



Analysis of OM3 and OM4 Reaches at 200G for 850 nm Wavelength Window

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April 29, 2026

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Key Assumptions and Link Bandwidth for 200G VCSEL Transmission

- For 200G VCSEL transmission, per IEEE 802.3ds TF, the wavelength window will be 852-868nm.
- Consistent with 802.3ds, we also use 0.45 nm RMS linewidth for our analysis
- For MMFs, we use IEC guidance (IEC 60793-2-10:2019) for EMB and chromatic dispersion
- There are two sets of specs discussed in the IEEE 802.3 liaison:
 - Spec. 1: OM4 can go 30 m from 852-868nm
 - Spec. 2: OM4 with EMB ≥ 5200 MHz.km from 852-868nm can go 50m.
- Link bandwidth includes both the contribution from modal bandwidth and chromatic dispersion contributed bandwidth for certain RMS linewidth

30m OM4

	852nm	860nm	868nm
EMB (GHz.km)	4.51	3.85	3.34
Link Bandwidth (GHz)	75.33	70.60	65.58

50m EMB ≥ 5200 MHz.km

	852nm	860nm	868nm
EMB (GHz.km)	5.2	5.2	5.2
Link Bandwidth (GHz)	48.09	49.12	50.14

- Due to the importance of 868 nm, we used link bandwidth values at that wavelength as the link bandwidth requirement for each option
 - Spec. 1 requires 65.48 GHz
 - Spec. 2 requires 50.14 GHz
- Note that in Ramana Murty, “MMF for 50 m Reach,” IEEE P802.3ds Task Force 200 Gb/s per Wavelength MMF PHYs, March 3, 2026. [50.2 GHz](#) link bandwidth is used with 0.45nm RMS linewidth

Transmission Reaches

Using Spec 1: Link Bandwidth of 65.48 GHz

Wavelength (nm)	852nm	860nm	868nm
OM4 EMB (GHz.km)	4.51	3.85	3.34
OM3 Reach (m)	19.9	18.8	17.8

Using Spec 2: Link Bandwidth of 50.14 GHz

Wavelength (nm)	852nm	860nm	868nm
OM3 Reach (m)	26.0	24.6	23.3

Using Spec. 2: Link Bandwidth of 50.14 GHz

Assuming 50GHz Link Bandwidth			
Wavelength (nm)	852nm	860nm	868nm
OM4 Reach (m)	45.2	42.4	39.3

- Taking lowest reach among three wavelengths
 - Under Spec 1, OM3 can transmit 18 m; OM4 can transmit 30 m as specified.
 - Under Spec 2, OM3 can transmit 23 m. OM4 can transmit 40 m (Rounded from 39.3 m).
- The reach values are compared to nominal OM3 15m and OM4 30m specs.

Remarks

- As far as we know, there is only one grade of a 200G VCSEL — so there should only be one relevant spec.
- Since the 50 m spec has a lower link bandwidth, it should determine the actual transmission capability.
- Based on this assumption, OM3 and OM4 can indeed reach 23 m and 40 m
- We can hypothetically consider the OM3 and OM4 specs to be 20m and 40m, by rounding to convenient values.
 - OM3 can cover 0-20m
 - OM4 can cover 0-40m
 - OM4 with EMB >5200 MHz.km over 852-868nm can cover 0-50m.
- This proposed spec will enable OM4 fibre to cover ~95% of the use cases and would greatly reduce the burden for high-EMB fiber to cover the 30–50 m range.

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