Asymmetric Reconciliation Sublayer

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From http://www.ieee802.org/3/ch/public/adhoc/Lo_3ch_01_1218.pdf

- Add an objective to 802.3ch

Define a power efficient mode of operation where one direction operates at 2.5Gb/s, 5Gb/s, or 10Gb/s, and the other direction operates at 10Mb/s

AXONNE

Recap

- Pick a standard Ethernet speed in the slow direction
  - i.e. 10M, 100M, 1Gb/s and not some weird speed
  - Things are well understood at standard speeds (timing, MIBs, etc.)
- Pick the slowest standard Ethernet speed that meets 90+% of volume
  - Picking some faster speed may impact power
  - Picking some faster speed may limit the solution space
  - If a faster speed is required use regular EEE
- Slow direction speed is typically less than 1Mb/s (I^{2}C, SPI like speeds)
- Don't need both direction to be slow speed
  - Both directions can be fast
  - One fixed direction fast, other fixed direction slow.

- ➔ Pick 10Mb/s in slow direction

Recap

- ## Option 1:
  - XGMII in the 10Gb/s, 5Gb/s, 2.5Gb/s direction
  - MII in the 10Mb/s direction
  - Precedent for this Clause 76 – EPON. XGMII in one direction, GMII in the other

- ## Option 2:
  - Replicate the data on XGMII 1000x, 500x, 250x in the slow direction

- ## Other Options?
  - As long as the reconciliation sublayer layer does not introduce variable delays, it is a valid solution

Discuss Option 1

- For MGBASE-T1 PHY define both XGMII and MII or its equivalent functionality as the base interface

- MII functionality is required only if asymmetrical modes implemented
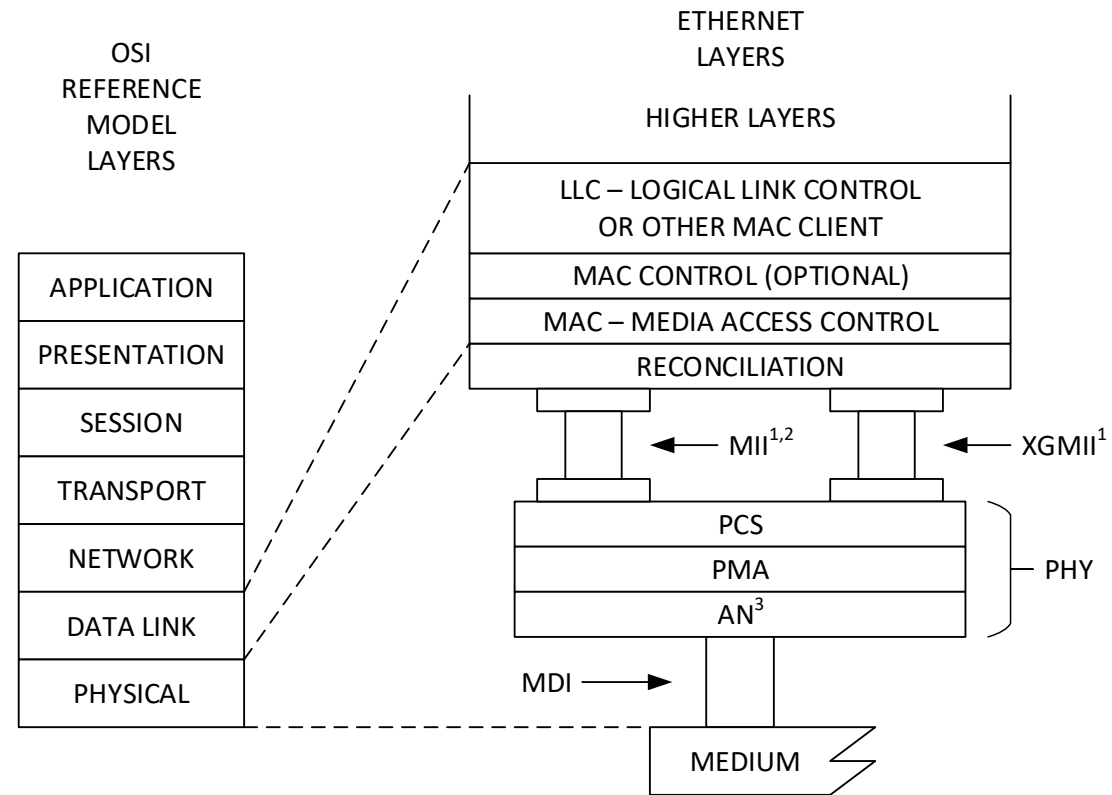
MDI = MEDIUM DEPENDENT INTERFACE
MII = MEDIA INDEPENDENT INTERFACE
PCS = PHYSICAL CODING SUBLAYER
PMA = PHYSICAL MEDIUM ATTACHMENT
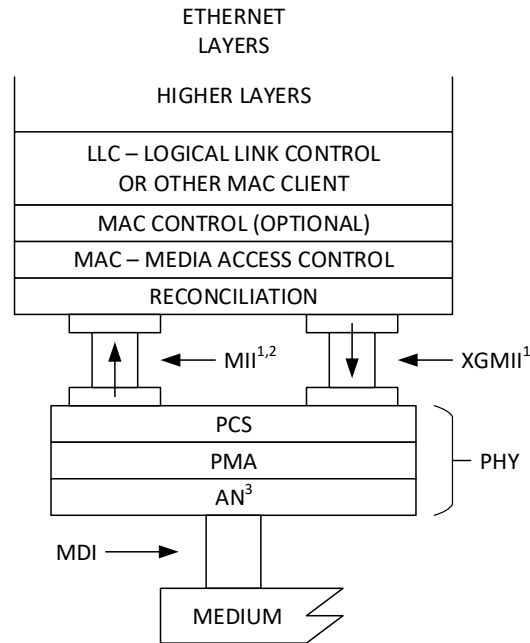PHY = PHYSICAL LAYER DEVICE
AN = AUTO-NEGOTIATION

NOTE 1 – Implementation of a physical XGMII and MII is optional
NOTE 2 – MII or equivalent functionality is required only if the optional asymmetrical mode is implemented
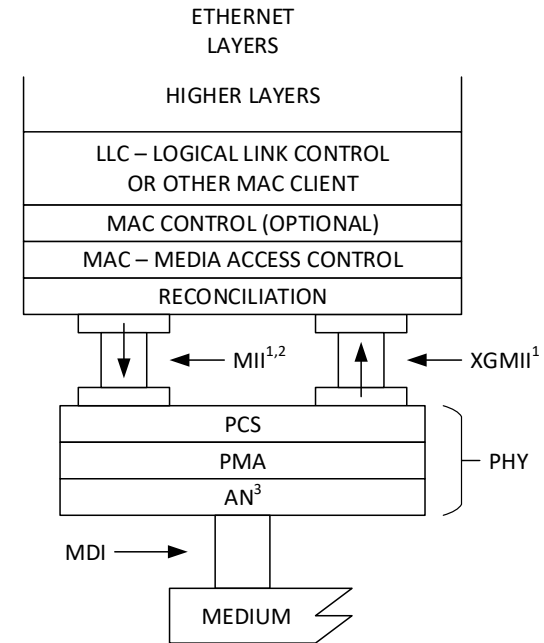NOTE 3 – Auto-Negotiation is optional

Modes of Operation

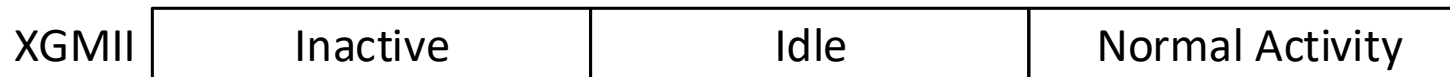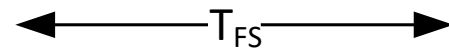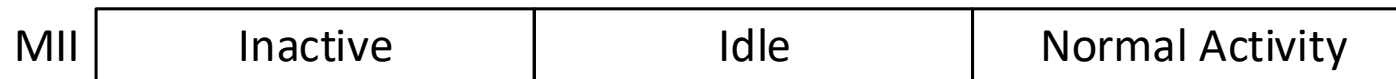- ## Symmetrical Mode
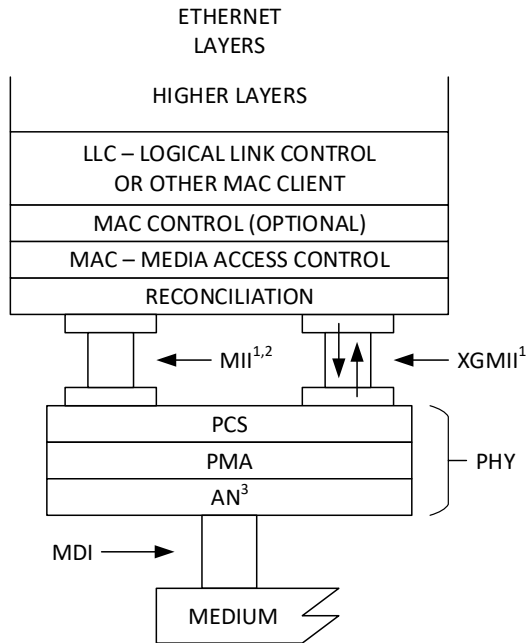
- ## Slow RX Mode

- ## Slow TX Mode

How to Determine XGMII or MII is Active

- Define New Sequence Ordered Set On XGMII
  - /Q/00/00/04/ ➔ Inactive XGMII
- Define New Encoding on MII
  - TX_EN (RX_DV) = 0, TX_ER (RX_ER) = 1, TXD<3:0> (RXD<3:0>) = 0010 ➔ Inactive MII
- If both XGMII and MII are Inactive, the PHY treats it as IDLEs in the mode it is currently operating in

How to Switch Between Modes

- T_{FS} – Time for PHY to transition from fast to slow mode
- T_{SF} – Time for PHY to transition from slow to fast mode

THANK YOU