Channel Parameter considerations for 10GBASE-T operation on Augmented/Extended Class E (C6)

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List of Supporters

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- Joe Dupuis – Ortronics
- Brian Ensign – Leviton Voice and Data
- Paul Vanderlaan – Belden Electronics Division
- Bernie Hammond – Krone, Inc.
- Ron Nordin – Panduit Corp.
- Henriecus Koeman – Fluke Networks
- Ed Pivonka – Ideal Industries
- Michel Bohbot – Nordx/CDT
- Olindo Savi – The Siemon Company
- George Zimmerman - Solarflare

Purpose

Motivate P802.3an group to

- indicate to cabling groups (ISO, TR-42) which channel parameters are critical to 10GBASE-T performance (ANEXT, AFEXT, IL) so that they can focus their efforts on developing those,

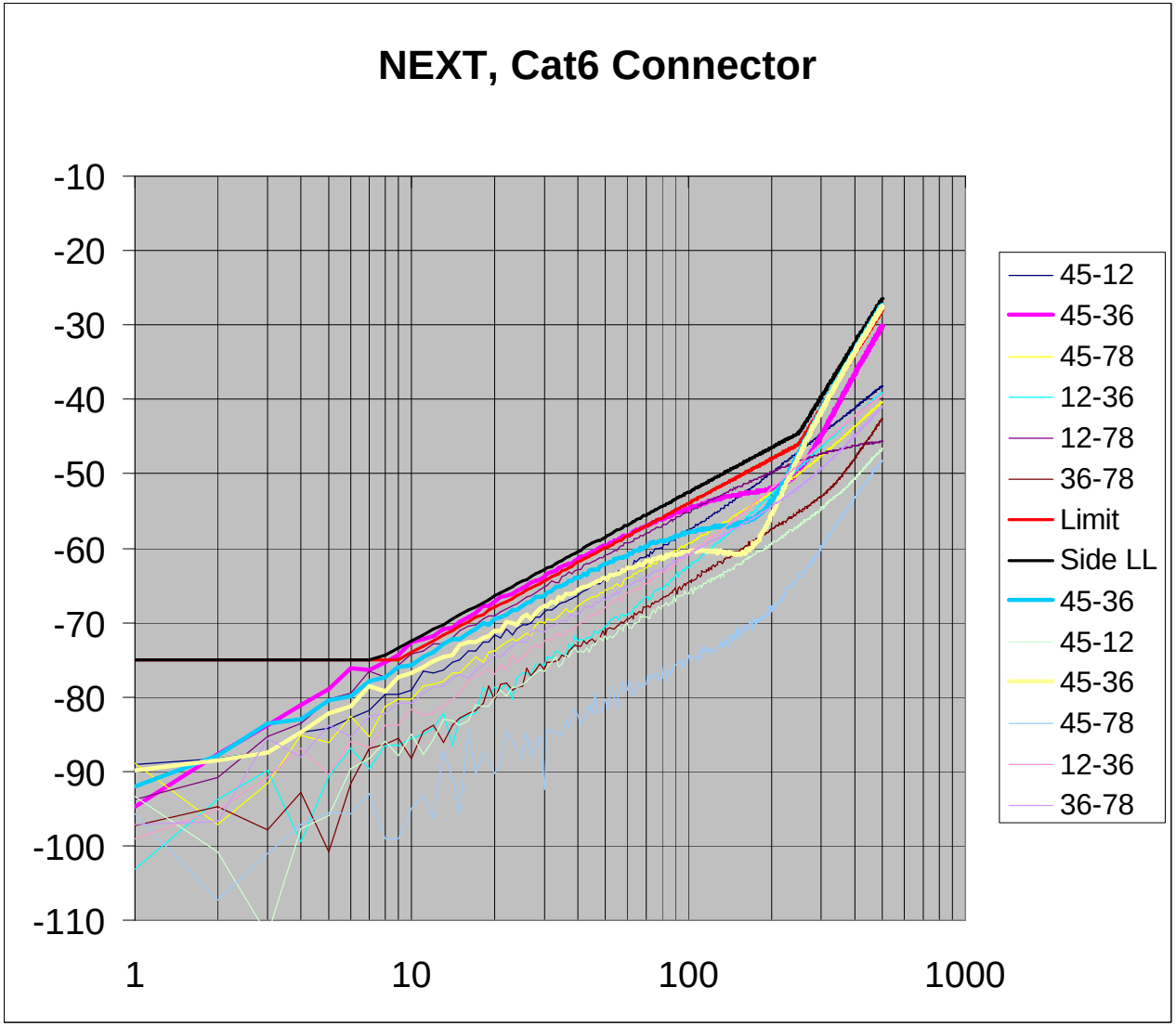
and

- Indicate which parameters are more flexible, where we are looking for their input and feedback. Confirm that extrapolated channel assumptions are only a starting point, (i.e. NEXT, PSNEXT, FEXT, and RL-for improvement,).

because,

- Cabling groups need the guidance on what is most important. Such a recommendation will simplify their efforts and avoid delaying their work. This would also increase the support base of manufacturers supporting and guaranteeing 10G on their cabling.

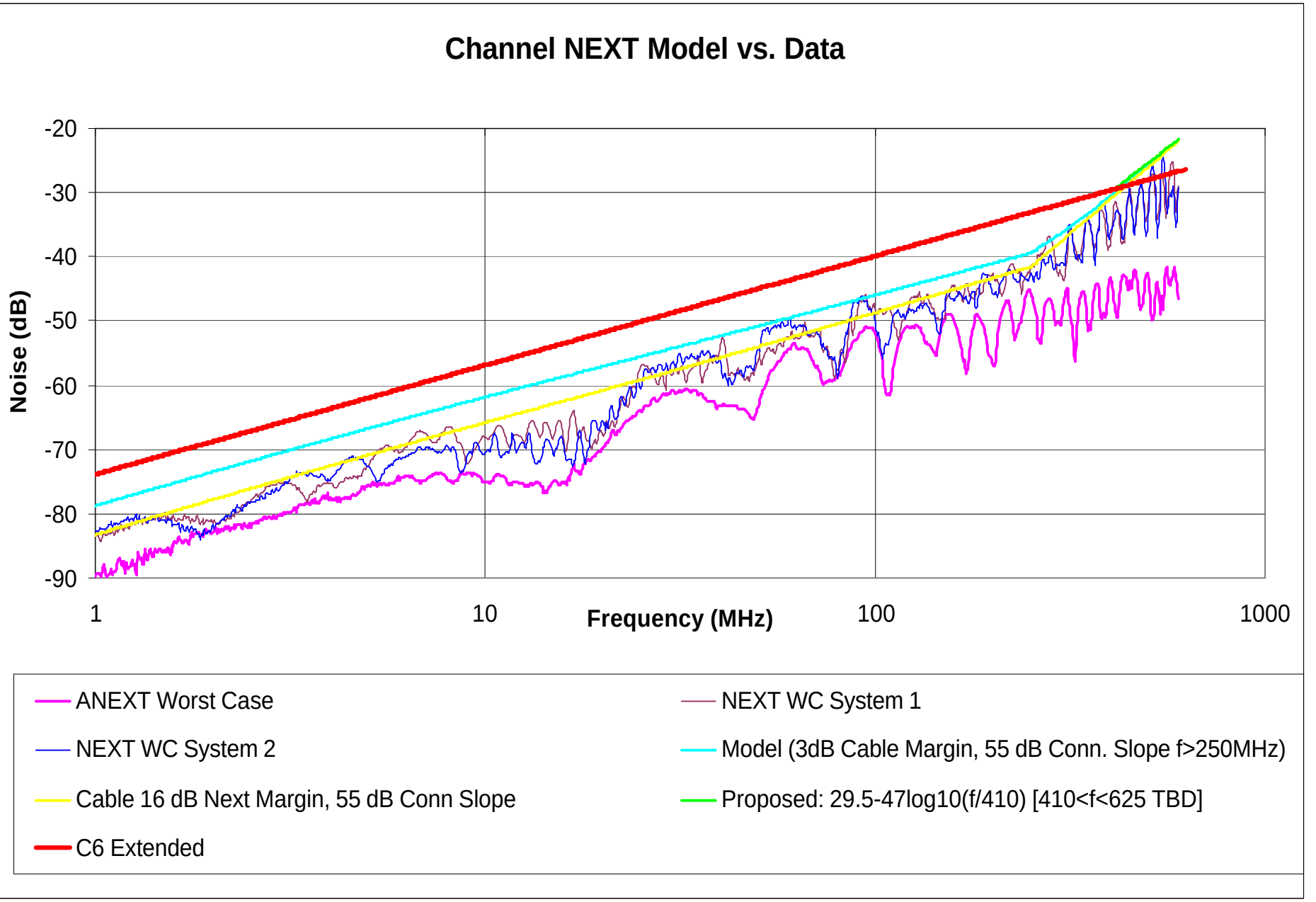
The Connector NEXT Model



Note:

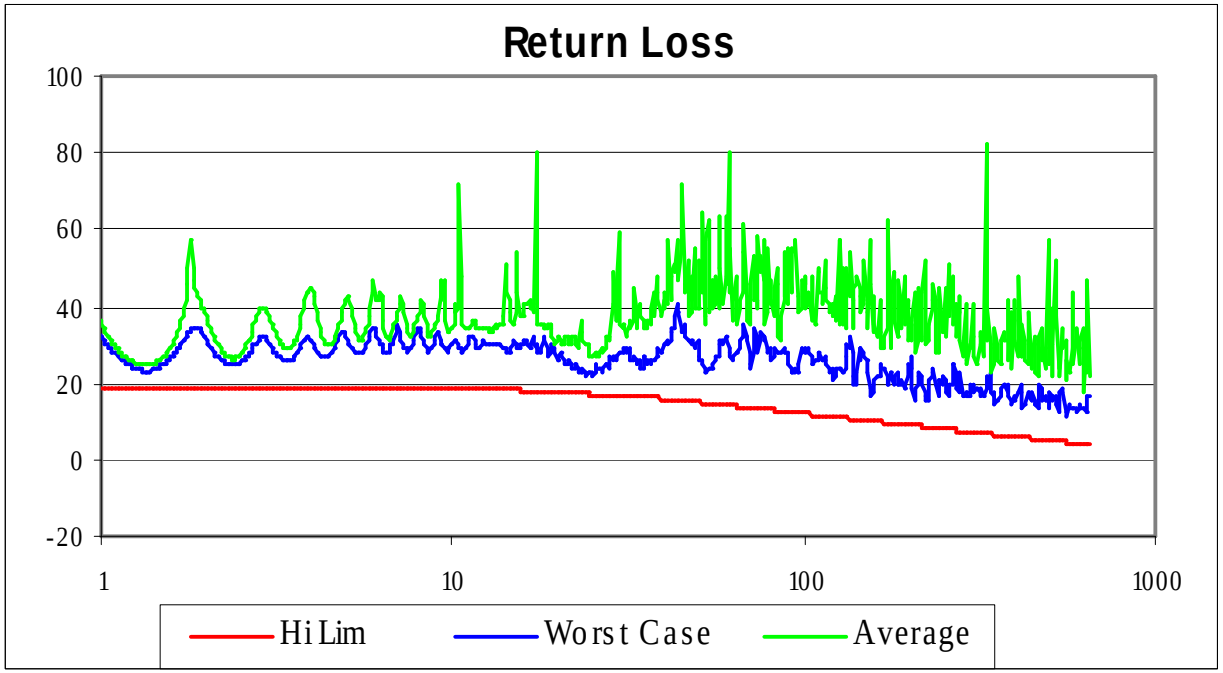
a) C6 Compliant

b) 60 dB Slope f>250 MHz



Proposed: 39.9-17log10(f/100) [1 < f ≤ 410], 29.5-47log10(f/410) [410 < f ≤ 625 TBD]

RL Measured



Measured RL may be better than extended limit.

Effect on Capacity

- Effect of 5.2 dB NEXT relaxation at 625 is negligible to Channel Capacity

  (based on suggested NEXT cancellation levels)
- Effect of RL improvement could compensate for loss due to NEXT.
- These numbers are being proposed here so the PHY vendors have an idea of expected WORST CASE – even if not adopted at this time.

Conclusions:

- Expected WC NEXT Model does not fit within linearly extended C6 limit at high frequencies.
- Return Loss is better than extended C6 Limits.
- The challenge for cabling group is considerable, we should focus their efforts on the parameters with no wiggle room for PHI (i.e. IL and ANEXT).
- This is being proposed to expedite

  CABLING STANDARD TIME TO MARKET.
- Start with minimal existing parameter extensions and allow those groups to come back with best performance they can.

Motion That

- Adopt the following BASELINE values for extended frequency channel NEXT,
  73.15-16.8log10(f) [1 < f ≤ 250], Equivalent Class E/C6
  73.15-16.8log10(f) [250 < f ≤ 410] TBD
  29.5-47log10(f/410) [410 < f ≤ 625 TBD] TBD
- Indicate to cabling groups that there is some flexibility in NEXT, RL and FEXT requirements for 10G feasibility and that P802.3an is interested in receiving accurate models of expected performance.
- Indicate to cabling standards groups that IL and ANEXT are the critical parameters with less flexibility, where the resulting relationship should be the focus of their work.

Motion by: Shadi AbuGhazaleh
Second:
Vote (P802.3an) Y: N: A:
(802.3 Voters) Y: N: A:

Backup Slide: Assumptions

- Minimally compliant C6 Cable with extended frequency range.
- Connecting Hardware
  - 54-20log10(f/100) $1 < f \leq 250$
  - 46.1-55log10(f/250) $250 < f \leq 625$
- More detailed modeling was used to derive the channel performance.