# Channel wavelength ranges for 400GBASE-4.2 OM3 and OM4 effective bandwidth, modal and chromatic dispersion included

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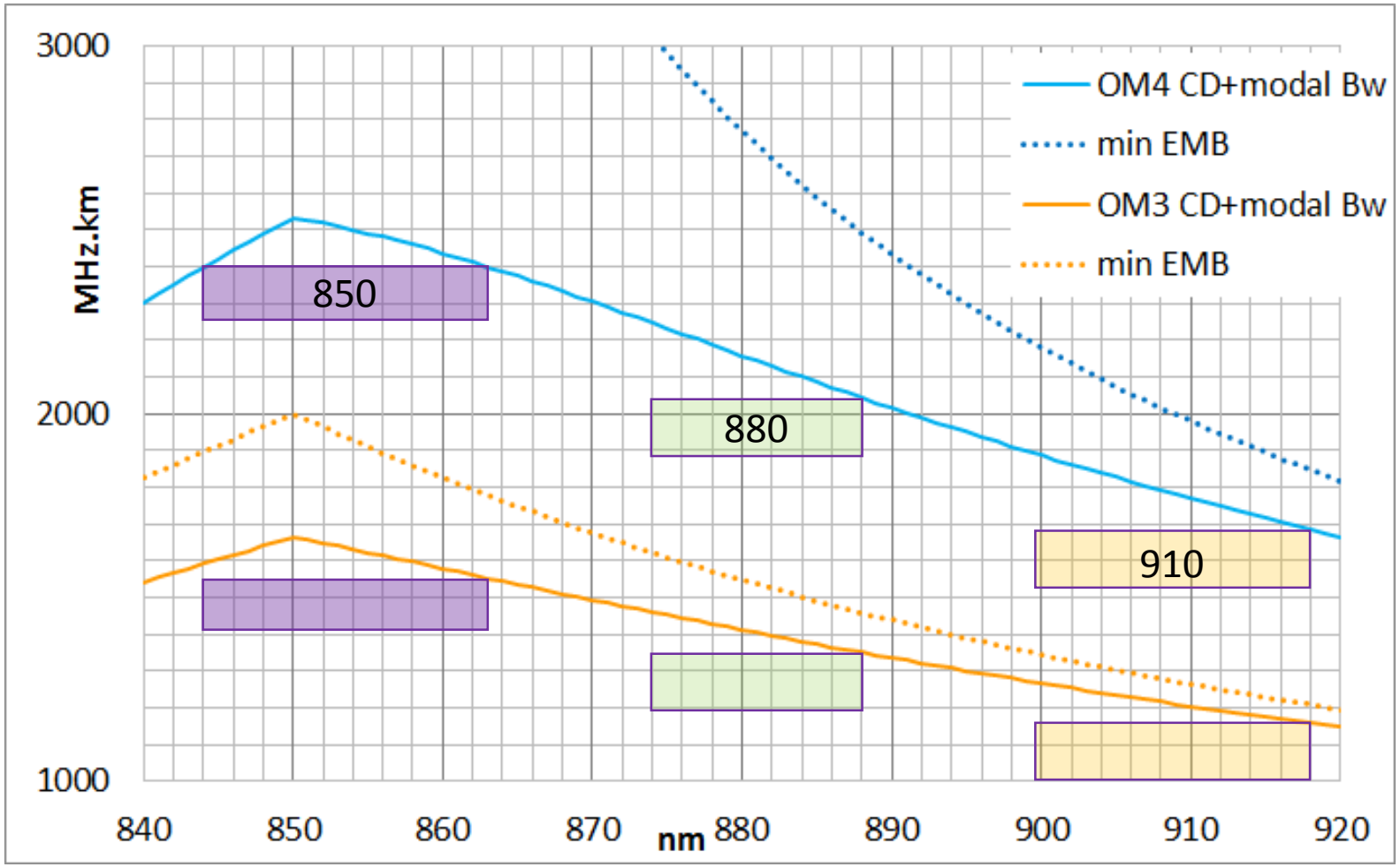
# Introduction

- Fibre bandwidth was calculated from combining the TIA proposed worst case EMB for OM3 and OM4, and an effective chromatic dispersion bandwidth, $BW_{CD}$, as used in the 10GE spreadsheet model
- The effective bandwidth $BW_{eff}$, in MHz.km, is calculated for a 0.6 nm rms spectral width transmitter, following the method used in the 10GE spreadsheet model.

# OM3 and OM4 effective bandwidth graph



# Effective bandwidth (MHz.km) table

- Effective bandwidth (in MHz.km) including modal and chromatic dispersion

| Wavelength (nm) | OM3 | OM4 |
|---|---|---|
| 844 | 1591 | 2398 |
| 850 | 1665 | 2531 |
| 863 | 1553 | 2399 |
| 874 | 1460 | 2246 |
| 888 | 1351 | 2044 |
| 900 | 1267 | 1887 |
| 916 | 1169 | 1704 |
| 918 | 1159 | 1683 |

Negligible change

1.3% lower

# Concluding remarks

- Nominal 850 nm channel should extend from 844 nm to 863 nm
  - Represents a negligible change to the minimum effective bandwidth compared to a range from 850 nm to 863 nm
- Nominal 910 nm channel should extend from 900 nm to 918 nm
  - Represents a 1.3 % lower minimum effective bandwidth compared to a range from 900 nm to 916 nm

# Back up

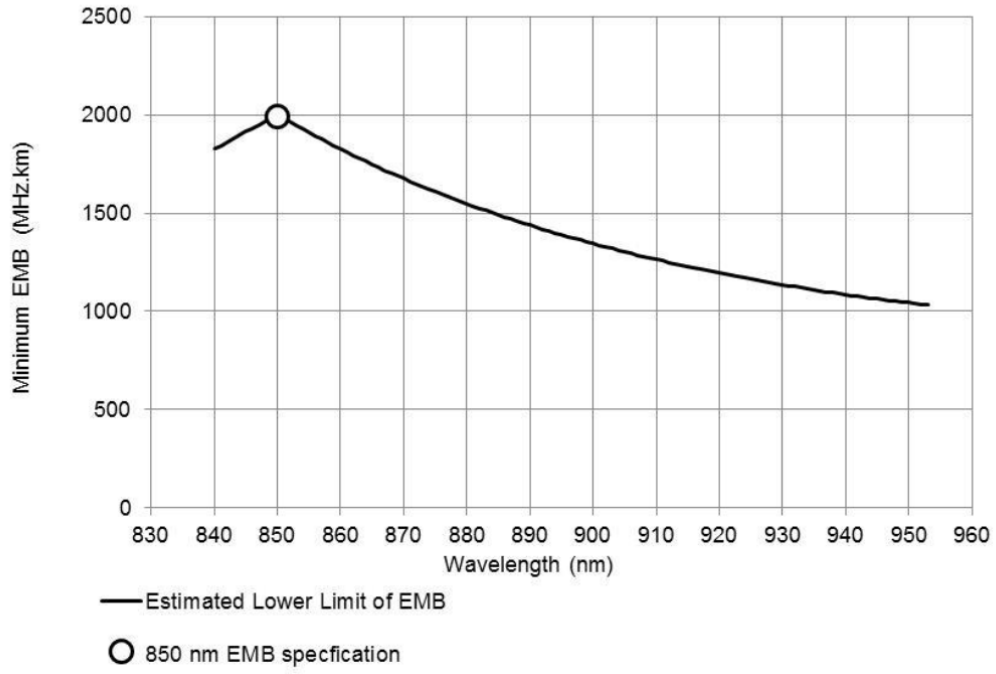
- TIA worst case OM3 and OM4 EMB
- Chromatic dispersion, effective bandwidth

# TIA worst case EMB for OM3 and OM4

$$EMB \geq 1826 + (2000 - 1826) \times (\lambda_c - 840)/(850 - 840) \text{ for } 840 \text{ nm} \leq \lambda_c \leq 850 \text{ nm} \quad \text{(E.3)}$$

$$EMB \geq 2000 \times (1.0010 - 0.9809x + 0.8073x^2 - 0.4304x^3 + 0.1194x^4) \text{ for } 850 \text{ nm} \leq \lambda_c \leq 953 \text{ nm} \quad \text{(E.4)}$$

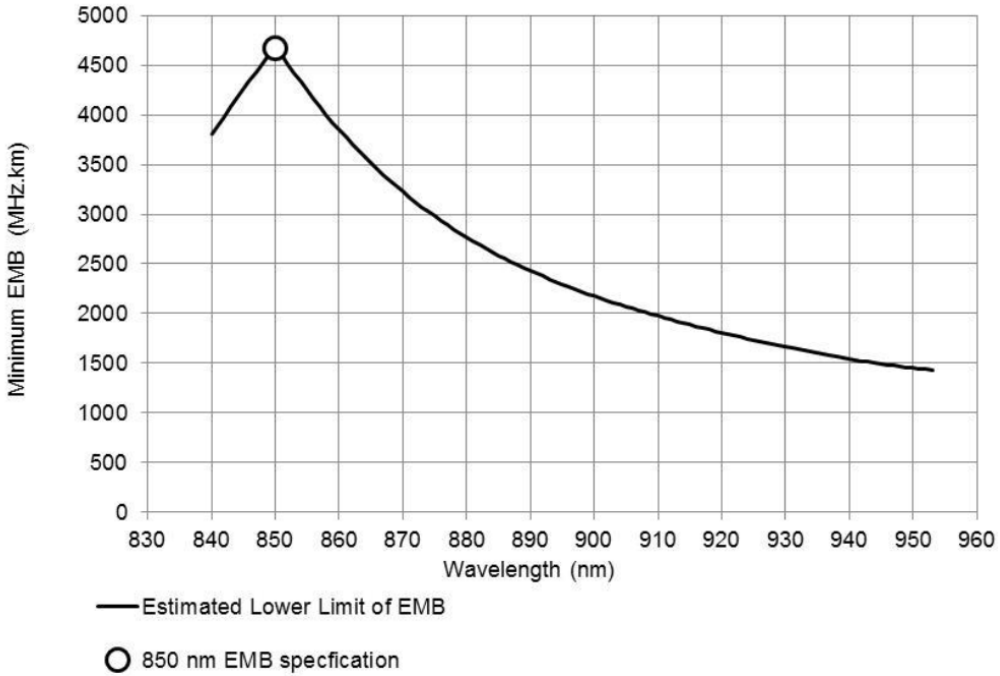
Where $x = (\lambda_c - 850)/(953 - 850)$




$$EMB \geq 3840 + (4700 - 3840) \times (\lambda_c - 840)/(850 - 840) \text{for } 840 \text{ nm} \leq \lambda_c \leq 850 \text{ nm} \quad \text{(E.5)}$$

$$EMB \geq 4700 \times (1.0002 - 2.1549x + 03.2700x^2 - 2.7328x^3 + 0.9280x^4) \text{ for } 850 \text{ nm} \leq \lambda_c \leq 953 \text{ nm} \quad \text{(E.6)}$$

Where $x = (\lambda_c - 850)/(953 - 850)$



# MMF effective bandwidth calculation

- Effective bandwidth was estimated from combining the TIA proposed worst case EMB for OM3 and OM4, and the effective chromatic dispersion bandwidth, $BW_{CD}$, following the 10GE spreadsheet model
- The effective bandwidth $BW_{eff}$, in MHz.km, was calculated for a 0.6 nm rms spectral width transmitter, following the equations used in the 10GE spreadsheet model:

$$BW_{eff} = (EMB^{-2} + BW_{CD}^{-2})^{-½}$$

where

$$BW_{CD} = (1.87 \times 10^5/U_w) \times (D^2+E^2)^{-½}$$

and

$$D = (\lambda/4) \times S_0(1-(U_0/\lambda)^4)$$

$$E = 0.7 \times S_o \times U_w$$

$\lambda$ is the centre wavelength

$U_0$ is the dispersion zero of the fibre, set to 1316 nm;

$S_0$ is the dispersion slope of the fibre, set to 0.10275 ps/nm$^2$.km

$U_w$ is the rms spectral width, set to 0.6 nm