Minutes of the meeting of IEEE P1394a Working Group
on September 25-26, 1997, Natick, MA

Chairman: Peter Johansson (PJ in these minutes)

Minute taker: Colin Whitby-Strevens

50 voting members were in attendance - see attendance list at the end of these minute

1. Introductions and procedures

1.1 Introductions were made around the room

1.2 Procedures

1.2.1 Call for patents

PJ issued a call for patents. He summarised the IEEE patent policy.

He asked whether there are any patent issues that anyone is aware of.

Someone said that there is a possibility of a patent on the Isochronous Resource manager which Sony might hold. PJ stated that he is not aware of relationship of this to our work since we have changed nothing in this respect.

PJ believes that there could be patent issues with Apple IP, and took an action item to contact Eric Anderson to clarify.

PJ asked again if anyone knew of any other possible patents which may affect our specification.

There was no response

2. Agenda approval

PJ solicited items of new business and several items were added

PJ asked for soft copy of all presentations to be sent to him for placement on the ftp site.

3. Review of action items

Carried-over: 3.1, 3.2 and 3.5

For 3.5, PJ said that he would contact Mike Eneboe to check on the status of legacy PHY acceleration issues

Completed: 3.3, 3.4, 3.6 — 3.11

4. Other old business

4.1 Alternate cable/connector

PJ said that the motion tabled last time is now on the floor. This motion is:-

That section 4, "Alternative cable media attachment specification" be removed from the draft.

Proposed: Dave Wooten, Seconded: John Fuller

Takao Yasuda (Sony) presented further information which was discussed. Handouts were provided (97-047r3).

Steve Midford presented further information which was discussed. Handouts were provided, these are an update of the information currently on the ftp site (97-056R1).

Takao Yasuda showed a foil proposing a revised cable construction which was discussed (97-060r0).

Discussion continued on various possible solutions to the issues raised.

Mike Brown commented on the 196 MHz emissions spike on the data – saying that this is prolific and across the I/O panel on the box.

Firooz Farhoomand made a statement on behalf of his company that they believe the connector is suitable for consumer electronics devices, indicating their use of it, and expressing their strong desire that it will be adopted. He indicated that some of the devices operate at S200.

PJ proposed four options

- remove 4 pin

- keep 4 pin

- keep 4 pin with restrictions

- defer the decision again

He asked for people to identify the open issues with the connector, to ensure that these are properly addressed. The following list was drawn up:-

- EMI

- safety

- speed signalling

- data rate (S100, . . .)

Susceptibility was also discussed, but put on the back burner as a system issue, and not specific to resolving the issue on the table.

Cable length was also discussed, but not added to the list for similar reasons.

PJ clarified that we're now considering the cable construction presented today (internal shield connected to the 4-pin shield and to pin 2 in the 6 pin connector, external shield connected to the shield on the 6-pin connector only)

Discussion on the issues.

Safety - possible concern with use of the 4-pin connector with green-wire ground. Solution – to require that the 4 pin connector only be used on devices with isolated ground. This restriction was initially acceptable to all present, but then it was discovered that Sony have a PCI card with a 4-pin connector. It was noted that the issue also arises with 6-pin connectors. So it was agreed to weaken the requirement to be an informative recommendation.

EMI - it was noted that to pass the regulatory requirements more measurements would have to be made than have been presented to day. This is a system issue. EMI looks OK at S100.

Speed signalling – we have no data. There's a difference of opinion as to how much emissions this generates (return path on a 4-pin to 4-pin is on the outer shield).

Motion considered

A friendly amendment proposed by Paul Levy to incorporate the current proposal into the draft.

Dave Wooten says that the amendment is unfriendly

Amendment withdrawn

Question is called. PJ clarified that a similar motion could be entertained later in the meeting.

Objection to calling the question by Mike Brown

Vote on not calling the question – 25 for, 1 against, rest abstain – discussion continues

Mike Brown proposed another friendly amendment – rejected

Question called again

Vote on the main motion (to remove the connector) – motion fails unanimously

Mike Brown moved that the drawing in the draft showing the connector cable termination be replaced by the one proposed in 97-060r0

Paul Levy seconded

Passed unanimously

It was pointed out that the cable construction drawing also needs analogous modifications – this was agreed (will be worked off line)

Paul Levy proposed that we add an informative note to restrict 4-pin connector to S100 devices, Mark Knecht seconded.

Discussion

Motion fails unanimously

Discussion on isolation (safety) issue. This is considered editorial. Annex A will be changed (Max Bassler and Mike Brown will do this in the connector working group) appropriately.

Jerry Hauck pointed out that there is still a lack of information.

PJ pointed out that he hoped further information, particularly S200 test results, will be presented in time for ballot.

John Fuller stated that is seems that the result of the voting today is that the issue is closed, and that there is no expectation of further data to be provided.

PJ described how the IEEE Sponsor Ballot process works.

4.2 Suspend Resume

A proposal is on the ftp site.

Claude Cruz introduced Dave Scott, who presented the proposal (definitions, modifications to existing C code, new port suspend/resume state diagram), 97-061r0,which was discussed. (NB: The suspend / resume proposals are described in more detail in 97-031r8, 97-053r0, 97-054r0 and 97-055r0)

Discussion

Motion:- We include Suspend/Resume facilities in the draft of 1394a that we forward for balloting

Proposed: D Wooten, Seconded: J Fuller

In response to a question on the P1394a schedule, PJ expressed the personal opinion that we could be ready to ballot highly optimistically in October, realistically December. If we include this the projected completion time would be February, worst case April. i.e. a two to four month slip.

A list of changes in the PHY to include suspend/resume was brainstormed

- remote PHY register access

- possible elimination of Ping (separate discussion)

- possible elimination of Caboose packet (separate discussion)

- arbitration state machine

- power switching analog circuitry

- power domains within the PHY

- port state logic

- node state logic

- register definitions

Discussion on the market need for this facility - just mobile, a wider market?

Question called by R Churchill

For: 37, Opposed: 2, Abstentions: 11

One of the no votes indicated that the delay of the standard would impact customer schedules

PJ indicated that he would work with the proposes to incorporate it into a suitable generation of the draft, but in the short term it would remain a separate document.

4.3 Priority Requests for transactions responses

Jerry Hauck introduced the topic. The issue is "how many responses can you issue in a fairness interval". Other work had assumed that a device was allowed to give an unlimited number of responses (but NB self-regulating). But an alternate proposal was captured in the SCAT table.

This was discussed at the OHCI meeting this week. It can cause a problem for the PC usage model (the many-to-one problem).

Discussion

If a specific response is busied, then perhaps it has to wait for the next fairness interval.

There may be a problem for bridges

Currently, you can provide concatenated responses, but you are penalised for even a small delay.

Proposed rule:-

Respond without regard to fairness (agreed)

Two ideas for how to deal with ack_busy_* to the response.

After an ack_busy_* to a specific response:-

a) wait a reset gap, same rules, (i.e. one shot per gap) or

b) subject the response to existing fairness rules (i.e. you don't have to wait if you have enough budget to send something, so the response now is treated like a request)

NB Stream packets have request-like behaviour as far as fairness goes.

Straw poll showed overwhelming support for (a)

Agreed to clarify that (a) should apply to ack_busy_* received for requests as well (regardless of fairness budget).

4.4 Software-initiated bus resets (timing).

John Fuller has emailed the proposed text to PJ, but it might be lost. Will be recovered. Agreed that the value should be 2 seconds.

4.5 Security extensions

A letter from VLSI has been received objecting to the text, which was distributed on the reflector. Deferred to tomorrow morning (see below)

4.6 Receiver sensitivity signal rise/fall times

Eric Hannah presented the Framemaker input he was asked to draft from the last meeting, proposing a minimum of 0.5ns.

Discussion on implications for P1394b of the new 0.5ns rise/fall time minimum values.

Discussion on the proposed informative text on Signal amplitude (118 mV min), and that this has no margin.

Agreed to modify the informative text to

Table 4-13 of IEEE Std 1394-1995 gives a minimum signal amplitude of 118 mV for S400 signals. It should be noted that analysis of connectors and cables in 1394 systems indicates that this number allows negligible margin for reliable operation.

Then substantial further discussion on whether something in the specification really does need changing.

Cable/connector group will look at possibly improving the cable

PHY designers will look at improving the silicon

4.14 6-pin differential electrical performance [Brunker]

Dave Brunker presented 6 circuit connector differential/single ended performance information

Discussion particularly on single-ended cross-talk (significant for speed signalling).

Agreed that the PHY designers will look at the 0.5ns (differential) and 3.0 ns (speed signalling) rise/fall time recommendations, and either endorse them or propose alternatives.

Annex K needs review(softening) - but wait to see what PHY designers review

Action item 3.11 Redefinition of pwr_class for 3W PHYs

Steve Bard reported on work carried out by PJ and himself, following decisions to change the numbers in Hawaii. Minor revisions have been made to Power Classes 4, 5, 6 and 7, whilst maintaining backward compatibility. Power class 5 also now says that no additional power is needed to enable the Link. Agreed by consensus. A copy will put on the ftp site.

4.7 potential problems in Self-ID

Lou Fasano identified a problem in Self-ID in July, and made a proposed change. An S100 PHY could get round to sending its own Self-ID whilst a child is still sending a speed signal. At S400, this can impact the arbitration states. This would change S100-only PHYs. In current implementations is probably not a problem, as they take enough time. The proposed change was agreed, to be confirmed at the PHY meeting.

4.12 Split time-out

PJ reported that disk vendors have reported that they may not be able to do the split time-out values below some minimum value, and other issues concerning behaviour on time-out have been identified.

He proposed that a minimum should be set and that it should be the default, and that all nodes on a bus need to share the same split time-out value and that the responder's behaviour after expiration of the time-out needs to be specified. T label reuse needs to be specified for the requested and the responder. There should be a guard-band. The bus manager needs to ensure consistent use. This was agreed in principle. PJ will produce a revision 1 of the proposal and put it on the ftp site prior to final approval.

4.8 Annex C

Concerned with the internal connector. It is proposed that the isolation requirements be informative, or perhaps deleted altogether. Agreed that it should be deleted. Dave Wooten to identify precisely the text to be deleted.

5 SCAT review and closure

See latest SCAT revision (97-035r5) for details of many minor decisions, including moving a large number of items into the "stable category", and several action items.

Significant debate/decisions include:-

SCAT 70 - After considerable debate, it was agreed that a packet with correct CRC and Tcode = 8 may always be assumed to be a cycle start packet. It is not necessary to check any other fields. This is an explicit decision that Tcode = 8 will not be available to be overloaded in the future. Action PJ to adjust the note.

6.2 Physical configuration limits

PJ raised the question that now we have PHY pinging, are we going to have any requirements on max. hops and/or max. lengths? Extensive discussion followed.

Perhaps some guidance on cable length should go into Annex A. (Cables have to meet electrical specifications and cannot be longer than 50m). An Annex seems to be required on how to manage the topology of the bus. Agreed that these requirements should not be mandatory, just

recommendations. There are issues at the electrical end and of a system nature.

This is an open issue. PJ will document in P1394A what we already know and which is not stated in -1995, e.g. that there is no hard 4.5m limit, etc. (its a recommended length should be captured). A group (perhaps on the reflector) will figure out what additional information needs to be added to the standard.

4.5 Security extensions

Paul Levy showed a memo from his legal department, who object to 9.16 (old numbering), as it implies that devices with normal VLSI test modes would not be compliant. Discussion.

PJ takes an action item to change the title to transaction integrity safeguards. Eliminate the use of the word security wherever possible (perhaps an informative reference). Make it clear that we're talking about modules, not the IC. components. Then engage in a feedback loop with lawyers.

Action on all to take the revised text to lawyers

7. Meeting schedule

October 20-21 Maui, HI

December 4-5 Ft Lauderdale, FL Marriott

Editorial session October 13 (Phoenix, AZ)

6.7 Carried over

6.10 Vendor-specific page

Lou Fasano proposed that page 7 should be identified as a vendor-specific page. Port_select is vendor specific. Agreed by consensus.

4.9 Vp relaxation

Item withdraw, no one could remember what the issue is.

6.3 Data Prefix

Jim Skidmore presented on a problem identified with early Apple PHYs, which need a total of 180 ns Data Prefix. These are in products, and present, in theory, an interoperability problem.

He propose a new timing constant of TOTAL_DATA_PREFIX of 180 ns min. Agreed that we want to define the constant (without prejudice as to the value).

Suggestion of making it speed dependent - 180 ns for S100, 120 ns for S200+.

Straw pole on the minimum single value? rejected. Straw pole on a single value of 180 ns. rejected. Straw pole on 180 ns for S100, 120 (or 140) for higher speeds. Agreed in principle, to be confirmed at the next meeting.

6.9 LinkOn specification

CWS briefly presented a spec which had been distributed to the PHY designers. It was felt that it is not necessary to have such a tight specification. Joe Bennett to make a proposal on the spec and use of LinkOn

6.1 Maximum isochronous payload

PJ pointed out that currently there is lack of clarity on this (though it is possible to calculate it).

Agreed that we should include a table for maximum isochronous packet sizes at the different speeds. Agreed that the maximum isochronous packet size will be exactly twice the asynchronous. Action PJ to check that this is consistent with 1394-1995 and to include a table in the draft.

6.4 Isochronous bandwidth allocation

PJ pointed out that currently there is a lack of clarity on this. Agreed to add text to explain how to allocate bandwidth. Action PJ. John Fuller pointed out that there is a small impact after reset as the gap count may be reset to 63

6.6 Changes to Tree-ID

Takayki Nyu presented a supplementary root contention method for long haul transmission and PHY delay. He provided a handout.

Discussion, on whether this is a P1394b problem, on whether simply to ensure the numbers in P1394a are correct (delays and cable length). Also, this proposal needs further study, it may not be robust (both ends could make the decision to be child, or root).

Advantages of a scheme like this - in that is reduces the number of interoperability concerns. Will be left as an open issue

6.8 Backplane PHY/Link and related issues

Carried forward to old business for the next meeting

6.11 PHY registers in integrated PHY/links

Carried forward to old business for next meeting

Any other business

PJ proposed to add to the SCAT an action to review on what is mandatory, what is optional. Some timings are still not well defined, whether they are seen from one side or the other side of an interface. PJ will co-ordinate.

Meeting adjourned

Summary of actions

Action: PJ to contact Apple (Eric Anderson) to clarify whether there are any patent issues with Apple IP

Action: Max Bassler to provided modified cable diagram and, with Mike Brown, to proposed modifications to cover safety issues with the four pin connector

Action: PJ to update draft per agreements and SCAT 24, 26, 35, 39, 51, 52, 70, 80, 84, 85

Action: Cable/connector group will look at possibly improving the cable to deal with 118 mV receive amplitude marginality

Action: PHY designers to review and provide recommendations (text) for SCAT 3, 36, 59, 74, 83, 87

Action: Dave Wooten to identify precisely the text to be deleted in Annex C

Action: PJ to put call for information on the reflector to implementers of dual-phase retry, and to propose corrections to the current specification (SCAT 33)

Action: Dave Brunker to propose modifications to Annex K for connector and cable testing (SCAT 56)

Action: Suspend/resume group to check that all information currently proposed to be provided in the Caboose can be accessed by their proposed remote register read.

Action: Joe Bennett to make a proposal on the spec and use of LinkOn

End of Minutes

Attendance list

Kazuyuki Abe	(415) 528-5904	kabe@sj-pceg.ccgw.nec.com
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
Mike Brown	(602) 554-3713	mike_brown@ccm.ch.intel.com
David Brunker	(630) 527-2622	dbrunker@molex.com
Jim Busse	(415) 528-3810	jimb@ccgate.sj.nec.com
Ed Butler	(602) 554-0751	ebutler@sedona.intel.com
Juinn-yan Chen	(408) 467-7459	juinn-yan_chen@acer.com
Carissa Cheung	(916) 785-3119	carissac@hprnd.rose.com
Richard Churchill	(713) 514-6984	richard.churchill@compaq.com
Dan Colegrove	(408) 256-1978	colegrove@us.ibm.com
Alistair Coles	44-117-922-8750	anc@hplb.hpl.hp.com
Claude A. Cruz	(503) 264-7109	claude_cruz@ccm.jf.intel.com
David Doman	(512) 891-2922	daved@oakhill.sps.mot.com
Jim Doyle	(602) 554-2051	jdoyle@sedona.intel.com
T.J. Dumont	33-1-3949-2071	jdumont@iway.fr
Firooz Farhoomand	(408) 945-5600	firoozf@ix.netcom.com
Lou Fasano	(914) 892-8904	fasano@us.ibm.com
Steve Finch	(714) 573-6808	steve.finch@tus.ssi1.com
Taka Fujimori	81-3-5448-6592	fujimori@arch.sony.co.jp
John Fuller	(425) 703-3863	jfuller@microsoft.com
Nobuo Furuya	(408) 588-5414	nobuo_furuya@el.nec.com
James Gay	(512) 891-2218	jimg@oakhill.sps.mot.com
Sreekanth Godey	(408) 235-8500 x38	sreekant@sandmicro.com
John Grant	(508) 653-8804	j.l.grant@ieee.org
Eric Hannah	(408) 765-4441	ehannah@mipos2.sc.intel.com
Yasumasa Hasegawa	81-22-347-1128	yasumasa@ffm.fujifilm.co.jp
Jerry Hauck	(408) 765-5528	jerry_hauck@ccm.sc.intel.com
Keith Heilman	(914) 892-2413	heilmann@us.ibm.com
Joe Herbst	(408) 969-4607	jherbst@issiusa.com
John L. Hill	(717) 592-6735	jhill@amp.com
Jack Hollins	(408) 957-2309	jack_hollins@eng.adaptec.com

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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
Kevin Johnston       (512) 891-3965      kevinj@oakhill.sps.mot.com
Jeff Kellam          (303) 776-1667 x240 jak@sismicro.com
Al Kelley            (904) 829-5600      akelley@tensolite.com
Diana Klashman       (508) 442-0575      klashman@east.sun.com
Mark Knecht          (408) 570-1097      mark_knecht@phoenix.com
David LaFollette     (408) 765-2587      dlafolle@mipos2.sc.intel.com
Thang Le             (916) 785-4667      tl@hprnd.rose.hp.com
Chong Lee            (610) 712-3002      chlee@lucent.com
Fred Leung           (408) 467-7449      fred_leung@acer.com
Paul S. Levy         (602) 752-6382      paul.levy@tempe.vlsi.com
Robert Macomber      (207) 541-4677      macomber@thoreau.nsc.com
Takashi Matsui       81-76-274-2440      takashi_matsui@ibm.net
Steven Midford       (408) 765-8370      steve_midford@ccm.sc.intel.com
Kiyoshi Miura        81-462-30-6209      miura@lsis.crl.sony.co.jp
Cyrus Momeni
Neil Morrow          (903) 868-5481      nmorrow@ti.com
Ganesh Murthy        (503) 264-8737      ganesh_murthy@ccm.jf.intel.com
Gopal Nair           (602) 556-2911      gopal_n_nair@ccm.intel.com
James Nave                               jim_nave@ti.com
Al Neves             (408) 925-9492      neves@icst.com
Bill Northey         (717) 938-2119      northewa@bergelect.com
Takayuki Nyu         81-44-856-2082      new@optsys.cl.nec.co.jp
Farrell Ostler       (505) 822-7791      farrell.ostler@abq.sc.philips.com
Kugao Ouchi          (408) 588-5503      kugao_ohuchi@el.nec.com
Bill Prouty          (916) 785-4631      billp@hprnd.rose.hp.com
Rahoul Puri          (408) 974-8598      rahoul@apple.com
Bradley Saunders     (714) 221-6513      bradley.saunders@nb.rockwell.com
Tom Schmidt          (978) 264-6883      schmidtth@mail.dec.com
David Scott          (503) 264-1615      davidx_j_scott@ccm.jf.intel.com
Michael Shinkarovsky(610) 712-2938       mshinkarovsky@lucent.com
Balraj Sidhu         (508) 389-5713      balraj.sidhu@smc.com
James Skidmore       (972) 480-2094      j-skidmore@ti.com
Martin Sodos         (408) 969-4683      msodos@issiosg.com
Michael Sorna        (914) 892-3425      sorna@vnet.ibm.com
Ju-ching Tang        (510) 623-8300 x5189 jctang@corp.cirrus.com
Peter Teng           (408) 588-5555      pteng@mail.com
Tom Trodden          (505) 822-7538      tom.trodden@abq.sc.philips.com
Sushant Verman       (416) 620-7400      sushant@lsil.com
Michael Wang         (602) 554-8555      mike_wang@ccm.ch.intel.com
Kent Waterson        (207) 541-8793      kent@thoreau.nsc.com
Colin Whitby-Strevens 44-1454-611500 colinws@bristol.st.com
Paul Whittemore      (508) 442-0611      paul.whittemore@sun.com
Lee Wilson           (512) 838-6569      leewils@us.ibm.com
Keith Winfield       (508) 442-0810      keith.winfield@sun.com
David Wooten         (281) 518-7231      davidw@bangate.compaq.com
Roy Yasoshima        (415) 858-1000      yaso@masca.com
Takao Yasuda         81-3-5448-6592      yasudat@cv.sony.co.jp
Phil Young           44-1908-837247      youngp@euk.nec.co.uk
Peng Zhang           (972) 480-3109      pzhang@ti.com
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