



Channel Model Ad Hoc: Agenda and General Information

Channel Model Ad Hoc Teleconference
February 23, 2005

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If you are present on today's call, please send me an e-mail indicating your attendance.



Schedule of Events

- Teleconference: Thursday, February 10 (10am PST)
 - Methodology to derive time-domain data.
- Teleconference: Wednesday, February 23 (10am PST)
 - Identify time-domain parameters.
- Teleconference: Wednesday, March 2 (10am PST)
 - As needed.
- Wednesday, March 9 (midnight EST)
 - Deadline for requests for presentation time.
- Tuesday, March 15 – Thursday, March 17
 - IEEE P802.3ap Task Force Meeting
 - Hyatt Regency, Atlanta, GA



Meeting Agenda

- Carry-over items
- New business
 - Popescu, “Proposal to IEEE P802.3ap Channel Model Ad Hoc”.
http://ieee802.org/3/ap/public/channel_adhoc/popescu_c1_0205.pdf
 - D’Ambrosia, “Revisiting Channel Model Measurements”.
http://ieee802.org/3/ap/public/channel_adhoc/dambrosia_c1_0205.pdf
- Walk-in items

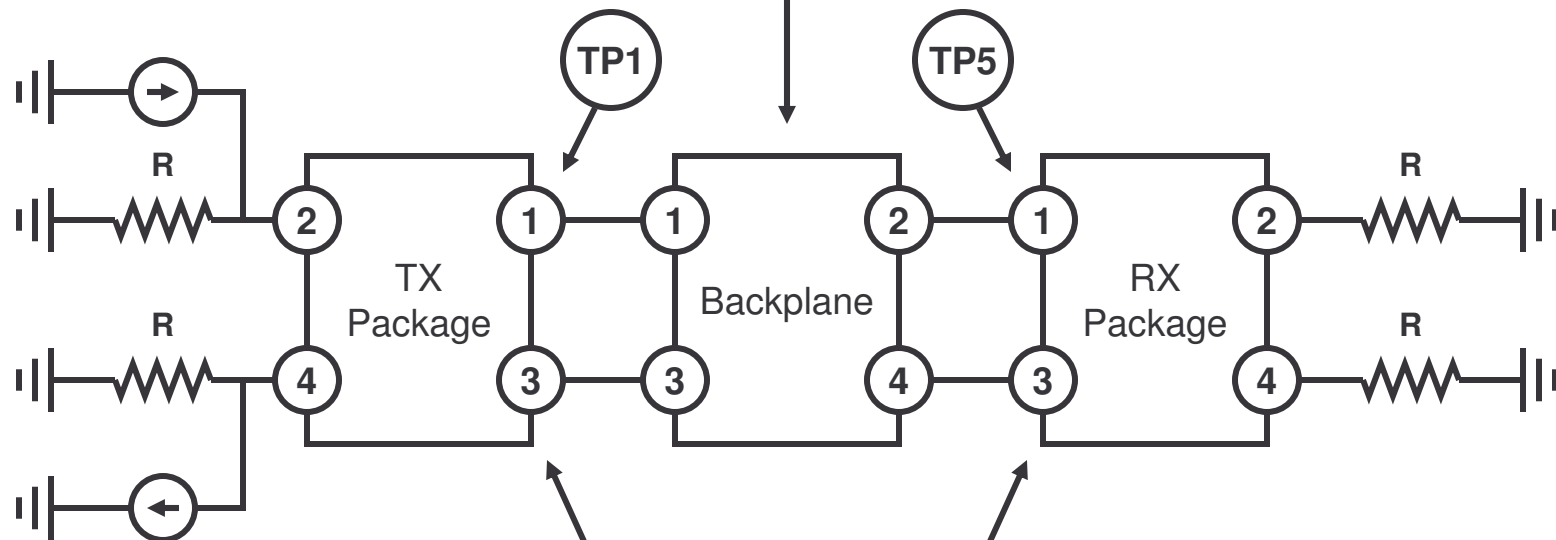


Carry-Over #1: Package Effects

- The ad hoc has been directed to include “transmitter and receiver effects” in the compliance methodology.
- At the February 10 teleconference, two approaches to this problem, as it pertains to TX / RX return loss effects, were identified.
 - Explicit inclusion of generic TX and RX package models.
 - Allocation of a fixed amplitude/timing margin for channel-package interaction.
- Per an action item accepted at the February 10 teleconference, the options are summarized.

“Explicit” Methodology

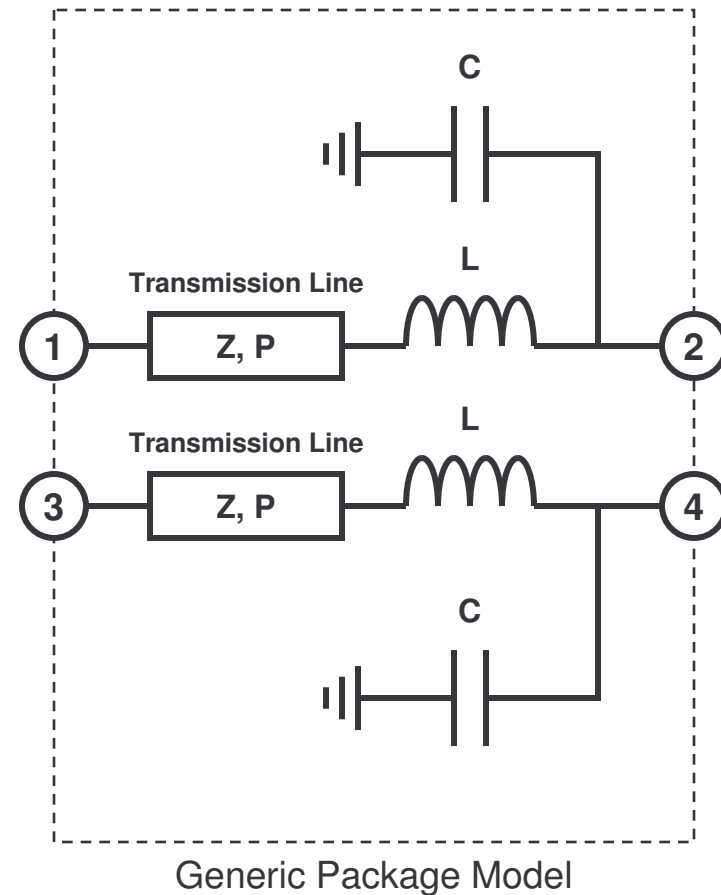
Step 1: Collect 4-port measurements from the backplane under test.



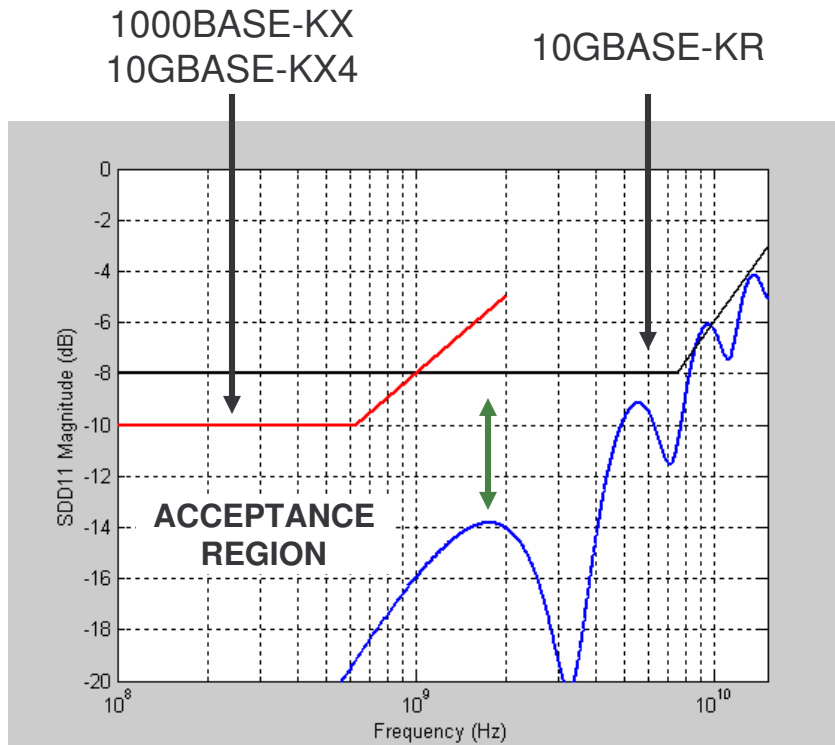
Step 2: Cascade with standard prescribed generic package model.

Generic Package Model

Parameter	Value	Units
Substrate Impedance (Z)	TBD	Ω
Substrate Length (P)	TBD	cm
Chip Attach Inductance (L)	TBD	nH
Chip Capacitance (C)	TBD	pF
Die Termination (R)	TBD	Ω



Package Model Example



Mellitz: Spec_RL_cap_like.s4p

Parameter	Value	Units
Substrate Impedance (Z)	42	Ω
Substrate Length (P)	17.78	mm
Chip Attach Inductance (L)	0.1	nH
Chip Capacitance (C)	0.4	pF
Die Termination (R)	50	Ω

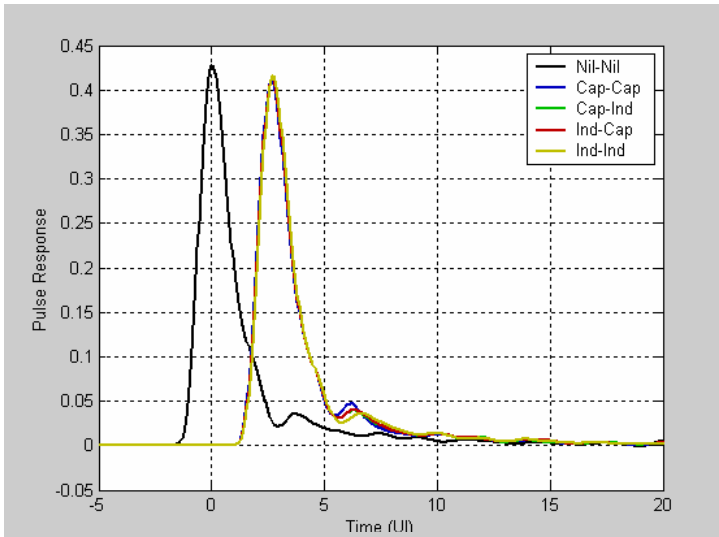


Observations

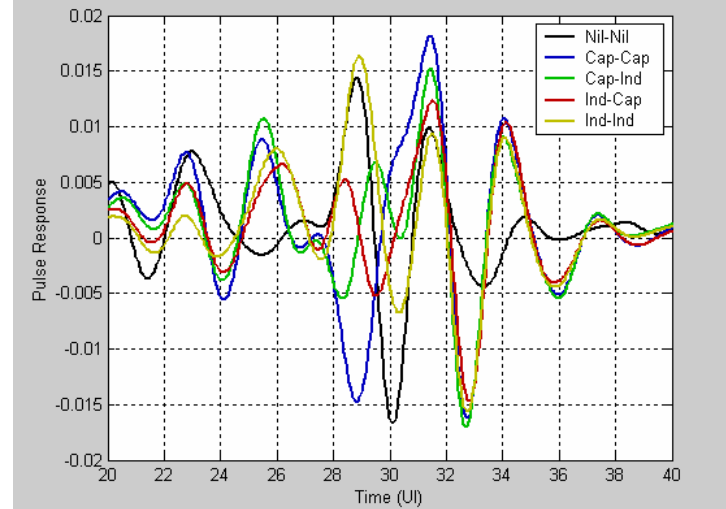
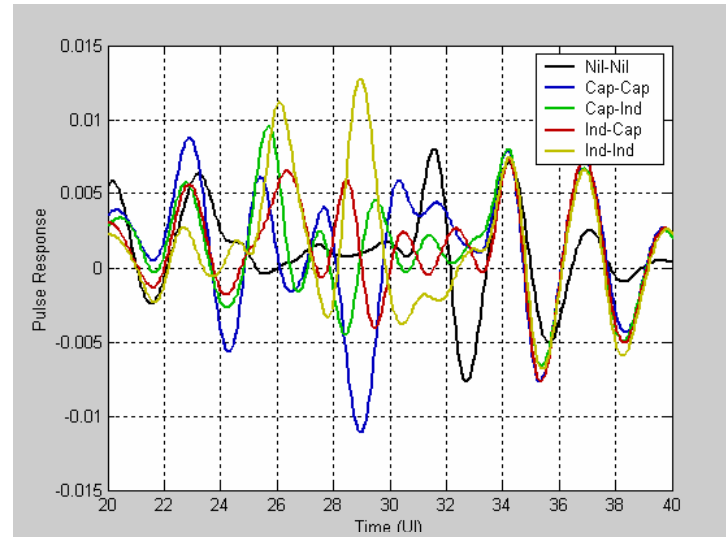
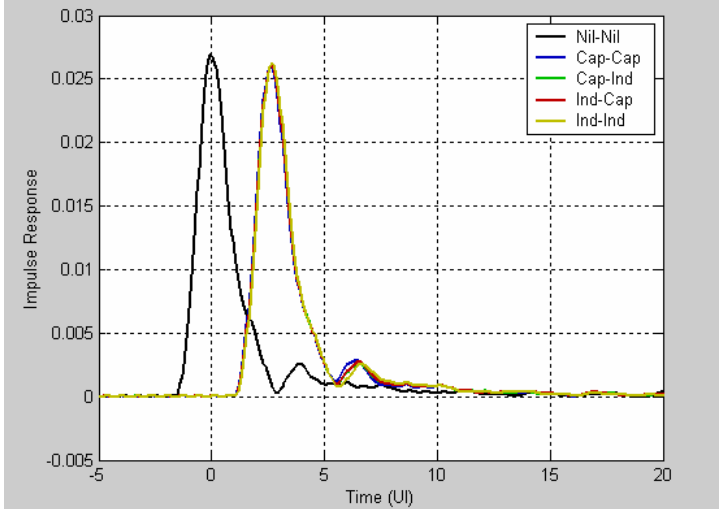
- Significant margin between specification line and model return loss.
 - Is this truly a worst-case package?
 - Is the specification line too forgiving?
- Definition of “worst-case” relative to PHY type.
 - Will this normative specification apply to all PHY types?
 - If so, then should a different package model be defined for 1000BASE-KX / 10GBASE-KX4 and 10GBASE-KR?
- A more complete way to describe the substrate transmission line is required.
 - RGLC?
 - $\tan(\delta)$, ϵ_r , H, W, S, ... ?
 - A compact yet precise definition is desired...

Sample Pulse Responses

Tyco Electronics
Test Case 5



Tyco Electronics
Test Case 6





“Margin” Method

- Results based on the “explicit” methodology are somewhat anecdotal.
 - There is no guarantee that the channel will work with a different, yet compliant, package.
 - Multiple test cases can help address this issue, but they become cumbersome as the number increases.
- In the limit, an infinite number of test cases would identify the worst-case performance.
- Rather than try a large number of test cases, a fixed margin can be allocated to represent the worst-case package-channel interactions.

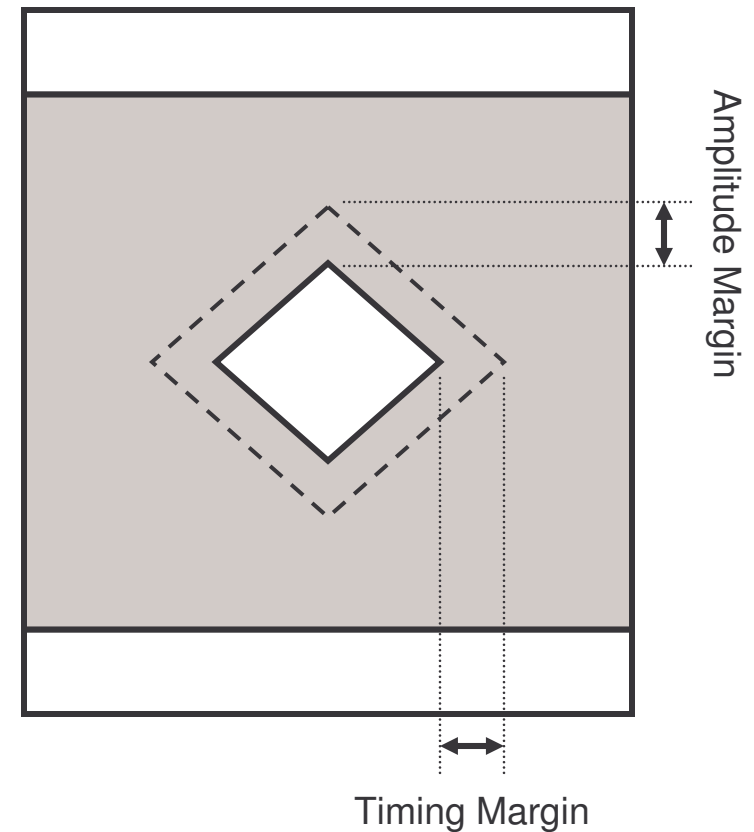
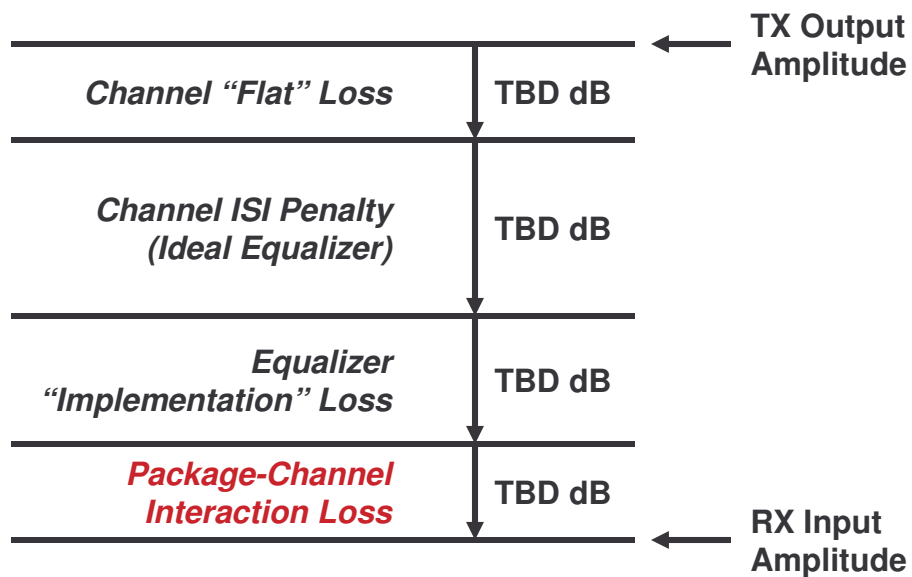
Margin Definition (Examples)

Link Budget

Refer to popescu_c1_0205 for a complete sample link budget.

Eye Mask

Channel alone must satisfy outer contour.
Receiver must work with inner contour.





Carry-Over #2: Extrapolation to DC

- Algorithms to extrapolate measured channel data to DC exist in multiple commercial software packages.
 - Often, these algorithms are considered proprietary.
- The open-source StatEye code contains an algorithm that can be considered “public domain”.
 - As of version 3.0f, it is linear extrapolation of magnitude and phase (line fit based on first 10 measured data points).
- Option #1 is to utilize, perhaps with modification, the StatEye algorithm.
- Option #2 is to leave such details out of the standard.
 - The user is free to choose their favorite tool set to acquire the backplane impulse/pulse response.