IEEE P802.3bp (1000BASE-T1) PHY Task Force
Channel Definitions Ad Hoc Report

San Antonio, Texas
November 2014

Ad hoc – co-chairs
Chris DiMinico –
MC Communications/Panduit
Mehmet Tazebay –
Broadcom

Channel Definitions Ad Hoc

- Ad Hoc charted to develop channel definitions
- Initial meeting IEEE Interim May 2012
- Communications via RTPGE reflector
- Follow-on meetings and conference calls to develop consensus on Link Segment specifications
  - Oct 2, Oct 16, Oct 23

Action items

- Conversion loss specification definition
- Test fixture specifications
  - Straw proposal: 802.3bp test points-3-6-14.pdf

Action items

- **Conversion loss specification definition -TIA/ISO Cabling/s-parameter/description**
  - **Longitudinal conversion loss (LCL) -SDC11/SDC22- common mode to differential mode return loss**
  - **Transverse conversion loss (TCL) - SCD11/SCD22 - differential mode to common mode return loss**
  - **Longitudinal conversion transmission loss (LCTL) - SDC12/SDC21 -common mode to differential mode insertion loss**
  - **Transverse conversion transmission loss (TCTL) - SCD12/SCD21 - differential mode to common mode insertion loss**

  - **LCL/TCL reciprocal / LCTL/TCTL reciprocal – LCL/LCTL to be used**
    - **Rainer Poehmerer - LEONI - 20141009_BalancePoehmerer.pdf**
    - **Thomas Mueller Rosenberger - mueller_01_3bp_1014**
    - **Chris DiMinico – MC Communications - 12-EMC-ModeConversion-ChrisDiMinico.pdf**

  - **Limit applies to both LCL/LCTL – tazebay_3bp_01a_0913.pdf**

- **Test fixture specifications**
  - **Straw proposal: 802.3bp test points-3-6-14.pdf**

Draft 1.0 comments – 97.4.4.1.4 Differential to common mode conversion

Cl 97 SC 97.4.4.1.4 P 28 L 24 # 51

DiMinico, Christopher MC Communications

Comment Type T Comment Status D Equation (97-3)

change equation 97-3 to use log10 and yield positive values (loss).

SuggestedRemedy

Change equation 97-3 to ConversionLoss>/= [50 10 </=f </= 80]dB [72-11.51*log(f) 80 < f </= 600]dB where f is frequency in MHz

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.
Needs alignment with comment #27

Cl 97 SC 4.4.1.4 P 28 L 26 # 27

Chini, Ahmad Broadcom

Comment Type ER Comment Status D Equation (97-3)

Equation (97-3) needs to be corrected for loss instead of gain. Replace "ln" with equivalent log10 to be consistent with other equations as well.

SuggestedRemedy

Use the equation in the attached document.

Proposed Response Response Status W

PROPOSED ACCEPT IN PRINCIPLE.
Reference: chini_3bp_01_1114.pdf - needs alignment with comment #50

$$\text{ConversionLoss}(f) \geq \begin{cases} 50 \text{ dB} & \text{for } 10\text{MHz} \leq f < 80\text{MHz} \\ 72 - 11.53 \times \log 10(f) \text{ dB} & \text{for } 80\text{MHz} \leq f \leq 600\text{MHz} \end{cases}$$

Conversion Loss – proposal

97.4.4.1.4 Differential to common mode conversion

The balance of the type A link segment is characterized by the differential to common mode conversion Each type A link segment shall meet the values determined using Equation (97–3) at all frequencies from 1 MHz to 600 MHz.

$$\text{ConversionLoss}(f) \geq \begin{Bmatrix} -50 & 10 \leq f \leq 80 \\ 5 \times \ln f - 72 & 80 < f \leq 600 \end{Bmatrix} \text{dB} \qquad (97\text{–}3)$$

where

f is the frequency in MHz; $1 \leq f \leq 600$

The function ConversionLoss(f) represents the conversion insertion loss at frequency f.

Editorial Note (to be removed prior to publication): *Equation (97–3) needs to be converted into conversion loss.*

Correction:

$$ConversionLoss(f) \geq \begin{pmatrix} 50 & 10 \leq f \leq 80 \\ 72 - 5\ln(f) & 80 < f \leq 600 \end{pmatrix} dB$$

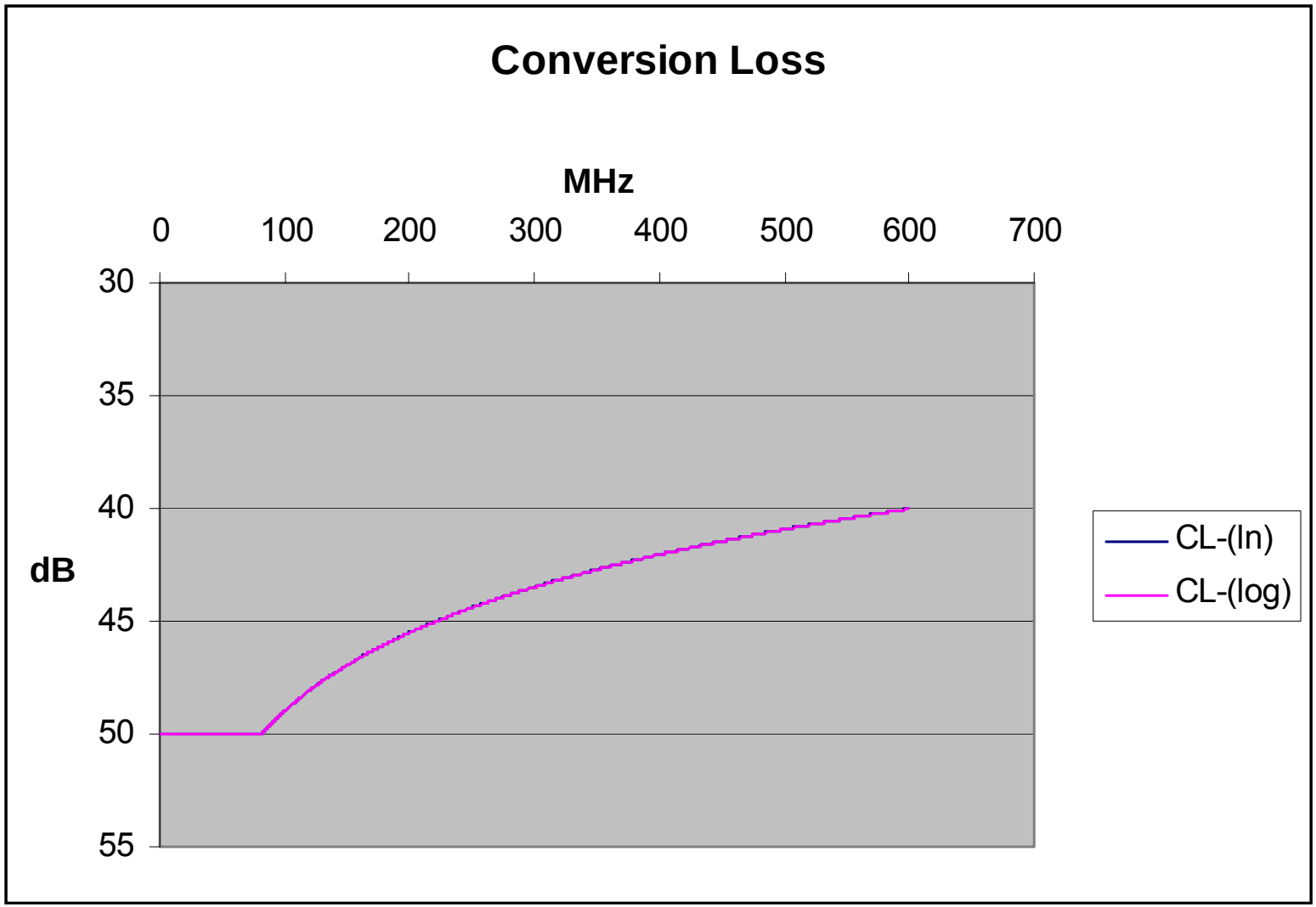
Recommendation: → convert *ln* to *log* to be consistent with all other equations

$$5 \cdot \ln(f) = 5 \cdot \ln(10) \cdot \log(f) = 11.51 \cdot \log(f)$$

→ resulting equation:

$$ConversionLoss(f) \geq \begin{pmatrix} 50 & 10 \leq f \leq 80 \\ 72 - 11.51 \cdot \log(f) & 80 < f \leq 600 \end{pmatrix} dB$$

Conversion Loss – proposal



Two significant digits

Draft 1.0 comments – 97.4.4.1.4 Differential to common mode conversion

Cl 97	*SC* 4.4.1.4	*P* 28	*L* 33	# 29

Chini, Ahmad — Broadcom

Comment Type ER *Comment Status* D

ConversionLoss definition ?

SuggestedRemedy

Replace "conversion insertion loss" with "mode conversion loss"

Proposed Response *Response Status* W

PROPOSED ACCEPT.

In addition to the change requested by commenter add text
“The mode conversion specification applies to;

•Longitudinal conversion loss (LCL) with s-parameter SDC11/SDC22 and description common mode to differential mode return loss.
•Transverse conversion loss (TCL) with s-parameter SCD11/SCD22 and description differential mode to common mode return loss
•Longitudinal conversion transmission loss (LCTL) with s-parameter SDC12/SDC21 and description common mode to differential mode insertion loss
•Transverse conversion transmission loss (TCTL) with s-parameter SCD12/SCD21 and description differential mode to common mode insertion loss

For compliance to the specification measurements of LCL and LCTL are sufficient as LCL and TCL are considered reciprocal and LCTL and TCTL are considered reciprocal.