

Asymmetric Framework

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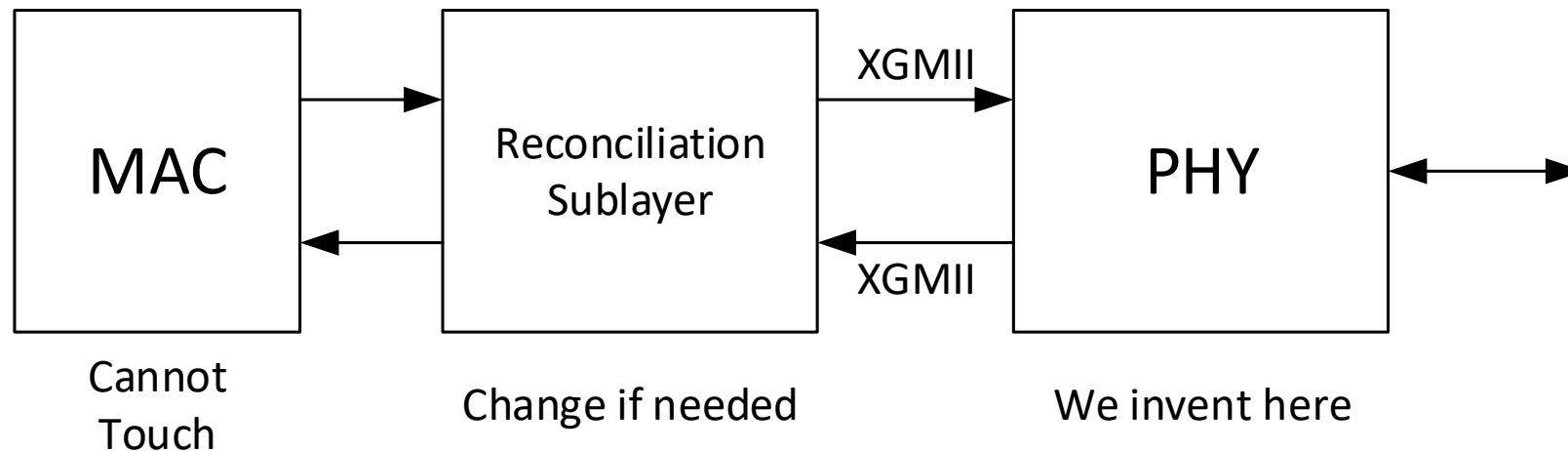
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Motivations and Requirements

- Target use cases where one direction transmits high data rate while the other direction is very low data rate.
 - i.e. Cameras, Displays, Sensors
- Asymmetric mode should be power efficient
- Cannot change the Ethernet MAC layer
- Cannot store and forward if it causes variable latency
- Can touch the Reconciliation Sublayer
- Ideally no excess latency when there is traffic to send in the low data rate direction
- Ideally no side band signaling between the Reconciliation Sublayer and the PHY

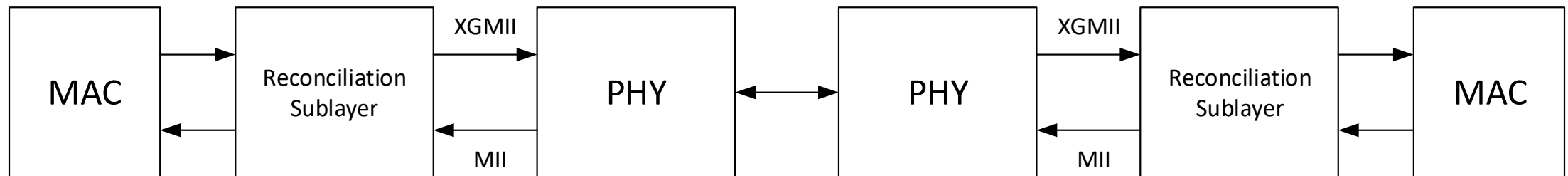
Bursty RS – Slow data transmitted in high speed bursts

- MAC cannot see line activity
 - Cannot ask MAC to sync to burst on line
 - Cannot sync with store and forward
- Can ask RS to hold off
 - Introduces latency
 - Introduces variable delay
- Slow direction on line
 - Solution can be bursty or
 - Can be slow and steady
 - We define how it operates



Smooth RS – Slow data transmitted at constant speed

- MAC operates normally
- Slow direction on line
 - Solution can be bursty or
 - Can be slow and steady
 - We define how it operates
 - We take care of constant latency in the PHY
- Constant flow in RS
 - No added latency
 - Fixed delay



Bound the Problem

- 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 (I²C, 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

How to Make the Reconciliation Sublayer Fixed Delay

- 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

Recommendation

- 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

THANK YOU