Approved Minutes
IEEE Higher Speed Study Group
November 14-17, 2006
Dallas, TX

Prepared by: George Oulundsen and Robert Lingle, Jr.

Meeting convened at 8:06 am, November 14, 2006.

Agenda & General Information
By – John D'Ambrosia
See – agenda_01_1106.pdf

- Introductions
- Chair appointed secretaries – Robert Lingle and George Oulundsen for this meeting
- Motion to approve the agenda- moved by Brad Booth, 2nd by Mike Bennett
    - Agenda approved by voice vote without objection
- September Interim minutes
    - Motion to approve the minutes with the following change - In the discussion section on Presentation #21 replace "PMD tolerance should say Mean DGD" with "PMD tolerance should say Max. DGD".
        - Moved by Pete Anslow
        - Second by John Abbott
    - Motion approved by voice vote without objection
- Goals for meeting
    - Hear presentations related to 5 Criteria, Goals, and Objectives
    - Start developing consensus for Objectives: HSSG Objectives, PAR, 5 Criteria Responses
- 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.
- IEEE Standards Process Flow
- Study Group function
- Presented possible Study Group Schedule

Liaison Report #1 (switched with Liaison Report #2)
Title – Liaison from ITU-T SG15
By – Pete Anslow, Nortel
See – ITU-T SG15 liaison.pdf

Discussion

- Liaison letter to be posted to HSSG website
- Mark Nowell and John Jaeger will draft response to ITU

Liaison Report #2

Title – OIF Liaison Letter
By – Tom Palkert, Xilinx (presented John D'Ambrosia, Force 10 Networks)
See – oif2006.324.01_IEEE.pdf

Discussion

- Joel Goergen will draft response to OIF.

Ad Hoc Report #1

Title – Reach Ad Hoc
By – Andy Moorwood, Extreme Networks
See – moorwood_01_1106.pdf

Ad Hoc Report #2

Title – Fiber Optic Ad Hoc
By – Dan Dove, HP (Dove Networking Solutions)
See – dove_01_1106.pdf

Presentation #1

Title – HSSG Objectives: The End Users' View
By – Mike Bennett, LBNL
See – bennett_01_1106.pdf

Presentation #2

Title – Objectives for Service Provider Shared Transport of 802.3 Higher Speed Ethernet
By – George Young, AT&T
See – young_01_1106.pdf

Discussion

- It is expected that the existing Express Backbone will all be capable of 40 Gb/s in 2008.
- Discussion of applicability regarding 10 GB WAN-PHY.

Break at 10:34 AM
Reconvened at 10:57 AM

Presentation #3

Title – Higher Speed Ethernet - A telecom system vendors view
By – Arne Alping, Ericsson
See – alping_01_1106.pdf

Discussion

- Distribution of 300-m in Telecom center. Need to look at the length distribution.

Presentation #4

Title – The Impact of Scalable HSSG from Systems Perspective
By – Joel Goergen and Subi Krishnamurthy, Force10 Networks
See – goergen_01_1106.pdf

Presentation #5

Title – HSSG Goals and Objectives - System Vendors' Perspective
By – Dan Dove, ProCurve Networking by HP
See – dove_02_1106.pdf

Discussion

- Proposal does not exclude MM fiber solution, but suggests SM is the shortest path to market deployment and should be focused on first.
- Discussion of possible need for multiple PARs and how to handle.

Lunch Break at 12:00 PM
Reconvened at 1:17 PM

Presentation #6

Title – Cray High Speed Interconnect Requirements
By – Mike Steinberger, Cray
See – steinberger_01_1106.pdf

Discussion

- Cray has built resiliency into their protocol. When a lane goes down, the data traffic continues on the other lanes until the computer can be shut down and fixed. Does not protect against a more catastrophic failure than a single lane failure, but fixing single lane failures has value. This may not be the case for applications other than Super-computing. It was indicated that it was complex to add resiliency in this application.
- The data going out of a single wire will be at 20 Gb/s and needs to be handled for links of 30-100 meters. Need an optimized Physical Layer.

Presentation #7

Title – HSSG Considerations
By – Jan Peeters, Intel
See – peeters_01_1106.pdf

Discussion

- Can consider faster speeds beyond 100 Gb/s.

Presentation #8

Title – Objectives Discussion – (i) MAC Data Rate Considerations (ii) Long Haul Objective
By – Menachem Abraham, Columbus Advisors
See – abraham_01_1106.pdf

Discussion

- Maintenance requirements for higher speed networks must be considered.
- Using a rate of the 95.846 Gb/s (stated on slide 3) may not be the best way to characterize the future speed for Long Haul networks.

Presentation #9

Title – Update on APL
By – Howard Frazier, Broadcom
See – frazier_01_1106.pdf

Discussion

- Clarification on slide 5 – Whether n x 25 G on the backplane would or would not be economically feasible may depend on the application.
- APL fragment format on slide 20 will require re-align capability driven by the skew.

Break at 3:05 PM
Reconvened at 3:21 PM

Presentation #10

Title – MAC Rate
By – Brad Booth, AMCC
See – booth_01_1106.pdf

Discussion

- Clarification – in the slides, the MAC and PHY rates need not be equal; when a rate of 100 G is recommended it refers to the static MAC rate.

Presentation #11

Title – Feasibility of a 100G MAC
By – Med Belhadj, Cortina Systems
See – belhadj_01_1106.pdf

Discussion

- There is margin to go above 100 G. The case presented had 15% margin. 120 G is likely possible.
- May need to go to a serial solution instead of parallel because of the large number of pins that would be required for a switch in the parallel solution.
- Did not look at what happens if one lane fails (resiliency not considered).

Discussion of legal issues regarding surveys and polls

Chair discussed concerns regarding conducting surveys by an IEEE ad hoc. IEEE 802.3 Chair, Bob Grow, introduced Michael Lindsay (IEEE Legal Counsel, Partner with Dorsey & Whitney LLP) who provided background and explained IEEE policy.

Presentation #12

Title – Higher Speed Ethernet Requirements
By – Drew Perkins and Ted Sprague, Infinera
See – perkins_01_1106.pdf

Discussion

- Discussed whether or not current WAN has protection for failed multiple aggregate lanes and if this is needed.
- Discussion of need of resiliency, and if it is application dependent

Meeting breaks for the day at 4:55 PM

Meeting reconvened at 8:05 AM, Wednesday, November 15, 2006.

Presentation #13

Title – Telecommunications Infrastructure Standard for Data Centers
By – Chris DiMinico, MC Communications
See – diminico_01_1106.pdf

Discussion

- Lengths listed in ANSI/TIA-492 are normative
- Document covers historical distances used in Data Centers
- Document covers application distances currently found in Data Centers
- Document addresses carrier termination and may be helpful for some outside plant topologies

Presentation #14

Title – The 10G Ethernet Link Model
By – Piers Dawe and David Cunningham, Avago
See – dawe_01_1106.pdf

Discussion

- The numbers used in the spreadsheet on the web are out of date relative to the 10 GBE standard. What is in the spreadsheet does not represent the standard nor does it claim too.
- Discussion as to whether or not using a Guassian representation for VCSELs that might not be Gaussian is reasonable or useful.
- References in the presentation may be useful as hot-links posted on the web.

Presentation #15

Title – Cisco 10GbE Historical Ethernet PMD adoption rates
By – Alessandro Barberi, Cisco
See – barbieri_01_1106.pdf

Discussion

- Discussion of whether or not the MM and SM distributions for early adopters would have been different if both SR and LR were readily available at the same time. Early adopters in 10 GBE started from the core of the network and they chose SM fiber.

Presentation #16

Title – PMD Objectives: 10KM to 40KM PMD
By – Joel Goergen, Force10 Networks
See – goergen_02_1106.pdf

Discussion

- SR data shows flat growth for 2006 to 2007 and significant growth from 2005 to 2006.
- 5-40 km is mostly used for Campus to Campus but is also used across a campus in the scientific community.

Break at 9:50 AM
Reconvened at 10:05 AM

Presentation #17

Title – MMF PMD for Short Distances in Data Center and High Performance Computing Environments
By – Petar Pepeljugoski, IBM Research
See – pepeljugoski_01_1106.pdf

Presentation #18

Title – Short-Reach on Parallel MMF for Low-Cost Higher-Speed Ethernet
By – Jack Jewell and Mike Dudek, Picolight
See – jewell_01_1106.pdf

Discussion

- 1310-nm VCSEL is targeted for SM fiber
- Discussion as to whether power dissipation will be an issue with copper.

Presentation #19

Title – Some Ideas for a Cost Effective OM3 PMD for HS Ethernet
By – Steve Swanson, Corning
See – swanson_01_1106.pdf

Discussion

- Channel width (10) was based on assumed data rate of 100 GB. Other widths can be considered.
- Numbers proposed in tables are strictly ideas to consider.
- Ribbon fibers can be pre-terminated in the field, but is more difficult than duplex fibers.

Presentation #20

Title – Optical Components for 100 Gbps
By – Jim Tatum, Finisar; presented by Chris Cole, Finisar
See – tatum_01_1106.pdf

Discussion

- ROF is relaxation oscillation frequency, not rate of failure.

Presentation #21

Title – Technical & Economic Feasibility of 20GBaud based 100Gb Transceivers
By – Chris Cole, Finisar
See – cole_01_1106.pdf

Discussion

- Additional test equipment requirements were not built into the relative cost comparison.
- OM3 MMF BW is lower than 2000 MHz-km at 1300-nm and may not work as described.
- Need to invest some time to look at PMD and the specific SM fiber requirements.

Lunch Break at 11:50 PM
Reconvened at 1:16 PM

Presentation #22

Title – PMD architecture with skew compensation mechanism for parallel link
By – Shinji Nishimura, Hitachi
See – nishimura_01_1106.pdf

Presentation #23

Title – Overhead Efficiency Analysis of Multi-Lane Alternatives
By – Steve Trowbridge, Lucent; and Maarten Vissers, Alcatel
See – trowbridge_01_1106.pdf

Discussion

- Additional requirements on clock accuracy?

Presentation #24

Title – Polarization Mode Dispersion Aspects for Parallel and Serial PHY
By – Marcus Duelk and Peter Winzer, Lucent
See – duelk_02_1106.pdf

Discussion

- How much DGD is allocated to the system components other than fiber? See back-up material. The shaded area on slide 12 represents the difference between a G.655/6 fiber which uses a DCM with relatively lower PMD (lower edge of shaded region) vs. G.652 fiber which requires a DCM with relatively higher PMD (represented by upper edge of shaded region).
- Interest was shown in additional information on PMD distribution of the installed base of cabled fiber across multiple carriers' networks.

Presentation #25

Title – DQPSK Format for Serial PHY
By – Marcus Duelk and Peter Winzer, Lucent
See – duelk_01_1106.pdf

Discussion

- Discussion of the complexity of the Tx and Rx for DQPSK 100Gbps. The delay interferometer in the Rx (slide 13) is used in 40G equipment today. The nested MZM is the less standard part of the DQPSK Tx, but several companies work on this.

Presentation #26

Title – Feasibility of a 100 Gbps copper interconnect
By – Chris DiMinico, MC Communications; George Zimmerman, SolarFlare
See – diminico_02_1106.pdf

Discussion

- Interest in power dissipation estimates for solution proposed
- Discussion of impairments at the connector

Break at 2:55 pm
Reconvened at 3:15pm

Presentation #27

Title – 100G Ten Bit Interface Proposal
By – Mark Gustlin, Cisco
See – gustlin_01_1106.pdf

General Discussion

Straw Poll #1: I do not support adding more than one MAC rate.

Yes -
No –

Results: Yes - 76
No - 5

Straw Poll #2: I do not support a MAC rate of _____. (Chicago Rules)

a) 40 Gbps
b) 80 Gbps
c) 120 Gbps
d) 100 Gbps

Results: a) 40 Gbps - 89
b) 80 Gbps - 84
c) 120 Gbps - 45
d) 100 Gbps - 3

Note: At time of straw poll 104 people were present

Straw Poll #3: I support a MAC rate of 100 Gbps.
Yes
No
Undecided

Results: Yes – 76
No – 2
Undecided - 24

Note – At the time of the Straw Poll there were 107 present in the room.

General discussion of resiliency. Informal straw poll by chair indicated approximately half of room were unsure of potential implications that resiliency would add.

Straw Poll #4: I do not support a reach objective of _____. (Chicago Rules)

a) At least 100 to 300 m over MMF
b) At least 2 to 10 Km over SMF
c) At least 40 Km over SMF

Results
a) At least 100 to 300 m over MMF - 4
b) At least 2 to 10 Km over SMF - 0
c) At least 40 Km over SMF - 9

Straw Poll #5: I do support a reach objective of _____. (Chicago Rules)

a) At least 100 to 300 m over MMF
b) At least 2 to 10 Km over SMF
c) At least 40 Km over SMF

Results
a) At least 100 to 300 m over MMF - 64
b) At least 2 to 10 Km over SMF - 80
c) At least 40 Km over SMF - 50

Straw Poll #6: I do not support an objective for a PMD for long-haul or ultra long haul applications.

a) yes
b) no

Results
a) yes – 44
b) no – 8

Note: at the time of the straw poll there were 97 present

Break for day at 5:44 PM

Meeting reconvened at 8:20AM on Thursday, November 16, 2006

Discussion and Motions

Motion 1
Move that the HSSG adopt as an objective: Support full-duplex operation only

M: Mike Bennett
S: Dan Dove

Technical (≥ 75% required)
HSSG voters: Y: 73 N: 0 A: 4
Motion Passes

Motion 2
Move that the HSSG adopt as an objective: Preserve the 802.3 / Ethernet frame format at the MAC Client service interface

M: Mike Bennett
S: Dan Dove

Technical (≥ 75% required)
HSSG voters: Y: 76 N: 0 A: 4
Motion Passes

Motion 3
Move that the HSSG adopt as an objective:
Preserve minimum and maximum FrameSize of current 802.3 Std

M: Mike Bennett
S: Dan Dove

Technical (≥ 75% required)
HSSG voters: Y: 74 N: 0 A: 4
Motion Passes

Motion 4

Move that the HSSG adopt as an objective:
Support a speed of 100 Gb/s at the MAC/PLS interface

M: Mark Nowell
S: Joel Goergen

Technical (≥ 75% required)
HSSG voters: Y: 67 N: 9 A: 14
802.3 voters: Y: 26 N: 4 A: 11
Motion Passes

Motion 5
The HSSG adopt an objective of:
Support at least 10km on SMF

Moved: Brad Booth
Second: Mark Nowell

Technical (≥ 75% required)
HSSG voters Y: 86 N: 0 A: 4
802.3 voters Y: 40 N: 0 A: 4
Motion Passes

Motion 6
Move to amend Motion 5 to:
The HSSG adopt two objectives:
Support at least 10km on SMF
Support at least 100m on OM3 MMF

Moved: Petar Pepeljugoski
Second: Paul Kolesar

Technical (≥75% required)
HSSG voters Y: 24 N: 37 A: 25
802.3 voters Y: 17 N: 16 A: 12
Motion fails

Motion 7
Postpone Motion 5 until after considering a motion of the reach on MMF

Moved: David Cunningham
Second: Petar Pepeljugoski

Procedural (>50% required)
HSSG voters Y: 28 N: 29 A:30

Recount
HSSG voters Y: 31 N: 29 A: 29
Motion Passes

Break at 9:55am
Reconvene at 10:20AM

Motion 8
The HSSG adopt an objective of:
Support at least 100m on OM3 MMF

Moved: Joel Goergen
Second: David Law

Call Q (>50% required)
Y: 46 N: 8 A: 11

Technical (≥75% required)
HSSG voters: Y: 61 N: 3 A: 27
802.3 voters Y: 33 N: 2 A:13
Motion Passes

Administrative Issues

Motion 9
Move that:
The HSSG requests that IEEE 802.3 extend the Higher Speed Study Group.

Moved by – Jeff Lynch
Second by – Joel Goergen

Procedural (>50%)
HSSG voters Y: 84 N: 2 A: 6
Motion Passes

Motion 10
The HSSG will meet the week of January 16 – 19, 2007 at the IEEE 802.3 Interim Meeting being held at Monterey, CA.

Moved by – Dan Dove
Second by – David Law

Procedural (>50%)
HSSG voters Y: 79 N:0 A: 12
Motion Passes

Motion 11
The HSSG will meet the week of May 28-31, 2007 at the IEEE 802.3 Interim Meeting being hosted by the ITU in Geneva.

Moved by – Steve Trowbridge
Second by – Geoff Thompson

Procedural (>50%)
HSSG voters Y: 76 N: 0 A: 18
Motion Passes

Straw Poll # 7
I would be interested in attending an HSSG Interim meeting in September 2007 in Korea and would like 802.3 to further explore this with ETRI and Samsung.

Yes - 43
No - 18

Motion 12
Motion to approve nowell_01_1106 as liaison document to the ITU-T SG15.

Moved by Tom Dineen
Second by Jeff Lynch

Procedural (>50%)
HSSG Voters Y: 74 N: 0 A: 5
Motion Passes

Motion 13
Motion to approve goergen_03_1106 as liaison document to the OIF.

Moved by Hugh Barrass
Second by Pete Tomaszewski

Procedural (>50%)
HSSG Voters Y: 77 N: 0 A : 3
Motion Passes

Straw Poll #8:
I will be attending the HSSG meeting at the IEEE 802.3 Interim the week of Jan 16 in Monterrey, CA

Yes – 65

Motion to adjourn approved by voice vote without objection.

Meeting Adjourned 11:30 AM