COM update 4.2

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Highlights

❏ New Keywords:

- Time Axis
- Txpskew, Txnskew, Rxpskew, Pxnskew
- PKG_NAME, .START, .END

❏ New output

- SCMR_dB

❏ Rx FFE Bug fix

Equalization Display and RxFFE Floating taps

Keywords:

☐ Time Axis : UI or S

- X axis annotation.
- Updated figure display (on right)

IEEE P802.3dj 200 Gb/s, 400 Gb/s, 800 Gb/s, and 1.6 Tb/s Ethernet Task Force
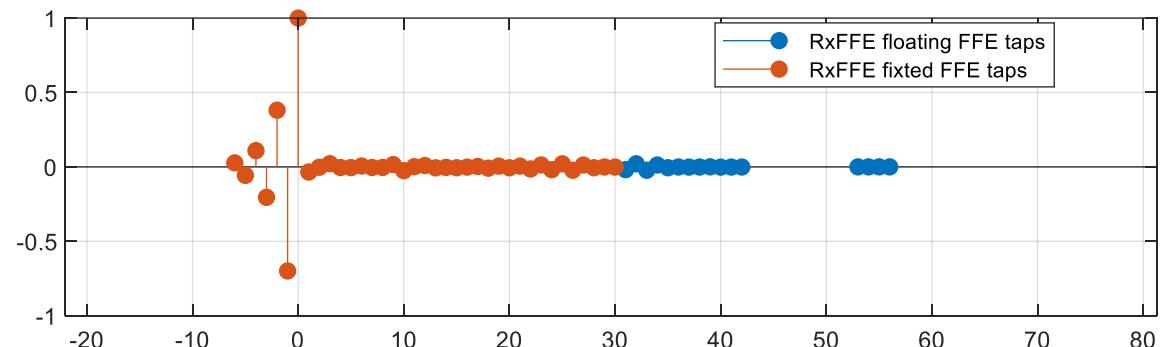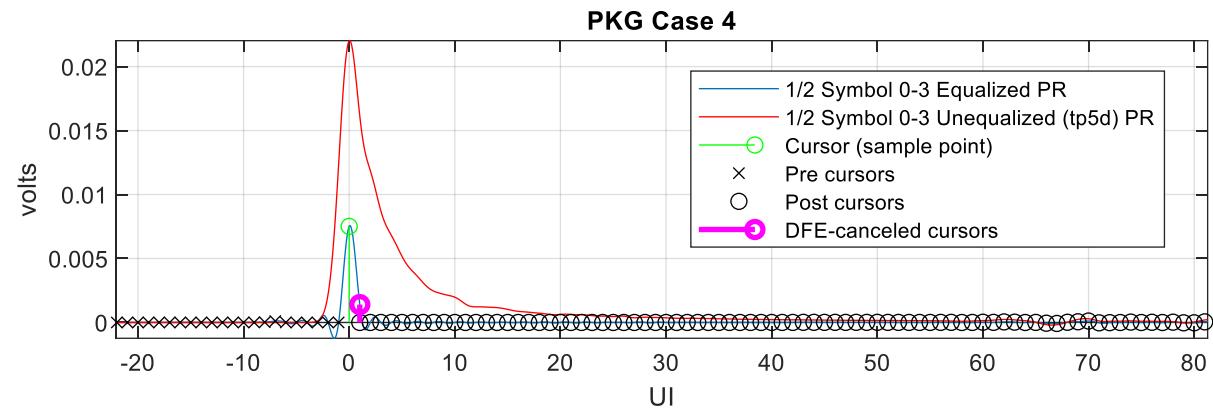
Rx FFE Bug fix

❑ Bug Fix: Problem resolved: RxFFE fails for channel with short delay or large RxFFE ranges and for COM using pulse response input

❑ The fix is just added some 0 voltage pre delay to the pulse response

❑ Applicable to most Rx FFE optimization methods implimentations

❑ Used for

- https://www.ieee802.org/3/dj/public/adhoc/electrical/23_1026/mellitz_3dj_elec_01_231026.pdf

and

- https://www.ieee802.org/3/dj/public/adhoc/electrical/23_1026/mellitz_3dj_elec_02_231026.pdf

IEEE P802.3dj 200 Gb/s, 400 Gb/s, 800 Gb/s, and 1.6 Tb/s Ethernet Task Force

COM 4.2 updates

- ❏ Keywords: Txpskew, Txnskew, Rxpskew, Pxnskew
  - Units are picoseconds (can be negative)
  - Add port delay to tp0-tp5 channel
    - See: https://www.ieee802.org/3/dj/public/adhoc/electrical/23_1207/mellitz_3dj_elec_01_23 1207.pdf
- ❏ Added output SCMR_dB as in mellitz_3dj_elec_01_231207

Package "A" and "B" support

❑ Support for different Tx and Rx package types in the same config sheet

❑ New keywords and syntax

PKG_NAME	PKGA_2023 PKGM		[TX RX]

❑ PKG_NAME corresponds to .START and .END sections

❑ .START and .END must be in column A and in rows after the main body

.START	PKGA_2023		
Table 93A–3 parameters			
Parameter	Setting	Units	Information
package_tl_gamma0_a1_a2	[5e-4 0.00065 0.0003]		
package_tl_tau	0.006141	ns/mm	
package_Z_c	[92 92 ; 70 70; 80 80; 100 100]	Ohm	
z_p (TX)	[8 24 30 45 ; 1 1 1 1; 1 1 1 1 ; 0.5 0.5 0.5 0.5]	mm	[test cases]
z_p (NEXT)	[8 24 30 45 ; 1 1 1 1; 1 1 1 1 ; 0.5 0.5 0.5 0.5]	mm	[test cases]
z_p (FEXT)	[8 24 30 45 ; 1 1 1 1; 1 1 1 1 ; 0.5 0.5 0.5 0.5]	mm	[test cases]
z_p (RX)	[8 24 30 45 ; 1 1 1 1; 1 1 1 1 ; 0.5 0.5 0.5 0.5]	mm	[test cases]
C_p	[0.4e-4 0.4e-4]	nF	[TX RX]
R_d	[50 50]	Ohm	[TX RX]
A_v	0.413	V	vp/vf=
A_fe	0.413	V	vp/vf=
A_ne	0.608	V	
.END			

IEEE P802.3dj 200 Gb/s, 400 Gb/s, 800 Gb/s, and 1.6 Tb/s Ethernet Task Force

Main body for configurable packages

CONFIGURATION SHEET

Table 93A-1 parameters

Parameter	Setting	Units	Information
f_b	106.25	GBd	
f_min	0.05	GHz	
Delta_f	0.01	GHz	
C_d	[0.4e-4 0.9e-4 1.1e-4 ;0.4e-4 0.9e-4 1.1e-4]	nF	[TX RX]
L_s	[0.13 0.15 0.14; 0.13 0.15 0.14]	nH	[TX RX]
C_b	[0.3e-4 0.3e-4]	nF	[TX RX]
PKG_NAME	PKGA PKGM		[TX RX]
z_p select	[4]		[test cases to run]
R_0	50	ohms	
L	4		
M	32		

filter and Eq

Parameter	Setting	Units	Information
f_r	0.58	*fb	
c(0)	0.55		min
c(-1)	[-0.4:0.02:0]		[min:step:max]
c(-2)	[0:.02:0.1]		[min:step:max]
c(-3)	0		[min:step:max]
c(-4)	0		[min:step:max]
c(1)	[-0.2:0.05:0]		[min:step:max]
N_b	1	UI	
b_max(1)	0.75		As/dffe1
b_max(2..N_b)	1		As/dfe2..N_b
b_min(1)	0		As/dffe1
b_min(2..N_b)	-0.15	S	As/dfe2..N_b
g_DC	[-15:1:-3]	dB	[min:step:max]
f_z	25.16	GHz	
f_p1	40.00	GHz	
f_p2	56.00	GHz	
g_DC_HP	[-5:1:0]		[min:step:max]
f_HP_PZ	1.328125	GHz	
Butterworth	1	logical	include in fr
Local Search	2		
sample_adjustment	[7 7]		
ts_anchor	1		

Intial syntax needed for package case selection

Table 93A–3 parameters

Parameter	Setting	Units	Information
ckage_tl_gamma0_a1	[5e-4 0.00065 0.0003]		
package_tl_tau	0.006141	ns/mm	
package_Z_c	[92 92 ; 70 70; 80 80; 100 100]	Ohm	
z_p (TX)	[8 24 30 45 ; 1 1 1 1; 11 1 1 ; 0.5 0.5 0.5 0.5]	mm	[test cases]
z_p (NEXT)	[8 24 30 45 ; 1 1 1 1; 11 1 1 ; 0.5 0.5 0.5]	mm	[test cases]
z_p (FEXT)	[8 24 30 45 ; 1 1 1 1; 11 1 1 ; 0.5 0.5 0.5]	mm	[test cases]
z_p (RX)	[8 24 30 45 ; 1 1 1 1; 11 1 1 ; 0.5 0.5 0.5]	mm	[test cases]
C_p	[0.4e-4 0.4e-4]	nF	[TX RX]
R_d	[50 50]	Ohm	[TX RX]
A_v	0.413	V	vp/vf=
A_fe	0.413	V	vp/vf=
A_ne	0.608	V	

I/O control

	Setting	
DIAGNOSTICS	1	logical
DISPLAY_WINDOW	1	logical
CSV_REPORT	1	logical
RESULT_DIR	.\results\C2M_{date}\	
SAVE_FIGURES	1	logical
Port Order	[1 3 2 4]	
RUNTAG	C2M TP1a_COM_model	
COM_CONTRIBUTION	0	logical

Operational

	Setting	
ERL Pass threshold	10	dB
COM Pass threshold	3	db
DER_0	2.00E-05	
T_r	4.00E-03	ns
FORCE_TR	1	logical
Min_VEO_Test	0	mV
PMD_type	C2C	
T_O	50	mUI
samples_for_C2M	100	samples/UI
EW	0	
MLSE	0	
.BREAD_CRUMBS_FIELDS	reduce.txt	
.BREAD_CRUMB	1	
TIME_AXIS	UI	S or UI

Noise, jitter

		UI
sigma_RJ	0.01	UI
A_DD	0.02	V^2/GHz
eta_0	1.25E-08	dB
SNR_TX	33	
R_LM	0.95	

minutes_3cwdfdj_2309_unapproved
benartsi_3dj_01_2311
mli_3df_02_220316

Floating Tap Control

	Setting	
N_bg	4	0 1 2 or 3 groups
N_bf	4	taps per group
N_f	60	UI span for floating taps
bmaxg	0.2	max DFE value for floating taps
B_float_RSS_MAX	0.1	rss tail tap limit
N_tail_start	31	(UI) start of tail taps limit
RXFFE FLOAT CTL	Taps	select Taps or ISI for floating

Filter: Rx FFE

	Setting	
ffe_pre_tap_len	6	UI
ffe_post_tap_len	30	UI
ffe_tap_step_size	0	
ffe_main_cursor_min	0.7	
ffe_pre_tap1_max	0.7	
ffe_post_tap1_max	0.7	
ffe_tapn_max	0.7	
ffe_backoff	0	

TDR and ERL options

	Setting	
TDR	1	logical
ERL	1	logical
ERL_ONLY	0	ns
TR_TDR	0.01	
N	1000	logical
TDR_Butterworth	1	
beta_x	0	
rho_x	0.618	
TDR_W_TXPKG	0	UI
N_bx	20	
fixture delay time	[0 0]	
Tukey_Window	1	
Txnskew	-1.2	ps
Rxpskew	0	ps

Receiver testing

	Setting	
SAVE_CONFIG2MAT	0	
RX_CALIBRATION	0	logical
Sigma BBN step	5.00E-03	V

ICN parameters

	Setting	
f_v	0.588	Fb
f_f	0.278	Fb
f_n	0.278	Fb
f_2	61.625	GHz
A_ft	0.450	V
A_nt	0.450	V

Parameter	Setting	
board_tl_gamma0_a1_a2	[0 6.44084e-4 3.6036e-05]	1.4 db/in @ 53.125G
board_tl_tau	5.790E-03	ns/mm
board_Z_c	100	Ohm
z_bp (TX)	32	mm
z_bp (NEXT)	32	mm
z_bp (FEXT)	32	mm
z_bp (RX)	32	mm
C_0	[0.2e-4 0]	nF
C_1	[0.2e-4 0]	nF
Include PCB	0	logical

Seletions (rectangle, gaussian,dual_rayleigh,triangle

	Setting	
Histogram_Window_Weight	gaussian	selection
Qr	0.02	UI

Package spec is below the main body

.START	PKGA_2023		
	Table 93A–3 parameters		
Parameter	Setting	Units	Information
ckage_tl_gamma0_a1	[5e-4 0.00065 0.0003]		
package_tl_tau	0.006141	ns/mm	
package_Z_c	[92 92 ; 70 70; 80 80; 100 100]	Ohm	
z_p (TX)	[8 24 30 45 ; 1 1 1 1; 1 1 1 1 ; 0.5 0.5 0.5 0.5]	mm	[test cases]
z_p (NEXT)	[8 24 30 45 ; 1 1 1 1; 1 1 1 1 ; 0.5 0.5 0.5 0.5]	mm	[test cases]
z_p (FEXT)	[8 24 30 45 ; 1 1 1 1; 1 1 1 1 ; 0.5 0.5 0.5 0.5]	mm	[test cases]
z_p (RX)	[8 24 30 45 ; 1 1 1 1; 1 1 1 1 ; 0.5 0.5 0.5 0.5]	mm	[test cases]
C_p	[0.4e-4 0.4e-4]	nF	[TX RX]
R_d	[50 50]	Ohm	[TX RX]
A_v	0.413	V	vp/vf=
A_fe	0.413	V	vp/vf=
A_ne	0.608	V	
.END			
.START	PKGA		
	Table 93A–3 parameters		
Parameter	Setting	Units	Information
ckage_tl_gamma0_a1	[5e-4 0.00065 0.00028]		
package_tl_tau	0.006141	ns/mm	
package_Z_c	[87.5 87.5 ;95 95 ;100 100; 78 78]	Ohm	
z_p (TX)	[8 24 30 45 ; 1.9 1.9 1.9 1.9; 1.3 1.3 1.3 1.3 ; 2 2 2 2]	mm	[test cases]
z_p (NEXT)	[8 24 30 45 ; 3 3 3 3; 1 1 1 1 ; 2 2 2 2]	mm	[test cases]
z_p (FEXT)	[8 24 30 45 ; 3 3 3 3; 1 1 1 1 ; 2 2 2 2]	mm	[test cases]
z_p (RX)	[8 24 30 45 ; 3 3 3 3; 1 1 1 1 ; 2 2 2 2]	mm	[test cases]
C_p	[0.35e-4 0.35e-4]	nF	[TX RX]
R_d	[50 50]	Ohm	[TX RX]
A_v	0.413	V	vp/vf=
A_fe	0.413	V	vp/vf=
A_ne	0.608	V	
.END			
.START	PKGM		
	Table 93A–3 parameters		
Parameter	Setting	Units	Information
ckage_tl_gamma0_a1	[5e-4 0.00065 0.0003]		
package_tl_tau	0.006141	ns/mm	
package_Z_c	[92 92 ; 70 70; 80 80; 100 100]	Ohm	
z_p (TX)	[8 8 8 8; 0 0 0 0 ;0 0 0 0 ;0 0 0 0]	mm	[test cases]
z_p (NEXT)	[8 8 8 8; 0 0 0 0 ;0 0 0 0 ;0 0 0 0]	mm	[test cases]
z_p (FEXT)	[8 8 8 8; 0 0 0 0 ;0 0 0 0 ;0 0 0 0]	mm	[test cases]
z_p (RX)	[8 8 8 8; 0 0 0 0 ;0 0 0 0 ;0 0 0 0]	mm	[test cases]
C_p	[0.4e-4 0.4e-4]	nF	[TX RX]
R_d	[50 50]	Ohm	[TX RX]
A_v	0.413	V	vp/vf=
A_fe	0.413	V	vp/vf=
A_ne	0.608	V	

Summary

❑ Syntax added align capability for packages to baseline

❑ Other syntax added to improve TF investigations toward baseline

❑ Bug fix for Rx FFE

- not core to optimization method.

❑ Rx FFE hooks for next beta version added but not specified yet

- For consensus activity

Thank You!