802.3an Task Force

July 802 Plenary Meeting
July 13-15, 2004
Portland, OR

Tuesday, July 13, 2004

The meeting was called to order by Brad Booth at 8:30am. The first topic of discussion was a request from the chair to have all cell phones silenced for the duration of the meeting.

The chair requested a volunteer to act as secretary for the meeting. Mike McConnell volunteered as secretary for the meeting.

The chair presented the agenda for the meeting.

Motion:	Accept the agenda:
M:	Sanjay Kasturia
S:	Henri Koeman

The motion carried.

The next order of business was the approval of the minutes from the May 2004 Interim meeting. A correction to the minutes noting that the footnote should reference Long Beach and not Orlando was made and accepted.

Motion:	Accept the minutes as currently recorded with the above footnote correction.
Mover:	Shadi AbuGhazaleh
Second:	Dan Dove

The motion carried.

At 8:45pm the chair presented and read the IEEE Patent Policy:

"IEEE standards July include the known use of essential patents and patent applications provided the IEEE receives assurance from the patent holder or applicant with respect to patents whose infringement is, or in the case of patent applications, potential future infringement the applicant asserts will be, unavoidable in a compliant implementation of either mandatory or optional portions of the standard [essential patents]. This assurance shall be provided without coercion and prior to approval of the standard (or reaffirmation when a patent or patent application becomes known after initial approval of the standard). This assurance shall be a letter that is in the form of either:

a) A general disclaimer to the effect that the patentee will not enforce any of its present or future patent(s) whose use would be required to implement either mandatory or optional potions of the proposed IEEE standard against any person or entity complying with the standard; or

b) A statement that a license for such implementation will be made available without compensation or under reasonable rates, with reasonable terms and conditions that are demonstrably free of any unfair discrimination.

This assurance shall apply, at a minimum, from the date of the standard's approval to the date of the standard's withdrawal and is irrevocable during that period."

Additional material on IEEE patent policy can be found on the 802.3 web site at http://grouper.ieee.org/groups/802/3/10GBT/public/jan04/index.html.

Material presented by the Task Force Chair referenced above is available for the web site for the Task Force (http://grouper.ieee.org/groups/802/3/10GBT/public/jan04/index.html)

The chair then reviewed inappropriate topics for the group.

- Don't discuss licensing terms or conditions
- Don't discuss product pricing, territorial restrictions or market share
- Don't discuss ongoing litigation or threatened litigation
- Don't be silent if inappropriate topics are discussed… do formally object.

The chair then presented and explained the standards process.

The chair then reviewed the voting rules for the task force. These are:

- 802.3 Rules apply
  - Foundation based upon Robert's Rules of Order
- Anyone in the room July speak
- Anyone in the room July vote
- RESPECT… give it, get it
- NO product pitches
- NO corporate pitches
- NO prices!!!
  - This includes costs, ASPs, etc. no matter what the currency
- NO restrictive notices

Additional usual and customary rules for 802.3 task force groups will apply. Specifically all technical votes will require a 75% majority to pass. Non-technical votes require greater than 50%. Anyone present in the room July vote however the chair will ask for and record a second vote of the 802.3 voters present in the room at the time on all technical matters. The voting rules July be changed at the discretion of the chair at any time. IEEE structure and organization was reviewed. Information on the Bylaws and Rules of 802 were noted. All the material referred to is publicly available via the 802 web site. Other operating (ground) rules and guidelines for the task force we also reviewed including the structure of the IEEE and the bylaws and rules of the IEEE.

The next agenda item was a review of the Objectives for the Task Force.

- Preserve the 802.3/Ethernet frame format at the MAC Client service interface
- Preserve min. and max. frame size of current 802.3 Std.

- Support full duplex operation only
- Support star-wired local area networks using point-to-point links and structured cabling topologies
- Support a speed of 10.000 Gb/s at the MAC/PLS service interface
- Select copper media from ISO/IEC 11801:2002, with any appropriate augmentation to be developed through work of
- 802.3 in conjunction with SC25/WG3
- Support Clause 28 auto-negotiation
- Support coexistence with 802.3af
- To not support 802.3ah (EFM) OAM unidirectional operation
- Meet CISPR/FCC Class A
- Support operation over 4-connector structured 4-pair, twisted-pair copper cabling for all supported distances and Classes
- Define a single 10 Gb/s PHY that would support links of:
  - At least 100 m on four-pair Class F balanced copper cabling
  - At least 55 m to 100 m on four-pair Class E balanced copper cabling
- Support a BER of 10^-12 on all supported distances and Classes

The overall timeline for the Task Force Objective was presented and reviewed. The next milestone is creation of Draft 1.0 at the conclusion of the July 2004 Plenary

Goals for this week were reviewed.

Path to the creation of D1.0

Adopt proposals for the formation of a baseline
Baseline is used to create D1.0
D1.0 $\Rightarrow$ D2.0 is when TF works to create technically complete specification

D1.0 will be circulated for Task Force review and comments

Comments should address making the draft technically complete
Comments will be reviewed in September meeting

Next on the agenda were liaison and ad hoc group reports. Ms. Val Rybinski presented her report on TIA TR-42 activities. Her complete report is available on the 802.3an web site.

Mr. Alan Flatman presented several updates from the ISO/IEC JTC/SG25/WG3. All the various documents are available on the 802.3an web page for the July meeting.

The chair noted that the group would have time later this afternoon to discuss responses to the liaison letters.

The chair then adjourned the meeting for a 15 minute break.

Mr. Sanjay Kasturia, editor for the 802.3an group presented a slide set and provided a report on the current status of the draft standard. He discussed the current status and

outlined a framework for most of the major sections that need further definition prior to creation of the draft.

Mr. Wayne Larsen presented NEXT can be Mitigated and responded to questions.

Mr. Terry Cobb presented Baseline Text for Clause 50.X MDI Specification and Environmental Requirements and responded to questions.

The chair then adjourned to the meeting for lunch and indicated that the meeting would resume at 1:00pm.

Mr. Chris DiMinico presented TSB-155 and Link Segment Specification and responded to questions.

The chair noted that in order to facilitate a scheduling conflict for Mr. Lynskey the agenda will be modified to permit him to present next.

Mr. Eric Lynskey presented Auto-negotiation for 10GBASE-T and responded to questions.

Mr. Alan Flatman presented 10GBASE-T Cabling Recommendations and responded to questions. During the Q&A period Mr. Sterling Vaden presented the ISO liaison letter (file 3n711.pdf on the 802.31an web site) and highlighted a note requesting national bodies to provide input on whether to adopt the indicated limits or adopt a relaxed limit. Additional comments followed regarding the topic of limit lines.

The chair adjourned the meeting for a 15 minute break.

Mr. Hugh Barrass presented PHY-based cable diagnostics in 10GBT and responded to questions.

Mr. Sandeep Gupta presented PHY PMA electrical specs baseline proposal for 802.3an and responded to questions.

Concluding presentations the chair adjourned the meeting for the day and indicated that we would resume at 8:30am July 14, 2004.

Wednesday, July 14, 2004

The chair called the meeting to order at 8:30am to resume the presentations.

Mr. Tetsuya Higuchi presented ANEXT reduction by correlative coding for 10GBASE-T and responded to questions.

Dr. Shu Lin presented LDPC Tutorial and responded to questions.

Mr. Katsutoshi Seki presented Performance evaluation of low latency LDPC codes and responded to questions.

Mr. Amir Mezer presented THP As A Companion To LDPC and responded to questions.

Mr. Scott Powell was the first presenter of 10GBASE-T PAM Scheme: Proposed Overall Architecture. Mr Jose Tellado presented the next section of the material and Mr. Hiroshi Takatori presented the finial section. All presenters responded to questions.

At 12:15 the chair adjourned the meeting until 1:30pm for Lunch.

Mr. Gottfried Ungerboeck presented 10GBASE-T PAM Scheme: Fixed Precoder for all Cable Types and Lengths and responded to questions.

Mr. Sailesh Rao presented LDPC 4D-PAM8 proposal for 10GBASE-T and responded to questions.

Mr. Katsutoshi Seki presented the initial portion of LDPC-PAM12 PHY proposal for 10GBase-T. Mr. Jose Tellado presented the second portion. They jointly responded to questions.

Concluding presentations the chair noted that the editors' wrap-up presentation would be moved to be the first item on the agenda tomorrow morning.

Tyco has offered to host the September Interim meeting in Hershey, PA.

The chair then took counts of the attendance of the meeting.

Headcount	82
802.3 Voters	46
New to this meeting	13
How many people will attend the September meeting:	68

Straw Poll: Should the Task Force continue to entertain and explore PHY proposals with line codes other than PAM?

Task Force Voters Only

Yes:

No: Unanimous

Straw Poll: Should the Task Force continue the PAM levels under investigation to (Chicago rules)?

8 levels

Task Force 28

10 levels

task Force 0

12 levels

Task Force 63

Straw Poll: Should the Task Force adopt Tomlinson-Harashima precoding (or derivatives) as the baseline proposal for channel equalization strategy?

There were no votes against adopting TH

Straw Poll: Should the Task Force adopt Clause 49 64B/66B coding as the baseline proposal for transmit framing?

Task Force Voters Only

Yes: 6

No: 22

Straw Poll: Should the Task Force adopt Low-Density Parity-Check (LDPC) as the baseline proposal for forward error correction?

There was no opposition

Block size 1025 to 2048	6
Block size less than 1024	33
Block size TBD	27

Straw Poll: Should the Task Force adopt transmit voltage levels at MDI (w/o baseline wander) to be 2-2.5V differential peak-to-peak?

Task Force Voters Only

Yes: 47

No: 0

Straw Poll: Should the Task Force adopt lynskey_1_0704 with the use of reserved bits in 1000BASE-T next page exchange (vs. adding 3 next pages)?

Task Force Voters Only

Yes: 16

No: 10

Abstain: “A Lot” as reported by the chair.

Straw Poll: Should the Task Force adopt TIA TR42.7 TSB-155 D1.0 modifications to the link segment specifications?

Task Force Voters Only

Yes: 56

No: 4

Straw Poll: Should the Task Force change the upper frequency limit for link segment specifications from (TBD □ 625 MHz) to 500 MHz?

Task Force Voters Only

Yes: 53

No: 8

The chair then adjourned the meeting for the day at 5:10pm and indicated that we would resume at 8:30am July 15, 2004 and discuss and consider motions.

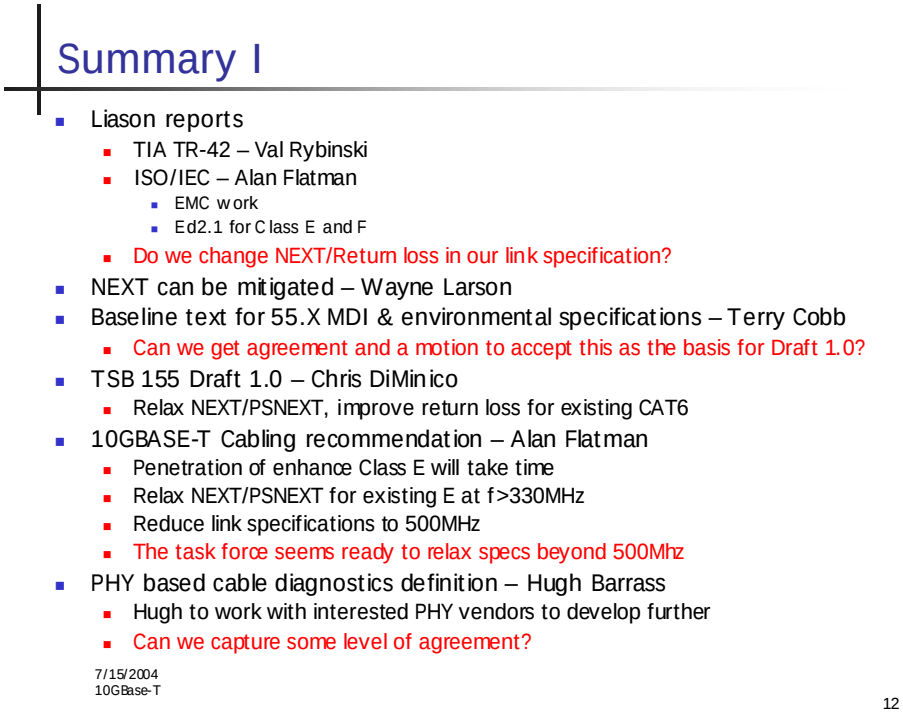
Electronic reference copies of all presentation are available publicly from the 802.3an July 2004 meeting web site at http://www.ieee802.org/3/10GBT/public/jul04/index.html

Thursday, July 15, 2004

The chair called the meeting to order at 8:30am.

The first order of business was an editor report.

Mr Kasturia presented the second section of his editorial presentation beginning with an updated slide 12. This was an overall summary of the major topics from the presentations made at this meeting and the open items that need to be resolved to permit the editor to create the draft. The presentation noted changes and summary positions in red in the updated presentation. These slides itemize many of the open issues to ultimately be resolved and were discussed individually.



Summary II

- Auto-negotiation for 10GBASE-T- Eric Lynskey
  - Can we accept his proposal to form the baseline for Draft 1.0?
  - Go with extended base-pages and later fold back into the 1000BASE-T pages if possible?
  - Features in clause 45, 22 or both
  - Tighten link test pulse template for 10GBASE-T?
  - Power backoff should be part of auto-negotiation or Startup?
- PHY PMA electrical specs – Sandeep Gupta
  - Can we close on the max transmit voltage?
  - For backoff, can we settle on number of levels and min?
  - Can we agree on the level-accuracy proposal?
  - What else can we agree on?
  - Time-line and steps to closing on remaining items
- ANEXT reduction by correlative coding for 10GBASE-T – Masahiro Murakawa/Shinji Nishimura

Summary III

- Structured Low-Density Parity-Check Codes – Prof Shu Lin
  - All codes presented so far have been based on RS code
- Performance eval. of low latency LDPC code – K. Seki/T. Higuchi
  - The task force must lock down agreement on LDPC
  - Time-line, criteria and steps to selection of final choice?
- Can all candidate codes be put on the table ASAP?
  - Subjecting choice to early collective scrutiny could save us a lot of compute time

Table 1 LDPC codes of length 1024 constructed based on the (32,31) extended RS code

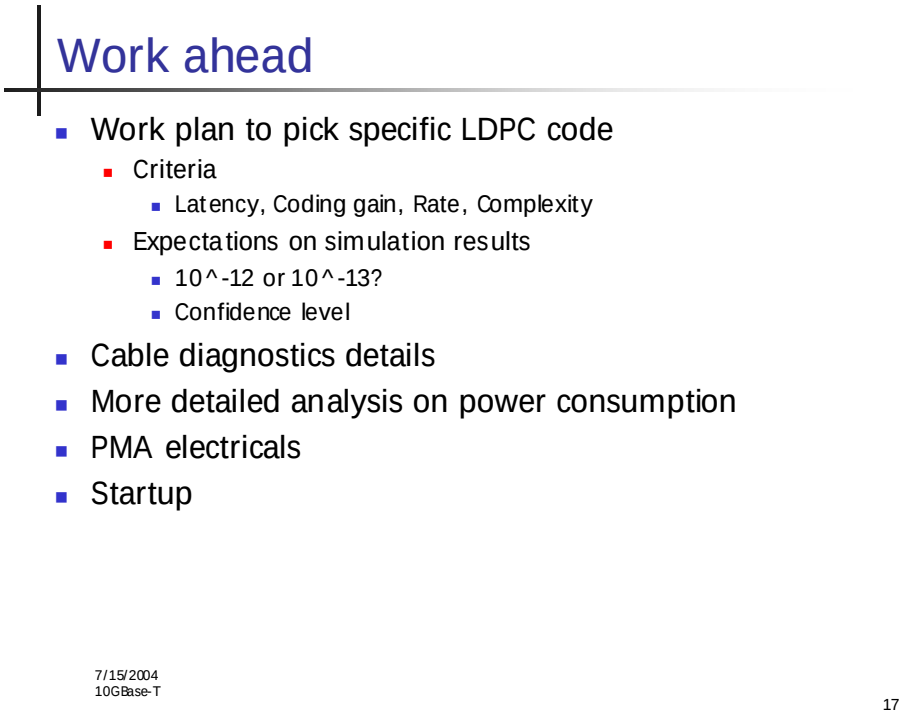
Codes	Rates	γ	Minimum Distantce
(1024,845)	0.8252	8	≥ 10
(1024,833)	0.8134	10	≥ 12
(1024,821)	0.8017	12	≥ 14
(1024,809)	0.7900	14	≥ 16
(1024,797)	0.7783	16	≥ 18
(1024,793)	0.7744	20	≥ 22
(1024,783)	0.7646	30	≥ 32
(1024,781)	0.7626	32	34

Summary IV

- THP as a companion to LDPC – Amir Mezer
  - Comparison of THP + LDPC vs. alternatives
  - The task force must lock down agreement on THP
- 10GBASE-T PAM scheme: Fixed THP precoder for all cable types and lengths – Gottfried Ungerboeck
  - Multiple presentations over a few meetings
  - Is the Task force ready to decide?

Summary V – proposals

- 10GBASE-PAM scheme: Proposed Overall Architecture
- LDPC 4D-PAM8 proposal for 10GBASE-T – Sailesh Rao
- LDPC-PAM12 PHY proposal for 10GBASE-T – Seki/Tellado
- Task for must lock down agreement on PAM, THP, LDPC
- Differences
  - PAM levels: 8 or 12?
  - LDPC code block size
    - Specific LDPC code
  - Framing
  - Cancellation Required?
  - Transmit filtering
- Discussion items
  - SNR margin under various conditions
  - Noise margin
  - Other tradeoffs: clock rate, framing
  - Transmit filtering – can we agree on a transmit PSD mask?



The chair adjourned the meeting for a 15 minute break

Upon resumption of the meeting the chair presented the first motion.

Motion: Move that the Task Force adopt lynskey_1_0704.pdf as the basis for auto-negotiation and MDIO for D1.0.
Moved: Eric Lynskey
SecondHugh Barrass

Mr. Kevin Brown made a motion to postpone
Seconded by Pat Thaler.

The motion was called by Mike McConnell

TF Voters	Yes	25
	No	35
	A	24

The motion to table failed.

TF Voters	Yes	49
	No	7
	A	27
802.3 Voters	Yes	35
	No	4
	A	11

The motion was approved.

Motion: 10GBASE-T adopt single tone, baseband PAM as the modulation strategy.
Moved L Harrison
Second S. Rao
Hearing no discussion or opposition the chair called for a voice vote.
The vote carried by unanimously

Motion: 10GBASE-T adopt programmable Tomlinson-Harashima precoding as part of the channel equalization strategy.
Moved S Powell
Second J Jover
Hearing no discussion or opposition the chair called for a voice vote.
The vote carried by unanimously

Motion: 10GBASE-T adopt systematic Low Density Parity Check (LDPC) coding as the channel coding approach
Moved V. Telang
Second S Rao

Mr A Mezer ask to make a friendly amendment to strike the word "systematic". The friendly amendment was rejected by Mr. Rao.
After some discussion Mr. Mezer withdrew the amendment.

TF Voters	Yes	78
	No	0
	A	11
802.3 Voters	Hearing no opposition the chair called a voice vote which was unanimous.	

Motion: Move that 802.3an Task Force adopt the D1.0 TSB-155 NEXT loss and Power sum NEXT and Return Loss channel equations for the Draft 1.0 Clause 55 Link Segment NEXT and Power sum NEXT Loss and Return Loss

Moved C. DiMinico
Second L Cohen

Mr. T Cobb made a friendly amendment to add model 2, 3 & 4 to the text. It was rejected by the mover.

Mr. Cobb made a motion to amend the motion. The modified motion is:
Move that 802.3an Task Force adopt the D1.0 TSB-155 NEXT loss and Power sum NEXT and Return Loss channel equations for the Draft 1.0 Clause 55 Link Segment NEXT and Power sum NEXT Loss and Return Loss for models 2, 3 and 4.
Seconded by T. Boucino

After some discussion Mr DiMinico called the question to amend.
TF Yes 17

No 22
A 37

The motion to amend failed

Discussion on the original motion resumed. Mr. S AbuGhazaleh called the question and Mr. W. Larson objected to calling the question. The chair held the vote to call the question.

Yes 33
No 11

The motion will be called.

TF Voters	Yes	46
	No	11
	A	25
802.3 Voters	Yes	28
	No	7
	A	4

The original motion carried.

Motion: Move that 802.3an Task Force adopt 500 MHz as an upper frequency for the clause 55 link segment specifications

Moved C. DiMinico
Seconded P. Kish

Mr. Powell made a friendly amendment to change the limit to 550Mhz. Mr. Kish rejected the friendly amendment. After some discussion Mr. Kasturia called the question.

The motion will be called.

TF Voters	Yes	67
	No	0
	A	15
802.3 Voters	Yes	36
	No	0
	A	7

The motion passes.

Motion: Motion: The 802.3an task force adopt the baseline text as defined in the presentation cobb_1_0704, with the addition of immunity to the electromagnetic emissions, for the MDI specifications and Environmental specifications in Draft 1.0

Moved T. Cobb
Second S AbuGhazaleh

TF Voters	Yes	24
	No	11
	A	22
802.3 Voters	Yes	15
	No	9

	A	15

The motion fails.

Motion: Move that the Task Force adopt into the baseline a definition of some cable diagnostic functions (the TF will investigate the inherent capabilities of the PHY to support these functions).

Moved H. Barrass
Second D. Dove

Mr. C DiMinico offered a friendly amendment to change the motion to reflect that what is being defined is register locations and MIB definition. He did not provide specific text changes or suggestions. Mr. AbuGhazaleh made a friendly amendment to replace cable with "channel" to the motion. Modifications accepted. The modified Motion is:

Move that the Task Force adopt into the baseline a definition of some channel diagnostic functions (the TF will investigate the inherent capabilities of the PHY to support these functions).

Mr. Kasturia called the question. By voice vote the question will be called. Seeing some opposition the called rejected the voice vote and ask for a show of hands.

TF Voters	Yes	50
	No	6
	A	20
802.3 Voters	Yes	26
	No	2
	A	9

The motion passes.

Motion: Task force narrow consideration of 10GBASE-T baseline approach to the PAM8 and PAM12 proposals described in rao_1_0704.pdf and powell_1_0704.pdf

Moved	K Brown
Second	J Babanezhad

Hearing no discussion the chair took a voice vote.

The motion carried.

Next was a straw poll vote requested by S. Powell: Task force adopt the multi-phy vendor proposal described in powell_1_0704.pdf as the baseline approach for 10GBASE-T. The main elements include: PAM-12, systematic LDPC coding, programmable Tomlinson-Harashima precoding, and clause 49-type framing modified for 64B/65B. All TBD and asterisked items (and dependents) to be determined prior to completion of Draft 1.

After some discussion the question was called by S. Kasturia.

TF Voters	Yes	44
	No	15
	A	21

Motion: Task force adopt the multi-phy vendor proposal described in powell_1_0704.pdf as the baseline approach for 10GBASE-T. The main elements include: PAM-12, systematic LDPC coding, programmable Tomlinson-Harashima precoding, and clause 49-type framing modified for 64B/65B. All TBD and asterisked items (and dependents) to be determined prior to completion of Draft 1.

Moved S. Powell
Second F. McCarthy

The floor opened to discussion. Mr. J. Jover made a motion to postpone until the September meeting. The motion to postpone was seconded by D. Dove.
The motion to postpone was called by G Zimmerman.

TF Voters	Yes	28
	No	49
	A	12

The motion to postpone failed.

Mr. S Kasturia called the question. Mr. J Jover opposed to calling the question. By voice vote the motion to call the question carried.

TF Voters	Yes	54
	No	20
	A	14
802.3 Voters	Yes	33
	No	9
	A	9

The motion failed.

Motion: Adopt the peak to peak differential transmitted voltage of 2V at the MDI for the 10GBASE-T transmitter as summarized in slide #3, (without any baseline wander) of the presentation gupta_1_0704.pdf and use that as the baseline for defining various transmitter test modes for Draft 1.0

Moved S Gupta
Second J Babanezhad

Mr. W Larsen made a friendly amendment to change the word “without” to “exclusive.” Mr. Rao made a friendly motion to change the range from 2 to 2-2.5V. Mr. Gupta also added the word “maximum” to peak to peak for further clarification.

Adopt the maximum peak to peak differential transmitted voltage of 2-2.5V at the MDI for the 10GBASE-T transmitter as summarized in slide #3, (exclusive any baseline wander) of the presentation gupta_1_0704.pdf and use that as the baseline for defining various transmitter test modes for Draft 1.0

The chair took the vote by voice. The motion carried unanimously.

Motion: Adopt the filter assumptions in slide 6 of the presentation gupta_1_0704.pdf for the purpose of defining transmit waveform templates. This is summarized as "A two pole continuous time low pass filter with -3dB frequency varying from fs/2 to 3fs/4, and a single pole continuous time high pass filter with pole ≤ 100kHz"

Moved S Gupta
Second V. Telang

Mr. Babanezhad made a friendly motion to change the "3db" should be "upper 3db" and the "at least 2 poles". Mr Varelijain made a friendly amendment to change the 3fs/4 to 2fs/4. It was accepted by the mover & second.

Adopt the filter assumptions in slide 6 of the presentation gupta_1_0704.pdf for the purpose of defining transmit waveform templates. This is summarized as "At least two pole continuous time low pass filter with upper -3dB frequency varying from fs/2 to 2fs/4, and a single pole continuous time high pass filter with pole ≤ 100kHz"

TF Voters	Yes	21
	No	21
	A	7

The motion failed.

The chair noted that we have a hard stop at 12:30.

Motion: Adopt a part of the distortion methodology as specified in the slide 17 gupta_1_0704.pdf summarized as follows: "A normative spec is specified for the transmit distortion required for the interoperability of the far end device, and a recommended, though not normative, number provided for the local device to maintain link performance as a baseline for Draft 1.0"

Moved S. Gupta
Second J. Tellado

Mr A Vareljian made a motion to postpone. After some discussion the motion to postpone was withdrawn. Mr Zimmerman offered a friendly amendment suggesting that these be included as informative text in the draft. Accepted.

The motion passed unanimously by voice vote.

Motion: Adopt a part of the common mode rejection methodology as specified in the slide 21 of the presentation gupta_1_0704.pdf summarized as follows: "The common mode rejection spec of the receiver widened up-to 625MHz such that the common mode output signal that the transceiver has to tolerate while maintaining 10G link performance, should be ≤ 2.8V for f e (1,f1] MHz, and ≤ 2.8 * f1/f for f e (f1,625] MHz, parameter f1 subject to further investigation, (initial value for f1 =80MHz) based on real environment conditions."

Moved S Gupta
Second J Babanezhad

Mr Zimmerman made a friendly amendment to limit to change the upper frequency to 500Mhz which was accepted by the mover & second.

Adopt a part of the common mode rejection methodology as specified in the slide 21 of the presentation gupta_1_0704.pdf summarized as follows: "The common mode rejection spec of the receiver widened up-to 500MHz such that the common mode output signal that the transceiver has to tolerate while maintaining 10G link performance, should be ≤ 2.8V for f e (1,f1] MHz, and ≤ 2.8 * f1/f for f e (f1,625] MHz, parameter f1 subject to further investigation, (initial value for f1 =80MHz) based on real environment conditions."

TF Voters	Yes	25
	No	9
	A	24

The motion failed.

Motion: Move that 802.3an Task Force adopt Class F insertion loss and ANEXT for augmented Category 6 (proposed Class E ed2.1) Cabling as per June 11, 2004 TR42 Liaison response to IEEE 802.3 on Augmented Category 6 Cabling and the 802.3an augmented Class E objective.

Moved P Kish
Second P Vanderlaan

Additional information provided is:
1. Augmented Category 6 (proposed Class E ed2.1) Channel Insertion Loss (IL) shall meet ISO/IEC11801 Ed2:2002 Class F channel specification

2. Augmented Category 6 (proposed Class E ed2.1)
Channel Power Sum Alien Near End Crosstalk (PSANEXT) shall meet:
PSANEXT ≥ 60 – 10log(f), 1 ≤ f ≤ 100 MHz
PSANEXT ≥ 60 – 15log(f), 100 < f ≤ 625 MHz

Mr Larsen made a friendly amendment to add ed2.0:2002 after adopted. Accepted. The question was called.

By voice vote the motion was accepted by unanimous vote.

Motion: Accept the cabling parameters for Class E cabling from the ISO liaison letter shown below.

Moved S Larsen
Second

Several friendly amendments were made and accepted which limited the

Mr Koeman made a motion to postpone until the next ISO/IEC meeting in January 2005. Mr Flatman seconded the motion to postpone. The question was called to postpone.

TF Voters	Yes	23
	No	24

The motion to postpone failed.
Mr. Cobb called the question.

TF Voters	Yes	31
	No	19
	A	14

The motion failed.

The chair asked the editor to create draft 1.0. Details on the next interim meeting will be posted on the web page.

Attendance List

Last name	First Name	Company
AbuGhazaleh	Shadi	Hubbell Premise Wiring
Adriaenssens	Luc	Systimax
Alexander	Jan	Nexans
Amer	Khaled	AmerNet, Inc.
Babanezhad	Joseph N.	Plato Labs
Barrass	Hugh	Cisco
Bennett	Mike	LBL
Berry	Joe	Bel Fuse
Booth	Brad	Intel
Boucino	Tomoyuji	CommScope, Inc.
Brown	Kevin	Broadcom
Chan	Kevin	Broadcom
Chopru	Rahul	Teranetics
Chou	Joseph	Real Communication
Cobb	Terry	Systimax
Cohen	Larry	SolarFlare
Dabiri	Dariush	Teranetics
Darshan	Yair	Power Dsine
DiMinico	Chris	MC Communications
Dove	Dan	HP
Dupuis	Joseph	
Dyer	Ken	KeyEye Communications
Eilser	George	SolarFlare
Ensign	Brian	Leviton
Fallahi	Siavash	Broadcom
Flatman	Alan	Independent
Fukuchi	Kiyoshi	NEC
Gupta	Sandeep	Teranetics
Hammond	Bernie	Krone
Hando	Shinyo	AIST
Harrison	Lee	KeyEye Communications
Hess	John	Bel Fuse
Hojabbi	Pirooz	Plato Labs
Iijima	Yosuke	ERI
Injeti	Anand	Krypton Systems
Jimenez	Andy	Anixter Inc.

Jover	Juan	Independent
Kaku	Shinkyo	Allied Telesyn
Kasai	Yuji	AIST
Kasturia	Sanjay	Teranetics
Kish	Paul	Nordx/CDT
Koeman	Henriecus	Fluke Networks
Kosukegawa	Tsutomu	ERI
Koyama	Tetsu	NEC
Larsen	Wayne	Systimax
Lee	Chen-Hsin	KeyEye Communications
Lou	Dennis	Pioneer PRA
Lynskey	Eric	UNH IOL
Matsumoto	Tomoyuji	Tokyo Electric Power Co
McCallum	David	Molex
McCarthy	Frank	Teranetics
McClellan	Brett	SolarFlare
McConnell	Mike	KeyEye Communications
Mei	Richard	Avaya
Meisler	Alon	Intel
Mezer	Amir	Intel
Miao	Tremont	Analog Devices
Muller	Shimon	Sun
Muller	Wayne	Neteffect
Muth	Jim	Broadcom
Nishimura	Shinji	Hitachi
Nordin	Ron	Panduit Corp.
Osawa	Takeo	Tokyo Electric Power Co
Osterhout	Mark	Hitachi Cable Manchester
Pivonka	Ed	IDEAL
Popescu	Petre	Quake Technology
Powell	Scott	Broadcom
Rabinovich	Rick	Spirent Communications
Rao	Sailesh	Phyten Technologies
Rodensky	Mike	SolarFlare
Rybinski	Valerie	Siemon
Sallaway	Peter (PJ)	Vativ Technologies
Savi	Olindo	Siemon
Scull	Harvey	KeyEye Communications
Seki	Katsutoshi	NEC

Sparrowhawk	Bryan	Leviton
Srodzinski	David	Elonics
Subram	Krishnamur	Force10 Networks
Takahashi	Eiichi	AIST
Takatori	Hiroshi	KeyEye Communications
Telang	Vivek	Vitesse
Tellado	Jose	Teranetics
Toyoda	Hidehiro	Hitachi
Ungerboeck	Gottfried	Broadcom
Vaden	Sterling	Superior Modular Products
Van Bavel	Nick	Vitesse Semi
Vanderlaan	Paul	Belden Electronics Div.
Vareljian	Albert	KeyEye Communications
Wang	Hui	Broadcom
Warren	Jeff	Independent
Wartski	Dan	Intel
Yu	Hong	Aboundi
Zimmerman	George	SolarFlare