



smartoptics
Expanding your network horizons



The Future of Fibre

June 2026

History Lesson

1965 – Day Zero

First working fibre-optic data transmission system

1977 – First Generation – 850nm

First metropolitan fiber optic cable deployed in Turin. It was 9km long and ran at 140Mbit/s

1984 – Second Generation – 1310nm

SaskTel completed construction of the world's longest commercial fiber optic network at 3,268 km

1991 – Third Generation – 1550nm

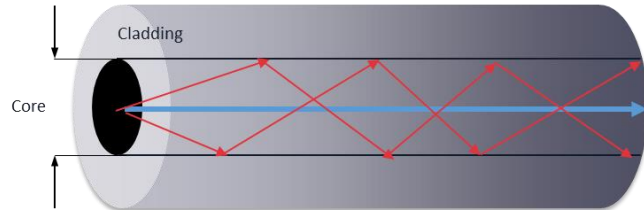
TAT-9 running at 565 Mbit/sec

1996 – Fourth Generation – DWDM

Ciena MultiWave 1600

Standard Fibre Technologies Today

“Multimode Fibre” multiple paths



Multimode signals are distributed in waves that are dispersed into numerous paths, or modes, as they travel through the cable's core: typically 850 or 1300nm. However, in long cable runs, multiple paths of light (*modal dispersion*) can cause signal distortion at the receiving end, resulting in an unclear and incomplete data transmission.

In graded index fiber modes that travel further also move faster. This reduces modal dispersion so the bandwidth is increased

Typical labeling 62.5/125µm or 50/125µm

Types available:

- OM1 (62.5/125, orange)
- OM2 (50/125, orange)
- OM3 (50/125, aqua)
- OM4 (50/125, aqua (some use violet))
- OM5 (50/125, lime green)

“Singlemode” single path



Single-mode fiber has a much smaller core than multimode through which only one mode will propagate. The small core and single light-wave virtually eliminate any distortion that could result from overlapping light pulses, providing the least signal attenuation and the highest transmission speeds of any fiber cable type

Typical labeling 9/125µm (SM / SMF / OS2) – typically yellow patch cords

- | | |
|--------|---|
| G.652 | Standard SM fiber. Most common. Zero dispersion @ 1310nm. |
| G.654 | Low-Loss SM fiber (similar to G.652) |
| G.655 | Dispersion-shifted. Zero dispersion @ 1550nm. |
| G.657 | Bend-insensitive fiber. Best type for patch cords. |
| .. etc | .. and more variants exist. |

Hollow Core Fibre (HCF)

A major step change in fibre technology

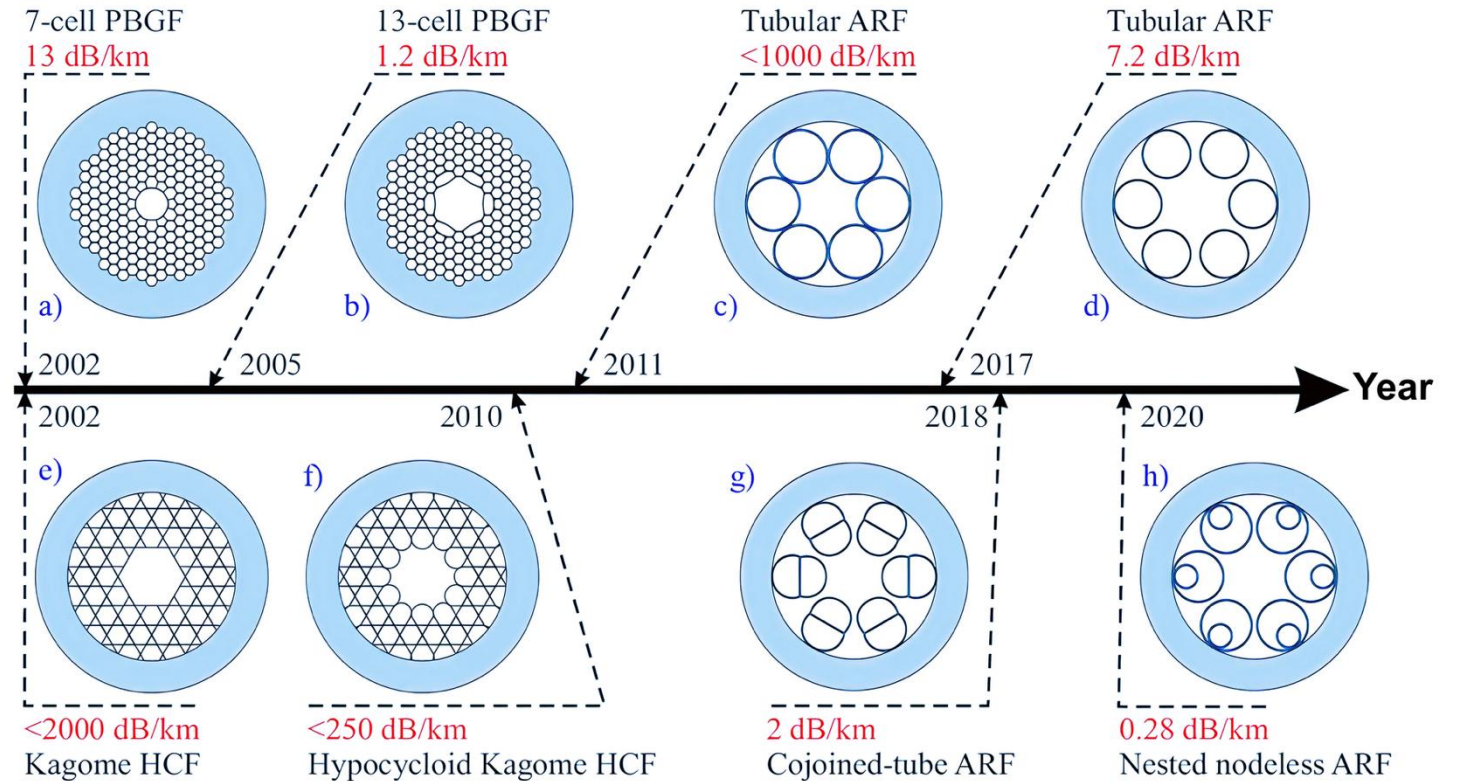
- Light propagates in air instead of glass
- Enables:
 - Lower latency (33% improvement)
 - Near-zero non-linear effects
 - Lower attenuation
 - YOFC reported **~0.05 dB/km**
 - [YOFC Unveils Breakthrough Hollow-Core Fibre Innovations at OFC 2025 | ICT Frame | Tech News, Reviews & Digital Updates from Nepal](#)
 - Microsoft/Lumenticity reported **~0.09 dB/km**
 - [Microsoft's hollow core fiber delivers the lowest signal loss ever | Network World](#)



Hollow Core Fibre Evolution

Challenges?

- Fabrication at scale
- Cost
- Splicing
- OTDR



Solutions!

- [Hollow core fibre fabrication | Hollow Core Fibre | University of Southampton](#)
- [Furukawa and Lightera Debut Precision Splicer for Hollow-Core, Multi-Core Fibers - Converge Digest](#)
- [ECOC25: EXFO Unveils Hollow Core Fiber Optimized Bi-directional OTDR - Converge Digest](#)

Thank you
