# Generating the 10GBASE-T drafts

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# Introduction

- Primary task is to get enough consensus that we can generate a "good" draft D1.0 coming out of the July 802 Plenary meeting..
- Motivated by goal set by chair (B. Booth)
  - "…generate draft D1.0 coming out of the July 802 Plenary meeting...
  - …we have 8 7 2 months in which to develop consensus AND the baseline for the first draft. "
  - Draft 0.9 coming out of the May meeting
- The key is developing consensus on a core proposal but…
  - This covers more than PAM, coding and choice of cable
  - The "creating a draft" part of the work is substantial
- THANK YOU TO CHRIS DIMINICO FOR GENERATING A DRAFT OF THE LINK SEGMENT SECTION

# What's needed in a proposal

- What's needed in a proposal so we can write the draft?
- A first cut was distributed via the reflector and is available on line at: http://www.ieee802.org/3/an/public/material/parameterlist.xls

| Item # | Description | Current active proposals | approved |
|---|---|---|---|
| | **PCS** | | |
| 1 | Symbol rate | | |
| 2 | Modulation | | |
| 3 | Frame structure | | |
| 4 | Transmit encoding for FEC | | |
| 5 | Transmitter bit to symbol mapping | | |
| 6 | Transmit processing | | |
| 7 | Transmit latency through PCS | | |
| | **PMA** | | |
| 8 | Transmit voltage specification | | |
| 9 | Transmit pulse shaping | | |
| 10 | Transmit master and slave jitter specifications | | |
| 11 | Transmit linearity specifications | | |
| 12 | Maximum allowable transmit distortion | | |
| 13 | Transmit noise floor | | |
| 14 | Transmit latency through PMA | | |
| | **Startup protocol** | | |
| 15 | state diagram for training | | |
| 16 | Coefficient exchange if required | | |
| 17 | Coefficient initialization if required | | |
| 18 | Mode selection method if phy operates in multiple modes | | |
| | **Receiver performance requirement** | | |
| 19 | BER or FER over specified channel models | 10^-12 for BER, FER?? | |
| 20 | Receiver latency requirement | | |

# Issues with parameter list

- It is not complete but is a starting point
- General
  - Can we address issues like auto-negotiation, start-up at this point?
  - Should we
    - develop multiple proposals in detail and select one or
    - Get consensus on specific issues and build a proposal from the basis of this consensus
- Specific
  - Measurable error performance should be specified as frame/packet error rate rather than BER (128 Byte, 10^-9)
  - The standard should not specify implementation latency but should specify fundamental latency

# PHY proposal details

- A first cut spreadsheet was distributed via the reflector and is available on line at:
  http://www.ieee802.org/3/an/public/material/proposaldetails.xls
- General comments
  - We shouldn't use a spreadsheet; how will we know that the numbers are correct?
  - Consensus on specific issues is a great way to go
  - Get complete proposals and then compare them to select the right one
  - It is too early to ask for this much detail
  - Some of the information should not be requested
  - More details should be provided by proposers (PAR at various points etc.
  - You can never capture the full details in one spreadsheet
- Specific comments
  - Change background noise from -150dBm/Hz to -145dBm/Hz and have this include non-idealities of implementation (residual NEXT, FEXT, Echo, Phase jitter)
  - In channel model #4, why does ANEXT get "better" for longer lengths
  - Jitter tolerance for transmitter should be specified, not for receiver
  - Crane test is not an appropriate measure
  - We don't know how to go from TX spectrum to EMI compliance tests
  - In addition to EMI, there is a European immunity to EM fields test that should be included
  - Specify Tx power rather than voltage and vice versa
  - Too many/to little implementation details have been requested
  - Some items requested depend on performance and specs of magnetics
- More?

# PHY proposal details

- Have received spreadsheets from:
  - AIST/Hitachi
  - NEC
  - Sailesh Rao
  - Solarflare
  - Teranetics
- Multiple reminders have been sent

# MORNING AFTER PRESENTATIONS - 1

- Editorial
  - George Zimmerman requested a meeting to discuss PHY proposal spreadsheet
  - Can we refine and approve the format?
  - Brad allocated time Thursday morning for this meeting
- Thanks to Thuyen Dinh for the presentation on magnetics
  - Addresses numerous requests for information on magnetics
  - Do we need a decision on using transformer with a choke or without a choke for the purpose of comparing proposals?
  - Request posting data on the balance for both.
- Chris DiMinico presented a draft of the link segment spec
  - Will go into the baseline

# PRESENTATION SUMMARY - 2

- Four presentations on NEXT & Link segment performance relating to connectors and cables
  - Are there any proposals to modify the channel models?
  - Will get feedback in after the June 11th meeting of TIA
- One presentation on Transmitter PMA specification
  - Item covered were transmit voltage levels, transmitter nonlinearity, return loss
  - Can we baseline any of these items?
    - Return loss was baselined
    - Please make presentations on transmit voltage levels or reach consensus prior to the next meeting
    - Bring presentations/proposals on transmitter nonlinearity

# PRESENTATION SUMMARY - 3

- Two presentations on optimal baud rates
  - Can we select a baud rate or range of baud rates?
  - There was a motion at the previous meeting that had passed among 802.3 voters
    - For PAM, range set to 8PAM or above; can we narrow it down further?
- Three presentations on equalization approach
  - Receiver based equalization using alternative DFE structure
  - Tomlinson Harashima Precoding
  - Rebuttal to THP proposal
  - Can we get a decision?
  - There was debate on whether error propagation was an issue in this application
    - Can someone provide simulation code so that contenders can decide for themselves?
  - There was debate on whether the THP loop is implementable with reasonable complexity
    - Can someone provide an implementation?
  - TRANSMITTER AND FRAME STRUCTURES WILL DIFFER GREATLY BETWEEN PAM AND OFDM. PLEASE PLAN ON BRINGING VERY DETAILED PROPOSALS THAT COULD BE THE BASIS OF THE "BLUE BOOK"
    - Select baseline proposals at the next meeting

# PRESENTATION SUMMARY - 4

- Six/Seven PHY proposal
  - Plato Labs – PAM 5 line signaling
    - No spreadsheet provided
    - Eliminated by PAM8 (or higher PAM) motion
  - AIST/Hitachi - Refinement of OFDM signaling method for 10GBASE-T
  - Sailesh Rao - Update on LDPC 4D-PAM 8 proposal
  - Solarflare - PHY Proposal for 10GBASE-T: Encoding, Mapping & Framing
  - Teranetics - 10GBASE-T PHY proposal
  - NEC – PHY Proposal for 10GBASE-T
  - Keyeye – No proposal presentation …
    - but proposal details spreadsheet provided the night of May 26th 2004
- Is there >75% support for any one of these?
  - Is there is less than 25% support for any one of these?
- Would the group like to …
  - Invite new proposals?
  - Discourage any new proposals?

# Proposal survey

- From PHY proposals spreadsheet
- Quite a few blanks
- FEC: 1 TCM, 5 LDPC
- Equalization: 1 OFDM, 1 receiver based, 4 THP based
- DAC rate: 810, 820.8, 833, 937.5, 1000, 1000 Mhz
- TX launch voltage
  - Specified in power: 10 dbm
  - Specified in Vrms: 0.63V
  - Specified in V (peak to peak): 1.5, 2, 2, 3.5

# Other Communication

- For questions on relating TX PSD to CISPR EMI compliance, see note forwarded by Alan Flatman
- Matrix channel models have been requested
  - Three sets of data have been provided by Siemon, Systimax and Chris DiMinico
  - The approved channel model motion needs detailed interpretation on scaling
    - http://www.ieee802.org/3/an/public/mar04/kasturia_2_0304.pdf
  - Jose Tellado has outlined different scaling options and has a recommendation based on feedback from PHY/Cable vendors
    - These will be mailed to the reflector and put on the website
    - Richard Mei volunteered to maintain this and add more models when the group decides
  - We have focused on long links but people have talked of other stress configurations
    - Can someone volunteer to provide these and associated files
      - Solarflare?
      - ETL/ITS?
- Can someone provide details on power back off proposals?