Wavelength plan for 25GBASE-BR

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IEEE P802.3cp Bidirectional 10G, 25G, and 50G Optical access PHYs

Introduction

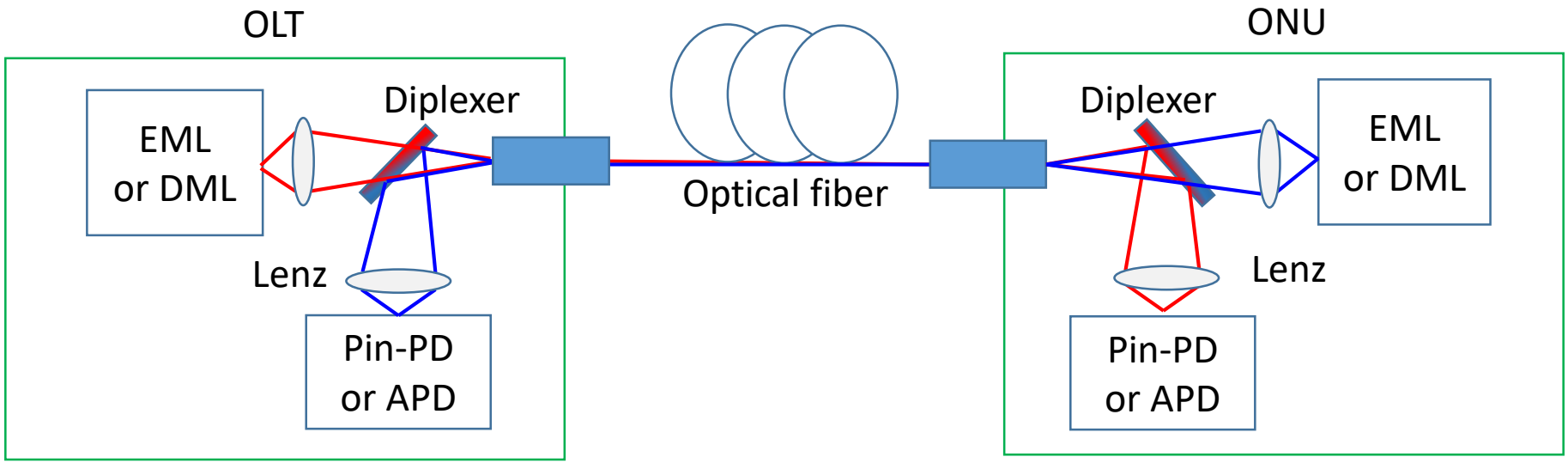
- In the Vancouver meeting, wavelength plans of 10G, 25G and 50G were reviewed and it was agreed to use 1270 nm for upstream at all speeds, all reaches as a starting point.
- 1270 nm is suitable for the upstream because negative chromatic dispersion at the wavelength helps to enhance transmission performance of DML.
- To decide the downstream wavelength, dispersion induced power penalty should be considered and US-DS Gap also be considered.
- So, there are two considerations to decide downstream wavelength.

  1.Penalty of DML

  2.Excess loss of BOSA with focused beam optics
- In this contribution, we propos wavelength plan for 25GBASE-BR.

Considerations on wavelength plan

1. Power penalty due to chromatic dispersion

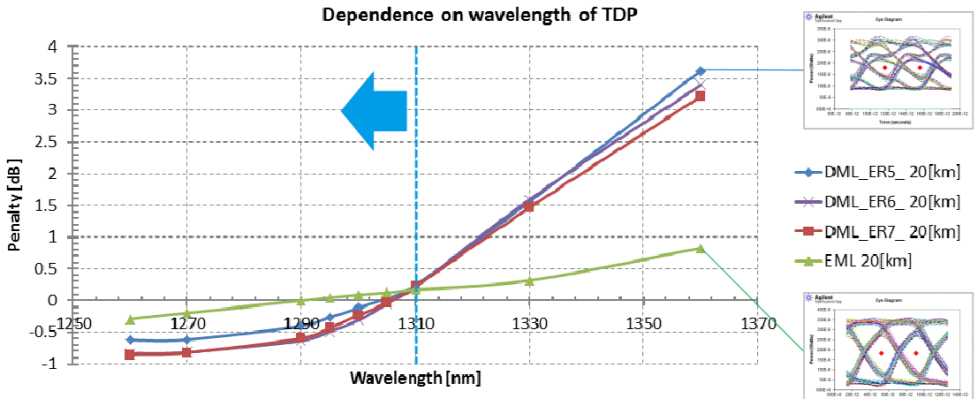


2. Excess loss of focused beam optics

Power penalty of 25G 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.)



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- Previous contribution provided simulated TDP of 25G DML with 25G NRZ over 20km transmission.
- There is negative penalty at 1270nm wavelength. But the penalty is increased rapidly after 1310 nm.
- 25G EML shows lower penalty under 1 dB over O-band.

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

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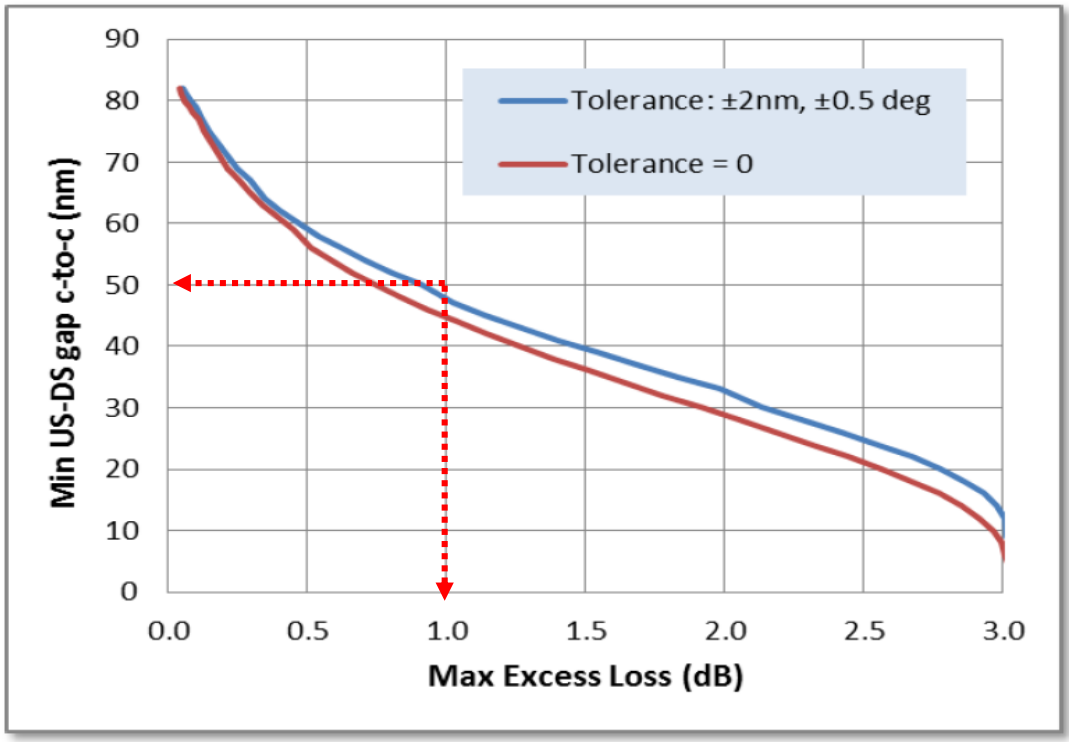
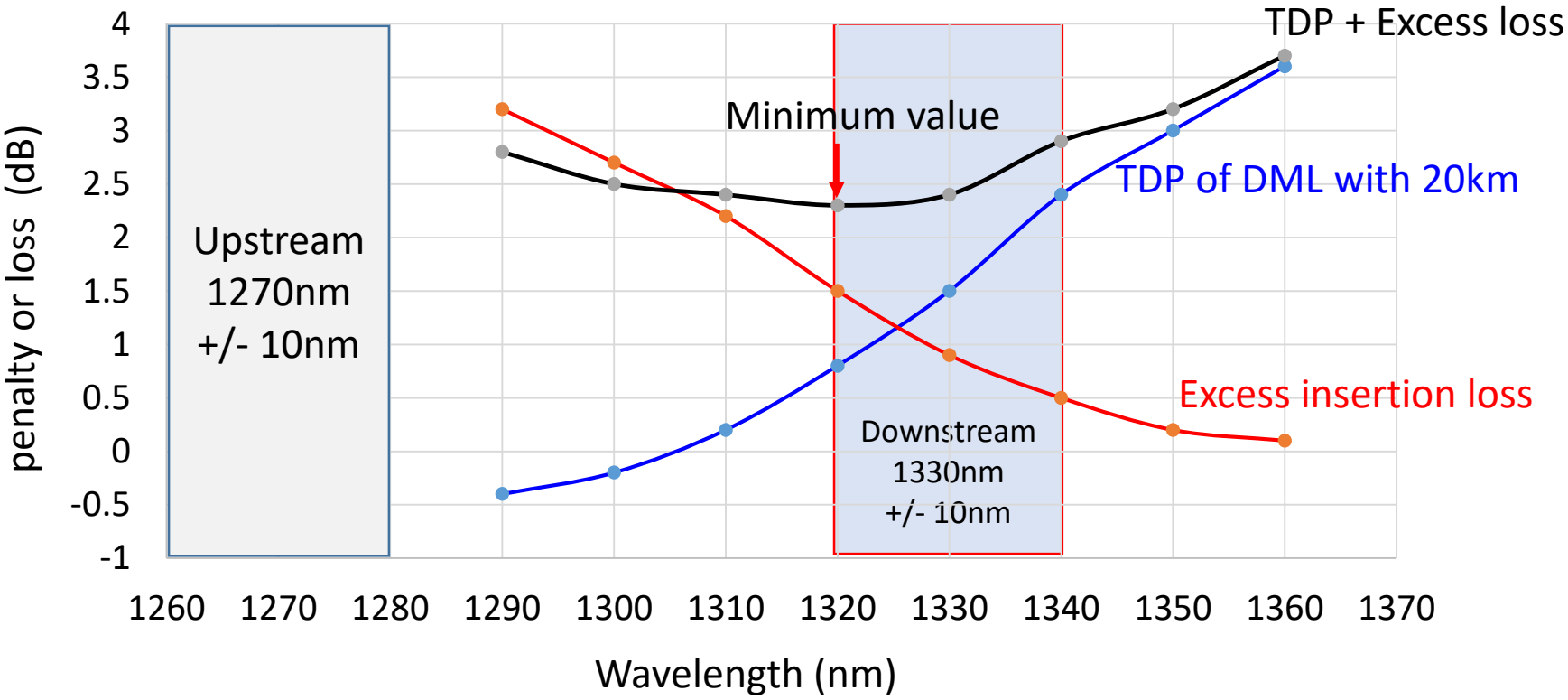
Excess insertion loss of BOSA with focused beam optics



http://www.ieee802.org/3/ca/public/meeting_archive/2016/11/johnson_3ca_1a_1116.pdf

- BOSA with focused beam optics is preferred since it is cheaper due to using a simple 45 degree diplexer. But, the sufficient diplexer guard-band such as US-Ds gap is required to minimize excess loss.
- Previous contributions in IEEE 802.3ca provided excess loss value depend on diplexer guard-band (US-DS gap).

Optimized wavelength



- To find optimum wavelength, we calculated sum of TDP + Excess loss by using data of previous contribution.
- If the upstream wavelength is 1270 nm with 20 nm of bandwidth, the 1320 nm is minimum point which means 1330 nm can be a center wavelength of downstream considering +/- 10 nm of bandwidth for uncooled DML.

Downstream wavelength proposal for 25GBASE-BR10 and BR20

- Currently, 1310 nm 25G DML is widely used for short-reach transceivers. So it will be good if BiDi transceiver use 1310 nm DML.
- From the calculate results, no loss difference between 1310 nm and 1330 nm and the loss is almost same between 1300 nm to 1320 nm.
- We propose to use 1310 nm as a downstream wavelength for 25GBASE-BR10, BR20 and BR40

	Center wavelength	Bandwidth
Upstream	1270 nm	20 nm
Downstream	1310 nm	20 nm

Downstream wavelength of 25GBASE-BR40

- In the case of 25GBASE-BR40 (40 km), a high link loss around 25 dB is hard to use BOSA with focusing beam optics because of their high excess loss if the UP-DN gap is small.
- One solution is using collimated beam optics to reduce excess loss. Then, 25G DML and 25G APD based BOSA can be applied for 25GBASE-BR40 even the downstream wavelength is 1310 nm.

25GBASE	BR10	BR20	BR40
Upstream	1270 nm		
Downstream	1310 nm		
Bandwidth	20 nm		
Laser	DML		
PD	Pin-PD		APD
BOSA design	Focusing beam optics		Collimated bean optics

Thank you!