Challenges with dSNDR Measurement

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Overview

- Current dSNDR test method
- dSNDR problem statement
- dSNDR specification
- SNDR correlation with channel IL
- Summary.

Reason to Use dSNDR

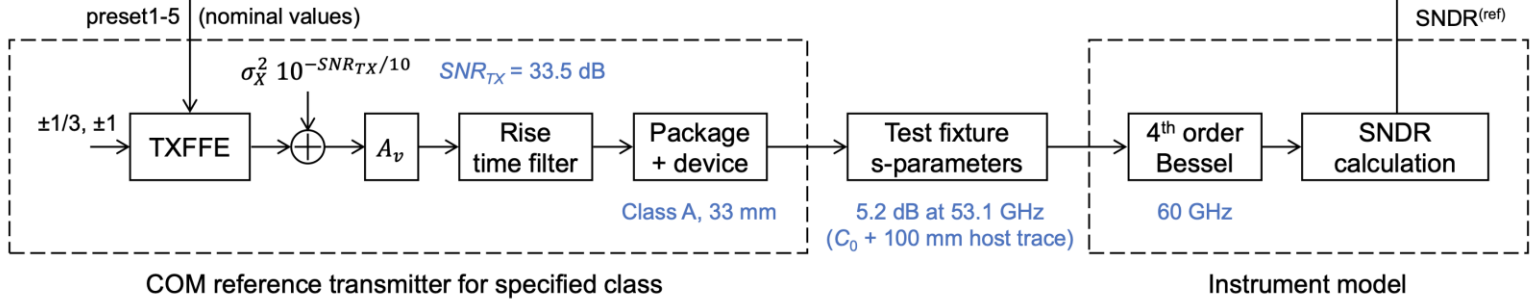
- **dSNDR was proposed healey_3dj_01_2411 and adopted by comment 206 into D1.3**
  - The reason Tx dSNDR was introduced was because transmitter were unable to meet the SNDR over the range of TxFFE taps

Coefficient initial conditions (nominal values)

Preset	c(−3)	c(−2)	c(−1)	c(0)	c(1)
1	0			1	0
2	0	0	0	0.5	0
3	0	0	−0.075	0.75	0
4	0	0.05	−0.2	0.75	0
5	−0.025	0.075	−0.25	0.65	0

Example calculation results

Preset	SNDR(ref), dB	Min. limit, dB
1	33.5	33.5
2	27.5	
3	30.7	
4	30.2	
5	28.7	



dSNDR Definition in 802.3dj

- **SNDR for reference channel is calculated by cascading measured S-parameters with corresponding package**
  - dSNDR is the difference between SNDR for reference channel and measured channel.

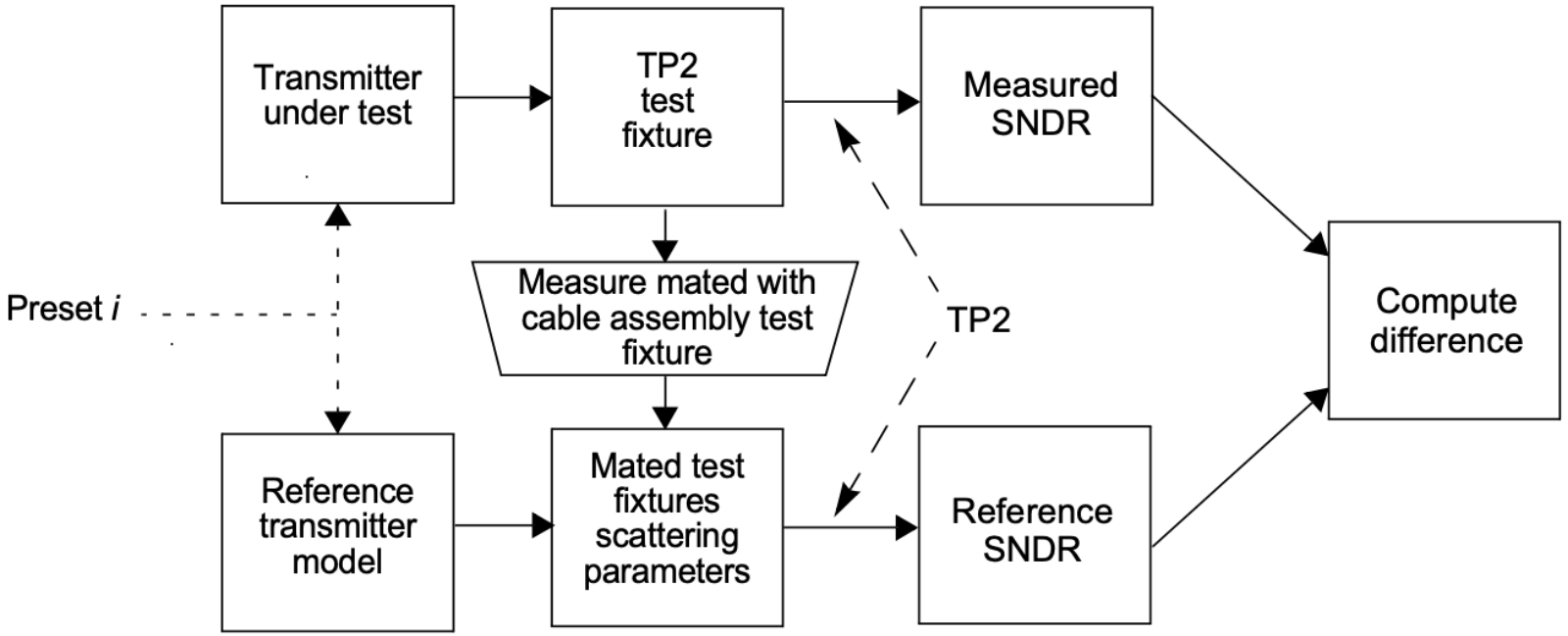


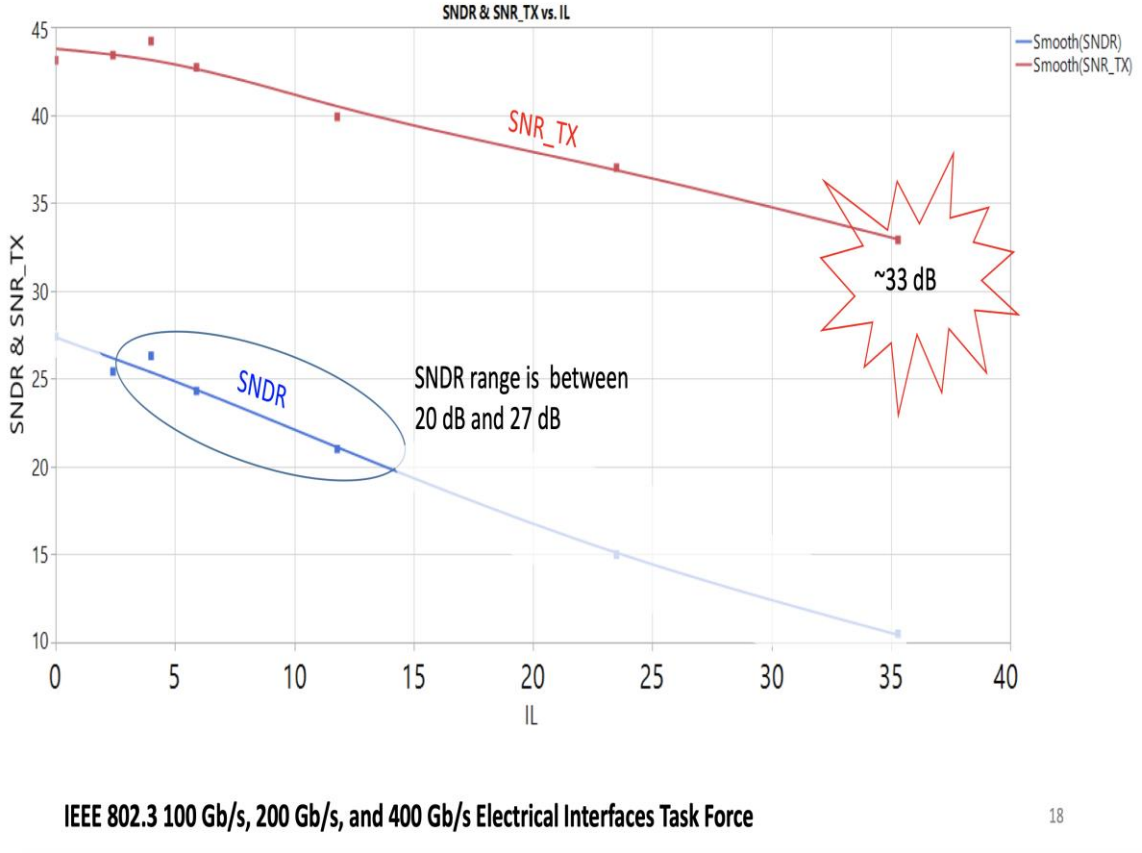
Figure 179–4—Calculation method for transmitter ΔSNDR

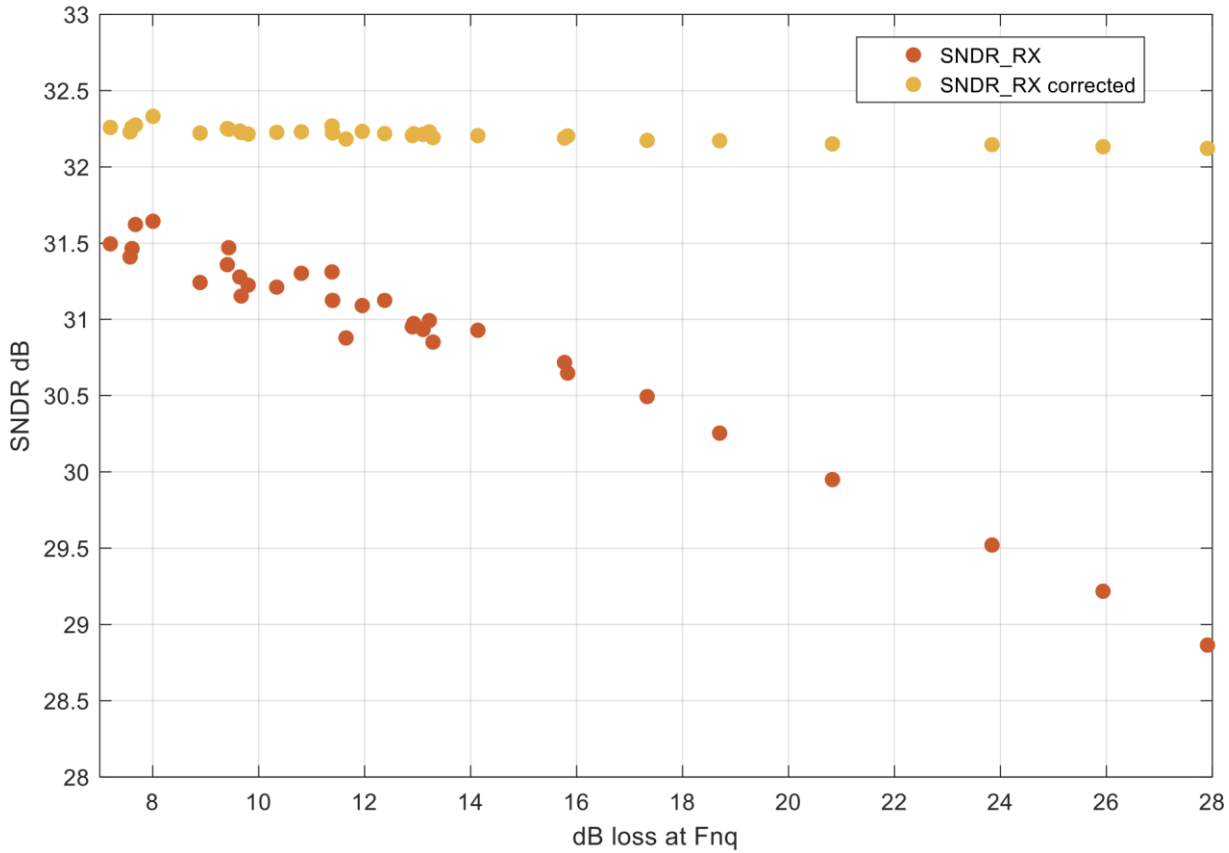
dSNDR Specifications

- **dSNDR is defiend in following 802.3dj clauses:**
  - dSNDR is calculated for Clause 178 KR defines dSNDR at TP0v
    - Measuring S-Parameters on a test board and performing calculation for two packages and two traces is not overlay burdenous
  - dSNDR is calculated for Clause 179 CR defines dSNDR at TP2
    - Require measurement of all host channel (512) then cascaded with two packages and two traces is just impractical
  - dSNDR is calculated for Clause 176C defines dSNDR at TP0v
    - Measuring S-Parameters on a test board and performing calculation for two packages and two traces is not overlay burdenous
  - dSNDR is calculated for Clause 176D defines dSNDR at TP1a
    - Require measurement of all host channel (512) then cascaded with two packages and two traces is just impractical.

SNDR and SNR Relation with Channel IL

- **mellitz_3ck_adhoc_02_090920 (left figure) show that SNDR and SNR have strong correlation to channel IL but updated SNDR definition corrects for IL by referring to transmitter mellitz_3dj_02_2405 (right figure)**
  - Primary reason for variation of SNDR are reflections and noise.





Summary

- **dSNDR as defined require S-Parameter measurement for the DUT channel for test points TP1a and TP2 which is impractical for 512 lanes and tedious**
  - dSNDR may improve SNDR accuracy in ideal world but establishing baseline SNDR overly burdenous
- **Ethernet specifications must be observable and measurable at the port (TP1a or TP2) without requiring to open the box, remove the package, and use a probe station to measure S-Parameters for 512 lanes switch**
- **Task Force need to find an alternate to simplify measurement method of dSNDR**
  - Synthetic channel with given IL currently used MTF is used to measure dSNDR at TP1a and TP2.