EFM FEC STATUS

Presented by:
Lawrence Rennie, National Semiconductor
FEC Chair
IEEE 802 Plenary, Kauai, Hawaii, Nov 11-15, 2002

FEC Group Participants (informal list)

Lior Khermosh, Passave

Ariel Maislos, Passave

Meir Bartur, Zonu

Ajay Gumalla, Broadcom

Jonathan Thatcher, World Wide Packets

Pat Thaler, Agilent

Larry Rennie, National Semiconductor

Eric Lynskey, UNH IOL

Piers Dawe, Agilent

Jerry Radcliffe, Hatteras Networks

The FEC meeting Plan.

1. FEC Status and Background (This presentation, Larry)

2. Presentation of FEC CDR and MPN Test Methodology and Results (Meir for MPN and Eric for CDR).

3. Presentation of a motion to add the frame based FEC presentation(s) as a baseline for the addition of FEC to EFM.

Background.
The FEC Group

1. The FEC group has been working for the last year and a half to come up with an FEC baseline for consideration by the EFM TF.

2. Our work to date has been guided by two approved FEC related motions and the desire of the EFM TF for lab test results showing the ramifications on link length and PMA/PCS performance resulting from the lower link BER's permitted by FEC

3. The expectation is that, after the EFM TF has considered the FEC test results, the TF will have the information necessary to approve or disapprove the addition of FEC to the baseline standard. If approved, the FEC group will re-focus its efforts into writing the new FEC clause (or new paragraphs for an existing clause).

Background.
Approved FEC Motions

1. Edinburgh, May 2002:
   "Add an FEC option for the 1Gig P2P and P2MP Phys, maintaining backward compatibility with the 1000BASE-X PCS, for the following reasons:
   a) Improves reach of a MPN limited link by 50% for links with MPN penalty of about 2dB.
   b) Permits operation at a SNR lower by 2.5dB for non dispersion limited links."

2. New Orleans, September 2002
   "Limit consideration of FEC proposals to those based on khermosh_general_1_0702.pdf as further elaborated in khermosh_fec_1_0902.pdf and maislos_fec_2_0902.pdf."

Background
Previous FEC Presentations

1. Baseline Proposals:
   "FEC in PON Technical Proposal" khermosh_general_0702.pdf
   "Frame FEC in EPON Technical Proposal" khermosh_fec_1_0902.pdf
   "Improving Frame FEC Efficiency using Frame Bursts",
   maislos_fec_2_0902.pdf

2. FEC Performance and Impact:
   "Responses to FEC Work Items List". Rennie_1_0502.pdf
   "EFM FEC: Operation, Cost, Complexity", rennie_1_0302.pdf
   "FEC in PON", berman_1_0302.pdf
   "FEC framing in EFM", khermosh_1_0102.pdf
   "FEC Cost Effectiveness in EFM", khermosh_2_0102.pdf
   "FEC Effect on MPN", khermosh_2_1101.pdf
   "BER Requirements", khermosh_3_1101.pdf
   "FEC for EFM: A Tutorial", rennie_1_0901.pdf
   "FEC and Line Coding for EFM", ivry_1_0901.pdf
   "FEC Framing Considerations for EFM", khermosh_1_0901.pdf

Accomplishments.
FEC Related Testing

1. At the last meeting the FEC group agreed to conduct lab testing on how the high link BER's ($\geq$10E-4) permitted by FEC affect PMA/PCS performance and distance improvement achievable.

2. The FEC group has developed the test methodology and will report its findings at this meeting for the following:
    a) CDR lock time at high (10E-4) an low (10E-12) BER's
    b) Length improvement with FEC on MPN limited links.
    c) Operation of FEC enabled links with non-FEC legacy 802.3z nodes.

Accomplishments.
FEC Draft

The FEC group has prepared a first draft of the FEC text in preparation of FEC adoption into the baseline standard.

FEC Impact
1Gbit/sec RS(255,239) code.

- Gate Count: About 40K-50K gates. Information from two FEC vendors.

- Power Dissipation: About 40-100 mW in 0.18u CMOS. Information from two FEC vendors.

- Latency Time: 20usec max.