

EA Technology Exploration Forum – 25G Electrical Signaling

CEI-25/28G: Taking steps towards 25Gb/s

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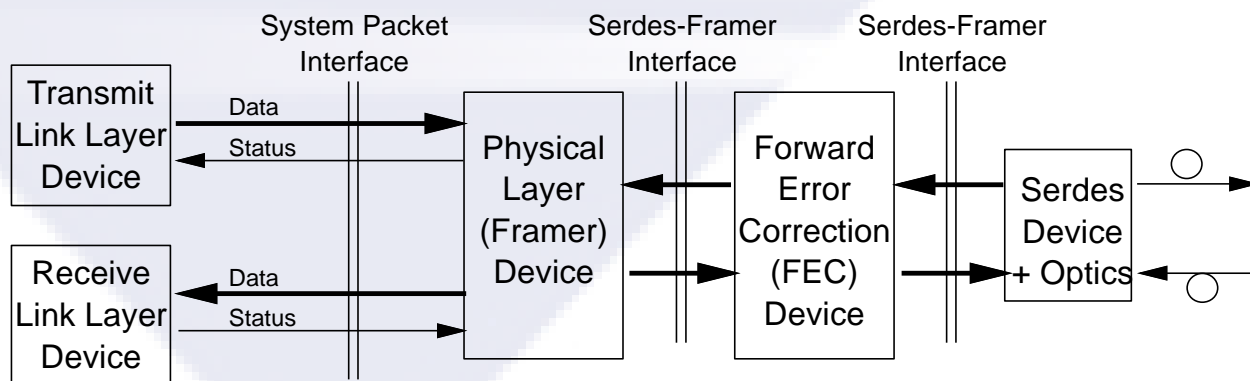
October 5, 2010

CEI 25/28G Brief History

- ◆ Early 100Gb/s applications will rely on 10Gb/s signaling; improvements in size, power, and diff pair count leads development of 25Gb/s signaling.
- ◆ Achieving 25 Gb/s requires evolutionary advances in *both Serdes and channel technology* for a cost effective solution.
- ◆ Solution must optimize cost and power for market acceptance.
 - ◆ Target power per 25Gb/s link less than 1.5x power of 10Gb/s link.
- ◆ Applicable to various application spaces.

CEI Brief History

- ◆ The OIF Reference Model recognizes two electrical interfaces
- ◆ **Serdes-Framer Interfaces (SFI)**
 - ◆ Connect Framer, FEC, and optics devices.
 - ◆ Typ: < 8", 0-1 connector, retimed optics, backchannel not assumed
- ◆ **System Packet Interfaces (SPI)**
 - ◆ Connect Framer devices and Network Processor Elements
 - ◆ Typ: < 1m, 0-2 connectors, backchannel not assumed



Generalized Application Spaces

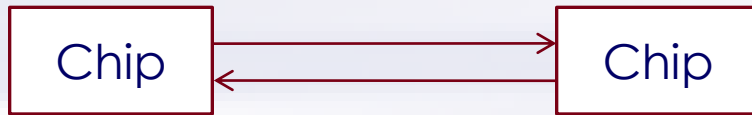
Increasing Insertion Loss on Electrical Channel



Chip-to-Optics, No or Partial Retiming in Optics Module



Chip-to-Optics, Full Retiming in Optics (SFI)



Chip-to-Chip (some SFI/ SPI applications)



Passive Copper Cable



Backplane (SPI)

- ◆ **Application Space ranges from short lowloss interfaces to high loss backplane channels.**
- ◆ **The higher the loss of the channel, the more signal processing, thus more power, required.**

CEI Application Spaces



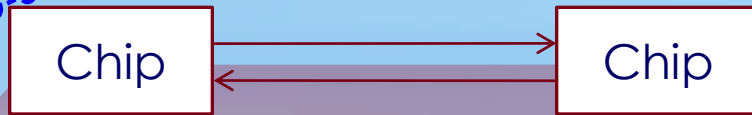
Chip-to-Optics, No or Partial Retiming in Optics Module

CEI-28G-VSR

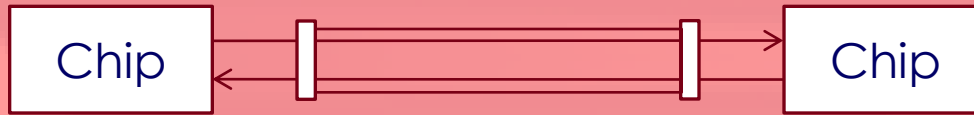


Chip-to-Optics, Full Retiming in Optics (SFI)

CEI-28G-SR

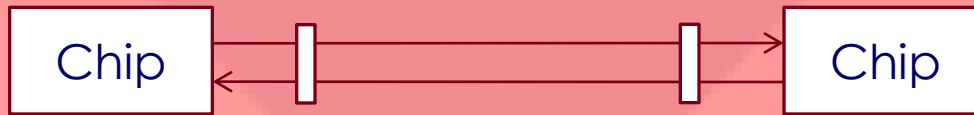


Chip-to-Chip (some SFI /SPI applications)



Passive Copper Cable

CEI-25G-LR

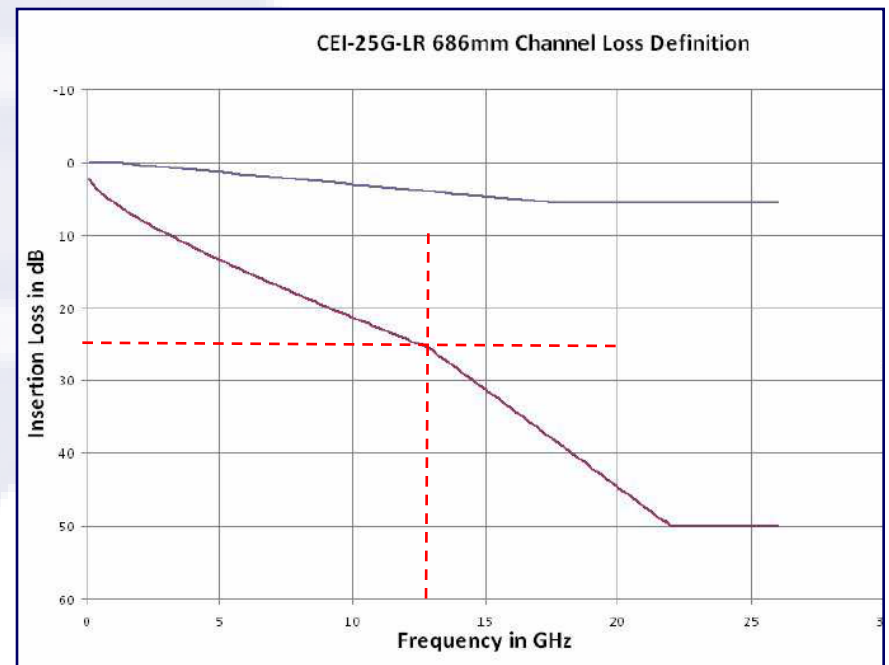
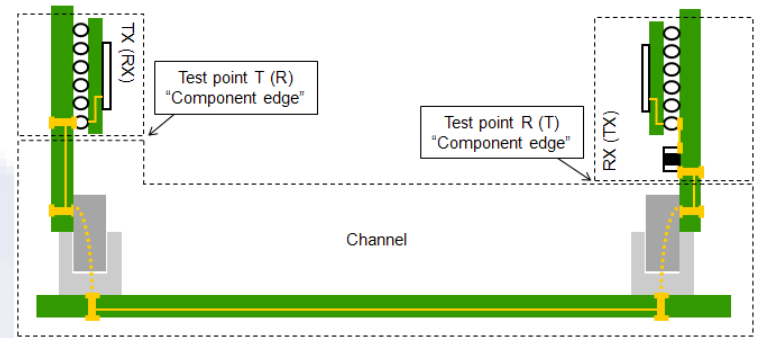


Backplane (SPI)

- ◆ **Changes due to industry feedback and discussions.**
- ◆ **SR is now chip-to-chip only and VSR will cover chip-to-optics with retiming.**
- ◆ **Chip-to-optics with non-or partial retiming is recognized, but may be premature.**

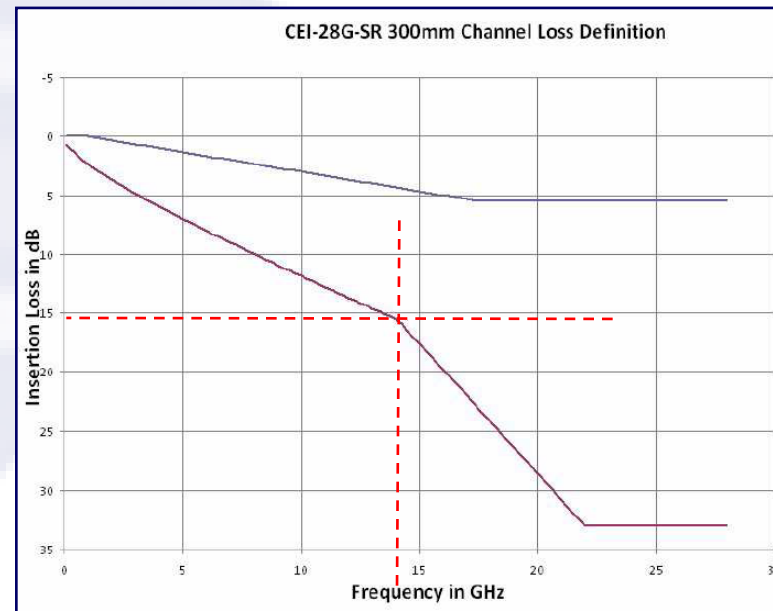
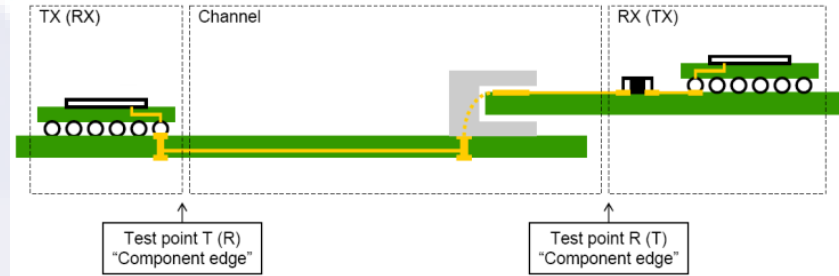
CEI-25 Long Reach Channel Requirements

- ◆ Backplane standard supporting 25.8 Gb/s to support 4-lane 100G interfaces.
- ◆ Budgeting for 27 inches of reach with 2 connectors.
- ◆ Channel limits to achieve technical feasibility:
 - ◆ Sdd21 insertion loss of -25.5 dB at 12.9 GHz.
 - ◆ Specify both max. and min. Sdd21 limits.
 - ◆ Specify limits for Sdd21 deviation & crosstalk.
- ◆ Status: Undergoing Balloting Process



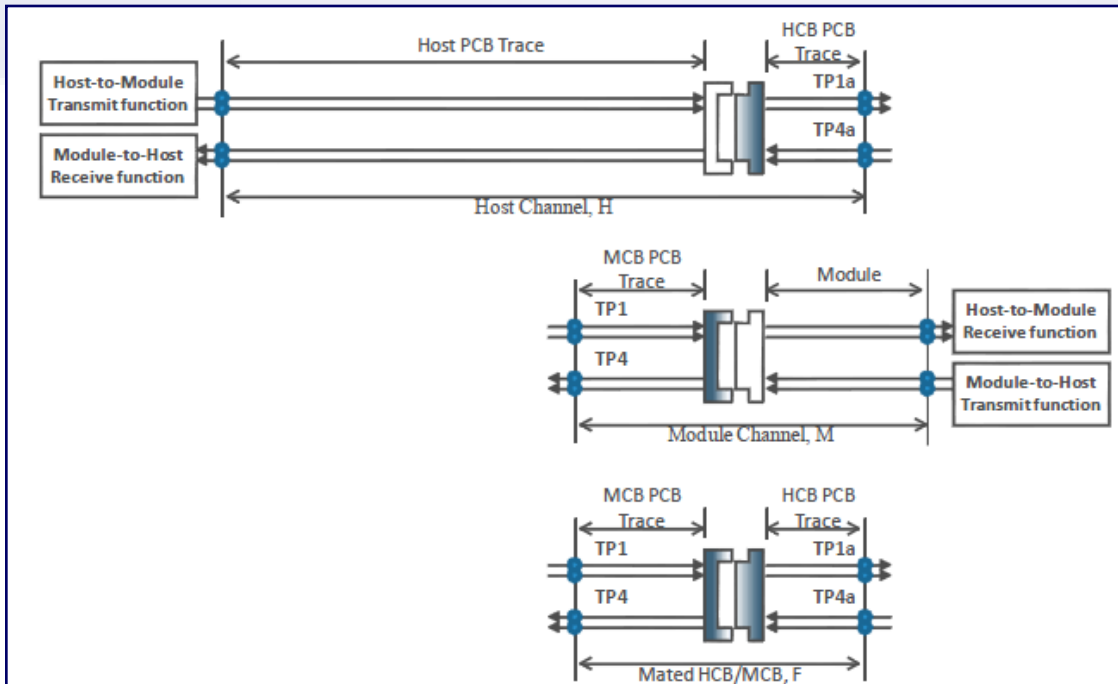
CEI-28 Short Reach Channel Requirements

- ◆ Chip-to-chip standard supporting 28.05 Gb/s for broad industry interest.
- ◆ Budgeting for 12 inches of reach with up to 1 connector.
- ◆ Channel limits to achieve technical feasibility:
 - ◆ Sdd21 insertion loss of -15.4 dB at 14.0 GHz.
 - ◆ Specify both max. and min. Sdd21 limits.
 - ◆ Specify limits for Sdd21 deviation & crosstalk.
- ◆ Status: Undergoing Balloting Process



CEI-28 VSR Channel Requirements

- ◆ Chip-to-optics supporting 28.05 Gb/s for broad industry interest.
- ◆ Channel limits to achieve technical feasibility:
 - ◆ Measured with use of compliance boards at connector.
 - ◆ Sdd21 full channel 'limit' to be informative model.
 - ◆ Specify limits for Sdd21 deviation & crosstalk.
- ◆ Industry consideration for non-symmetrical channel specifications



for low power benefit is in process.

- ◆ Budget for channel insertion loss and allocation is under deliberation; budget will include 1 conn.

CEI-25/28G Industry Considerations

- ◆ **Gaining industry interest through...**
 - ◆ 2009 EA Technology Exploration Forum,
 - ◆ OIF workshops (Feb. & July)
 - ◆ Whitepapers
- ◆ **Liason activity with...**
 - ◆ Fibre Channel – FC-PI-6 & 32GFC
 - ◆ Ethernet – LR4/ER4, future CFI? (MM, Cu, BP)
 - ◆ Infiniband – EDR
 - ◆ Level of common ground is undetermined.
- ◆ **Status: Early draft in process**

Thank You

OIF is a contribution driven organization.

Progress is driven by its members.

www.oiforum.com

If you would like to be involved with any of the

CEI-25 efforts, please feel free to contact

David Stauffer (dstauffe@us.ibm.com)

Industry Needs

Infiniband - EDR

Host Channel Adaptor (HCA)

- Plugs into a PCI slot
- Short traces (4 in. is sufficient)

Switches

- Port density is important
- Retimers are not desired
- Long traces (8-12 in) are desired

Ethernet – SM, MM?, Cu?, BP?

Host Channel Adaptor (HCA)

- Plugs into a PCI slot
- Short traces (4 in. is sufficient)

Router Ports

- Retimers acceptable
- Short traces (4 in. is sufficient)

Switches

- Port density is important
- Retimers are not desired
- Long traces (8-12 in) are desired

Backplane

- Long traces (40 in?) are desired

Fibre Channel – FC-Pi-6, 32G

Host Channel Adaptor (HCA)

- Plugs into a PCI slot
- Short traces (4 in. is sufficient)

Switches

- Port density is important
- Retimers are not desired
- Long traces (8-12 in) are desired

Storage Enclosures

- 16 in backplane traces

Can we find a common ground?

Test points?

Host trace distance?

Connector?

Retimers?

Operating Frequency?

Support of passive Cu?