Use of FEC in PAM2 Backplane and Copper

Mike Dudek Qlogic

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Supporters.

Troy Beukema	IBM
Roy Cideciyan	IBM
Mark Gustlin	Xilinx
Scott Kipp	Brocade
Mounir Meghelli	IBM
Vasudevan Parthasarathy	Broadcom
Pravin Patel	IBM
Rick Rabinovich	ALU
Oren Sela	Mellanox
Xiaofeng Wang	PMC-Sierra

Introduction

- **Optional FEC has been proposed for PAM2**
  - Doesn't change symbol rate
  - Latency, Power dissipation and complexity relatively low
- **Traditionally FEC invoked during auto-negotiation**
  - During link establishment
  - Prior to knowing error rate
- **FEC is being proposed in order to meet copper cable objectives and may also be needed to meet backplane objectives**
  - Implies that FEC implementation is required for copper cable and maybe also be required for backplane.
- **This presentation discusses how to decide whether to use FEC or not**

Proposal

- **Make implementation of FEC mandatory for copper cable maybe also for backplane**
- **Use of FEC is optional to save power and latency.**
- **I.e. all copper cable ports required to be capable of operating in both non-FEC and FEC mode.**
- **Determine whether to use FEC during auto-negotiation.**
  - Make FEC the default. Turn off FEC only if both ends agree.

Request for FEC turn off Criterion

- **Copper Cable**
  - QSFP cables have optional cable loss fields in the required EEPROM memory maps (available by I2C). Infiniband has made these mandatory for their QSFP cables.
  - On plug in of cable host reads cable and based on knowledge of own loss and the cable loss determines whether to ask for FEC off (must assume that host loss on other end is max).
- **Backplane**
  - Prior knowledge of backplane (and in which slot blade is inserted gives knowledge of loss/performance).
- **Manual over-ride (could lead to undesirable error rate)**

Other Option

- **Require FEC coding in Tx for all applications, Rx decides whether to perform error detection and correction or not**
- **Advantages**
  - No need to use auto-negotiation
  - Less need for 2 different modes in Tx, however existing 100GBASE-LR/ER is FEC off so ASIC's are likely to have both modes anyway
- **Disadvantages**
  - Mean time to false package acceptance may be too short without FEC protection. If so would at least need error detection.
  - Somewhat less saving in latency and power