



COM Configuration Parameter Impact on Copper Cable

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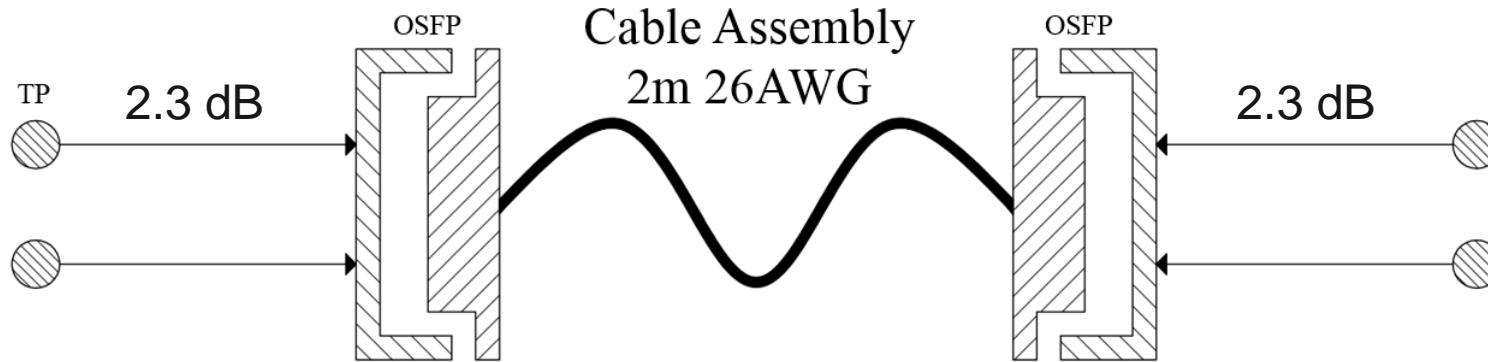
Overview

- Description of new work being shared
- Results of copper cable measurements using various COM settings in addition to recommended settings
- Summary

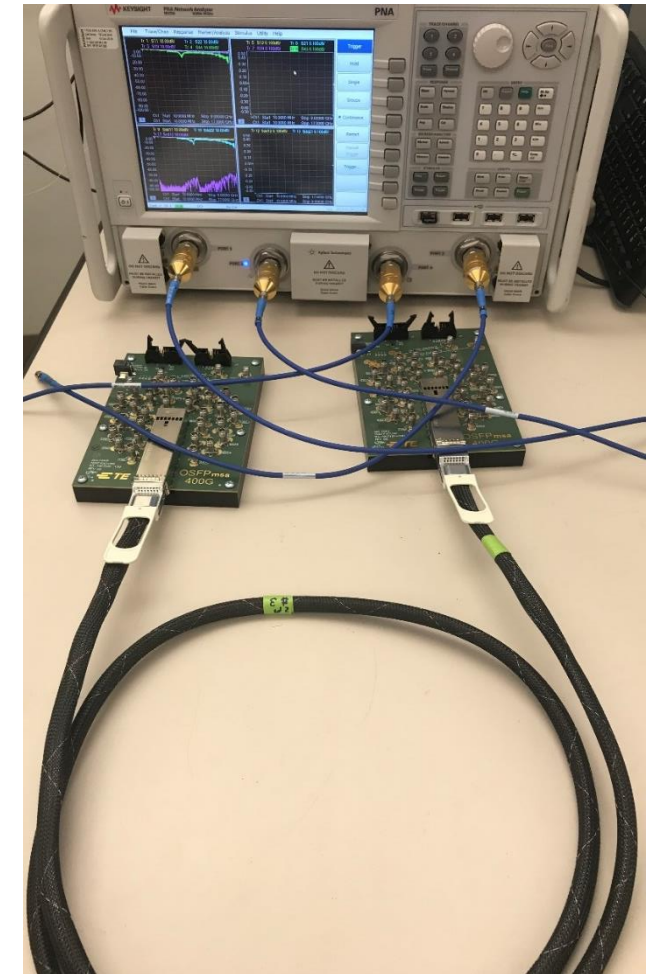
New Work Being Shared

- 2m, 26 AWG OSFP cable assembly has been built
- Tested with prototype OSFP MCBs and connectors
- MCB trace loss is per the draft specification, 2.3 dB at 26.56 GHz
- Measurement results were then analyzed using various COM settings specifically in regard to SNR_Tx and eta_0

2m, 26AWG OSFP Cable: TP1-TP4 Test Data



- Data taken from TP1 to TP4
- 10 MHz to 50 GHz
- All Thru files and all XT collected



OSFP Pin Map

Pin #	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31
	G	Tx1+	Tx1-	G	Tx3+	Tx3-	G	Tx5+	Tx5-	G	Tx7+	Tx7-	G	SB	SB	SB	SB	G	Rx8-	Rx8+	G	Rx6-	Rx6+	G	Rx4-	Rx4+	G	Rx2-	Rx2+	G
	G	Tx2+	Tx2-	G	Tx4+	Tx4-	G	Tx6+	Tx6-	G	Tx8+	Tx8-	G	SB	SB	SB	SB	G	Rx7-	Rxy+	G	Rx5-	Rx5+	G	Rx3-	Rx3+	G	Rx1-	Rx1+	G
Pin #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

Results

COM Setting	Channel	SNRtx & eta0 Settings from COM 2.75	COM Settings for Reference	COM Initial 2.76 settings	COM Existing Settings (Draft 1.1)	ERL	FOM ILD	ICN mV	MDFEXT ICN mV	MDNEXT ICN mV	CA Loss	Total IL w/pkgs
SNR_Tx		32.5	32.5	32	32							
eta0		8.37e-9	9.00e-9	9.00e-9	1.00e-8							
	1	3.596	3.492	3.414	3.248	12.760	0.503	1.502	1.235	0.855	17.880	38.547
	2	3.544	3.427	3.337	3.173	14.460	0.597	1.711	1.493	0.836	18.040	38.580
	3	3.414	3.286	3.210	3.024	15.960	0.373	1.578	1.336	0.840	19.580	39.934
	4	3.363	3.248	3.173	2.987	15.040	0.435	1.511	1.271	0.817	18.800	39.675
	5	3.312	3.198	3.123	2.950	14.350	0.728	1.748	1.561	0.786	18.950	39.523
	6	3.286	3.173	3.098	2.926	14.300	0.454	1.423	1.118	0.881	19.170	40.039
	7	3.223	3.098	3.024	2.829	14.640	0.399	1.496	1.286	0.764	19.980	40.287
	8	3.210	3.098	3.012	2.841	14.160	0.502	1.541	1.382	0.682	19.290	39.937
	9	3.198	3.086	3.012	2.841	13.940	0.507	1.808	1.606	0.829	17.990	38.661
	10	3.123	3.012	2.938	2.769	12.370	0.497	1.316	1.006	0.847	19.360	40.343
	11	3.073	2.975	2.890	2.734	14.050	0.361	1.570	1.148	1.071	20.290	40.573
	12	3.073	2.963	2.878	2.722	14.770	0.315	1.697	1.333	1.051	20.380	40.802
	13	3.012	2.914	2.841	2.674	13.740	0.482	1.703	1.315	1.082	20.630	41.085
	14	2.975	2.865	2.793	2.627	13.970	0.464	1.679	1.126	1.245	20.960	41.070
	15	2.902	2.805	2.722	2.569	13.870	0.634	1.827	1.288	1.296	19.670	39.958
	16	2.781	2.686	2.615	2.464	14.040	0.454	2.007	1.270	1.555	20.420	40.740

- COM settings have slowly deteriorated channel performance (specifically looking at SNR_Tx and eta0)
- Using SNR_Tx & eta0 settings from 2.75 yielded passing results while failing channels with high MDNEXT
- Existing settings make channels with good IL, ILD, and ICN fail
 - Existing settings may not support full loss TP1-TP4 channels (19.75 dB)
 - Using SNR_Tx = 32, eta0 = 1.00e-8, 2 out of 3 channels that pass have IL that is far below 19.75 dB target
- Need more consideration and measurements on SNR_Tx and eta0 values
- Recommend to adopt SNR_Tx = 32.5, eta0=8.37e-9, ERL=11.5

COM Settings

Table 93A-1 parameters			
Parameter	Setting	Units	Information
f_b	53.125	GBd	
f_min	0.05	GHz	
Delta_f	0.01	GHz	
C_d	[1.2e-4 1.2e-4]	nF	[TX RX]
L_s	[0.12, 0.12]	nH	[TX RX]
C_b	[0.3e-4 0.3e-4]	nF	[TX RX]
z_p select	[1 2]		[test cases to run]
z_p (TX)	[12 31; 1.8 1.8]	mm	[test cases]
z_p (NEXT)	[12 29; 1.8 1.8]	mm	[test cases]
z_p (FEXT)	[12 31; 1.8 1.8]	mm	[test cases]
z_p (RX)	[12 29; 1.8 1.8]	mm	[test cases]
C_p	[0.87e-4 0.87e-4]	nF	[TX RX]
R_0	50	Ohm	
R_d	[50 50]	Ohm	[TX RX]
A_v	0.415	V	vp/vf=.694
A_fe	0.415	V	vp/vf=.694
A_ne	0.608	V	
L	4		
M	32		
filter and Eq			
f_r	0.75	*fb	
c(0)	0.54		min
c(-1)	[-0.34:0.02:0]		[min:step:max]
c(-2)	[0:0.02:0.12]		[min:step:max]
c(-3)	[-0.06:0.02: 0]		[min:step:max]
c(1)	[-0.2:0.05:0]		[min:step:max]
N_b	12	UI	
b_max(1)	0.85		
b_max(2..N_b)	0.2		
g_DC	[-20:1:0]	dB	[min:step:max]
f_z	21.25	GHz	
f_p1	21.25	GHz	
f_p2	53.125	GHz	
g_DC_HP	[-6:1:0]		[min:step:max]
f_HP_PZ	0.6640625	GHz	

I/O control		
DIAGNOSTICS	0	logical
DISPLAY_WINDOW	0	logical
CSV_REPORT	1	logical
RESULT_DIR	.\results\100GEL_CR_{date}\	
SAVE_FIGURES	0	logical
Port Order	[1 3 2 4]	
RUNTAG	CR_eval_	
COM_CONTRIBUTION	0	logical
Operational		
COM Pass threshold	3	dB
ERL Pass threshold	10	dB
DER_0	1.00E-04	
T_r	6.16E-03	ns
FORCE_TR	1	logical
TDR and ERL options		
TDR	1	logical
ERL	1	logical
ERL_ONLY	0	logical
TR_TDR	0.01	ns
N	3000	
beta_x	2.3407E+09	
rho_x	0.21	
fixture delay time	[0.6e-9 0.6e-9]	[port1 port2]
TDR_W_TXPKG	0	
N_bx	12	UI
Receiver testing		
RX_CALIBRATION	0	logical
Sigma BBN step	5.00E-03	V
Noise, jitter		
sigma_RJ	0.01	UI
A_DD	0.02	UI
eta_0	9.00E-09	V^2/GHz
SNR_TX	32.5	dB
R_LM	0.95	

Table 93A-3 parameters		
Parameter	Setting	Units
package_tl_gamma0_a1_a	[0 0.0009909 0.0002772]	
package_tl_tau	6.141E-03	ns/mm
package_Z_c	[87.5 87.5 ; 92.5 92.5]	Ohm
benartsi_3ck_01_0119 & mellitz_3ck_01_0119		
Table 92-12 parameters		
board_tl_gamma0_a1_a2	[0 3.8206e-04 9.5909e-05]	1 dB / in
board_tl_tau	5.790E-03	ns/mm
board_Z_c	100	Ohm
z_bp (TX)	110.3	mm
z_bp (NEXT)	110.3	mm
z_bp (FEXT)	110.3	mm
z_bp (RX)	110.3	mm
C_0	[0.29e-4]	nF
C_1	[0.19e-4]	nF
Include PCB	1	logical
Floating Tap Control		
N_bg	3	0 1 2 or 3 groups
N_bf	3	taps per group
N_f	40	UI span for floating taps
bmaxg	0.2	max DFE value for floating taps
B_float_RSS_MAX	0.03	RSS tail tap limit
N_tail_start	25	(UI) start of tail taps limit
ICN parameters		
f_v	0.723	*Fb
f_f	0.723	*Fb
f_n	0.723	*Fb
f_2	39.844	GHz
A_ft	0.600	V
A_nt	0.600	V
heck_3ck_03b_0319	Adopted Mar 2019	kasapi_3ck_02_1119
walker_3ck_01d_0719	Adopted July 2019	Adopted Nov 2019
result of R_d=50		under consideration
benartsi_3ck_01a_0719	require COM 2.72 or later	
mellitz_3ck_03_0919	mellitz_3ck_03_1119	

- SNR_Tx & eta_0 varied according to values shown on previous slide

Summary

2m, 26 AWG, TP1 to TP4 OSFP cable assembly measured results have been presented

Based on these results, more work needs to be done to improve some cable assembly channels

SNR_Tx proposal and eta_0 settings currently in the draft will make it extremely difficult, if not impossible, to consistently produce copper cable assemblies in compliance with the ck specification

Recommend to change SNR_Tx and eta_0 values to 32.5 and 8.37e-9 respectively

Recommend an ERL value of 11.5