Comments on Multi-Lane
PMD Reliability

Hidenori Takahashi and Itsuro Morita
KDDI R&D Laboratories Inc.
Discussion Objectives

• 40/100G Ethernet are not just “local area network” technologies anymore
• It will be used for link aggregation and large-scale network
• The link fault of 40/100GbE should give large impact for network

=> The one of expectations for P802.3ba is **reliability** of link
Most promising application

LAG (link aggregate group)  4 ~8(10)x10GbE

- Advantages: #1 Simple configuration  #2 High bandwidth utilization
- How about reliability? Is it comparable to LAG?

40/100GbE  @1 port
Even though just an optical lane of Multi-lane PMD fails, the link fails immediately. Intrinsically, the larger number of lanes gives the higher possibility of failure.

To bring the FIT of Multi-Lane close to Serial one, some kinds of solution will be employed inside/outside of IEEE P802.3ba standardization.
Solutions for the reliability of Multi-Lane

**Solution #1:**
Prove the reliability of Multi-Lane PMD experimentally
(e.g. www.ieee802.org/3/hssg/public/jan07/jaeger_01_0107)

**Solution #2:**
Keep the bandwidth with redundant lane (protection lane)
(detect a lane fault)

**(Partial) Solution #3:**
Keep connectivity with decreased bandwidth
(detect a lane fault)

Solution #2 or #3 may be deployed by some vendors depending on their policy, and users may not notice whether the Solution #2 or #3 are activated.

However, the information of “One of lanes failed” is very useful for users.

⇒ Standardizing the format of the “lane” fault signal is recommended.
Application 1: Fault-Lane Recovery Mechanism


With “lane” fault signal:

Users can notice the possibility of link fault in advance
⇒ It will be helpful for users to make maintenance plan
⇒ Users can decide anytime when the data path should be changed
⇒ Users can confirm availability of redundant path before changing data path
Application 2: Partial Fault Protection[2]

With “lane” fault signal:

⇒ Users can notice which link must be replaced immediately before changing the data path
⇒ Users can decide whether keep or down this link intentionally
Summary

• The reliability of 40G/100GbE link is very important

• Some kinds of effort are required that the reliability of Multi-lane PMD should be comparable to serial PMD

• For the Multi-lane PMD, redundant lane or partial lane protection may be deployed inside/outside of P802.3ba, but the “lane” fault signal is useful for users, therefore standardizing the format of “lane fault signal” is recommended

With “lane” fault signal:

⇒ Users can notice the possibility of link fault in advance

⇒ It will be helpful for users to make maintenance plan

⇒ Users can notice which link must be replaced immediately before changing the data path
Thank you