10GigE SerDes Interface

Iain Verigin - PMC-Sierra
Bjorn Liencres - Juniper
Paul Bottorff, David Martin - Nortel Networks
Gary Nicholl - Cisco
Mike Salzman - Lucent Technologies
Tom Palkert - AMCC
Bill Woodruff - Giga
Fred Weniger - Vitesse
OIF’s OC-192 SerDes

- WAN PHY can leverage the OC-192 SERDES interface in development at the OIF.

- Benefits
  - Works with Serial PMDs.
    - Serial PMDs are needed in a Metro environment.
  - Works with “parallel fiber PMD”.
    - Short reach WAN connectivity. OIF99.120.
  - Borrows from OC-192 development in progress.
    - Many of us here are working on this. It is not foreign.
  - Simple, low-pin count, reasonable IC technology.
    - Less aggressive IC technology than proposed at HSSG to date.
• Similar position to serial interface presented in York.
  - Electrical interface between PMA and PMD.
• OIF terms for reference.
  - Interface between SONET framers and SerDes chips.
  - Works with “parallel fiber” PMD proposed in OIF99.120.
Interface Summary

• Features
  - Unidirectional, point-to-point links.
  - Sixteen data bits each direction.
  - LVDS voltage levels at 622 Mhz.
  - Source-synchronous clocking.

• Signals (Thirty-six differential pairs)
  - Sixteen transmit data.
  - Sixteen receive data.
  - One transmit clock.
  - One transmit source clock.
  - One receive clock.
  - One reference clock.
SerDes Interface

MAC/PCS/PMA

SONET Framer ASIC

PMD

OC192 SERDES

REFCLK

TXDATA

TXCLK

TXCLK_SRC

RXDATA

RXCLK

RECOVERED CLK
OIF-192 vs. Serial Interface

- **OIF OC-192 SerDes Interface**
  - 36 differential pairs.
  - 622 Mhz clock rate.
  - No encoding.
  - Easy i/f to serial optics.
  - Works with parallel optics*.
  - Aggressive CMOS technology.
  - Distance - short - inches.
  - Speed
    - matches WAN PHY.
    - Too slow for “coded” PHY (LAN).
      - Needs speed up or repositioning.

- **Serial Interface**
  - 9 differential pairs (8 + clk).
  - 3.125 Ghz clock rate.
  - 8B/10B encoding.
  - Not a “clean” i/f to serial optics.
  - Works with parallel optics.
  - Very aggressive CMOS technology.
  - Distance - longer - ~ 20 inches.
  - Speed
    - Matches schemes with 8B10B et al.
    - Faster than req’d for WAN PHY.

- *See OIF99.120.
Summary of OIF SerDes

• For WAN PHY
  - Supports long (serial) and short distances (serial/parallel).
  - Has broad vendor support.
  - It is feasible.
  - Does not impose extra-bandwidth and serialization issues of the “York” serial interface on a serial WAN PHY.

• For LAN PHY
  - Not clear what value OIF interface has.
    • We could investigate speeding up the interface to accommodate higher bandwidth.
    • We could bind the PMA/PMD together.
    • Both are rather unlikely to occur.
Reference - OIF Project

- Project Name:
  - SERDES/Framer electrical interface for OC192
- Working group:
  - PLL
- Problem statement:
  - STS-192/STM-64 interfaces are critical to the future of the industry. Currently, there is no industry-defined electrical interface for the framer/serdes interface at lower SONET/SDH speeds. This lack of common interfaces has hurt the industry, as multiple incompatible solutions exist. No other standard bodies or forums are working on this problem for SONET/SDH.
Reference - OIF Project (cont.)

- **Scope**
  - This project will define the electrical interface, including pin definitions, function, timing, clocking, and signal levels. The scope does not include the footprint.

- **Expected output**
  - A technical document describing the electrical interface that can be used by framer, serdes, optical module, and system vendors to design and produce SONET/SDH systems.