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PRACTICAL LOW-CURRENT KNOWLEDGE

Fiber Optics

Singlemode vs multimode, the OM/OS grades, and the connectors that decide your link budget.

Singlemode or multimode?

It comes down to distance and cost. A thinner core carries light further with less spreading — that single fact drives the whole choice.

DEFINITION · 1 OF 2

OS2

Singlemode, ~9 μm core.



One light path, almost no spreading. **Campus, backbone, 10 km+** with the right optics.

DEFINITION · 2 OF 2

OM4

Multimode, **50 μ m core.**



Many paths, cheaper optics. **Inside a building / data hall** over shorter reach.

THE TRADE-OFF

$$\text{Reach} \propto \frac{1}{\text{modal dispersion}}$$

Smaller core, less modal dispersion, longer reach. That is why singlemode wins outdoors and multimode wins short, dense links.

Same 10G. Three reaches.

Maximum distance at 10 Gb/s by fiber grade (illustrative).

OM3

Multimode

300

m

OM4

Multimode

400

m

OS2

Singlemode

10

km+

Grades & connectors **to** **know.**

Common types on a structured-cabling drawing.

OM3 · 10G

300 m

OM4 · 40G

150 m

OS2 · singlemode

10 km+

LC duplex

small form

MPO/MTP

12-24 fibers



Mixing fiber grades on one link.

Splicing OM3 to OM4, or singlemode to multimode, **wrecks the link budget**. Match core size and connector polish end to end, or the optics never sync.

NEXT TIME YOU SPEC A BACKBONE

Match fiber to distance.

Pick the grade for the run length first, then the connector and the transceiver follow.

- ✓ Singlemode (OS2) vs multimode (OM3/4/5)
- ✓ Connector: LC / SC / MPO
- ✓ Link budget & insertion loss

PRACTICAL LOW-CURRENT KNOWLEDGE

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NEXT EPISODE

Structured Cabling

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