Towards a 6Gbps SAS-2 Physical Specification
Equalization will be needed for SAS-2
  • See previous presentation for details

Example Eyes w/ TCTF test channel

SAS-1 3G 9m InfiniBand 24AWG
  De-Emphasis Enabled

6G 9m InfiniBand 24AWG
  De-Emphasis Enabled
Towards a SAS-2 Physical Specification

Need to define the SAS-2 channel
- Is TCTF sufficient as a channel model?
- Attenuation at 6Ghz higher than 10.6 dB for FR4.
- Should it be extended to higher frequencies – What is the history of the corner frequency?

Need to prove technical feasibility of Equalizer’s to proposed SAS-2 channel
- Initial simulation results look promising
- Equalization of up to 25” FR4 and 9m 24AWG Infiniband (both exceed SAS-1 TCTF)
Rx Compliance Issues with Mask Test

- BER of the link is dictated at the Decision Point (Equalizer Output)
- In general the equalizer output is not accessible.
- Eye mask at compliance point CR is not applicable to a closed eye
- Need to use a compliance test designed for Equalized channels

![Diagram of SAS Channel and Receiver Phy Circuit]
Towards a SAS-2 Physical Specification

Transmit Modifications

- Need appropriate rise/fall times for 6Gbps
- Need to modify Jitter tolerance methodology (Deterministic Jitter can be >1UI)

Need to Determine compliance test and Inoperability

- Tx Compliance: If De-Emphasis is specified how do we insure interoperability across multiple vendors
- Rx Compliance: Eye mask at CT does not make sense for an equalized channel

Equalization Implementation & Specification

- Target solution should be low power
  - Comparable to 3G Phy in die area and power
  - Support high port counts applications, ie 24 and 36 ports
- Should not specify the detail of the Equalization implementation
  - Keep Equalizers Vendor specific – do not impose architecture, # taps …
  - Open to advances in equalization techniques
Propose that the SAS Phy working group drive the 6 Gpbs standard
  • Weekly conference calls to form consensus and resolve issues

Incomplete list of topics for discussion
  • Channel Model
  • Transmit Specifications
    • Eye mask at launch
    • Rise/Fall times
  • Tx and Rx Compliance testing
  • Interoperability
  • Speed Negotiation

Desired Outcome
  • Proposal on electrical specification for 6G operation