Unapproved Minutes
IEEE Higher Speed Study Group
January 17-19, 2007
Monterey, CA

Prepared by: George Oulundsen, Robert Lingle

Meeting convened at 8:30 am, Wednesday, January 17, 2007.

Agenda & General Information
By – John D'Ambrosia
See – agenda_01_0107.pdf

- Introductions
- Appointed Secretaries – George Oulundsen and Robert Lingle, Jr. appointed by Chair as Secretaries for this meeting
- Motion to approve the agenda
  - Moved by Dan Dove, 2nd by Robert Lingle, Jr.
  - Approved by voice vote without objection
- Motion to approve the November Plenary minutes
  - Moved to accept minutes by John Abbott, 2nd by Schelto Van Dooren
  - Approved by voice vote without objection
- Goals for meeting
  - Hear presentations related to objectives and 5 Criteria
  - Finalize HSSG Objectives
  - Finalize number of recommended PAR
  - Start developing consensus on:
    - Project Authorization Request (PAR)s
    - 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
  - Normal function is to draft a complete PAR and Five Criteria
  - The HSSG has approval to recommend more than one PAR
- Explain PAR and 5 Criteria
- Presented possible Study Group Schedule and Timeline

Ad Hoc Report #1

Title – Fiber Optic Ad Hoc
By – Dan Dove, Procurve Networking by HP
See – dove_01_1108.pdf

Discussion

- Next Ad Hoc Teleconference will be announced in the next few weeks

Presentation #1

Title – Technical Feasibility of SMF & MMF 100GE Transceivers
By – Chris Cole, Finisar
See – cole_01_0107.pdf

Discussion

- During the presentation, presenter asked if he could show additional data that was not included in the original presentation slides. Chair asked the group if there were any objections. There were none.
- Presenter will send updated presentation with data and references to the Chair.

Presentation #2

Title – Cost Analysis of MMF Variants
By – Paul Kolesar, Commscope Enterprise Solutions
See – kolesar_01_0107.pdf

Discussion

- During the question and answering period, a question was asked regarding the assumptions made in the cost decline. Presenter asked to show additional slides to better answer the question. Chair asked the group if there were any objections. There were none.
- Presenter will send updated presentation with the additional data to the Chair.

Break at 10:23 AM
Reconvened at 10:40 AM

Presentation #3

Title – Parallel Optical ~10x~10G 100-Gigabit Ethernet
By – Mike Dudek on behalf of Jack Jewell, Picolight
See – jewell_01_0107.pdf

Presentation #4

Title – Market Potential and Technical Feasibility of 12 Channel Parallel Optical Interconnects for 802.3 HSSG
By – Petar Pepeljugoski, IBM Research
See – pepeljugoski_01_0107.pdf

Presentation #5

Title – 100G Ethernet Technical Feasibility & Reliability Support for DWDM SMF PHY Approaches
By – John Jaeger, Infinera
See – jaeger_01_0107.pdf

Presentation #6

Title – Roadmap to 100GbE, a CWDM Solution
By – Xavier Clairardin, Kotura
See – clairardin_01_0107.pdf

Lunch Break at 12:00 PM
Reconvened at 1:10 PM

Presentation #7

Title – Spectral-efficient 100G parallel PHY in metro/regional networks
By – Winston Way, Opvista
See – way_01_0107.pdf

Presentation #8

Title – Photonic Integrated Circuit (PIC) Alternatives for 100GE
By – Robert Hartman, CyOptics
See – hartman_01_0107.pdf

Presentation #9

Title – Proposal to discuss optical interface
By – Shinji Nishimura, Hitachi
See – nishimura_01_0107.pdf

Presentation #10

Title – 1.5μm DMLs for 10x10Gb/s or 5x20Gb/s for links of 10km and 40km in SMF-28
By – Thomas Schrans, Optical Communication Products, Inc.
See – schrans_01_0107.pdf

Presentation #11

Title – 20 and 26 Gbps uncooled 1310nm EMLs for 100 GbE applications
By – Milind Gokhale, Apogee Photonics
See – gokhale_01_0107.pdf

Break at 3:10 PM
Reconvened at 3:25 PM

Presentation #12

Title – 100GbE Silicon Photonics Platform
By – Salah Khodja, APIC
See – khodja_01_0107.pdf

Presentation #13

Title – Reliability considerations for inverse-multiplexed 100G Ethernet transport
By – Marcus Duelk on behalf of Peter Winzer, Alcatel-Lucent
See – winzer_01_0107.pdf

Presentation #14

Title – Skew and Dispersion Calculations
By – Pete Anslow, Nortel
See – anslow_01_0107.pdf

Chair asked the Fiber Ad Hoc group to review the “Skew and Dispersion” Excel Worksheet developed and presented in “anslow_02_0107.xls” .and once the model is accepted by the Fiber Ad Hoc group it will be uploaded to a “tools” section of the HSSG website.

Presentation #15

Title – Technical and economic feasibility of a 1x100G serial LAN PHY
By – Thomas Fischer, Siemens
See – fischer_01_0107.pdf

Presentation #16

Title – Technical and Economic Feasibility of DQPSK Serial PMDs
By – Marcus Duelk and Chris Doerr, Alcatel-Lucent
See – duelk_01_0107.pdf

Presentation #17

Title – 100Gb/s DQPSK transmission at 1300nm
By – Noriyuki Takeda, KDDI Labs
See – takeda_01_0107.pdf

Presentation #18

Title – Comb based WDM for 100 GE applications
By – Andrew Ellis, Tyndall National Institute
See – ellis_01_0107.pdf

Meeting breaks for the day at 5:50 PM
Meeting reconvened at 8:40 AM, Thursday, January 18, 2007.

Presentation #19

Title – BER measurements for 100GbE
By – Michael Fleischer-Reumann, Agilent
See – fleischer_reumann_01_0107.pdf

Presentation #20

Title – Market Potential for 100 GbE Copper
By – Chris DiMinico, MC Communications
See – diminico_01_0107.pdf

Discussion

- Discussion regarding possible future presentations on this subject.

Presentation #21

Title – A 40km PMD Objective
By – Joel Goergen, Force10 Networks
See – goergen_01_0107.pdf

Presentation #22

Title – 100 Gbit/s is not Enough
By – Steve Trowbridge, Alcatel-Lucent
See – trowbridge_01_0107.pdf

Break at 10:00 AM
Reconvened at 10:20 AM

Presentation #23

Title – HSSG Speeds and Feeds --- Reality Check
By – Shimon Muller, Sun
See – muller_01_0107.pdf

Presentation #24

Title – Bandwidth drivers for next generation network capacity
By – Vik Saxena, Comcast Cable
See – saxena_01_0107.pdf

Lunch Break at 11:55 AM
Reconvened at 1:00 PM

Presentation #25

Title – 100GE - Service / Network Provider View
By – Ralf-Peter Braun, T-Systems
See – braun_01_0107.pdf

Presentation #26

Title – How to Make Multimode 100GigE Succeed
By – Scott Kipp, McData
See – kipp_01_0107.pdf

Presentation #27

Title – IEEE 802.3 HSSG 5 Criteria Strawman
By – David Law, 3COM
See – law_01_0107.pdf

Break at 2:45 PM
Reconvened at 3:05 PM

Presentation #28

Title – End User Perspective on Higher Speed Ethernet
By – Louis Lee, Equinix
See – lee_01_0107.pdf

Presentation #29

Title – 100g Technical Feasibility
By – Hugh Barrass, Cisco
See – barrass_01_0107.pdf

Presentation #30

Title – More on the feasibility of a 100G MAC
By – Med Belhadj, Cortina Systems
See – belhadj_01_0107.pdf

Presentation #31

Title – The Technical Feasibility of a 100GE PCS and Electrical Interface
By – Mark Gustlin, Cisco
See – gustlin_01_0107.pdf

Presentation #32

Title – Economics and market drivers behind the adoption of Higher Speed Ethernet Technologies
By – Alessandro Barbieri, Cisco
See – barbieri_01_0107.pdf

Discussion, Straw polls & Next Steps

Chair presented some wrap up slides and led discussion and started Straw Polls (see dambrosia_01_0107)

Straw Poll #1: The HSSG should adopt as a BER objective:

a) Support BER of 10^-12
b) Support BER of 10^-13
c) Support BER of 10^-15
d) Support BER of 10^-12 or better
e) Other
f) No BER objective
g) Abstain

Results

a) 42
b) 0
c) 0
d) 20
e) 0
f) 1
g) 12

Straw Poll #2: Does the HSSG feel that the current adopted objectives (November 2006) should be addressed by a single PAR?

Results
Yes - 63
No - 3
Abstain - 18

Straw Poll #3: Based on adopted objectives (from November Plenary), does the HSSG believe that there is broad market potential for 100 GbE?

Results
Yes - 52
No - 17
Abstain – 16

Straw Poll #4: The HSSG has demonstrated technical feasibility for a 10km single-mode PMD. [Requested by Dan Dove, FO Ad Hoc Chair]

Results
Yes - 66
No - 0
Abstain - 12

Straw Poll #5: The HSSG has demonstrated economic feasibility for a 10km single-mode PMD. [Requested by Dan Dove, FO Ad Hoc Chair]

Results
Yes - 37
No - 3
Abstain - 38

Straw Poll #6: The HSSG has demonstrated technical feasibility for a 100m multi-mode PMD. [Requested by Dan Dove, FO Ad Hoc Chair]

Results
Yes - 60
No - 1
Abstain - 17

Straw Poll #7: The HSSG has demonstrated economic feasibility for a 100m multi-mode PMD. [Requested by Dan Dove, FO Ad Hoc Chair]

Results
Yes - 34
No - 6
Abstain - 39

Requested by Brian Holden:
Straw Poll #8: Based on adopted objectives (from November Plenary), does the HSSG believe that there is broad or sturdy niche market potential for 100 GbE?

Results
Yes - 32
No - 5
Abstain - 35

Requested by Shimon Muller:
Straw Poll #9: Should the HSSG continue to study 40 Gb/s operation?

Results
Yes - 22
No - 33
Abstain - 21

Chris Cole requested if the HSSG would like him to present slides related to a SMF 40-km link length at 100 Gb/s. The Chair asked the HSSG if they would and the group said yes. Chris Cole will present information related to the possibility of a SMF 40-km link length at 100 Gb/s.

Meeting breaks for the day at 6:27 PM
Meeting reconvened at 8:40 AM, Friday, January 19, 2007.

Presentation #33

Title – Technical Feasibility of 40km SMF 100 GE Transceivers
By – Chris Cole, Finisar
See – cole_02_0107.pdf

Motion #1: The HSSG has demonstrated technical feasibility for a 10km single-mode PMD.
Technical (>=75% required)
Moved by Dan Dove; 2nd by Schelto Van Dooren

Results
All
Yes - 64
No - 0
Abstain - 13

802.3 voters
Yes - 25
No - 0
Abstain - 6

Motion passes

Motion #2: The HSSG has demonstrated technical feasibility for a 100m multi-mode 100 Gb/s PMD.
Technical (>=75% required)
Moved by Dan Dove; 2nd by Petar Pepeljugoski

Results
All
Yes - 64
No - 0
Abstain - 17

802.3 voters
Yes - 23
No - 0
Abstain - 7

Motion Passes

Motion #3: Motion to reconsider Motion #1
Procedural (>50% required)
Moved by Dan Dove; 2nd by Schelto Van Dooren

Results
Motion Passes by voice vote without objection

Friendly amendment to modify motion #1 proposed by Dan Dove and agreed by seconder Schelto Van Dooren

Motion #1 (reconsidered): The HSSG has demonstrated technical feasibility for a 10km single mode 100 Gb/s PMD.
Technical (>=75% required)
Moved by Dan Dove; 2nd by Schelto Van Dooren

Results
All
Yes - 67
No - 0
Abstain - 14

802.3 voters
Yes - 25
No - 0
Abstain - 4

Motion Passes

Motion #4: Move that the HSSG adopt as an objective:
Support a BER better than or equal to 10^{-12} at the MAC/PLS service interface.

Technical (>=75% required)
Moved by Mark Nowell; 2nd by Petar Pepeljugoski

Results
All
Yes - 68
No - 0
Abstain - 4

Motion Passes

Requested by Joel Goergen:
Straw Poll #10: Should the HSSG adopt a 40-km SMF 100 Gb/s solution as an objective?

Results
Yes - 41
No - 6
Abstain - 31

Motion #5: The HSSG adopt an objective of:
Support at least 40-km on SMF.

Technical (>=75% required)
Moved by Joel Goergen; 2nd Ralf-Peter Braun

Results
All
Yes - 38
No - 10
Abstain - 32

802.3
Yes - 12
No - 6
Abstain - 16

Motion Passes

Break at 10:29 AM
Reconvened at 10:50 AM

Requested by Ralf-Peter Braun:
Straw Poll #11: Should the HSSG adopt as an objective:
Support of Optical Transport Network (OTN) inter-networking.

Results
Straw poll withdrawn by requester.

Straw Poll #12: Does the HSSG feel that the current adopted objectives should be addressed by a single PAR?

Results
Yes - 28
No - 16
Abstain - 32

Discussion:
Mark Nowell stated that he and others put together a strawman PAR and asked the Chair if the HSSG would like to review the document. The Chair asked the HSSG if they would like to review the strawman PAR and the group said yes.

Mark Nowell preceded to present the strawman PAR (see nowell_01_0107.pdf)

Break for Lunch at 12:00 noon
Reconvened at 1:11 PM

Motion #6: Based on the objectives listed below, the HSSG adopts "nowell_01_0107.pdf" as a working draft for the PAR.

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.
Support a speed of 100 Gb/s at the MAC/PLS service interface.
Support at least 10km on SMF.
Support at least 100 meters on OM3 MMF.
Support a BER better than or equal to 10^{-12} at the MAC/PLS service interface.

Technical (>=75% required)
Moved by Joel Goergen; 2nd Mark Nowell

Results
All
Yes - 54
No - 1
Abstain - 7

802.3
Yes - 25
No - 1
Abstain - 4

Motion Passes

Note: The working draft of the PAR adopted in Motion #6 will be referred to as "HSSG PAR A."

Motion #7: Based on the working draft of PAR A, the HSSG adopts the following criterion response as a working draft for the compatibility response.

> As an amendment to IEEE Std 802.3, the proposed project will remain in conformance with the IEEE 802 Overview and Architecture as well as the Bridging standards IEEE Std 802.1D and IEEE Std 802.1Q.
> As an amendment to IEEE Std 802.3, the proposed project will follow the existing format and structure of IEEE 802.3 MIB definitions providing a protocol independent specification of managed objects (IEEE Std 802.1F).
> The proposed standard will conform to the full-duplex operating mode of the IEEE 802.3 MAC, appropriately adapted for 100 Gb/s operation.
> As was the case in previous IEEE 802.3 standards, new physical layers will be defined for 100 Gb/s operation.

Technical (>=75% required)
Moved by Hugh Barrass; 2nd Larry Green

Results
All
Yes - 54
No - 1
Abstain - 6

802.3
Yes - 25
No - 1
Abstain - 5

Motion Passes

Motion #8: Based on the working draft of PAR A, the HSSG adopts the following criterion response as a working draft for the distinct identity response.

> The proposed standard is an upgrade path for IEEE 802.3 users, based on the IEEE 802.3 MAC, running at 100 Gb/s.
> •By adapting the existing IEEE 802.3 MAC protocol for use at 100 Gb/s, this proposed standard will maintain maximum compatibility with the installed base of Ethernet nodes.
> •The established benefits of the IEEE 802.3 MAC include:
> –Deterministic, highly efficient full-duplex operation mode
> –Well-characterized and understood operating behavior
> –Broad base of expertise in suppliers and customers
> –Straightforward bridging between networks at different data rates
> •The Management Information Base (MIB) for 100 Gb/s IEEE 802.3 will be extended in a manner consistent with the IEEE 802.3 MIB for 10 / 100 / 1000 / 10000 Mb/s operation. Therefore, network managers, installers, and administrators will see a consistent management model across all operating speeds.
> •The proposed standard will be an amendment to the existing IEEE 802.3 standard, formatted as a collection of new clauses, making it easy for the reader to select the relevant specification.

Technical (>=75% required)
Moved by Hugh Barrass; 2nd Larry Green

Results
All
Yes - 53
No - 1
Abstain - 5

802.3
Yes - 26
No - 1
Abstain - 3

Motion Passes

Motion #9: Based on the working draft of HSSG PAR A, the HSSG adopts the following criterion response as a working draft for the technical feasibility response.

The proposed project will build on the array of Ethernet component and system design experience, and the broad knowledge base of Ethernet network operation.
•The principle of scaling the IEEE 802.3 MAC to higher speeds has been well established by previous work within IEEE 802.3. This 100 Gb/s project will build on this experience.
•The principle of building bridging equipment which performs rate adaptation between IEEE 802.3 networks operating at different speeds has been amply demonstrated by the broad set of product offerings that bridge between 10, 100, 1000, and 10000 Mb/s.
•Component vendors have presented data on the feasibility of the necessary components for 100 Gb/s Ethernet. Proposals, which either leveraged existing technologies or employed new innovative technologies, have been provided.
•The reliability of Ethernet components and systems can be extrapolated in the target environments with a high degree of confidence. Presentations demonstrating this have been provided.

Technical (>=75% required)
Moved by Hugh Barrass; 2nd Larry Green

Results
All
Yes - 57
No - 2
Abstain - 6

802.3
Yes - 21
No - 2
Abstain - 4

Motion Passes

Motion #10: Based on the working draft of HSSG PAR A, the HSSG adopts the following criterion response as a working draft for the economic feasibility response.

> The cost factors for Ethernet components and systems are well known. The proposed project may introduce new cost factors which can be quantified.
> •Representations from component and equipment suppliers and their customers indicate that Ethernet at 100 Gb/s will offer better value and lower cost than rival technologies available for early adopters.
> •Customers will be able to use the SMF and OM3 fiber defined and installed in accordance with existing standards.
> •Installation costs for new fiber runs based on established standards are well known and reasonable.
> •Network design, installation and maintenance costs are minimized by preserving network architecture, management, and software.

Technical (>=75% required)
Moved by Hugh Barrass; 2nd Frank Chang

Results
All
Yes - 48
No - 4
Abstain - 8

802.3
Yes - 21
No - 3
Abstain - 7

Motion Passes

Break at 2:50 PM
Reconvened at 3:15 PM

Motion #11: Based on the working draft of HSSG PAR A, the HSSG adopts the following criterion response as a working draft for the broad market potential response.

•Rapid growth of network and internet traffic has placed high demand on the existing infrastructure motivating the development of higher performance links. Quantitative presentations have been made to the IEEE 802.3 HSSG indicating significant market requirements for 100 Gb/s Ethernet across a wide range of applications.
•100 Gb/s IEEE 802.3 provides a solution for applications that have been demonstrated to need bandwidth beyond existing capabilities. –Examples include: providing interconnect & aggregation capabilities in data centers, internet exchanges and service provider peering points; serving growth applications such as video on demand; and as an interconnect for high performance computing environments.
•There has been wide attendance and participation across end users, equipment manufacturers and component suppliers. It is anticipated that there will be sufficient participation to effectively complete the standardization process.
•Prior experience scaling IEEE 802.3 across the range of 1 to 10000 Mb/s indicates that the cost distribution between routers, switches, and the infrastructure remains acceptably balanced. 100 Gb/s Ethernet should continue this trend in the intended higher end application spaces.
•Given the topologies of the networks and intended applications, the early deployment will be driven by key aggregation & high-bandwidth interconnect points. This is unlike the higher volume end system application typical for 10/100/1000 Mb/s Ethernet, and as such, the initial volumes for 100 Gb/s Ethernet are anticipated to be more modest than the lower speeds. This does not imply a reduction in the need or value of 100 Gb/s Ethernet to address the stated applications.

Technical (>=75% required)
Moved by Hugh Barrass; 2nd Petar Pepeljugoski

Results
All
Yes - 39
No - 4
Abstain - 9

802.3
Yes - 15
No - 3
Abstain - 7

Motion Passes

Future Meetings

- March 2006 Plenary
  - March 11 -16, 2007
  - Orlando, Fl
  - Caribe Royale

- April 2007 Interim
  - Tenative Dates – April 17 – 19 or April 24 – 26, 2007
  - Ottawa, Canada
  - Sponsored by Nortel

- May 2007 Interim
  - May 28 – 31, 2007
  - ITU, Geneva, Switzerland

Polls on April Interim Meeting Dates

60 attendees were present in the room
April 17-19 in Ottawa – 36
April 24-26 in Ottawa – 28

Chair would work with Glen Parsons, Nortel to review hotel availability, and based on straw polls would check on week with largest attendance indicated by straw polls first.

Motion to Adjourn: Hugh Barrass, 2nd: Frank Chang
Passed by voice vote without objection

Meeting Adjourned 3:56PM