EPON over Coax

Reponses to Feedback on Channel Bonding Proposal

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Abstract

- In January there was a presentation on channel bonding that allowed an evolutionary approach to increasing support for additional OFDM channels [1]
- Some feedback was received during that presentation. The feedback was captured during the discussion in January
- This presentation provides responses to the feedback that was received in January
- This presentation also introduces a new idea for signaling the CBI over XGMII in order to place the LLID to CBI mapping in the reconciliation sublayer
- Several straw polls have also been included in the presentation

Feedback Summary

1. Is it necessary to reorder Frames above the XGMII in order to transmit them in a special order over the XGMII to support channel bonding?
2. When the channel bonding sublayer reads the LLID upon transmit, does that represent a layer violation?
3. How does the traffic shaper know the bandwidth of the destination channel?
4. If the LLID is mapped to multiple channels how does the traffic shaper know how to shape the traffic?
5. How does multicast traffic impact performance?
6. How can we shape the same multicast traffic to different channels with different rates?
7. Is there a scenario where the packets are received out of order?

Feedback #1

Feedback

- Is it necessary to reorder Frames above the XGMII in order to transmit them in a special order over the XGMII to support channel bonding?

Response

- There is no need to reorder packets above the XGMII to transmit them in a special order
- Just like in the single-channel case, the frames need to be separated sufficiently by idles so that these idles can be deleted in the PCS, to match the PHY rate

Feedback #2

Feedback

- When the channel bonding sublayer reads the LLID upon transmit, does that represent a layer violation?

Response

- The Channel Bonding sublayer and the Reconciliation sublayer are both within the Physical Layer, and hence the reading of the LLID by the Channel Bonding sublayer is not a layer violation
- If the TF prefers, there is an alternative proposal in the next few slides does not require the CBS to read the LLID

Feedback #2 (cont.)

Alternative approach to having CBS read the LLID

- Signaling channel bonding interface number over XGMII
  - Similar approach to signaling a low power idle (LPI)
  - In Table 46-3 [2] a TXC = 1 and TXD = 06 on all lanes request an LPI
- Set TXC = 1 (indicating control character, not data character)
- Set TXD = specified value (e.g. 08) in lanes 0-2 to indicate channel bonding interface (CBI) number in TXD (lane 3)
- Set TXD = CBI number in lane 3 to indicate channel number
- The channel bonding sublayer (CBS) directs the frame to the CBI indicated in lane 3 of TXD

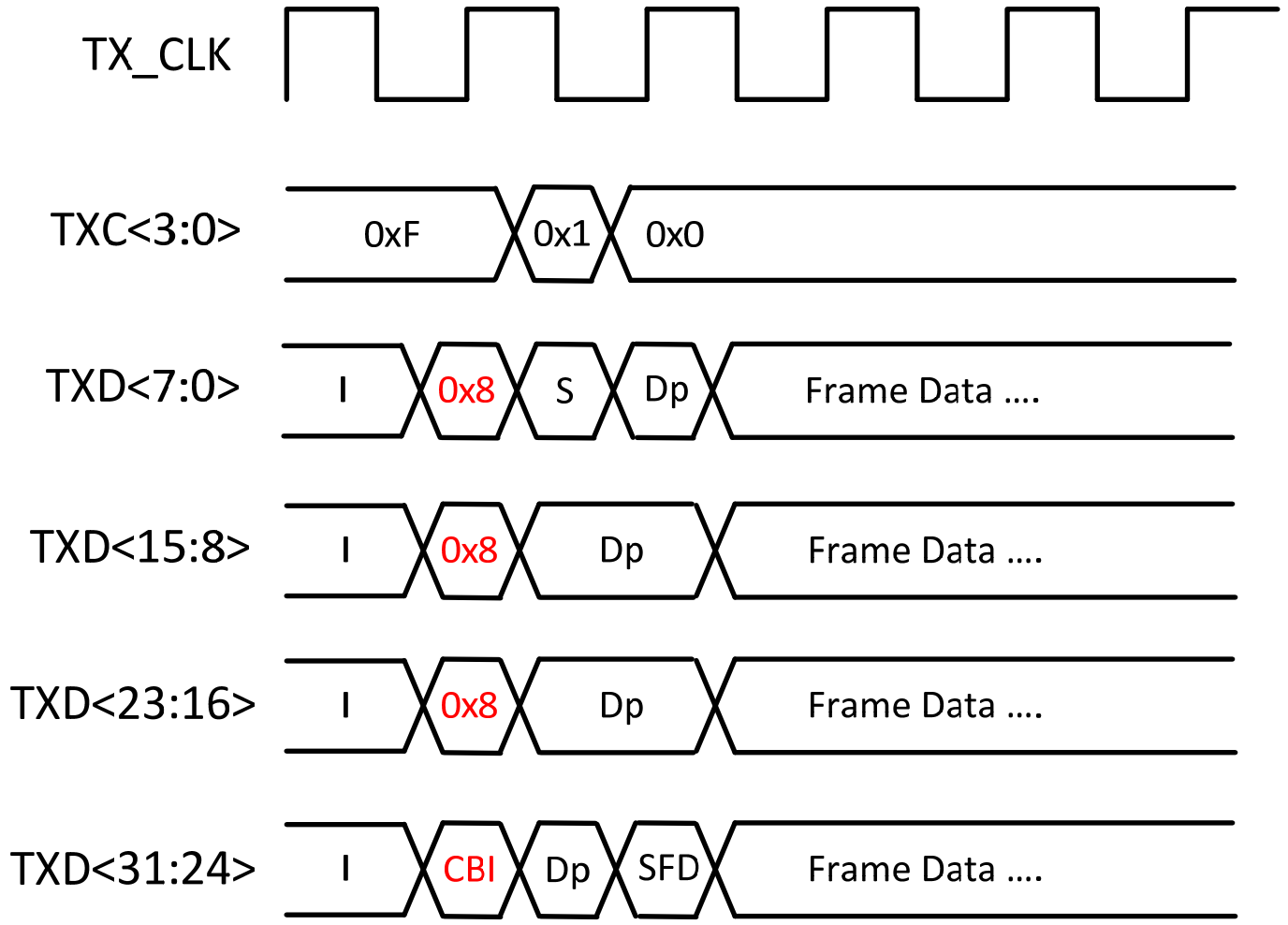
Feedback #2 (cont.)

- This is a change to the Reconciliation sublayer
- The LLID mapping to CBI is moved to the RS sublayer
- This avoids the CBS from having to read LLIDs

- The CBI signaling is placed just prior to the preamble of the frame on the XGMII
- This signals the CBI number for that frame

Feedback #2 (cont.)

- Figure illustrating the CBI signaling over XGMII
- Used 0x8 in TXD for illustration purposes
- Show only beginning of Frame (for illustration purposes)



Feedback #3

Feedback

- How does the traffic shaper know the bandwidth of the destination channel?

Response

- The management system must configure both the DBA (traffic shaper) and the PHY (via MDIO) the same

Feedback #4

Feedback

- If the LLID is mapped to multiple channels how does the traffic shaper know how to shape the traffic

Response

- After technical discussions and review we now think that the LLID should be mapped to a single channel
- In this case the traffic shaper knows the bandwidth of that single channel by configuration

Feedback #5

Feedback

- How does multicast traffic impact performance?

Response

- This depends on the configuration
- An example is provided in the subsequent slide

Feedback #5 (Example)

Assumptions

- Equal Load on CNUs
- Variable multicast fraction of the total load
  - Specify multicast fraction, the remainder is unicast traffic
- CNUs share a common channel
- Mixture of single channel and dual channel CNUs
  - Specify fraction of CNUs dual channel, the remainder are single channel
- PHY channel rate = 1.6 Gb/s

Feedback #5 (Example)

Configuration #	Fraction of CNUs which are dual channel	Fraction of Traffic which is Multicast	EPoC Throughput (Gb/s)
1	0.0	0.0	1.6
2	0.0	0.1	1.6
3	0.5	0.0	3.2
4	0.5	0.1	3.0

Feedback #6

Feedback

- How can we shape the same multicast traffic to different channels with different rates?

Response

- It is possible to support two types of deployments
  - There is a common channel shared by all CNUs
  - There is not a common channel shared by all CNUs
- If we have a common channel, then there is only one rate for the multicast traffic
- If there is not a single common channel then the traffic shaper needs to duplicate multicast frames (if XGMII signaling of CBI is used)

Feedback #7

Feedback

- Is there a scenario where the packets are received out of order?

Response

- Since each LLID is mapped to a single channel, there can be no out-of-order frame reception, since all frames for an LLID go through the same channel

Straw Poll #1

- Do you support the following statement:
- *The Task Force should develop a channel bonding design that provides support for CNUs with different number of channels in the same network, in order to allow a economical evolution in CNU capacity?*

Yes:

No:

Too Early to Decide:

Straw Poll #2

- Which of the following methods do you prefer for indicating the channel bonding interface for the transmission of a frame?

- LLID to CBI mapping in CBS:
- CBI signaling over XGMII:
- Too Early to Decide:

References

1. Steve Shellhammer, Patrick Stupar, Andrea Garavaglia, Nicola Varanese and Christian Pietsch, "PHY Channel Bonding: Towards A Baseline Proposal," January 23-25, 2013
2. IEEE Std. 802.3-2012, "IEEE Standard for Ethernet," 28 December 2012