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Ethernet in the First Mile

Optical Architectures and Fibers

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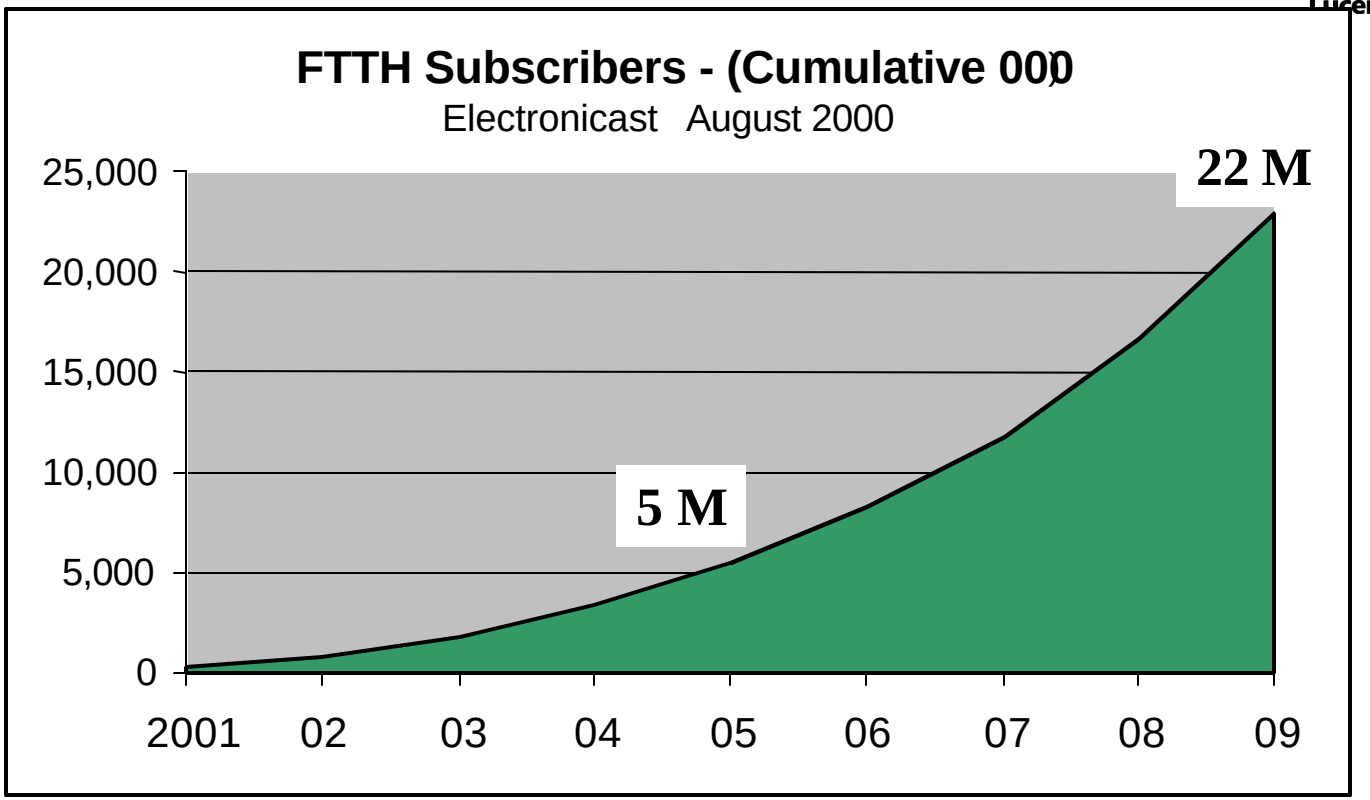

Drivers of FTTH/B

- Poor quality of copper loop/drops
- Copper exhaust due to cross talk
- Need for BW >> 10 Mbps (Digital Video, Video on Demand, Video clips, etc)

Conclusion: Large market potential for FTTH/B

IEEE EFM should support viable FTTH/B Architectures

Point-to-Point (PtP) Ethernet Mux

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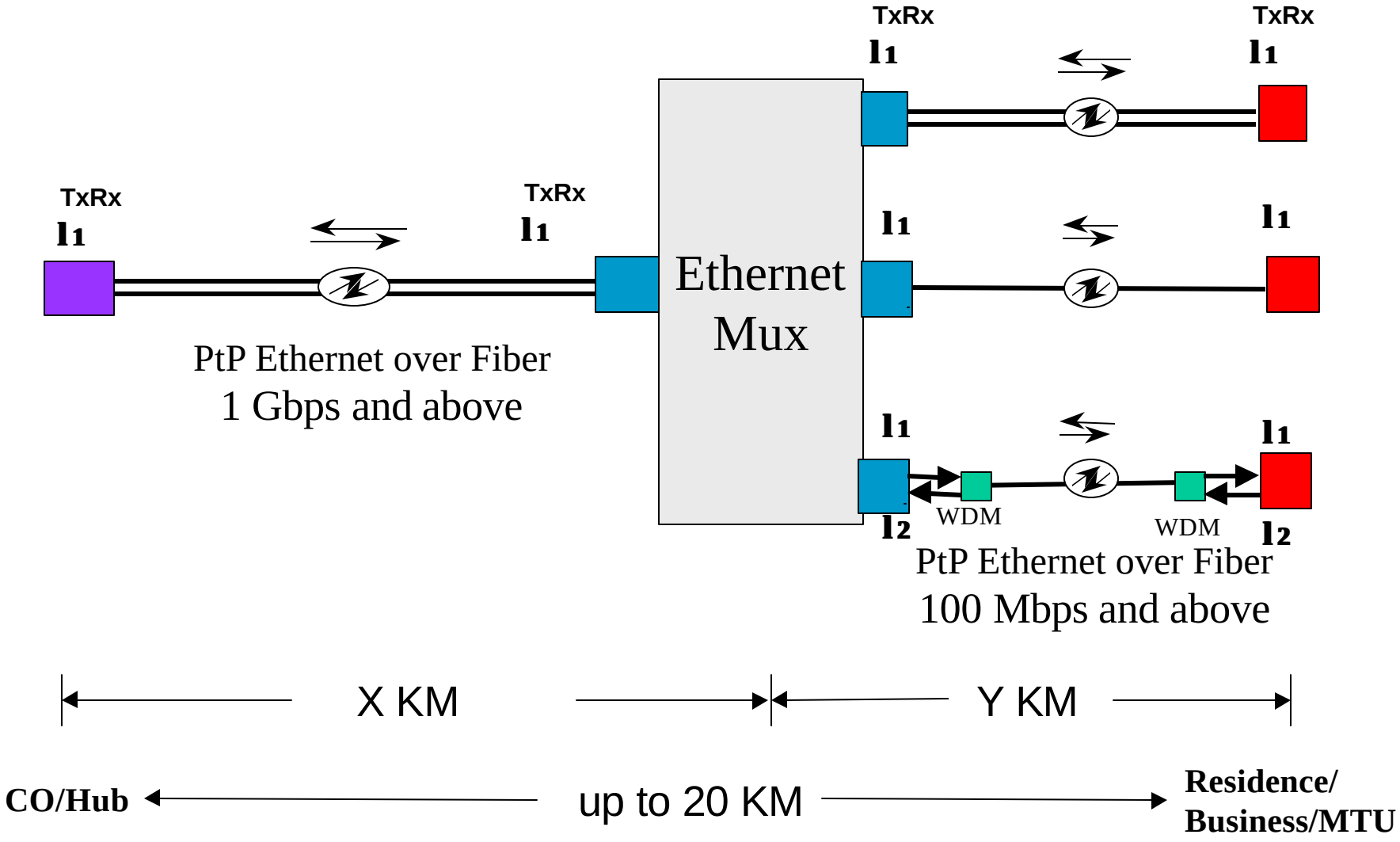
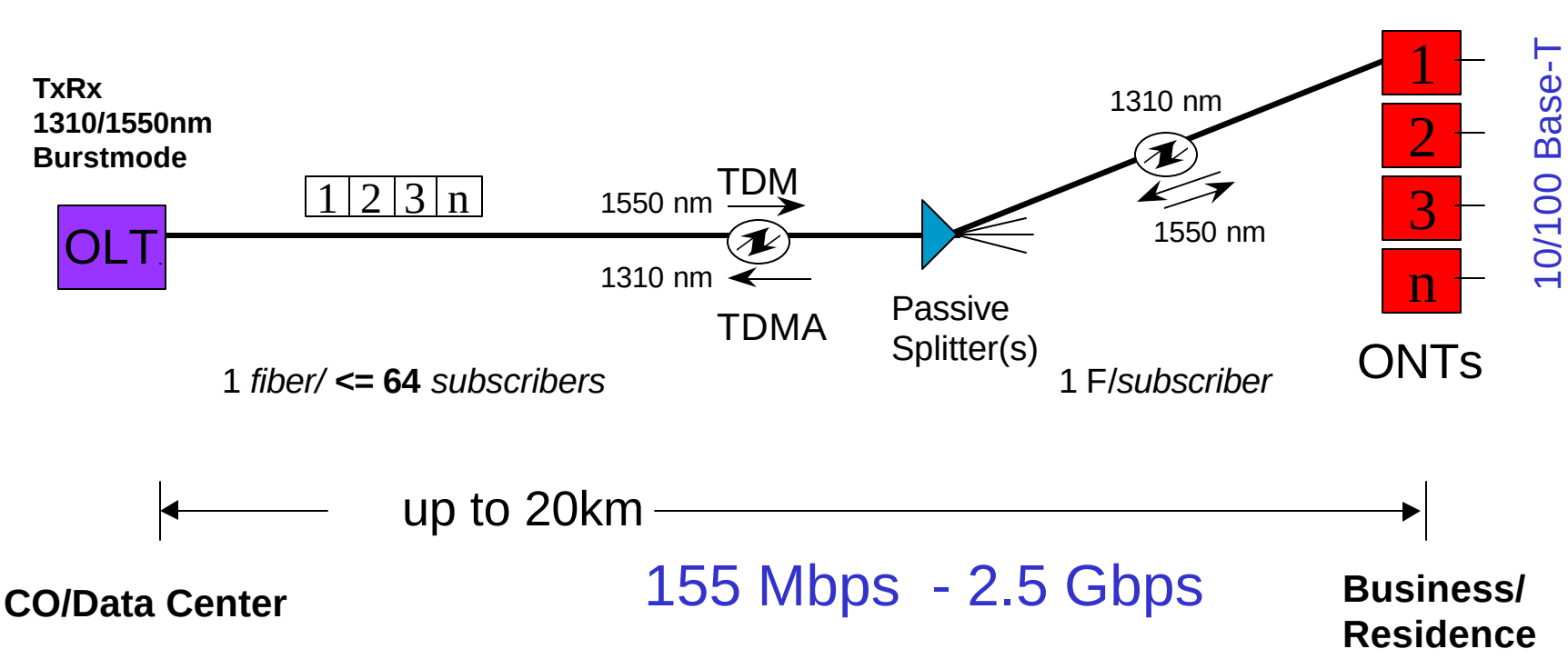
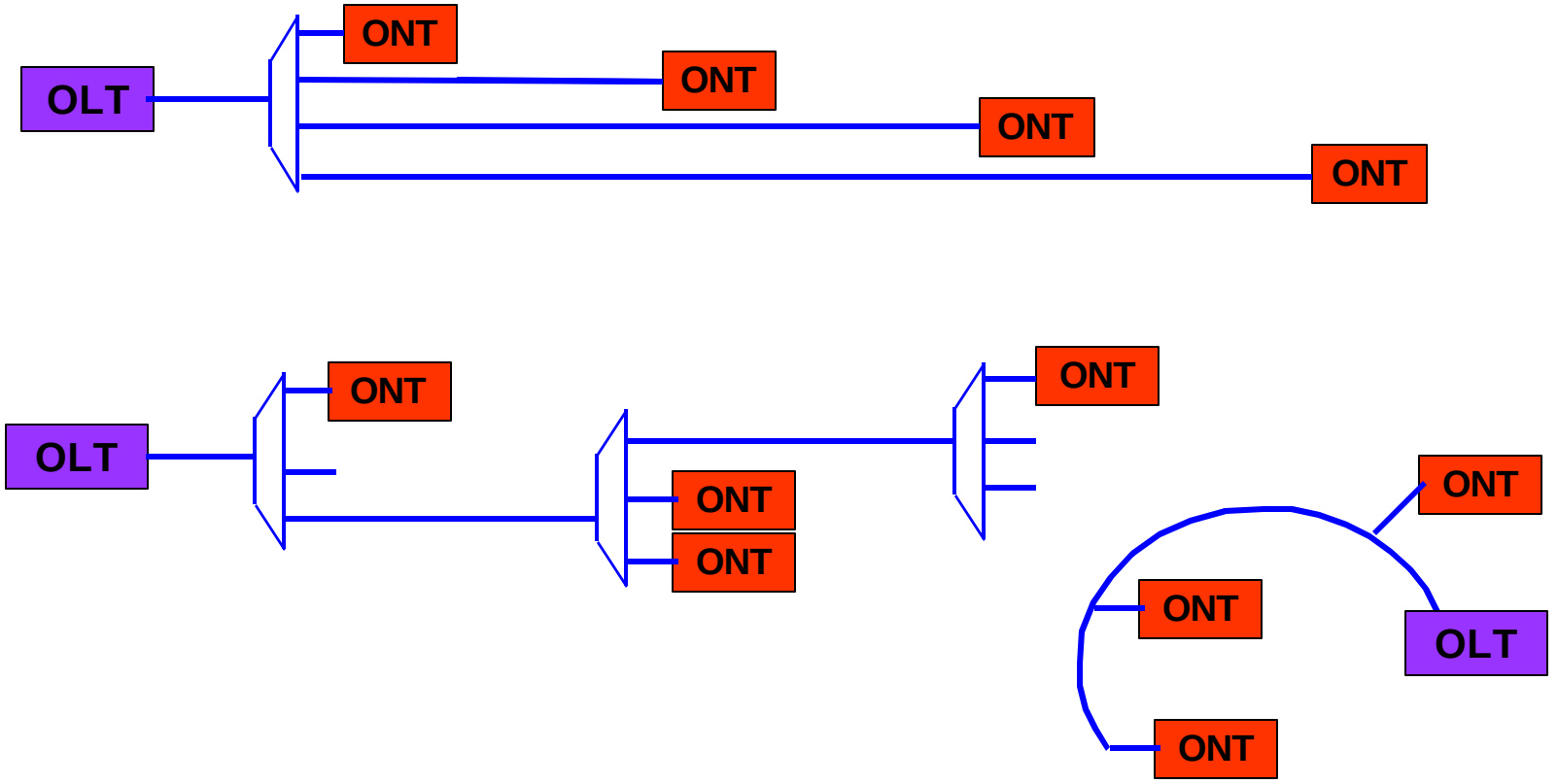


TDMA/TDM PON (EPON)



- Single Single Mode Fiber, Standard SMF or EWB
- Passive, flexible OSP
- Physical/Optical Layer re-use from ITU G.983.1 (FSAN ATM-PON) for 622Mbps and lower

PON Outside Plant (OSP) Flexibility



- Point-to-point, trees, linear add/drop, rings,
- Single or cascaded splitter (1:32); (1:2) (1:16), (1:4)(1:8)....
- Simple engineering of facilities—optical loss budgets

CWDM EPON w/Standard SMF or EWB Fiber

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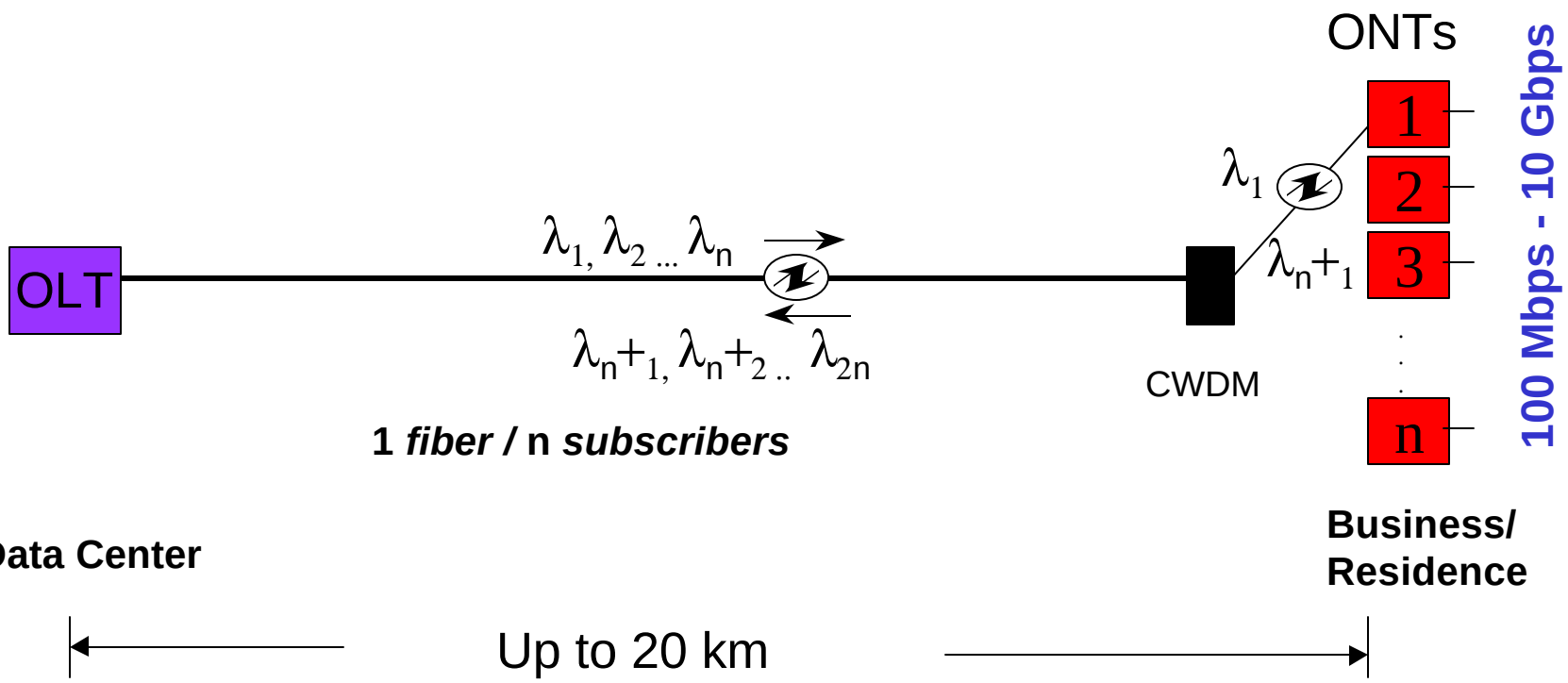

- ***Future*** higher bandwidth implementation
- Can re-use fiber plant from EPON or Remote Switched)

Coarse Wavelength Division Multiplexing Grids Proposed to TIA (1/01) and ITU (2/01)

Coarse channel plan 1:

O-Band: 1270, 1290, 1310, 1330 nm
E-Band: 1370, 1390, 1410, 1430 nm
S+C+L-Band: 1470, 1490, 1510, 1530, 1550, 1570, 1590, 1610 nm

Coarse channel plan 2:

O-Band: 1275.7, 1300.2, 1324.7, 1349.2 **(802.3ae 10 GbE)**
E-Band: 1380, 1400, 1420, 1440
S+C+L-Band: 1470, 1490, 1510, 1530, 1550, 1570, 1590, 1610 nm

CWDM Grid Standards Activities

- IEEE (P802.3ae) has proposals to support 4 CWDM channels in the “O” band (1260 - 1360 nm)
- January 2001 Approvals
  - TIA approval of proposed grids as Lucent contribution to ITU
  - US Dept. of Commerce SGB approval as Lucent contribution to ITU
- February 2001 Presentation at ITU
  - Q.16 Systems: Directed to present “white contribution” at next conference in October; propose as new rec. or as change to previous rec.
  - Q.17 Components: Identified new CWDM classification for WDM components for G.671 update

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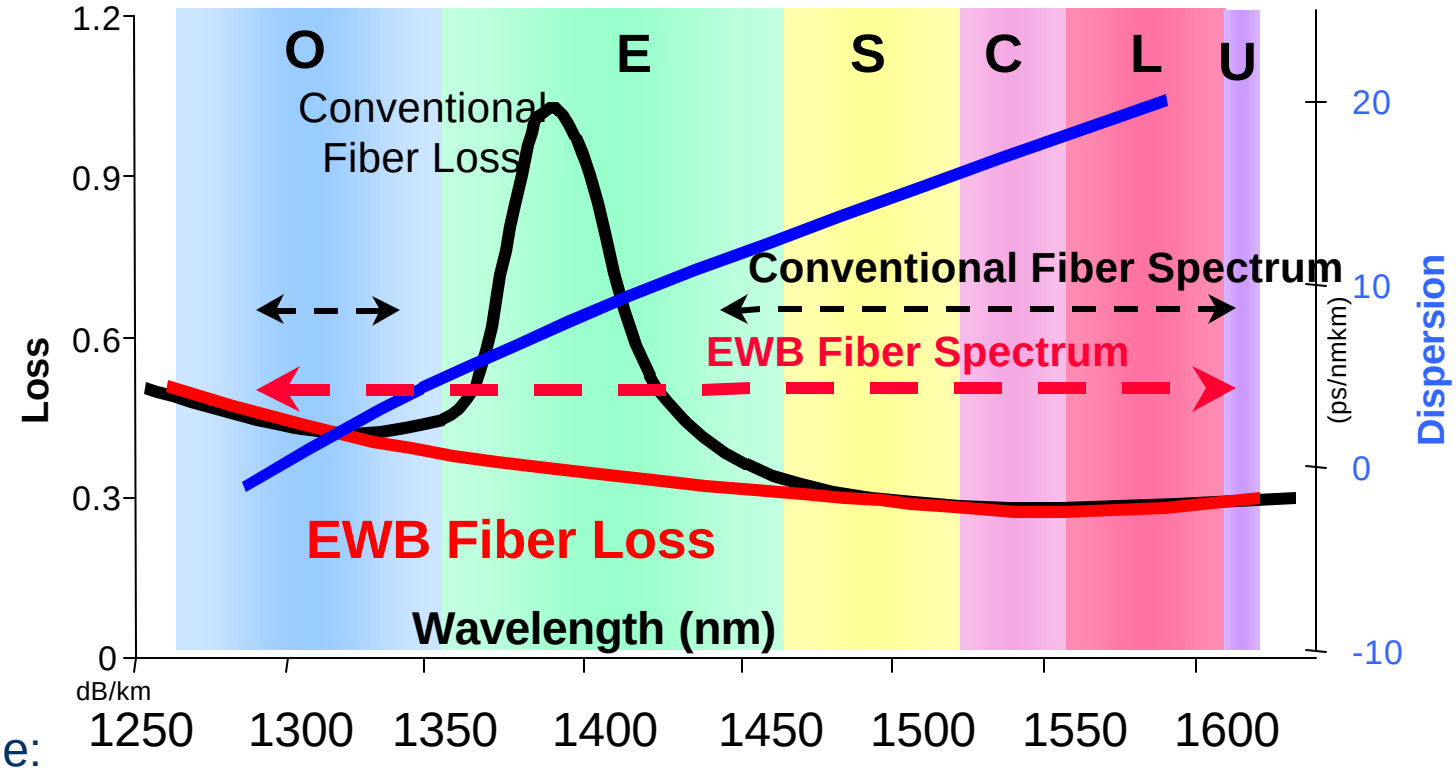
Extended Wavelength Band SM Fiber

- **Supports E-Band, greater useable spectrum**
- **EWB Fiber eliminates the 1385 nm water peak**



Example:

EWB Fiber: 16 Wavelength CWDM

Conventional SMF: 12 “ “

Extended Wavelength Band Fiber

Identical specifications to Std SMF, PLUS:

- 25% fewer fibers in CWDM feeder
- 25% less CWDM CO floor space and apparatus requirements
- Improved CWDM packaging economy
- Lowers installed CWDM system cost by 10%
- Opens E band spectrum
- Maximum future proofing for 25+ yr fiber plant.

Recommendation

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IEEE EFM should reference the following fiber types and architectures

	Std SMF	**EWB SMF**
IEC (Category) 6073-2-50	B1.1	B1.3 (extended wavelength band)
ITU G652	G.652.B	G.652.C (extended wavelength band)
TIA 492CAAB (Class)	IVa	IVa (dispersion-unshifted with low water peak)
Architectures Supported	EPON P2P Ethernet Mux 12 λ CWDM EPON	EPON P2P Ethernet Mux 12 λ CWDM EPON 16 λ CWDM EPON