MAC & Scope Background for 802.3cg, Priority & PLCA

IEEE P802.3cg 10 Mb/s Single Pair Ethernet Task Force Ad Hoc

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PAR Scope

- Specify additions to and appropriate modifications of IEEE Std 802.3 to add 10 Mb/s Physical Layer (PHY) specifications and management parameters for operation, and associated optional provision of power, using a single balanced pair of conductors.

- Operative part: "Physical layer specifications and management parameters"

802.3cg CSDs with Regards to Scope

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Compatibility

Each proposed IEEE 802 LMSC standard should be in conformance with IEEE Std 802, IEEE 802.1AC, and IEEE 802.1Q. If any variances in conformance emerge, they shall be thoroughly disclosed and reviewed with IEEE 802.1 WG prior to submitting a PAR to the Sponsor.

    a) Will the proposed standard comply with IEEE Std 802, IEEE Std 802.1AC and IEEE Std 802.1Q?
    b) If the answer to a) is "no", supply the response from the IEEE 802.1 WG.
    c) Compatibility with IEEE Std 802.3
    d) Conformance with the IEEE Std 802.3 MAC
    e) Managed object definitions compatible with SNMP

As a PHY amendment to IEEE Std 802.3, the proposed project will remain in conformance with IEEE Std 802, IEEE Std 802.1AC, and IEEE Std 802.1Q.

As a PHY amendment to IEEE Std 802.3, the proposed project will use MII, and follow the existing format and structure of IEEE 802.3 protocol-independent specification of managed objects.

The proposed amendment will conform to the IEEE 802.3 MAC.

The project will include a protocol independent specification of managed objects. In addition, it is expected that the protocol-specific definition of managed objects will be added in a future amendment to an IEEE 802.3 Standard for Management.

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- *There is some discussion about whether this includes enhancements to the specifications either in 802.1 or 802.3*
  - *The CSDs may be refined by 802.3cg -> 802.3 -> 802*

802.3cg Objectives with regard to Scope

- MAC-related:
  - Preserve the IEEE 802.3/Ethernet frame format at the MAC client service interface.
  - Preserve minimum and maximum frame size of the current IEEE 802.3 standard.
  - Support a speed of 10 Mb/s at the MAC/PLS service interface.
- Function support: Auto-Negotiation, EEE, operation in automotive & industrial environments, fast startup, BER
- Do not preclude: EMC requirements, surviving automotive & industrial faults, working in Intrinsically Safe devices & systems
- Define:
  - 2 link segments, one mixing segment
  - 2 PHYs (one of which supports half-duplex multidrop on the mixing segment)
  - Optional power distribution for use in conjunction with 10 Mb/s Ethernet PHYs

- *NO MENTION OF PLCA, collision management, new MACs or TSN*
- *May be modified by 802.3cg with approval by 802.3*

The Base Standard: 802.3-2018 Definitions

- 1.4.321 Media Access Control (MAC): The data link sublayer that is responsible for transferring data to and from the Physical Layer.

- 1.4.425 Reconciliation Sublayer (RS): A mapping function that reconciles the signals at the Media Independent Interface (MII) to the Media Access Control (MAC)-Physical Signaling Sublayer (PLS) service definitions. (See IEEE Std 802.3, Clause 22.)

IEEE Std 802.1AC-2016 MAC Service Interface (Subcl. 7.2)

- 'Service interface primitives, parameters, and frames'
  - 'The primitives of the MAC Service comprise a data request and a corresponding data indication, each with <u>MAC destination address</u>, <u>MAC source address</u>, a <u>MAC Service Data Unit</u> (MSDU) comprising one or more octets of data, and <mark><u>priority parameters</u></mark>.'

- 802.3-2018 Subcl. 4.3.2 describes all of these as the MAC service interface except priority parameters

- 802.3 Clause 4.3.3 describes the physical layer services

Table 4–1—Physical Layer interface

Function	Procedures	Variables
ReceiveBit	TransmitBit Wait	collisionDetect carrierSense receiveDataValid transmitting

802.3-2018 Clause 4 MAC functions

Clause 4 (4.1.1 Overview):

Nevertheless, the partitioning of functions presented in this standard requires two main functions generally associated with a data link control procedure to be performed in the MAC sublayer. They are as follows:

a) Data encapsulation (transmit and receive)

1) Framing (frame boundary delimitation, frame synchronization)

2) Addressing (handling of source and destination addresses)

3) Error detection (detection of physical medium transmission errors)

b) Media Access Management

1) Medium allocation (collision avoidance)

2) Contention resolution (collision handling)

Note that some of the lower level functions are often also present as part of the physical layer – e.g., error detection & correction, but operating on the destination address and the data frame are generally reserved for the MAC

Thank You!

Reference model from 802

During discussion, the following figure was used to illustrate interfaces from 802 to 802.3
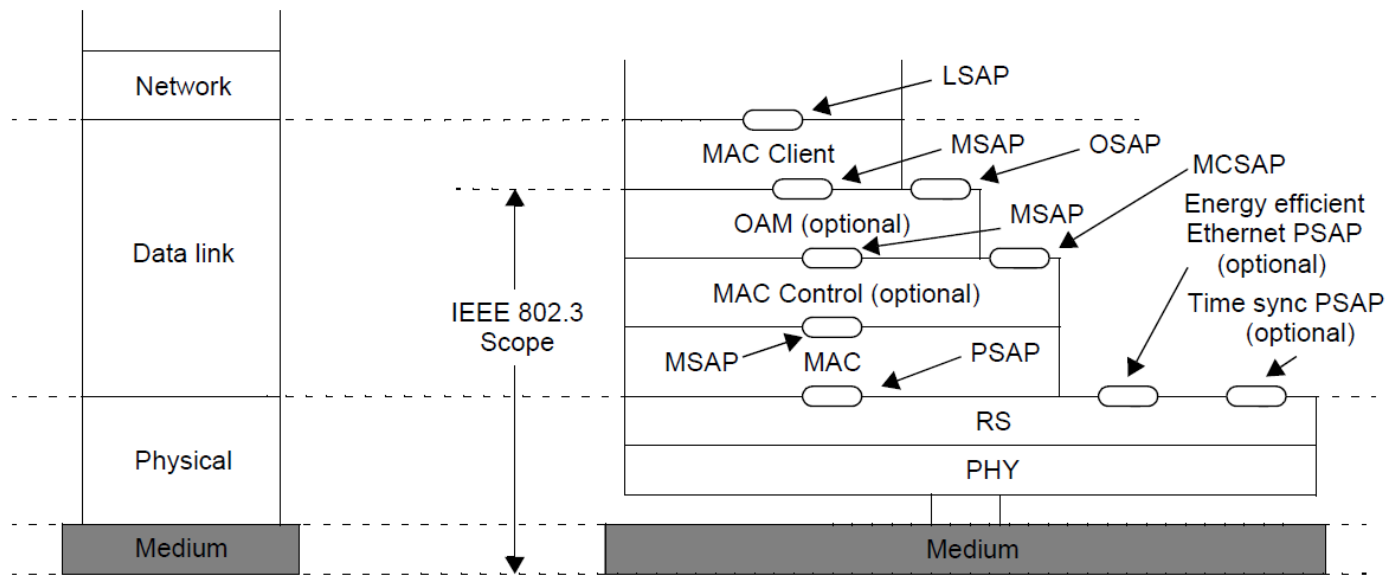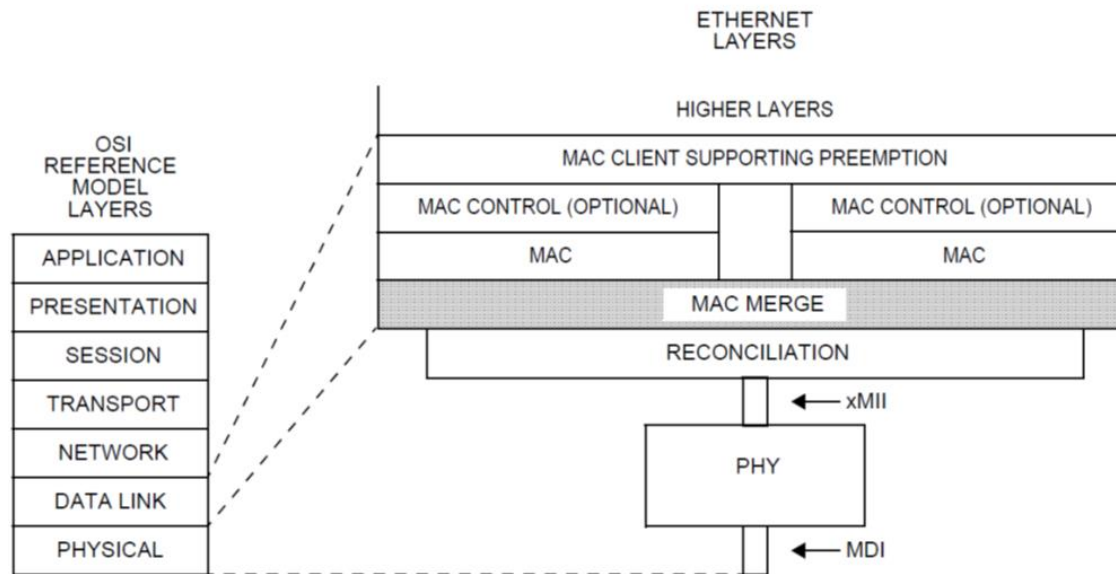

Figure B.2—The RM for IEEE 802.3 point-to-point stations

MAC Merge model from 802.3

During discussion, the following figure was used to discuss the MAC Merge Sublayer

Figure 99–1—Relationship of MAC Merge sublayer to the ISO/IEC Open Systems Interconnection (OSI) reference model and the IEEE 802.3 Ethernet model