GSCF potentials in fault notification

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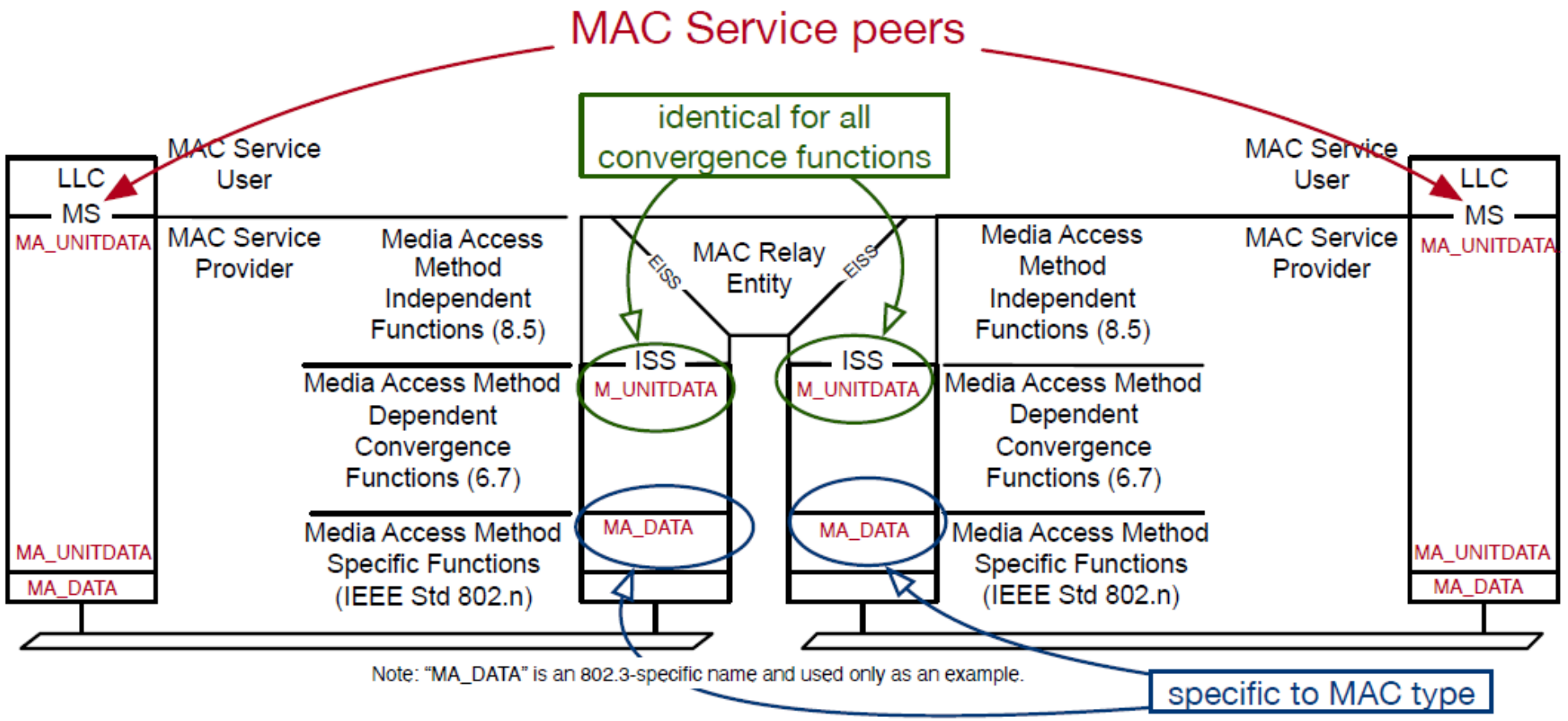
Architectural Model per 802.1Q – interface details



gRS to GSCF Interface: use PLS

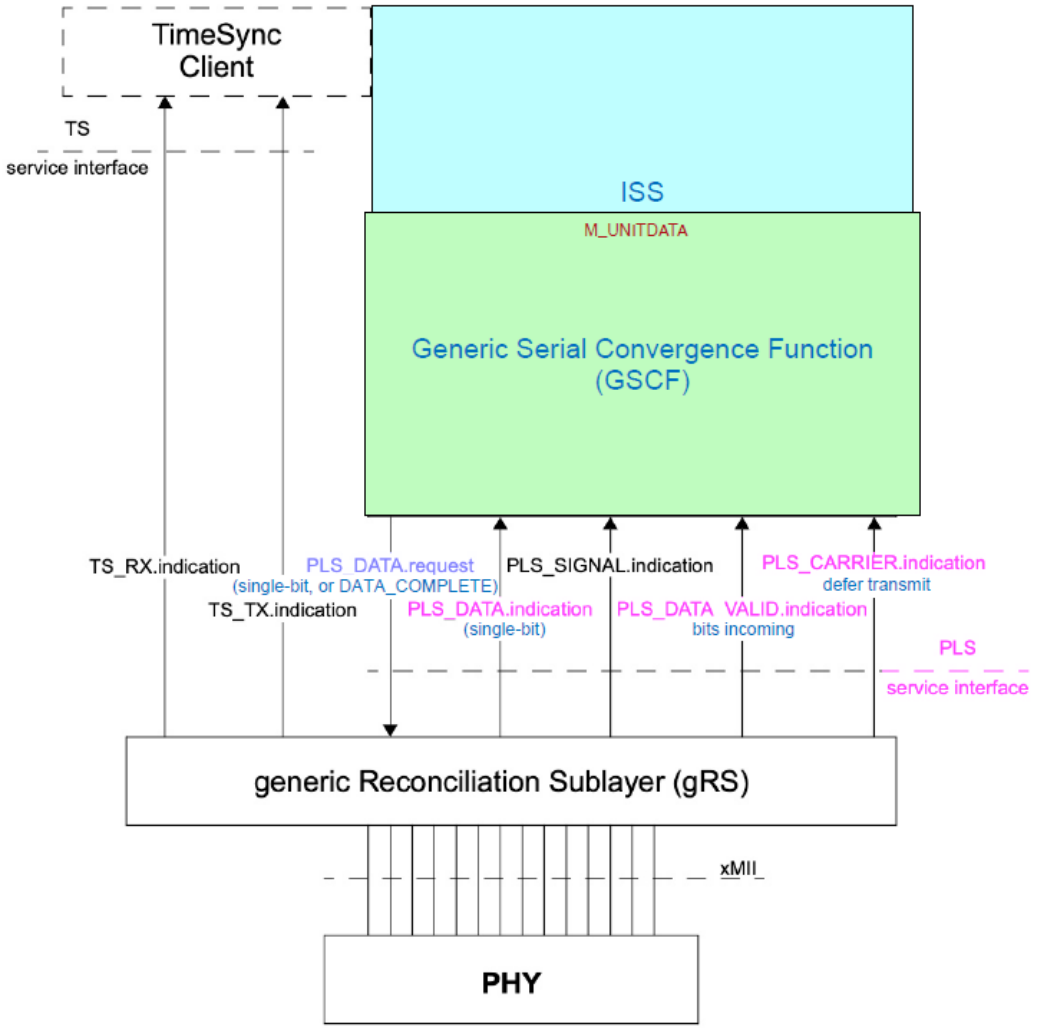
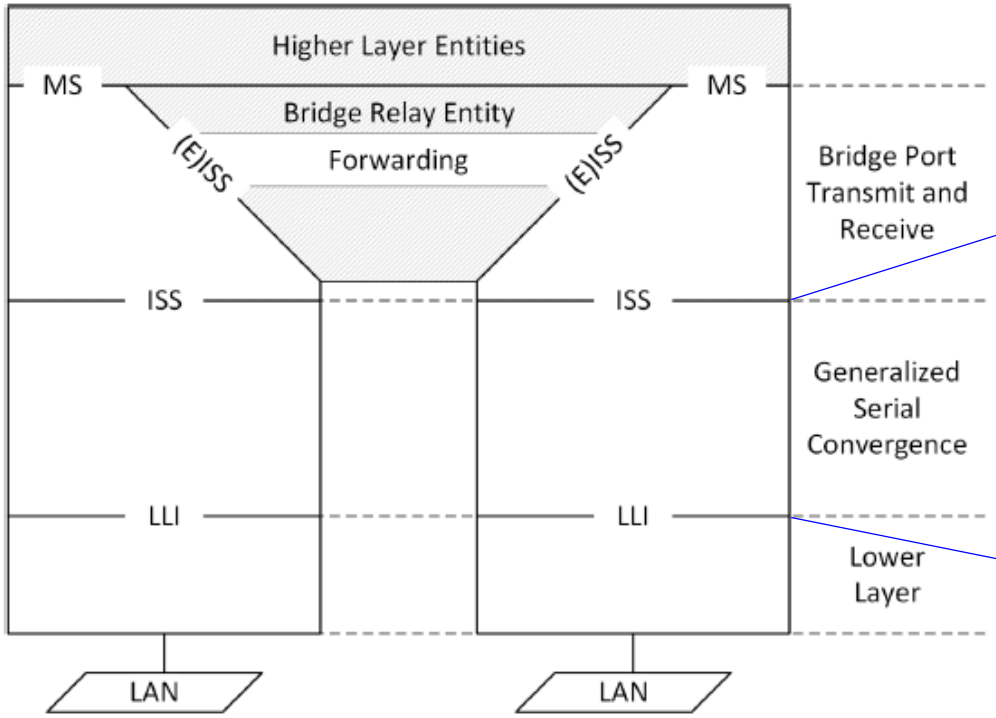


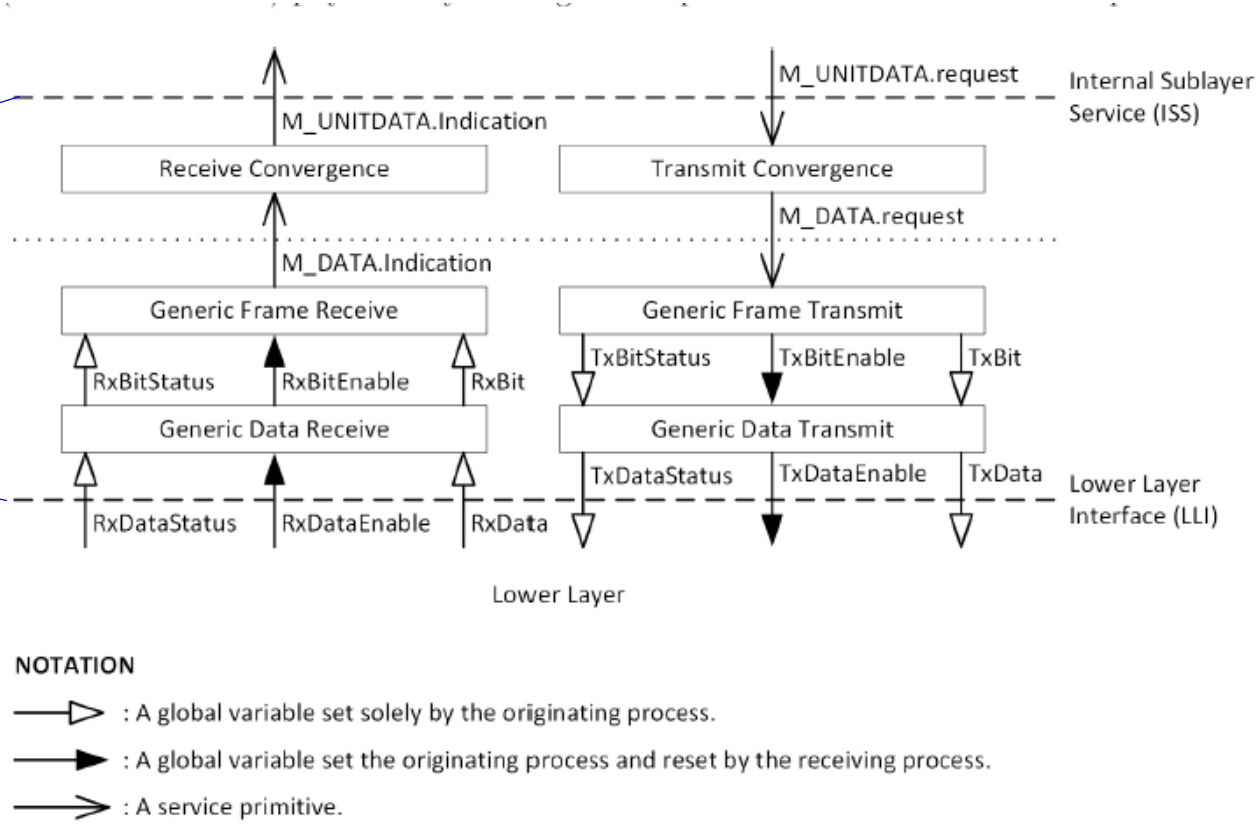
Figure 90–1—Relationship of the TimeSync Client, TSSI and gRS sublayer relative to MAC and MAC Client and associated interfaces

- Specify the lower GSCF interface to match PLS interface.
- Then GSCF interfaces to gRS, or anything behaving the same at PLS interface.

Observations:
- GSCF has upper and lower service interfaces
- Upper interface uses M_UNITDATA primitives
- Lower interface can use PLS primitives, but is not limited to that.

GSCF used by CTF





NOTATION

: A global variable set solely by the originating process.

: A global variable set the originating process and reset by the receiving process.

: A service primitive.

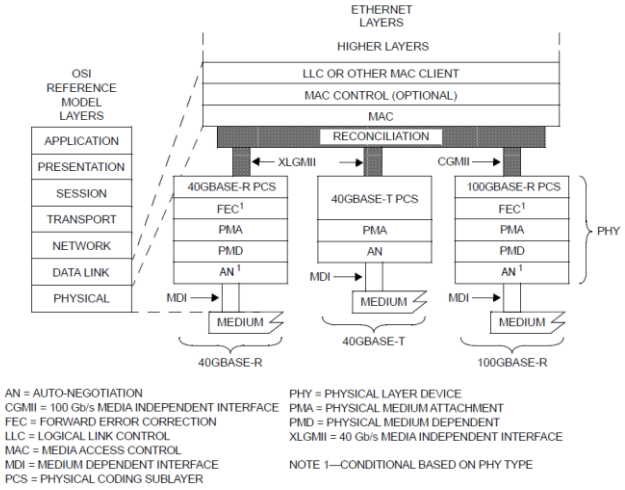
Figure 6.1.: Overview of the generalized serial convergence operations.

Observations:

- Global variables can be defined at the GSCF lower interface.
- M_DATA is the service primitive used rather than MA_DATA, i.e. CTF specific primitives at GSCF/LLI.

Link fault detection and reporting at Phy - 1

- The RS (Reconciliation Sublayer) participates in link fault detection and reporting by monitoring the receive path for status reports that indicate an unreliable link, and generating status reports on the transmit path to report detected link faults to the DTE on the remote end of the connecting link.



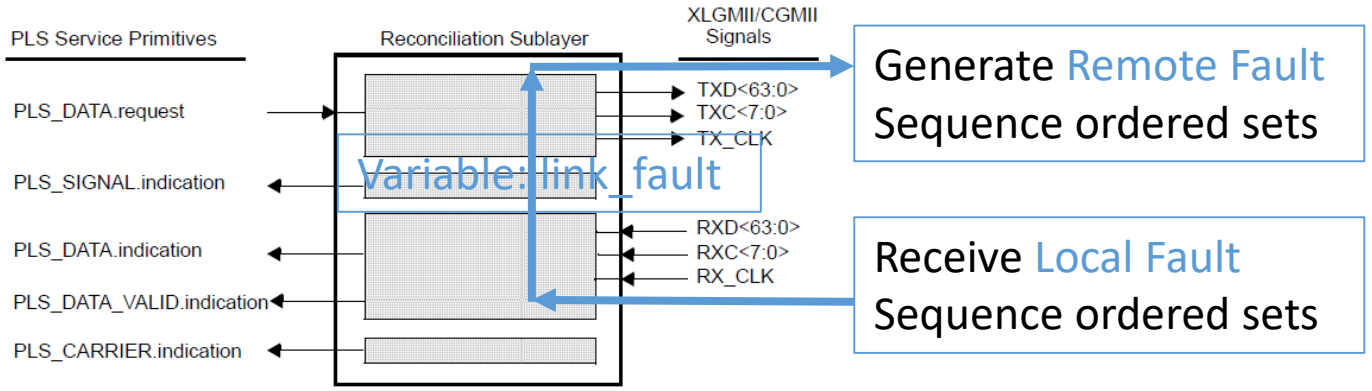


Figure 81–2—Reconciliation Sublayer (RS) inputs and outputs

Link fault detection and reporting at Phy - 2

- Varaible link_fault at RS, 4 values, more could be defined:

  link_fault

  An indicator of the fault status.

  Values: OK; No fault.

  Local Fault; fault detected by the PHY.

  Remote Fault; fault detection signaled by the remote RS.

  Link Interruption; link temporarily unavailable, signaled by the PHY.

- The variable link_fault is set to indicate the value of a received Sequence ordered set when four fault_sequences containing the same fault value have been received with fault sequence separated by less than 128 columns and no intervening fault_sequences of a different fault value.

- The RS output onto TXC<3:0> and TXD<31:0> is controlled by the variable link_fault.

  a) link_fault = OK

  The RS shall send MAC frames as requested through the PLS service interface. In the absence of MAC frames, the RS shall generate Idle control characters.

  b) link_fault = Local Fault

  The RS shall continuously generate Remote Fault Sequence ordered sets.

  c) link_fault = Remote Fault or link_fault = Link Interruption

  The RS shall continuously generate Idle control characters.

Some observations

- RS maintains a variable link_fault. Its value is accessible.
  - Rx path faults set variable link_fault (OK, Local Fault, Remote Fault, Link Interruption)
  - Variable link_fault controls Tx path to generate the control and data block

- RS handles link fault by itself (in 802.3 spec)
  - It consumes its lower layer Fault Sequence Ordered Sets
  - It seem not pass the link fault info to upper layer in PLS service primitives form

- Work on a single port (Tx and Rx path)
- Link fault can be detected very quick (~100x ns)

GSCF potentials in fault notification

- Link fault status is widely used in various OAM mechanisms in addition to phy layer local fault->remote fault Sequence ordered set generation.

- It looks not clear in standard spec whether and how the link fault status passed up from RS on Rx path.

- GSCF looks like a potential standard function to describe it.

Link fault is also reported using OAMPDU

EFM (Ethernet in the First Mile)

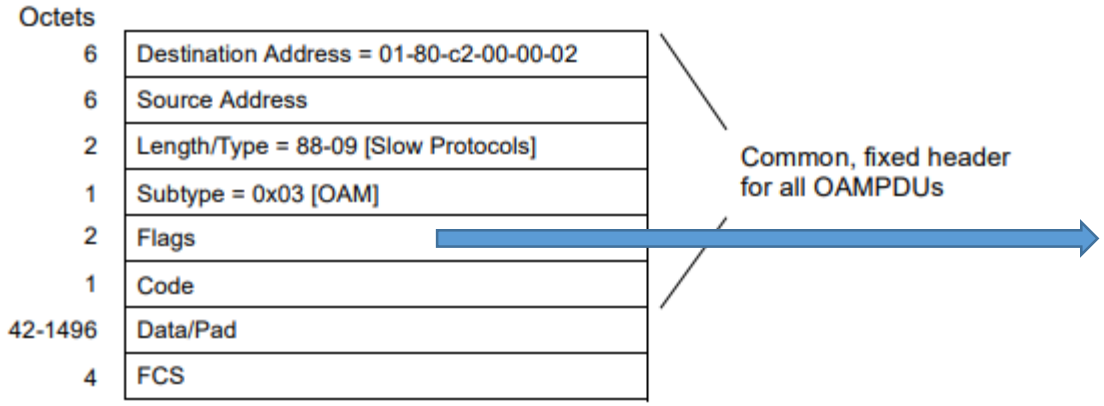


Figure 57–9—OAMPDU frame structure

- It assumes Link fault can be passed up for processing to generate PDU?
- Not so clear yet if it should be further passed up to ISS or processed at GSCF

Table 57–3—Flags field

Bit(s)	Name	Description
15:7	*Reserved*	Reserved bits shall be set to zero when sending an OAMPDU, and should be ignored on reception for compatibility with future use of reserved bits.
6	Remote Stable	When remote_state_valid is set to TRUE, the Remote Stable and Remote Evaluating values shall be a copy of the last received Local Stable and Local Evaluating values from the remote OAM peer. Otherwise, the Remote Stable and Remote Evaluating bits shall be set to 0.
5	Remote Evaluating	
4	Local Stable	Local Stable and Local Evaluating form a two-bit encoding shown below: 4:3 0x0 = Local DTE Unsatisfied, Discovery can not complete 0x1 = Local DTE Discovery process has not completed 0x2 = Local DTE Discovery process has completed 0x3 = Reserved. This value shall not be sent. If the value 0x3 is received, it should be ignored and not change the last received value.
3	Local Evaluating	
2	Critical Event	1 = A critical event has occurred. 0 = A critical event has not occurred.
1	Dying Gasp	1 = An unrecoverable local failure condition has occurred. 0 = An unrecoverable local failure condition has not occurred.
0	Link Fault	The PHY has detected a fault has occurred in the receive direction of the local DTE (e.g., link, Physical layer). 1 = Local device's receive path has detected a fault. 0 = Local device's receive path has not detected a fault.

NOTE—The definition of the specific faults comprising the Critical Event, Dying Gasp, and Link Fault flags is implementation specific and beyond the scope of this standard.

Other examples leveraging link fault status info by the upper layers

- As placeholder

GSCF potentials in fault notification between phy and ISS for fast fault detection

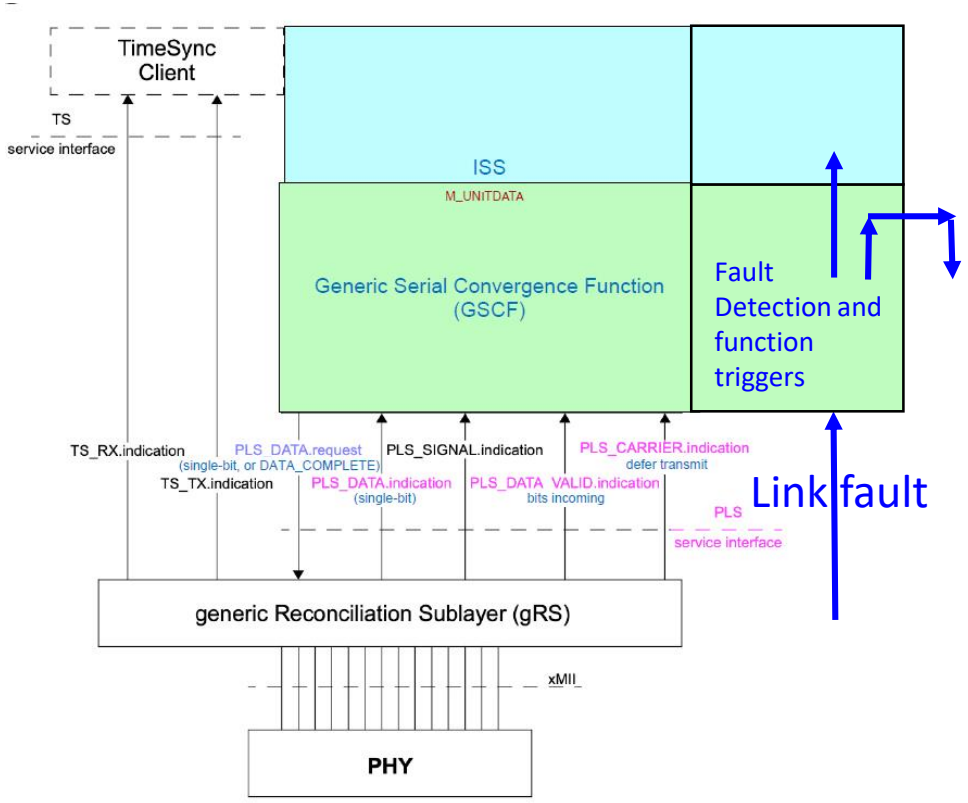


Figure 90–1—Relationship of the TimeSync Client, TSSI and gRS sublayer relative to MAC and MAC Client and associated interfaces

For discussion:

Would GSCF be potentially useful here for fault notification?

What would Service Primitive at the lower interface of GSCF look like? A global variable link_fault would do?

Should GSCF be able to do more processing in addition to what current CTF requires?

References

- Generic Serial Convergence Function (GSCF)**:** DCN 802.1-22-0040-05-ICne
- Technical Descriptions for Cut-Through Forwarding in Bridges: DCN 1-22-0042-12-ICne
- IEEE802.3-2018