WSIS FORUM 2022
Starting on 15 March
Final week 30 May - 3 June

New Concept of Optical Fibre Cable for Sustainable Growth

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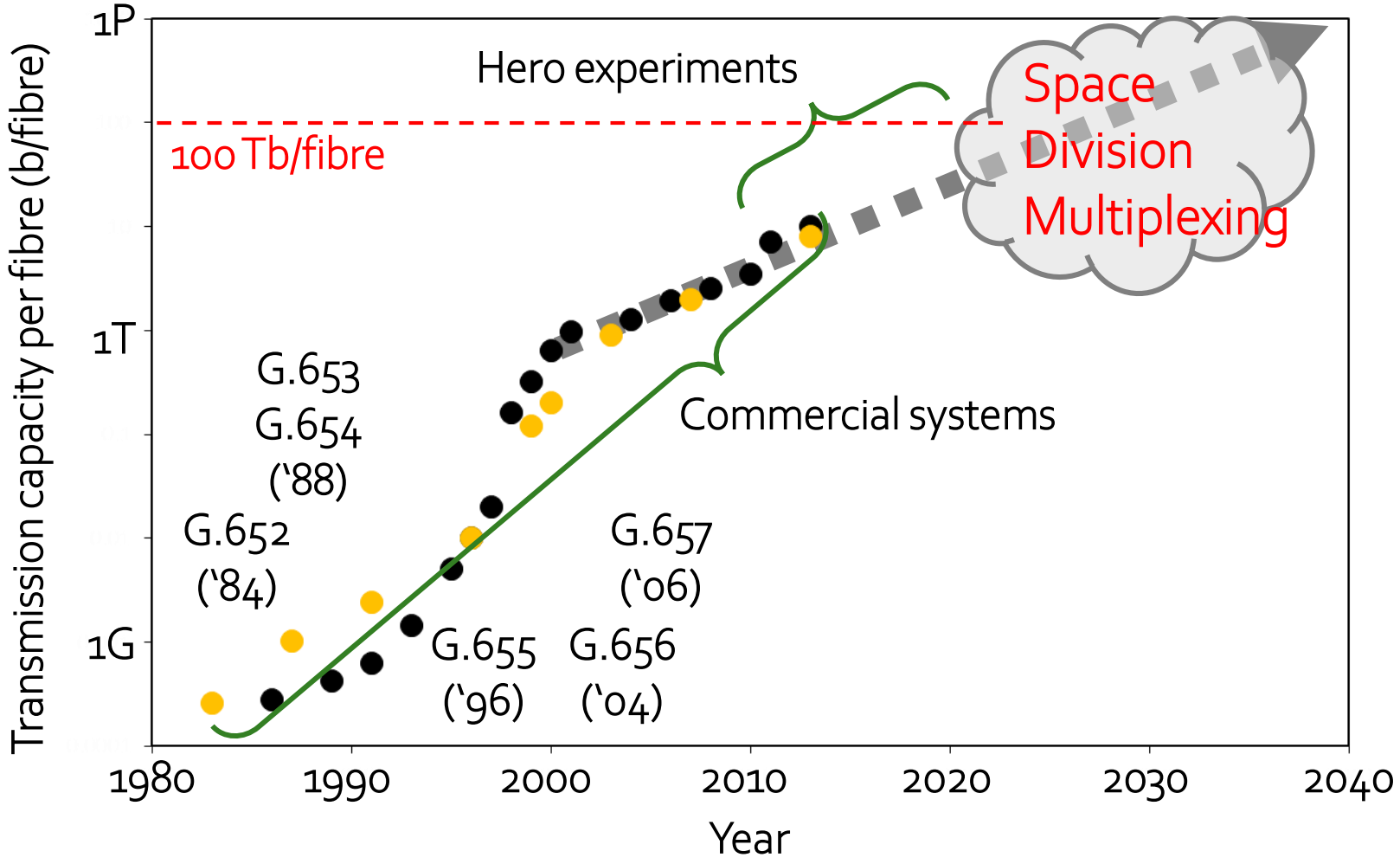
26 April 2022

Outline

1. History of Optical Fibre Standard
2. What's & Why Space Division Multiplexing, SDM?
    - Definition
    - Capacity & Space limitation
3. Present and Perspective of SDM Technology
    - Candidate SDM optical fibres
    - Backward compatibility
    - Sustainable growth
4. Summary

History of Optical Fibre Standard



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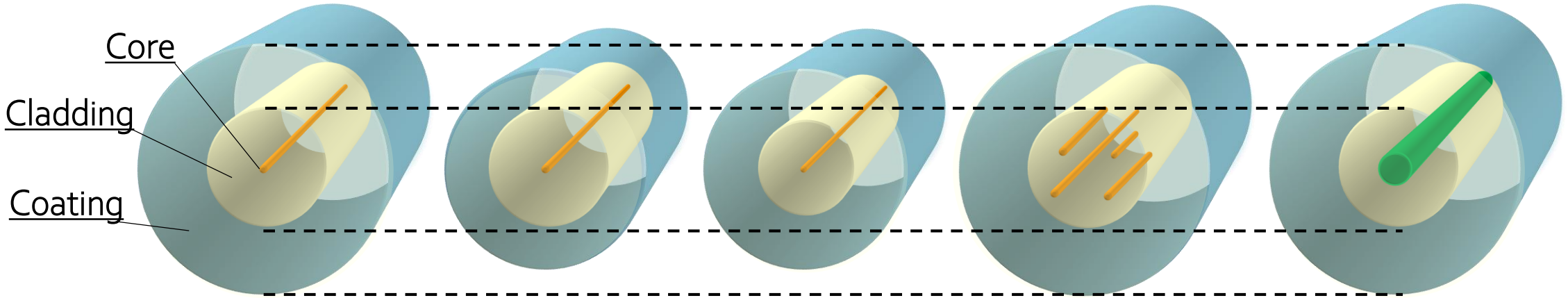
What's SDM?: Definition

SDM Optical Fibre Cable can

- improve a spatial density of optical fibre in a unit cross section,
- increase the number of spatial transmission channels in a common cladding.



Traditional

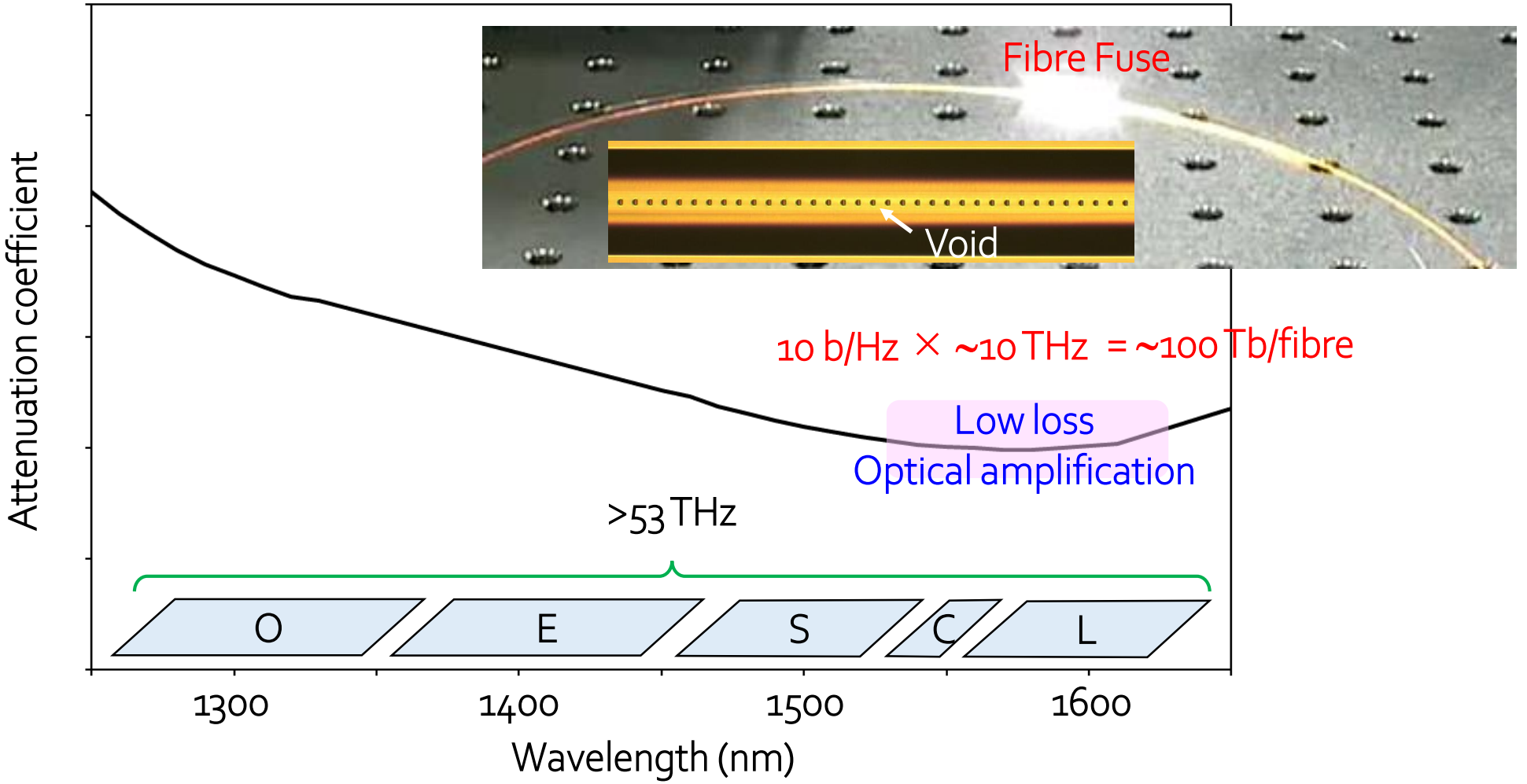
Reduced Coating Diameter Fibre

Reduced Cladding Fibre

Multi Core Fibre

Few Mode Fibre

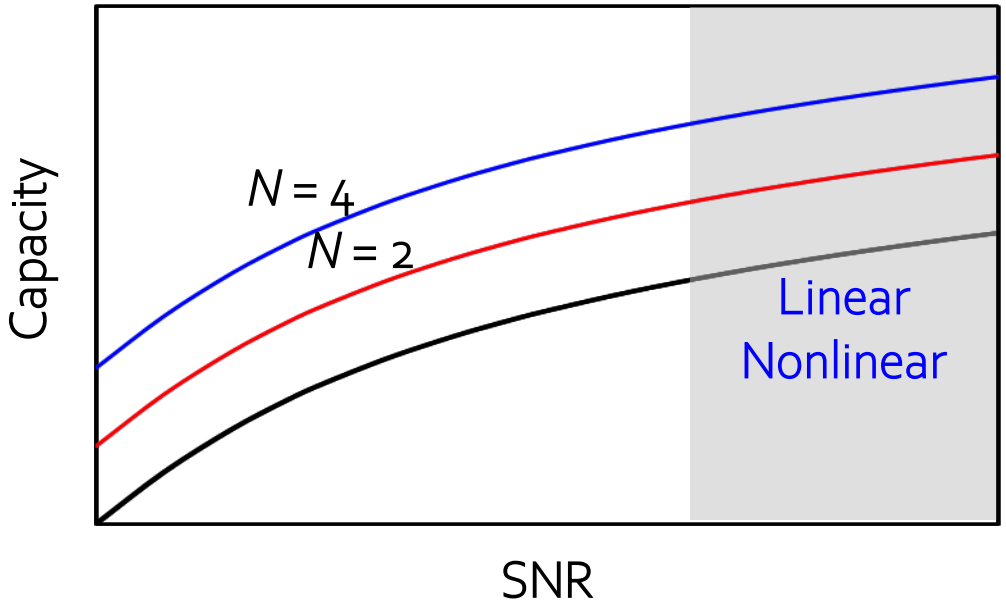
Why SDM?: Capacity



Why SDM?: Shannon Theorem

Shannon Theorem

$$C = 2 \times B \times N \times \log_2(1+SNR)$$

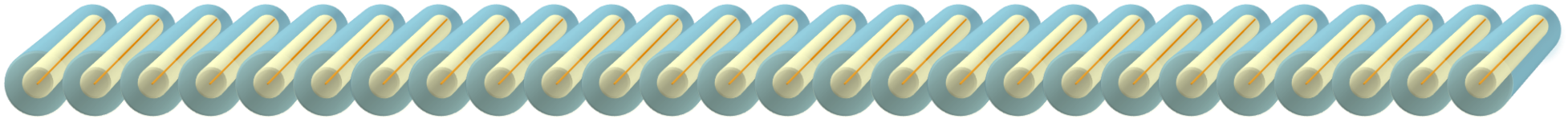


SNR: Limited
Bandwidth: Limited

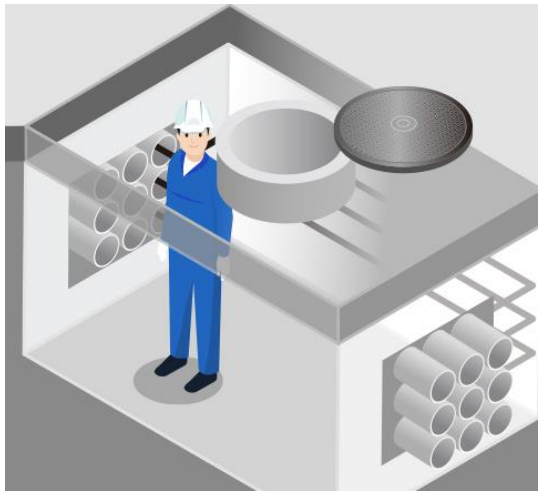
Number of spatial paths: Last enabler

Why SDM?: Space

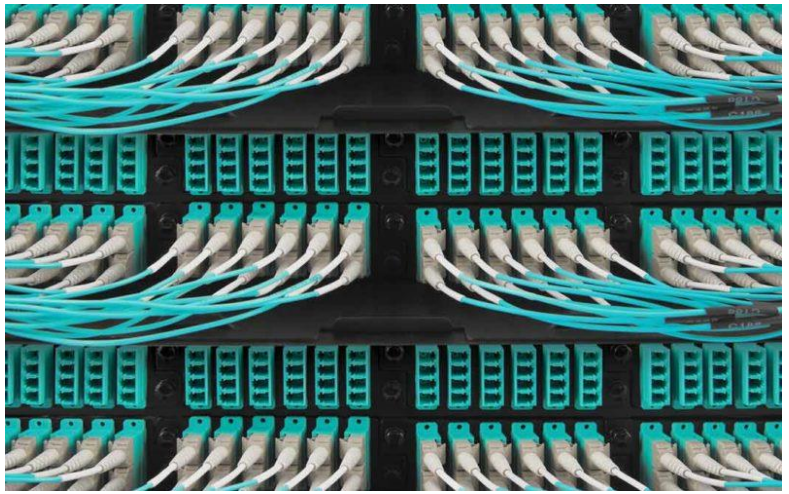
Plenty of traditional fibres can solve the capacity limitation in one fibre, but



Submarine cable



Terrestrial duct



Footprint in DC

https://jpn.nec.com/ir/pdf/library/081205/081205_2.pdf
https://bb.watch.impress.co.jp/column/infra/2001/10/10/cable1.jpg
https://www.nttinf.co.jp/service/glossary.html
http://www.fiber-optic-cabling.com/fiber-optic/high-density-fiber-optic-patch-cords-in-the-data-center/

1. History of Optical Fibre Standard
2. What's & Why Space Division Multiplexing, SDM?
    - Definition
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    - State of the Art
    - Backward compatibility
    - Sustainable growth
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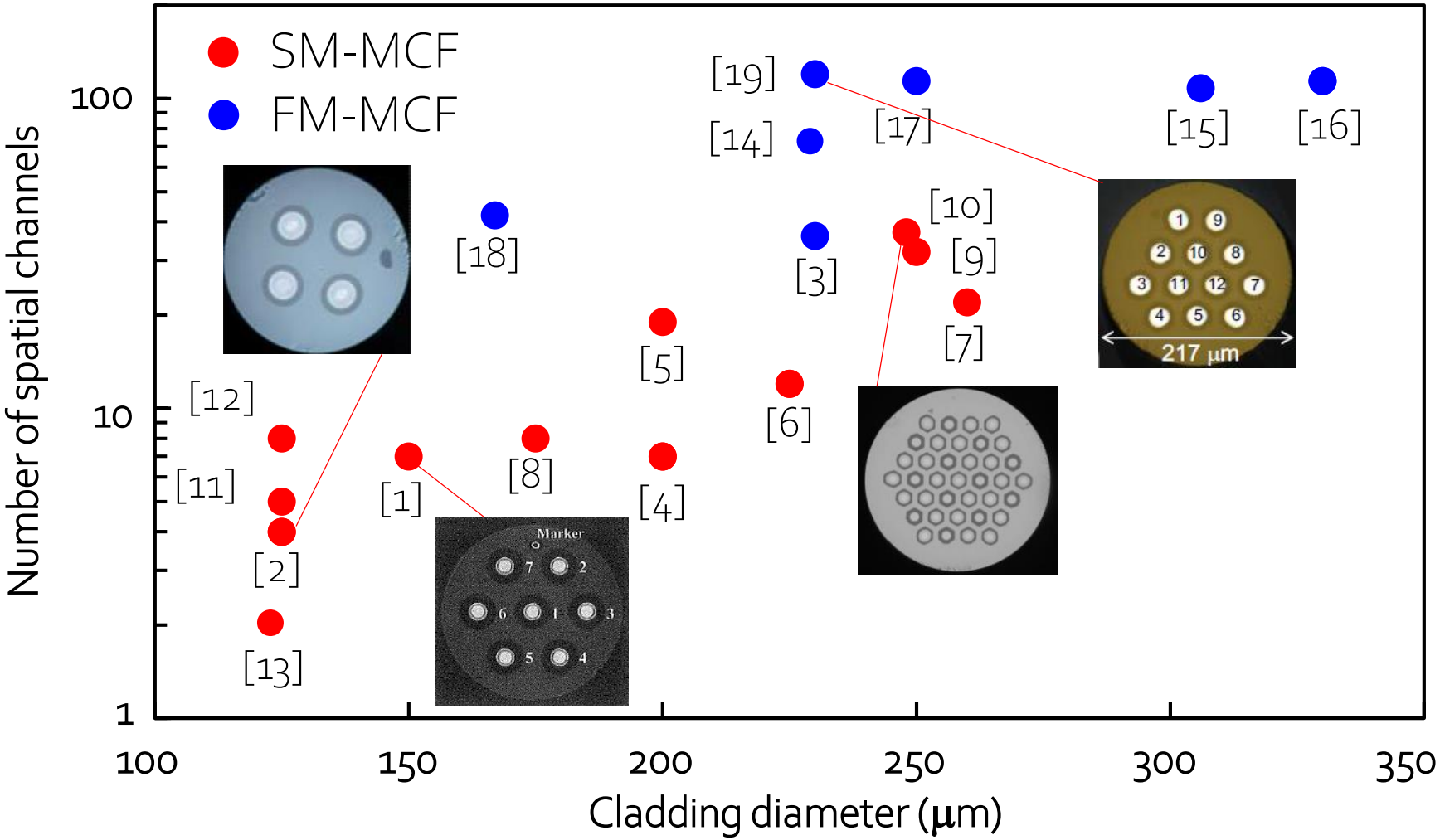
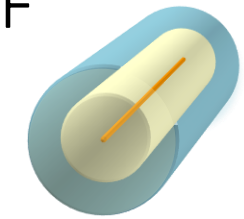
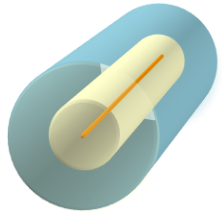
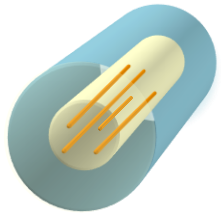
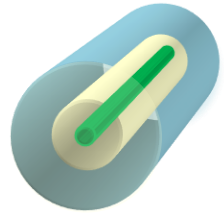
Present: State of the Art

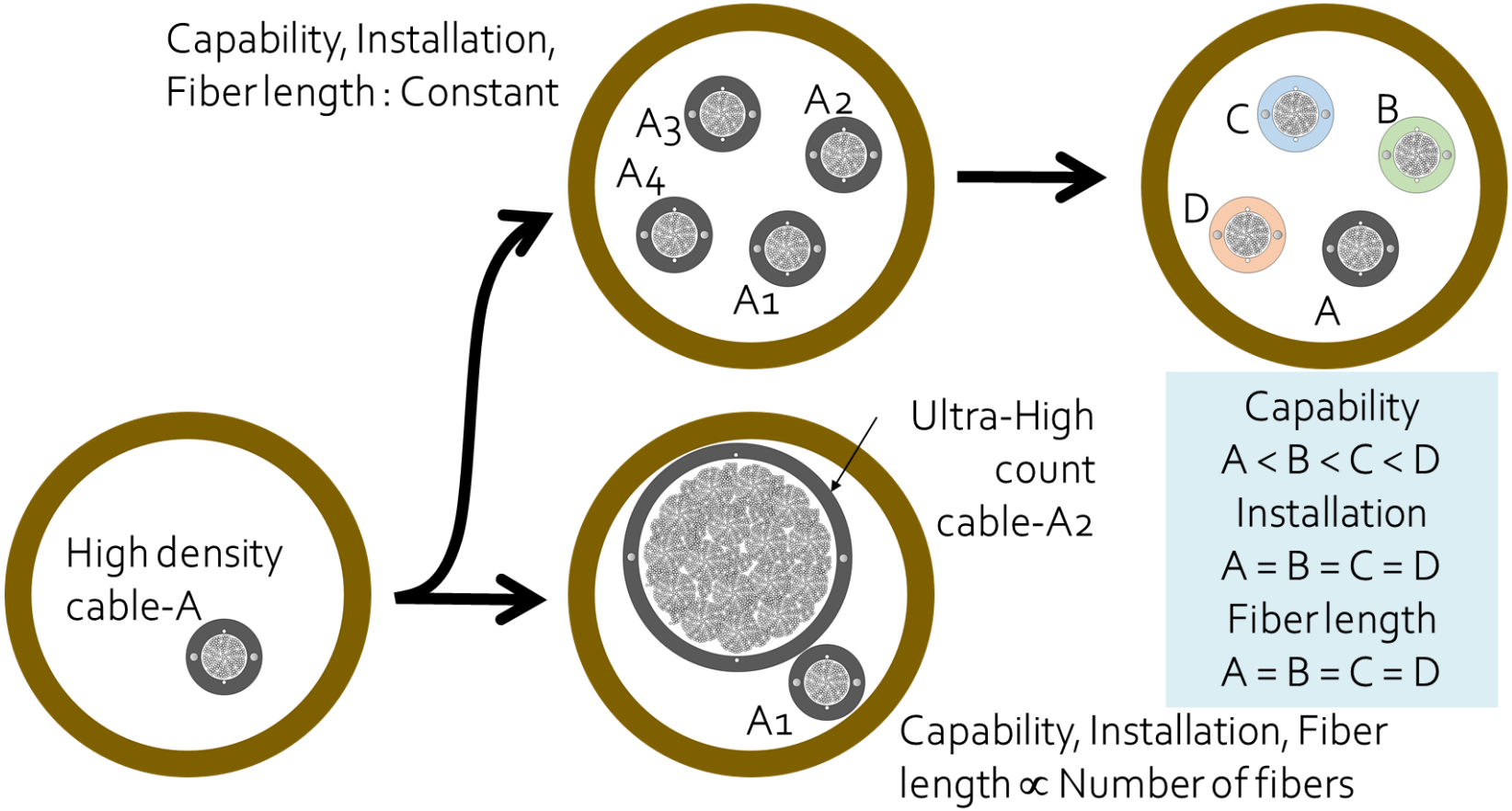


Perspective: Backward Compatibility

Backward compatibility	RCDF 	RCF 	MCF 	FMF 
Geometrical	✓	NA	✓	✓
Optical	✓	✓	✓	NA
Expected application	Ultra high fibre count cable e.g., Inter-DC	Higher density footprint e.g., Intra-DC	High core density cable e.g., Submarine, terrestrial	Needs advanced digital signal processing

Perspective: Sustainable Growth 1

- Effective use of physical infrastructure



Perspective: Sustainable Growth 2

- Full connected world with easier way

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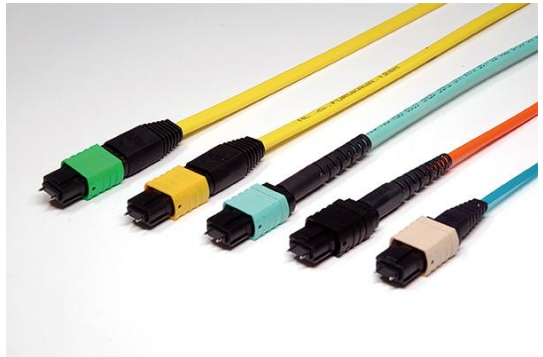
SERIES L: ENVIRONMENT AND ICTS, CLIMATE CHANGE, E-WASTE, ENERGY EFFICIENCY; CONSTRUCTION, INSTALLATION AND PROTECTION OF CABLES AND OTHER ELEMENTS OF OUTSIDE PLANT

Optical fibre cables – Cable structure and characteristics

Optical fibre cables for direct surface application



https://www.occjp.com/jp/products/telecommunications/mpac.html
https://www.furukawa.co.jp/telecom/en/product/connector/product/mpo.html
https://www.corning.com/catalog/coc/documents/brochures/CRR-455-A4-BEN.PDF

Summary

- SDM optical fibre and cable technology is expected to be a key enabler for realizing the full connected world in a sustainable manner
- ITU-T SG15 has been studying a new Technical Report for SDM optical fibre and cable technology to analyse the technical status and to show the roadmap for future deployment and standardization

  To be issued after September 2022 meeting!

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