



Questions to be Answered by the IEEE P802.3ap Task Force

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Scope and Purpose

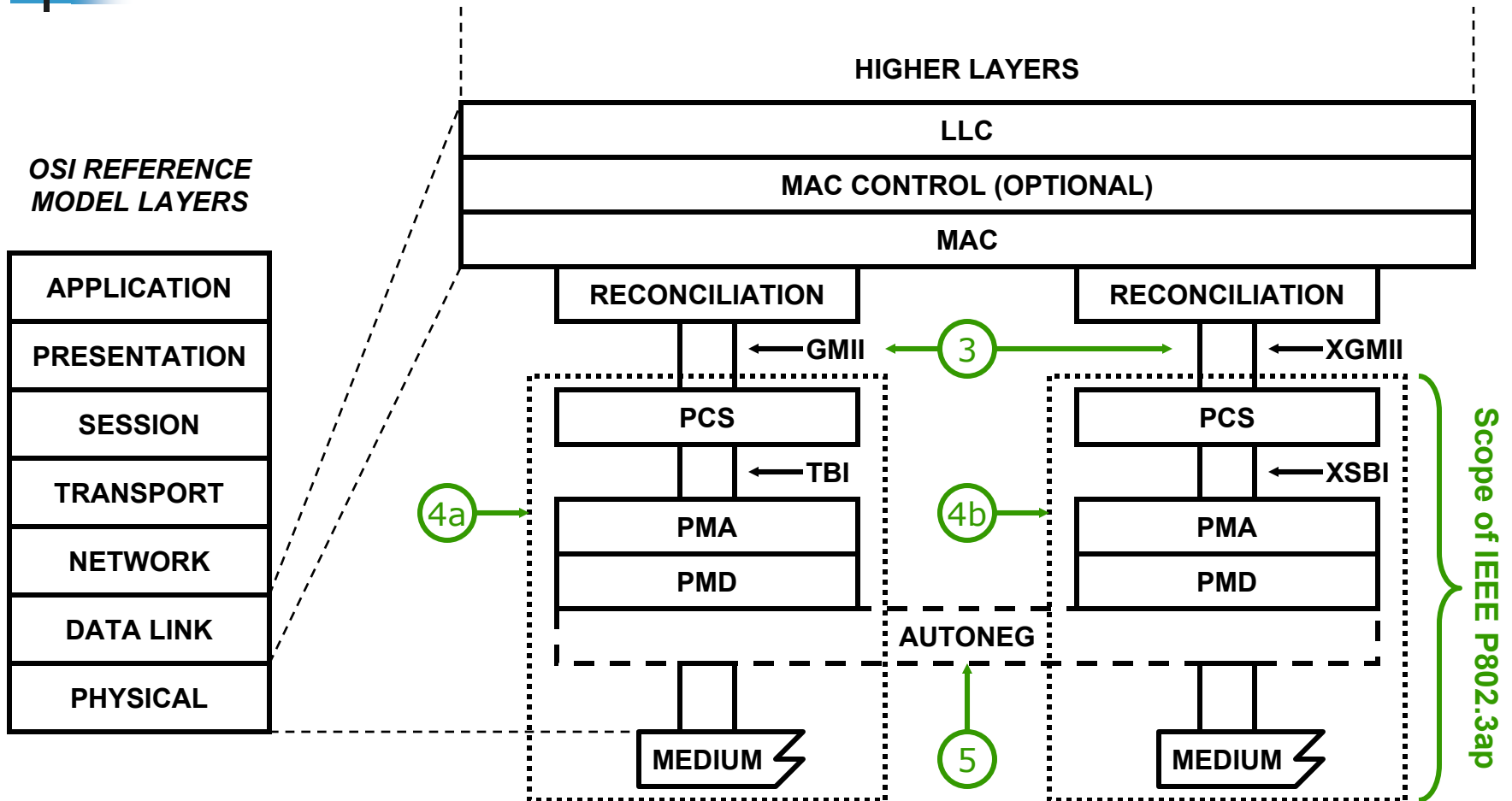
- As the IEEE P802.3ap Task Force, we are now tasked with the development of Draft 1.0 of the Backplane Ethernet Physical Layer specifications.
- While agreeing on a channel model and line code are significant and important tasks, there is much additional work that needs to be done to create a complete specification.
- This presentation seeks to highlight some of the issues that must be addressed.
 - This is the first pass at this list and points out some of the more obvious issues.
 - This is a living list; it is very likely that additional issues will be identified as we proceed.



IEEE P802.3ap Objectives

- 1) Preserve the 802.3/Ethernet frame format at the MAC Client service interface.
- 2) Preserve min. and max. frame size of current 802.3 Std.
- 3) Support existing media independent interfaces.
- 4) Support operation over a single lane across 2 connectors over copper traces on improved FR-4 for links consistent with lengths up to at least 1m.
 - a. Define a 1 Gb/s PHY
 - b. Define a 10 Gb/s PHY
- 5) Consider auto-negotiation.
- 6) Support BER of 10^{-12} or better.
- 7) Meet CISPR/FCC Class A.

Layer Model

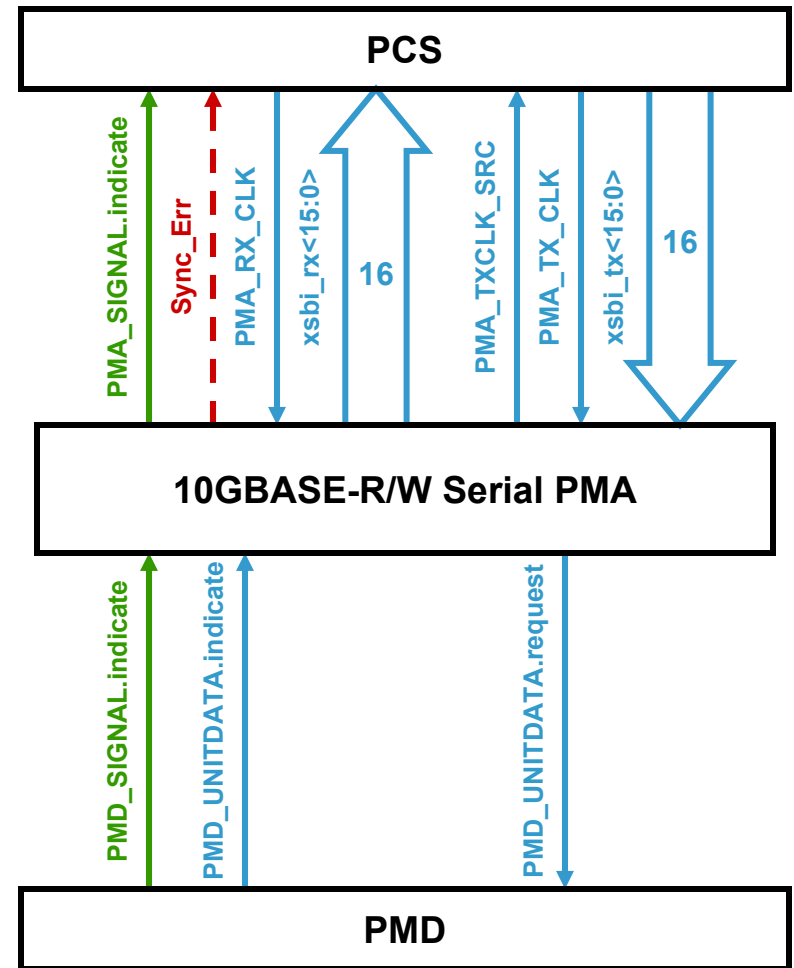
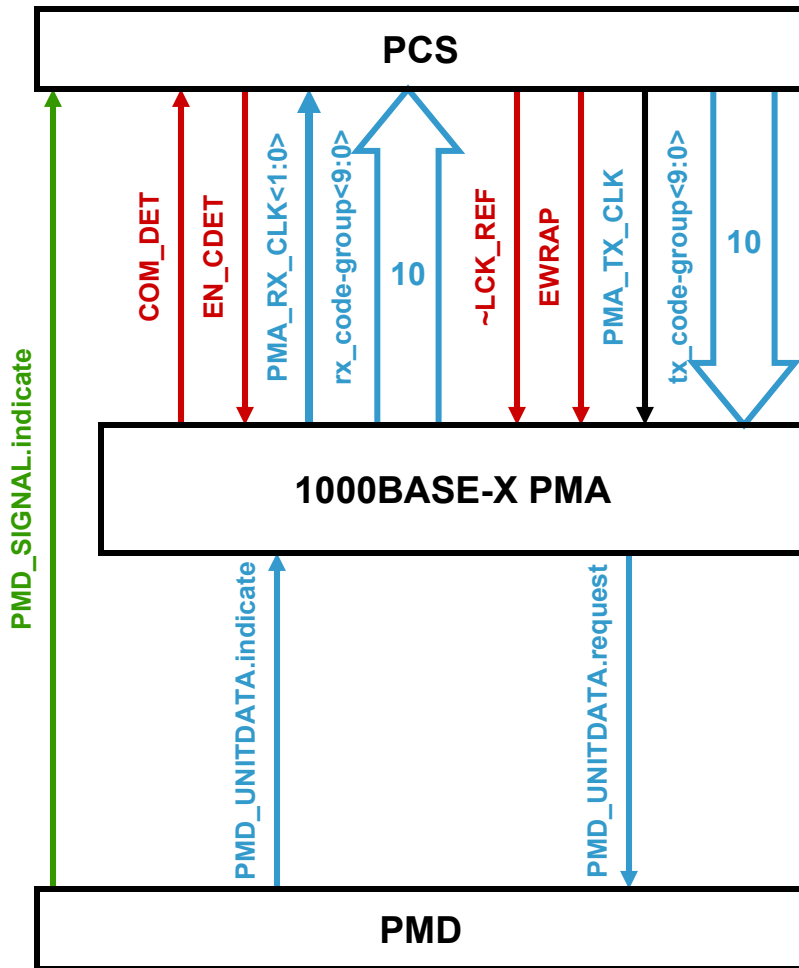




PHY Definition Possibilities

- Starting from the GMII/XGMII...
- Option #1: Define from the PCS down
 - Only necessary if we need to define a new PCS (a different block code, FEC)
- Option #2: Define from the PMA down
 - Leverage existing PCS
 - 1000BASE-X for 1 Gb/s and 10GBASE-R for 10 Gb/s
 - Build to PMA service interface
 - TBI for 1 Gb/s and XSBI for 10Gb/s
- Option #3: Define from the PMD down
 - Leverage existing PCS and PMA (including service interface).
 - Build to PMD service interface.

PMA/PMD Service Interfaces



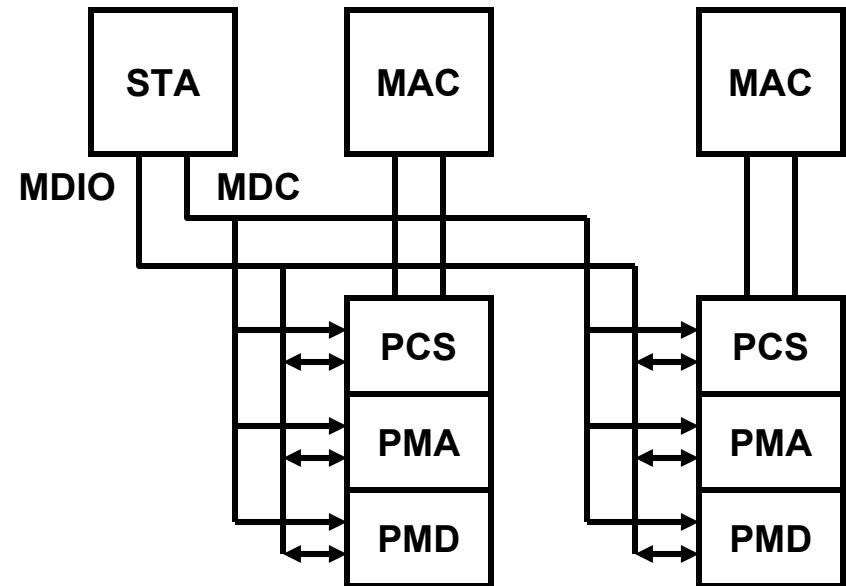


Observations

- PMA is simply the serializer/deserializer function.
 - Little difference between building from the PCS down and from the PMA down.
- PMD is typically responsible for pre-conditioning and/or equalization of the electrical waveform.
- PMD may also apply simple encodings.
 - For example, in 100BASE-TX, the TP-PMD scrambles data from the PMA and applies MLT-3 encoding.
- The PMD service interface presents a signal detect indication.
 - Signal detect functionality will need to be considered for the new 10 Gb/s serial PMD.

Management

- Two protocols:
 - Clause 22 for 1 Gb/s
 - Clause 45 for 10 Gb/s
- Current standard defines how both protocols can co-exist on the same bus.
 - Refer to Annex 45A and, in P802.3ah, Annex 22D
- The issue for P802.3ap is the identify MMDs, registers, and bits required to support the new PHYs.
- The also need to mapped to Clause 30 CMIP management arcs.





Considerations for Multi-Rate PHYs

- Management interface
 - Already established Clause 22 and Clause 45 can co-exist on the same bus; they can co-exist in the same device.
 - Clause 22 register set controls the auto-negotiation process (if implemented).
- GMII/XGMII
 - Logically, both interfaces are implemented and one is selected based on the speed negotiated (or provisioned).
 - In the case of MII/GMII, a recommended pin map was defined to promote interoperability between devices that elect to pin-share the interfaces. Valuable to do for the next speed step?
- Coordinate with IEEE P802.3an (10GBASE-T) on this topic.



Test Procedures

- “Support BER of 10^{-12} or better”
- Repeated indications that “or better” is the operative term.
 - Resistance to specifying lower BER related, for the most part, to test time.
- Some thoughts regarding how we might test devices with test time proportional to $1E-12$, but provide confidence that actual performance will be better.
 - For example, enforce margin through application of additional stress in “stressed receiver” test.
- Other issues, such as test patterns will need to be addressed.
- New test procedures require significant time to validate.
 - Should start thinking about this sooner than later.



Call to Action

- In addition to defining a backplane channel model, we must...
- Identify the set of sublayers we will need to define (or modify) to satisfy our objectives.
 - At 1 Gb/s, it should not be necessary to define more than a new PMD.
 - For serial 10Gb/s, at least a new PMD is necessary. Proposals need to take into account the entire PHY stack.
- Need to identify any new management objects, and support existing objects and service primitives.
 - Example: Signal detect
- Verification of compliance, i.e. test procedures, are a critical element of the specification.
 - Consider them sooner than later
 - Tied to choice of modulation format.