NOKIA

25G power budget: 1st iteration

Ed Harstead, member Fixed Networks CTO
Dora van Veen, Vincent Houtsma, Bell Labs

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Downstream

10G EPON PR30 downstream

AVP_{min} = 2 dBm
OMA_{min} = 3.91 dBm

Loss budget = 29 dB

TDP = 1.5 dB

Receiver sensitivity specified at ER=9 dB

$Rx\ Sens_{max}$ = -28.5 dBm
$OMA\ Rx\ Sens_{max}$ = -26.59 dBm

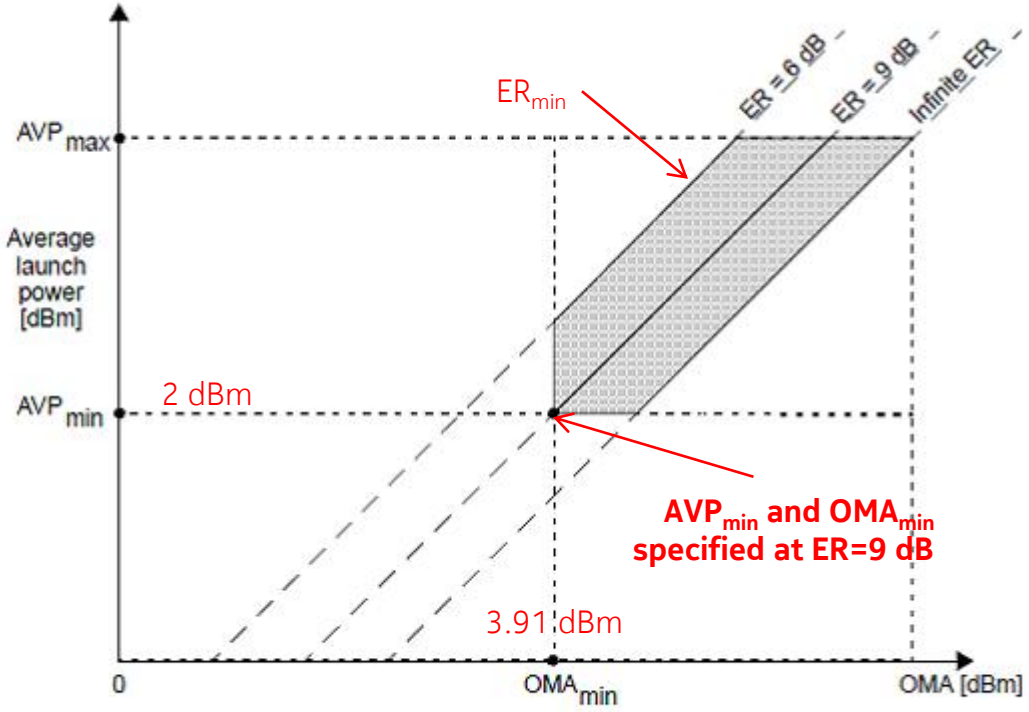
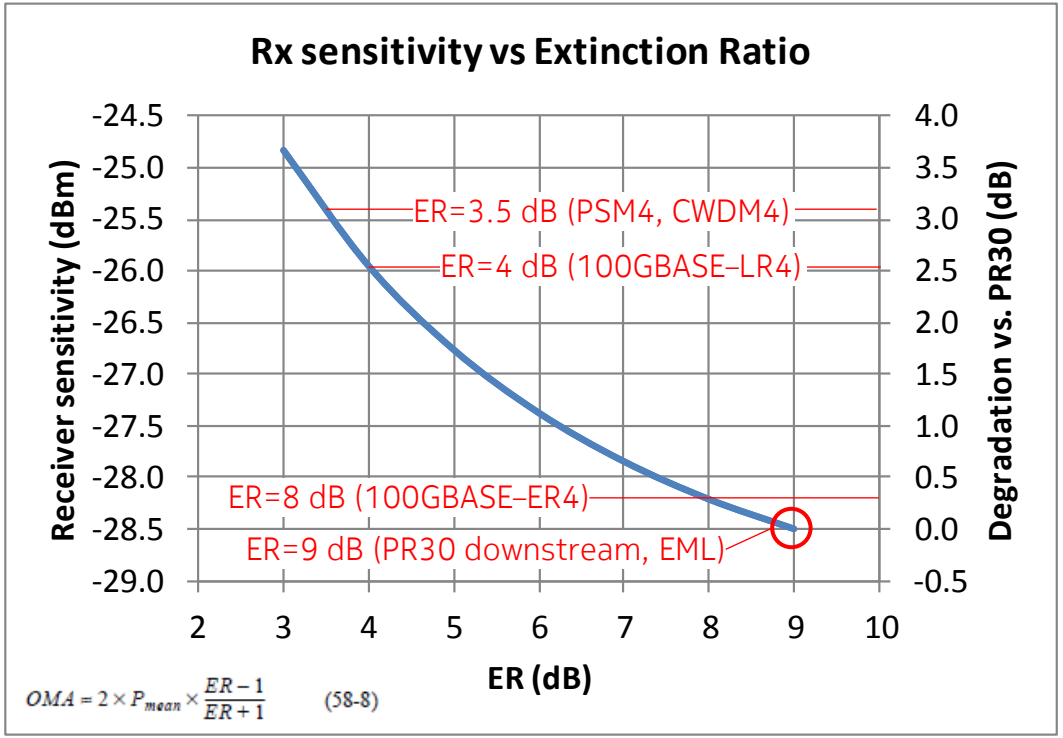


Figure 75–4—Graphical representation of region of PR–D type transmitter compliance

Degradation of ONU receiver sensitivity for ER<9 dB

If DML, and ER=4 dB, then ~2.5 dB degradation in PR30 receiver sensitivity

A DML needs ~2.5 dB more launch power to break even with an EML.



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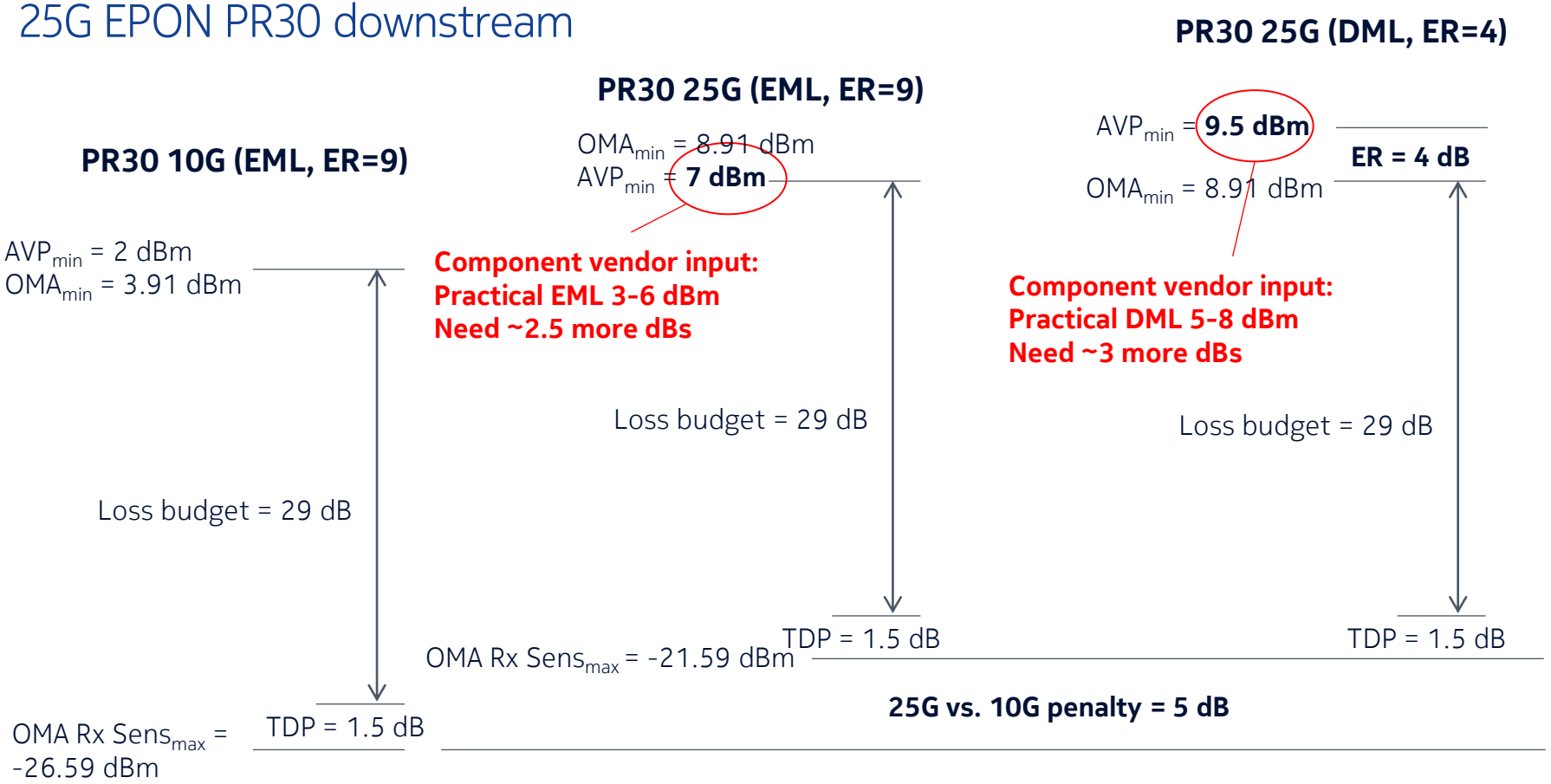
25G EPON PR30 downstream



Where to find more dBs for downstream

Parameter	DML scenario	EML scenario
Additional dBs required **(t.b.c.)**	3 dB	2.5 dB
Receiver sensitivity improvement*	1 dB	1 dB
Transmitter ER improvement	1 dB (ER = 4→5.5 dB)	
TDP reduction **Need analysis, λ dependent**	**?**	0.5 dB**?** (O-band instead of C-band)
Gap = Required FEC coding gain improvement **(t.b.c.)**	1.0 dB	1.0 dB **Future contributions**

*For example: **NeoPhotonics**

- Design version: NEO latest NG-EPON 10G/10G ONU transceiver design;
- Sample size: 50pcs;
- Testing temperature: -5C, 25C and 70C
- Testing result:
- APD Sensitivity: no yield impact when changing the spec from PR30 (Meet -28.5dBm max at -5C, 25C, 70C) to PR40 (Meet -29.5dBm at -5C, 25C, 70C) when using the latest NEO APD

25G EPON PR30 downstream pentagon diagram, 1st iteration

EML
ER = 9 dB

OMA_{min} = 6.41 dBm
AVP_{min} = **4.5 dBm**

TDP = 1.0 dB

DML
ER = 5.5 dB

OMA_{min} = 6.91 dBm
AVP_{min} = **6.5 dBm**

TDP = 1.5 dB

Loss budget = 29 dB

OMA Rx $Sens_{max}$ = -23.59 dBm

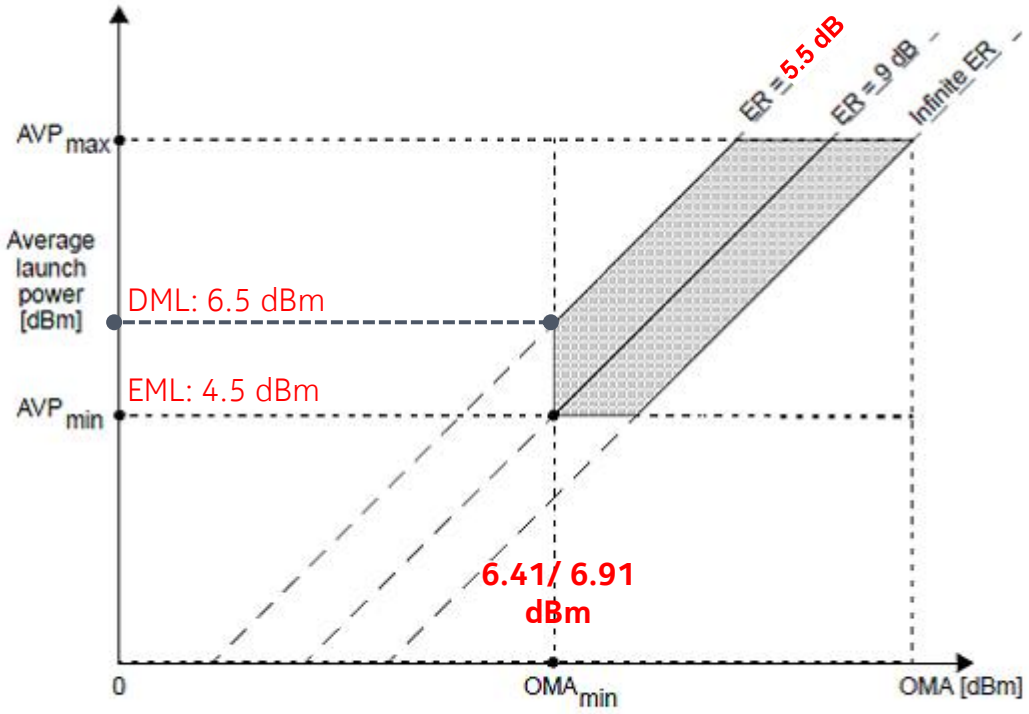


Figure 75–4—Graphical representation of region of PR–D type transmitter compliance

Upstream

10G EPON PR30 upstream

AVP_{min} = 4 dBm
OMA_{min} = 4.78 dBm

Loss budget = 29 dB

Receiver sensitivity specified at ER=6 dB

$Rx\ Sens_{max}$ = -28 dBm
$OMA\ Rx\ Sens_{max}$ = –27.22dBm

TDP = 3.0 dB*

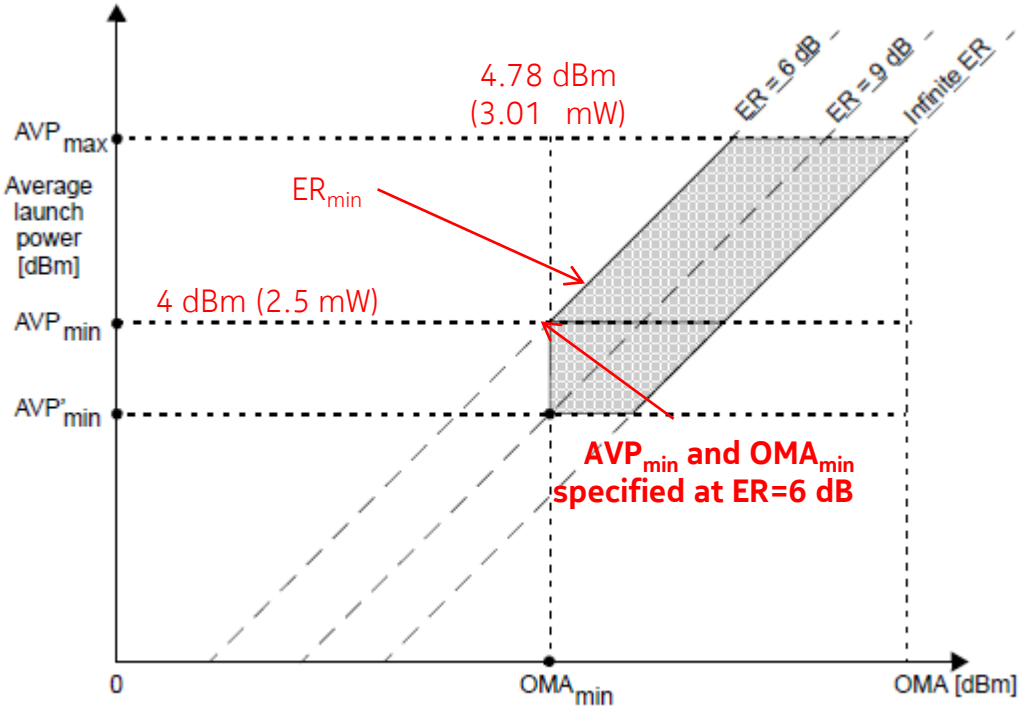


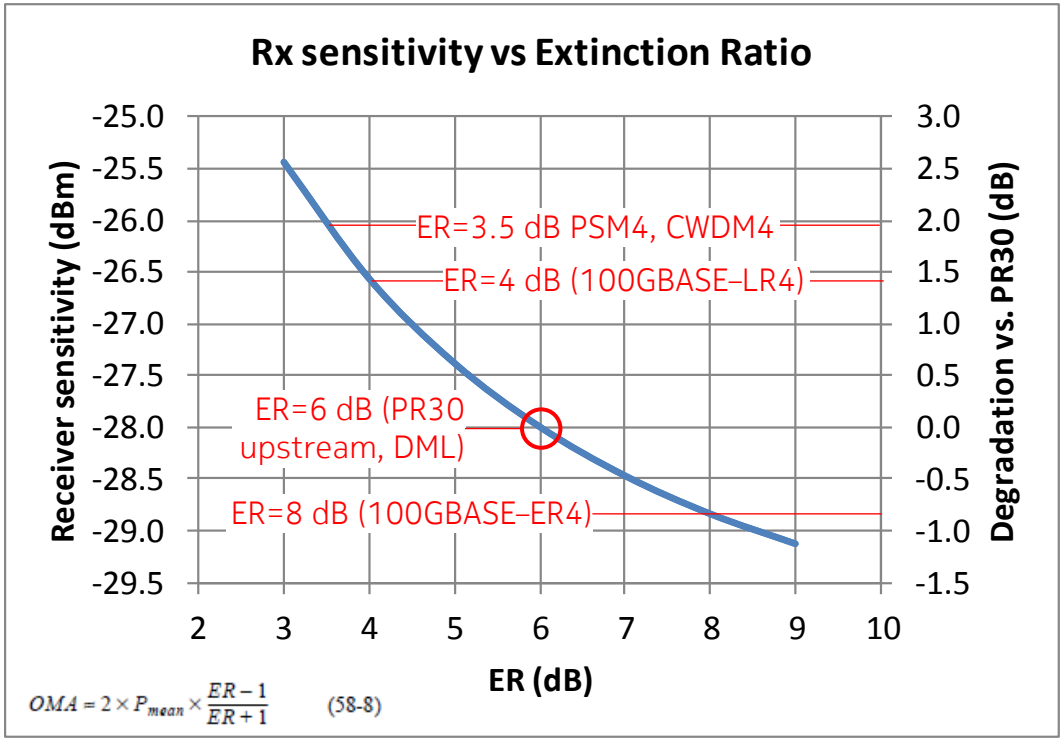
Figure 75–5—Graphical representation of region of PR–U type transmitter compliance

*If a transmitter has a lower TDP, the minimum transmitter launch OMA (OMAmin) and average minimum launch power (AVPmin) may be relaxed by the amount 3.0 dB – TDP.

Degradation of OLT receiver sensitivity for ER<6 dB

If DML, and ER=4 dB, then 1.5 dB degradation in PR30 receiver sensitivity

An EML would gain about 1 dB improvement



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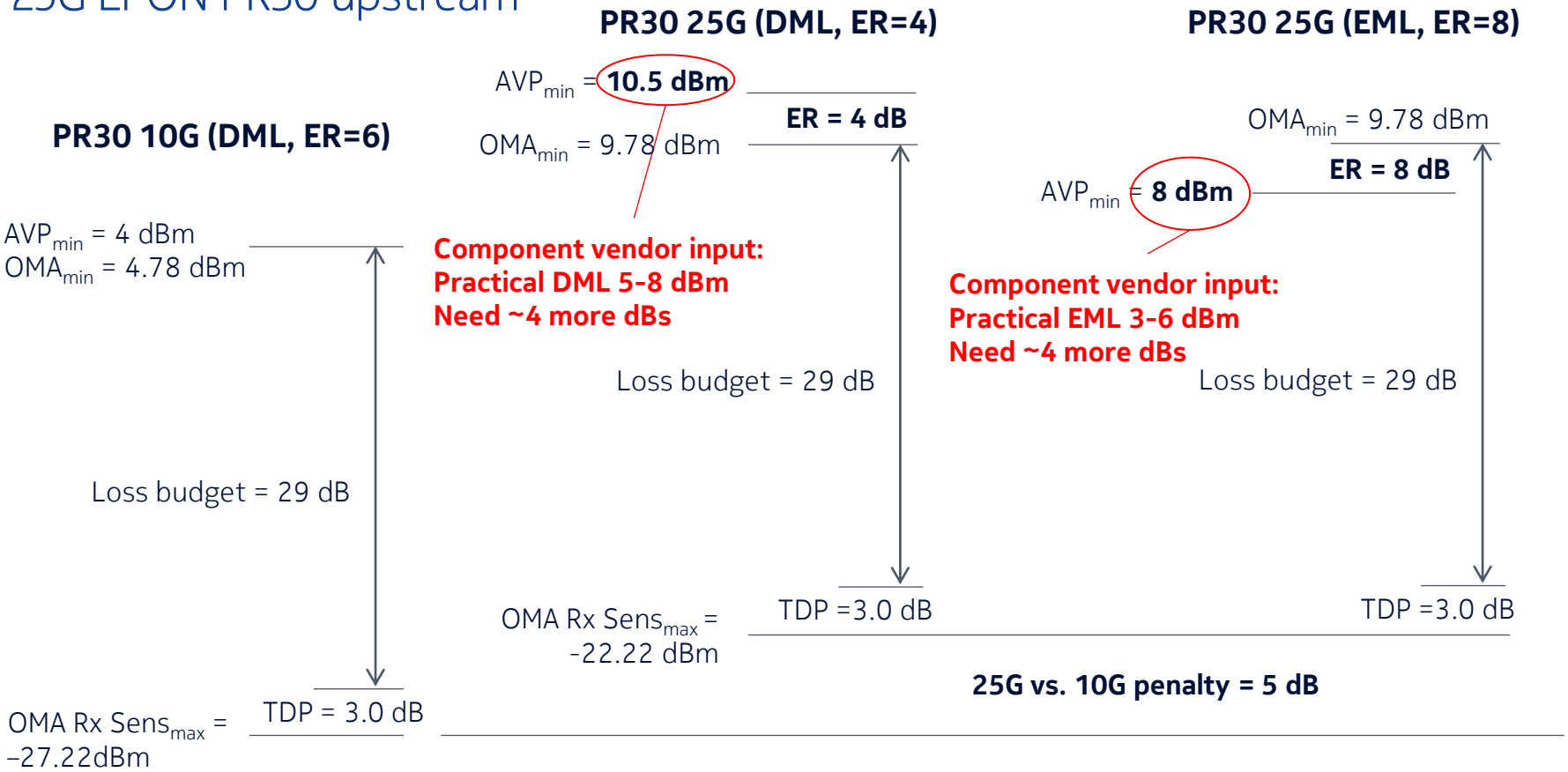
25G EPON PR30 upstream



Where to find more dBs for upstream

Parameter	DML scenario	EML scenario
Additional dBs required **(t.b.c.)**	4 dB	4 dB
Receiver sensitivity improvement	2 dB (SOA+p-i-n?)	2 dB (SOA+p-i-n?)
Transmitter ER improvement	1 dB (ER = 4→5.5 dB)	
TDP reduction **Need analysis, λ dependent**	**?**	1.0 dB (EML vs. DML)
Gap = Required FEC coding gain improvement	1.0 dB	1.0 dB **Future contribution**

100G EPON

100G EPON will need optical amplifiers

*http://www.ieee802.org/3/bs/public/14_09/cole_3bs_02b_0914.pdf (for unidirectional mux or demux. Loss could be higher for bidirectional mux/demux)