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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Agenda

• TWDM-PON introduction

• TWDM-PON features

• Why TWDM-PON is the clear winner
- 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
  ◆ Tunbale ONU
  ◆ One inventory supports all requirements
Wavelength plan

◆ Option 1: C-band wavelength plan

◆ Option 2: XG-PON wavelength reuse
### Power budget

<table>
<thead>
<tr>
<th></th>
<th>C-band wavelength plan</th>
<th>XG-PON wavelength reuse</th>
</tr>
</thead>
<tbody>
<tr>
<td>OLT launched power per channel</td>
<td>10.5 dBm</td>
<td>6 dBm</td>
</tr>
<tr>
<td>ONU receiver sensitivity</td>
<td>-28 dBm</td>
<td>-28 dBm</td>
</tr>
<tr>
<td>ONU launched power</td>
<td>2 dBm</td>
<td>2 dBm</td>
</tr>
<tr>
<td>OLT receiver sensitivity</td>
<td>-38 dBm</td>
<td>-31.5 dBm</td>
</tr>
<tr>
<td>Downstream OPP</td>
<td>1 dB</td>
<td>1 dB</td>
</tr>
<tr>
<td>Upstream OPP</td>
<td>0.5 dB</td>
<td>0.5 dB</td>
</tr>
<tr>
<td>Loss budget</td>
<td>37.5 dB</td>
<td>33 dB</td>
</tr>
</tbody>
</table>

- 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
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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