# Approved Minutes
# IEEE Higher Speed Study Group
# September 20 - 21, 2006
# Knoxville, TN

## Prepared by: Roger Merel

Meeting convened at 8:31 am, September 20, 2006.

Agenda & General Information
By – John D'Ambrosia
See – agenda_01_0906.pdf

- Introductions
- Bob Grow briefs on IEEE Study Group process & attendance
  - Geoff Thompson raises issue of multiple PARs and SG continuing after PARs.
- John D'Ambrosia unanimously confirmed as Chair of HSSG by show of hands.
- Roger Merel appointed by Chair as Secretary for this meeting
- Agenda
  - 2 presentations were not received by Wednesday deadline
    - Roger Merel – "Implementation Considerations"
    - Menachem Abraham – "Objectives Proposal"
    - Agenda as modified to add these presentations to the end of today
- Goals for meeting
  - Hear presentations related to 5 Criteria, Goals, and Objectives
  - Start developing consensus on HSSG Objectives
  - Lay the ground work for the next meeting
- Ground Rules
- IEEE Structure, Bylaws & Rules
- IEEE Patent policy read to the body by Chair.
- Inappropriate Topics for IEEE meetings read to the body by Chair.
  - Bob Grow confirmed that this applies to SG activities.
- IEEE Standards Process Flow
- Study Group function
- Show example Objectives using 802.3ae as example
- Explain PAR and 5 Criteria
- Present Agenda

Motion to approve Agenda plus 2 post-deadline presentations
- Moved by – Paul Kolesar
- Second – Frank Chang
- Minutes were accepted by voice vote without objection

Presentation #1

Title – 802.3 Standards Development Lessons Learned
By – Brad Booth , AMCC
See – booth_01_0906.pdf
*Discussion* - none

Presentation #2

Title – Review of the Five Criteria
By – Howard Frazier, Broadcom
See – frazier_02_0906.pdf
*Discussion*

- The 5 Criteria are a tool for self-examination and that the top 3 (Broad Market Potential, Technical Feasibility & Economic Feasibility) are inter-dependent.

Presentation #3

Title – Overview of 10G Ethernet Family
By – David Law, 3COM
See – law_01_0906.pdf
*Discussion* - none

Break at 10:36 am
Reconvened at 10:50 am

Presentation #4 (NOTE: presentation swapped with #8)

Title – Surveying the Industry For a Higher Speed Ethernet
By – Mike Bennett, LBNL
See – bennett_02_0906.pdf
*Discussion*

- Seek future clarification on numbers of 100G ports that could be needed e.g. by 2010.

Presentation #5

Title – End user perspective on Higher speed Ethernet
By – Henk Steenman, AMS-IX
See – steenman_01_0906.pdf
*Discussion*

- 25km is the maximum ISL distance for the AMS-IX
- Cost was conceded to not need to be 10x$ for 3xBW
- Presently, not much data is video and this is not uniquely factored into projections which are extrapolated from history but already reflect the actual mix of various applications.

Presentation #6

Title – Ethernet in the Network Service Provider
By – Peter Schoenmaker, NTT
See – schoenmaker_01_0906.pdf
*Discussion*

- Next generation slide represents ~5 yrs from now.

- Clarification regarding permissibility of references of product equipment Brands/Models which was deemed acceptable in this instance.
- Would not prefer WAN vs LAN PHY if both available and at the same cost.
- Would prefer a single HSSG PMD even if at some premium to avoid multiple PMDs
- Would prefer single fiber over ribbon fiber solutions
- For longer than 2km reach, transport is constrained to other service provider's offerings.
- 40km might be a benefit for some limited dark fiber routes.
- POPs are co-located in Europe while owned in US and Japan.
- All fiber is SMF and all 10G uses LR.
- New fiber cables and types is an option for the HSSG ports.
- Will be an early adopter in ~4 yrs and will use 100's of ports within ~6 yrs total across all POPs.

Break at 12:04pm
Reconvened at 1:36pm

Presentation #7

Title – Data Center Fiber Cabling Topologies and Lengths
By – Paul Kolesar, Systimax
See – kolesar_01_0906.pdf
*Discussion*

- This information on structured cable applies to within data centers (not backbones).
- Asked about tap couplers for monitoring which is not applicable to MMF and not available in ribbon configurations.
- Asked about structured vs field terminated proportions. Data centers are mostly using structured cable whereas field terminated cables is used more in risers and between customers in carrier hotels (for instance).
- For structured cable, the mix of fiber types is approximately 80% OM3, 19% SMF, 1% OM1/OM2.

Presentation #8 (NOTE: presentation swapped with #4)

Title – Higher Speed Ethernet an End User's Perspective
By – Mike Bennett, LBNL
See – bennett_01_0906.pdf
*Discussion* – none

Presentation #9

Title – Market Drivers for 100 Gigabit Ethernet
By – Alesandro Barbieri, Cisco
See – barbieri_01_0906.pdf
*Discussion*

- If there is a desire to focus on a single PMD; ideally, he would like to see one PMD solution which supports SMF for up to 10km.
- Slide #6 excluded fixed copper ports and 10G-Base-T.
- Slide #3 10G to Server hasn't happen yet.

Presentation #10

Title – Objectives for HSSG
By – Pete Tomaszewski, Force10 Networks
See – tomaszewski_01_0906.pdf
*Discussion*

- If the SG seeks to limit effort, suggest that two PMDs are worked on, one for <300m and one somewhere in up to 10-40km over no particular fiber type.
- Discussion that scalable solutions will add some complexity.
- Justification of BER of 1E-15 not clear

Break at 3:20pm
Reconvened at 3:40pm

Presentation #11

Title – 802.3 Higher Speed Study Group Objectives and Work Areas
By – Mark Nowell, Cisco
See – nowell_01_0906.pdf
*Discussion*

- First PMD will not likely be serial.
- Clarification that XAUI was driven to support pluggables
- >10km is interesting problem and need more info.
- Multi-XFI in CMOS is becoming comfortable. 6.25G is too low for I/O. Beyond XFI is challenging. Don't want to go above XFI.
- Want simplicity of connecting two interfaces without having too many varieties.

Presentation #12

Title – The Next Rate for a Higher Speed Ethernet
By – Drew Perkins, Infinera
See – perkins_01_0906.pdf
*Discussion* - none

Presentation #13

Title – Transport Ethernet Interfaces 1.5 Mbit/s to 10 Tbit/s
By – Stephen Trowbridge, Lucent for Marteen Vissers, Alcatel
See – vissers_01_0906.pdf
*Discussion*

- Clarification on slide 3 that these are actually network layer headers & trailer

Presentation #14

Title – Considerations for multi-lane implementations of higher rate Ethernet interfaces
By – Stephen Trowbridge, Lucent
See – trowbridge_01_0906.pdf
*Discussion*

- OTN has no synchronized central reference clock and then uses data stuffing.
- Where did 125microseconds come from? Uncertain of precise justification.
- Uses 20ppm instead of 100ppm on clocks which was easy enough to implement.

Presentation #15

Title – Implementation Considerations
By – Roger Merel, Luxtera
See – merel_01_0906.pdf

*Discussion*

- Slide #3 regarding Cu Interconnect (CX-4) was clarified that while the drivers/transceivers are low-cost, the cable is actually considerably more expensive than ribbon fiber cable per meter.
- Slide#8 uncooled operation of DWDM needs to operating in combination with the filters which "track" as the comb of DWDM laser wavelengths will move together over temperature.
- Slide #12 should be clarified that SMF is "the most future proof" of known media types as there was a concern that SMF might not last into eternity.

Meeting breaks for the day 5:45pm

Meeting reconvenes at 9:01 am, Thursday, September 21, 2006.

Presentation #16

Title – Physical Layer Aggregation
By – Howard Frazier, Broadcom
See – frazier_01_0906.pdf

*Discussion*

- Prefers fixed fragment size.
- CRC-8 should be used to cover Fragment Header.
- APL should be independent of the Compatibility Interface and should work with any Compatibility interface.
- Slide 27-29 illustrates the function but implementation would not necessarily strand all the unused silicon capacity in the MAC/APLs by implementations which bit slice across lesser capacity silicon MAC/APLs which can bit slice together.
- The X-point in slide 27-29 is not the switches' switch fabric.
- The MAC + APL + X-Point would likely be implemented all in the same silicon.
- Can work with XFI.
- With a higher speed PHY/PMD (e.g. 25G or 40G), this APL technique can be used to aggregate them to create a HS-Ethernet.

Presentation #17

Title – MultiPHY Ethernet
By – Drew Perkins, Infinera
See – perkins_02_0906.pdf

*Discussion*

- On slides 15-17, by MultiPHY, he was meaning an APL like technology
- On slide 3, cost and power on each of these axes varies with time.

Break at 10:39 am
Reconvened at 11:05am

Presentation #18

Title – Proposal of PMD architectures for HSSG
By – Shinji Nishimura, Hitachi
See – nishimura_01_0906.pdf
*Discussion*

- Slide 11 on short reach option is for MMF and the skew values all need to be verified.

Presentation #19

Title – WDM alternatives for 100Gb SMF applications
By – Chris Cole, Finisar
See – cole_01_0906.pdf
*Discussion*

- Indicated that the comments on parallel VCSELs were empirical and not his views.
- Off-the-shelf test equipment at 25G+ rates is expensive, but it is not inherent or can make your own.
- Encourages that going forward to use the ITU CWDM grid if CWDM is used for HS-Ethernet.

Break at 11:55 am
Reconvened at 1:31pm

Chair asked permission from the group and the group agree to permit the addition of a new presentation by Drew Perkins. Approved without objection.

Presentation #20 (Added presentation as mentioned above)

Title – Dispersion and Skew
By – Drew Perkins, Infinera
See – perkins_03_0906.pdf
*Discussion*

- With Broadband Dispersion compensators used today, there would be little DWDM skew.
- Some questions on where the data came from which was extrapolated from fiber datasheets. Not measured data.
- There may need to be a few corrections to the table.

Presentation #21

Title – Serial PHY for Higher-Speed Ethernet
By – Stephen Trowbridge, Lucent for Marcus Duelk, Lucent
See – duelk_01_0906.pdf
*Discussion*

- Complexity of devices is straightforward compared to 40G components and so cost should not be that much more.
- PMD tolerance should say Max. DGD
- Uncompensated reach for PMD and CD are limited (single digit km). Thus CD and PMD compensators would affect the economics especially for single channel application even if it might be acceptable to WDM systems on multiple 100G channels.

Presentation #22

Title – Objectives Proposal
By – Menachem Abraham, Columbus Advisers
See – abraham_01_0906.pdf

*Discussion*

- No opinion on reliability benefits of one vs multiple fibers.

Discussion, Straw polls & Next Steps

Roger Merel appointed by Chair as Study Group Secretary.

The Chair led discussion (see discussion_01_0906).

Straw Poll #1: At the November Plenary, I will be attending:
A – 802.3av
B – 802.3 HSSG
C – Both

Results: A - 22
B - 48
C - 14

Straw Poll #2: I plan on attending the January Interim:
Results: Yes – 53

Terminology - As part of 802.3 ae, terminology was defined. Geoff Thompson agreed to post list of prior definitions and take suggestions on additional definitions required via the reflector.

Discussion of project planning and how the group might divide its agreed upon objectives into multiple PAR. General agreement that the SG should determine the initial list of objectives and then consider how to separate them into the appropriate number of PAR. Schedule and state of technology were two criteria suggested. The Chair welcomes any presentations that provide proposed criteria on how to separate the objectives into multiple PAR.

Discussion of SG schedule and overall project schedule.

Break at 3:02pm
Reconvened at 3:21pm

Straw Poll #3: Support for the following as objectives:

- Support full-duplex operation only
- Preserve the 802.3/Ethernet frame format at the MAC Client service interface
- Preserve minimum and maximum FrameSize of current 802.3 Std.

Results: Yes – 46
No - 0

Straw Poll #4: The HSSG should adopt as an objective:
A – One MAC Data Rate >10Gbps
B – Multiple MAC Data Rates >10Gbps
C – No opinion at this time

Results: A – 25
B - 11
C - 16

Proposed by Drew Perkins (with suggestions/contributions from others) -
Straw Poll #5: Should this group pursue Physical Layer Aggregation?

Results: Yes - 37
No - 1
Abstain - 11

Proposed by Mark Nowell -
Straw Poll #6: [Chicago Rules] Is the HSSG interested in defining objectives to support?
Option A – Data Center
Option B – Campus
Option C – Metro
Option D – Long-Haul
Option E – Backplane
Option F – HPC

Results:
Option A – 46
Option B – 34
Option C – 38
Option D – 9
Option E – 10
Option F – 26

Proposed by Drew Perkins -
Straw Poll #7: Should this group study (i.e. pursue) a new generalized media independent interface at a rate higher than 10Gbps?
Yes – 14
No – 0
Don't Care – 4
Abstain – 23

Proposed by Menachem Abraham -
Straw Poll #8: Should the group pick data rate(s) which are friendly/compatible/easy to carry with existing long-haul transport systems (STM64/OC-192, STM256/OC-768, OTU2, OTU3)?

Yes – 13
No – 9
Abstain – 21

A “Reach” Ad-hoc was formed. Its charter is:

- Research reach / media (fiber / copper cabling) for applications (examples- HPC, Data Center, Metro, others)
- Report findings to SG.

The Chair appointed Andy Moorwood “Reach” Ad Hoc Chair.

Future Meetings

- November 2006 Plenary
  - Week of November 12
  - Dallas, TX
  - Hyatt Regency Dallas
- Jan 2007 Interim (Details being finalized)
  - Date Week of Jan15
  - Monterey, Ca

Encouragement to bring presentations regarding the “Objectives” topics including in the “Discussion” slides.

Motion to Adjourn – Moved by Drew Perkins
Seconded by Howard Frazier
Motion to adjourn - Passed by voice approval without objection.

Meeting adjourned for day 4:58pm