Insertion Loss Terminology Comments 13, 14, 116

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Comments 13, 14, 116

CI 162   *SC* 162.B.1.3.3   *P* 283   *L* 33   # 13

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Comment Type   ER   *Comment Status* X

Throughout 802.3cd, the terminology for insertion loss and conversion loss parameters is inconsistent. In this subclause alone two terms are used.

SuggestedRemedy

Select and use common terminology throughout the draft. A summary presentation will be provided.

Proposed Response   *Response Status* O

CI 162   *SC* 162.B.1.3.3   *P* 283   *L* 37   # 14

Brown, Matt   Huawei

Comment Type   ER   *Comment Status* X

Throughout 802.3ck, the variable names used to describe insertion loss and conversion loss are inconsistent. In D2.1, the return loss variables were updated so that they were common throughout the draft. A similar convention is encouraged for IL and CL.

SuggestedRemedy

Select and use common variable names throughout the draft. A summary presentation will be provided.

Proposed Response   *Response Status* O

CI 162   *SC* 162.11.5   *P* 181   *L* 2   # 116

Dawe, Piers   Nvidia

Comment Type   E   *Comment Status* X

Follow the nomenclature we chose last round.

SuggestedRemedy

Change Conversion_loss(f) to ILcd(f), in 4 places

Proposed Response   *Response Status* O

Return loss variables in D2.1

D2.0 comment #61 aligned the return loss variable terminology for the different modes.
These have been implemented in D2.1.
A similar alignment would be beneficial for the insertion loss variables.

120F/120G/162B return loss variable names (part 4)
Comments 61, 62, 63, 65, 66

CI 120F	SC 120F.3.2.2	P 223	L 2	#	61

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Comment Type   E   *Comment Status* A   *RL terminology*
   Align terminology with other clauses.

SuggestedRemedy
   In Equation 120F-1 and in the variable list that follows, change variable name RL_dcm to
   Return_Loss.

Response   *Response Status* C
   ACCEPT IN PRINCIPLE.

   Per straw poll #16 and #17, there is consensus to change all return loss variable names to
   the form of option 2 on slide 9 of brown_3ck_01a_0521.

   Change all return loss variable names to the form of option 2 on slide 9 of
   brown_3ck_01a_0521.

   Straw poll #16 (Chicago Rules)
   Straw poll #17 (Pick one)
   For all return loss variable names I support:
   A: Option 1 per slide 9 of brown_3ck_01a_0521 (return_loss)
   B: Option 2 per slide 9 of brown_3ck_01a_0521 (e.g., RLdd)
   C: Option 3 per slide 9 of brown_3ck_01a_0521 (e.g., RLDD)
   D: RLxx where xx is DD, DC, CD, CC as subscript
   E: No changes to return loss variable names
   Straw poll #16
   A: 3 B: 26 C: 14 D: 12 E: 2
   Straw poll #17
   A: 1 B: 22 C: 3 D: 4 E: 1

Parameter	Option 1 (per comments)	Candidate variable names	
		Option 2 (type is lower case)	Option 3 (all upper case)
differential RL	return_loss	RLdd	RLDD
common-mode to common-mode RL	return_loss	RLcc	RLCC
common-mode to differential RL	return_loss	RLdc	RLDC
differential to common-mode RL	return_loss	RLcd	RLCD

Parameter and Variable name proposal

- Use consistent parameter names and variable names throughout 802.3ck.
- Adopt the variable formats based on return loss variable names used adopted for D2.1.
- Table below shows proposed parameter names and variable names.
  - ILcc is never referenced in 3ck, but is included in this table for completeness.
  - The name for ILdd might alternately be "differential insertion loss", "differential-mode insertion loss", or "differential-mode to differential-mode insertion loss", but due to the broad, consistent, and long-term use of simply "insertion loss", this is the proposed name.

Parameter name	Variable name
Insertion loss	ILdd
Common-mode to common-mode insertion loss	ILcc
Common-mode to differential conversion loss	ILdc
Differential to common-mode conversion loss	ILcd

Examples of conversion loss terminology, part 1

differential to common-mode conversion loss	162.11 Table 162-17 162.11.5 163.10 Table 163-10 163.10.5

common-mode to differential conversion loss	163.10.6
common-mode conversion insertion loss	162B.1.3.3
common-mode to differential-mode conversion insertion loss	162B.1.3.3

Examples of insertion loss and conversion loss variables, part 1

162.11.2 Cable assembly insertion loss

The measured insertion loss at 26.56 GHz of a cable assembly shall be less than or equal to 19.75 dB.

The measured insertion loss of a cable assembly shall be greater than or equal to the minimum cable assembly insertion loss given in Equation (162–17) and illustrated in Figure 162–6.

ILdd$_{min}$(f)

$$IL_{min}(f) \geq \begin{cases} 0.418\sqrt{f} + 0.177f + 0.0059f^2 & 0.05 \leq f < 26.56 \\ 1.222\sqrt{f} + 0.138f + 0.0015f^2 & 26.56 \leq f \leq 40 \end{cases} \quad (162-17)$$

where ILdd$_{min}$(f)

ILmin(f)　　　is the minimum cable assembly insertion loss in dB
f　　　　　　is the frequency in GHz

ILcd(f)-ILdd(f)

$$Conversion\_loss(f) - IL(f) \geq \begin{cases} 10 & 0.05 \leq f < 12.89 \\ 14 - 0.3108f & 12.89 \leq f \leq 40 \end{cases} \quad (162-19)$$

where ILcd(f)
Conversion_loss(f)　is the cable assembly differential to common-mode conversion loss at frequency f in dB

IL(f) ILdd(f)　　is the cable assembly insertion loss at frequency f in dB
f　　　　　　　is the frequency in GHz

163.10.2 Channel insertion loss (recommended)

The maximum recommended insertion loss of the channel is given by Equation (163–4).

ILdd(f)

$$IL(f) \leq \begin{cases} 0.693 + 2.161\sqrt{f} + 0.607f & 0.01 \leq f \leq 26.5625 \\ -19.12 + 1.773f & 26.5625 < f \leq 40 \end{cases} \quad (163-4)$$

where ILdd(f)
IL(f)　　is the insertion loss in dB at frequency f
f　　　　is the frequency in GHz

163.10.5 Channel differential to common-mode conversion loss

The difference between the TP0 to TP5 channel differential to common-mode conversion loss and the TP0 to TP5 channel insertion loss shall meet Equation (163–6) as illustrated in Figure 163–8.

ILcd(f)-ILdd(f)

$$Conversion\_loss(f) - IL(f) \geq \begin{cases} 10 & 0.05 \leq f < 12.89 \\ 14 - 0.3108f & 12.89 \leq f \leq 40 \end{cases} \quad (163-6)$$

where ILcd(f)
Conversion_loss(f)　is the TP0 to TP5 channel differential to common-mode conversion loss at frequency f in dB

IL(f) ILdd(f)　is the TP0 to TP5 insertion loss at frequency f in dB
f　　　　　is the frequency in GHz

Examples of insertion loss and conversion loss variables, part 2

120F.4.2 Channel insertion loss (recommended)

The channel insertion loss should be equal to or less than Equation (120F–2). Actual channel loss could be higher or lower than that given by Equation (120F–2) due to the channel ILD, return loss, and crosstalk. Note that for this equation the channel loss at the Nyquist frequency is less than or equal to 20 dB.

ILdd(f)

$$Insertion\_loss(f) \leq 1.083 + 1.444\sqrt{f} + 0.432f \quad (dB) \tag{120F–2}$$

for $0.01 \leq f \leq 53.125$

where

f	is the frequency in GHz
$Insertion\_loss(f)$	is the informative C2C insertion loss

ILdd(f)

ILdd(f)

$$IL(f) \leq \begin{cases} 0.05 + 1.8\sqrt{f} + 0.2513f & 0.01 \leq f \leq 26.56 \\ -12.4181 + 1.07f & 26.56 < f \leq 40 \end{cases} \tag{120G–3}$$

where ILdd(f)

$IL(f)$	is the channel insertion loss in dB
f	is the frequency in GHz

ILdd$_{PCB}$(f)   ILdd$_{PCBmax}$(f)

$$IL_{PCB}(f) \leq IL_{PCBmax}(f) = 0.9809(0.417\sqrt{f} + 0.1194f + 0.002f^2) \tag{162A–1}$$

for $0.01\ GHz \leq f \leq 50\ GHz$

where

$IL_{PCB}(f)$	is the insertion loss of the transmitter and receiver PCB in dB
$IL_{PCBmax}(f)$	is the maximum insertion loss of the transmitter and receiver PCB in dB
f	is the frequency in GHz

common-mode to differential conversion loss

162B.1.3.3 Mated test fixtures ~~common-mode conversion insertion loss~~

common-mode to differential conversion loss

The ~~common-mode conversion insertion loss~~ of the mated test fixtures measured at either test fixture test interface shall meet the values determined using Equation (162B–6). ~~This parameter is common-mode to differential-mode conversion insertion loss.~~

ILdc(f)

$$CMCIL(f) \geq \begin{cases} 30 - (21/28)f & 0.01 \leq f < 20 \\ 15 & 20 \leq f \leq 50 \end{cases} \tag{162B–6}$$

where ILdc(f)

$CMCIL(f)$	is the common-mode conversion insertion loss in dB at frequency f
f	is the frequency in GHz

There are many more examples in 162A and 162B.

Summary

- Align insertion loss and conversion loss parameter names and variable names throughout 802.3ck.
- Use formats adopted for return loss terminology in D2.1.
- Adopt the proposed parameter/variable names proposed on slide 4 or similar.