Minutes of IEEE P1394c Working Group Meeting (6/8/2004)

The IEEE P1394c Working Group was hosted by Broadcom in San Jose, CA on Tuesday, June 8, 2004. The attendees were:

Colin Whitby-Strevens	Apple	colinws@apple.com
Kevin Brown	Broadcom	kbrown@broadcom.com
Walter Hurwitz	Broadcom	whurwitz@broadcom.com
Les Baxter	Commscope	les@baxter-enterprises.com
David James	Self	dvj@mit.alum.edu
Michael Johas Teener	Self	mike@teener.com

Agenda:

1) Welcome and introductions
2) IEEE Patent Policy – Chairman Michael Johas Teener reviewed the IEEE's patent policy.
3) Minutes from April meeting were approved by acclamation.
4) Review of old action items
5) Relationship with IEEE 802.3
6) Synchronous Ethernet
7) 1394c patent issues
8) Technical discussion of the negotiation section of the 1394c draft
9) Request for a conference paper on 1394c
10) 1394c document status
11) Next Meetings

Previous Action Items:

(Note – comments from this meeting are in red.)

No.	Name	Description	Opened	Closed
30	Mike	Add language to the 1394c draft to specify that IEEE 802.3af powering will be used with both S800-T ports and 1394b S100 UTP ports. – (Still open)		
31	Mike	Send in tutorial request form to schedule a 1394c tutorial at the July 802.3 mtg., copy to Kevin 3/23/2004 -- Paperwork done, not mailed in yet. (See discussion below)	2/17/2004	6/8/2004
33	Mike	Follow up w/Bob Grow regarding technical liaison (No response yet.)	2/17/2004	
36	Burke	Confirm characteristics of 1394b UTP signal detect implementation to make sure they will not be confused by 802.3 link pulses or fast link pulses. 3/23/2004 -- Colin and Mike will discuss w/Burke at the Shanghai mtg. (Still open)	2/17/2004	
41	Les	Investigate the 1394c/802.3 patent issue (See discussion below.)	4/27/2004	6/8/2004
42	Les	Send email to John Gildred re: comments on the Sync-E CFI presentation (See discussion below.)	4/27/2004	6/8/2004
43	Walter	Make a list of the changes needed to section 14.11.2.1 (Done)	4/27/2004	6/8/2004
44	Walter	Contact 802 committee and make sure the 1394 selector code is listed on the web site. (Done)	4/27/2004	6/8/2004
45	Dave James	Review OUI mapping in section 14.11.2.6 (Still open)	4/27/2004	
46	Walter	Add a statement about parallel negotiation for S100 somewhere in section 14. (Done)	4/27/2004	6/8/2004

No.	Name	Description	Opened	Closed
47	Mike	Add a figure to explicitly show the signals (and any name changes) between the 802.3 PHY and the 1394 reconciliation layer. (Still open)	4/27/2004	
48	Walter	Add a state machine to make sure that parallel negotiations both complete at the same time. (Done)	4/27/2004	6/8/2004
49	Walter	Define the format of ALPs and the protocol for using them. (Done)	4/27/2004	6/8/2004
50	Mike	Distribute candidate draft by July 12 for page-turning review at July 26 mtg. (Still open)	4/27/2004	

Relationship with IEEE 802.3

Mike Teener drafted a proposal for a couple of presentations for the next IEEE 802.3 plenary. The two presentations are described below in an excerpt from Mike's email.

The overlap between capabilities of IEEE 1394 and IEEE 802 networks seems to be getting larger and larger over time, something that can lead to unnecessary conflict and market confusion. Most of the 1394 community of users and developers would much rather prefer to be in a cooperative relationship with the 802 community. As part of this process, I would like to propose a tutorial at one of the next two 802 plenary meetings. The tutorial will consist of two presentations as described below:

Presentation 1: IEEE 1394 Technical and Market Summary
Outline:

- A brief history of 1394 - technical and market justification
- Quick summary of 1394 operation - why it works the way it does
- Introduction to the associated higher protocol layers defined by other organizations - mass storage, imaging, consumer electronics, industrial automation
- Market status - where 1394 is used and why
- Current technical and implementation developments

Presentation 2: Possible Areas of Cooperation Between 1394 and 802
Outline:

- Potential for competition and conflict - home and professional streaming networks
- Example of successful cooperation - 802.15.3 Protocol Adaption Layer
- Example of basic cooperation - p1394c negotiation between 1394 and 802.3 endpoints
- Example of future cooperation - transparent bridging of isochronous streams between 1394 and Sync-E
- Example of future cooperation - full 1394 Protocol Adaption Layer for Sync-E

I'd like to use this turtorial as a way to encourage further cooperation between 1394 and 802. Education and cross-fertilization seems like the best first step.

Synchronous Ethernet

There was a series of emails exchanged between several 1394c members and John Gildred (the chair of the Sync-E group.) Following this, Mike Teener had a meeting with Gildred to discuss 1394/Sync-E issues. The meeting included a discussion of synchronization and clock distribution issues. Mike emphasized that transparent bridging to 1394 should be a requirement for Sync-E.

1394c patent issues

Email from Les Baxter (6/4/2004):

> I have had discussions with a couple of people at the IEEE-SA (specifically David Ringle and Bob Pritchard) regarding the 802.3/1394c patent issues. I have also left messages twice for the IEEE-SA attorney, but he has not called back.
>
> The general concensus is that letters of assurance normally apply to derivitive standards if we use the old standard as is, but not necessarily if we modify it. I think it is arguable whether we are making changes that would require new LoAs. In any case, we definitely do not have to search for patents that might be affected. Ringle's advice was that we could either do nothing and hope that nobody complains or send a notice to all the companies that have filed LoAs for 802.3 and 1394c. I think this is the safer approach.
>
> According to the IEEE database, about 50 companies (some of which have since been acquired) have filed 802.3 LoAs. Six companies have filed 1394 LoAs. In my opinion, probably the best thing is to send an email similar to the one that Peter recently sent about 1394.1 to everyone on both of the above lists.

It was decided to send out a letter as described above after the draft 1394c specification is ready for ballot.

Technical discussion of the negotiation section of the 1394c draft

Walter presented a document with new material for the negotiation section which closed out action items 43,46,48, and 49. A copy is attached at the end of the minutes.

Request for conference papers:

Mike Teener reported that EE Times is organizing a conference on “Design for Consumer Electronics” in the spring of 2005. They are looking for material on networking and consumer electronics. Mike has been approached about doing a paper on 1394c. They are looking for a couple of other papers as well – contact Mike if interested.

1394c document status

There will probably be another draft of the 1394c spec incorporating Walter’s negotiation material before the July 12 draft for the page-turning review.

New Action Items

No.	Name	Description	Opened	Closed
51	Mike	Distribute a draft copy of the presentation for the IEEE 802.3 plenary.	6/8/2004	
52	Mike	After the 1394 draft specification is ready for ballot, send out a patent LoA email to companies who submitted LoAs for 802.3 and 1394.	6/8/2004	
53	Colin	Explore the difference between PMD_TPORT_CONNECTED and PMD_TPORT_FW.	6/8/2004	

Next Meetings

The schedule for the next meeting is:

- Monday, July 26, 2004 page-turning review @ South San Francisco 1394 TA Mtg.

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Required Register Support

S800T must provide a mechanism to read and write 802.3 MII registers

S100T Parallel Negotiation

A legacy S100T 1394B device will transmit tones (per section XX.XX) on the RJ45 pins 3 & 6. Reception of these tones by a 1394B device will cause SIGNAL_DETECT to assert (per section XX.XX).

For Parallel Detection of S100T the assertion of SIGNAL_DETECT shall assert the link_status[S100T]=READY primitive as defined in IEEE 802.3 28.2.6.1.

Auto-Negotiation Arbitration State Machine(s)

"Combo" devices supporting 1394c and Ethernet shall implement Auto-Negotiation as described in 1394c.

This enhanced Auto-Negotiation for Combo devices requires two simultaneous negotiations – normal Ethernet Auto-Negotiation on copper cable pairs A & B, and 1394c negotiation on pairs C & D.

Therefore two instances of the Auto-Negotiation Arbitration State Diagram found in IEEE Figure 28-16 are required to operate at the same time. Since there are two instantiations it is also required to provide an interlock between them.

The following are required modifications to Figure 28-16:

In order to support parallel detection of S100T the following must be added to the transition conditions from ABILITY DETECT to LINK STATUS CHECK:

+ link_status_[S100T]=READY

In order to provide an interlock between the two arbitration state machines the following must be added:

Add a new state:

PAIR CD WAIT

(empty)

A state transition shall be provided from COMPLETE ACKNOWLEDGE to PAIR CD WAIT with the following conditions:

double_negotiation=true * {original COMPLETE ACKNOWLEDGE to FLP LINK GOOD CHECK conditions}

Where:

double_negotiation

Indicates whether two simultaneous auto-negotiations are occurring – one on pair A&B and the other on C&D

Values: true; when two negotiation are being done

False; when one negotiation is being done

NOTE: This variable is set by the configuration of the device

A state transition shall be provided from PAIR CD WAIT to LINK GOOD CHECK with the following conditions:

{other pair negotiation is to this state (done) OR other pair negotiation will not finish (no energy, stuck in ABILITY DETECT state, no parallel detect, timeout for next pages, and the like…)}

The state transition from COMPLETE ACKNOWLEDGE to FLP LINK GOOD CHECK shall be modified as follows:

double_negotiation=false * {original COMPLETE ACKNOWLEDGE to FLP LINK GOOD CHECK conditions}

The following shall be added to the ABILITY DETECT state:

PMD_Status_Request=NEGOTIATION_ACTIVE

The following shall be added to the FLP LINK GOOD state:

PMD_Status_Request=NEGOTIATION_INACTIVE (check with Colin that this is the opposite polarity; Could just mate up with mr_autoneg_complete)

The following should be added to the FLP LINK GOOD CHECK state: OR
The following should be set properly as part of the HCD resolution process:

Check these with Colin (to match up with 14.9,14.11)

PMD_TPORT_CONNECTED = true

PMD_TPORT_FW = true

PMD_TPORT_802

Beta_mode

T_mode

[NOTE: Verify gig-gig, 1394-1394, 1394-gig, both-legacy, both-1394, both-gig, both-both, AB/CD finish first, second, together scenarios]

ASSIGN “t” bit for S800T

Need to handle NEXT PAGE WAIT entry

NOTE that when both AB & CD negotiation are done, they must both be started at the same time and proceed at the same speed on the same device.

For pair CD negotiation, the Arbitration state diagram states LINK STATUS CHECK and PARALLEL DETECTION FAULT are optional states. It is not expected that these legacy technologies would transmit on these pairs.

T Mode Suspend and Resume

T Mode provides a new PMD mechanism to signal and power down devices on a link segment.

Suspend

An initiator device that wishes to suspend power on a link segment sends a high level SUSPEND token. The receiver will then initiate a PMD_UNSELECT_PORT to cause the PMD to transmit Alternative Link Pulses with the SUSPEND value (all zeros). While waiting for the initiator to transmit an ALP with the SUSPEND value the receiver may still receive data even though it will not transmit data. ???

The initiator, upon reception of one ALP with the SUSPEND value will enter suspend mode and initiate a PMD_UNSELECT_PORT to cause the PMD to transmit Alternative Link Pulses with the SUSPEND value (all zeros).

The receiver, upon reception of one ALP with the SUSPEND value will enter suspend mode.

Resume

An initiator device that wishes to resume from power down mode initiates a PMD_SELECT_TPORT. The device PMD will then power up and switch from sending ALPs with the SUSPEND value to sending ALPs with the RESUME value.

The receiver, upon reception of an ALP with the RESUME value will begin sending ALPs with the RESUME value, power up and resynchronize. [DESCRIBE WHAT THIS MEANS – Richard]

The initiator, upon reception of an ALP with the RESUME value will begin resynchronize.

Resynchronization will occur within XXX ms.

Alternative Link Pulse (ALP)

The Alternative Link Pulse (ALP) is used to signal suspend information between two devices. The ALP is an FLP Burst (as defined in 28.xxxx) where there are two defined 16 bit values:

SUSPEND = 0000 0000 0000 0000
RESUME = 1111 1111 1111 1111