

Implications of < 4 vs 10 Gs/s

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Outline

- Implications on electrical links
- Implications on fibers
- Implications on timing
- Implications on equipment cost
- Summary

Implications on Electrical Links

- SCT:
 - ◆ use short flex to avoid electromagnetic interference
- Pixel:
 - ◆ use ~ 1 meter of micro-twist pairs (100 μm)
- What is maximum speed of the transmission lines:
 - ⇒ testing required

Implications on Fibers

- Single mode:
 - ◆ no modal dispersion
 - high bandwidth
 - ◆ core diameter: 5 μm
 - high precision alignment is needed for good light coupling
- Multi-mode:
 - ◆ core diameter: 50-62.5 μm
 - alignment is less critical
 - ◆ SIMM: rad-hard pure silica core
 - low bandwidth
 - ◆ GRIN: rad-tolerant
 - intermediate bandwidth
- Pixel opto-link has few meters of SIMM spliced to GRIN
 - What is the maximum transmission speed?

Implications on Timing

- 1 Gb/s link:
 - ◆ 500 ps pulse width
 - ⇒ rise/fall times and jitter < 50 ps?
- 10 Gb/s link:
 - ◆ 50 ps pulse width
 - ⇒ rise/fall times and jitter < 5 ps?
- 10 Gs/s link is significantly more challenging

Implications on Equipment Cost

- A few ATLAS institutions probably have equipment to test few Gb/s links
 - ◆ these equipment are very expensive
 - ◆ equipment for 10 Gb/s would be much more expensive

Summary

- 10 Gs/s link will take much more money and longer time to develop
- It is sexy but don't do it unless it is absolutely necessary