Interferometric noise
– 1300 Serial –

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What is interferometric noise

- A delayed pulse from receiver, transceiver and connectors reflectors will interfere with the signal.
Coherence not really needed

• If frequency difference between the direct signal and the reflected signal is below the receiver bandwidth, interference will be a problem.

• For 10 GE, this is very probable as 10 GHz = 0.05 nm
Simple calculation

• Ignore connector reflections and higher order reflections.


• NOT really worst case (explained later)

\[ P_Q = A \frac{OMA_{TX}}{2} \delta \left[ 1 - 2A \sqrt{R_{RX} R_{TX}} \frac{\sqrt{2ER[\delta(ER-1)+ER+1]}}{\delta(ER-1)} \right] \]
1300 nm: results

Link Margin $M$ (dB)

Attenuation (dB)

No reflection

$R_{TX}=R_{RX}=-12$ dB

ER=10 dB

ER=4 dB

ER=3 dB

ER=2 dB

TX=

RX=-12 dB
1550 nm: results

$R_{TX} = -12 \text{ dB}, R_{RX} = -26 \text{ dB}$
To find really worst case

- Return loss of transmitter allowed to be worse than 12 dB
- Connector reflection must be included: 12 dB and 26 dB generate up to 10.4 dB with interference
- Overshoot in signal possible
- Base-line wander due to interferometric noise
What to do about 1300 nm serial

- At least 20 dB return loss for both Rx and TX, ER min 3 dB