

ISAAC: Duplex Operation Objective

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Problem Statement

- There is a proposal to use “Full Duplex Operation only” for the asymmetric ISAAC PHY
https://www.ieee802.org/3/ISAAC/public/081623/PAR_CSD_OBJ_081623_01.pdf

- Per IEEE 802.3, definition of “Full Duplex Operation” is as follows

1.1.2.2 Full duplex operation

Full duplex operation allows simultaneous communication between a pair of stations using point-to-point media (dedicated channel). Full duplex operation does not require that transmitters defer, nor do they monitor or react to receive activity, as there is no contention for a shared medium in this mode. Full duplex mode can only be used when all of the following are true:

- a) The physical medium is capable of supporting simultaneous transmission and reception without interference.
- b) There are exactly two stations connected with a full duplex point-to-point link. Since there is no contention for use of a shared medium, the multiple access (i.e., CSMA/CD) algorithms are unnecessary.
- c) Both stations on the LAN are capable of, and have been configured to use, full duplex operation.

- Per IEEE 802.3 clause 1.1.2.2, Full Duplex Operation does not require that transmitter defer. Deferring is used in EEE and may be used in other asymmetric solutions. Question: is EEE a Full Duplex Operation ?

GMI Reconciliation Sublayer

MAC

PHYSICAL LAYER

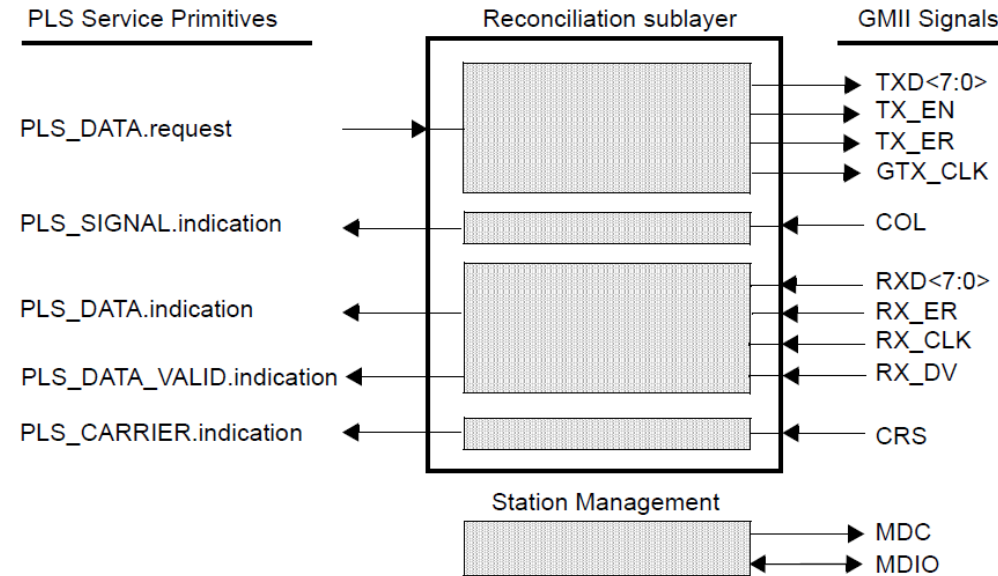
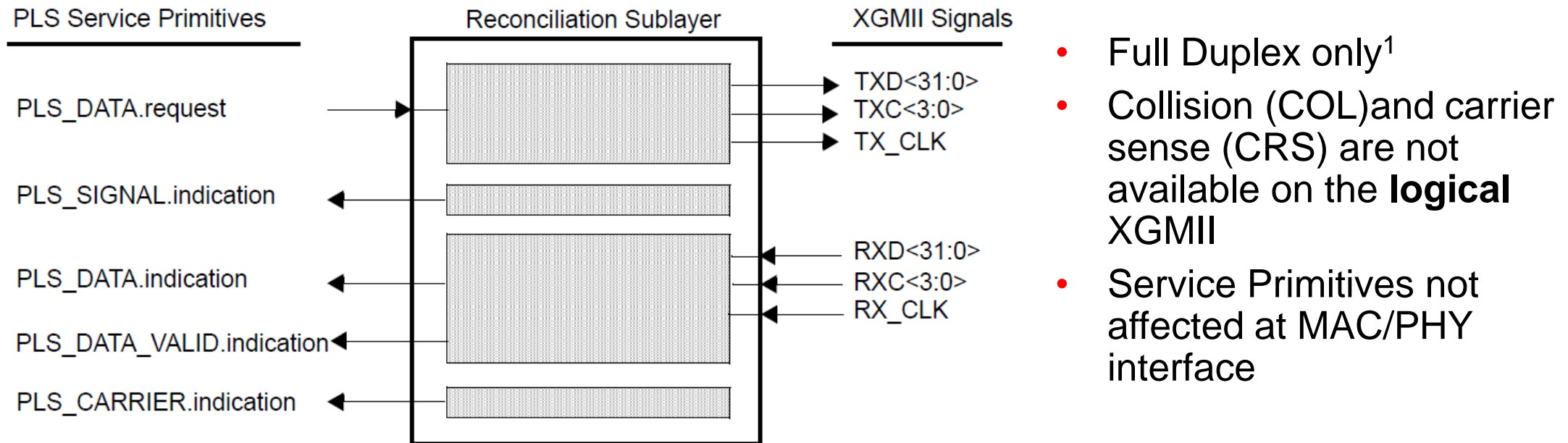


Figure 35-2—Reconciliation Sublayer (RS) inputs and outputs and STA connections to GMII

- Reconciliation sublayer is part of Physical Layer.
- Full Duplex and Half Duplex operations are supported for GMII.
- For Half Duplex operation, COL represents collision and CRS indicates carrier sense.

XGMII Reconciliation Sublayer



- Full Duplex only¹
- Collision (COL) and carrier sense (CRS) are not available on the **logical** XGMII
- Service Primitives not affected at MAC/PHY interface

Figure 46–2—Reconciliation Sublayer (RS) inputs and outputs

CARRIER.Indication is not asserted in Full Duplex Operation

1-In Full Duplex mode, there is no need for Transmit Media Access Management to avoid contention with other traffic on the medium. **Frame transmission may be initiated after the interframe delay** (IEEE 802.3 clause 4.1.2.1.1 **Transmission without contention**)

XGMII Reconciliation Sublayer for existing EEE

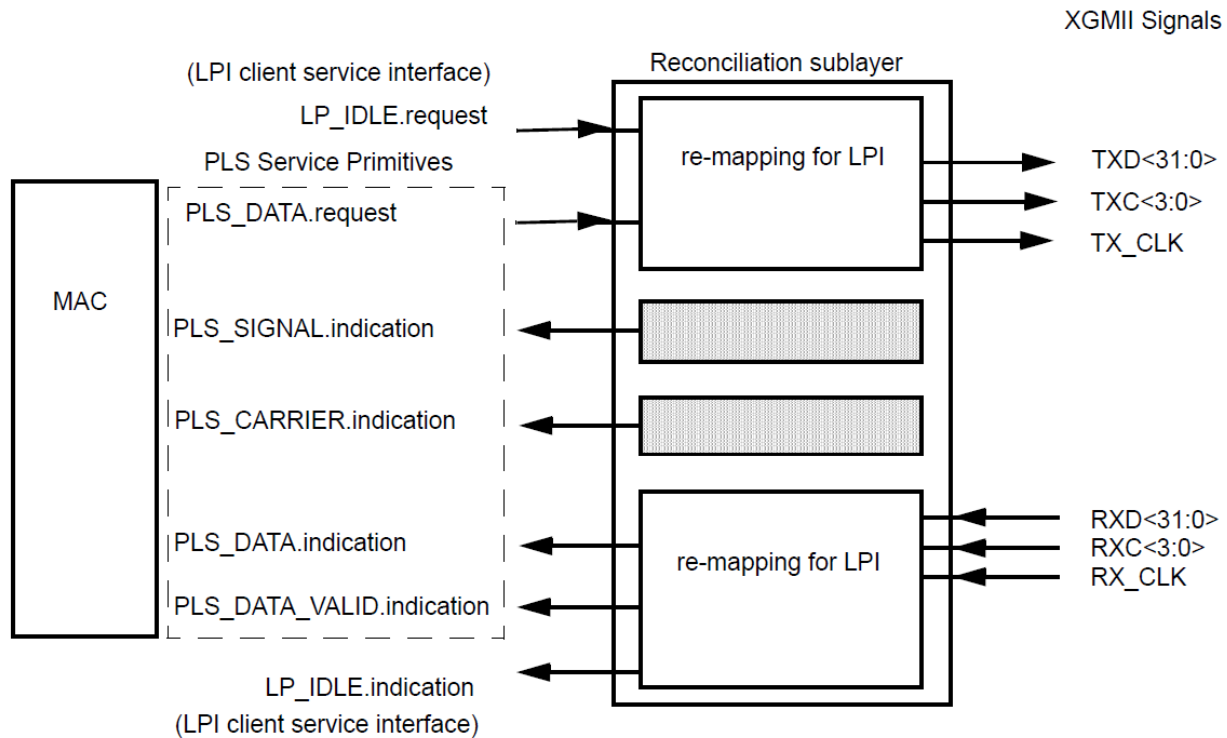


Figure 46-12—LPI assertion and detection mechanism

- “The timing of **PLS_CARRIER.indication** when used for the LPI function is controlled by the LPI transmit state diagram”

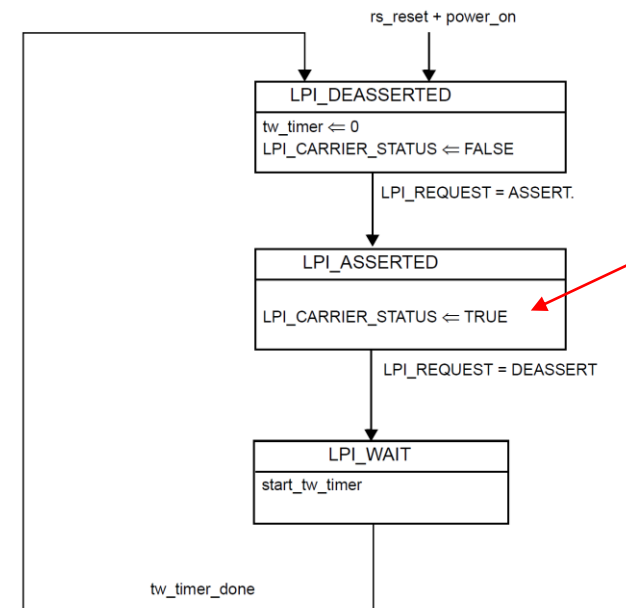


Figure 46-13—Transmit LPI state diagram

CARRIER.Indication is asserted in EEE. Therefore, it is considered Full Duplex, but with Carrier Sense Deferral!

Operation of EEE (Clause 78)

78.1.1.1 Reconciliation sublayer service interfaces

Figure 78-1 depicts the LPI Client and the RS interlayer service interfaces.

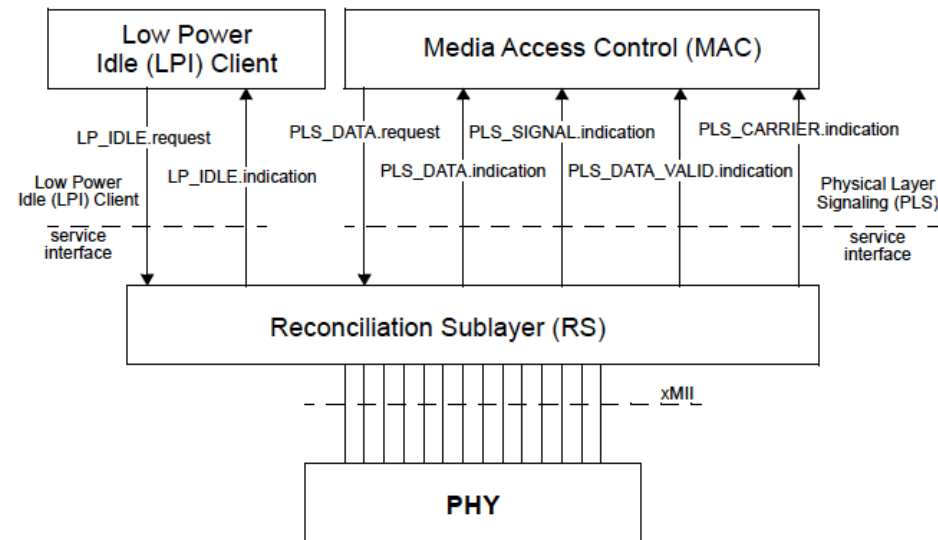


Figure 78-1—LPI Client and RS interlayer service interfaces

The definition of LPI signaling assumes the use of the MAC defined in Annex 4A for simplified full duplex operation (with carrier sense deferral). This provides full duplex operation but uses the carrier sense signal to defer transmission when the PHY is in the LPI mode.

Summary

- For an asymmetric PHY operation, CARRIER. Indication may be used to defer traffic when PHY is not immediately available (as in EEE for an example).
- Objectives specified for ISAAC should not rule out transmit deferral option.

Potential Options for An Objective

Goal is to make sure the ability to defer transmission is not precluded.

Question is how to write the specific objective to accomplish this behavior?

- Option 1
 - Remove the objective that states “Full Duplex Operation Only”
- Option 2
 - Replace with - Support Full Duplex Operation at MAC/PLS interface **with Carrier Sense Deferral**
- Option 3
 - Replace with - Half Duplex Operation **with Collision Avoidance**