Considerations of 25GBASE-BR40 PMD

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

Motion#4 in Salt Lake City meeting

Motion # 4

Move to use the existing 10GBASE-ER, 25GBASE-ER, and 50GBASE-ER optical Tx and Rx characteristics for the 10GBASE-BER, 25GBASE-BER, and 50GBASE-BER optical Tx and Rx characteristics (tables 158-12, -13; 159-6, -7; 160-6, -7) with the exception of operating wavelength, and with the caveat that TDP/TDEC(Q) will need to be re-evaluated.

Moved: Frank Effenberger Second: Han Hyub Lee

For: 8 Against: 0 Abstain: 0

Technical (≥ 75%) Motion Passed

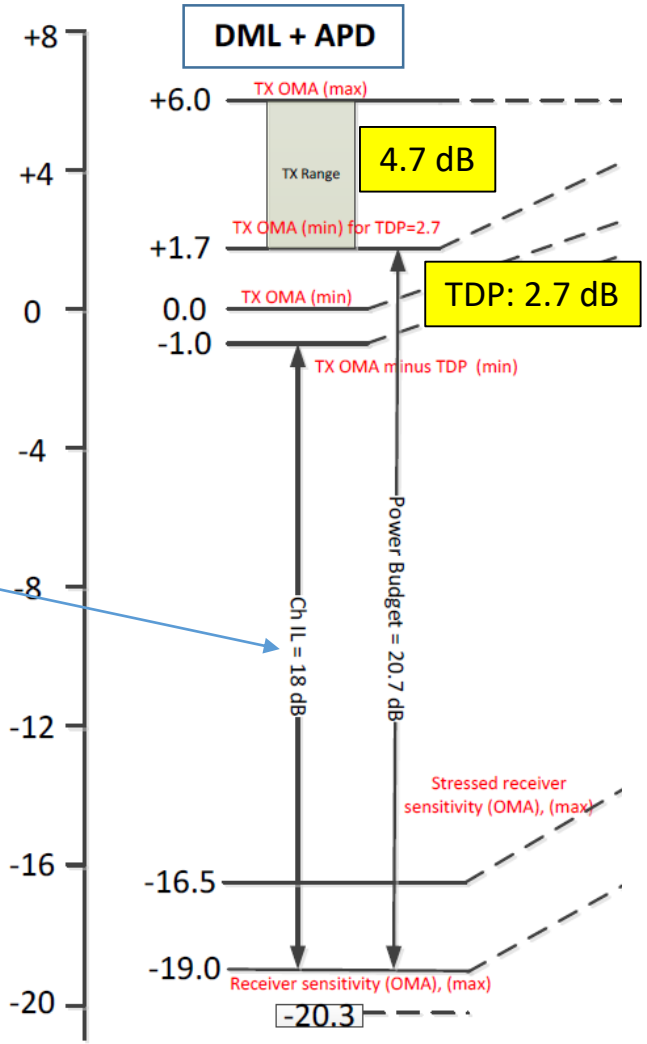
- From the motion#4, 25GBASE-BER (or BR40) may use same PMD parameter values of 25GBASE-ER. But, BR40 power budget have a GAP over 5 dB against 25GBASE-ER.
- In this contribution, we discuss three approaches to compromise the GAP between 25GBASE-ER and 25GBASE-BR40 power budget.

25GBASE-ER Power Budget

Table 114–8—25GBASE-LR and 25GBASE-ER illustrative link power budgets

Parameter	25GBASE-LR	25GBASE-ER		Unit
Power budget (for maximum TDP)	9.7	20.7		dB
Operating distance	10	30	40[a]	km
Channel insertion loss	6.3[b]	15[b]	See 114.9[a]	dB
Maximum discrete reflectance	See 114.10	See 114.10		dB
Allocation for penalties[c] (for maximum TDP)	3.4	20.7 minus maximum channel insertion loss per Table 114–12		dB
Additional insertion loss allowed	0	Maximum channel insertion loss per Table 114–12 minus 15	0	dB

18dB



Channel insertion loss
= Fiber loss + Connector loss + Margin

http://www.ieee802.org/3/cc/public/16_10/lewis_3cc_01_1016.pdf

25GBASE-BR40 Power Budget

Channel insertion loss

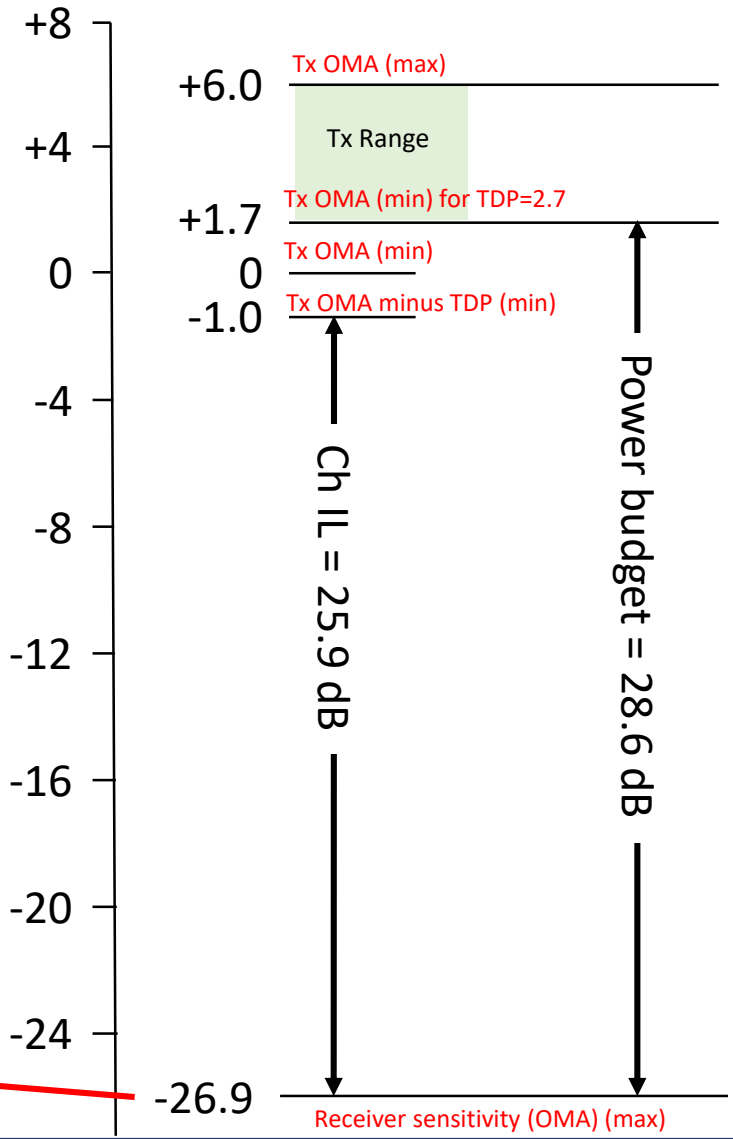
Distance (km)		40
6 Connector loss	0.35 dB each x 6 per link	2.1
Splice loss	0.1 dB each x 1/km	4
Fiber loss	0.47 dB/km	18.8
Repair/ageing margin	1 dB	1
Total		25.9

The 40 km optical access objective
http://www.ieee802.org/3/cp/public/1906/OpticalAccess40km.pdf

- Korea operator's comments.

① It is excessive to estimate the number of splicing to be one per km.

AVP=-27.7dBm@ER=4dB



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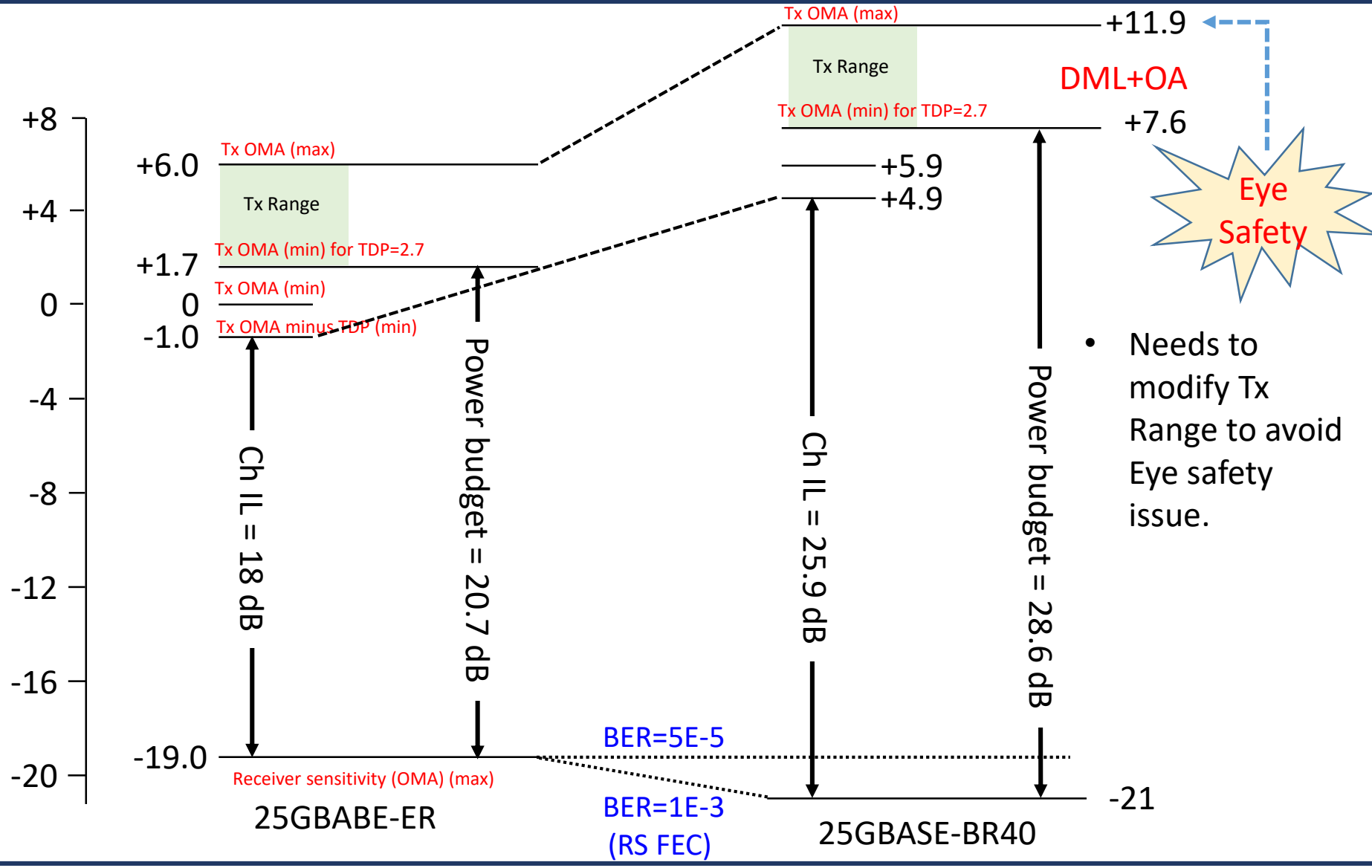
Approach 1: OA and FEC (BER=1E-3)



- Needs to modify Tx Range to avoid Eye safety issue.

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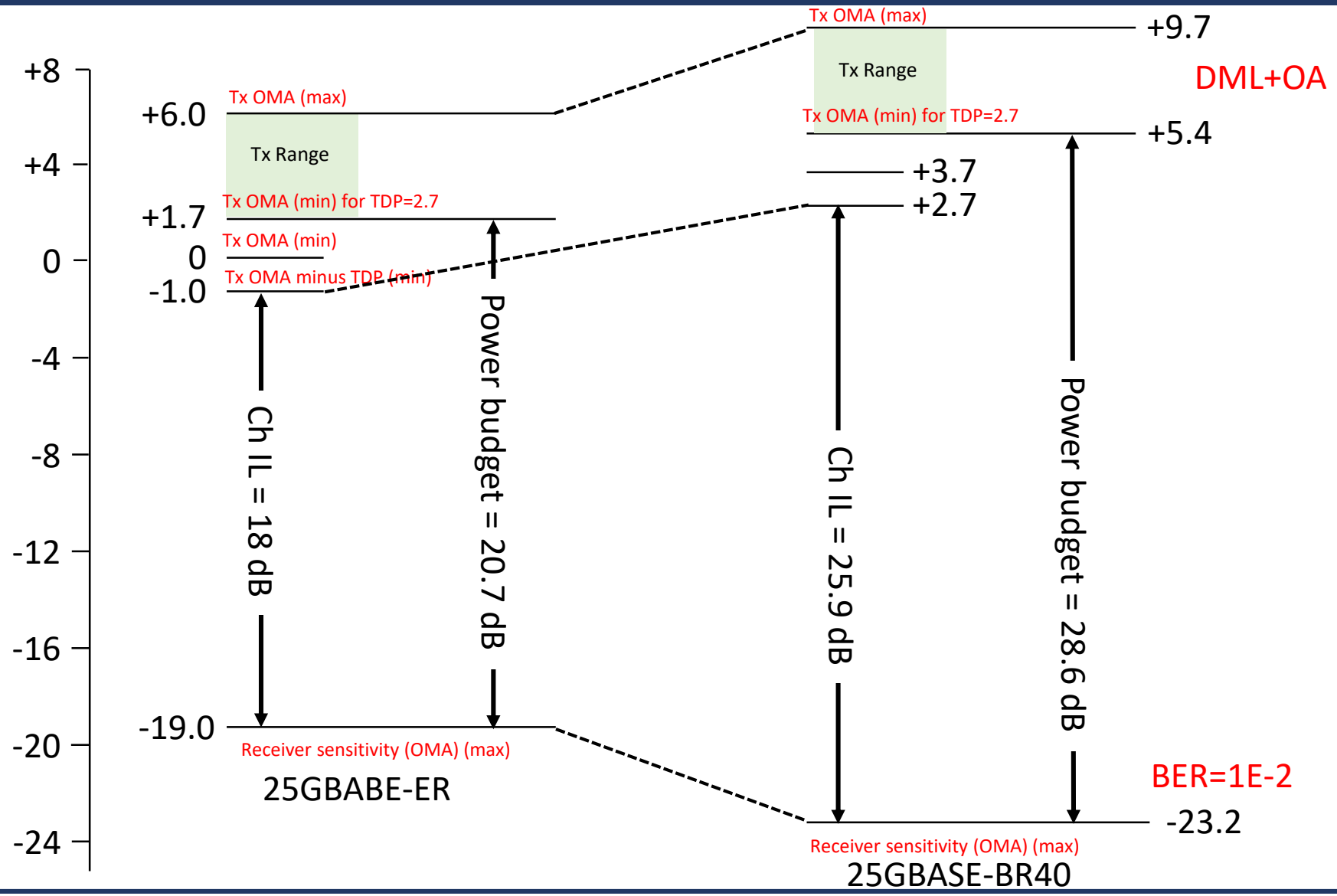
Approach 2: OA and Strong FEC (BER=1E-2)



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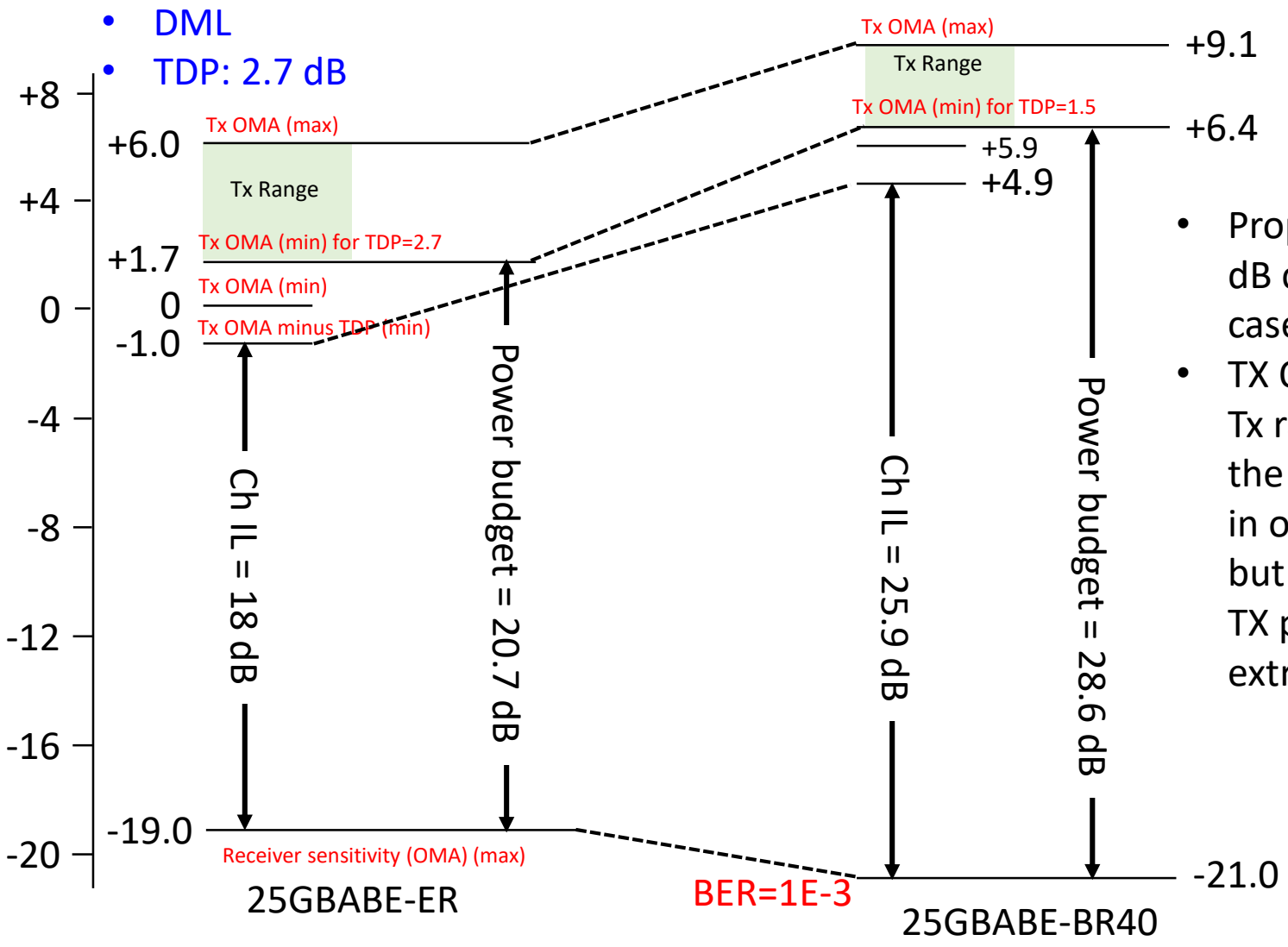
Approach 3: EML, Reduced TDP, and FEC (BER=1E-3)

- DML
- TDP: 2.7 dB



- Propose TDP is 1.5 dB considering EML case.
- TX OMA is 2.7dB of Tx range is less than the 5dB range used in other standards, but such high 25G TX power is extremely unlikely.

Summary

Approach	DML	EML	APD	OA	FEC BER=1E-3	FEC BER=1E-2
1	O		O	O	O	
2	O		O	O		O
3		O	O		O	

- FEC and APD must be used to support high power budget.
- Using EML will be better than OA+DML for BOSA implementation.
- Need to more discussion about TDP value and Tx Range if EML solution is selected.

Thanks!