An Updated P802.3dj COM Parameter Value Proposal for KR and CR

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Background and Objectives

- Comments and resolutions for the COM parameters for KR/CR had been made [1], however, only some had been accepted.

- New and updated COM simulations for KR/CR had been just been conducted [2]
  - Using the latest COM V4.6B4
  - Using the latest KR/CR channels contributed to the 802.3dj (a total of 111)
  - COM configuration calibrated with the latest test chip silicon and design

- This presentation hence proposes the COM parameters based on [2] for filling-in the remaining TBDs and proposed appropriate changes for the D1.1 Spec [3]

Proposed Device/COM Parameters for KR (Table 178-12/13) (I)

Single-ended reference resistance	R_0	TBD 50	Ω
Single-ended transmitter termination resistance	$R_d^{(t)}$	TBD 46.25	Ω
Single-ended receiver termination resistance	$R_d^{(r)}$	TBD 46.25	Ω

Receiver 3 dB bandwidth	f_r	TBD × f_b 0.55		GHz
Transmitter equalizer, coefficient −3 Minimum value Maximum value Step size	$c(-3)$	TBD	0 -0.06 0.02	
Transmitter equalizer, coefficient −2 Minimum value Maximum value Step size	$c(-2)$	TBD	0 0.12 0.02	
Transmitter equalizer, coefficient −1 Minimum value Maximum value Step size	$c(-1)$	TBD	0 -0.34 0.02	
Transmitter equalizer, coefficient 0 Minimum value	$c(0)$	TBD	0.54	
Transmitter equalizer, coefficient 1 Minimum value Maximum value Step size	$c(1)$	TBD	0 -0.2 0.02	
Continuous time filter, gain 1 Minimum value Maximum value Step size	g_1		−20 -15 0 1	dB dB dB
Continuous time filter, gain 2 Minimum value Maximum value Step size	g_2		−6 -5 0 1	dB dB dB

■ TBD filling

■ Proposed changes

Proposed COM Parameters for KR (Table 178-13) (II)

Parameter		Symbol	Value	Units
Continuous time filter, zero 1 frequency for $g_1=0$		f_{z1}	$f_b/2.5$ fb/4.223	
Continuous time filter, zero 1 frequency for $g_2=0$		f_{z2}	$f_b/80$	GHz
Continuous time filter, pole 1 frequency		f_{p1}	$f_b/2.5$ fb/2.6562	
Continuous time filter, pole 2 frequency		f_{p2}	f_b fb/1.8973	
Continuous time filter, pole 3 frequency		f_{p3}	$f_b/80$	GHz
Differential peak output voltage				
victim transmitter		A_v	TBD 0.413	V
far-end aggressor		A_{fe}	TBD 0.413	V
near-end aggressor		A_{ne}	TBD 0.608	V
Transmitter transition time		T_r	TBD 0.004	ns
Number of signal levels		L	4	—
Receiver singled-sided input referred noise		η_0	TBD 1e-8	^{2}/GHz

Parameter	Symbol	Value	Units
Transmitter signal-to-noise ratio	SNR_{TX}	TBD 33	dB
Random jitter, RMS	σ_{RJ}	TBD 0.01	UI
Dual-Dirac jitter, peak	A_{DD}	TBD 0.02	UI
Level separation mismatch ratio	R_{LM}	TBD 0.95	—
Number of samples per unit interval	M	32	—
Receiver discrete-time equalizer parameters			
Number of pre-cursor taps	d_w	TBD 6	—
Number of fixed-position taps	N_{fix}	TBD 8	—
Number of floating tap groups	N_g	TBD 2	—
Number of taps per floating tap group	N_f	TBD 4	—
Highest allowed tap index	N_{max}	TBD 80	—
Normalized upper limit on feed-forward coefficient $w(j)$	$w_{max}(j)$	TBD 0.7	—
Normalized lower limit on feed-forward coefficient $w(j)$	$w_{min}(j)$	TBD -0.7	—
Number of feedback taps /MLSD taps	N_b	1	—
Normalized upper limit on feedback /MLSD coefficient b(i)	$b_{max}(j)$	TBD 0.85	—
Normalized lower limit on feedback /MLSD coefficient b(j)	$b_{min}(j)$	TBD 0.3	—
Target detector error ratio	DER_0	2×10^{-4}	—
MLSD implementation allowance	Q	0	dB

MLSD usage: Yes

Proposed Device/COM Parameters for CR (Table 179-15/16) (I)

Single-ended package capacitance at package to board interface	c_p		...
Single-ended reference resistance	R_0	TBD **50**	Ω
Single-ended transmitter termination resistance	$R_d^{(t)}$	TBD **46.25**	
Single-ended receiver termination resistance	$R_d^{(r)}$	TBD **46.25**	

Receiver 3 dB bandwidth	f_r	TBD $\times f_b$ **0.55**		GHz
Transmitter equalizer, coefficient −3	$c(-3)$	TBD **0**		
Minimum value			-0.06	
Maximum value			0.02	
Step size				
Transmitter equalizer, coefficient −2	$c(-2)$	TBD **0**		
Minimum value				
Maximum value			0.12	
Step size			0.02	
Transmitter equalizer, coefficient −1	$c(-1)$	TBD **0**		
Minimum value				
Maximum value			-0.34	
Step size			0.02	
Transmitter equalizer, coefficient 0	$c(0)$	TBD		
Minimum value			0.54	
Transmitter equalizer, coefficient 1	$c(1)$	TBD **0**		
Minimum value				
Maximum value			-0.2	
Step size			0.02	
Continuous time filter, gain 1	g_1			
Minimum value		−20	-15	dB
Maximum value		0		dB
Step size		1		dB
Continuous time filter, gain 2	g_2			
Minimum value		−6	-5	dB
Maximum value		0		dB
Step size		1		dB

- ▨ TBD filling
- ▨ Proposed changes

Proposed COM Parameters for CR (Table 179-15/16) (II)

Parameter	Symbol	Value		Units
Continuous time filter, zero 1 frequency for $g_1=0$	f_{z1}	$f_b/2.5$	fb/4.223	
Continuous time filter, zero 1 frequency for $g_2=0$	f_{z2}	$f_b/80$		GHz
Continuous time filter, pole 1 frequency	f_{p1}	$f_b/2.5$	fb/2.6562	
Continuous time filter, pole 2 frequency	f_{p2}	f_b	fb/1.8973	
Continuous time filter, pole 3 frequency	f_{p3}	$f_b/80$		GHz
Transmitter differential peak output voltage				
Victim	A_v	TBD	0.413	V
Far-end aggressor	A_{fe}	TBD	0.413	V
Near-end aggressor	A_{ne}	TBD	0.608	V
Transmitter transition time	T_r	TBD	0.004	ns
Number of signal levels	L	4		—
One-sided noise spectral density	η_0	TBD	1e-8	V^2/GHz
Transmitter signal-to-noise ratio	SNR_{TX}	TBD	33	dB

Parameter	Symbol	Value		Units
Random jitter, RMS	σ_{RJ}	TBD	0.01	UI
Dual-Dirac jitter, peak	A_{DD}	TBD	0.02	UI
Level separation mismatch ratio	R_{LM}	TBD	0.95	—
Number of samples per unit interval	M	TBD	32	—
Receiver discrete-time equalizer parameters				
Number of pre-cursor taps	d_w	TBD	6	—
Number of fixed-position taps	N_{fix}	TBD	8	—
Number of floating tap groups	N_g	TBD	2	—
Number of taps per floating tap group	N_f	TBD	4	—
Highest allowed tap index	N_{max}	TBD	80	—
Normalized upper limit on feed-forward coefficient $w(j)$	$w_{max}(j)$	TBD	0.7	—
Normalized lower limit on feed-forward coefficient $w(j)$				
Number of feedback /MLSD taps	$w_{min}(j)$	TBD	-0.7	—
Normalized upper limit on feed /MLSD coefficient b(i)				
Normalized lower limit on feed /MLSD coefficient b(j)	N_b	1		—
	$b_{max}(j)$	TBD	0.85	—
	$b_{min}(j)$	TBD	0.3	—
Target detector error ratio	DER_0	2×10^{-4}		—
MLSD implementation allowance	Q	0		dB

MLSD usage: Yes

References

[1] **https://www.ieee802.org/3/dj/comments/index.html**

[2] **https://www.ieee802.org/3/dj/public/24_07/lim_3dj_02a_2407.pdf**

[3] **https://www.ieee802.org/3/dj/private/index.html**

Thank You!