EEE Update for 1000BASE-T1

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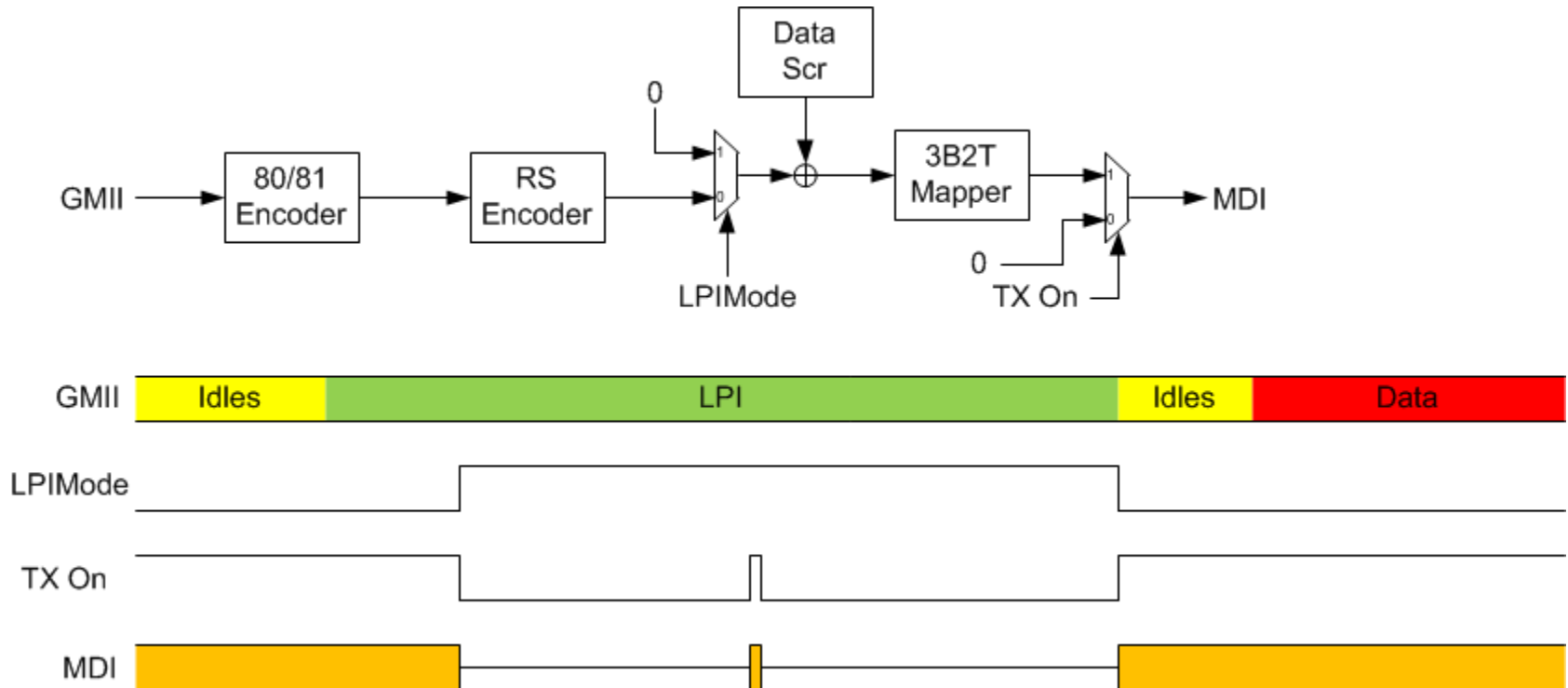- Mehmet Tazebay

Summary

- Reconciled EEE
  - Parameters
  - Exit LPI
- Refreshes
  - Consists of scrambled zeroes
  - Scrambler position
  - OAM
- 1 second delay before entry into LPI after linkup
- Refresh monitor

EEE Parameter Reconciliation

Symbol	Definition	Value
RS3	# PAM3 symbols per RS frame	2700
RST	Duration of RS frame (ns)	3600
PRS3	# PAM3 symbols per partial RS frame	180
PRST	Duration of partial RS frame (ns)	240
PF	# partial frames per RS frame	15
QRF	# RS frame per Quiet Refresh cycle	24
QRT	Duration of quiet refresh cycle (ns)	86400
AF	# partial RS frames separating alert	30
AlertGranularityT	Alert Granularity (ns)	7200
Refresh_LPI	# partial RS frames for refresh	6
Refresh_T	Duration for refresh (ns)	1440
QR_Ratio	Quiet/Refresh Ratio	60
Enter_LPI_RS	# RS frames with all LPI to enter LPI	1
Alert	Alert length (RS frames)	0.9
Exit_LPI_RS	# RS frames with all idles upon exit LPI	2

Refreshes (macro view)

- Scramble zeroes except OAM
- Scrambler after RS (tu_3bp_01_1114.pdf)

OAM During Refreshes

- Normal mode OAM
- LPI mode OAM
- Embed OAM in Refresh

Delay after linkup before LPI

- Delay 1 second between link status == OK and entry into LPI

- 78.1.2.1.2

- Does existing verbiage in 78.1.2.1.2 cover 1000BASE-T1?

Refresh Monitor

- Need to deal with unreliable Refresh detection?
  - **55.4.2.7 Refresh Monitor function:** Force a re-link if Refresh is unreliably detected after 50 Q/R cycles => 4.32ms

- Unreliable Refresh detection causes
  - Can be caused by unplugging the cable
    - Not in automotive Ethernet
  - In asymmetric LPI mode the LP receiving Normal may need to re-link
    - Instead of immediately ceasing transmission the LP can initiate a Wake and then cease transmission
  - EMI overwhelms Refresh
    - Could cause the loops to degrade
    - Alert wouldn't be recognized even after EMI is over
    - Would not want to wait until missing Alert before re-linking

- Recommend 10G type EEE Refresh Monitor