

Choice of parameters for single mode serial PMDs

Krister Frojdh

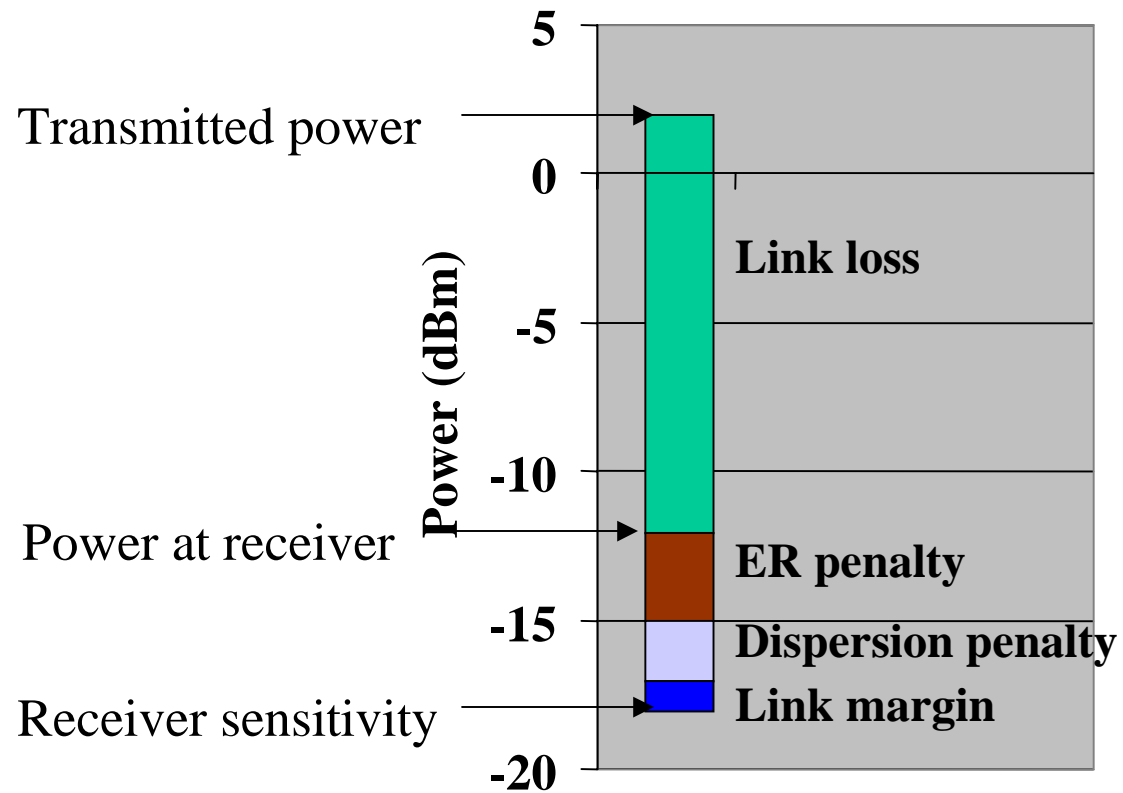


krister.frojdh@optotronic.com

Choice of specification

- ITU uses parameters relevant for external modulators
 - Average power, ER and dispersion penalty for a given dispersion
- Can 10GE make something more intelligent?
 - What is the right choice of parameters for a 10 GB/s 40 km single channel link?
 - What can be gained?

Link budget



System aspects

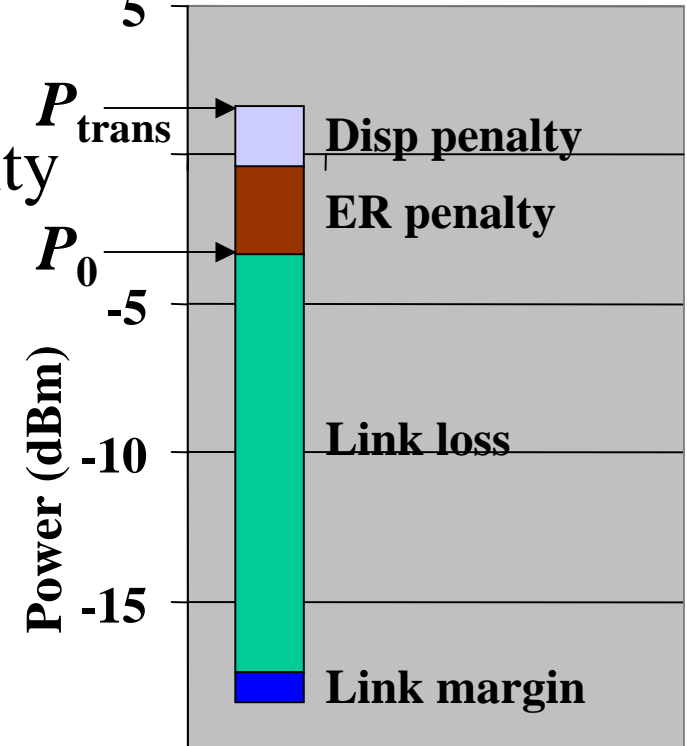
- Total penalty (dispersion penalty + extinction penalty) relevant parameter.
- A rather high total penalty can be accepted as long as the transmitter has higher output power
- Maximum total penalty needs further study but at least 6 dB seems OK.

Better parameters

- BETTER: Use of OMA instead of P_{av}
- BEST: Define transmitter minimum output power as sum:

$$P_{trans} = P_0 + \text{Disp Penalty} + \text{ER penalty}$$

- P_0 is power needed for ideal transmitter.
- Dispersion penalty and ER penalty is the measured penalty for this transmitter.



What do we gain?

- Lower transmitter cost due to higher yield
- Longer distance possible
- Direct modulated lasers possible: lower cost and +40 km handling
- Simpler driving electronics
- **No disadvantage for current ITU transmitters**

Further work

- Find the maximum allowable power penalty
- Find the cost-minimum for trade-off between receiver sensitivity and transmitter power.

For more details

- See my reflector contribution
- Check
 - S. Mohrdiek, H. Burkhard, F. Steinhagen, H. Hillmer, R. Lösch, W. Schlapp and R. Göbel. "10-Gb/s standard fiber transmission using directly modulated 1.55- μ m quantum-well DFB lasers", *IEEE Photon. Technol. Lett.*, vol 7, pp. 1357-1359, 1995
 - J. Binder and U. Kohn "10 Gbit/s-dispersion optimized transmission at 1.55 μ m wavelength on standard single mode fiber", *IEEE Photon. Technol. Lett.*, vol 6 pp 558-560 1994
 - O. Kjebon and E. Almström "Transmission over 125 km standard fiber at 10 Gbit/s with two-section DBR lasers" ECOC 99, Nice (France) Sept 99.