Equalization Ad Hoc Progress Report

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Overview

- Charter is to report on feasibility of equalization for P802.3ae links by WG Ballot time.
- Currently studying the impact of Polarization Mode Dispersion on singlemode links.
- Will next work on linearity and time variance of multimode links.

PMD – how it works

- Effect is significant only for 1550 nm 40 km singlemode link.
- A pulse “splits” into two parts, each traveling at a different Group Velocity. Result: horizontal and vertical eye closure.
- Can be compensated by allocating a penalty in the link power budget.
- Complex statistics.

PMD – Power Penalty

- For compliant fiber, less than 0.5 dB Penalty will compensate for eye closure with high probability.
- It appears likely that this provision will also take care of horizontal eye opening budget.

Pre-1992 fiber

- PMD can be several times higher than 0.5 ps/sqrt(km). Operation of 1550 Serial link cannot be guaranteed for all fiber.
- A few percent of total fiber in metro routes will have high PMD. This number is shrinking, and difficult to determine precisely. Estimates range from “between 2% and 5%” to “12%.”
- Can be isolated with Interferometric test equipment and procedures (ITU G.650, IEC TR 61941), or other means (cable markings, purchase records).

Bellcore PMD Survey

- Field audit of 1000 cables, domestic and international.
- PMD values varied significantly with cable design, manufacturers, plant type and vintage.
- Found average PMD levels greater than 1 ps/sqrt-km in 35% of older and 4% of newer cables. One interpretation of the histograms leads to 12% of total population as having PMD issues.
- Report’s conclusion: For OC-192 deployment, test all pre-1992 fiber.

Recommendation for 1550 nm Serial PMD

- Applies to the majority of fiber, compliant with the 0.5 ps/sqrt(km) limit.
- Provide for PMD Power Penalty equivalent to 19 ps DGD.
- Provide for Horizontal Eye Closure, amount TBD.

What should we do with the high-PMD fiber?

- Ignore the high-PMD fiber…(and let upper layers handle long bursts of errors)
- … or define a test procedure to isolate it? (Test equipment are not inexpensive or easily portable.)