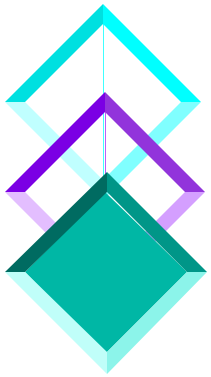

TIA FO-2.2.1 Task Group on Modal Dependence of Bandwidth

11/8/99 Status Update

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Chair, TIA FO-2.2 Task Group

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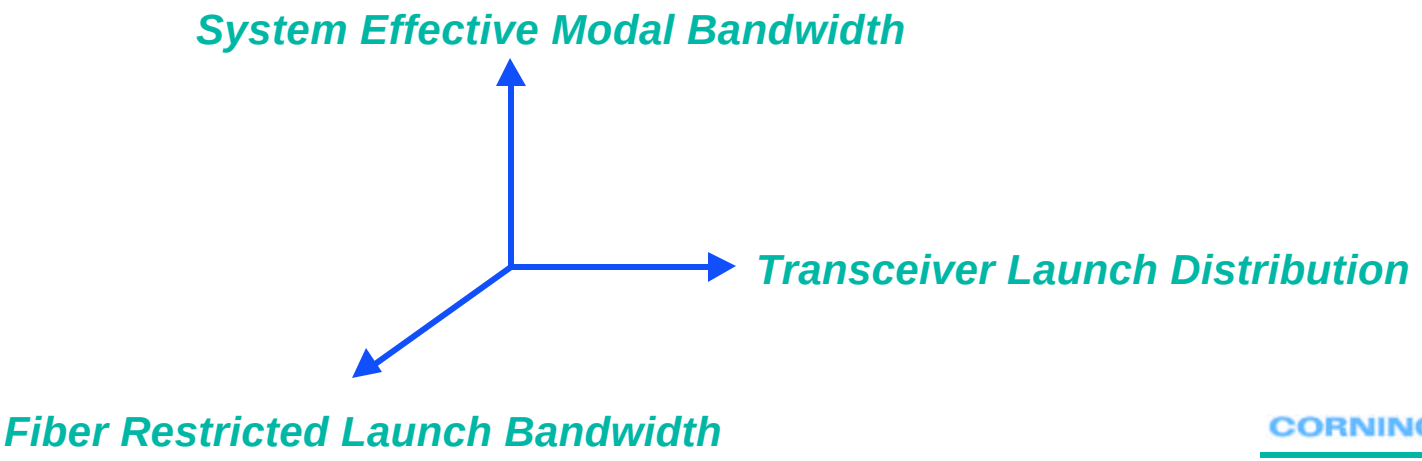
2.2.1 TG Scope - Two Part Objective

1) Devise a bandwidth test for MMF fiber which is representative of the actual system performance.
   - Standard overfilled bandwidth does not correlate to laser bandwidth.
2) Develop transceiver launch distribution test to ensure restricted launch (e.g. encircled flux).
   - "Typical" transceivers range from overfilled to single-mode

RESULT: Deliver improved system performance using MMF

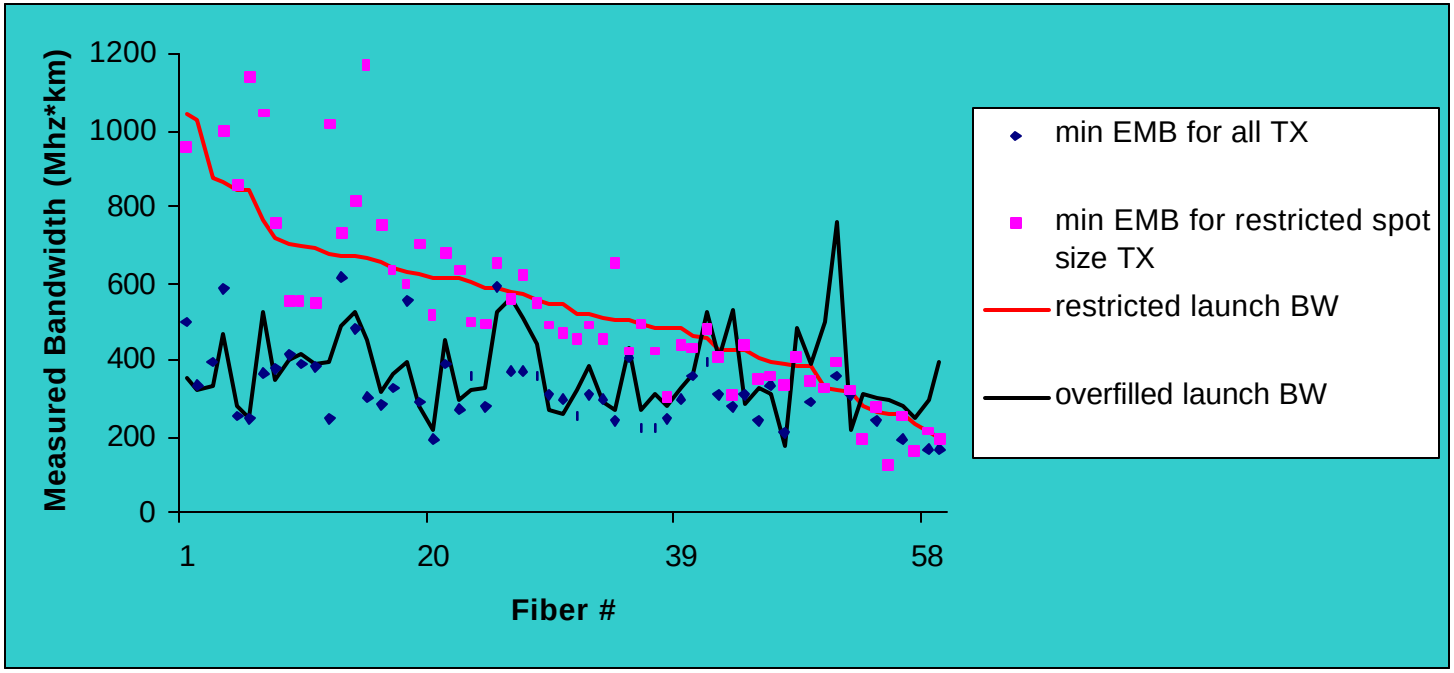


TIA 2.2 Task Group Status - Validation Experiment

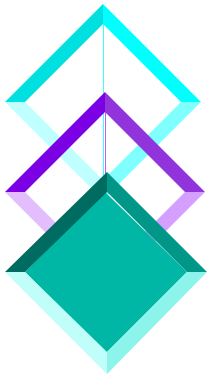
- Objective
  - To confirm that a new, improved level of system performance can be achieved using
    1) 850 nm sources meeting a new launch condition criteria and
    2) Multimode fiber meeting a new bandwidth requirement using a restricted launch condition.
- Experiment details
  - 2 48 fiber Siecor cables from fiber supplied by 5 manufacturers
    - 59 62.5 µm fibers
    - 36 50 µm fibers
    - Measured with multiple fixed launches including 23.5 µm fiber
  - 69 transceivers from 6 manufacturers measured for encircled flux
  - 6 test labs making EMB and ISI measurements

Restricted Launch Bandwidth Recommendation in Progress

- Initial results look promising - other alternatives being evaluated
- Transceiver EMBs are dots, lines are fiber bandwidths - black is OFL and red is 23.5 μm fixed launch bandwidth



Results from validation experiment courtesy Jim Rice, Cielo.
(850 nm and 62.5 μm fiber)

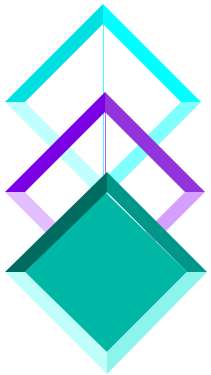


12/14 TIA 2.2.1 Task Group Objective

- Validation experiment data analysis
  - Preliminary results and recommendation anticipated by end November
  - 62.5 μm recommendation hoped for TIA January plenary
  - Objective to have system recommendation by IEEE March plenary

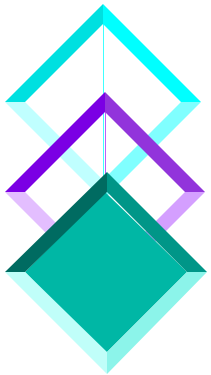
12/14 TIA 2.2.1 Task Group Objective

- FOTP review
  - Encircled flux (FOTP 203) - completed letter ballot with no significant technical issues, SP ballot process initiated
  - Restricted mode launch (RML) bandwidth (FOTP 204) - draft anticipated 11/30 for review 12/14
    - Consolidation includes
      - Two methods - time domain (FOTP 51) and frequency domain (FOTP 30)
      - Two attributes - standard OFL bandwidth (FOTP 54) and RML bandwidth (new 23.5 μm launch)
      - Could slow process
    - 23.5 μm launch acceptance growing with verification



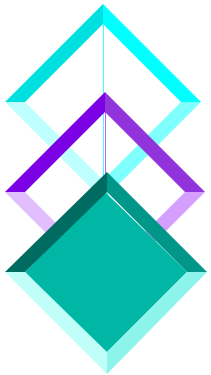
12/14 TIA 2.2.1 Task Group Objective

- Begin focus on 50 μm system performance improvement
  - Extend 62.5 μm performance understanding to 50 μm fiber
  - Create plan to determine
    - Fiber restricted launch bandwidth characterization
    - Transceiver launch condition control
  - Review results from validation experiment
  - Discussion



Task Group Future Activities

- Document conclusions and support of task group recommendations
  - Performance improvement given launch conditioning
  - New fiber and transceiver test procedures (FOTPs)
- Wrap up work on 50 μm fiber
  - Investigate higher speed applications (e.g. 10 Gbps)
- Support translation of recommendation into systems standards



Acknowledgments

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- The numerous technical experts participating in the Task Group