KR Preliminary Draft Report

Junqing (Phil) Sun, Credo Semiconductor

Introduction

- This is to summarize preliminary draft of Clause 163 "Physical Medium Dependent (PMD) sublayer and baseband medium, type 100GBASE-KR1, 200GBASE-KR2, and 400GBASE-KR4", and identify areas requiring further inputs.

- Clause 163 is based on baseline proposal adopted at March 2019 Plenary meeting, which leverages Clause 137 and Annex 93A.
  - http://www.ieee802.org/3/ck/public/19_03/heck_3ck_03b_0319.pdf

  - Leverage the 802.3cd specification with modifications for updated COM reference package, reference receiver and SerDes parameters.
    - Clause 137
    - Annex 93A

- Draft text that may deserve some attention is highlighted in orange.

Missing Information #1

- 163.9 Electrical Characteristics
    - 163.9.1 MDI
    - Electrical characteristics of TX/RX test fixtures.

- There is information in the adopted baseline:

    - The location of TP0a and electrical characteristics of the test fixture used to measure transmitter characteristics are defined in Figure 93-5 and 93.8.1.1, respectively.
    - The location of TP5a and electrical characteristics of the test fixture used to measure the receiver are defined in Figure 93-10 and 93.8.2.1, respectively.

- This needs to be confirmed as test fixture is characterized only to 25 GHz, and BT filter 3dB bandwidth is 33GHz.

$$IL_{ref}(f) = -0.0015 + 0.144\sqrt{f} + 0.069f \quad \text{dB} \qquad 0.05 \leq f \leq 25 \qquad\qquad (93\text{--}1)$$

$$RL_d(f) \geq \begin{cases} 20 - f & 0.05 \leq f \leq 5 \\ 15 & 5 < f \leq 13 \\ 20.57 - 0.4286f & 13 < f \leq 25 \end{cases} \quad \text{dB} \qquad\qquad (93\text{--}2)$$

Missing Information #2

- 163.9 Electrical Characteristics
  - 163.9.2 Transmitter Characteristics

  - The value of linear fit pulse peak minimum TBD.

  - SNDR TBD

  - 163.9.2.1 Transmitter ERL
  - Transmitter ERL at TP0a threshold TBD

  - 163.9.3.1 Receiver ERL
  - Receiver ERL at TP5a threshold TBD

- Transmitter electrical characteristics at TP0a for 100GBASE-KR1 are the same as those summarized in Table 120D-1 and detailed in 120D.3.1.1 through 120D.3.1.2.2, except
  - Steady state voltage v_f (max): 0.60 V
  - Steady state voltage v_f (min): 0.40 V
  - Linear fit pulse peak (min): TBD
  - Signal-to-noise-and-distortion ratio (min): TBD dB

heck_3ck_03b_0319

Missing Information #3

- 163.10 Channel Characteristics
  - Adopted baseline is based on table 137-6 with modifications per
    - mellitz_3ck_adhoc_01_121918_COM2p57.

  - Reference receiver DFE tap number and location are TBD.

  - Note SNRTX is set to 32.5 dB for COM in table 137-6. COM spreadsheet is 33dB.

  - Note Rise time Tr is set to TBD
    - ~6 ps in mellitz_3ck_adhoc_01_121918_COM2p57.zip

  - Flex package model terminology and Cd are TBD

Device package model			
Single-ended device capacitance	C_d	TBD	nF
Transmission line length, Test 1	z_p	12	mm
Transmission line length, Test 2	z_p	32	mm
PTH length	z_{pth}	1.8	mm
Single-ended package capacitance at package-to-board interface	C_p	0.87×10^{-4}	nF
Package transmission line nominal characteristic impedance	Z_c	87.5	Ω
PTH nominal characteristic impedance	Z_{pth}	92.5	Ω

Missing Information #4

- Dependency to other clauses
  - C2C-L, C2C-S
  - RS-FEC for 100GBASE-P
  - Inverse RS-FEC
- TBD in Table 163-1 will be resolved after 100GBASE-P FEC and C2C baselines are adopted.

Table 163–1—Physical Layer clauses associated with the 100GBASE-KR1 PMD

Associated clause	100GBASE-KR1
80—RS	Required
80—CGMII[a]	Optional
82—PCS for 100GBASE-R	Required
91—RS-FEC for 100GBASE-R	Optional
152—Inverse RS-FEC	Optional
161—RS-FEC for 100GBASE-P	Required
83—PMA for 100GBASE-R	Optional[b]
83A—CAUI-10	Optional
83D—CAUI-4 C2C	Optional
135—PMA for 100GBASE-P	Required
135D—100GAUI-4 C2C	Optional
135F—100GAUI-2 C2C	Optional
120F—100GAUI-1 C2C-L	Optional
120G—100GAUI-1 C2C-S	Optional
73—Auto-Negotiation	Required

[a]The CGMII is an optional interface. However, if the CGMII is not implemented, a conforming implementation must behave functionally as though the RS and CGMII were present.
[b]PMA for 100GBASE-R is required when either CAUI-10 or CAUI-4 is used.

Potential Errors in Baseline

- "fb" on Page 13 is 53.135 GHz
  - appears to be a typo

$$IL(f) \leq \begin{cases} 0.693 + 2.161\sqrt{f} + 0.607f & 0.01 \leq f \leq f_b/2 \\ -19.12 + 1.773f & f_b/2 < f \leq 53.135GHz \end{cases}$$