Energy Efficient Ethernet Study Group
15 January 2007

Meeting Minutes

Attendees:
1. Ghani Abbas — Ericsson
2. Kaual Ali — Gennum
3. Joseph N Babanezhad — Plato Networks
4. Hugh Barrass — Cisco
5. Mike Bennett — Lawrence Berkeley National Lab
6. Steve Carlson — HSD
7. David Chalupsky — Intel
8. Ken Christensen — University of South Florida
9. Claudio Desanti — Cisco
10. Alan Flatman — LAN Technologies
11. Howard Frazier — Broadcom
12. Paul Gyugyi — NVIDIA
13. Ruoy Klecka — Cisco
14. David Koenen — Hewlett Packard
15. Bruce Nordman — Lawrence Berkeley National Lab
16. Bob Noseworth — UNH-IOL
17. Timothy J Parker — Nortel
18. Scott Powell — Broadcom
19. Ted G Sopher Jr — Lawrence Berkeley National Lab
20. Noriyuki Takeda — KDDI
21. Pat Thaler — Broadcom
22. Kory Sefidvush — Broadcom
23. Bill Woodruff — Aquantia
24. George Zimmerman — Solarsflare
25. David Law — 3COM

Announcements

Ted Sopher recording secretary
Bob Grow held vote for Mike Bennett to be EEESG chair
Vote was unanimous

Mike reviewed the Study Group function

New sign-in rules reviewed   Bob Grow assisted in the review.

Mike read the rules regarding patents, and then called for patents. There were none.

Bob G. pointed out that IEEE patent rules will be changing, though they haven't changed yet.

An extension may be requested in March 07 (no PAR)

Reviewed PARs and Five Criteria is defined in IEEE

Howard Frazier presented a Review of the 5 Criteria

David Law corrected Howard on his compatibility slide (should use the full 802 text).

Further discussion included historic perspective on the 5 criteria, including that we can't afford mistakes due to the wide deployment of Ethernet

1st Break

Mike corrected folks about attendance sheets

Brad Booth presented 802.3 Standards Development: Lessons Learned.

There was general discussion on the purpose of objectives, 5 criteria and PAR. There was discussion about where EEE would fit in the standard; that we need definitions, that there could be legal liabilities in the implementation of a standard, and that non-objectives are a good thing to have in addition to objectives.

Hugh Barrass presented Objectives and 5 Criteria – a strawman to spur discussion

Hugh made it clear that the purpose of the presentation was to get people talking about the project.

Discussion included how to communicate with upper layers, whether or not the scope was limited to copper, EEE PHY would have to interoperate, but not necessarily save energy with a non-EEE PHY, and we should not inadvertently create a condition in which more power is consumed than before EEE.

There was a question regarding the application space for EEE: core, edge, WAN, copper or fiber? It was suggested that someone should bring material to the group to support applications of interest.

There was a conversation about the difficulty links going up and down, and someone mentioned the loss of security associations when a link is dropped.

Interesting discussion of "Die On LAN" but seemed out of scope

Lunch --- 12:20

Return --- 1:45

Ken Christensen presented Rapid PHY Selection, A Performance Evaluation of Control Policies

Future work slide in his talk identified possible areas of exploration.

Discussion on how to deal with switching speeds based on thresholds

Bruce Nordman presented Energy Efficient Ethernet: Outstanding Questions

Bruce asked the group to think about questions regarding link speed, e.g whether the group should consider speeds between 10x increments, where the control policies should be kept and so on.

There were concerns about how link state changes will impact IEEE802.1AG, OAM including ccm messages.

Discussion went to data center and how to handle them.

Control protocol communications should be considered to be bidirectional

So, the policies that determine the link behavior don't effect the hardware implementation.

- The delay to changing speed cause packet loss, consider how to prevent packet loss. Perhaps should be worded, will minimize packet loss.

- What paradigms(protocols?) are envisioned to apply link rate changes.

Home
Enterprise
Provider
Data Center

POE+ project – intended to raise the power level?

Dropping to 10M from other speeds doesn't seem worth considering.
- Debate in the group - This has to be addressed
- From here out we consider power –argument against 10BaseT

Policy versus implementation mechanism continues to be discussed.

We should consider power consumption of consumer equipment --- very energy sensitive.

Should there be a 0Mb link speed?

Howard Frazier presented Control protocol frames

Discussed both 802.3ah and OAM frames and also discussed LLDP

Note that making OAM changes can be done within the 802.3 working group.

LLDP Deployed in LAN whereas OAM is deployed in service provider networks.

Using the LLDP will not require coordination with 802.1

Straw Poll should identify the project objectives to be voted on:

There were too many ambiguities to accomplish a straw poll.

It was suggested that we come up with a strawman for the objectives—first.

It was is thought we should consider all speeds ignoring that most 10BaseT Phys consume more power than higher speed media

Discussion on Non-objectives included:
    Addressing new phy types
    Speed change will be related to current IEEE media types.

Loss of link possess special problem – concerns were raised about this.

Would like a strawpoll mechanism 100BASE-TX and 1000BASE-T? Not clear

The group wanted a list of technologies in the first straw poll question

Meeting recessed around 5PM

Tuesday 16 January 2007
Meeting started 9:05am

Attendees:
1. Ghani Abbas   Ericsson
2. Kaual Ali   Gennum
3. Jim Barnette   Vitesse Semiconductor
4. Hugh Barrass   Cisco
5. Yakov Belopolsky   Bel Stewart
6. Mike Bennett   Lawrence Berkeley National Lab
7. Brad Booth   AMCC
8. Steve Carlson   HSD
9. David Chalupsky   Intel
10. Ken Christensen   University of South Florida
11. Claudio Desanti   Cisco
12. Wael Diab   Broadcom
13. Chris Diminico   MC Communications
14. Alan Flatman   LAN Technologies
15. Howard Frazier   Broadcom
16. Paul Gyugyi   NVIDIA
17. Rudy Klecka   Cisco
18. David Koenen   Hewlett Packard
19. Jeff Lapak   UNH-IOL
20. David Law   3COM
21. Bruce Nordman   Lawrence Berkeley National Lab
22. Bob Noseworth   UNH-IOL
23. Timothy J Parker   Nortel
24. Scott Powell   Broadcom
25. Rich Seifert   Networks and Communications
26. Ted G Sopher Jr   Lawrence Berkeley National Lab
27. Noriyuki Takeda   KDDI
28. Pat Thaler   Broadcom
29. Geoff Thompson   Nortel / GCSI
30. Kory Sefidvush   Broadcom
31. Bill Woodruff   Aquantia
32. George Zimmerman   Solarsflare

The Chair summarizes and reviews yesterdays work.

Straw Polls

Question - The EEESG should adopt the following project objective:

Minimize frame corruption due to transitioning between speeds

Discussion

Regarding the word "minimize." What does it mean minimize,   1, a few?
Concern about using "zero" was voiced because it may initiate an objective change if not attainable.
The chair decided to change it to zero for this straw poll.

The EEESG should adopt the following project objective:

There should be zero frame corruption due to transitioning between speeds

Vote
Yes   24
No   0
Abstain   3

Question - The EEESG should adopt the following project objective:

Minimize frame loss during the time to change between PHYs for reasonable traffic

Vote
Yes
No
Abstain

Discussion
Concerns were raised about the vagueness of the wording. Both Minimize and reasonable were of concern.   Further, some think that under some circumstances frame loss is unavoidable.   The purpose of the objective was to allow possible lost frames during conditions which make it unavoidable.

Withdrawn

Question - The EEESG should adopt the following project objective:

Minimize the time to change between PHYs

Discussion

It was stated that we need actual studies though some say let's agree to replace minimize with a number or expression, e.g., less than 1ms. Argument was that number simply can't be determined without analysis.

Reworded: The time to switch between PHYs

Withdrawn

Question - The EEESG should adopt the following definitions:

Preparation Time: the time between the first request to change speeds and the time the data transmission is stopped

Transition time: the time that data transmission is stopped or at risk of corruption while speed is changing

Discussion

"Transition time" has been word-smithed
There was much discussion about what transition time encompasses.   Concern was raised that the definition was at odds with previous straw poll questions.

Wael Diab - Announcement about how to sign the attendance books reiterated at this time.

Discussion continued
Transition time is distinctly different that warm up time.

An added definition
Settling Time: time between end of transition time and achieving specified BER.

The question for vote: The EEESG should adopt the following definitions:

Preparation Time: the time between the first request to change speeds and the time the data transmission is stopped

Transition time: the time that data transmission is stopped or at risk of corruption while speed is changing

Settling Time: time between end of transition time and achieving specified BER.

<u>Vote</u>
Yes   Unanimous
No
Abstain

The Chair called a break at 9:20am to return at 9:40am

Question -   The EEESG should adopt the following project objective:

Define the mechanism to change between 10GBASE-T & 1000BASET PHYs rapidly (not auto-negotiation)

Discussion
Changed PHY to "Operation"
Some indicated this was a subtle change although without objections.
Auto-negotiation (AN) is slow and disruptive, the objective needs to convey that a mechanism should be temporally more efficient than AN and less disruptive.
It was noted that improvements to AN should not be excluded by this.
New definitions needed for speed change states— PHY behaviors

Wordsmithed: Define the mechanism to change rapidly between 10GBASE-T & 1000BASET operation by some means other than auto-negotiation.

Returned full circle to: Define the mechanism to change between 10GBASE-T & 1000BASET PHYs rapidly (not auto-negotiation)

Final text: Define the mechanism to change between 10GBASE-T & 1000BASET PHYs more rapidly than auto-negotiation

Vote
Yes   21
No   0
Abstain   4

Question - The EEESG should adopt the following project objective:

Define the means to change between 100BASE-TX and 1000BASE-T PHYs more rapidly than auto-negotiation

Discussion
The question to limit the number of communications methods was broached.

Vote
Yes   20
No   0
Abstain   7

Question - The EEESG should adopt the following project objective:

Define one communications mechanism to negotiate and control rapid PHY change

Discussion
See previous question

Vote
Yes   23
No   0
Abstain   4

Question - The EEESG should adopt the following project objective:

Define the mechanism to change between 10BASE-T & 100BASETX more rapidly than auto-negotiation

Vote
Yes   10
No   3
Abstain   14

Question - It is not an EEESG project objective to:

Change the operational mode of existing PHY definitions

Discussion
Concern was that this limits other more innovative ways to attain power savings. The 802.3 provided authorization to study power savings from link state changes. There were arguments on both side of the question of study scope. There were thoughts that we should soften the statement thus not to exclude other possible innovations.

Withdrawn

Question - The EEESG should adopt the following project objective:

Both ends of the link must be EEE PHYs to save energy
or
Both ends of the link must be EEE PHYs to maximize energy savings

Discussion
Again, this question limits interoperability with existing PHYs such that energy savings could be attained.

Withdrawn

Question - The EEESG should study the benefit of:

Defining the means to change speed between backplane PHYS:

Discussion
This addresses the end system and the data center equipment. Do we include the data center machines? Does the committee explicitly reject the above technologies?   Some argue not eliminate areas of study that may be fruitful. Some believe we should wait until we get more contributions to decide this question. It was pointed out that supporting these technologies in the straw poll-at this junction-seems appropriate.   Changing the wording to "study" the potential demand and power saving these technologies.

Vote
Yes   13
No   0
Abstain   12

Question - The EEESG should adopt the following project objective:

EEE PHYS shall be interoperable with legacy PHYS (including auto-negotiation) of the same ~~port~~ type over all specified media and operating conditions

Discussion
 New PHYs would have to be backward compatible. It would be best to define what PHYs.

Vote
Yes   19
No   1
Abstain   8

The chair called lunch at 12:30pm to return at 1:30pm

Staw Poll (continued)

What does "port" mean?

Discussion
It was unclear what *port* means in the question. However, this lead to a request for a new straw poll question, mainly,   The EEESG should adopt the following project objective:
No new port type.
It was argued that EEE interfaces capability looks like a new PHY type.   What constitutes a new port type? **This question was withdrawn.**

Question - The EEESG should adopt the following project objective:

Compatible with Clause 28 auto-negotiation

Discussion
Changed from "Support" to "compatible. "   Concerns were noted that Clause 28 could not be extended to support EEE. It was also pointed out that in 10GbaseT was extended and could in-fact support EEE extensions. The chair changed the interoperability objective to include auto-negotiation and withdrew this question.

Withdrawn

Bob Grow presented EEE PAR Scope Thoughts

Reviewed the study group charter, raised the concern that market tolerance for silicon spins is decreasing and a broader scope should be considered to study other ways to save energy. The main point is to try to get all the silicon changes in one project.

Call for motions by the chair, none brought forward.

Discussion on what constitutes justification for asking for a PAR extension. The threshold is generally based on the progress of the study group.

Pat Thaler discussed where EEE control fits in the standard.   She showed a diagram of where AN currently fits and thus illuminates the difficulty of deciding where to put the EEE switching.

Action Items:

Chris Diminco – Will alert folks at BICSI
Bob Grow – Will consider and at least organize his thoughts on "zero-utilization"
Relationship with clause 28 – George Zimmerman, Jeff Lapak
Technical Feasibility of PHY switching (RPS)
Look into other WG efforts in this area
      Perhaps chair to do a road show to present to other task forces and study groups

Solicit other groups to give us knowledge of their effort, e.g. wireless – Mike Bennett.

Motion to adjourn:
Moved:Claudio Desanti
Seconded: Rudy Klecka
Passed by acclamation.

Meeting adjourned around 2:40 PM.