RS layer

Work plan

www.huawei.com

Agenda

- **Two Cases**
  - Lane assignment done in RS
  - Lane assignment done in Multi-Lane Control Protocol (MLCP)
- **Other considerations**
  - Allowed/Defined rates
  - Fragmentation
  - EEE support

Lane assignment in RS

www.huawei.com

Outline of 10G-EPON RS

76. Reconciliation Sublayer, Physical Coding Sublayer, and Physical Media Attachment for 10GEPON

76.1 Overview

76.2 Reconciliation Sublayer (RS) for 10G-EPON

76.2.1 Overview

76.2.2 Dual-speed MII

76.2.2.1 10/10G-EPON

76.2.2.2 10/1G-EPON

76.2.2.3 Dual-rate mode

76.2.2.4 Mapping of XGMII and GMII primitives

76.2.3 Summary of major concepts

76.2.3.1 Application

76.2.4 GMII structure

76.2.5 XGMII structure

76.2.6 Mapping of XGMII and GMII to PLS

76.2.6.1 Functional specifications for multiple MACs

76.2.6.1.1 Variables

76.2.6.1.2 RS Transmit function

76.2.6.1.3 RS Receive function

76.2.6.1.3.1 SLD

76.2.6.1.3.2 LLID

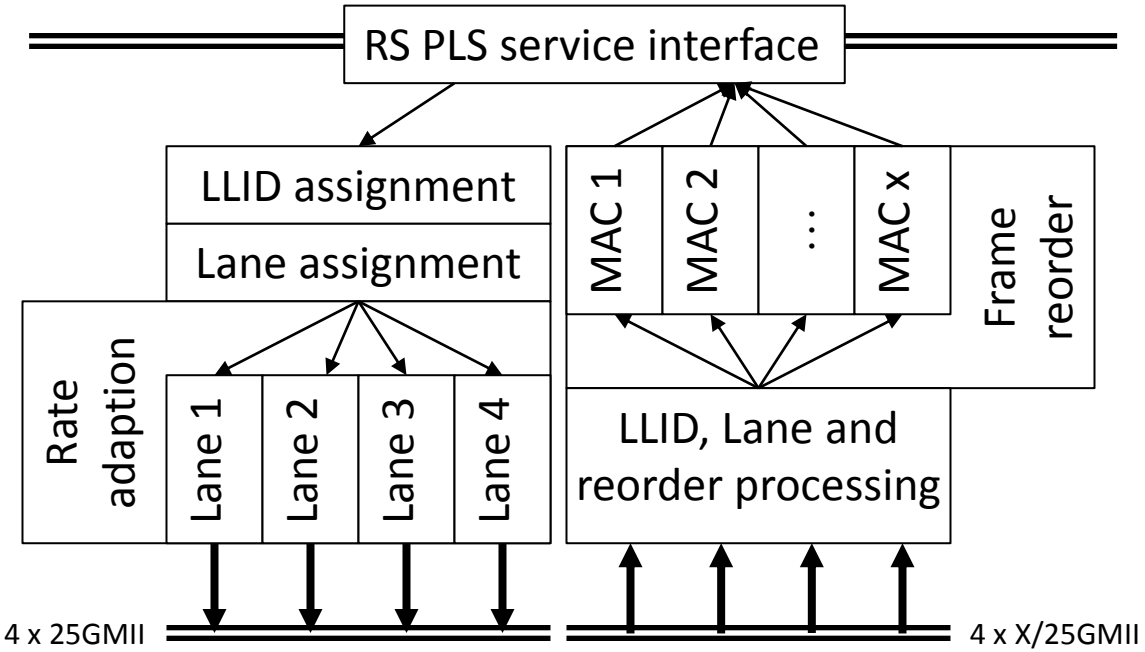
76.2.6.1.3.3 CRC-8

- 100G-EPON will have complementary functions on multi-rate:
  - 25/100G ?
  - 10/25G ?
  - 50/100G ?
  - 25/100G ?
- New Function: Lane Assignment
  - Mux/Demux
  - Frame Reordering
- Which MII will we use ?
  - 25GMII ?
  - XGMII ?
  - Something else ?
- New overhead: Lane Assignment
  - Mux/Demux
  - Frame Reordering
- EEE Support?

Task Force decisions

- **Which MII; 25GMII, 25GMII/XGMII, or any combination?**
- **Multi-Lane decisions:**
  - How to distribute multi-lane traffic; by whole frames?
  - If distribution by frames how to deal with frame reordering; PSN?
    - **How large is PSN? 9 bits appears to be needed for jumbo packets**
    - **Where to put PSN? Clearly have 8 bits available for PSN, but 9th bit location is not as obvious. Can we steal the mode bit? (remember we DO steal!)**
  - How to describe frame reordering in the receive RS?
- **Buffering** (not necessarily part of the standard but need to understand)
  - Transmit buffering to adapt 100G RS input to 25G output (assumed rates)
  - Receive buffering to accommodate frame reordering mechanism
- **Idle Insertion – part of RS or MPCP/PCS?**
- **EEE support?**

RS Block Diagram – OLT & Multi-lane ONU



Lane assignment in MLCP

www.huawei.com

Outline of 10G-EPON RS

76. Reconciliation Sublayer, Physical Coding Sublayer, and Physical Media Attachment for 10GEPON

76.1 Overview

76.2 Reconciliation Sublayer (RS) for 10G-EPON

76.2.1 Overview

76.2.2 Dual-speed MII

76.2.2.1 10/10G-EPON

76.2.2.2 10/1G-EPON

76.2.2.3 Dual-rate mode

76.2.2.4 Mapping of XGMII and GMII primitives

- 100G-EPON will still have complementary functions on multi-rate:
  - 25/100G ?
  - 50/100G ?
  - 10/25G ?
  - 25/100G ?

76.2.3 Summary of major concepts

76.2.3.1 Application

- New Function: Lane Assignment
  - Part of MLCP

76.2.4 GMII structure

76.2.5 XGMII structure

76.2.6 Mapping of XGMII and GMII to PLS

76.2.6.1 Functional specifications for multiple MACs

- Use 25GMII and XGMII
  - 25GMII
  - XGMII

76.2.6.1.1 Variables

76.2.6.1.2 RS Transmit function

76.2.6.1.3 RS Receive function

- New overhead?
  - If needed would be added in MLCP?

76.2.6.1.3.1 SLD

76.2.6.1.3.2 LLID

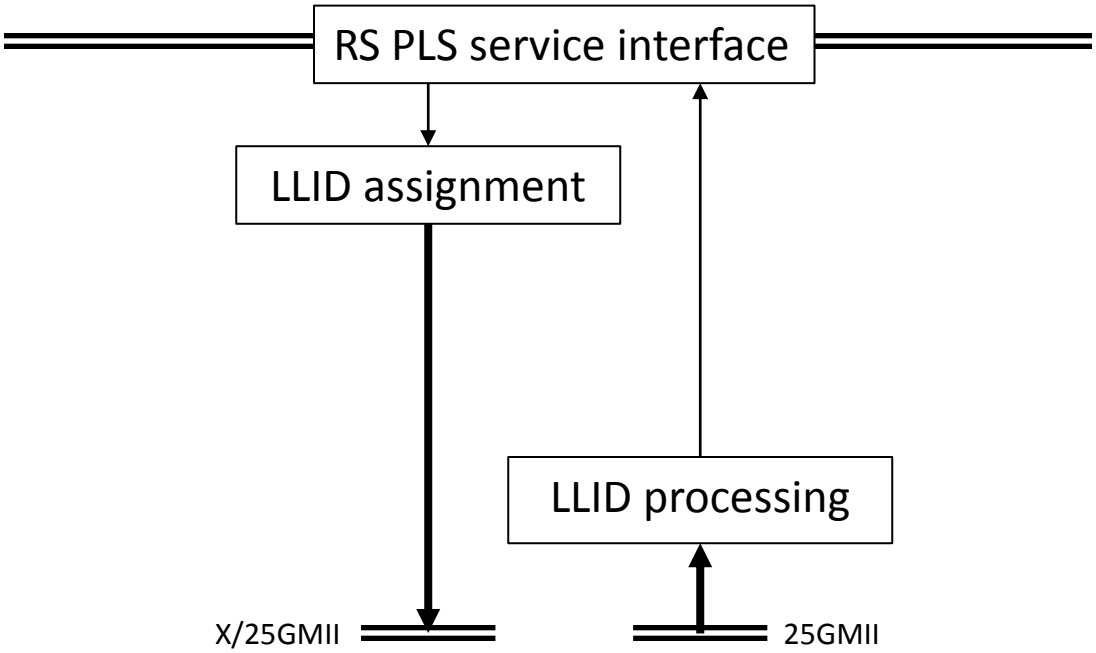
76.2.6.1.3.3 CRC-8

- EEE Support?

Task Force decisions

- **Which MII; Use 25GMII, and 25GMII/XGMII – decision is a given**
- **Multi-Lane decisions:**
  - Assumption is this would be solved in MLCP
- **Buffering** (not necessarily part of the standard but need to understand)
  - Assumption is this would be understood in context of MLCP
- **Idle Insertion – part of RS or MPCP/PCS?**
- **EEE support?**

RS Block Diagram – MLCP (same as current)



Additional items the TF needs to consider

www.huawei.com

HUAWEI TECHNOLOGIES CO., LTD.

HUAWEI

Rate decision

- **Downstream base rate of 25 Gbps?**
  - 25, 50 & 100 Gbps required by Objectives
  - Exclude 75?
- **Upstream base rate of 10 Gbps or 25 Gbps**
  - Allow 10, 25, 50 & 100 Gbps?
  - Exclude other combinations?

DS Rate (Gbps)	**US rate** (Gbps)					
	10	25	50	100	20	combinations of 10+25
25	Y	Y	N	N	N	N
50	N	Y?	Y	N	N	N
100	N	Y?	Y?	Y	N	N

Y	Specifically defined & specified?
Y?	Named but maybe not specified precisely?
N	Omit from standard?

Fragmentation?

- **Allowed or Disallowed? BIG IMPLICATIONS!**
- **If Allowed**
  - Optional or mandatory?
  - What is the minimum packet size that can be fragmented?
    - **Preemption allows anything > 124 Bytes**
      - **note preemption per 802.3br (D2.4) is mutually exclusive of EPON as it uses byte 8 of the preamble for Start mPacket Delimiter (SMD) which is CRC8 in EPON.**
    - **Set to Max allowed framed size (2000 B)?**
      - **implies that only jumbo packets would be fragmented.**
      - **Limits size of fragmentation indication**
    - **Allow variable size fragmentation?**
      - **Could be provisionable allowing implementer (or market) to set.**
  - Buffering impact? (Cost & Technical Feasibility impacts need to be clear)
  - Has implications to the RS (maybe not so much to PCS/PMA/PMD)

EEE Support

- **In a multi-lane solution individual lanes could potentially be disabled to support lower power during times when there is little traffic demand**
  - Would need some protocol to support
    - **Part of MLCP?**
    - **Addition to MPCP?**
  - Affects more than just the RS

Thank you

www.huawei.com

Straw Polls

www.huawei.com

Rate Straw Poll (1 of 3)

DS Rate (Gbps)	US rate (Gbps)					
	10	25	50	100	20	N10+M25
25	Y	Y				
50			Y			
100				Y		

- **Straw Poll #**
- **Adopt the DS/US MAC rates of 25/10 Gbps, 25/25 Gbps, 50/50 Gbps and 100/100 Gbps to fulfill the TF Objectives.**
  - Agree:
  - Disgree:
  - No opinion:

Objectives

- **Support subscriber access networks using point to multipoint topologies on optical fiber**
- **Provide specifications for physical layers operating over a single SMF strand and supporting symmetric and/or asymmetric the MAC data rates of:**
  - 25 Gb/s in downstream and less than or equal to 25 Gb/s in upstream
  - 50 Gb/s in downstream and less than or equal to 50 Gb/s in upstream
  - 100 Gb/s in downstream and less than or equal to 100 Gb/s in upstream
- **PHY(s) to have a BER better than or equal to 10-12 at the MAC/PLS service interface (or the frame loss ratio equivalent)**
- **Support coexistence with 10G-EPON**
  - Optical power budgets to accommodate channel insertion losses equivalent to those supported by the 10G-EPON standard
  - Wavelength allocation allowing concurrent operation with 10G-EPON PHYs

Rate Straw Poll (2 of 3)

DS Rate (Gbps)	US rate (Gbps)					
	10	25	50	100	20	N10+M25
25	Y	Y	1	2		
50	3	4	Y	5		
100		6	7	Y		

- I support standardizing the additional US/DS MAC rate of _____

Straw Poll #	DS/US rate (Gbps)	Agree	Disagree	No Opinion
	25/50 (1)			
	25/100 (2)			
	50/10 (3)			
	50/25 (4)			
	50/100 (5)			
	100/25 (6)			
	100/50 (7)			

Rate Straw Poll (3 of 3)

- **The standard should remain silent on US/DS MAC rate of _____**

DS Rate (Gbps)	US rate (Gbps)					
	10	25	50	100	20	N10+M25
25	Y	Y	1	2	A	E
50	3	4	Y	5	B	E
100	C	6	7	Y	D	E

Straw Poll #	DS/US rate (Gbps)		Agree	Disagree	No Opinion
	25/20	(A)			
	50/20	(B)			
	100/10	(C)			
	100/20	(D)			
	X/(Nx10+Mx25)	(E)			