# Evaluation of Various channels

Using a Method proposed by Healey and Moore

Charles Moore Avago Technologies

2011 November 1

- This evaluation uses the method and values called out in another presentation at this meeting
- This evaluation has 2 goals:
  - Illustrate use of the evaluation method and the information it provides
  - Provide useful information toward setting taskforce objectives
- I intend to run this evaluation, or a refinement of it, if one is agreed upon, on all channels provided to the study group and task force, and make the results available.

# Simulation parameters used as recommended in healey_01_0111 “Suggested practices of reporting simulation results”:

| | |
|---|---|
| Bit rate | 26 Gb/s |
| Modulation | PAM2 |
| Signaling rate | 26 Gbaud |
| Number of symbols simulated | N/A |
| Target symbol error ratio | $1 \cdot 10^{-12}$ |
| Tx Test pattern | NA |
| Tx output voltage, peak-to-peak | 0.8 V (NEXT is 1.2 V) |
| Tx Deterministic jitter, peak-to-peak | NA |
| Tx Deterministic jitter distribution | NA |
| Tx Random Jitter, RMS | NA |
| Rx Random noise, RMS | Included in implementation noise |
| Rx Deterministic jitter, peak-to-peak | NA |
| Rx Random Jitter, RMS | NA |
| Rx Low-frequency gain | 1.0 |
| Tx, Rx Device package | No loss, indefinite phase |
| Tx, Rx Single ended resistance | 66 Ω (gives magnitude but not phase of device reflection coefficient) |
| Tx, Rx Single ended capacitance | 200 fF (gives magnitude but not phase of device reflection coefficient) |

# Backplane channel Data

Provided by Pravin Patel of IMB
(patel_03_0911.zip)

| dibit gain | available Signal | implementation noise | ILD noise | Re-reflection Tx | Re-reflection Rx | Re-refelction Tx-Rx | total channel noise | FEXT 0 | FEXT 1 | FEXT 2 | FEXT 3 | FEXT 4 | FEXT 5 | FEXT 6 | FEXT 7 | PSXT | total noise | S/N | margin |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 139.984m | 37.292mV | 3.592mV | 1.637mV | 1.818mV | 2.011mV | 1.405mV | 3.464mV | 0.738mV | 1.156mV | 0.177mV | 0.678mV | 0.292mV | 0.823mV | 1.032mV | 0.156mV | 2.056mV | 5.397mV | 6.91 | -1.001mV |

# Color code

| |
|---|
| "passes" margin is > 0 |
| "passes with 3 dB margin" margin > total noise |
| "fails near pass" margin < 0 but S/N>5.02 |
| "fails badly" margin < 0 and S/N<5.02 |
| margin column, if positive, additional noise which can be added and still meet BER<$1 \cdot 10^{-12}$ |

# Backplane channel Data

By Mike Dudek of QLogic
(dudek_02a_0911.zip)

| case | Nyqui | pulse gain | dibit gain | available Signal | implement | ILD noise | Re-reflection | Re-reflection | Re-refelction | total channel | FEXT 0 | FEXT 1 | FEXT 2 | FEXT 3 | FEXT 4 | FEXT 5 | FEXT 6 | FEXT 7 | PSXT | total noise | S/N | margin |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Qlogic_1m_0_new | -29.65 | 182.608m | 129.716m | 34.556mV | 3.458mV | 1.977mV | 1.962mV | 1.962mV | 1.112mV | 3.584mV | 0.377mV | 0.376mV | 0.050mV | 0.254mV | 0.193mV | 0.339mV | 0.390mV | 0.067mV | 0.812mV | 5.046mV | 6.85 | -1.143mV |

# Color code

| |
|---|
| "passes" margin is > 0 |
| "passes with 3 dB margin" margin > total noise |
| "fails near pass" margin < 0 but S/N>5.02 |
| "fails badly" margin < 0 and S/N<5.02 |
| margin column, if positive, additional noise which can be added and still meet BER<$1 \cdot 10^{-12}$ |

# Observations:

- These 2 channels are similar to the channel used in patel_01b_0911.pdf
- I have added Insertion Loss (in dB) at 13 GHz to the tables. This is the value of the fitted curve, not the actual S-Parameters