

# AppliedMicro

## CR4/10 TP2/TP0 Parametric Specification and Measurement Methodology

IEEE 802.3ba Interim Meeting  
May 4, 2009

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# Contributors

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# Introduction

- Propose TP2 measurement methodology to optimize measurement accuracy.
  - Measure parameters directly at TP2, if practical.
  - Use Moore/Misek IL loss extraction and referred TP0 interface (or similar method) to measure parameters that are not directly measurable at TP2.

# Background

- Two methodologies have previously been proposed for parameter specification at TP2 on 10GBASE-CR4 and 10GBASE-CR10 interfaces.
  - Use TWDP measurement similar to 10GBASE-LRM
  - Extract insertion loss (Moore/Misek method) based on time domain measured, extract insertion loss, and refer all measurements to a virtual driver output.
- The TWDP methodology has problems
  - Does not deal with broad range of driver settings
  - Assumes a single Rx architecture
- The Misek/Moore methodology may lead to inaccurate measurement of fine numbers.

# Jitter Methodology: RJ, DCD, PJ

- Measure the following jitter components directly at TP2
  - RJ
  - DCD
  - PJ (uncorrelated DJ)
- Use jitter decomposition to determine the above components
- Use square wave, either 1/1 or 8/8 (ones/zeros) or PRBS9/11
  - for either pattern jitter analyzer can extract the jitter components
- DCD may need correction factor based on derived channel insertion loss.

## Data Dependent Jitter

- DDJ is directly related to the insertion loss characteristics of the channel.
- DDJ also technically includes DCD which is already measured.
- Non-DCD DDJ will be bounded by IL.
- Do not specify DDJ directly. Instead, specify IL characteristics.

## Total Jitter (TJ)

- TJ interpretation must change since we can't differentiate DDJ from device and channel.
- Redefine TJ to include everything except DDJ (call it TJx, for now).
- If measuring jitter with square wave, TJx can be directly measured with jitter analyzer.
- If measuring jitter with PRBS, TJ can be determined by convolving all histograms other than DDJ.

# Insertion Loss

- Determined by extraction methodology being proposed by Moore/Misek (or other method).
- Bound insertion loss
  - specify with consideration of range possible channels from TP2 to TP5
  - consider equalizability, e.g., avoid bad reflections
- Specification of fitted IL and ILD should be sufficient
  - Need better correlation of ILD and end performance.



## Transmitter Waveshape

- Measure driver wave shapes per methodology in Clause 72.
- Two methods possible...
- Measure directly at TP2
  - Must allow for channel loss
  - May be difficult to specify over range of channels
  - Need new numbers and perhaps definitions
- Measure referred to TP0 per Moore/Misek methodology (or other method)
  - Measure referred waveforms and use same parameter values specified in Clause 72.

## Summary

- Measure unequalizable jitter components directly at TP2.
- TP0 to TP2 channel may be bound by fitted IL and ILD.
  - ILD must be specified with good correlation to performance.
- Clause 72 driver mask compliance may be achieved either by
  - measure directly at TP2 with new target specifications
  - referred to TP0 after channel extraction with similar specifications

# Conclusion

- Use the best measurement methodology for each parameter.