205 rtb@artb.itg.ti.com
Steven Bard   (503) 264-2923 steve_bard@ccm.jf.intel.com
Max Bassler   (630) 527-4490 mbassler@molex.com
Joe Bennett   (916) 356-3722 joseph_a_bennett@ccm.fm.intel.com
Vilas Bhade   (408) 777-4723 vilas@wipro.com
Brad Bickford   (503) 696-2499 brad_bickford@cc2.hf.intel.com
Charles Brill   (717) 592-6198 cebrill@amp.com
Mike Brown   (602) 554-3713 mike_brown@ccm.ch.intel.com
Jim Busse   (415) 528-3810 jimb@ccgate.sj.nec.com
Ed Butler   (602) 554-0751 ebutler@sedona.intel.com
Richard Churchill (713) 514-6984 richard.churchill@compaq.com
Dan Colegrove   (408) 256-1978 colegrov@us.ibm.com
Barry Colella   (978) 635-6380 b.colella@neccsd.com
Jim Doyle   (602) 554-2051 jdoyle@sedona.intel.com
Bill Duckwall   (408) 461-4902 duck@zayante.com
Firooz Farhoomand (408) 653-4059 firoozf@ix.netcom.com
Steve Finch   (714) 573-6808 steve.finch@tus.ssi1.com
Bill Frank   (714) 932-6402 bill.frank@wdc.com
John Fuller   (425) 703-3863 jfuller@microsoft.com
Dave Gampell   (408) 435-6680 dave_gampell@hp.com

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Jon Hanmann          (714) 932-5189 jhanmann@dt.wdc.com
Eric Hannah          (408) 765-4441 ehannah@mipos2.sc.intel.com
Jerry Hauck          (408) 765-5528 jerry_hauck@ccm.sc.intel.com
Keith Heilman        (914) 892-2413 kheilman@us.ibm.com
John L. Hill         (717) 592-6375 jhill@amp.com
Jack Hollins         (408) 957-2309 jack_hollins@eng.adaptec.com
David Instone        44-1705-486363 dinstone@uk.xyratex.com
Peter Johansson      (510) 531-5472 pjohansson@aol.com
David Johnson        (972) 480-3632 dkjohnson@ti.com
Prashant Kanhere     (510) 668-1457 prashant@macrodesigns.com
Marcus Kellerman     (714) 932-5000 marcus.c.kellerman@wdc.com
Al Kelley            (904) 829-5600 akelley@tensolite.com
David LaFollette     (408) 765-2587 dlafolle@mipos2.sc.intel.com
Steven Larky         (619) 613-7906 larky@anchorchips.com
Farrukh Latif        (610) 712-7546 flatif@lucent.com
Thang Le             (916) 785-4667 tl@hprnd.rose.hp.com
Paul S. Levy         (602) 752-6382 paul.levy@tempe.vlsi.com
Francesco Liburdi    (607) 748-0025 liburdif@hollingsworth.com
Robert Liu           (408) 765-6549 robert_liu@ccm.intel.com
Takashi Matsui       81-76-274-2440 takashi_matsui@ibm.net
Keiji Miura          81-44-435-1454 kmiura@lsi.nec.co.jp
Farrokh Mottahedin   (408) 324-7934 fmottahe@qntm.com
Rich Nesiu           (610) 712-6785 nesiu@lucent.com
Bill Northey         (717) 938-2119 northewa@bergelect.com
Farrell Ostler       (505) 822-7791 farrell.ostler@abq.sc.philips.com
Kugao Ouchi          (408) 588-5503 kugao_ohuchi@el.nec.com
James Piccione       (408) 895-5136 james.piccione@smt.siemens.com
Bill Prouty          (916) 785-4631 bprouty@hp.com
David Scott          (503) 264-1615 davidx_j_scott@ccm.intel.com
James Skidmore       (972) 480-2094 j-skidmore@ti.com
John Smolka          (972) 480-1049 jsmolka@ti.com
John Ta              (714) 573-6957 john.ta@tus.ssi1.com
Ju-ching Tang        (510) 623-8300 jctang@corp.cirrus.com
Peter Teng           (408) 588-5555 pteng@mail.com
Van Ton              (408) 894-3826 vton@fcpa.fujitsu.com
Motoyasu Tsunoda     (408) 922-4142 mtsunoda@hmsi.com
Sushant Verman       (416) 620-7400 sushant@lsil.com
Colin Whitby-Strevens
                     44-1454-611500 colinws@bristol.st.com
Paul Wiener          (650) 361-2341 pwiener@raychem.com
David Wooten         (281) 518-7231 davidw@bangate.compaq.com
Roy Yasoshima        (415) 858-1000 yaso@masca.com
Won Yoon             (610) 712-2503 wjy@aluxpo.lucent.com
Phil Young           44-1908-837247 youngp@euk.nec.co.uk
Michael Zarreii      (717) 767-8030 mzarreii@framconn.com
Peng Zhang           (972) 480-3109 pzhang@ti.com
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