Report

on the

July 5-8, 1999

MEETING OF THE 802.3 HIGH SPEED STUDY GROUP

Montreal, Canada

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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

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)**
  - **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**

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)**

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

HSSG Motion 2

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

HSSG Action 1

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