O-band wavelength plan for 25GBASE NGBIDI

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Motivation

Big ticket items

http://www.ieee802.org/3/NGBIDI/public/1807/180712_IEEE802.3cp-Schedule.pdf

- Loss budget
  - 10km and 20~40km budgets are envisioned
  - Must translate these into loss and dispersion values
  - Use 0.5dB/km (O-band)? Assume 4 connectors with 0.5dB loss?
- Wavelength plan
  - 10G has existence proof at 1270nm upstream, 1330nm downstream
    - ✓ Is there any objection to continuing with these values?
  - 25G has a few obvious possibilities:
    - ✓ Reuse 100GBase-LR4 wavelengths (1295nm and 1310nm)?
    - ✓ Reuse 25G PON ONU Channel 0 wavelength options (1270nm and 1300nm)?
- Silent start
  - How to capture that into the standard?

Review of wavelength plan of P802.3ca 50G-EPON

- P802.3ca TF decided the wavelength plan for 50G-EPON in O-band to have a dispersion tolerance of 25G NRZ signal.
- The wavelength plan was decided considering that

(1) using an uncooled DFB source for upstream and cooled EML source for downstream

→ center wavelength and wavelength range

(2) implementation of BOSA for BiDi optical transceiver.

→ wavelength gap btw. DN and UP wavelengths

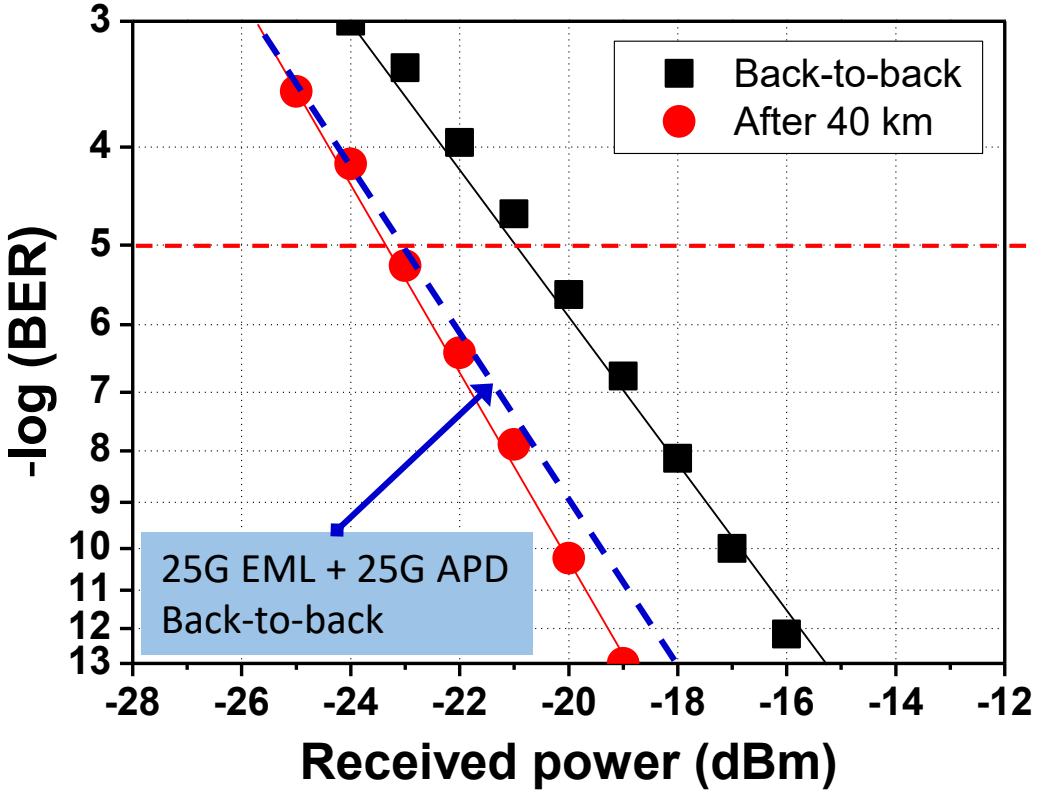
	center wavelength	wavelength range	candidate source
UW0	1270 nm	+/- 10 nm	uncooled DML
DN0	1358 nm	+/- 2 nm	Cooled EML

Wavelength gap: 76 nm = (1358 nm – 2 nm) – (1270 nm + 10 nm)

Uncooled DML Source

- In 50G-EPON, the first wavelength of upstream is decided to enable an uncooled DML for ONU transceiver. Downstream wavelength specification was determined assuming that OLT transmitter is a cooled EML.
- Since cost of OLT is shared by multiple customers such as 32 or 64 ONUs, OLT transceiver can use the cooled EML.
- In P-t-P access application, DML based transceiver for both down and upstream directions will be preferred rather than EML based transceiver considering the transceiver cost doesn't be shared.
- Recent our experiment results show a possibility of 20 dB power budget by using DML transmitter and 25G APD receiver.
  - Target BER is 5×10^{-5} refereeing 25GBASE-LR in 802.3cc

Experiment result



Target BER is $5x10^{-5}$ refereeing 25GBASE-LR in 802.3cc

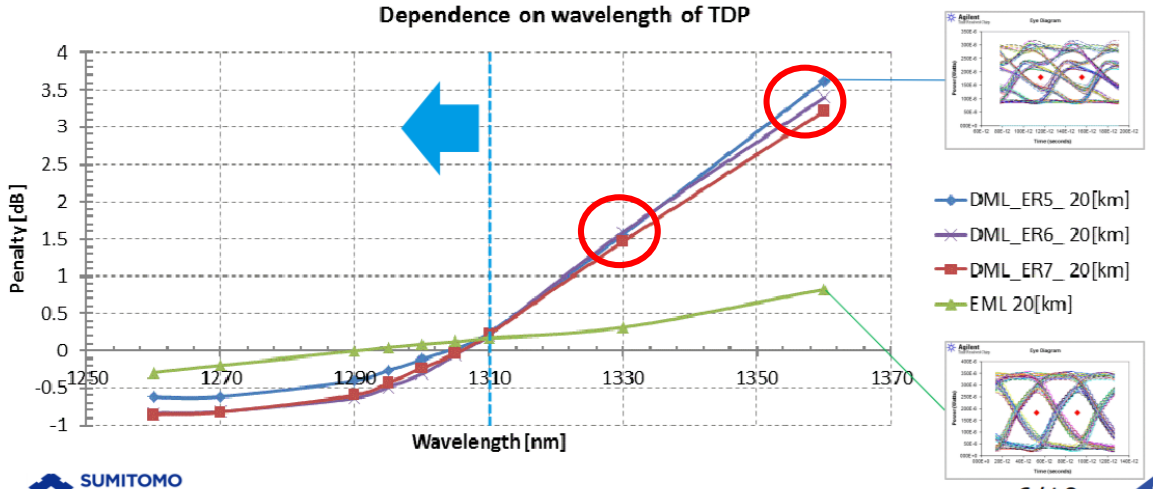
25G DML Source
- Commercial SFP28
- ER: 5.2 dB
- Output power: 0 dBm
- λ: 1310 nm

- 25G EML or DML + 25G APD based transceiver will support over 20 dB of power budget at 1310 nm.

Performance degradation of DML

Simulated TDP with 25G NRZ

- Simulated TDP at 20km based on measured chirp data.
- TDP of DML increases extremely above 1.5dB over 1330nm.
- Shorter side of O-Band is appropriate to select for DML. Lowest TDPs are expected in 1270~1290nm. (+2dB TDP isn't unfeasible.)



SUMITOMO ELECTRIC
24-25 May 2016

IEEE P802.3ca 100G-EPON Task Force meeting, Whistler

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http://www.ieee802.org/3/ca/public/meeting_archive/2016/05/tanaka_3ca_1_0516.pdf

- 25G DML is not good for operating over 1310 nm due to dispersion induced power penalty when transmission distance is over 20 km.

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Proposed wavelength plan

- We propose a wavelength plan of 25GBASE NGBIDI.
  - ➢ Downstream option A
    - ✓ Same with the wavelength of commercial 10G bidirectional SFP+ transceiver.
    - ✓ The wavelength range is modified to consider EML source.
  - ➢ Downstream option B
    - ✓ Same with 50G EPON wavelength plan in order to share optics and electronics of 50G EPON

	Upstream	Downstream (Option A)	Downstream (Option B)
Center wavelength	1271 nm	1331 nm	1358 nm
Wavelength range	20 nm	+/- 2 nm	+/- 2 nm
Gap btw Up and Dn		48 nm	76 nm
Note	• DML+ APD • Same as a UW0 wavelength of 50G-EPON	• EML + APD	• EML + APD • Same as a DN0 wavelength of 50G-EPON