

TIA FO-2.2.1

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Chair, TIA FO-2.2.1

Task Group on Modal Dependence of Bandwidth

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Next Generation 50 mm System Recommendation Complete

- Requirements have been defined
 - * Fiber DMD (FOTP 220) and
 - * Transceiver encircled flux (FOTP 203)
- IEEE P802.3ae/D3.1 specification correct
 - * Swanson and Kolesar
- Final standardization in progress and on schedule

Progress Since March

- Risk Assessment Modeling complete
 - * Modification required to DMD mask to achieve low failure risk
 - * Six masks allow tradeoff in fiber design
- Differential Modal Delay FOTP 220 technical issues resolved
 - * Final approval in progress
 - * Defines a maximum allowable broadening (ps/m) over a range of radial offsets (μm)
- Optimum tradeoff achieved
 - * Intermediate modes in the fiber are easiest to tune
 - * Typical sources using cost effective manufacturing have a limited range of launches

Transceiver Requirement Set

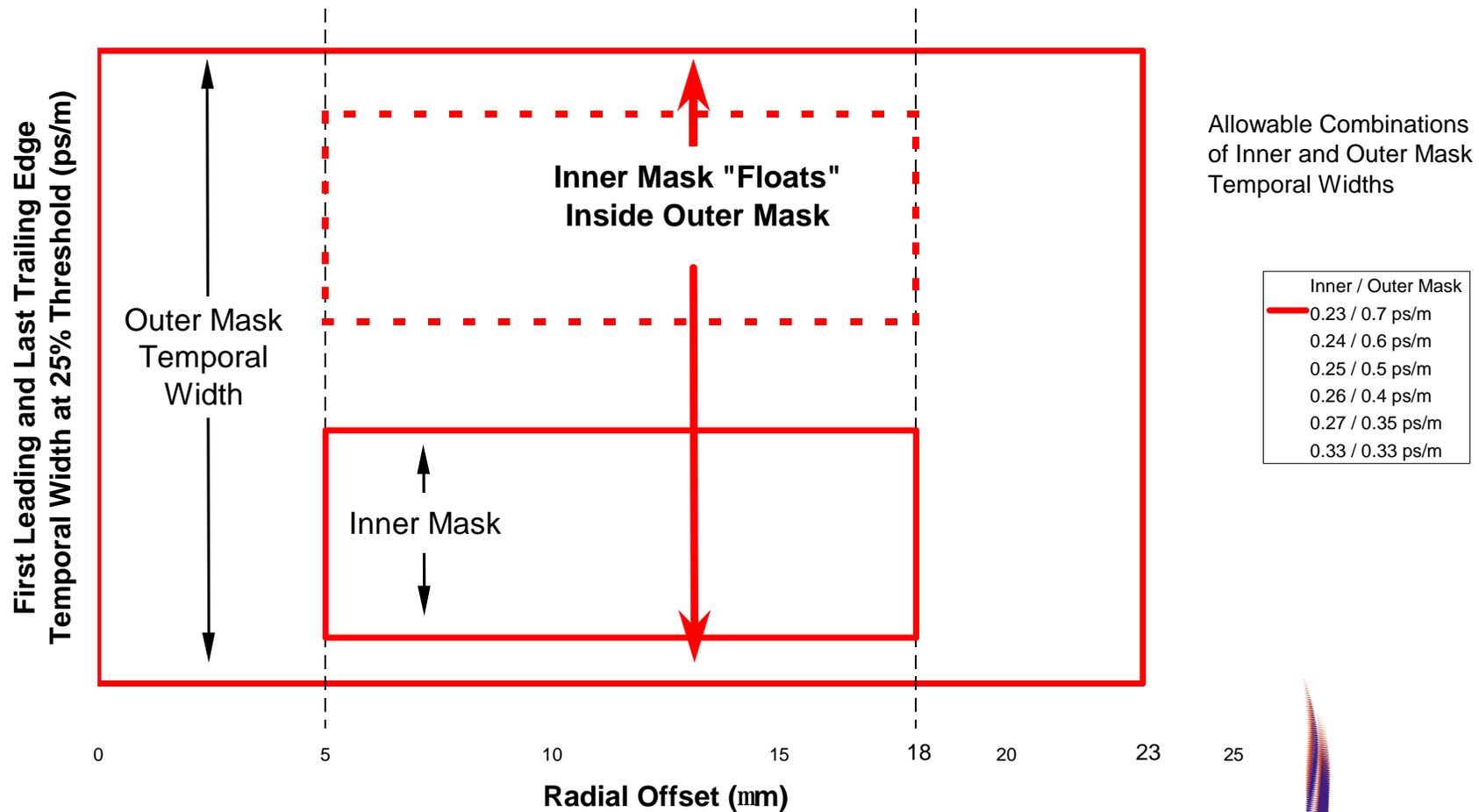
- Transceiver requirement defined in terms of Encircled Flux
 - * TIA FOTP 203 - status approved
- Encircled flux requirement
 - * $\geq 86\%$ at $19\ \mu\text{m}$ radius
 - Eliminates launches too large
 - * $\leq 30\%$ at $4.5\ \mu\text{m}$ radius
 - Eliminates launches too small
- “Not too large, not too small” - Just Right

Fiber Requirement

- Specification defined in terms of six “floating” masks (inner 5-18 μm / outer 0-23 μm at 850 +/- 10 nm):
 - 1) ≤ 0.23 / ≤ 0.7 ps/m or
 - 2) ≤ 0.24 / ≤ 0.6 ps/m or
 - 3) ≤ 0.25 / ≤ 0.5 ps/m or
 - 4) ≤ 0.26 / ≤ 0.4 ps/m or
 - 5) ≤ 0.27 / ≤ 0.35 ps/m or
 - 6) ≤ 0.33 / ≤ 0.33 ps/m Flat
 - * Note: Masks 1 through 5 require OFL BW ≥ 1500 MHz-km)
- Meeting any one of the six is sufficient
- Six masks allow tradeoff in fiber design (inner / outer at 850 +/- 10 nm):

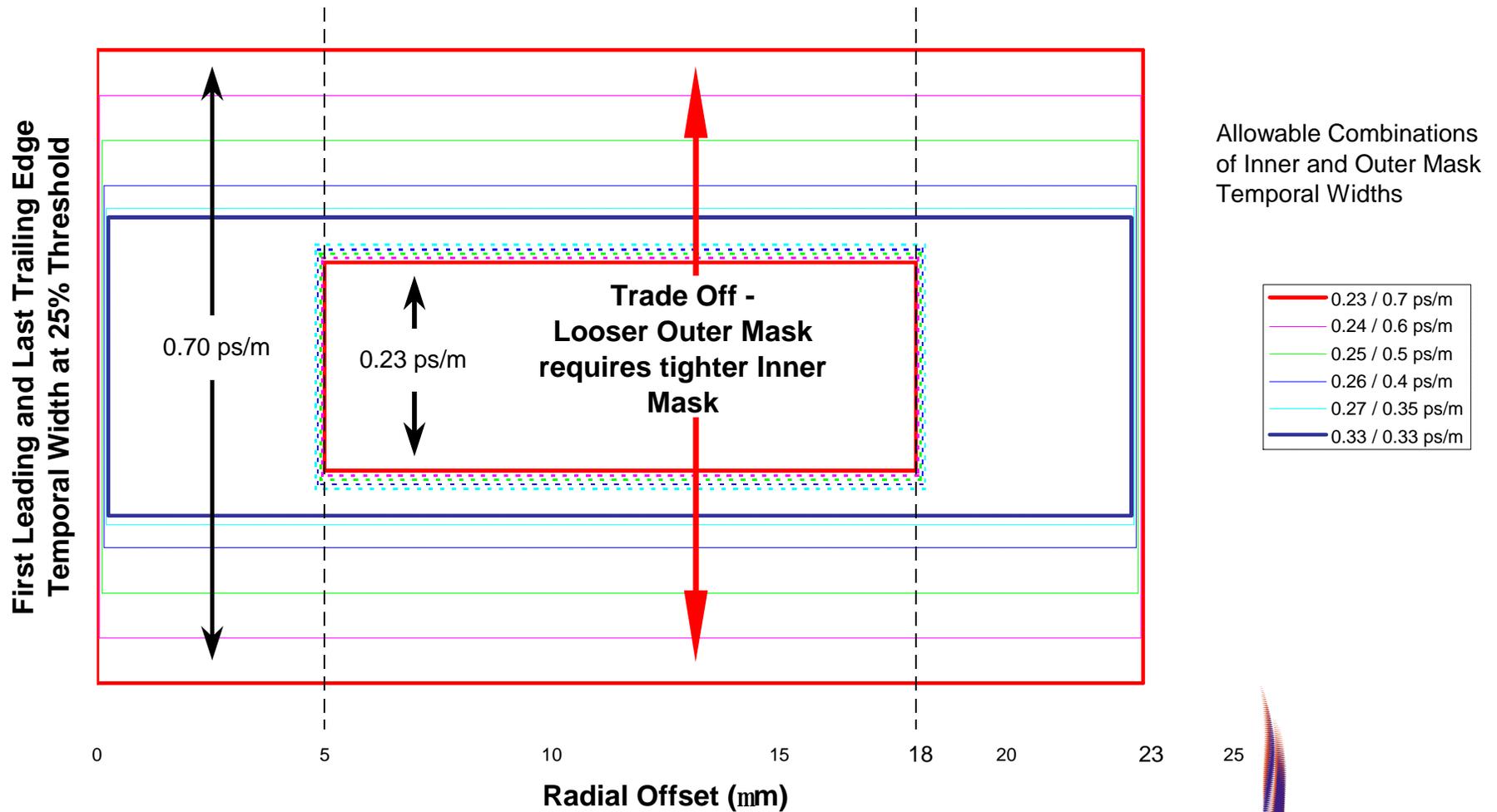
DMD "Floating" Mask

TIA 2.2.1 850 nm Laser Optimized



DMD "Floating" Mask

TIA 2.2.1 850 nm Laser Optimized



Risk Assessment Modeling

- Modeling used to confirm risk assessment
 - * Includes fiber and transceiver performance / interaction
 - * Connector offset impact evaluated
- Modeling supported by
 - * 2 fiber manufacturers
(Steve Golowich, John Ritger - Lucent, John Abbott - Corning)
 - * 1 transceiver manufacturer
(Petar Pepeljugoski - IBM)
- 40,000 transceiver fiber combinations evaluated
 - * Included a broad range of fiber profiles and transmitter launches
 - * 5000 fiber DMD profiles included realistic profiles
 - * 2000 transmitter launch distributions spanned allowable range of encircled flux

Conclusion

- TIA FO-2.2.1 recommendation complete
 - * Recommendation submitted in comments by Swanson and Kolesar
 - * Achieves optimum balance between fiber and transceiver properties
 - * Includes fiber DMD and transceiver encircled flux requirement
 - * Final modeling demonstrated acceptably low risk
- TIA FO-2.2.1 wrap up actions in progress
 - * Complete the standards process
 - * Complete documentation
 - * Prepare for the next Ethernet standard (100 Gb over MMF!)

Next Generation 50 mm Fiber Standardization Timing

- TIA
 - * Technical cutoff - June 2001 Plenary **(DONE)**
 - * FOTP 220 30 day PN ballot - March 2001 **(DONE)**
 - * 492 fiber specification - draft June 2001 **(DONE)**
 - Publication anticipated by February 2002
 - * FOTP 220 publish by January 2002
 - Publication anticipated in August 2001
- IEC
 - * 793-2 international fiber specification includes IEEE requirement
 - * IEC 60793-1-41 and 49 test method
 - Introduced in March 2001, review and ballot in October
- IEEE
 - * Final reference required by publication **(March 2002)**