OIF CEI-56G - It’s Happening Now
OFC 2015
March 26, 2015

Moderator: Nathan Tracy
Panelists: Ed Frlan, Brian Holden, Tom Palkert

Abstract: The OIF CEI-56G interfaces will provide a new level of density and performance to the networking, telecom and computing industries. This panel will discuss the objectives of the five current OIF CEI-56G projects as well as the use of the three modulation formats: NRZ, PAM-4 and ENRZ in each.
Electrical Implementation Agreements

- CEI IA (Common Electrical Interconnect) is a clause-based format supporting publication of new clauses over time:
  - CEI-2.0: added CEI-11G-LR clause
  - CEI-3.0: added work from CEI-25G-LR, CEI-28G-SR
  - CEI-3.1: will add CEI-28G-MR and CEI-28G-VSR
- CEI-11G and -28G specifications have been used as a basis for specifications developed in IEEE 802.3, ANSI/INCITS T11, and IBTA.
CEI-56G Application Space

- **USR**: 2.5D/3D applications
  - 1 cm, no connectors, no packages
- **XSR**: Chip to nearby optics engine
  - 5 cm, no connectors
  - 5-10 dB loss @28 GHz
- **VSR**: Chip-to-module
  - 10 cm, 1 connector
  - 10-20 dB loss @28 GHz
- **MR**: Interfaces for chip to chip and midrange backplane
  - 50 cm, 1 connector
  - 15-25 dB loss @14 GHz
  - 20-50 dB loss @28 GHz
- **LR**: Interface for chip to chip over a backplane
  - 100 cm, 2 connectors
  - 35 dB at 14 GHz
Framing the Discussion

At 56Gb/s electrical interfaces become challenging due to the losses in the printed circuit boards, packages and interconnects.

New chip packaging technologies are becoming available that create opportunities to develop interoperable interface definitions for extremely short channels.

Power consumption of equipment is becoming a critical limitation that must be considered in choosing an electrical definition.

There are multiple options to consider, including NRZ, PAM4 and eNRZ.
Introduction of Panelists

Brian Holden

Brian Holden is responsible for the product strategy of Kandou Bus. Brian was the Co-founder of StrataCom, which was acquired by Cisco Systems in 1996. Brian was the founder and CEO of Network Synthesis, which was acquired by IgT in 1996, where Brian remained as CTO. IgT was acquired by PMC-Sierra in 1998, where Brian remained until 2007, serving as their Director of Standards. He serves as MA&E Co-Chair of the OIF. He is a Fellow, Technical Chair & President of the Hypertransport Consortium and attends the JEDEC memory standards body. He has written two published books and has 18 U.S. patents.

Ed Frlan

Ed Frlan is a Senior System Architect within the Signal Integrity Product Group of Semtech Corp responsible for the definition of next generation datacom and video PHY products. He is also the OIF’s PLL Interoperability Working Group chair and is actively working on the development of OIF’s various CEI-56G PAM-4 specifications. Ed holds a Ph.D. degree in Electrical Engineering from Carleton University.

Tom Palkert

Tom Palkert has worked on high speed SERDES designs from 100m to 56Gbps. He is involved in Ethernet, Fibre channel, InfiniBand and the Optical Internetworking Forum. Tom is a past member of the OIF board of directors, past chair of the OIDA silicon photonics alliance and is currently chair of the Fibre Channel T11.2 Physical Layer Task Group and vice chair of the OIF Physical and Link Layer (PLL) working group.