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SOA Gain Equalization

IEEE 802.3ca

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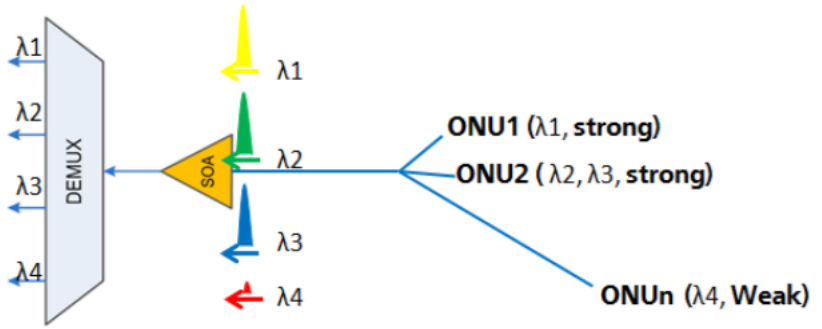
Problem: SOA gain shared unevenly by US wavelength channels

- Described in liudekun_3ca_1_0517.pdf
- Identified as cross gain modulation

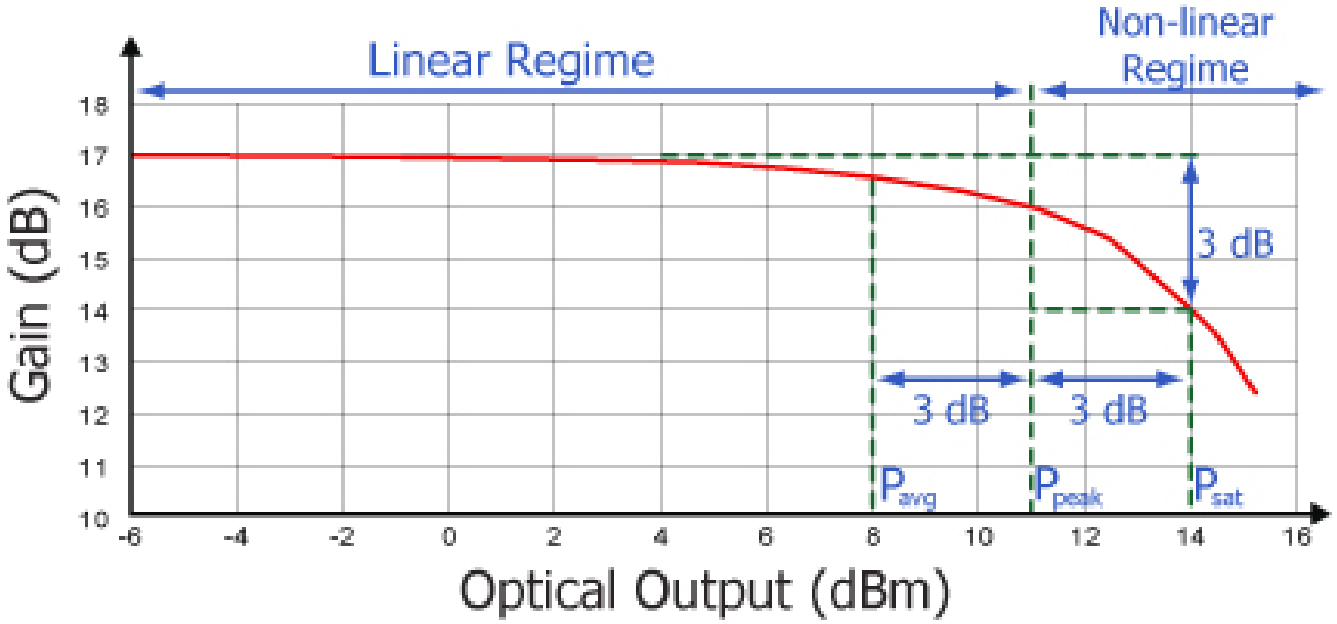


If three strong signal together with one weak signal arrive the OLT at the same time, the SOA will become saturated and can't provide enough gain for weak signal

- Gain, output power, and OSNR seen by each wavelength depends on power of other wavelengths

Constant gain vs. constant power amplifiers

- Constant gain
  - Linear regime
  - Different channel powers not an issue
- Constant power
  - Saturation regime
  - Weaker channels in presence of strong channels
    - ➢ See less gain
    - ➢ Lower output power
    - ➢ Lower OSNR



Courtesy Thorlabs

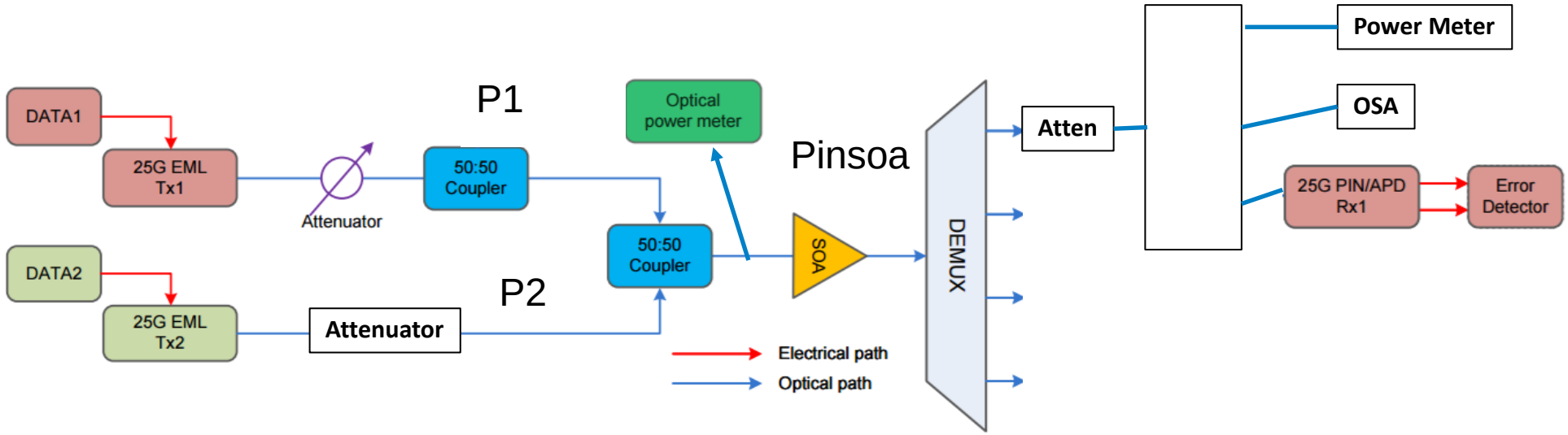
Possible solutions

- One SOA per US wavelength in OLT
- Idler tones in US
- Limit range of OLT Rx powers
  - Wavelength selective switch in OLT
  - Attenuator in ONU Tx

Limit range of OLT receive powers

- We want to limit range of Rx powers
- Easiest to attenuate higher powers
- 802.3ca will specify min Rx power
- Can also specify max Rx power to keep SOA in linear regime

Requested experiments



- Set attenuators so
  - Pinsoa = P1+P2 < Ppeak (stay in linear regime)
  - P1-P2 is 0 dB, 10 dB, 20 dB, etc.
- Measure OSNR on OSA
- Sweep attenuator after DEMUX to get BER vs. received power

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Thank You

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