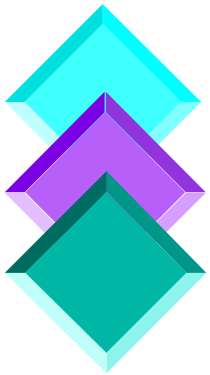

TIA FO-2.2.1 Task Group on Modal Dependence of Bandwidth

7/99 Status Update

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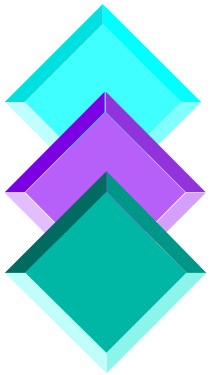
July 4, 1999



2.2.1 TG Scope

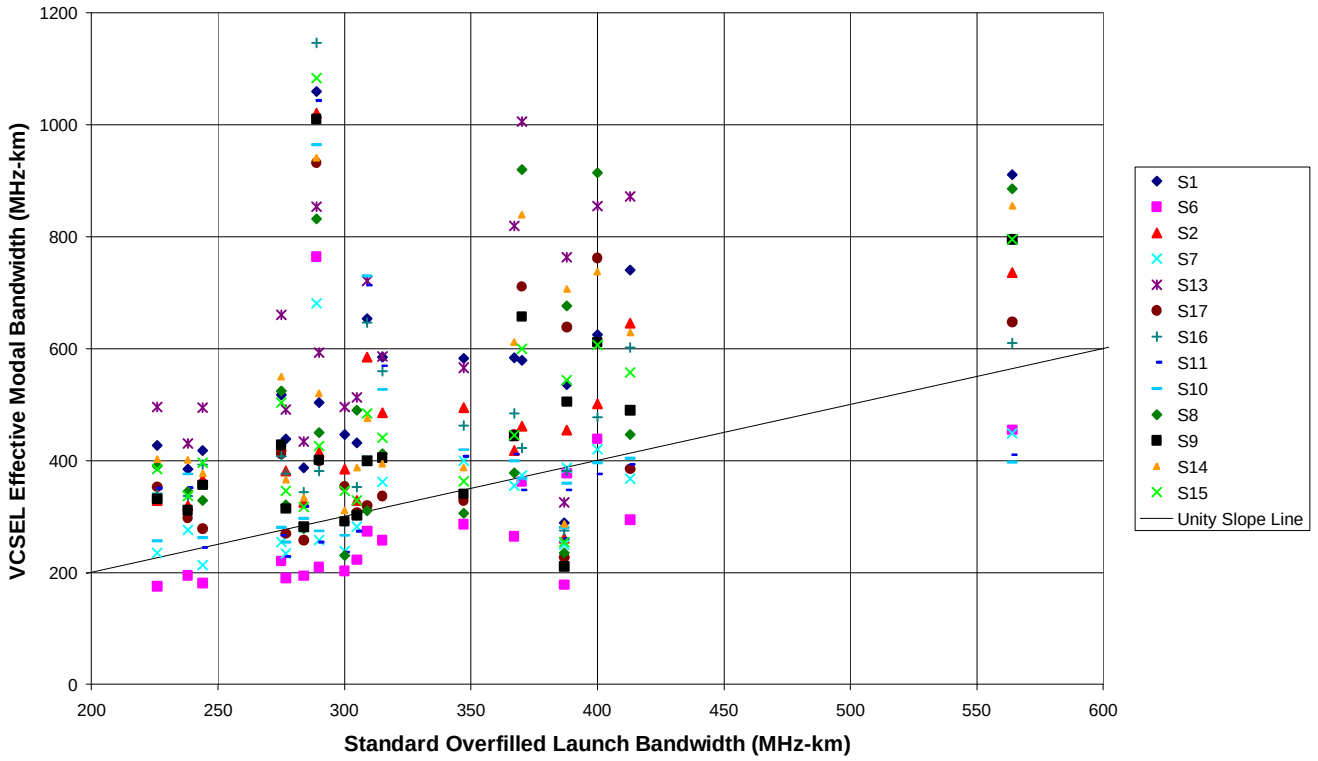
- Develop recommendation of system bandwidth prediction methodology
  - For the short haul data communications
  - Using both 62.5 μm fiber and 50 μm multimode fiber.
  - Focused on current short wavelength (850 nm window) sources (e.g. VCSEL and CD laser technology).
- Determine if a specifiable launch condition exists which provides a better agreement between fiber bandwidth characterization and actual performance.
- Develop a recommendation for test methods as appropriate.

Two Part Objective

1) Devise a bandwidth test for 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.

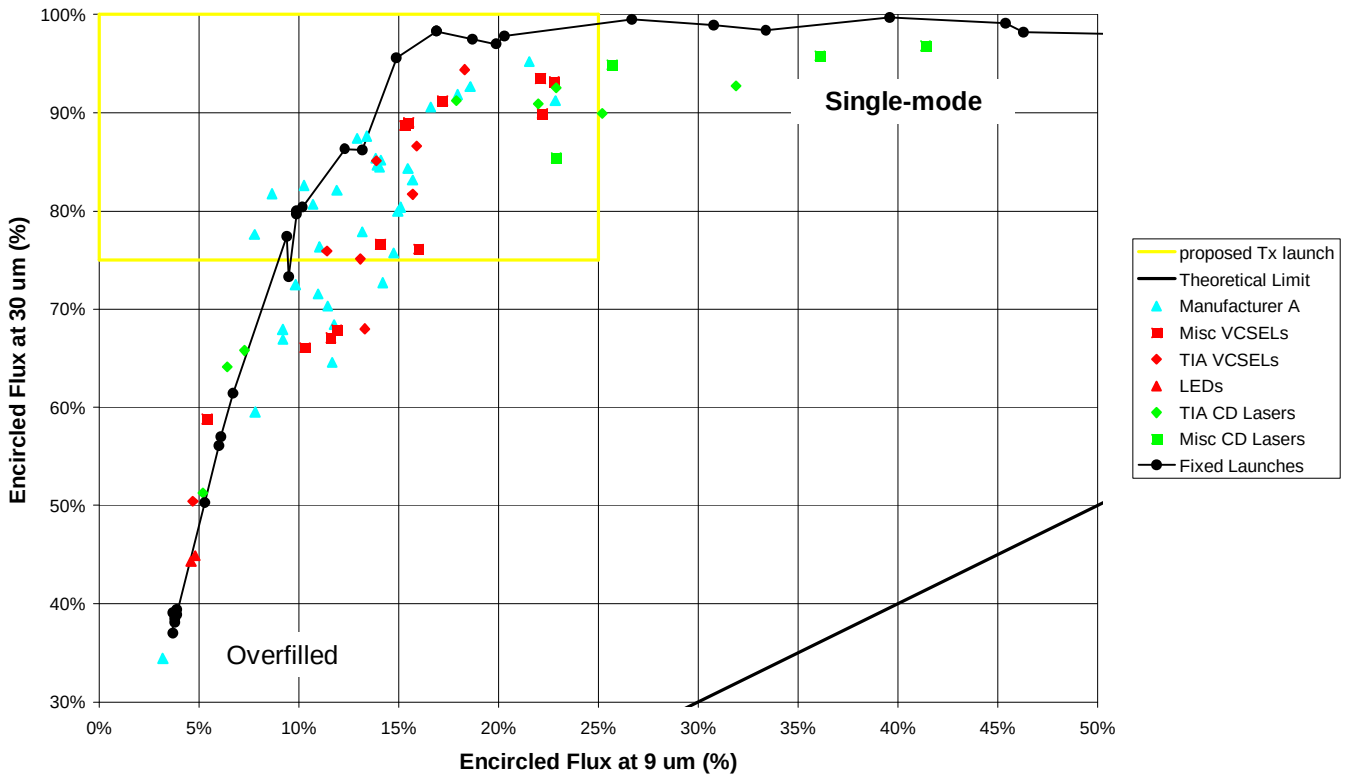
VCSEL Effective Modal Bandwidth Versus Standard Overfilled Bandwidth

- There is no clear relationship between overfilled bandwidth and effective modal bandwidth using standard VCSELs
- Data includes 21 62.5 μm fibers and 13 VCSEL transmitters



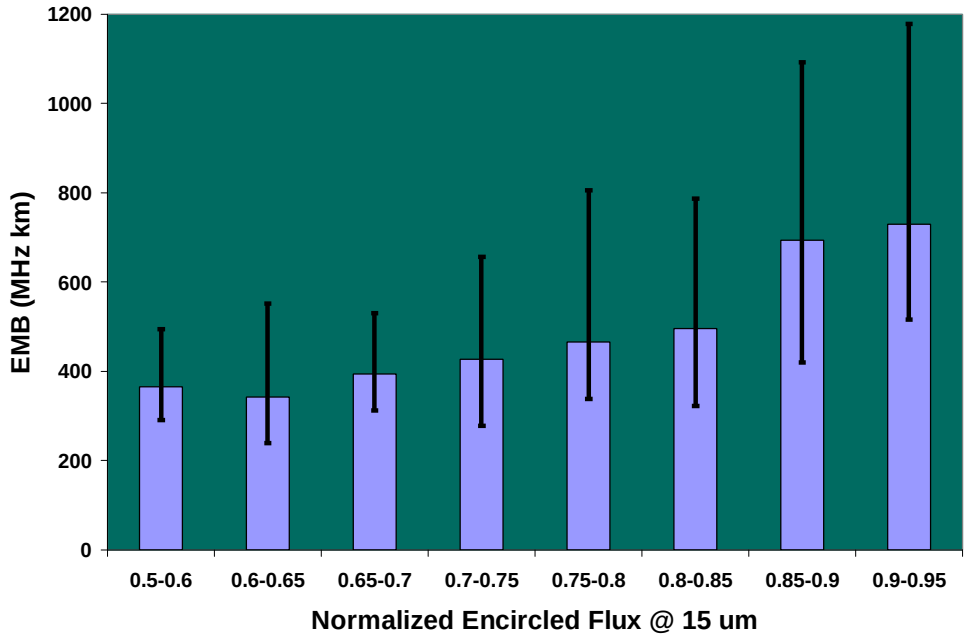
Typical Transceivers Range from Overfilled to a Single-mode Launch

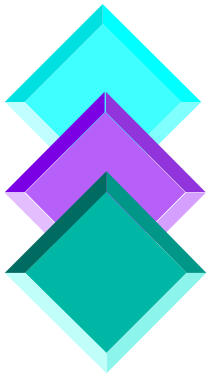
- Encircled Flux measures power contained within a radius
- 30 um and 9 um launch requirements needed to limit both large and small transceiver launches.



VCSEL Effective Modal Bandwidth Versus Encircled Flux

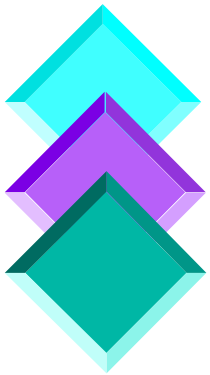
- There is a clear relationship between encircled flux and effective modal bandwidth (850 nm and 62.5 μm fiber)





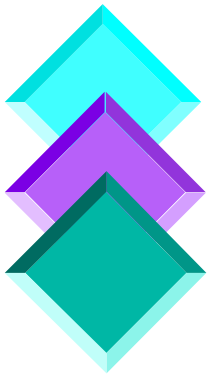
Task Group Current Status

- Validation experiment in progress 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 restricted launch bandwidth requirement**
- Establish launch condition for new fiber restricted launch bandwidth measurement
- Finalize transceiver launch criteria



Task Group Future Activities

- Complete development which is in progress
- 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
  - Extend 62.5 μm performance understanding to 50 μm fiber
    - Validation experiment also included 50 μm
- Support translation of recommendation into systems standards
- Investigate higher speed applications (e.g. 10 Gbps)



Acknowledgments

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- The numerous technical experts participating in the Task Group