

Time and Wavelength Division Multiplexed Passive Optical Network (TWDM-PON)

NFOEC workshop: Technologies for NG-PON2:
Why I Think This Technology Is the Clear Winner

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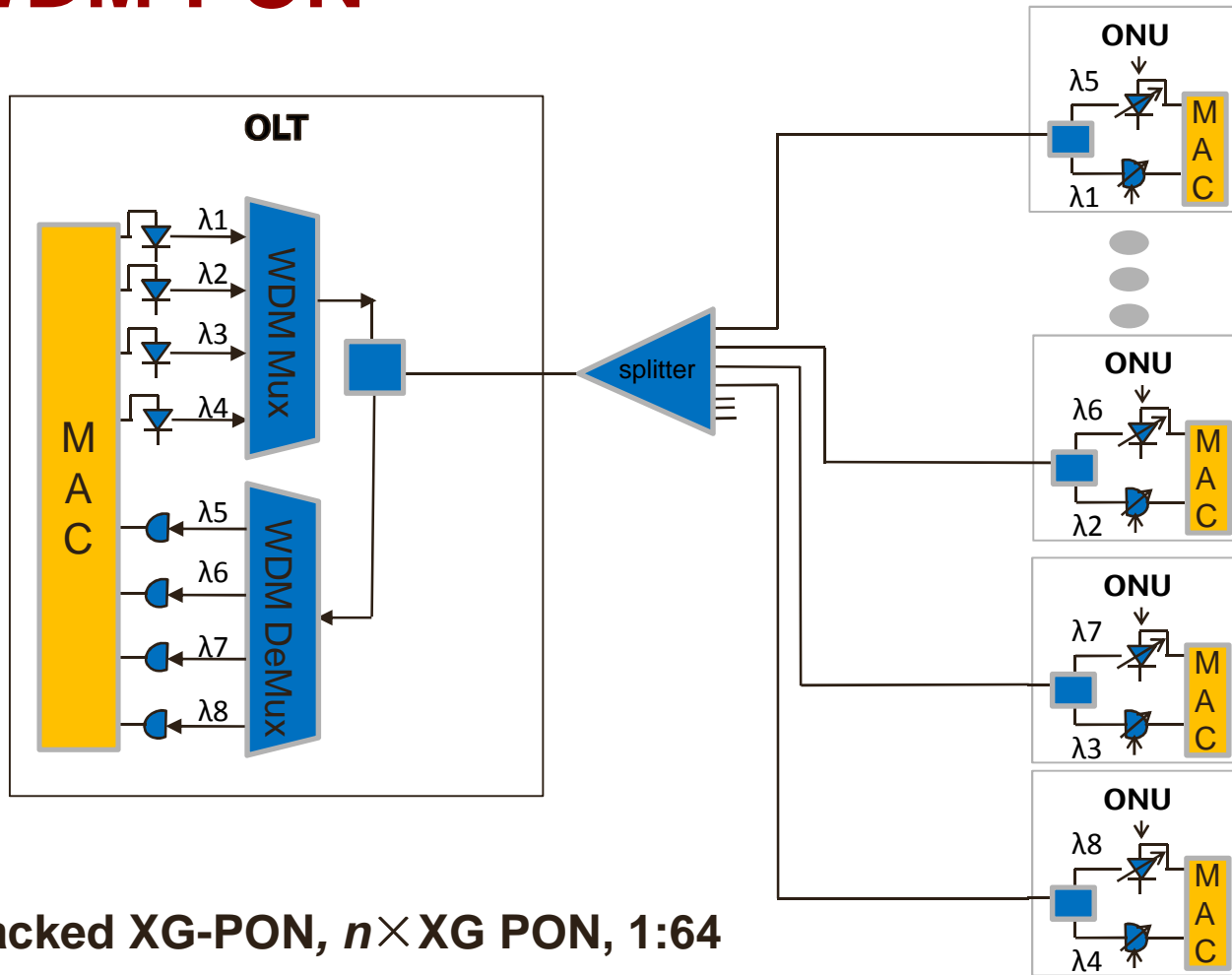
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Agenda

- **TWDM-PON introduction**
- **TWDM-PON features**
- **Why TWDM-PON is the clear winner**

TWDM-PON



- ◆ Stacked XG-PON, $n \times$ XG PON, 1:64
- ◆ $n=4$, downstream 40Gb/s, upstream 10Gb/s
- ◆ ODN reuse, colorless and reconfigurable ONU

Major features

◆ Stacked TDM-PON

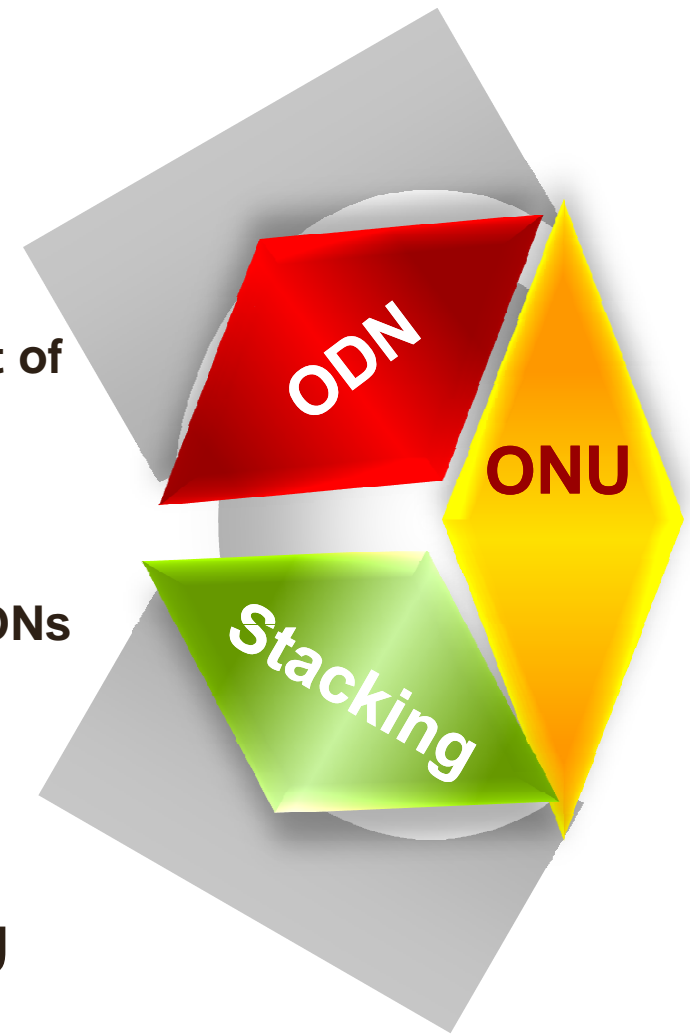
- ◆ Leverages successful development effort of TDM-PON optics, MAC, OAM

◆ ODN reuse

- ◆ Coexists with previous generations of PONs (e.g., G/E-PON, XG-PON/10GE-PON)
- ◆ FTTB/FTTH can be upgraded to higher bandwidth

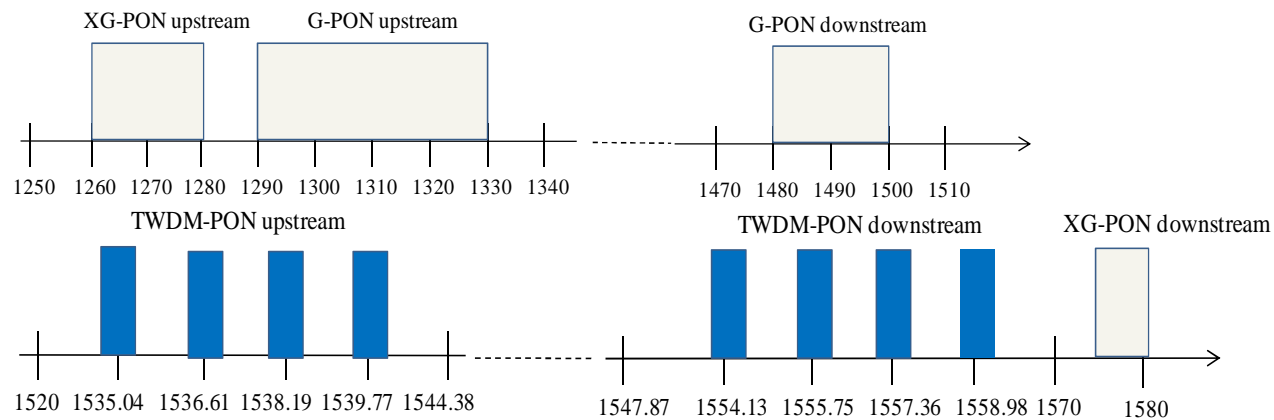
◆ Colorless and reconfigurable ONU

- ◆ Tunable ONU
- ◆ One inventory supports all requirements

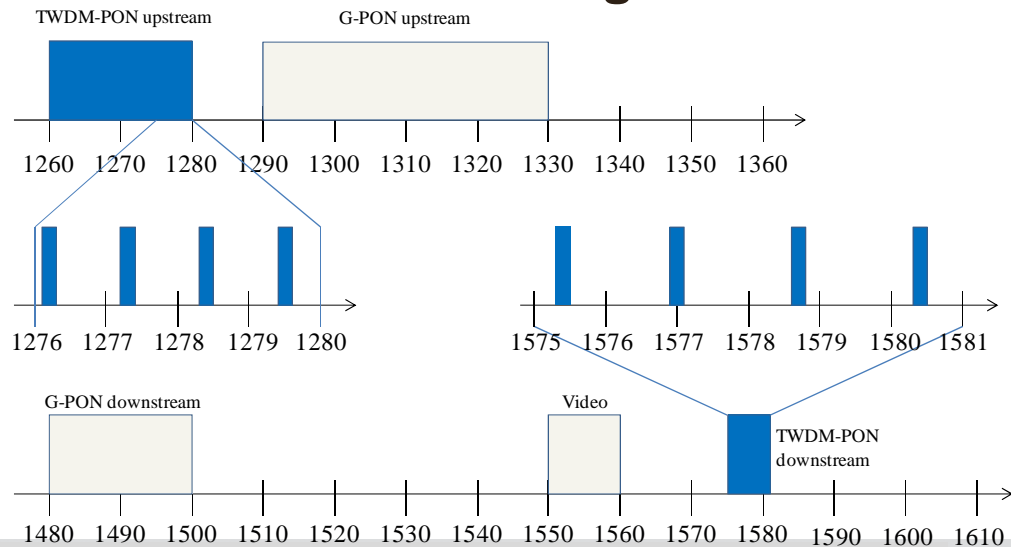


Wavelength plan

◆ Option 1: C-band wavelength plan



◆ Option 2: XG-PON wavelength reuse

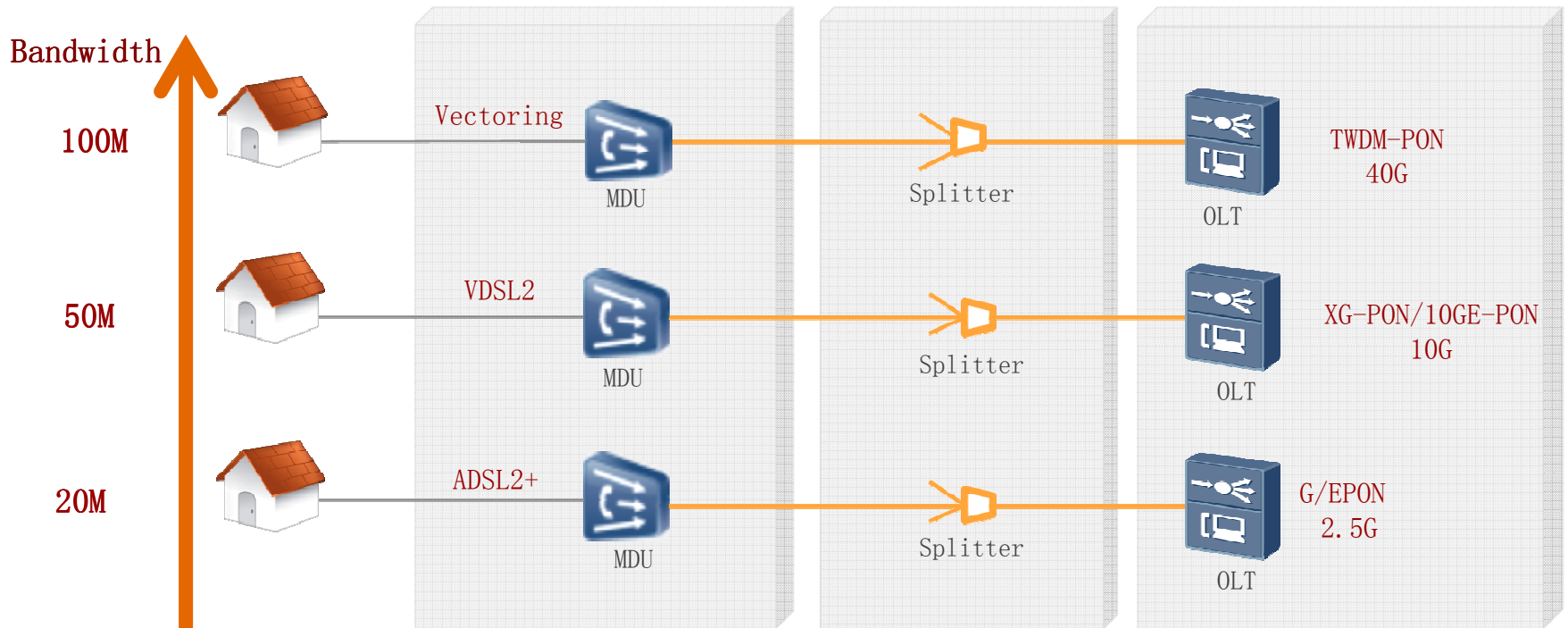


Power budget

	C-band wavelength plan	XG-PON wavelength reuse
OLT launched power per channel	10.5 dBm	6 dBm
ONU receiver sensitivity	-28 dBm	-28 dBm
ONU launched power	2 dBm	2 dBm
OLT receiver sensitivity	-38 dBm	-31.5 dBm
Downstream OPP	1 dB	1 dB
Upstream OPP	0.5 dB	0.5 dB
Loss budget	37.5 dB	33 dB

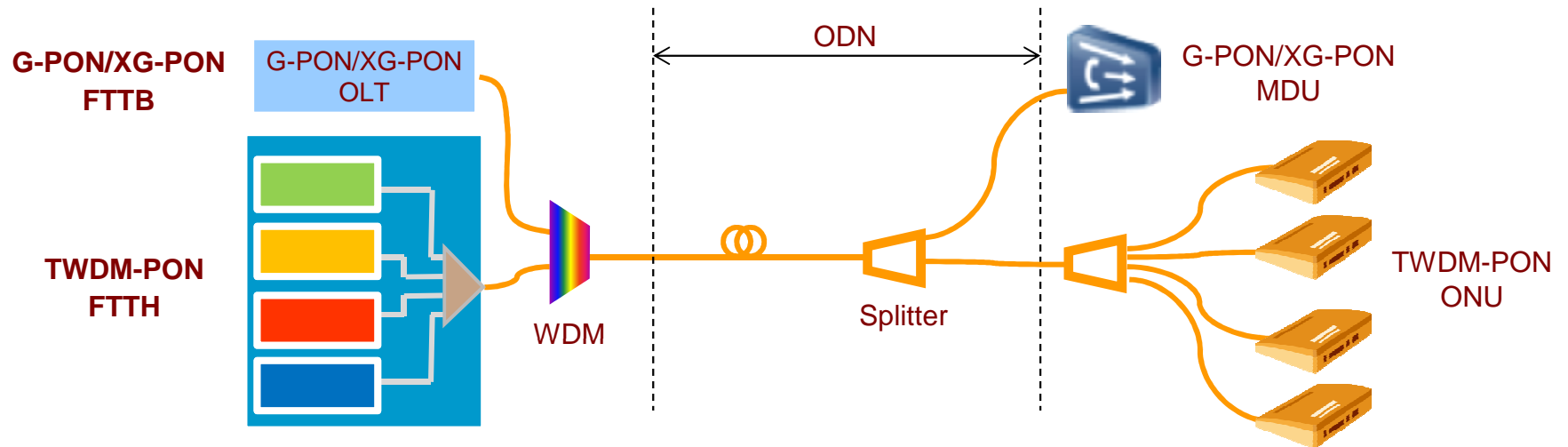
- ◆ Power budget depends on wavelength plan
- ◆ C-band wavelength plan supports loss budget ~37.5 dB
- ◆ XG-PON wavelength reuse provides loss budget similar to XG-PON

FTTB/N upgrade



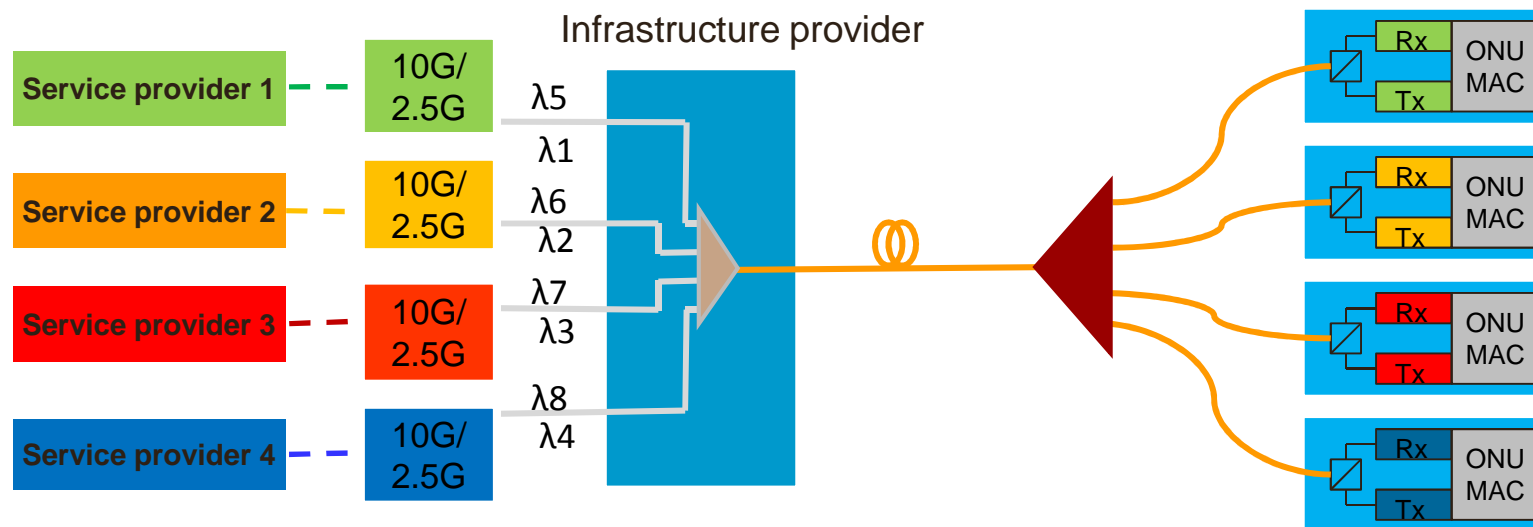
- ◆ TWDM-PON helps to upgrade from 1G to 10G to 40G step by step as demands increases without changing MDU and ODN

Migration from FTTB to FTTH



- ◆ Migration from FTTB to FTTH by replacing active MDU with passive power splitter
- ◆ Migration node by node if required

Flexible spectrum: open access



- ◆ One infrastructure supports multiple service providers
- ◆ ODN shared by all service providers
- ◆ Tunable ONU supports remote reconfiguration

Why TWDM-PON is the clear winner

NG-PON2 requirements:

TWDM-PON basic architecture provides 40G aggregated rate, 40km reach, 10G per ONU, 64 split

Migration and evolution:

ODN reuse and spectrum flexibility support coexistence with legacy PON systems, step by step migration, open access, etc.

Technology and cost:

Multiple tunable TRx technologies are developed to implement TWDM-PON ONUs, there are options if one technology does not perform to expectation

Thank you

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