Security Level:

100G EPON wavelength plan consideration

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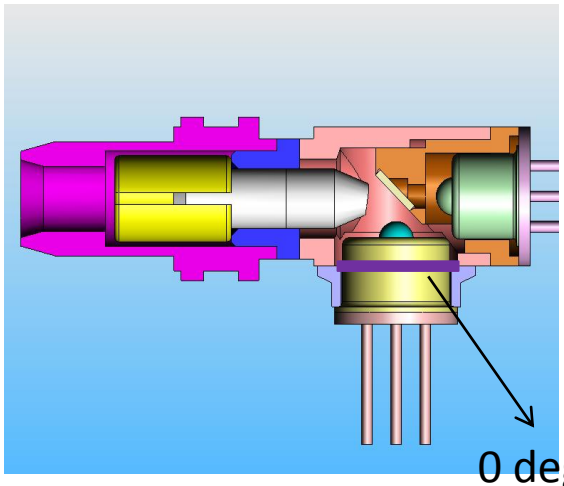
- The required guard band for 25G EPON

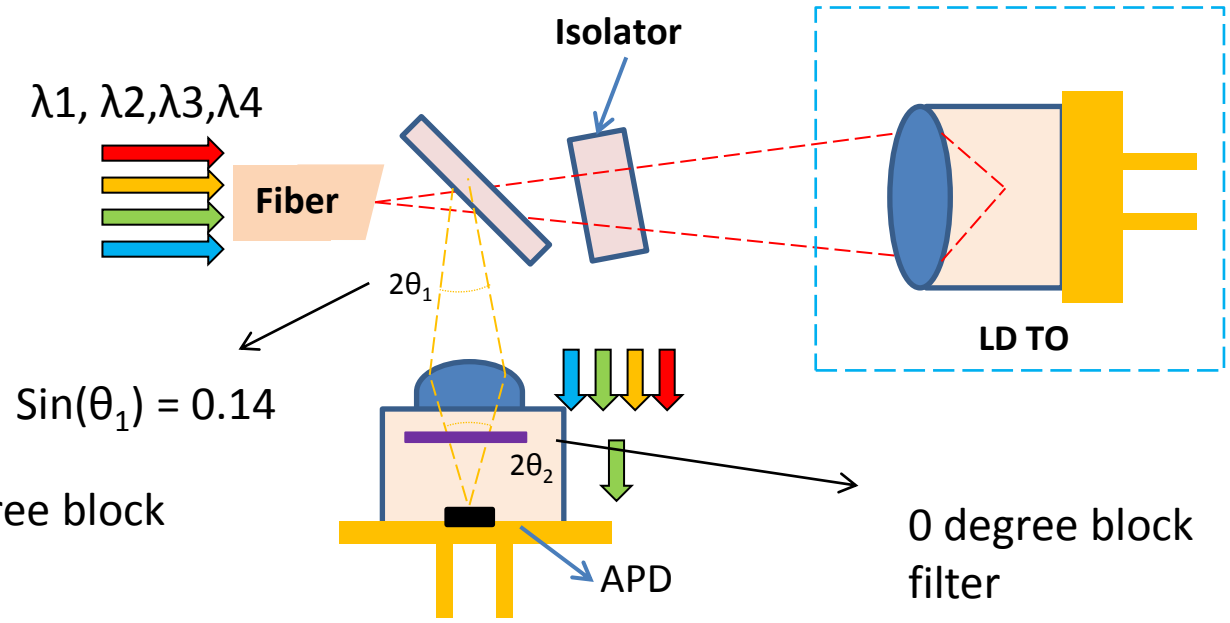
- Required wavelength bandwidth for uncooled device

Required guard band for 25G EPON

- 25G ONUs must be able to coexist with 100G EPON ONUs.
- 25G ONU receiver should be able to block other 3 or 4 wavelengths of 100G EPON.
- Enough guard band should be left for ONU wide band blocking filter to reject other downstream wavelengths.

25G ONU Bidi structure

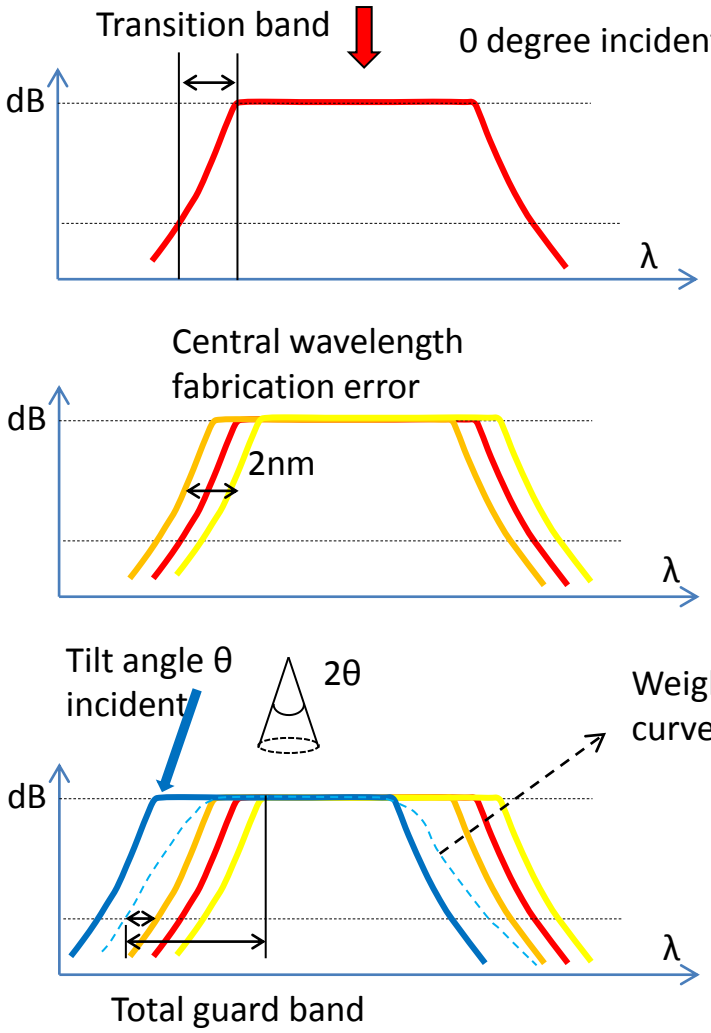




- Above is a typical Bidi structure based on convergence beam
- The 0 degree filter is usually assembled by simple overlay in the submount (no active alignment needed).

Required guard band analysis

- Transition band of the filter: 3 ~ 4 nm
  - To achieve 25dB isolation of adjacent channel and 35dB isolation of Tx wavelength
- Central wavelength fabrication error: +/- 1nm
  - Require film thickness tolerance <0.1nm
- Wavelength shift with tilt angle incident due to convergence beam
  - tilt angle wavelength
  - Wavelength shift : ~5nm $\lambda(\theta) \approx \lambda_0 \cos(\theta)$
- Total guard band: >10nm for convergence beam
  - > 5nm for collimated beam



Required wavelength bandwidth for uncooled device

- In whistler meeting: “16nm bandwidth may be used for uncooled device” was proposed

■ Uncooled DML
  - ✓ Wavelength distribution at constant case temperature: <±2nm
  - ✓ Temperature dependency; 0.095nm/deg.C
  - ✓ Require 16nm band for I-temp (-40 to 85deg.C).

- Feedback from some more component vendors:
- Vendor 1:
  - 0.095nm/deg.C is OK;
  - 16nm can be achieved in theory for industrial temperature range, but there is no margin, this will be challenging for mass volume
- Vendor 2:
  - Typical wavelength distribution is ±3nm, ±2nm is very challenging.
  - Chip temperature range is usually larger than surrounding temperature
  - Temperature dependency : ~ 0.1nm in O-band
- Summary: 0.095nm/deg.C seems OK in O-band. 16nm will be challenging for an uncooled device. The cost needs more study.

Summary :

- The required guard band for 25G EPON is analyzed, for downstream, at least 10nm is required for convergence beam.

- Feedback on 16nm for uncooled device from vendors are shown. 16nm will be challenging, the cost impact of 16nm needs more study.

Thank you

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