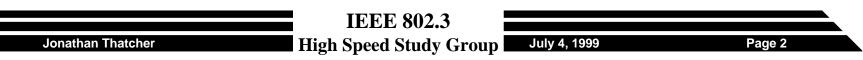
Report on the July 5-8, 1999 **MEETING OF THE 802.3 HIGH SPEED STUDY GROUP** Montreal, Canada Jonathan Thatcher jonathan@picolight.com **IEEE 802.3** Jonathan Thatcher High Speed Study Group July 4, 1999

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Objectives For The Week

- < Complete the OBJECTIVES for the HSSG
- < Improve understanding of TECHNICAL PROPOSALS



Presentations (1 of 10)

< Alan Flatman

- < Fiber base survey extrapolated to YE 2000
- < Segmented by Fiber type (62.5, 50, SMF)
- < Large proportion of campus backbone < 750 m
- < Large proportion of building backbone < 300 m

< Atikem Haile-Mariam

- < MAN Long Haul data: much proprietary difficult to piece story together
- < Introduction of "Profit Centered" fiber
- < **RBOCs carry far more data than CLECs; trend will continue**
- < Majority of data on the CLECS
- < 10 to 20 km typical for CLEC Rings
- < CO to drop min: 186 ft; ~Mean 10,000 ft; Max 114,000 ft
- < Therefore, need a -> need 3 to 4 km objective

< Ed Chang

< Use TIA 2.2 bandwidths, longer distance calculations presented



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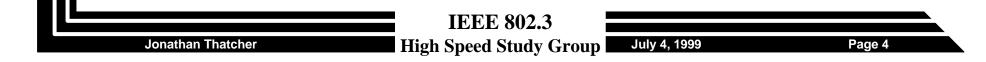
Presentations (2 of 10)

< Mike Hackert

< More detailed discussion of history and scope of TIA 2.2

< Zinan Chen

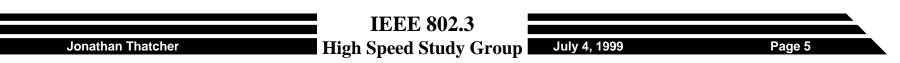
- < Bandwidth growth curves for Ethernet (et al) to show need
- < LAN growth at 19% AGR; MAN & WAN at 38% AGR
- < Most OC-x not growing, sans 10 Gig; 10 Gig port projections (Nortel alone)
- < "Magic time to unify local, metro, and wide area...."
- < Howard Frazier
 - < Recommendations for common MII, PMD and Mgmt I/F's
 - < Description of delimiters; special characters; levels; etc.



Presentations (3 of 10)

< Paul Bottorf

- < 3 types of media: dark fiber; dark wavelengths; lit OC-192
 (which is frequency sensitive)</pre>
- < **Description of DWDM Network**
- < Analysis of time dependencies
- < Summary: support OC-192
- < Kamran Azadet
 - < FEC used to dramatically improve BER with low overhead
 - < FEC definitions; examples (e.g. Hamming; Reed-Solomon)
 - < Benefit analysis
- < Ed Chang
 - < BER analysis supporting need for 10e-13



Presentations (4 of 10)

< Dai Young Kim

- < New code scheme: MB810;
- < Advantages: ~2x spectrum BW vs 8B10B or has 2X the BW capability; Run Length 7: Alternating Sum Variable (ASV) = 5; DSV 6

< Encoder chip in design now; expect ~10k GATES to implement

- < Norival Figueira
 - < 2 Polynomial scrambler; how encoding is done
 - < Explanation of error duplication; why it isn't a problem
 - < How detection works;
 - < Probability of error is 8.4 x 10e-11
- < Al Widmer
 - < Discussion of error correction over 8B/10B
 - < Requires 17 bits per EC segment
 - < Works best with 4 byte boundaries

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Presentations (5 of 10)

< Al Widmer

- < Discussion of 16B/18B Code (v 8B/10 B)
- < Comma spread over 2 bytes; Larger running disparity; takes longer to detect
- < Run length is 7 (v 5); Maximum Digital Sum is 12
- < Low freq time constands have to be increased by 2.25
- < No data control characters
- < A 16/18 can be developed preserving 8B/10B characteristics

< Paul Kolesar

- < Review of fiber standards activities (High B/W 850 going frwd)
- < 850 nm power budget
- < Comparison to 980 nm and 1300 nm
- < IEC safety limits MAY increase
- < New 850 nm receivers fast enough to support 10 gig.
- < Flip chip not a problem for detectors
- < 980 test equipment not common
- < 980 would have large inertia to overcome (e.g. stds; fiber mfgs)

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Presentations (6 of 10)

< Mark Donhowe

- < Evaluation Gore, multimode, VCSELs with Lucent HBW fiber
- < Demonstrated 300 meters at 12.5 GBd; 400 meters at 10 GBd

< Georgio Giaretta

- < Compare solutions for MMF (Serial; WDM; PAM)
- < Modal noise previously no problem due to low coherence sources; low coherence becoming more of a problem as we move to DFB and single mode VCSELs
- < Restricted, small, center launch can overcome modal noise via reduced fiber system loss

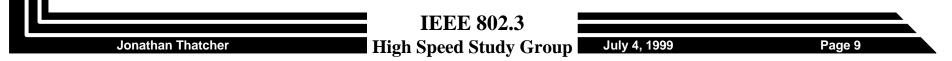
< Richard Kriese

- < **Parallel components available today; used by other standards;** multiple sources
- < Relative cost curve at short distances are competitive
- < Currently lowest cost option; long term may not be.

Presentations (7 of 10)

< Del Hanson

- < Case for 980 nm solutions; improved power budget
- < Comparison of 850 v 1300 nm (Rx Sensitivity; Eye Safety)
- < Transparent substrate helps with packaging using flip chip
- < Advantages of device characteristics (current; voltage)
- < Potential interoperability with 1300 nm
- < David Cunningham
 - < Theoretical analysis of PAM / T-Wave Optical Systems
 - < Issues: Power Penalty; RIN; Non-linearity; Modal Noise
 - < May require coding-gain techniques to overcome penalties.



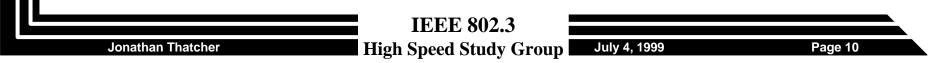
Presentations (8 of 10)

< Brian Lemoff

- < Update on WWDM Proposal
- < Low cost because: no new fiber; slower lasers
- < **Propose LX style (could be either SM or MM)**
- < Some experimental results (e.g. channel cross talk)
- < Review of laser safety calculations
- < Link budget (derived down from eye safety limit) -> margin

< Jaime E. Kardontchik

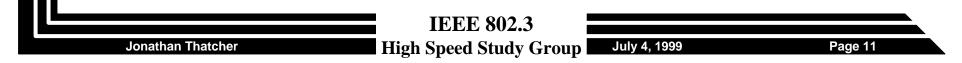
- < Review of Architecture: 1000BASE-T PCS + 4 WDM
- < 1.25 GBd line rate
- < Scrambling; PAM-5; Coding gain by FEC



Presentations (9 of 10)

< Martin Nuss

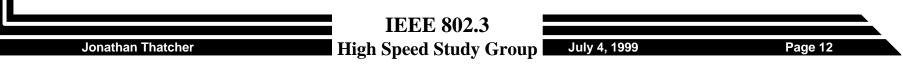
- < Serial is good
- < Use scrambling (chip cost is low)
- < Recommended PHY Interfaces: 32 bit to PMA; 1 bit to PMD
- < Scrambling Alternatives (A**-like; SDL-like; ...)
- < WAN Architectures (Dark Fiber; WDM; SONET)
- < Fred Weniger
 - < Group should seriously consider a 10 bit interface
 - < 10 independent 802.3z lines @ 1.25 GBd
 - < Comparision of 8B/10B : Scrambling : Scrambling with FEC



Presentations (10 of 10)

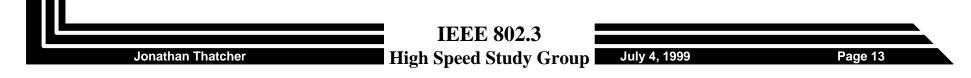
< AD-HOC Reports

- < Copper: Objectives for 10 meter motion w/ 2 presentations....
- < Media Reference: Review of 11801 Revision and ability to influence future direction
- < Survey: Ready to go out; goal 100 to 300 sites surveyed
- < Speed: Only 1 speed; either 10.000 or 9.58464; can't resolve by 75% vote
- < Distance: Multiple options to be presented to group, in sequence as prioritized by ad-hoc "Chicago Rules" voting.
- < In support of Copper Objectives Motions
 - < **Drew Plant**
 - < Rich Taborek
 - < Pluggable MAS PHY using common coding with optics



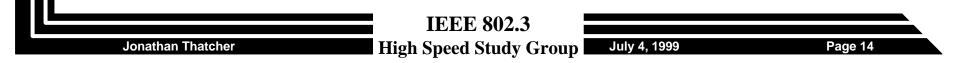
HSSG Objectives Passed (1 of 2)

- Preserve the 802.3/Ethernet frame format at the MAC Client service interface. (acclamation)
- Meet 802 Functional Requirements, with the possible exception of Hamming Distance. (Y: 63 N: 2 A: 16)
- Preserve minimum and maximum FrameSize of current 802.3 Std. (acclamation)
- Support full-duplex operation only. (acclamation)
- Support star-wired local area networks using point-to-point links and structured cabling topologies. (Y: 55 N: 11 A: 17)
- Specify an optional Media Independent Interface. (Y: 52 N: 0 A: 6)
- Support proposed standard P802.3ad, Link Aggregation ("Link Aggravation"; acclamation)
- Select only one of 10.000 Gb/s or 9.58464 Gb/s to standardize as the MAC/PLS data rate (For: 113; Against: 3; Abstain: 10)



HSSG Objectives Passed (2 of 2)

- Support fiber media selected from the second edition of ISO/IEC 11801 (802.3 to work with SC25/WG3 to develop appropriate specifications for any new fiber media). For: 119; Against: 0; Abstain: 1
- Provide a family of Physical Layer specifications which support a link distance of:
 - At least 2 km over SMF (For: 105; Against: 0; Abstain: 0)
 - At least 10 km over SMF (For: 93; Against: 5; Abstain: 7)
 - At least 100 m over installed MMF (For: 73; Against:13; Abstain: 21)
 - At least 300 m over MMF (For: 83; Against: 3; Abstain: 12)
 - At least 40 km over SMF (For: 68; Against: 4; Abstain:



HSSG Motion 1

- In response to the motion passed in the HSSG, requests that the 802.3 Chair sign an appropriate letter addressed to 802.3 members that enlists their support in administering a cabling survey developed within the HSSG to support 802.3 standards effort.
 (Supported in HSSG: For 71; Against: 3; Abstain: 9)
- < Passed by voice vote
- < Moved: Jonathan Thatcher (for HSSG)
- < Procedural

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HSSG Motion 2

- < Request 802.3 extend the HSSG charter until November, 1999.
- < Passed by voice vote
- < Moved by Jonathan Thatcher for HSSG
- < Procedural

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HSSG Action 1

- < Schedule an interim meeting for Jan, 2000
 - < Note: Texas Instruments has volunteered to host this meeting in Dallas, Texas.

