

# COM updates to support C2M investigations

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January 201 IEEE 802.3 100 Gb/s, 200 Gb/s, and 400 Gb/s Electrical Interfaces Task Force

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# COM 2.58

- ❑ Correction to support different Tx and Rx packages with flex packages
- ❑ Prior flex versions used the same Cp for Tx and Rx.
- ❑ Added two requested keyword option for the configuration spread sheet.

- *Keyword EXE\_MODE*

- *0 full grid search as all version prior to 2.53*
- *1 ignored optimization search for just one setting*
- *2 ignored all following setting for c(1) all other setting are searched*

- *Keyword: CDR*

- *MM as in Annex 93A (default if not specified)*
- *mod-MM as in lu\_3ck\_adhoc\_01\_121218*

```
switch OP.EXE_MODE
case 0
case 1
    if (20*log10(A_s/sigma_ISI) < best_FOM)
        continue
    end
case 2
    if (20*log10(A_s/sigma_ISI) < best_FOM)
        break
    end
end
```

# background

# COM 2.40

IEEE P802.3ck July 25, 2018 Ad Hoc Meeting

[http://www.ieee802.org/3/ck/public/adhoc/july25\\_18/mellitz\\_3ck\\_adhoc\\_01a\\_072518.pdf](http://www.ieee802.org/3/ck/public/adhoc/july25_18/mellitz_3ck_adhoc_01a_072518.pdf)

Available for analysis

1. Zero Forced DFE
2. Quantized Forced DFE - **abandoned**
  - only produced COM offset
3. One DFE tap and a number of (Rx)FFE taps
  - Sum of taps = 1
4. One DFE tap and a number of (Rx)FFE taps with gain at cursor - **abandoned**
  - Same as 4 but gain at cursor
  - Gain not justified

Changed computation of crosstalk variance in `optimize_FOM()/get_xtlk_noise()` to be computed similar to ICN in the frequency domain.

- 5x speed-up for 7 or more crosstalk aggressor
- Original `get_xtlk_noise()` renamed to `get_xtlk_noise1()`

# COM 2.41

## IEEE P802.3ck August 15, 2018 Ad Hoc Meeting

[http://www.ieee802.org/3/ck/public/adhoc/aug15\\_18/mellitz\\_3ck\\_adhoc\\_01\\_081518.pdf](http://www.ieee802.org/3/ck/public/adhoc/aug15_18/mellitz_3ck_adhoc_01_081518.pdf)

1. Zero Forced DFE
2. Quantized Forced DFE - abandoned
3. One DFE tap and a number of (Rx)FFE taps
  - Cursor tap set to 1
4. One DFE tap and a number of (Rx)FFE taps with gain at cursor - abandoned

# COM 2.50

## Flexible Package Model added

- [http://www.ieee802.org/3/ck/public/18\\_09/mellitz\\_3ck\\_01\\_0918.pdf](http://www.ieee802.org/3/ck/public/18_09/mellitz_3ck_01_0918.pdf)

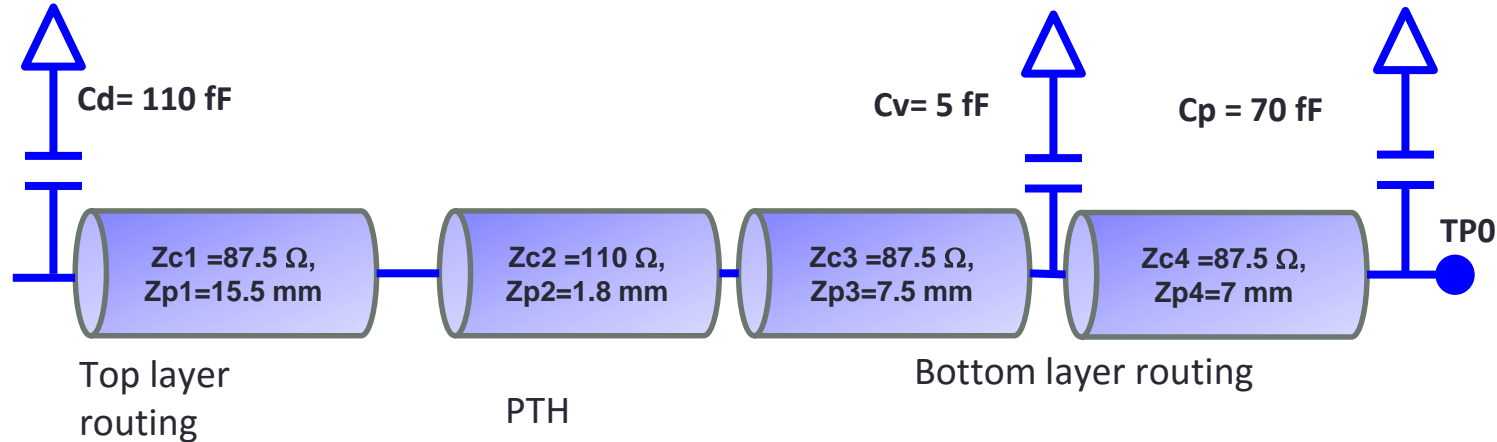


Table 93A-3 parameters		
Parameter	Setting	Units
package_tl_gamma0_a1_a2	[0 1.0404e-3 4.201e-4]	
package_tl_tau	6.325E-03	ns/mm
package_Z_c	[87.5 87.5 ; 110 110; 87.5 87.5; 87.5 87.5 ]	Ohm (Tx Rx)

C_d	[1.1e-4 1.1e-4]
z_p select	1
z_p (TX)	[15.5 20 30; 1.8 0 0; 7.5 0 0; 7 0 0]
z_p (NEXT)	[15.5 20 30; 1.8 0 0; 7.5 0 0; 7 0 0]
z_p (FEXT)	[15.5 20 30; 1.8 0 0; 7.5 0 0; 7 0 0]
z_p (RX)	[15.5 20 30; 1.8 0 0; 7.5 0 0; 7 0 0]
C_p	[0.7e-4 0.7e-4]
C_v	[ 5e-6 5e-6 ]

# COM 2.51

## IEEE P802.3ck OCT 03, 2018 Ad Hoc Meeting

[http://www.ieee802.org/3/ck/public/adhoc/oct03\\_18/mellitz\\_3ck\\_adhoc\\_01\\_100318.pdf](http://www.ieee802.org/3/ck/public/adhoc/oct03_18/mellitz_3ck_adhoc_01_100318.pdf)

- ❑ Rx FFE monotonic tap sensitivity refinement per wu\_3ck\_01\_0918 in the IEEE P802.3ck July interim meeting

[http://www.ieee802.org/3/ck/public/18\\_09/wu\\_3ck\\_01\\_0918.pdf](http://www.ieee802.org/3/ck/public/18_09/wu_3ck_01_0918.pdf)

- ❑ Fixed RxFFE index modulus problem in force()

- John Ewen, Global Foundries

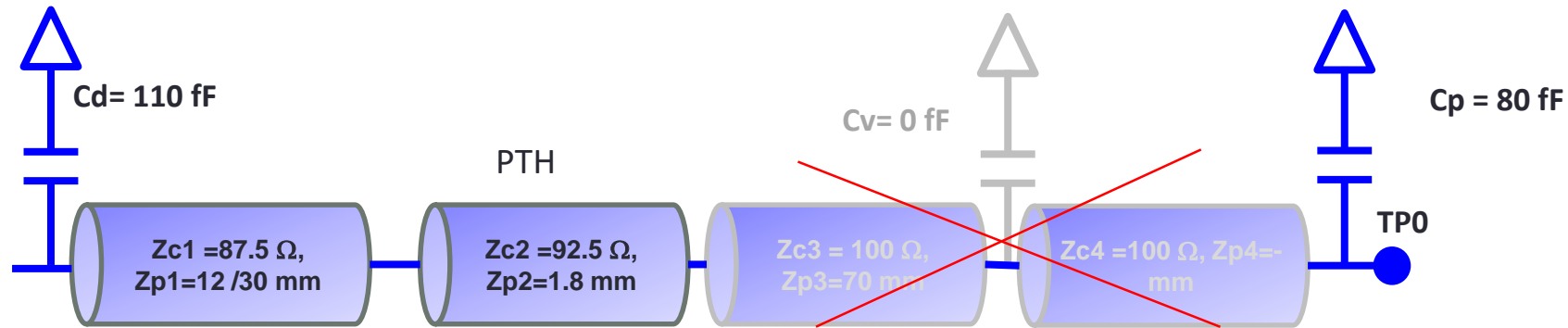
- ❑ Refined RxFFE post cursor forcing to the minimum of the post cursor pulse response value or the DFE1  $b_{\max}$  limit.

- ❑ Removed minimum signal threshold for TDR and ERL computations



# COM 2.52 12 mm & 30 mm package

- Flexible Package Model initial 12 mm / 30 mm suggestion
- From Liav Ben-Artzi, Marvell Israel Ltd



Parameter	Setting	Units
package_tl_gamma0_a1_a2	[0 0.0007901838 0.00050925]	
package_tl_tau	6.325E-03	ns/mm
package_Z_c	[87.5 87.5 ; 92.5 92.5; 100 100 ; 100 100 ]	Ohm

C_d	[1.1e-4 1.1e-4]
z_p select	[ 1 2]
z_p (TX)	[12 30; 1.8 1.8 ; 0 0 ; 0 0]
z_p (NEXT)	[12 30; 1.8 1.8 ; 0 0 ; 0 0]
z_p (FEXT)	[12 30; 1.8 1.8 ; 0 0 ; 0 0]
z_p (RX)	[12 30; 1.8 1.8 ; 0 0 ; 0 0]
C_p	[0.8e-4 0.8e-4]
C_v	[ 0 0]

# COM 2.52 (test version only)

❑ add Rx FFE filter to receiver noise filter to eq. 93A-35 per request from Bill Kirkland, Semtech

- This basically adds Rx noise amplification from the Rx FFE

$$\sigma_N^2 = \eta_0 \int_0^{\infty} |H_r(f) H_{cif}(f)|^2 df$$

$H_{RXFFE}(f)$

❑ change ICN in get\_xtlk\_noise() to end at fb rather than fb/2. No impact observed because only used to compute the FOM to determine equalizer settings

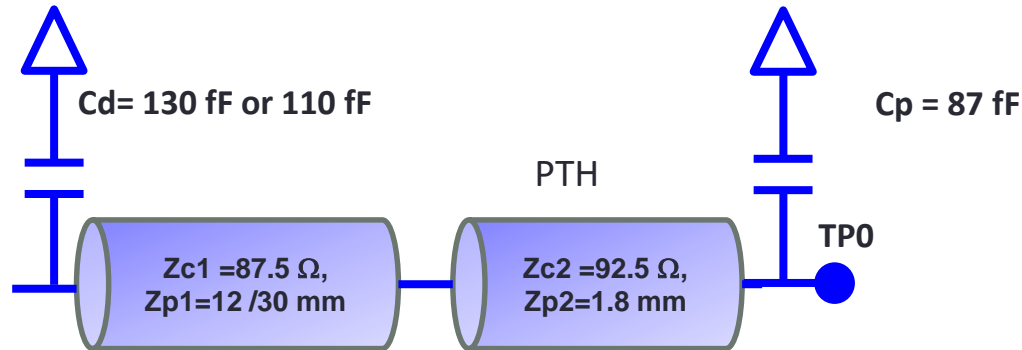
❑ 12 mm and 30 mm package proposal spreadsheets

# COM 2.53 just bug fixes

- ❑ Equivalent to 2.52 with a minor bug fix
- ❑ Keep some channels from crashing COM
  - Indexing fix in force routine
  - Open Kateri
- ❑ Remove bug when not FFE post cursors are present but FFE precursors are requested
  - Yasuo Hidaka

# COM 2.57 12 mm & 30 mm package

- ❑ Reduce Syntax for Flex model (2 section)
- ❑ Latest package model fits



$C_d$	[1.1e-4 1.1e-4]	nF	[TX RX]
$z_p$ select	[ 1 2]		[test cases to run]
$z_p$ (TX)	[12 30; 1.8 1.8]	mm	[test cases]
$z_p$ (NEXT)	[12 30; 1.8 1.8]	mm	[test cases]
$z_p$ (FEXT)	[12 30; 1.8 1.8]	mm	[test cases]
$z_p$ (RX)	[12 30; 1.8 1.8]	mm	[test cases]
$C_p$	[0.87e-4 0.87e-4]	nF	[TX RX]

Table 93A-3 parameters		
Parameter	Setting	Units
package_tl_gamma0_a1_a2	[0 0.0009909 0.0002772]	
package_tl_tau	6.1400E-03	ns/mm
package_Z_c	[87.5 87.5 ; 92.5 92.5 ]	Ohm

# COM 2.57 updates

- ❑ optimize\_fom function
  - Fix testing of maximum precursor value (Yasuo Hidaka)
    - Do not allow excessively large precursor taps
- ❑ Accept syntax for 2 segment line flex package model
  - This syntax will not working on older versions
- ❑ 3 starter configuration sheets
  - config\_com\_ieee8023\_93a=100GEL-KR\_DFE\_121918.xls
  - config\_com\_ieee8023\_93a=100GEL-CR\_DFE\_121918.xls
  - config\_100GEL\_C2M\_4dBpkg\_baseline\_121918.xls
  - config\_100GEL\_C2M\_4dBpkg\_baseline\_tp1a\_121918.xls
- ❑ speed up in optimize FOM
- ❑ added code from Yasuo Hidaka for reading in parameters and printing out noise
- ❑ Improved extrapolation of channel with lower bandwidths in s21\_to\_impulse\_DC from John Ewen
- ❑ In get\_xtlk\_noise in optimize\_FOM: refine crosstalk accounting from John Ewen

Thank You!