# OM3, OM4, OM5 Modal Bandwidth Over Wavelengths for WDM

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# Purpose and Approach

- Provide a starting point reference for
  - worst-case modal bandwidth guidance over wavelengths of interest for wavelength division multiplexing
- Employs a simulation-based approach
  - for OM3 and OM4 fiber types
- Use spec from IEC 607923-2-10 ed. 6 and TIA 492AAAE
  - for OM5 fiber type
- Curves for all three are provided in later slides

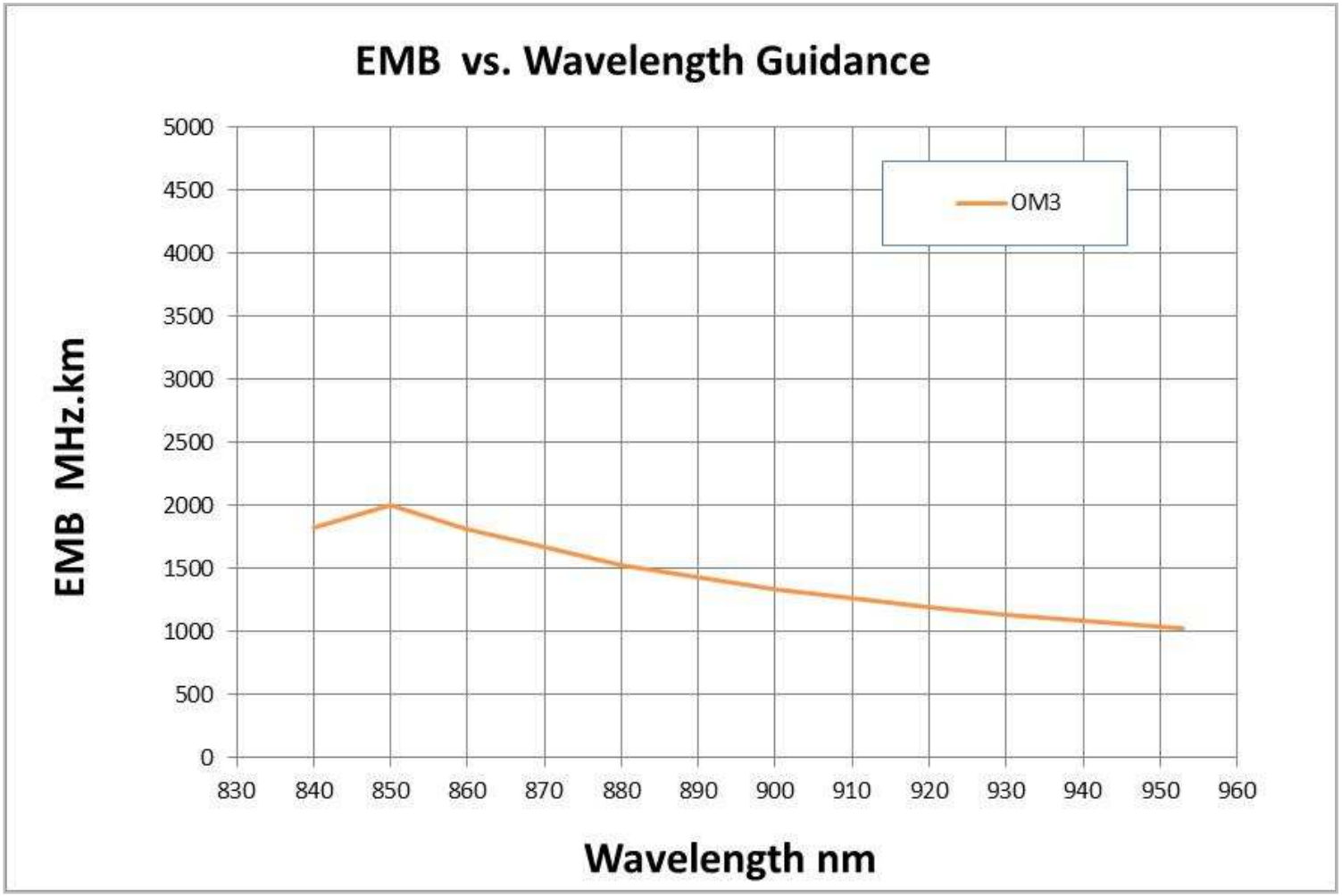
# Possible Approaches

- Simulation-based approaches
  - Modification of TIA 5000-fiber modal delay set used for OM3 and OM4 standardization to provide guidance for 840 nm to 953 nm bandwidths
    - Employs ten diverse VCSEL weighting functions (mode power distributions) defined in TIA-492AAAC/D/E and IEC60793-2-10 to peg the lowest resulting bandwidth
  - Modal-solver studies across wavelengths
    - to verify the TIA data set at multiple wavelengths
- Equation-based approaches
  - as defined in TIA-492AAAE and IEC 60793-2-10 for OM5 fiber
  - as appropriate for OM3 and OM4
    - may be derived from curve fit to simulation results
- Empirical-based approach
  - Collect measurement data to check “worst case” boundary of simulation-based approach

# Wavelength Range of Interest

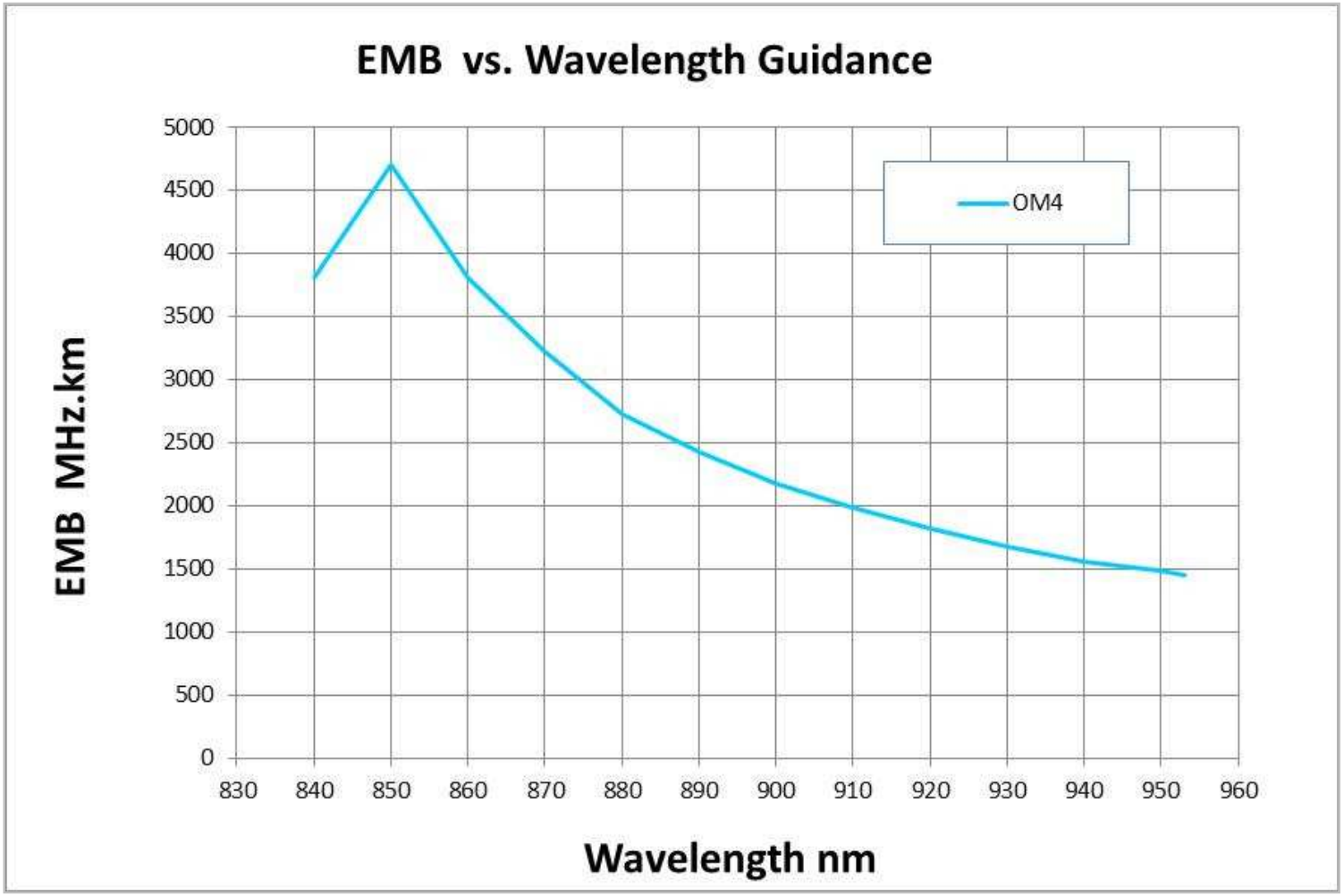
- Range encompasses
  - the wavelengths employed for commercial products to date according to:
    - 40G-BiDi Spec Sheet
    - 40G-SWDM4 MSA
    - 100G-SWDM4 MSA
  - the range specified in the OM5 standard
    - Selected to enable low-cost WDM for at least four wavelengths
    - Covers the three commercial products mentioned above
    - Specifically: 840 nm to 953 nm

# OM3



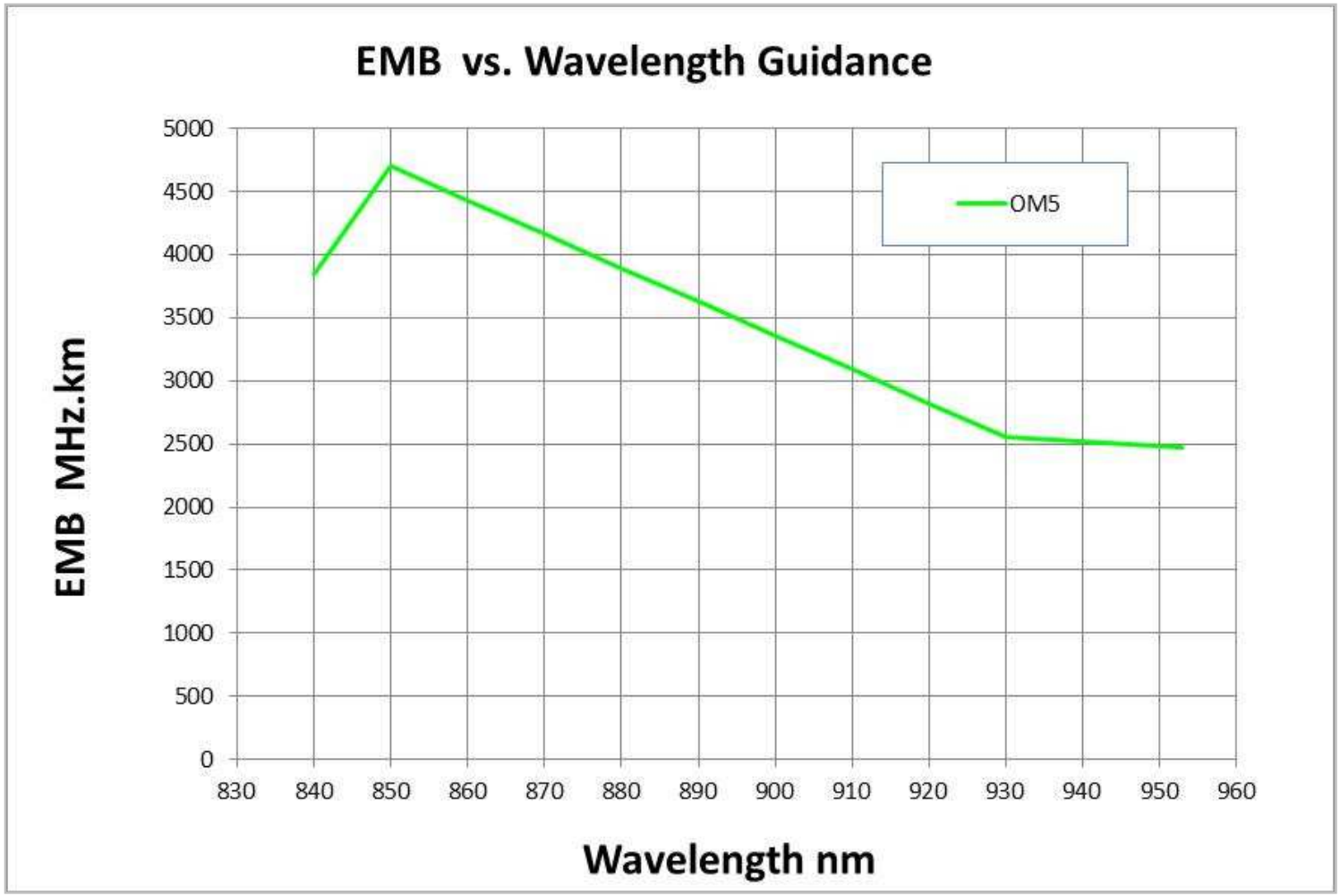

Preliminary data which may be subject to change

# OM4

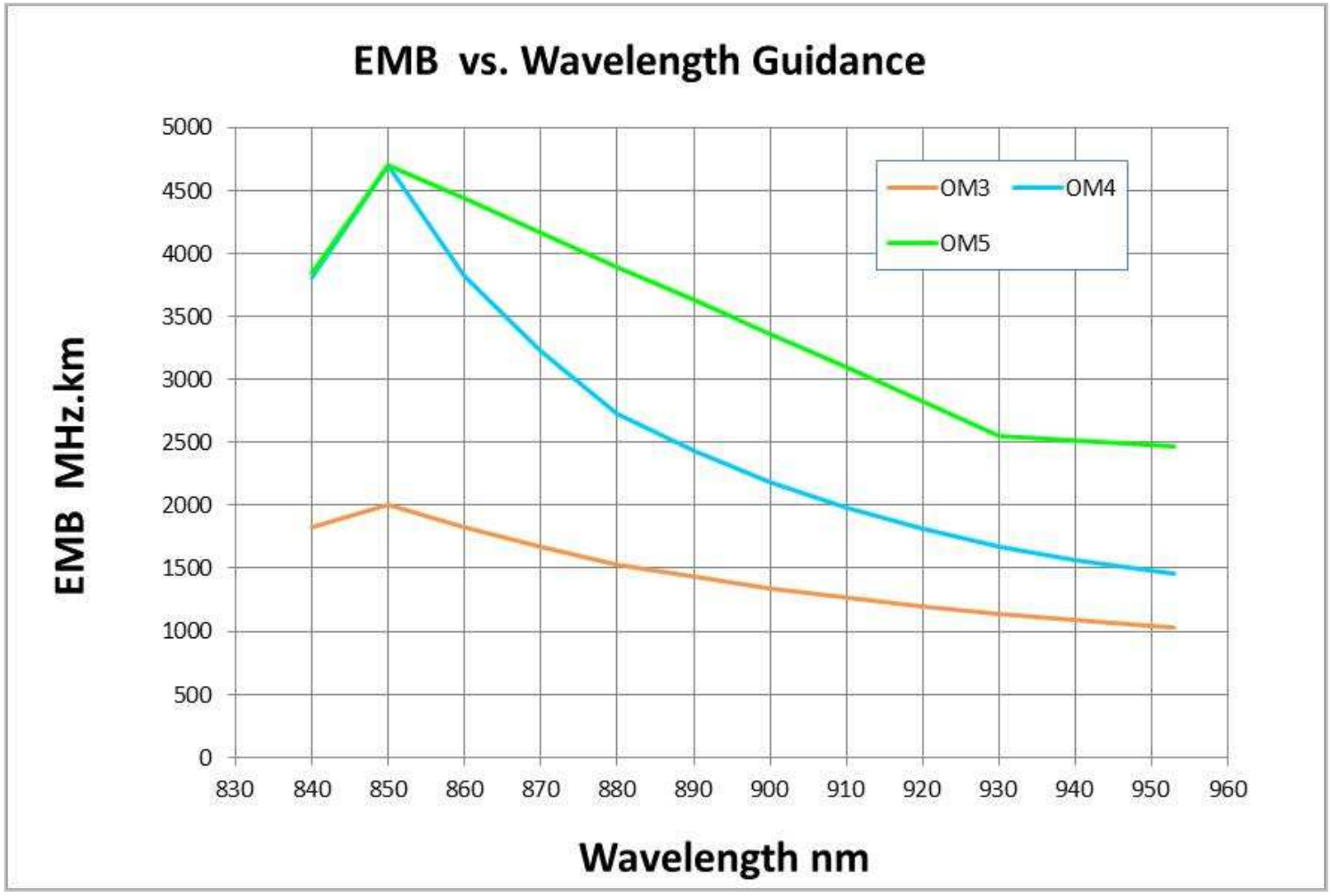



Preliminary data which may be subject to change

# OM5


EMB vs. Wavelength Guidance
EMB MHz.km
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
830
840
850
860
870
880
890
900
910
920
930
940
950
960
Wavelength nm
OM5

# OM3, OM4, & OM5




Preliminary data for OM3/OM4 which may be subject to change

# Summary & Closing Perspectives

- Presented preliminary simulated “worst-case” modal bandwidth curves for OM3, OM4 based on the TIA 5000 delay set and curves for OM5 from standards
  - across a range of interest that supports WDM wavelengths (840 nm to 953 nm)

- See kolesar_NGMMF_02_0118 for validation activities planned for fiber standards bodies
  - Alternative approaches may be compared to this and are encouraged

- In the absence of additional input, the curves herein serve as reasonable indicators for modelling purposes

# Q & A