

Equalization Ad Hoc Concluding Report

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In September 2000...

- Equalization Ad Hoc was created.
- When we began, we did not know if equalization for Installed MMF was feasible at all, because we did not know if the MMF channel was linear and stationary, or if it would support the SNR needed for an equalized receiver.
- IC prototypes performing Equalization for SMF was already demonstrated by some companies.

Objectives

- To examine feasibility of equalization for P802.3ae links.
- To recommend changes in the Serial PMD specs if necessary.

Polarization Mode Dispersion

- Studied the impact of Polarization Mode Dispersion on Serial links, and made recommendations to P802.3ae on power penalty.
- Recommended 19 ps DGD allowance in link budget for 1550 nm links based on fiber compliant with 0.5 ps/sqrt(km) limit.

Acknowledgement

- We thank Mike Hackert and his colleagues in TIA FO 2.2 for providing samples of DMD-challenged MMF fiber.

MMF links

- With analysis and measurements over DMD-challenged fibers, demonstrated feasibility of extending link length with equalization.
- 1310 nm DFB Serial: 300 meters on installed MMF (62.5/125, 500 MHz-km).
- 850 nm Serial: ~100 meters on installed MMF (62.5/125, 160 MHz-km).

Case: Serial PMD over Installed MMF

- Measurements support the assertion that the channel is linear and stationary to the extent needed for equalization, and that the SNR is good enough to support an equalized receiver.
- This is enough to begin design and implementation of prototypes of an equalization enhanced receiver.

Case: Serial 1550 nm PMD over SMF

- At 40 km, the 1550 nm link with externally modulated laser is attenuation limited, not bandwidth-limited.

Interoperability for equalized links

- Equalization-enhanced PMD will interoperate with a P802.3ae PMD but it will not extend the link distance.
- To realize full benefits of equalization, PMDs at both ends of the link must be equalization-enhanced.
- This creates an opportunity to improve some PMD specifications later, without requiring existing 802.3ae PMD specs to be enhanced now.

Equalization is feasible for bandwidth-limited SMF links

- 60+ km links, 1550 nm, with optical amplifiers.
- 40 km link, 1550 nm, directly modulated. Chirping effect can be compensated by the equalizer IC.
- Metro fiber routes where Polarization Mode Dispersion does not comply with the new $0.5 \text{ ps}/\sqrt{\text{km}}$ recommendation.

Recommendation

- No changes in existing 802.3ae specifications because
 - For MMF, current specs are adequate.
 - For SMF, equalization-enhanced PMD will be a superset of the P802.3ae PMD.

Planning for Call for Interest

- Discussion and questions.