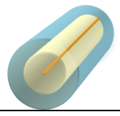
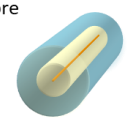
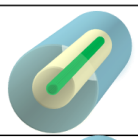
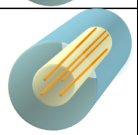
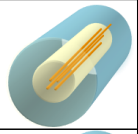
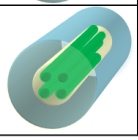
ITU-T Study Group 15

# GSTR-SDM Optical Fibre, Cable, and Components for Space Division Multiplexing Transmission

- This technical report aims to analyse the current state of space division multiplexing (SDM) technical maturity and clarify the technical and commercial aspects of this technology.
- It aims to raise awareness of advantages and disadvantages of several SDM options as well as the changes and new measurement processes that must be developed and agreed to by then industry.
- The ultimate goal is to develop a cost-effective network and ecosystem utilizing SDM optical fibre and cable technologies.

| Type | | General features |
|---|---|---|
| Single-core design | Reduced Coating Diameter Fibre  | Coating diameter is reduced while maintaining a cladding diameter of 125 µm<br>- Higher count optical fibre cable is achieved<br>- Microbending sensitivity may be elevated<br>- Puncture and abrasion resistance may be reduced |
| | Reduced Cladding Fibre  | Cladding diameter is reduced to less than 125 µm<br>- Higher count optical fibre cable and/or higher density connection is achieved<br>- Microbending sensitivity may be elevated<br>- Puncture, abrasion resistance and tensile strength may be reduce |
| | Few Mode Fibre  | A core is designed to support multiple-mode propagation<br>- Higher spatial multiplicity is achieved with a standard cladding diameter<br>- Multiple input and multiple output digital signal processing (MIMO-DSP) may be needed |
| Multicore design | Weakly coupled Multicore Fibre  | Multiple cores are allocated within a cladding so that each core supports an individual spatial path<br>- Each core design can be compatible with conventional SMFs<br>- The number of cores in the standard cladding diameter is limited by inter-core crosstalk and loss |
| | Randomly coupled Multicore Fibre  | Multiple cores are allocated within a cladding so that sufficient signal coupling among the cores is achieved<br>- Higher core multiplicity is achieved than with a weakly coupled multicore fibre<br>- MIMO-DSP is required |
| | Few Mode Multicore Fibre  | Multiple few-mode cores are allocated within one cladding so that each core has sufficiently low crosstalk<br>- Higher spatial channels are achieved thanks to the multiplication of core and mode numbers<br>- MIMO-DSP may be needed |

1. Clauses 5 and 6 describe the historical development of optical fibre standards, expectation of SDM technology, and the potential application areas.
2. Clause 6 defines the classification of SDM optical fibres and describes the technical maturity and objective of SDM fibre, cable, and component technologies.
3. Clauses 7 analyses the new properties and corresponding characterisation technique that should be considered when SDM fibre, cable, and components are deployed.
4. Clauses 8 and 9 investigate the motivating factors expected by utilizing SDM technology in each application area, considered deployment scenarios, and relationship with other standard organizations.

For more information, please visit the ITU-T Study Group 15 website at: www.itu.int/go/tsg15