Considerations for Data Detector Placement

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Purpose

This presentation describes several issues which might affect which data detector scheme we choose:

1) Non-routine XGMII codes

   - PCS Transmit-generated:
     - Error blocks
     - Local Fault

   - RS Link Fault Signaling process

   - Codes arriving over XGMII due to presence of XAUI/XGXS

2) Deterministic behaviour to facilitate OLT grant size calculation

3) IDLE Deletion

“Non-routine” codes generated by PCS

- 10GBASE-R PCS Transmit Process (802.3-2005 Figure 49-14) generates blocks of /E/ and also Local Fault ordered sets

- 10GEPON should *probably* treat these codes transparently ie. the codes should probably be transmitted

- Implication: ONU laser operation should not be affected by PCS-generated error codes

RS Link Fault Signaling

- RS link fault signaling (clause 46.3.4) is a point-to-point process that is not suitable for 10GEPON

- For 10GEPON this function in the RS must be modified or deleted

- As long as some form of this function remains, however, “Local Fault” or “Remote Fault” control codes can arrive on the ONU transmit XGMII
  - Data detector should handle them in some appropriate TBD manner

XSGS stuff

- Table 49-1: “codes for /A/, /K/, and /R/ are used on the XAUI interface to signal idle. They are not present on the XGMII when no errors have occurred, but certain bit errors cause the XGXS to send them on the XGMII”
- So if they do appear, then data detector should not turn laser on/off as a consequence

PCS Burst Overhead

- The OLT needs to assess the ONUs reported available data and assign a burst size. Our PCS design should be "friendly" to such a mechanism by behaving deterministically.

- OLT will need to take various overhead into account:

  - RS adds variable overhead for aligning /S/ to the first XGMII column. If Deficit IDLE count is implemented, then this overhead will be between 0 and 3 bytes.

  - Additionally there is FEC overhead

- But whatever term is calculated for these overheads.., there is impact in aligning the burst into the beginning of a 66b word. This eliminates an *additional* 4 bytes from the "overhead term" and thus sometimes eliminates an extra FEC block

Precedent in 802.3

- GEPON and Clause 48 both have PCS logic which operates on the “IDLE/non-IDLE” distinction

- Implication for 10GEPON data detector?

IDLE Deletion

- Thus far we have talked about the IDLE deletion mechanism only tangentially
- But we agree that the function must be above scrambler
- If function is between encoder and scrambler:
  - we can look at the actual codes and not just the sync header
  - But we can only delete groups of 8 not 4
  - And we don’t have any “queue” to see eg. If there is still a requisite number of IDLEs for IPG

Advocacy

Top 6 reasons to select XGMII-based data detection:

1) It delivers more precise and deterministic behavior
2) It is more efficient - by (on one estimate) an average of two bytes per burst
3) It makes detection of non-IDLEs direct and trivial
4) It offers simplicity and flexibility in handling the IDLEs produced by whichever MAC sub-rating solution that we choose because of its direct visibility into the XGMII codes
5) It makes handling the all of the corner cases of the /E/ XAUI error indication routine
6) It offers a solution that isn't trying to solve the problem with one hand tied behind its back