Approved Minutes
IEEE Higher Speed Study Group
March 13-15, 2007
Orlando, FL

Prepared by: George Oulundsen and Robert Lingle

Meeting convened at 8:30 am, Tuesday, March 13, 2007.

<u>Agenda & General Information</u>
By – John D'Ambrosia
See – agenda_01_0307.pdf

- Introductions
- Appointed Secretary – George Oulundsen and Robert Lingle appointed by Chair as Secretary for this meeting
- Motion to approve the agenda- moved by Schelto Van Dooren, 2nd by Tom Palkert
  - Approved by voice vote without objection
- Motion to approve the November Plenary minutes
  - Motion moved to approve minutes by Pete Tomaszewski, 2nd by Pete Anslow
  - 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.
  - The Chair advised the HSSG that:
    - The IEEE's patent policy is consistent with the ANSI patent policy and is described in Clause 6 of the *IEEE-SA Standards Board Bylaws*;
    - Early disclosure of patents which may be essential for the use of standards under development is encouraged;
    - Disclosures made of such patents may not be exhaustive of all patents that may be essential for the use of standards under development, and that neither the IEEE, the WG, nor the WG Chairman ensure the accuracy or completeness of any disclosure or whether any disclosure is of a patent that, in fact, may be essential for the use of standards under development.
  - Chair advised the HSSG to review the tutorial given this week on the updated Patent policy. See IEEE website.
  - Opportunity was given for anyone to come forward with a Patent. No one came forward.
- Inappropriate Topics for IEEE meetings read to the body by Chair.

- Study Group function
  - Function is to draft a complete PAR and Five Criteria
  - Provide a plenary week tutorial to the LMSC
  - Gain approval at the WG 802.3, 802 SEC, IEEE NesCom and IEEE-SA Standards Board.
  - We have the approval to develop more than one PAR
- IEEE Standards Process Flow
- Reviewed HSSG "PAR A" (Working Draft)
- Reviewed HSSG January 2007 Interim Meeting Strawpoll results
- Presented possible Study Group Schedule
- Present list of presentations
  - Chair accepted three presentations (jewel_01_0307, sprenger_01_0307, bach_01_0307) after the deadline but before the posting, The Chair asked if there were any objections to hearing these presentations. There was no objection to allowing these presentations.
  - Ralf-Peter Braun made late request to give presentation. Chair asked if there were any objections, and there were none.
- Chair reminded the HSSG to make sure they declared their affiliation.

Ad Hoc Report #1
Title –	Fiber Optic Ad Hoc
By –	Dan Dove, Procurve Networking by HP
See –	dove_01_0307.pdf

Presentation #1
Title –	Saturating 100G and 1T Pipes
By –	Donn Lee, Google
See –	lee_01_0307.pdf

Presentation #2
Title –	A Web Company's View on Ethernet
By –	Adam Bechtel, Yahoo!
See –	bechtel_01_0307.pdf

Presentation #3
Title –	100G Ethernet - Tomorrow Is Too Late
By –	Ted Seely, Sprint Nextel, on behalf of Troy Sprenger, EDS
See –	sprenger_01_0307.pdf

Break at 10:06 AM
Reconvened at 10:25 AM

Presentation #4
Title –	Financial Industry Projected Bandwidth Growth
By –	Andy Bach, New York Stock Exchange
See –	bach_01_0307.pdf

Presentation #5
Title –	Carrier Hurdles To Meeting 10GE Demand
By –	Ted Seely, Sprint Nextel
See –	seely_01_0307.pdf

Further Q&A and general discussion regarding end-user presentations.

Lunch Break at 11.45 AM
Reconvened at 1:05 PM

Presentation #6
Title –	Bandwidth Drivers in Broadband Access - A BMP case study from EPON perspective
By –	Frank Chang, Vitesse
See –	chang_01_0307.pdf

Presentation #7
Title –	The Ethernet EcoSystem - Broad Market Potential for 100 Gb Ethernet
By –	Mark Nowell, Cisco
See –	goergen_01_0307.pdf

Presentation #8
Title –	Broad Market Potential of 100GE Transceivers
By –	Chris Cole, Finisar
See –	cole_02_0307.pdf

Presentation #9
Title –	Higher Speed Ethernet and Server Requirements
By –	Schelto Vandoorn, Intel
See –	vandoorn_01_0307.pdf

Break at 3:12 PM
Reconvened at 3:35 PM

<u>Presentation #10</u>

Title –   40 Gb/s Ethernet 5 Criteria Responses
By –   Howard Frazier, Broadcom
See –   frazier_01_0307.pdf

<u>Presentation #11</u>

Title –   Understanding a 40km Reach Objective
By –   Pete Tomaszewski, Force10 Networks on behalf of Joel Goergen, Force10
             Networks
See –   goergen_02_0307.pdf

<u>Presentation #12</u>

Title –   To Infinity and Beyond!": Why 40km+ Links Matter and What HSSG Might Do
             About It.
By –   Ted Woodward, Telcordia Technologies, Inc.
See –   woodward_01_0307.pdf

Chair presented some wrap up slides for the day and led discussion and started Straw Polls
(see dambrosia_01_0307)

- **Straw Poll #1**: Based on adopted objectives for PAR A, does the HSSG believe that
  there is broad market potential for 100 GbE?
  Results:
    o Yes - 71
    o No - 2
    o Abstain – 10

- **Straw Poll #2**: Should the HSSG continue to study 40 Gb/s operation?
  Results:
    o Yes - 35
    o No - 33
    o Abstain - 20

- **Straw Poll #3**: Does the HSSG believe that there is broad market potential for 40 GbE
  (in addition to 100 GbE)?
  Results:
    o Yes - 23
    o No - 32
    o Abstain – 36

- **Straw Poll #4**: Does the HSSG believe that the 40-km reach objective should be added
  to HSSG PAR A?
  Results: Strawpoll withdrawn for consideration at this time until the SG hears
  presentations on Wednesday related to 40 km technical / economic feasibility

- **Straw Poll #5**: If 40Gig were adopted as an objective, the HSSG feels it should be addressed by:
  - A. HSSG PAR A
  - B. a new PAR

Results:
- o Yes - 18
- o No - 32
- o Abstain - 33

Meeting breaks for the day at 5:40 PM
Meeting reconvenes at 8:35 AM, Wednesday, March 14, 2007.

Presentation #13
Title –	Future Market Potential for 100G Ethernet: An MSO Perspective by Time Warner Cable
By –	Bill Trubey Time Warner Cable Warner Cable
See –	trubey_01_0307.pdf

Presentation #14
Title –	HSSG Presentation Mapping to 5 Criteria Responses
By –	John Jaeger, Infinera
See –	jaeger_01_0307.pdf and jaeger_02_0307.xls

Presentation #15
Title –	10x10G VCSEL Array Feasibility Issues
By –	Jack Jewell, Picolight
See –	jewell_01_0307.pdf

Presentation #16
Title –	Technical & Economic Feasibility of 10km SMF 100GE Transceivers
By –	Chris Cole, Finisar
See –	cole_01_0307.pdf

Meeting Break at 9:58AM
Reconvene at 10:20AM

Arlon Martin requested permission to present 1 additional slide not present in submission. Chair asked SG if any objections, and there were none.

Presentation #17
Title –	100GbE, 10x10 Alternative
By –	Arlon Martin, Kotura
See –	martin_01_0307.pdf

Presentation #18
Title –	Optical Specifications for 10km Link
By –	Matt Traverso
See –	traverse_02_0307.pdf

Presentation #19
Title –	Approach for 40km PMD
By –	Matt Traverso
See –	traverse_01_0307.pdf

Presentation #20
Title –	Updated Cost Analysis of MMF Variants
By –	Paul Kolesar, CommScope
See –	kolesar_01_0307.pdf

Presentation #21
Title –	Relative Costs of 100GbE Point-to-Point Links
By –	John Abbott, Corning
See –	abbott_01_0307.pdf

Presentation #22
Title –	Single Mode Fibre Loss
By –	Pete Anslow
See –	anslow_01_0307.pdf

Break for lunch at 12:30 noon
Reconvene at 1:45 PM

Presentation #23
Title –	100G Ethernet: 10/40km Economic Feasibility
By –	Ralf-Peter Braun
See –	braun_01_0307.pdf

Presentation #24
Title –	25 Gbps SerDes
By –	Charlie Zhong
See –	zhong_01_0307.pdf

Presentation #25
Title –	Mapping of 100 Gbit/s Ethernet into OTN and the need for a Lane Independent PCS
By –	Steve Trowbridge
See –	trowbridge_01_0307.pdf

Meeting Break at 2:55PM
Reconvened at 3:15PM

Presentation #26

Title –   High Speed Study Group objectives and five criteria
By –   Chris DiMinico, MC Communications
See –   diminico_01_0307.pdf

Presentation #27

Title –   The Need for a low-cost 100GbE inter-rack copper interconnect
By –   Mike Bennett, LBNL
See –   bennett_01_0307.pdf

Presentation #28

Title –   Twinaxial cable assembly transmission characteristics
By –   Chris DiMinico, MC Communications
See –   diminico_02_0307.pdf

Presentation #29

Title –   High Speed Copper Cabling for HSSG
By –   Herb Van Deusen, Gore Associates
See –   vandeusen_01_0307.pdf

Presentation #30

Title –   24 AWG twinaxial cable structure for 25Gb applications
By –   Carl Booth, Amphenol
See –   booth_01_0307.pdf

Presentation #31

Title –   100G Copper Proposal: Technical Feasibility From Connector Technology
                Standpoint
By –   Jim McGrath, Molex
See –   oganessyan_01_0307.pdf

Presentation #32

Title –   100G Ethernet Test Adapter
By –   Will Miller, Efficere Technologies
See –   miller_01_0307.pdf

Discussion

Chair presented some wrap up slides and led discussion and started Straw Polls (see dambrosia_02_0307)

Straw Poll #6: The HSSG has demonstrated economic feasibility for a 10km single-mode PMD at 100 Gb/s.

Results
- o   Yes - 59
- o   No – 0
- o   Abstain – 16

Requested by Dan Dove, FO Ad Hoc Chair

Straw Poll #7: The HSSG has demonstrated economic feasibility for a 100m multi-mode PMD at 100 Gb/s.

Results
- o   Yes - 47
- o   No – 0
- o   Abstain – 25

Requested by Dan Dove, FO Ad Hoc Chair

Straw Poll #8: The HSSG has demonstrated technical feasibility for a 40 km SMF PMD at 100 Gb/s.

Results
- o   Yes - 30
- o   No – 6
- o   Abstain – 40

Requested by Dan Dove, FO Ad Hoc Chair

Straw Poll #9: The HSSG has demonstrated economic feasibility for a 40 km SMF PMD at 100 Gb/s.

Results
- o   Yes - 12
- o   No – 15
- o   Abstain – 50

Requested by Dan Dove, FO Ad Hoc Chair

Straw Poll #10: Does the HSSG believe that the 40km reach objective should be added to HSSG PAR A?

Results
- o   Yes - 14
- o   No – 26
- o   Abstain – 43

Straw Poll #11: The HSSG should adopt a copper objective.

Results
- o   Yes - 34
- o   No - 15
- o   Abstain - 36

Straw Poll #12: Does the HSSG feel that the chair should request to present "PAR A" to the IEEE 802.3WG at the July Plenary?

Results
- o   Yes – 48
- o   No - 3
- o   Abstain - 28

Meeting breaks for the day at 5:40 PM
Meeting reconvenes at 8:35 AM, Thursday, March 15, 2007.

John Jaeger requested permission to give a presentation on proposed changes to 5 Criteria Responses. Chair asked the SG if there were any objections. The HSSG did not object.

Open remarks by Chair. See dambrosia_03_0307.pdf.

Motion #1: Move that:

   The HSSG requests that IEEE 802.3 extends the Higher Speed Study Group.

Moved by Schelto Vandoorn, 2nd by Mark Nowell
Procedural (>50%)

   Results:
   All
   - o   Yes - 58
   - o   No – 0
   - o   Abstain – 0

   Motion passes

Straw Poll #13: I would be interested in attending an HSSG Interim meeting in September in Korea per the offer to host by Samsung Electronics, ETRI, and TTA.

>   Results:
>   o Yes - 27
>   o No – 29

Straw Poll #14: I would be interested in attending an HSSG Interim meeting in September in Korea per the offer to host by Samsung Electronics, ETRI, and TTA, but can not because of date of event.

>   Results:
>   o Yes - 10
>   o No – 12
>   o Abstain – 17

Presentation #35

Title –   100G Ethernet Test Adapter
By –   John Jaeger, Infinera
See –   jaeger_03_0307.pdf

Motion #2: Modify the 2nd Economic Feasibility response to change 'rival technologies' to 'alternate approaches or technologies' in HSSG_PARA_5C_WD_0107:

New response would be:
>   "Representations from component and equipment suppliers and their customers indicate that Ethernet at 100 Gb/s will offer better value and lower cost than <u>alternate approaches or technologies</u>."

Moved by John Jaeger, 2nd by Mark Nowell
Technical (>= 75%)

>   Results:
>   All
>   o Yes - 59
>   o No – 1
>   o Abstain – 4

>   **Motion passes**

Motion #3: Modify the 1st Broad Market Potential response to change 'market requirements' to 'market need' in HSSG_PARA_5C_WD_0107:

New response would be:

> *"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 need** for 100 Gb/s Ethernet across a wide range of applications".*

Moved by John Jaeger, 2nd by Mark Nowell

Technical (>= 75%)

    Results:
       All
         o Yes - 62
         o No – 0
         o Abstain – 8

Motion Passes

Chair opened the floor for discussion.

Motion #4: The HSSG should adopt an objective to specify a single PCS to be used for all PMDs.

    Moved by Steve Trowbridge; 2nd by Ted Woodward

Technical (>= 75%)

    Results:
       All
         o Yes - 13
         o No – 43
         o Abstain – 15

Motion fails

Before the motion was heard and discussed by the SG, the Chair ruled the motion out-of-scope, as it is not in the scope of the SG to determine solutions. His ruling was objected to by Tom Dineen. Chair indicated he would defer to the HSSG if it wished to hear the motion. (see Motion #5 below).

Motion #5: The HSSG would like to hear Motion #4.

Moved by Tom Dineen; 2nd by John Dallesasse

Procedural (>50%)

Results:
All
- o Yes - 45
- o No – 5
- o Abstain – 22

Motion passes

Motion #6: The HSSG has demonstrated broad market potential for 100 GbE based on adopted objectives for PAR A. PAR A objectives (to be uploaded as HSSG_PAR_A_Objectives_0307.pdf) are:

- 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.

Moved by Mark Nowell, 2nd by John Jaeger

Technical (>= 75%)

Results:
All
- o Yes - 59
- o No – 5
- o Abstain – 12

Motion Passes

Motion #7: The HSSG has demonstrated economic feasibility for a 10km SMF 100 Gb/s PMD.

Moved by Dan Dove, 2nd by Chris DiMinico

Technical (>= 75%)

       Results:
         All
- Yes - 52
- No – 1
- Abstain – 11

       Motion Passes

Motion #8: The HSSG has demonstrated economic feasibility for a 100m multi-mode 100 Gb/s PMD.

Moved by Dan Dove, 2nd by Mike Dudek

Technical (>= 75%)

       Results:
         All
- Yes - 54
- No – 0
- Abstain – 10

       Motion Passes

Motion #9: The HSSG modify the meeting format to use a 2-minute question/comment requirement.

Moved by Tom Dineen, 2nd by Paul Kolesar

Procedural (>50%)

       Results:
         All
- Yes - 14
- No – 52
- Abstain – 12

       Motion Fails

Chair opened the floor for discussion.

Action plan was discussed for bringing a PAR forward at the July plenary. Importance and need of tutorial session was discussed.

Chair went over future meetings

- April 2007 HSSG Interim Session
    - April 17 - 19
    - Hosted by Nortel
    - Crowne Plaza Hotel
    - Ottawa, ON, Canada

- May 2007 Interim
    - May 28 – 31
    - ITU
    - Geneva, Switzerland
    - For information, see http://www.ieee802.org/1/files/public/docs2006/meetings-may07-interim+workshop-1106.pdf

- July 2007 IEEE 802 Plenary
    - July 16 – 19
    - Hyatt Regency
    - San Francisco, CA, USA

Straw Poll #15: I intend to attend the April interim meeting in Ottawa.

    Count: 40

Straw Poll #16: I intend to attend the May interim meeting in Geneva.

    Count: 45

Motion to adjourn

Moved by Mike Dudek; 2nd by Steve Trowbridge

Motion passes

Meeting adjourned at 11:50 AM on Thursday, March 15, 2007.

Attendees:

Abdolreza Langari	Qlogic
Adam Bechtel	Yahoo!
Adam Healey	Agere Systems
Alan Flatman	LAN Technologies
Andreas Lenkisch	Schroff Gmbk Germany
Andrew Bach	NYSE
Andrew Jimenez	Anixter Inc.
Andy Moorwood	Extreme Networks
Arlon Martin	Kotura
Arne Alping	Ericsson AB
Bengt-Eric Olsson	Chalmers Industrial Technology
Bernie Hammond	ADC Telecommunications
Bill McIntosh	Fortress Technologies, Inc.
Bill Ring	WSR Optical Device Soln's rep OIDA
Bill Trubey	Time Warner Cable
Bob Thornton	Fujitsu
Brad Booth	AMCC
Brad Turner	Juniper
Carl Posthuma	Alcatel-Lucent
Charlie Zhong	LSI Logic
Chris Cole	Finisar
Chris DiMinico	MC Communications
Craig W. Carlson	Qlogic
Dan Dove	DoveNetworking - Procurve by HP
Donn Lee	Google
Drew Perkins	Infinera
Ed Cady	MERITEC
Ed Cornejo	Opnext
Eddie Tsumura	Excelight
Frank Chang	Vitesse
Gary Nicholl	Cisco
George Oulundsen	OFS
George Young	AT&T
George Zimmerman	Solarflare
Ghani Abbas	Ericsson, UK
Hans Lackner	QoSCom
Henk Steerman	AMS-1X
Herb Van Deusen	Gore Associates
Hubert Kostal	APIC Corp.
Howard Frazier	Broadcom
Jabulani Dhliabyo	Corning Inc.
Jack Jewell	Picolight
Jan Peeters Weem	Aprius
Jason Weil	Cox Comm.
Jason Wertz	Sandia National Laboratories
Jeffery Maki	Juniper Networks
Jim McGrath	Molex
Joe O'Brien	Efficere Technologies
John Abbott	Corning
John D'Ambrosia	Force 10 Networks
John Dallesasse	Emcore Corp.
John Jaeger	Infinera

John McDonough	NEC America
Judith Meester	APIC Corp.
Keisuke Kojima	Mitsubishi Electric Res. Lab
Ken Jackson	Emcore Corp.
Marcus Duelk	Alcatel-Lucent
Mark Dupuis	Madison Cable
Mark Molitor	Ciena
Mark Nowell	Cisco
Martin Carroll	Verizon
Masayuki Shigematsu	Innovation Core SEI, Inc.
Matt Traverso	Opnext
Med Belhadj	Cortina Systems
Mike Connaughton	Belden
Mike Dudek	Picolight
Mike Reisl	Hitachi Cable America
Milind Gokhale	Apogee
Moran Roth	Corringent Systems
Neil Peers	ADVA Optical Networking LTD
Noriyuki Takeda	KDDI R&D Laboratories Inc.
Olindo Savi	The Siemon Co.
Paul Gavrilovic	Cisco
Paul Kolesar	CommScope
Pete Anslow	Nortel
Pete Tomaszewski	Force 10 Networks
Peter Ronco	Corning
Pierre Herve	Intel
Piers Dawe	Avago Technologies
Ralf-Peter Braun	Deutsche Telekom, T-Systems
Rami Kanama	Redfern Integrated Optics
Richard Mei	Commscope
Rick Pimpinella	Panduit Corp.
Rick Rabinovich	Spirent Communications
Robert Lingle, Jr.	OFS
Ron Nordin	Panduit Corp.
Sashi Thiagarajian	Ciena
Satoshi Obara	Fujitsu
Schelto vanDoorn	Intel
Shashi Patel	Foundry Networks
Shimon Muller	Sun
Shinji Nishimura	Hitachi
Shoukei Kobayashi	NTT
Steve Song	Excelight
Steve Swanson	Corning
Steve Trowbridge	Alcatel-Lucent
T. Kumamoto	Fujitsu
Taesik Cheung	ETRI
Ted Seely	Sprint
Ted Woodward	Telcordia
Thomas Dineen	Self
Thomas Fischer	Siemens Networks
Thomas Jorgensen	Vitesse
Tom Palkert	Xilinx, Luxtera

Tremont Miao	Analog Devices Inc.
Uri Cummings	Fulcrum
Wembin Jiang	JDSU
Will Miller	Efficere Technologies
Winston Way	OPVISTA
Xavier Clairardin	Kotura
Yan Wang	Huawei
Yasuaki Kawatsu	Hitachi-Cable
Youichi Akasaka	Fujitsu Labs