Quantum™

00-106R0: Ultra-320 SCSI Summary & Recommendations

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What we showed today and last month

- We have shown our initial concerns with how to implement drivers that can support 1.8x precomp

  Dick Uber (00-103r0)
- We have shown measured data at 320MB/s rates for a few configurations using available high-quality cable

  Andy Bishop (00-104r0)
  - heavily and lightly loaded configs, long & short busses, backplanes & cables
  - transmit pre-compensation and simulated receive equalization
  - with & without cross-talk
- We have shown the resulting eye diagrams, with acceptability judged by an error mask based on:

  Andy Bishop (00-104r0)
  - amplitude errors from SPI-3 specs, and interconnect resistance data
  - estimated timing errors for Ultra320, mostly from T10/99-261, LSI Logic
  - We have NOT established the required margin for acceptable error rate performance
- We have compared Calibration strategies and proposed a flexible training pattern

  Russ Brown (00-105r1)

Transmitter vs. Receiver

- Transmit Pre-comp ‘boost on transition’ actual results
  - 1.8X boost required to frequency compensate for SPI-3 configurations with 400mV / 720mV drive levels
    - is INADEQUATE for 10m cable length configurations
    - uses all available driver headroom with NO MARGIN for further amplitude increases
  - 1.8X boost presents serious driver design difficulties
- Receive Equalization simulated results
  - Equalizer performance with 400mV transmit amplitudes is much better than 1.8X Pre-comp performance with 400mV / 720mV drive levels
  - Equalizer achieved with simple equalization filter and simple training pattern used for adaption
  - Equalizer gives optimized equalization for each receiver bus location
- We recommend Receive Equalization over Transmit Pre-compensation

Calibrations and Training Pattern

- CAL strategy
  - Our analysis indicates that Host-initiated Major Calibrations on power-up, timer or error is the preferred strategy
- Training Pattern
  - We recommend a flexible training pattern containing low and high frequency components that allows vendor-specific CAL approaches for timing de-skew, receive equalization and other possible compensation techniques