

VITESSE

IEEE803.3aq 10GBase-LRM Overview

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YOUR PARTNER FOR SUCCESS

Goal

- Operate 10.3 Gbps Ethernet over FDDI grade Multimode Fiber (MMF)
- Fiber lengths up to 300 meters
- Support transition of core enterprise switching from 1GbE to 10GbE
- Note: 10GbE on 62.5um MMF without equalization the maximum operation length is 26 meters
 - 10G-Base –SR

Technical Challenge

- Modal Dispersion induced Inter-Symbol Interference (ISI) dominant issue
- Must operate on legacy fiber (~68% installed fiber base is MMF)
 - Fiber from early years of production
 - Fiber defects cause modal dispersion
 - Fiber variations from lot-to-lot and manufacture-to-manufacture
- Fiber must be modeled with statistics of defects

Techniques Considered

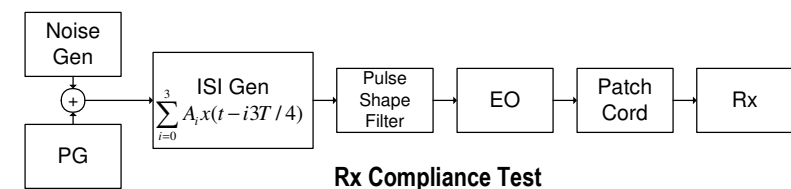
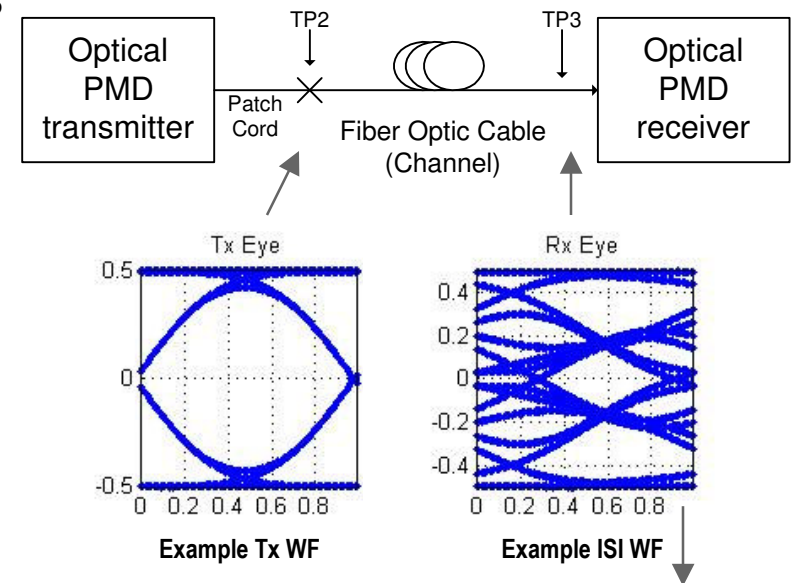
- Optical Mode Filtering
 - Excite a reduced number of optical modes, limit spread of modal dispersion
 - Rejected because mode coupling in optical connectors reduced effectiveness
- Pulse Amplitude Modulation (PAM-4)
 - Rejected because it lacked industrial support and noise levels differences at each modulation level reduces benefit.
- NRZ w/ Linear Equalizers Feed Forward Equalizers / Decision Feedback Equalizers (FFE/DFE)

Technique Chosen

- NRZ w/ Center and Offset launch
- No Training sequences (blind equalization)
- Equalizer implementation is vendor specific

Salient Specification Features

- Channels supported
 - Fiber Diameter/ Length/ Modal Bandwidth/ Insertion loss
- Transmit Specification & Compliance Test
 - Launch power, RIN, Eye Mask, TWDP,...
 - Transmit Waveform Dispersion Penalty test (TP2)
- Receiver Characteristics & Compliance Test
 - Bandwidth, Stressed receiver sensitivity,...
 - Rx Compliance test (TP3)
 - ISI Generator Architecture
 - Parameters of ISI generator chosen to represent channel model
 - Pre-cursor, split and post cursor channel response
 - Additive noise
 - Note: Eye is closed in RX Stress test at Rx
 - Test is to run with BER < 1e-12 at specified SNR with ISI





What Could Apply to SAS-2

- Tx/Rx Compliance testing?



Status

- In Draft circulation and comment cycle



See Web Page for more information

- <http://www.ieee802.org/3/aq/index.html>