Approved Minutes
(At Long Beach, CA, May 2004)
IEEE 802.3 - Backplane Ethernet Study Group
March 16th – 18th, 2004
Orlando, FL

Prepared by: John D'Ambrosia

Meeting convened at 8:26am, March 16, 2004.

Agenda / Housekeeping Issues

- Introductions
- Motion to approve minutes from January meeting that are posted on web
    - Moved by - Schelto Van Doorn
    - Second - Glen Koziuk
    - Minutes were accepted by voice vote without objection
- IEEE rules read to the body by Chair
- IEEE Patent policy read to the group
- Project schedule discussed
    - See agenda_01_0104 for Possible Timeline

Presentation #1

Title – "10 GbE Serial PHY Requirements"
By – Michael Altmann
See altmann_01_0304

- Advanced backplane technology is not required
- Can enable blade-server (XAUI for example) upgrades via card swapping
- Compatible with current connectors
- Routing compatibility
- PHY needs to support BER <1E-18
- Installed base attractive market opportunity
    - Not just XAUI, but a lot of Ethernet based backplanes out there
    - TFI-5, PCI-Express, Infiniband, proprietary
- Power issue brought up.
- Is it 10G or 12.5G
- Is this a proposal to do 40G (4 lanes of 10G)? It is conceivable, but not the intent of the presentation. Not XAUI-like- but can use link aggregation
- Backwards compatibility to 1.25 Gbps based backplanes? How big is the market? Key question as it affects the potential market, but also the size of the task.
- What is reason for going to Class B?
    - Response - broader usage of system and opens up more markets if Class B compliant.
        - Telecom – Class A not restrictive
        - Medical might require Class B

Presentation #2

Title – "Channel Requirements for Ethernet over Backplane"
By – Tom Palkert
See palkert_01_0304

- BER of 1E-15? See Force10 Networks
- Detected vs Undetected errors –
  - If undetected errors are detected, can overall BER be improved?
  - Errors can not be tolerated due to latency issues
- Correction – "Traditional Ethernet is 10x performance at 3x cost."
- Question – if I/O power is increasing does it mean that backplane power has to actually go down, if the same rack is being used. Can be explored later after a channel model is defined.

Presentation #3

Title – "Channel Model Criteria"
By – Joel Goergen
See goergen_01_0304

- ½ rack and 1/8 rack are popular size systems for telecom environment
- memory needs are being driven up (ACL used as example). Eating up board real estate and channels
- power takes up a lot of space
- customers are getting very intelligent and asking very specific questions regarding the aspects of the system
- should not settle for BER 1E-12
- two length ranges where one is a subset of the other. The solution needs to address both lengths
- Joel is going to push for standard test connector interface to allow a standard test interface.
- Joel - Ethernet frame and payload not used at the backplane level. Don't use Ethernet CRC at backplane.
- A generic high-speed I/O not necessarily related to Ethernet framing would be out of scope.
  - Larger frame sizes point out need for better BER.

Break 10:40

Reconvened at 10:50

Presentation #4

Title – "Market Drivers and Cost Considerations in Support of 40 inch average grade FR4 backplane links at 10Gb/s per lane"
By – Bill Hoppin
See hoppin_01_0304

Presentation #5

Title – "Comparison of PAM-4 and NRZ Signaling"
By – Steve Anderson
See Anderson_01_0304

- Being presented on behalf of UXPi
- Concerns expressed regarding conclusions of analysis due to the different chip techniques used
- Points out need for a channel model to allow fair assessments

Lunchbreak @ noon
Reconvened at 1pm

Presentation #6

Title – "Relative Cost for Backplanes and Blades"
By – John D'Ambrosia
See - dambrosia_01_0304

Presentation #7

Title "Next Generation System Costs: A True Look"
By Mike Oltmanns
See oltmann_01_0304

- Other than baseline – all boards included counterboring
  - 6 Levels for daughtercard
  - 10 levels for backplane
- Question to both presenters – can we meet 40" cost effectively?
- Mike Ottsman – feels it is possible
- John D'Ambrosia – what is cost matrix? Concerned about hidden costs

Presentation #8

Title – "Developing a Channel Model to Include Variance"
By – John D'Ambrosia
See – dambrosia_02_0304

- Environmental conditions cited may be extreme for test environments, but
  - Some customers / products do need to deal with this
  - Could consider the impact to be accelerated life testing
- Can we go 40" –
  - Depends on chip technique used
- Depends on developments in material to improve stability with temperature and humidity
- Can we prevent any of this?

    - Humidity – maybe based on design, being explored
    - Temperature – dependent on materials
- Could we get presentations from system vendors that indicate variance of backplane performance from boards in the field based on their original measurements?

Presentation #9

Title – "1 / 10 Gbps Autonegotiation Schemes "
By – Ilanga Ganga
See - chang_1_0304

- Opinion stated by Ilango is that GigE will be around for near future
- Can a PLL go from 1.25 Gb to 10 Gb?
- Can use a divide strategy
    - Vendors would need to get together and agree to things

Break – 2:38 pm
Reconvened at 3:07

Presentation #10

Title – "Case for Enhancing Ethernet Capabilities for Backplane Fabric Interconnects"
By – Gopal Hegde
See – hegde_01_0304

- Gopal - Some enhancements for Layer 2 Improvements are necessary
    - Pat – Too broad for this group
    - Gopal – very specific requests
    - Pat – should be two PARs
    - There is some data that shows the impact of doing this.

Presentation #11

Title – "Throughput & Latency Control in Ethernet Backplane Interconnects"
By – Manoj Wadekar
See – wadekar_01_0304

- This has been discussed in a previous Study Group (QoS), the commenter indicated he would forward this presentation to the reflector
- Latency vs. Throughput serious issue, but appears to be big / important enough that some think it should be done as a separate PAR
- Interrelated issues between packet drop / latency / throughput
- Question to the chair – How do we handle? Other activities underway, with some straw polls to be taken

Straw Poll #1
Description: How many people consider themselves to be Layer 2 competent?
Results: 26 out of 60

Straw Poll #2
Description: Should enhancements to flow-control as discussed in this meeting a topic worth studying within 802?
Results: 34 out of 60

Layer 2 competency does not imply flow control competency. Flow control goes beyond Layer 2.

There is a CFI on Tuesday (3/16)

Straw Poll #3
Description: Count of who would be interested in participating in a study on congestion management?
Results: 15 out of 60

Meeting adjourned for the day 4:36pm

Meeting convened @ 8:40am Tuesday, 3/17/04

Auto-negotiation Discussion

Thomas Jorgensen requested presentation time on the agenda to give a presentation addressing auto-negotiation.

The chair put forth to the study group to hear presentation by Thomas Jorgensen to address auto-negotiation

- Agenda was amended by voice vote without objection

Presentation #12

Title – "Backplane Ethernet Auto-Negotiation"
By – Thomas Jorgensen
See - Jorgensen_01_0304

- Discussion of Clause 28 approach vs Clause 37 approach
- Do we need to do this or can we manage via system software
  - Industrial server architectures do not have an overall system software

Discussion

- Different industry applications will
- Is plug-n-play a requirement?
- It is desirable, because off the shelf components are being used and auto-negotiation would be helpful.

- Future interoperability needs
- Should negotiate
  - Speed
  - Signaling speed
  - Number of lanes
  - Protocol might be an issue. Some enclosures allow multiple protocols to exist in the same backplane, ATCA for example.
- Channel considerations could affect auto-negotiation
  - Might be able to add training sequence in it
  - Other standards de-couple the two. Negotiate speed first.

Straw Poll #4
Description: Should Backplane Ethernet standardize auto-negotiation?
Results: Yes – 17 No – 9 Abstain - 10
Reasons for voting "no"
- **Added complexity**
- **Can be done at later time**

Straw Poll #5
Description: For those voting "yes" to Straw Poll #4,
- **Option #1 - Clause 28 approach**
- **Option #2 - Speed negotiation per jorgenson_01_0304**
- **Not enough information**

Results: Option #1 – 8
Option #2 – 2
Not enough information – 13

Channel Discussion
Joel Goergen requested presentation time to address definition of "FR-4"

The chair put forth to the study group to hear presentation by Joel Goergen to address definition of "FR-4"
- Agenda was amended by voice vote without objection

Presentation #13

Title – "FR-4 Definition"
By – Joel Goergen
See goergen_02_0304
- Objectives state "FR-4"
  - This is vague, do we want to be vague
  - Perhaps even be more general and use "available laminate materials"
  - Objective could be read that the standard would work over all types of "FR-4", which would make the objective to be virtually impossible
  - Use limited set of numbers to try and identify a subset of material

- Channel Model Study Group to be formed. Joel Goergen has been appointed to head up the ad hoc.

Break @ 10:23 am
Reconvened at 10:50 am

Straw Poll #6

Description: **Preferred wording for definition of "FR-4"**
Option #1 – Leave as is
Option #2 – Change "FR-4" to "Improved FR-4"
Option #3 – Change "FR-4" to
"FR-4 with the following characteristics –
- **Dk ≤ 4.1 @ 1 GHz and ≤ 4.3 @ 1 MHz**
- **Df ≤ 0.015 @ 1 GHz and ≤ 0.020 @ 1 MHz"**

Option #4 – Change Option #3 to reflect specifications that would cover approximately 80% of available glass construction for FR-4

Results: Option #1 - 5
Option #2 - 22
Option #3 – 8
Option #4 – 24

Chicago Rules

Straw Poll #7

Description: **Preferred wording for definition of "FR-4"**
Option #2 – Change "FR-4" to "Improved FR-4"
Option #4 – Change Option #3 to reflect specifications that would cover approximately 80% of available glass construction for FR-4

Results: Option #2 - 18
Option #4 – 14

- What are we going to be judged by?
- Customer cost for boards is one aspect to consider, but the impact on semiconductor vendors and implementation to meet the requirements stated by this objective are of concern.

Meeting break – 12pm

Meeting re-convened at 1:15pm

Joel Goergen provided details for Option #4

Option #4 – Change "FR-4" to
"FR-4 with the following characteristics –
- **Dk ≤ 4.0 @ 1 GHz and ≤ 4.2 @ 1 MHz**
- **Df ≤ 0.0149 @ 1 GHz and ≤ 0.020 @ 1 MHz"**

Straw Poll #8

Description: **Preferred wording for definition of "FR-4"**
Option #1 – Leave definition as is with guidance to Channel Ad hoc group to use details provided in Option 4 numbers given by Joel Goergen.
Option #2 – Change "FR-4" to "Improved FR-4" with guidance to Channel Ad hoc group to use details provided in Option 4 numbers given by Joel Goergen.
Option #4 – Change "FR-4" to
"FR-4 with the following characteristics –
- **Dk ≤ 4.0 @ 1 GHz and ≤ 4.2 @ 1 MHz**
- **Df ≤ 0.0149 @ 1 GHz and ≤ 0.020 @ 1 MHz"**

Results: Option #1- 16
Option #2 - 27
Option #4 – 0

Chicago rules

Motion # 1 General Session Motion

Description: **In all Objectives change references to "FR-4" to "Improved FR-4."**
Motion Type: Technical 75 % required
Moved By: Mike Lerer
Seconded By: Nitish Amin
Results: Motion passes by voice vote without objection
P/F **Motion Passes**

Motion # 2 General Session Motion

Description: **In all Objectives change references to "40 inches" to "1m"**
Motion Type: Technical 75 % required
Moved By: Charles Moore
Seconded By: Glen Koziuk
Results: Motion passes by voice vote without objection
P/F **Motion Passes**

BER Discussion

- Industry expectations of 1E-15
- Measured BER vs characterized BER that needs to be explored
- Consider forming an ad hoc group after transceiver technology is chosen to explore testing to better than 1E-12, suggest 1E-15. The group could explore testability and concepts of measured vs characterized BER.

Motion # 3 General Session Motion

Description: In Objectives, change "Support BER of 1E-12**"** to "Support of BER of better than 1e-12."
Motion Type: Technical 75 % required
Moved By: Bryan Parlor
Seconded By: Glen Koziuk

Results:	All	Yes – 14	No - 16
	IEEE802.3	Yes - 6	No – 2
P/F:	**Motion Fails**		

Discussion – Flow Control

- Architecturally, it is needed
- Is the group focused on PHY specification or Crossbar specification
  - Crossbar knowledge can be company IP
  - 10G PHY development will be a large effort
  - Flow control is needed across multiple PHY, not just this one
- Where should be it done?
- Concern that if flow control is put in the objectives the project won't be approved.
- Potentially, a PAR could be submitted that addresses the PHY aspect, and the Study Group could continue to address the issue of flow control.

Straw Poll #9

Description: Should an objective to address congestion management be added to this project?

Results:	Yes	7	No	22

Straw Poll #10

Description: Should congestion management be addressed within 802?

Results:	Yes	32	No	0

Motion # 4 General Session Motion

Description: The BESG recommends that an 802.3 Study Group be established to continue the evaluation of Layer 2 enhancement for congestion management for Backplane Ethernet.
Motion Type: Technical
Moved By: Pat Thaler
Seconded By: Gopal Hegde

Results:	All	Yes – 36	No – 1	Abstain - 3
	IEEE802.3	Yes - 17	No – 1	Abstain - 0
P/F:	**Motion Passes**			

Discussion – Auto-Negotiation

- Optional vs mandatory.
- Needs of the users – having systems that support multiple speeds.
- Other blade systems have auto-negotiation.
- Speed negotiation / feature negotiation.
- Reliance on auto-negotiation negates whether it is optional.
- Auto-negotiation might add burden to devices and impact optimization of the signaling technology.
- Software drivers cause more interoperability issues than what can be done on feature auto-negotiation.
- Environments where there are products produced by different manufacturers a management bus or an auto-negotiation scheme is needed.

Straw Poll #11

Description: **Should Backplane Ethernet standardize-**
Results: Optional Auto-negotiation - 33
Mandatory Auto-negotiation – 8
No Auto-negotiation - 16

Chicago Rules

Straw Poll #12

Description: Is the BESG prepared to clarify the objective concerning "Consider auto-negotiation?"
Results: Yes - 1 No - 17

Meeting adjourned 5:10pm

Meeting called to order, 8:43am, Thursday, 3/18/04

Straw Poll #12

Description: **Who is planning on attending May interim meeting?**
Results: Yes - 18

Attendance was approximately ½ of previous day

Review of BESG Objectives

- Concern has been expressed regarding confusion of three separate channels the group will address or one channel that will require support of two speeds of PHY's.
- Review of proposed editorial changes by secretary

Motion # 5 General Session Motion

Description: Move that the Backplane Ethernet Study Group adopt the Backplane Ethernet Objectives as revised. (To be posted as objectives_1_0304.pdf)

Motion Type: Technical
Moved By: Glen Koziuk
Seconded By: Tom Palkert

Results:	All	Yes – 30	No – 0	Abstain - 0
	IEEE802.3	Yes – 10	No – 0	Abstain - 0
P/F:	**Motion Passes**			

Motion # 6 General Session Motion

Description: Move that the Backplane Ethernet Study Group request approval of the Backplane Ethernet Objectives document, per objectives_1_0304.pdf, by the 802.3 WG.

Motion Type: Technical
Moved By: Tom Palkert
Seconded By: Jeff Cain

Results:	All	Yes – 27	No – 0	Abstain - 0
P/F:	**Motion Passes**			

Motion # 7 General Session Motion

Description: Move that the Backplane Ethernet Study Group request approval of the Backplane Ethernet 5 Criteria document, per critters_1_0104.pdf, by the 802.3 WG.

Motion Type: Technical
Moved By: Jonathan Thatcher
Seconded By: Joel Goergen

Results:	All	Yes - 35	No – 0	Abstain - 0
P/F:	**Motion Passes**			

Motion # 8 General Session Motion

Description: Move that the Backplane Ethernet Study Group request 802.3 approval of the Backplane Ethernet PAR document, as submitted to 802.3 and the Executive committee.

Motion Type: Technical
Moved By: Joel Goergen
Seconded By: Jeff Cain

Results:	All	Yes - 37	No – 0	Abstain - 0
P/F:	**Motion Passes**			

Motion # 9 General Session Motion

Description: Move that the Backplane Ethernet Study Group be extended and request the 802.3 WG to approve Backplane Ethernet Interim meeting(s).

Motion Type: Procedural
Moved By: Tom Palkert
Seconded By: Bill Hoppin

Results:	All	Yes - 38	No – 0	Abstain - 0
P/F:	**Motion Passes**			

Straw Poll #13
Description: Who is planning on attending May Backplane Ethernet interim meeting?
Results: Yes – 22

Straw Poll #14
Description: if a new study group were formed to address congestion management would you participate in the study group at the May interim meeting?
Results: Yes – 15

Straw Poll #15
Description: Would you attend both sessions at the May interim meeting?
Results: Yes – 6

Meeting adjourned at 10am.