

Gain Control of SOA Preamp

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Motivation

- SOA preamplifier at OLT is one of the candidates to overcome upstream loss budget, especially 50G/100G.
- Reported two solutions^{[1][2]} for burst mode operation at the meeting on July, 2017. Usage of optical attenuator at ONU^[2] is effective to reduce the dynamic range of SOA preamplifier, but additional cost is needed. SOA gain control at OLT^[1] has challenges how to determine the gain in burst mode.

[1] "SOA Gain Control at OLT"

http://www.ieee802.org/3/ca/public/meeting_archive/2017/07/umeda_3ca_1_0717.pdf

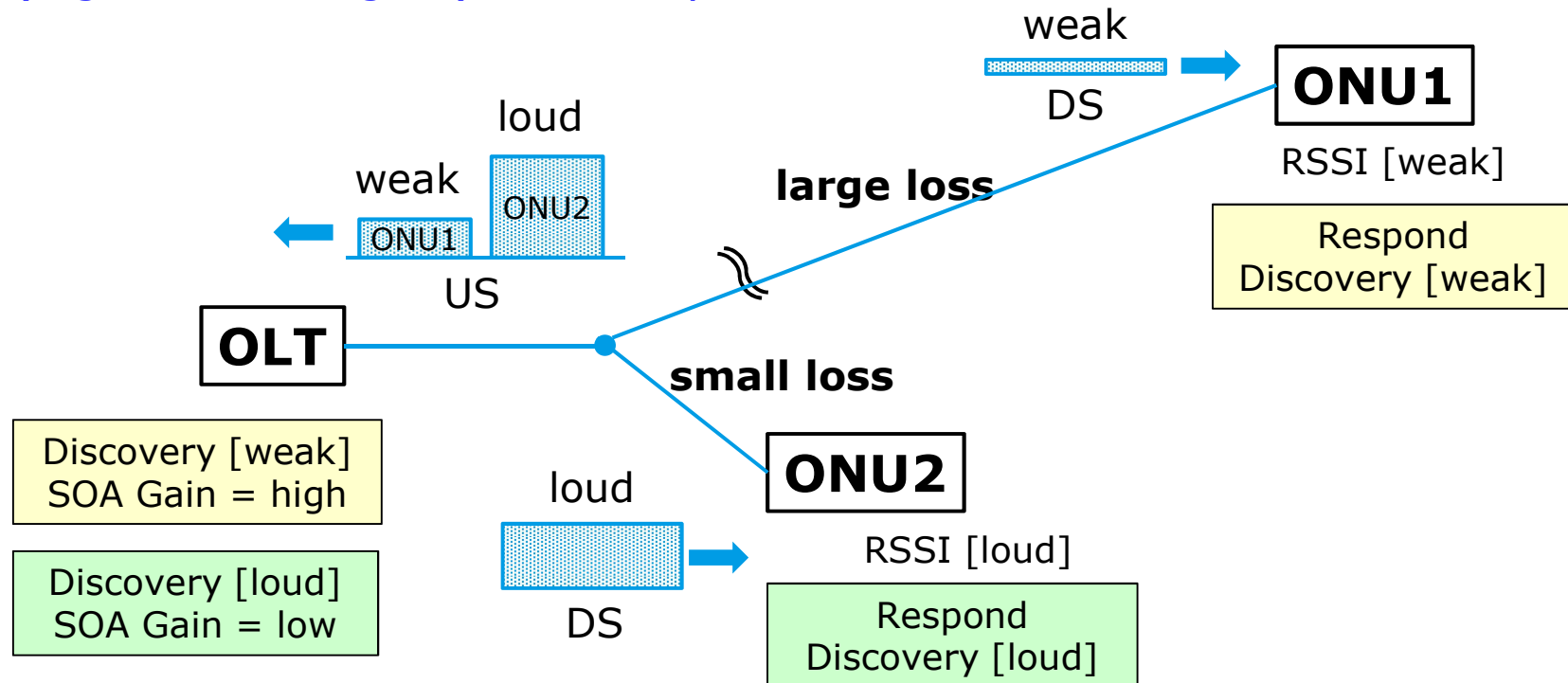
[2] "Compensation of Channel Insertion Loss at ONU"

http://www.ieee802.org/3/ca/public/meeting_archive/2017/07/umeda_3ca_2_0717.pdf

- In this contribution, I'm proposing a SOA gain control at OLT with system support.

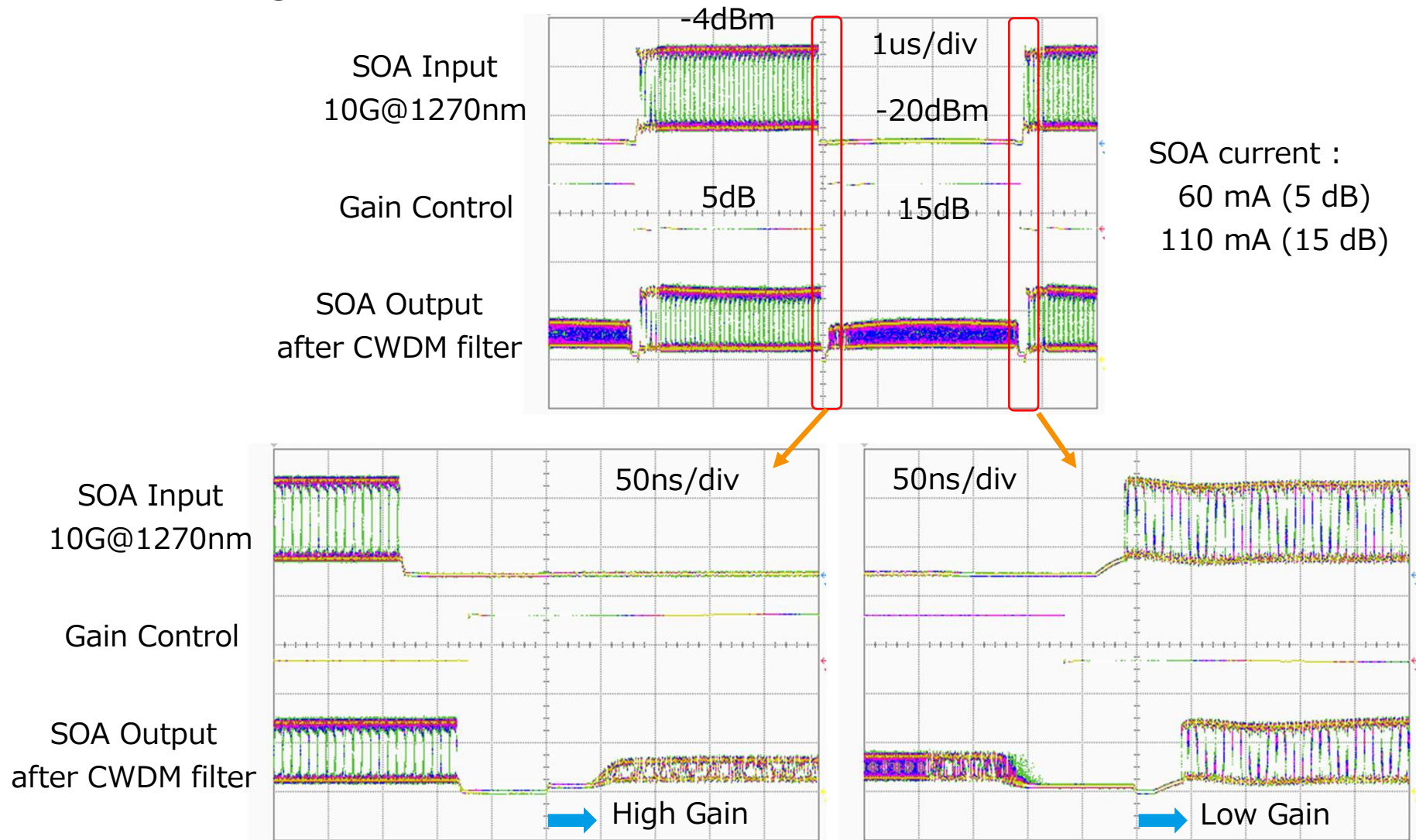
Concept of SOA Gain Control

- OLT receives weak US from ONU1 that receives weak DS and loud US from ONU2 that receives loud DS. ONU can estimate OLT received level by RSSI.
- In case of upstream dual rate operation, OLT doesn't detect the rate of each burst signals. Discovery windows for 10G and 25G can be opened at different time. ONU knows the own rate and respond to the proper window.
- Similarly, in case of upstream SOA gain control, OLT doesn't need to detect the strength of US and determine SOA gain. Discovery windows for weak/loud signal (high/low SOA gain) can be opened at different time.



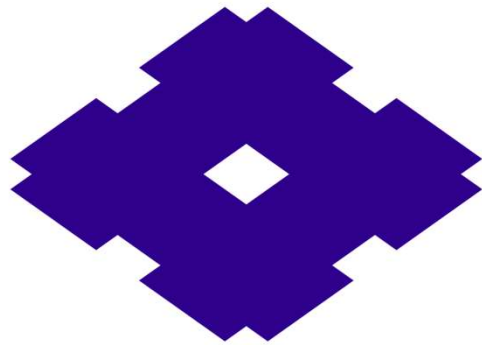
Example of SOA Gain Switch in Burst Mode (Updated)

- SOA gain can be switched before burst reception (no damage issue) by predetermined gain control.



Summary

- Proposed the concept of SOA gain control for OLT preamplifier.
- 25G-EPON would not need SOA preamplifier, but the separate discovery option based on ONU's RSSI would help the future 50G/100G-EPON OLT operation.
- Multi-level SOA gain control is possible. 2 or 4 levels would be enough.
- Need to define new fields in discovery handshake messages.



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