Effect of Transmit Distortion On Receiver SNR

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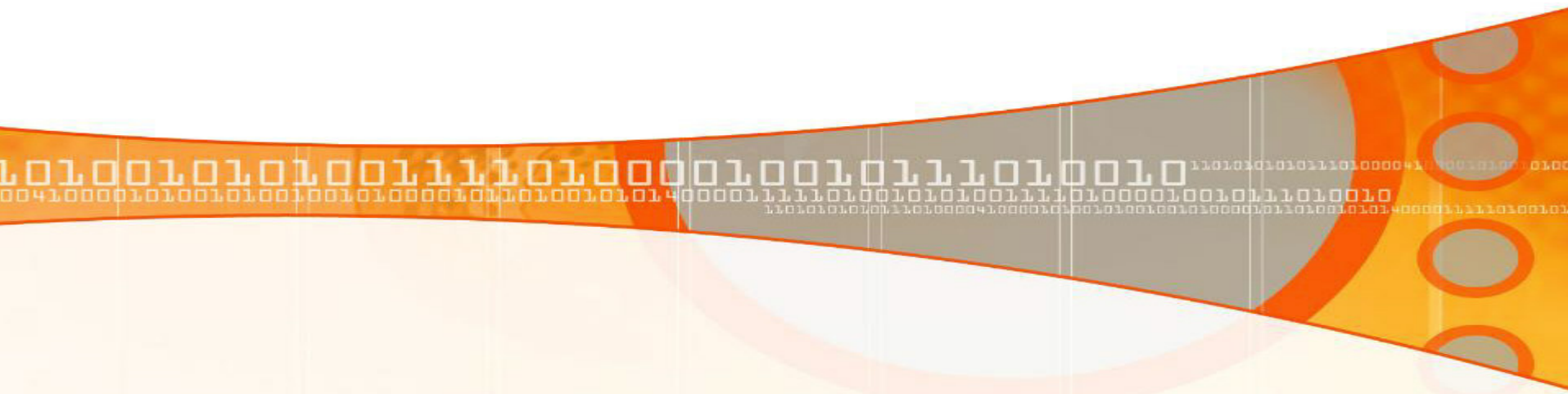


IEEE 802.3an: 10BASE-T Task Force

Purpose

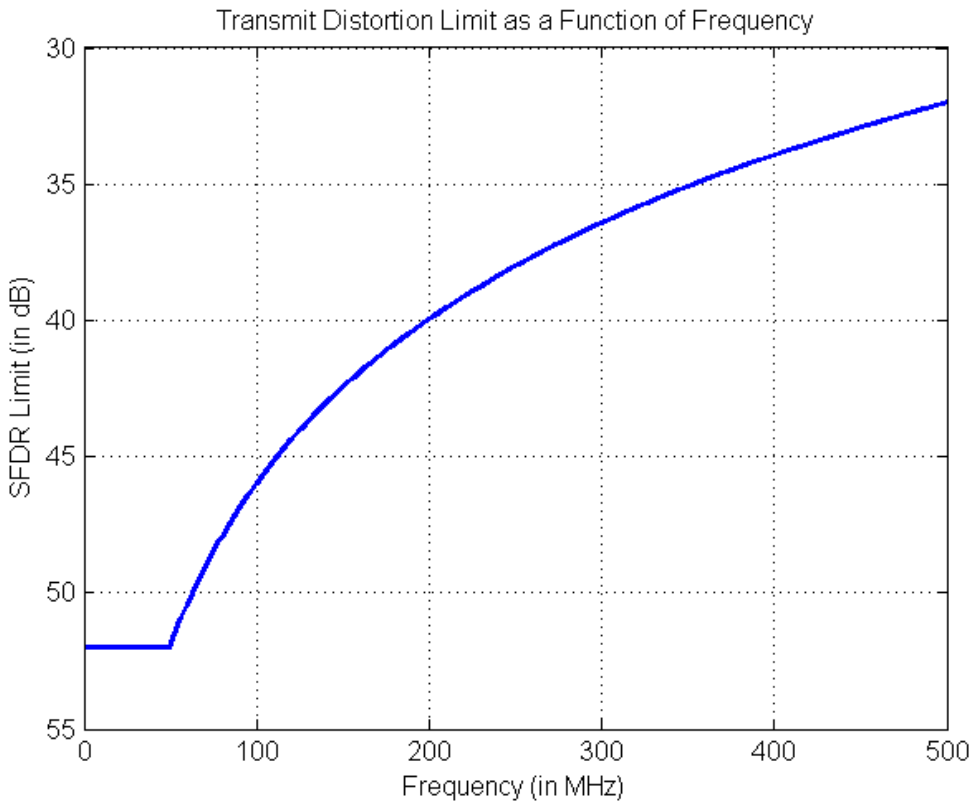
- Specify the transmit distortion model required for interoperability
- SFDR model is specified in D1.3 Sec 55.5.5
  - Equation 55-7 has 4 TBDs
  - We recommend values for all 4 TBDs
- The values are decided based on the receiver SNR loss
  - Not based on transmit echo cancellation requirement

Simulation Models

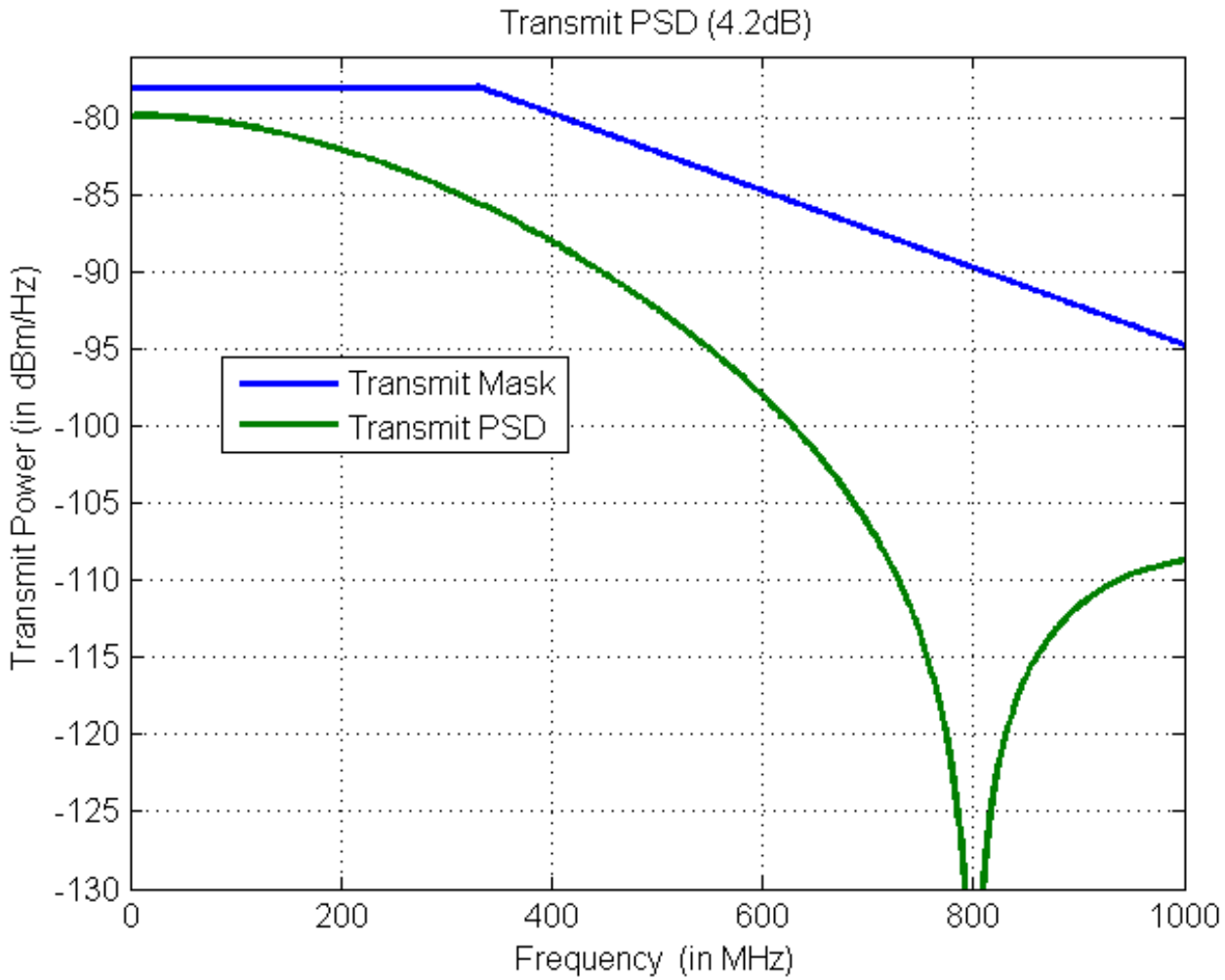
- Transmit distortion Model
  - SFDR >= max(X_nonlin, X_nonlin – X_nslope *log10(f/f1)), f>fo
  - fo=1 MHz, f1 = 50 MHz
  - X_nslope = 20 dB
  - X_nonlin variable
- Transmit PSD
  - Total power within 400MHz band: 4.2dBm
  - Transmit Filter: Second order with fc at 500MHz
  - Transformer: first order lower cutoff at 200KHz
- Impediments
  - ANEXT as per D1.3, (3.5 dB adjustment)
  - AFEXT as per D1.3, (4.0 dB adjustment)
  - All other impediments is modeled as -140dBm/Hz white noise
- Channel Model: 100m Class E (model 3)

Transmit Distortion Model

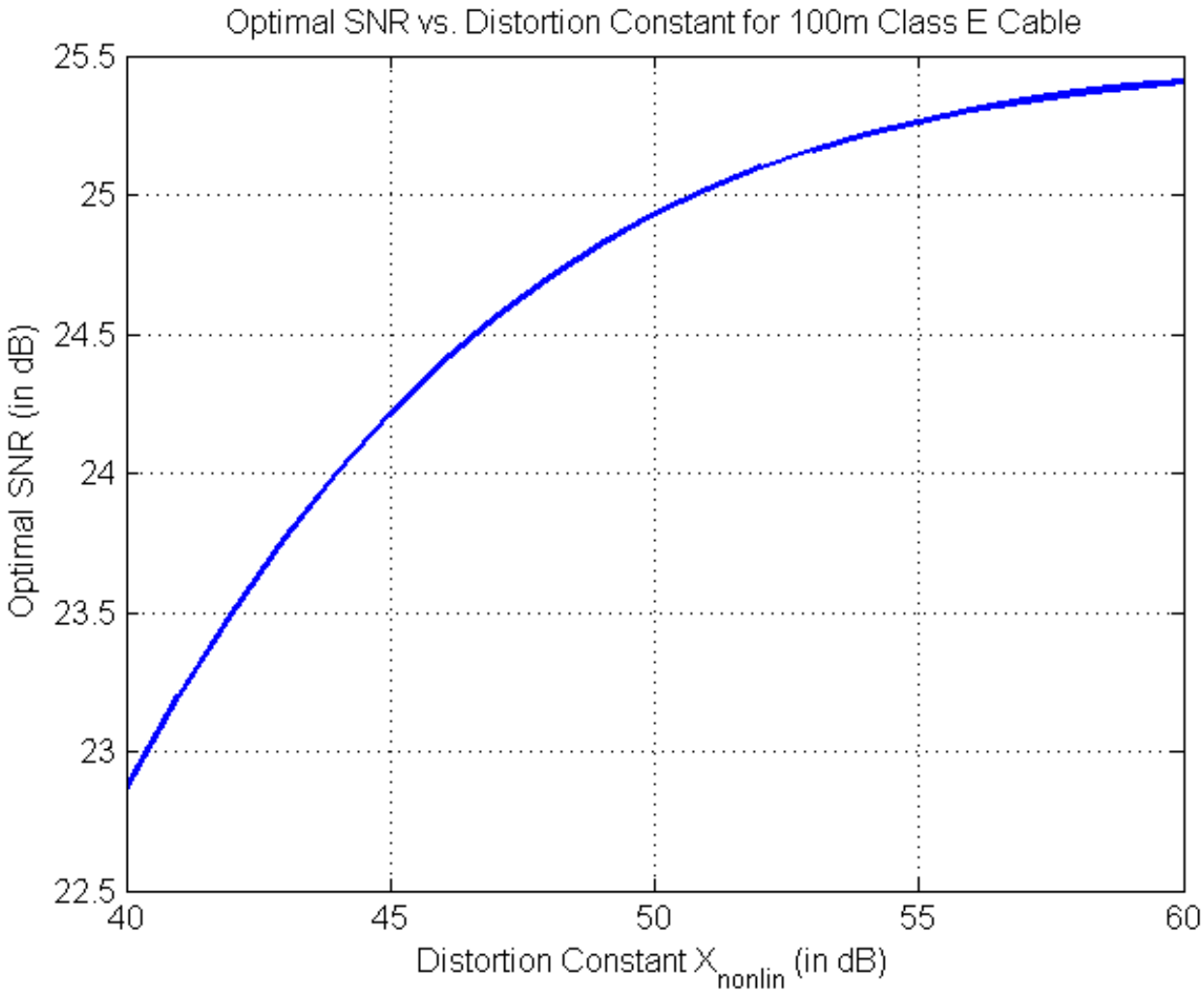
- X_nonlin =52 dB



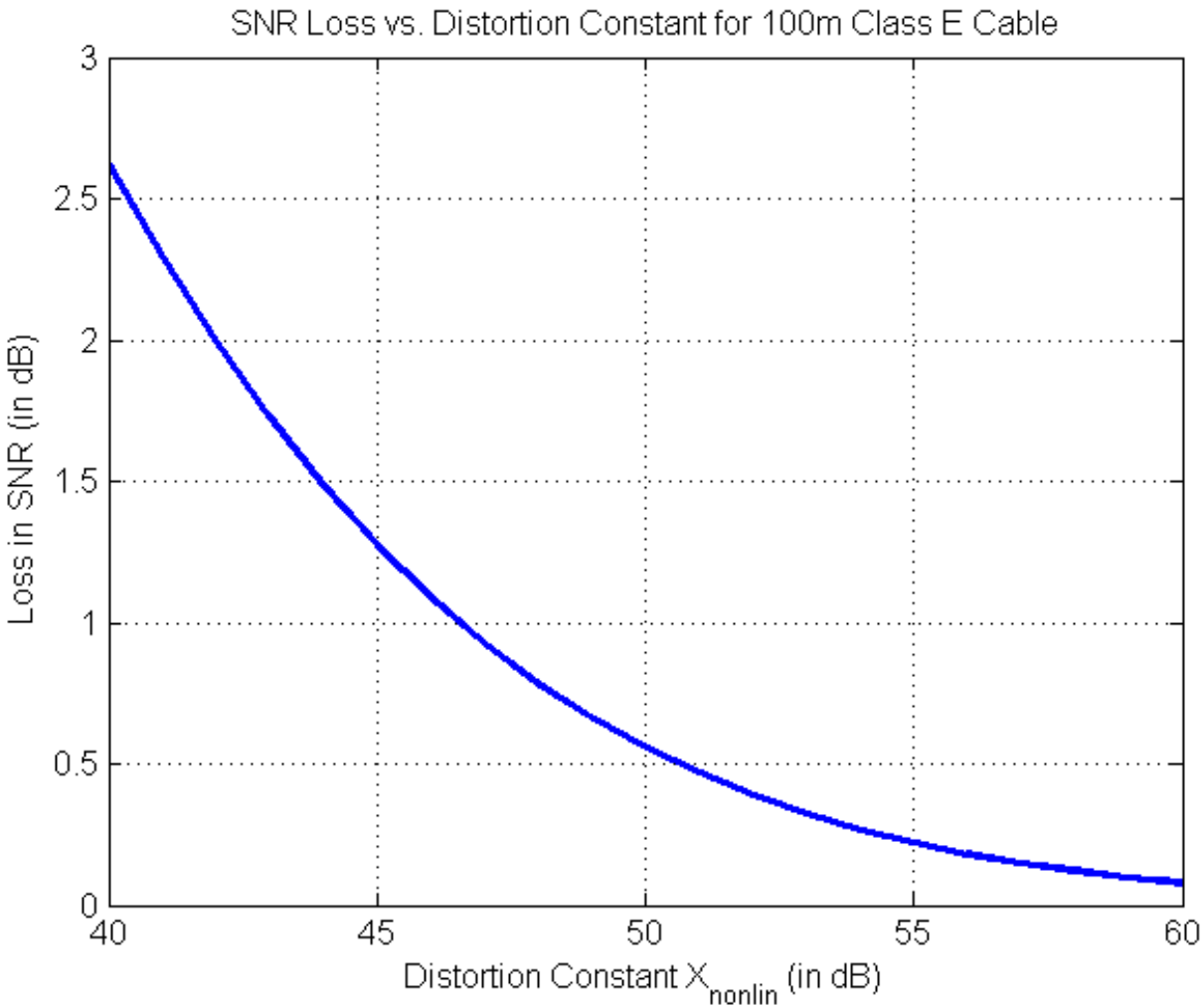
Transmit PSD



Optimal SNR Vs. Distortion Level



SNR Loss Vs. Distortion Level



Observations

- For X_nonlin < 50 dB
  - SNR Loss > 0.5 dB
- For SNR loss to be < 0.4 dB
  - X_nonlin = 52 dB
- For SNR loss to be < 0.3 dB
  - X_nonlin = 53.5
- We recommend that the following values are adopted for the Draft
- Xnonlin = 52 dB
- X_nslope =20 dB
- f1 = 50 MHz, fo = 1 MHz

Q&A

Thanks!