



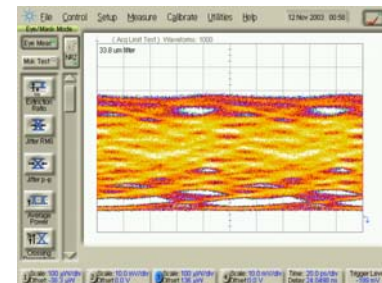
**IEEE 802.3
10GE MM Study Group
Channel Model Submission**

**Modal Noise Considerations
for 10GE FDDI Fiber Transmission**

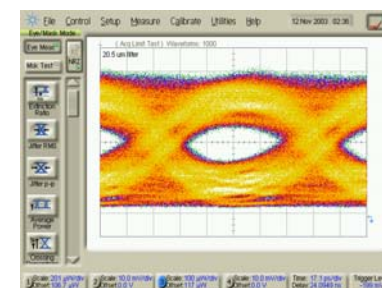
**Jan 13, 2004
Pete Hallemeier**

Optical Mode Filtering Approach

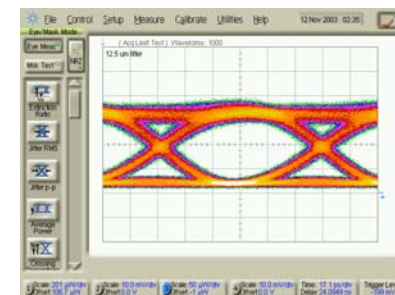
1. The ISI caused by DMD attributable to poor index profile limits link distance ➡
2. An output modal filter can be used to recover a small set of the modes; higher order mode groups are filtered out
However, if Mode Selective Loss is present, MODAL NOISE will be present and must be compensated ➡
3. Proper Tx Design, Launch Profile and Output Mode Filter can reduce the Modal Noise and enable 300m transmission ➡



DMD
Limited
Eye



Mode Filtered
Receive Eye with
Modal Noise



Mode Filtered
Receive Eye with
Modal Noise
Compensated

Channel Issues for Mode Filtering

- Mode Filtering was not studied during GBE activities, so this will be new
- Modal noise generation is the primary consideration in a mode filtering approach
 - Also needs to be considered in detail for EDC approaches
- Environmental stresses cause drastic modal noise variations if not properly addressed
- Any channel model must address parameters which contribute to modal noise by minimizing:
 - The Speckle Pattern Size
 - Points of Mode Selective Loss (MSL)
 - Environmental Effects which cause a speckle pattern variation
- Detailed PHY test results on optical mode filtering will be presented tomorrow

Modal Noise Considerations

- To bound the modal noise in the channel the following must be considered:
 - Temporal mode propagation variations caused by:
 - Channel Environmental Effects: Mechanical, Thermal
 - MSL accumulation in the channel
 - Any MSL contributing effect
 - The Effective MSL will depend on the mode field at the MSL point so the MSL can be reduced with restricted launch
 - Connector Junction offsets
 - MSL points due to fiber defects

The SG needs to work on bounding the modal noise generation in the channel model