Quantum™

T10/00-224r0

Validation of Quantum's Lab Set-up Used for Testing Ultra320

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Introduction

- We wanted to validate the lab set-up used for gathering all of Quantum's Ultra320 data.
  - Seagate's presentation at the March Physical working group meeting in Milpitas (T10/00-194r0) stated that their lab set-up is more pessimistic than a system using an actual SCSI initiator.
  - We did not believe this was true for our set-up.
- Since we have no real Ultra320 system, we compared data gathered with two actual Ultra160 host bus adapters in real systems to Quantum's lab set-up run at Ultra160 speed.
- We used identical cables, backplane, and disk drives in all set-ups.
- We used the resulting eye diagrams for comparison.

System Configuration Description

- We gathered data with two commercially available Ultra160 host bus adapter cards, one from Vendor A and one from Vendor B
- Test Configuration 4 as described in T10/00-214r0 "Details of test set-up used by Quantum for Ultra320 data" and T10/00-215R0 "Quantum Ultra320 SCSI Test Configurations" was used for the test
  - 10 meter twisted-flat ribbon cable - 30AWG
  - 10-slot backplane fully populated with Quantum Ultra160 disk drives

Test Method for HBAs

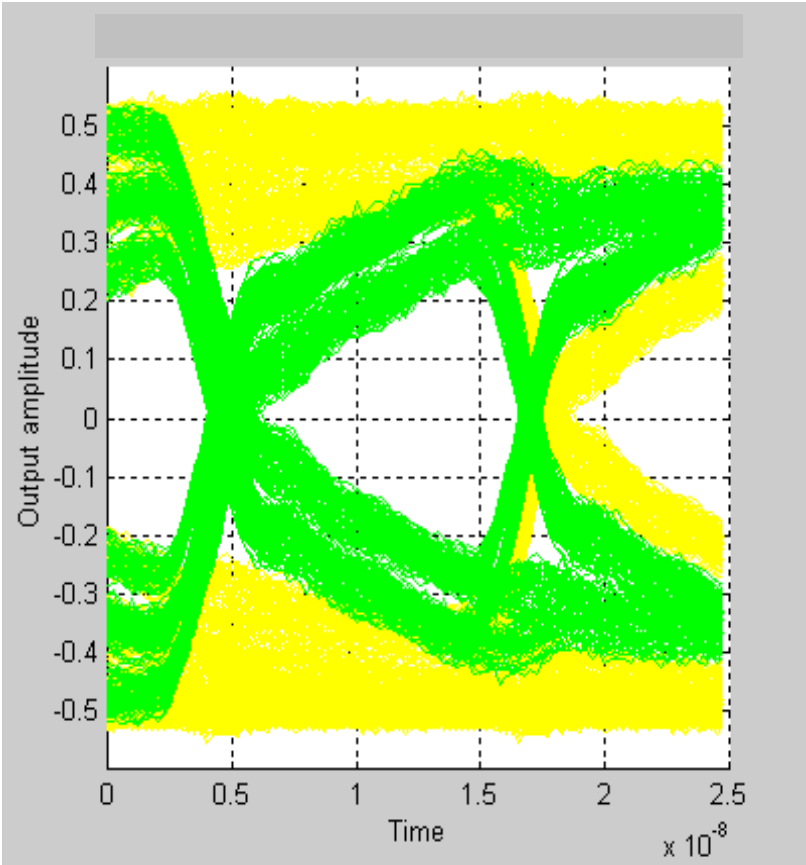
- Data was transferred to the disk drive at the Ultra160 rate
- The data pattern that was transferred was identical to that used for the test set-up (see T10/00214r0 for the specific data pattern):
  - n bytes of 1010.. followed by random data on the victim signal
  - 1010... pattern on the two adjacent signals to stimulate worst case crosstalk
- The entire data phase was captured by a digital oscilloscope at 10 gigasamples per second
- The output file of the time/voltage pairs was transferred to a system running Matlab.
- Matlab was used to plot the eye diagram from the data

Test Method for Test Set-up

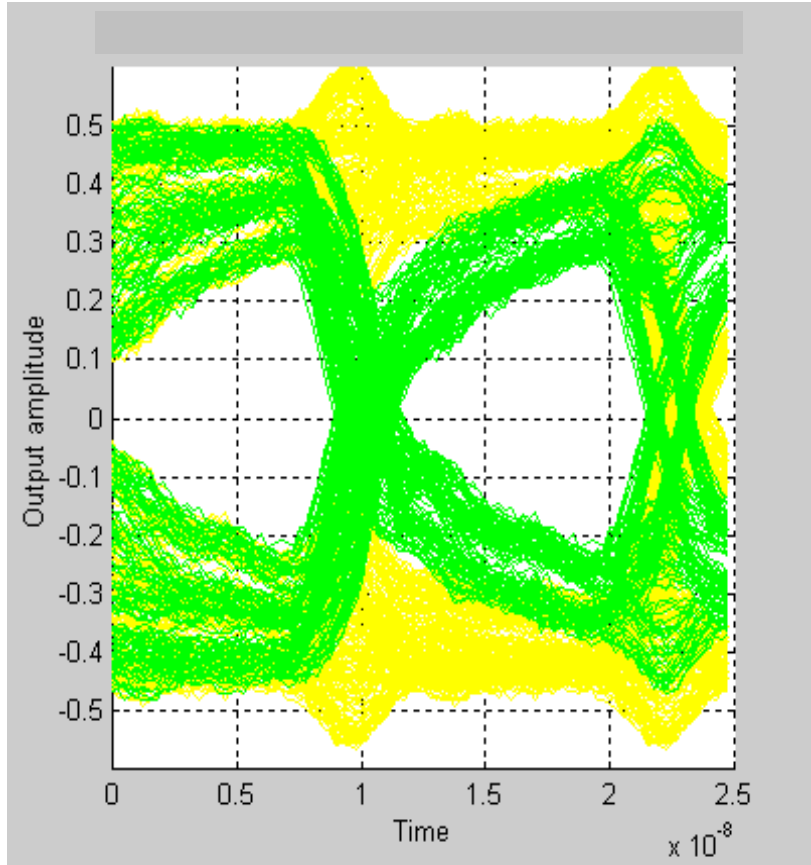
- An arbitrary waveform generator created a random data pattern.
- Signal generators generated crosstalk on adjacent channels.
- The amplitude of the transmitted signal was set at 500 mV to be roughly equivalent to the amplitude of the HBA from Vendor A.
- The output file of the time/voltage pairs was transferred to a system running Matlab.
- Matlab was used to plot the eye diagram from the data.

Quantum Test Set-up vs Vendor A

Test Set-up



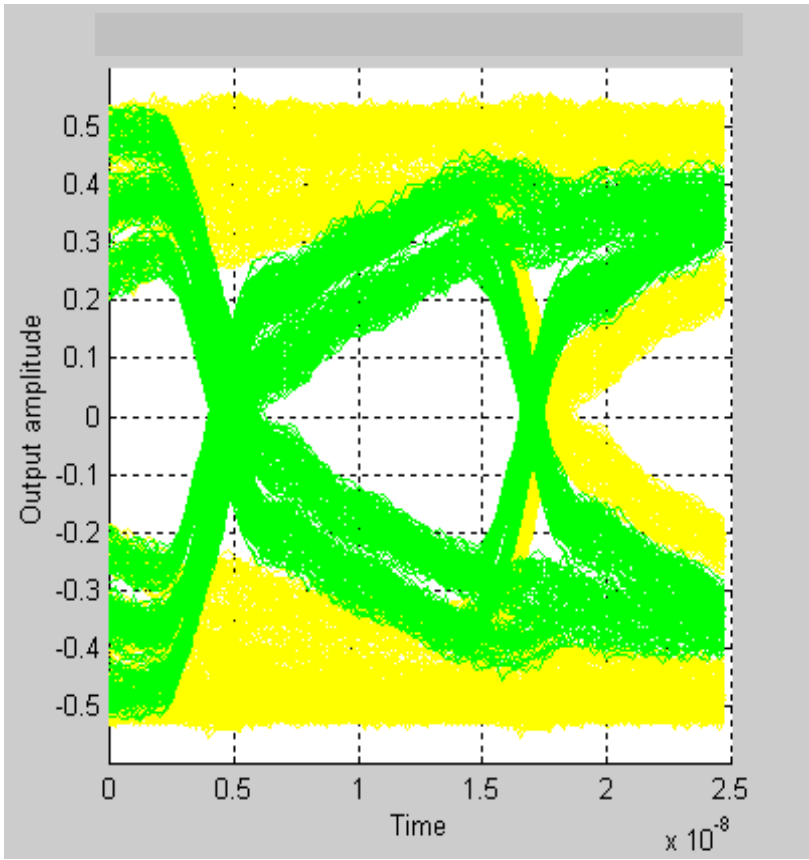
Vendor A HBA



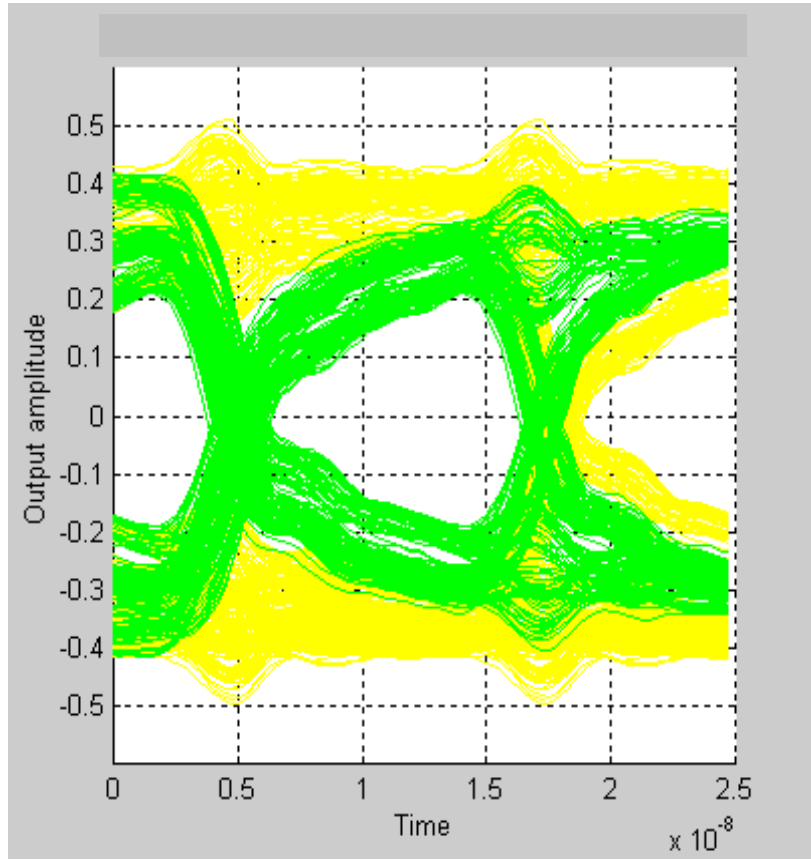
- The green (or darker) traces are data cells containing transitions. These open area inside these traces describe the eye opening.
- The yellow (or lighter) traces are data cells without transitions.

Quantum Test Set-up vs Vendor B

Test Set-up



Vendor B HBA



- The green (or darker) traces are data cells containing transitions. These open area inside these traces describe the eye opening.
- The yellow (or lighter) traces are data cells without transitions.

Interpretation and Conclusions

- The HBA from Vendor B has a smaller eye opening than the HBA from Vendor A. This is because:
  - Vendor B's HBA uses a lower driver amplitude than Vendor A's HBA (Vendor B ≅ 400 mV versus Vendor A ≅ 500 mV)
  - Vendor A's HBA has higher slew rates than Vendor B's HBA (Vendor A at 846 mV / ns versus Vendor B at 385 mV / ns)

- Quantum's test set-up and systems using actual host bus adapters produce very similar patterns: identical set-up configurations yield identical results.
- There is no reason to expect that actual silicon in interface ASICs should yield better results than those from identical test set-ups.