

Link Budget for 10GBASE-KR

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 - Charles Moore, Avago
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Introduction

- This slide package proposes the use of a flexible link budget as a basis to specify the characteristics of the informative channel model and the normative EIT channel.

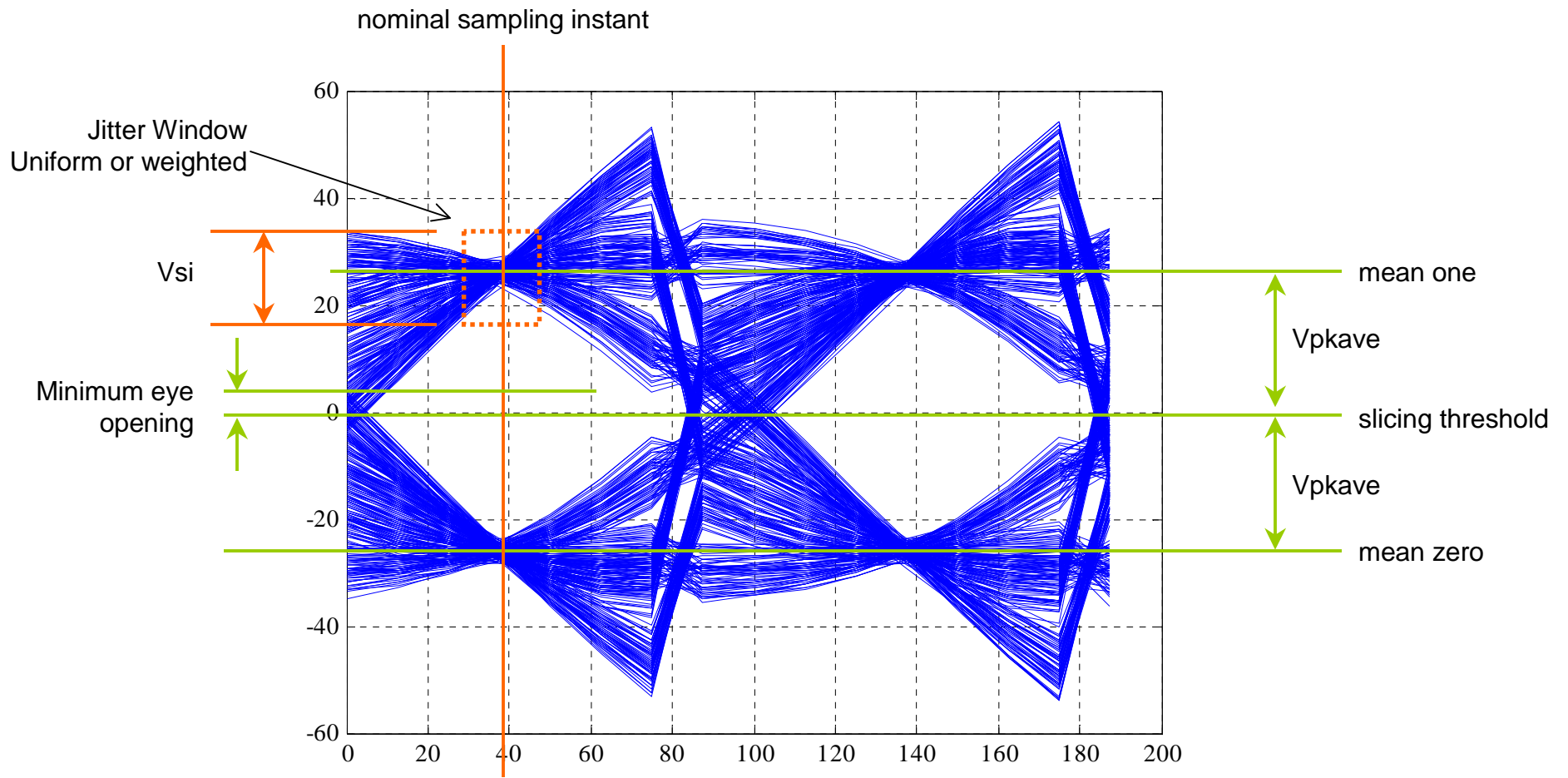
History

- We have found it difficult to define each of the channel impairments in isolation of each other such we can get clean differentiation between working and non-working channels.
- We are having difficulty in specifying an EIT channel that both reflects the informative channel characteristics and is compatible with real receiver architectures once all impairments are added in.

Link Budget

- Why do we need a link budget?
 - Precisely and completely specify the target channels.
 - A flexible budget allows backplane and device designers to balance specifications against each other.
 - By itemizing all of the substantial parameters it provides a helpful basis for discussion, analysis, and design.
 - Use as a basis to related the EIT channel to the informative model specification.

Eye Diagram



Tyco Case 1
Simple 5-tap DFE, Standard 3 tap FFE
No Xtalk, no Gaussian Noise, no jitter

Strawman Budget (values are exemplary)

Item	Value	Unit	Notes
Launched eye	400	mVpk	
Effective channel loss	23.0	dB	includes effects of Tx and Rx s-parameters
Mean eye amplitude referred to Rx input	28.3	mVpk	
Eye closure from what???	1.0	mV	
Eye amplitude	27.3	mVpk	
Mean decision distance	24.8	mVpk	
Eye opening @ 1e-12 BER	2.5	mVpk	
Maximum tolerable noise	3.90	mVrms	= (mean decision distance) / (Q @ 1e-12)
DFE error propagation penalty	0.50	dB	
DCD penalty	0.50	dB	
DFE implementation penalty	0.50	dB	
FFE resolution penalty	0.50	dB	
Maximum tolerable noise with margin	3.10	mVrms	
Gaussian noise	1.50	mVrms	
Self interference	1.50	mVrms	includes effects of RL and jitter
Cross talk	2.20	mVrms	includes effects of RL
Budget for other interference	0.52	mVrms	
Total noise	3.10	mVrms	
Should SI be viewed as eye closure or noise or a bit of each?			
Could alternatively add budget items for effects of Rx and Tx packaging.			
Should jitter be a penalty item or be part of the SI parameter?			

What do we need?

- Budget containing all consequential parameters.
- Agree upon numbers for each of the fixed parameters.
- Establish a relationship between the flexible parameters.
 - e.g., total noise from gaussian, SI, XT, etc.
- Establish a method to determine the derived parameters.
 - e.g., self-interference from SDD21 and reference receiver
- Specify reference receiver
 - suggest unconstrained 5-tap DFE and Tx as specified in Clause 72
- Specify composite reference channel
 - e.g., package model + channel (EIT or DUT) + package model
- Reference channel
- Reference receiver (e.g., 5-tap unconstrained DFE)

Proposal

- Establish a flexible link budget.
- Use this link budget as a basis for specifying the informative channel model.
- Use this link budget as a basis for relating the normative EIT channel and informative channel model.