

Baseline Proposal for 100, 200 and 400 Gb/s Backplane (Update)

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IEEE 802.3ck 100 Gb/s, 200 Gb/s and 400 Gb/s
Electrical Interfaces Task Force

Acknowledgements

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- This proposal follows the approach used in [li_3cd_01b_0916.pdf](#) from Mike Li and Mike Dudek.

Method

- Leverage the 802.3cd specification with modifications for updated COM reference package, reference receiver and SerDes parameters.
 - Clause 137
 - Annex 93A
- Propose to use the same per lane specifications for 100GBASE-KR1, 200GBASE-KR2 and 400GBASE-KR4. The presentation refers to 100GBASE-KR1 for all of these per lane specifications.

Contents

- PMD
- Compliance Points
- Transmitter Characteristics
- Receiver Characteristics
- Channel
- Environmental Specs & PICS

PMD

- PMD clause structure
 - Follow the structure contained in 137.1-137.8.
 - Several functional specifications in 137.8 (PMD functional specifications) refer to requirements in Clause 136. Need to coordinate this with the corresponding 100GBASE-CR1 Clause.
- MDI
 - The MDI for 50GBASE-KR1 PHY is an implementation-dependent direct electrical connection between the PMD and the medium.
 - The MDI comprises two differential pairs, one for the transmit function and one for the receive function, marked by TP0 and TP5 in Figure 137–2.
 - Transmitter and receiver characteristics are defined at TP0a and TP5a, which are connected to the MDI through the test fixtures described in 93.8.1.1 and 93.8.2.1.

Compliance Points

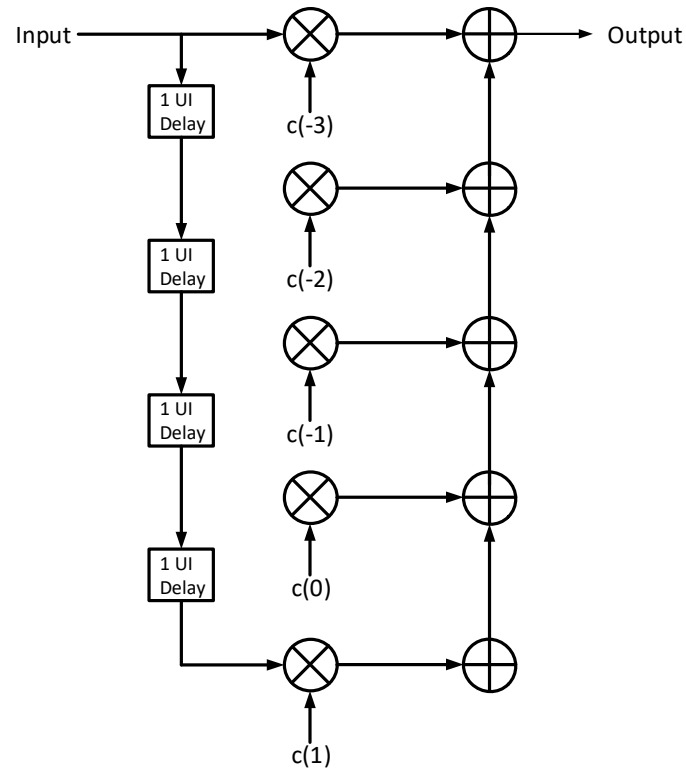
- Compliance point definition

- The electrical characteristics for the 100GBASE-KR interfaces are defined at compliance points for the transmitter (TP0a) and receiver (TP5a), respectively.
- 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.

Transmitter Characteristics

- 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): $0.75 \times v_f$
 - Signal-to-noise-and-distortion ratio (min): 32.5 dB
- Equalization: See slide 8
- ERL: See slide 10

Transmitter Equalization



Coefficient	Amplitude		Step Size
	Min	Max	
$c(-3)$	-0.06	0	0.02
$c(-2)$	0	0.12	0.02
$c(-1)$	-0.34	0	0.02
$c(0)$	0.54		
$c(1)$	-0.2	0	0.05

TxEQ values go in the COM Table (refer to Table 137-6 for an example). Refer to “config_com_ieee8023_93a=100GEL-KR_DFE_121918.xls” in

http://www.ieee802.org/3/ck/public/tools/tools/mellitz_3ck_adhoc_01_121918_COM2p57.zip.

Receiver Spec

- Receiver characteristics at TP5a for 100GBASE-KR1 are the same as those in 137.9, except:
 - Insertion loss @ 26.5625 GHz values for Test 1 are 13.5 (min) and 14.5 (max).
 - Insertion loss @ 26.5625 GHz values for Test 2 are 27.5 (min) and 28.5 (max).
- ERL: See Slide 10.

Transmitter/Receiver ERL

Parameter	Symbol	Value	Units
Transition time associated with a pulse	T_r	0.0137	ns
Incremental available signal loss factor	β_x	1.7	GHz
Permitted reflection from a transmission line external to the device under test	ρ_x	0.32	—
Length of the reflection signal	N	200	UI

Minimum spec = 12 dB

Channel Spec

- ERL: See Slide 12
- Insertion Loss: See Slide 13
- COM: base upon table 137-6 with modifications per “config_com_ieee8023_93a=100GEL-KR_DFE_121918.xls” in [mellitz 3ck adhoc 01 121918 COM2p57.zip](#).
 - Transmit equalizer per the values in slide 8.
 - Flexible reference package per slide 14.
 - Parameter values that differ from Table 137-6 are shown on slides 15-17.

Channel ERL

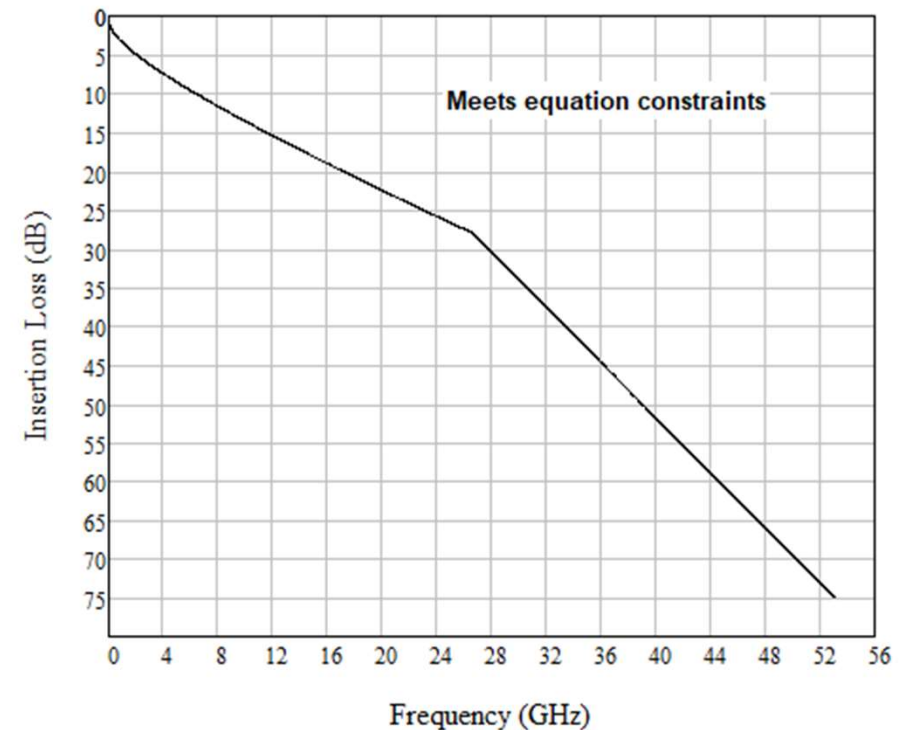
Parameter	Symbol	Value	Units
Transition time associated with a pulse	T_r	0.0137	ns
Incremental available signal loss factor	β_x	1.7	GHz
Permitted reflection from a transmission line external to the device under test	ρ_x	0.25	—
Length of the reflection signal	N	2000	UI

pass/fail spec = 10 dB

Channel Insertion Loss

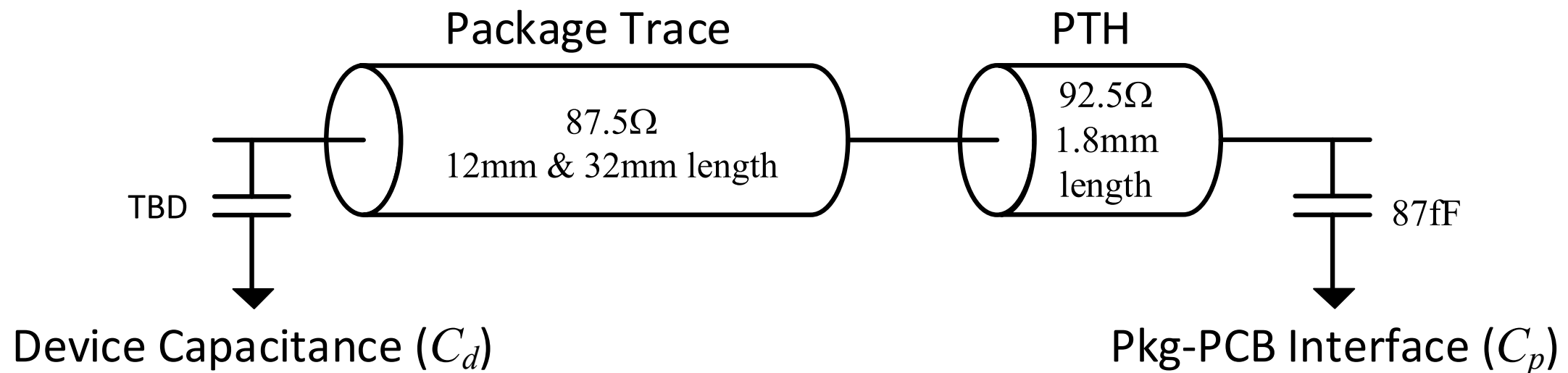
- Insertion loss (informative): maximum 28 dB at Nyquist.
- Use a modified version of equation 137-1.
- Proposed equation:

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



Channel Spec – Reference Package

- Adopt the flexible package model proposed in http://www.ieee802.org/3/ck/public/19_01/benartsi_3ck_01_0119.pdf.
- Modify 93.A.1.2 to comprehend the flexible package model.



COM

Differences from Table 137-6:

Parameter	Symbol	Value	Units
Device package model			
Single-ended device capacitance	C_d	0.13×10^{-4}	nF
Transmission line length, Test 1	z_p	12; 1.8	mm
Transmission line length, Test 2	z_p	32; 1.8	mm
Single-ended package capacitance at package-to-board interface	C_p	0.087×10^{-4}	nF
Package transmission line nominal characteristic impedance	Z_c	87.5; 92.5	Ω

COM (2)

Parameter	Symbol	Value	Units
Transmit equalizer minimum coefficient	$c(0)$	0.54	—
Transmit equalizer, 1 st pre-cursor coefficient	$c(-1)$		—
Minimum value		-0.34	
Maximum value		0	
Step size		0.02	
Transmit equalizer, 2 nd pre-cursor coefficient	$c(-2)$		—
Minimum value		0	
Maximum value		0.12	
Step size		0.02	

COM (3)

Parameter	Symbol	Value	Units
Transmit equalizer, 3 rd pre-cursor coefficient	$c(-3)$		—
Minimum value		-0.06	
Maximum value		0	
Step size		0.02	
Transmit equalizer, post-cursor coefficient	$c(1)$		—
Minimum value		-0.2	
Maximum value		0	
Step size		0.05	

Environmental Specs & PICS

- Environmental Specs: Base on 137-11.
- PICS: Base on 137-12 with updates as needed.

Proposal

- Propose that the P802.3ck task force adopt the baseline proposal contained in these slides.

Thank you!