Receiver sensitivity of 50G-EPON ONU

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Supporters

- John Johnson, Broadcom

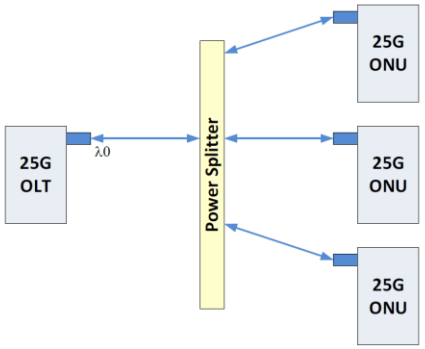
Motivation

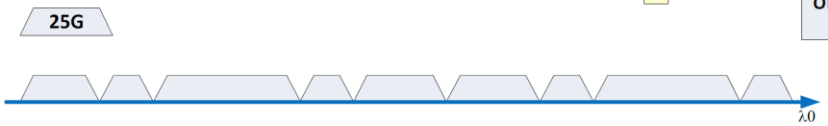
- A receiver sensitivity of 25G-EPON ONU was decided in TF considering technical feasibilities and vender survey results.
  - 25G ONU receiver sensitivity: -25.7 dBm at BER= 1e-2 and ER=8 dB
  - 25G OLT transmitter: AVPmin = 4.8 dBm and ER min = 8 dB
- The receiver sensitivity of 25G-EPON ONU is a good reference for deciding a receiver sensitivity 50G-EPON ONU.
- 50G-EPON ONU PMD will employ a wavelength multiplexer/demultiplexer for two pairs of 25G signals. So, an insertion loss of the wavelength multiplexer/demultiplexer should be considered.
- In this contribution, we review implementation candidates of 50G-EPON ONU PMD to discuss additional losses in PMD and required receiver sensitivities.

25G-EPON ONU and 50G-EPON ONU

Deployment of 1st Generation

- 25G OLT serves 25G ONUs
- One DS and one US wavelength
- One scheduler
- Architecture is similar to 10G-EPON, just 2.5x faster





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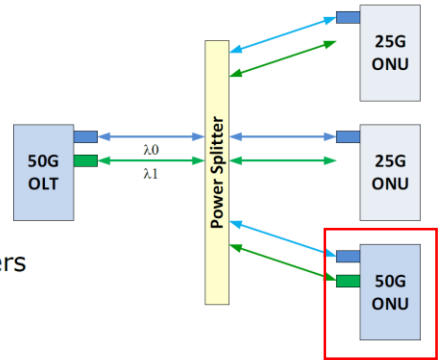
Deployment of 2nd Generation

- 50G OLT serves a mix of 25G and 50G ONUs
- Two DS and two US wavelengths
  - λ0: 25G and 50G ONUs, all broadcast traffic
  - λ1: 50G ONUs
- Two independent US schedulers



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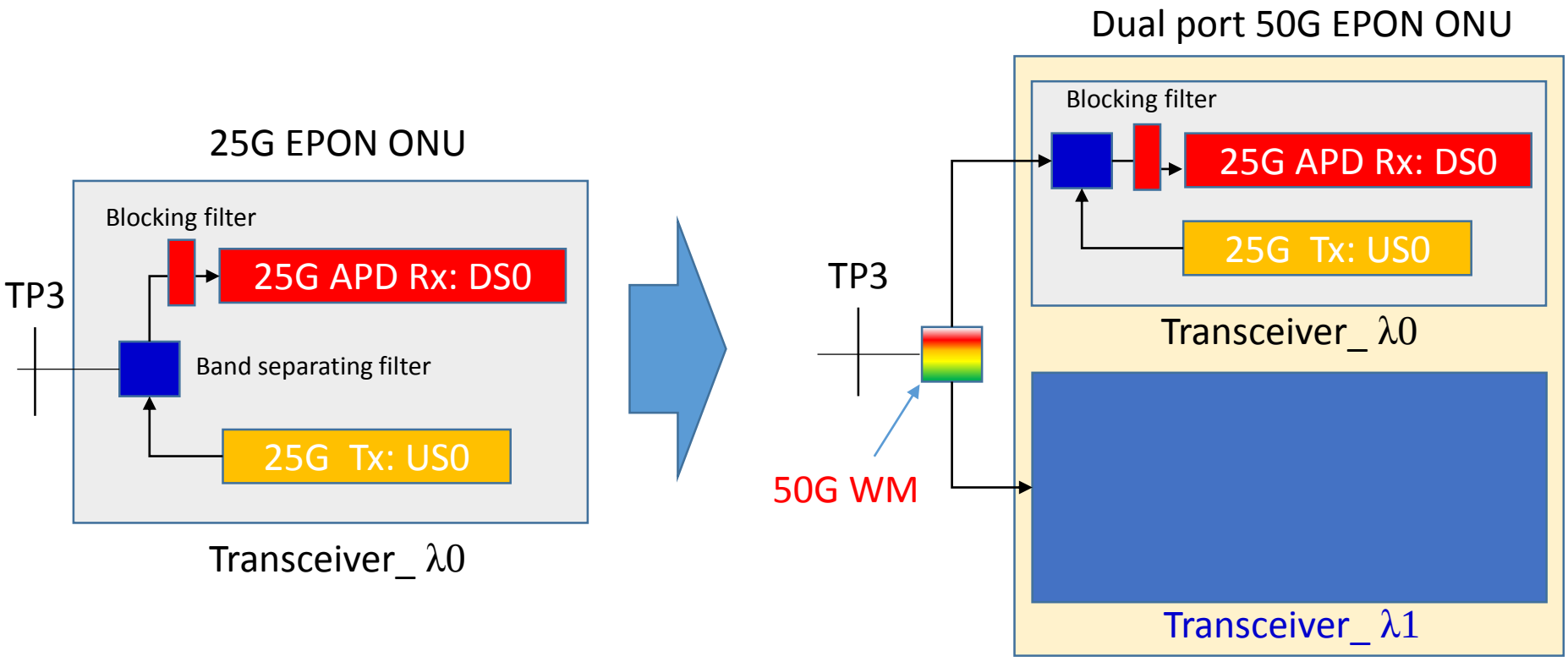
http://www.ieee802.org/3/ca/public/meeting_archive/2016/03/kramer_3ca_1_0316.pdf

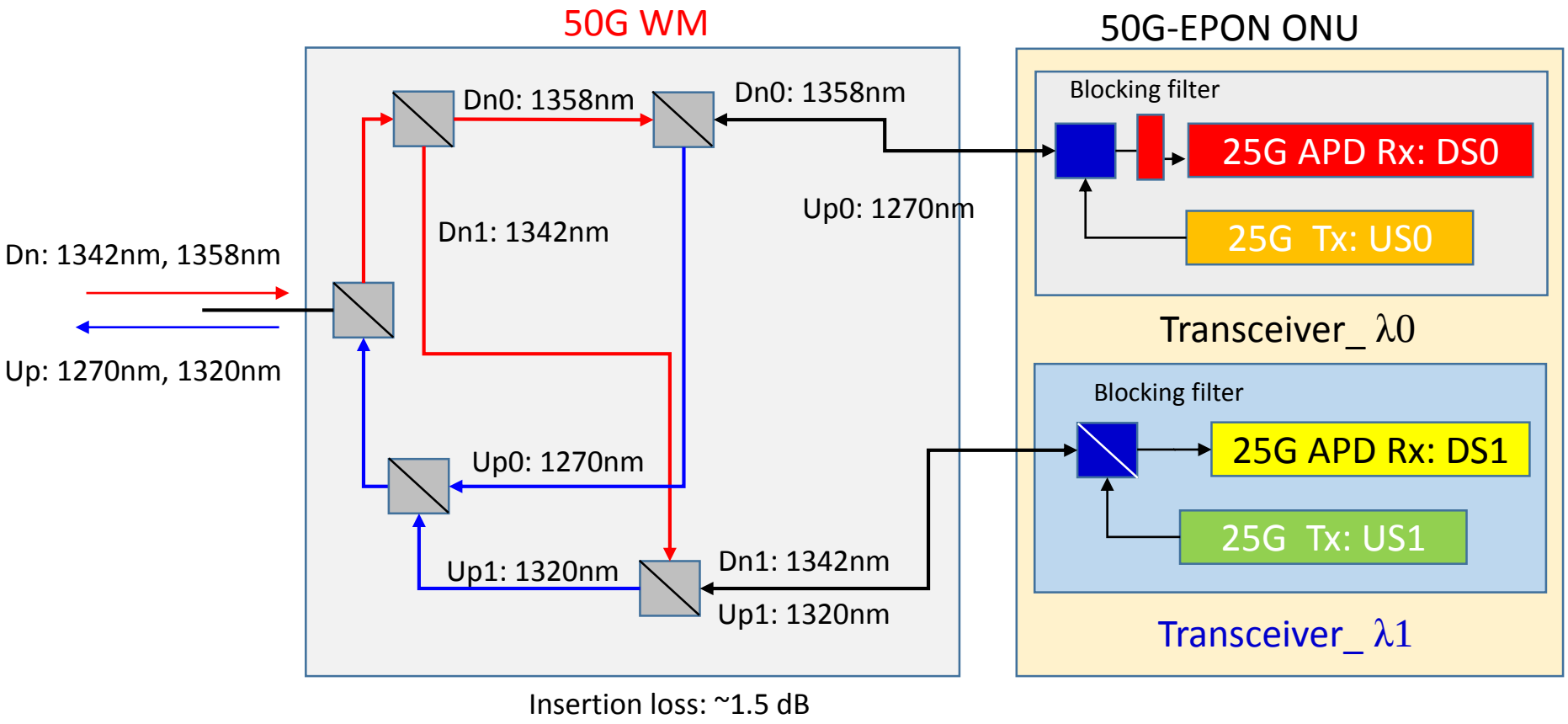
- To deploy 2nd generation, 50G-EPON ONU requires a second transceiver for λ1 as well as the first transceiver.
- It would be good if 25G-EPON ONU and 50G-EPON ONU can share the transceiver for λ0

Case study



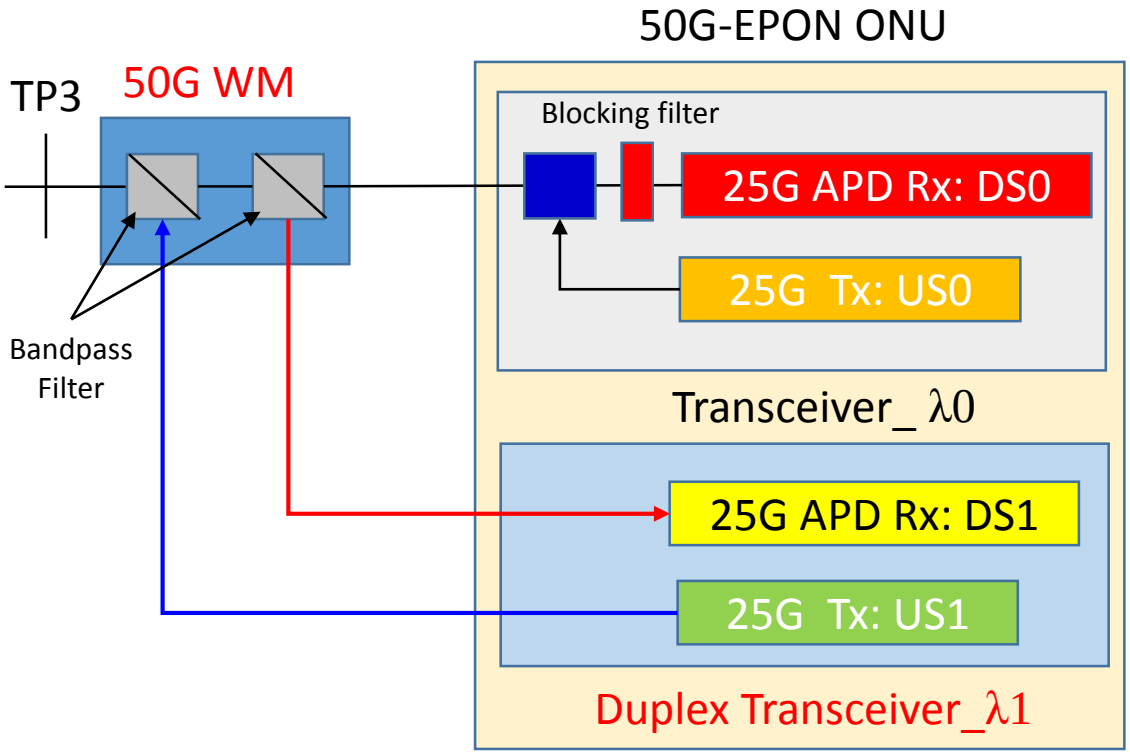
- 50G-EPON ONU will require 50G WM in front of transceivers to separate λ0 and λ1. It will give the additional loss to PMD.
- Configuration of 50G WM is depending on a configuration of transceiver_ λ1.

Case1: Transceiver with BOSA



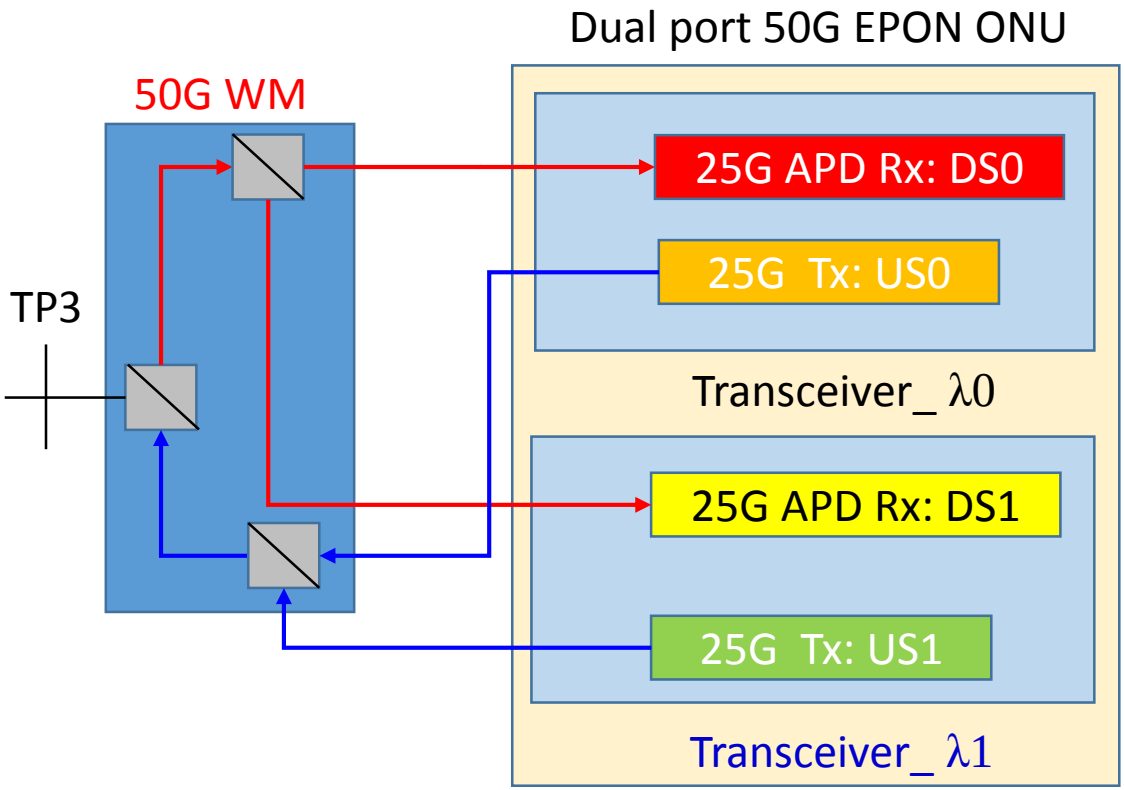
- If 50G-EPON ONU use a transceiver_ λ1 with BOSA, 50G WM configuration will be complex and give about 1.5-dB additional loss in PMD.

Case2: Duplex transceiver



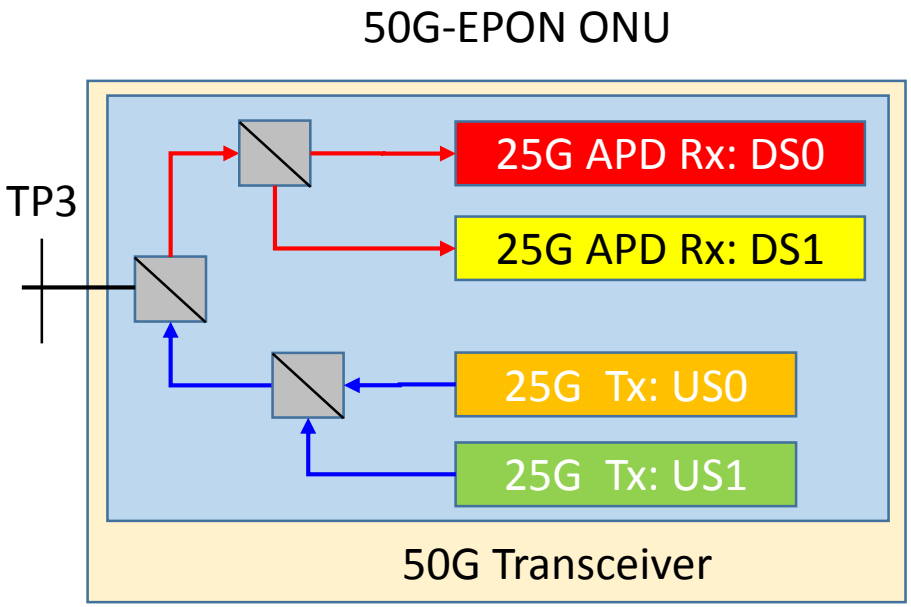
- To keep 25G transceiver_λ0 and simplify 50G WM configuration, a duplex transceiver_ λ1 can be applied to 50G-EPON ONU.
- An Insertion loss of 50G WM is less than 1 dB but an insertion loss per wavelength is not constant.

Case3: Two duplex transceivers



- Two duplex transceivers are used to simplify 50G WM and this case can keep a same insertion loss per wavelength.
- An Insertion loss of 50G WM is less than 1 dB.

Case4: Single 50G transceiver



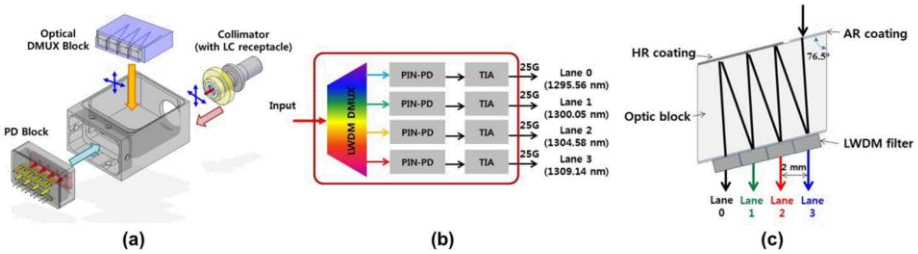


Fig. 1. (a) Schematic diagram of the ROSA. (b) Block diagram of the ROSA. (c) Schematic diagram of the optical DMUX block.

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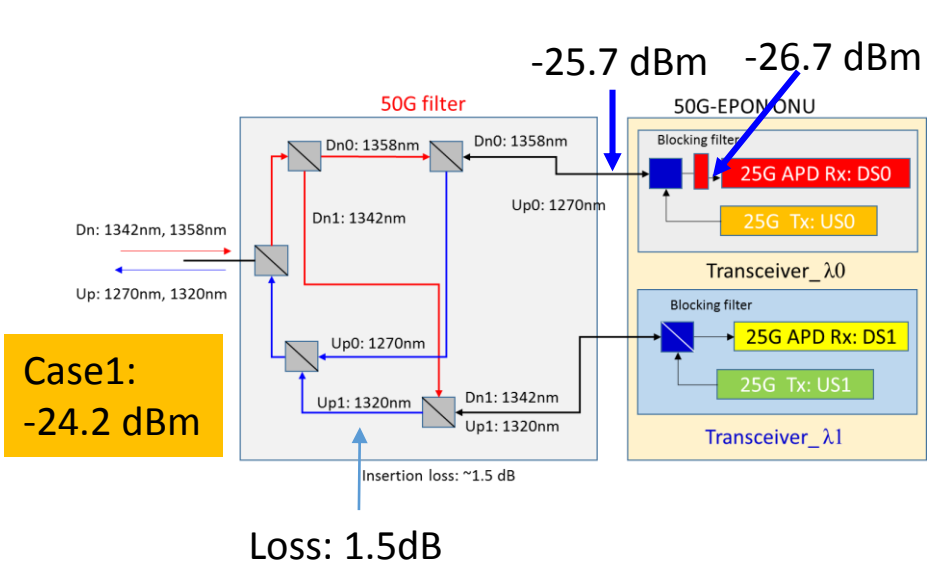
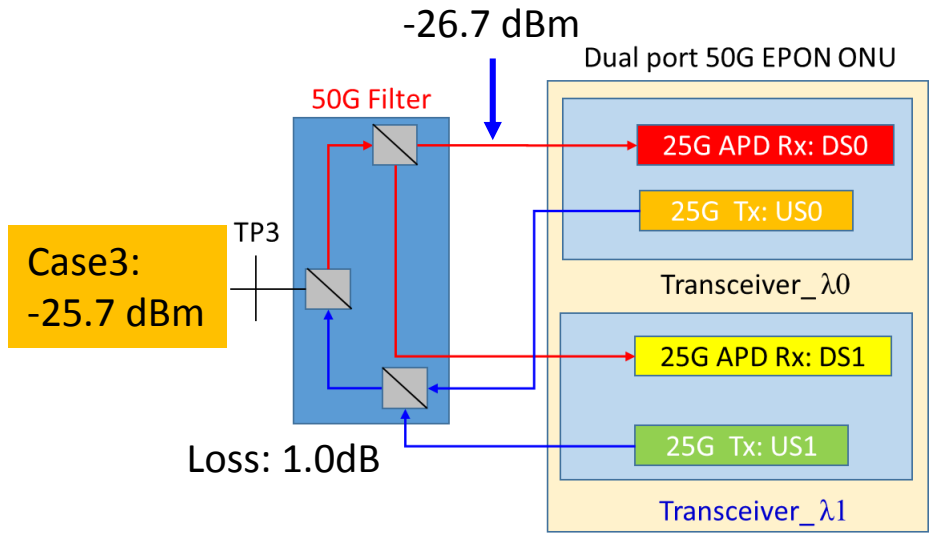
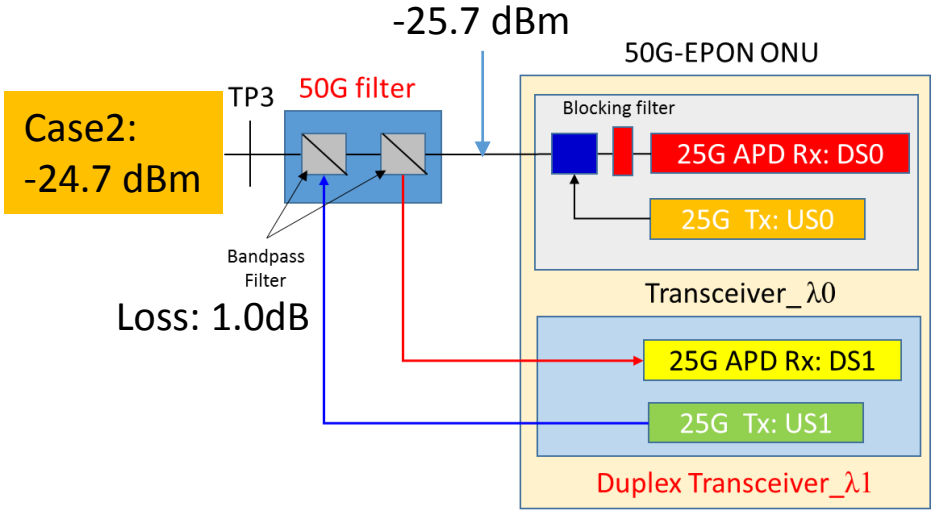
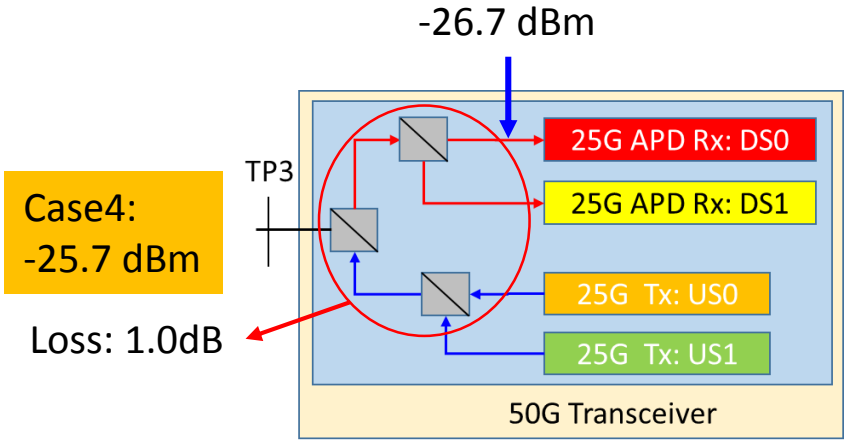
- It will be simple to use a single transceiver for 50G-EPON ONU.
- Single packaged 2channel BOSA would be possible considering integration technologies of 100G Ethernet TOSA and ROSA.

Receiver sensitivity at TP3









Conclusion

- It would be nice if TF decide the 50G ONU receiver sensitivity for satisfying the maximum loss case (case1) to allow many implementation cases.
- However, a higher power OLT transmitter is required and it need new PMD specifications for allowing all implementation cases.
- 50G ONU receiver sensitivity is equal to 25G ONU receiver sensitivity in some cases (case3 and case4)
- We propose to use same receiver sensitivity specification for 25G ONU and 50G ONU and add use-cases of 50G-EPON ONU PMD in page 8 and page 9 to the draft.