

25G I/O for Ethernet

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OIF spec

Ethernet needs

Recommendation

What needs to be done?

What is specified in OIF CEI28G-SR?

- Symmetric chip to module 25G electrical interface
 - 3 tap FFE in TX
 - Equivalent to a 5 tap DFE in the RX?
 - Channel attenuation of 15dB
 - Insertion loss deviation, Return loss, crosstalk.

What is needed by IEEE?

- 4x25G chip to module electrical specification
 - Reduced ASIC I/O pin count
 - Smaller optical modules
 - Reduce power (no PCS in transponder)

How is IEEE different than OIF

- Power, size are more important for IEEE
 - OIF connections are for long haul telco modules which do not have critical power, size, cost constraints

Recommended changes to OIF CEI-28-SR spec for IEEE use

- Reduce power and complexity of the optical module by creating an asymmetrical interface with relaxed specifications on the module side
 - Goal would be a single retimer in the module or
 - Reduced Eq requirements on module RX (no DFE?) and
 - Reduced FFE requirements on module TX (single FFE non adaptive tap?)

Existing jitter budget

Table 10-13. CEI-28G-SR Informative Jitter Budget

Source	Uncorrelated Jitter		Correlated Jitter		Total Jitter				Amplitude	
	Unbounded Gaussian	Bounded High Prob.	Bounded Gaussian	Bounded High Prob.	Gaussian	Sinusoidal	High Prob.	Total		
Abbreviation	UUGJ	UBHPJ	CBGJ	CBHPJ					k	
Unit	Upp	Upp	Upp	Upp	Upp	Upp	Upp	Upp		mVppd
Transmitter	0.150	0.150			0.150		0.150	0.300		800
Channel (see 4)			0.230	0.400						
Receiver Input	0.150	0.150	0.230	0.400	0.275		0.550	0.825	0	0 See 2
Equalizer				-0.300 See 1						
Post Equalizer	0.150	0.150	0.230	0.100	0.275		0.250	0.525	0.25	100
DFE Penalties				0.100						-45
Clock & Sampler	0.150	0.100		0.100						-45
Budget	0.212	0.250	0.230	0.300	0.313	0.050	0.550	0.913	0.13	10

Note:

1. Due to receiver equalization, it reduces the ISI as seen inside the receiver. Thus this number is negative.
2. It is assumed that the eye is closed at the receiver, hence receiver equalization is required.
3. Jitter values in yellow are specified values from [Table 10-1](#), [Table 10-6](#), and [Table 10-11](#). Amplitude values are specified in [Table 10-1](#), [Table 10-5](#), and [Table 10-10](#).
4. Budgeted channel jitter includes equalization by the Transmitter FFE.

Key issues

- Connector performance
 - S21, Crosstalk, S11
- Optical link budget
 - Impacts single vs dual retimer decision

Additional work required

- Power savings
 - OIF compliant solution
 - Dual 'simple' retimers
 - Single retimer
- Channel requirements
 - Connector requirements
 - Insertion loss deviation effects vs eq performance
- Proposed asymmetric link jitter budget