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Determination of the 10GBASE-KR Transmit Tap Default setting

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Scope and Purpose

- This presentation is intended to describe the method used to determine a suitable set of default preset transmit equalizer taps.
- A set of transmit equalizer taps enabling CDR acquisition with IEEE802.3ap channels is proposed.

Agenda

- Simulation description
- Channel description
- Results
- Conclusions

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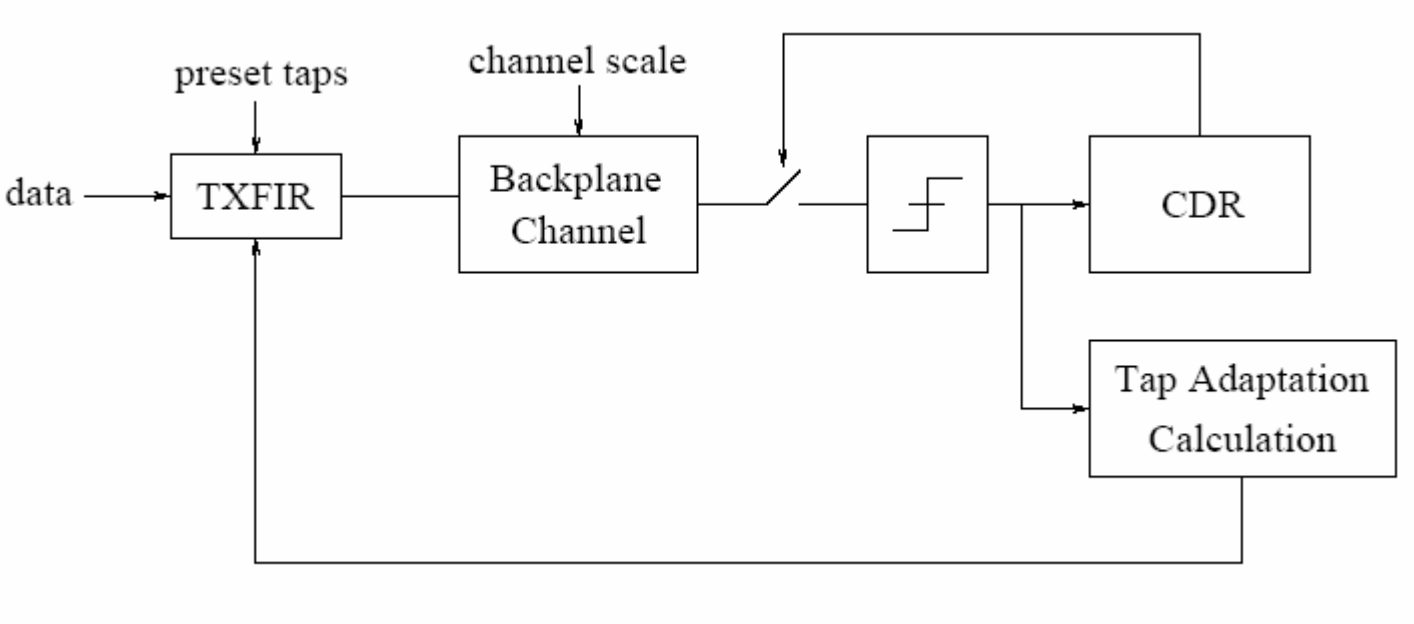
Simulator Overview

Simulation Model

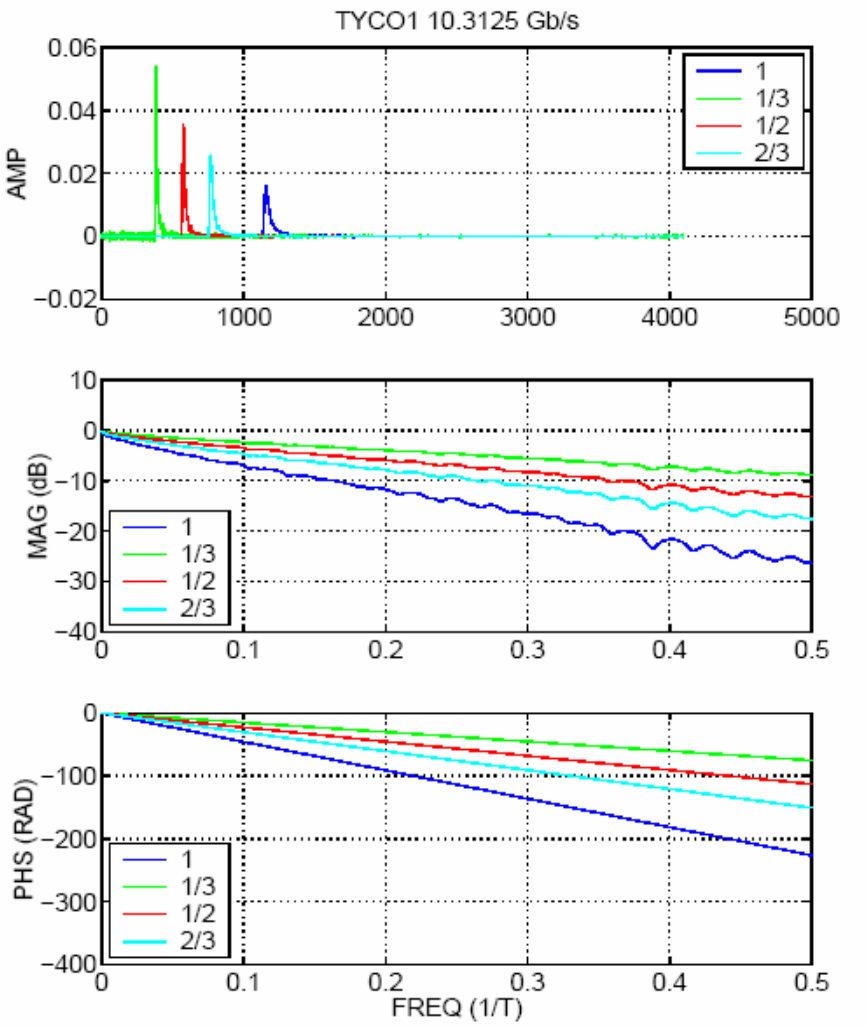


Simulation Conditions

- Scaled Tyco1 channel used
  - Scaling is explained on the next page
- No crosstalk applied
- FFE Only adaptation – no DFE adaptation considered
  - No DFE adaptation is considered because the DFE has not yet adapted at this point in the link initialization procedure.

Channel Scaling Description

- For the purposes of coming up with “reasonable" pre-sets for TXFFE taps, back-plane length was scaled by a factor resulting in exponent of complex frequency response scaling by same factor
- $H_m(\omega)\exp(j(\omega)) = \exp(a + jb)$
- Scale (a + jb) by say w
- This results in $H_m(\omega)^w\exp(jw(\omega))$



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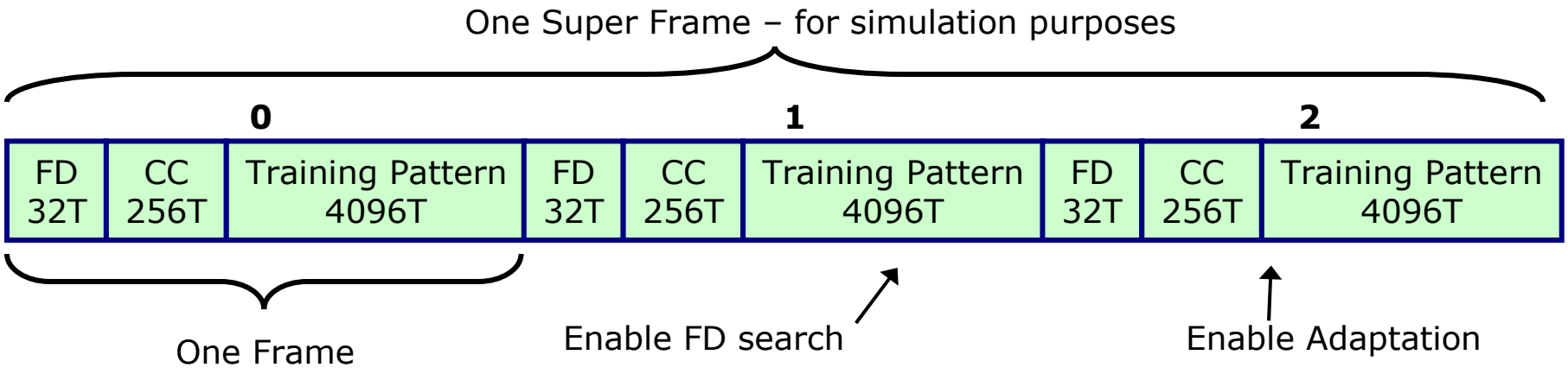
Simulation Technique



- Each Super Frame is repeatedly simulated with random initial phase as well as updated FIR taps
- To minimize sim time, using 2 frames to allow CDR settling (more frames will give better settling)
- Receiver keeps sense of position in the super frame.
- FFE Only adaptation

Results

- Channel Scale - the scale factor of the channel used
- Taps - the optimum taps derived from the channel with the given scale factor
- InitAcq? – Was CDR acquisition possible

Channel Scale	Taps	InitAcq?
1	1	Yes
1	2/3	Yes
1	1/2	Yes
1	1/3	No
1/3	1	Yes
1/3	2/3	Yes
1/3	1/2	Yes
1/3	1/3	Yes

Conclusions

- When the channel is highly attenuated, some preset Tx boost is required to enable robust CDR acquisition.
- The 1/2-scaled case, normalized and mapped to the 10GBASE-KR transmit equalizer space would be…
  [-0.050 0.675 -0.275] or ~9.1 dB gain at Nyquist.
- Resulting in Rpre = 18/14 = 1.29 and Rpst = 36/14 = 2.57

Tx Tap Default Setting Proposal

- Specify Rpre = 1.29 +/- 10%
- Specify Rpst = 2.57 +/- 10%

- Test these conditions as part of the already specified Transmit equalizer tests described in Sections 72.6.1.10 and 72.6.1.11 of Draft 2.0.