

Architectural Considerations for Ethernet Fault Managed Power

GEORGE ZIMMERMAN, CME CONSULTING

10/30/2026

Introduction

Fitting FMP into the Ethernet Ecosystem

Layer Stacks and Reference Models

Potential Primitives and EFMP Client Management

Discussion

Fitting FMP into the Ethernet Ecosystem

PoE gives us a model for management & for architecture/reference

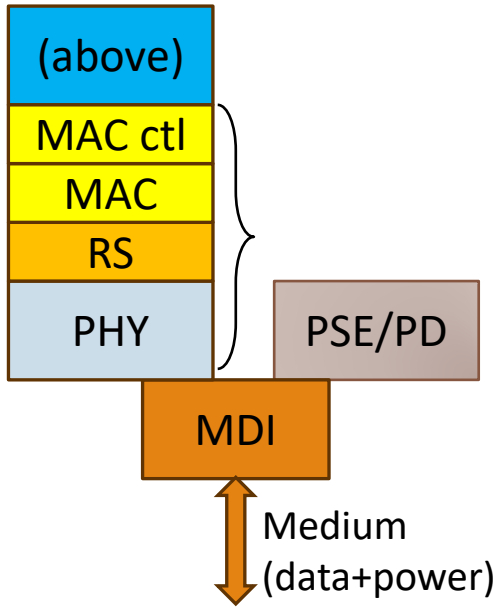
- PoE power entities (PSE/PD) are ‘aside’ the MAC/PHY
- PoE management is defined in Clause 30 (& YANG) MIBs
- PoE can use LLDP, but powering doesn’t impact Ethernet traffic
- PoE needs no intereraction with the data plane to function alongside Ethernet data

Fitting PoE into Ethernet can begin with the PoE architectural model…

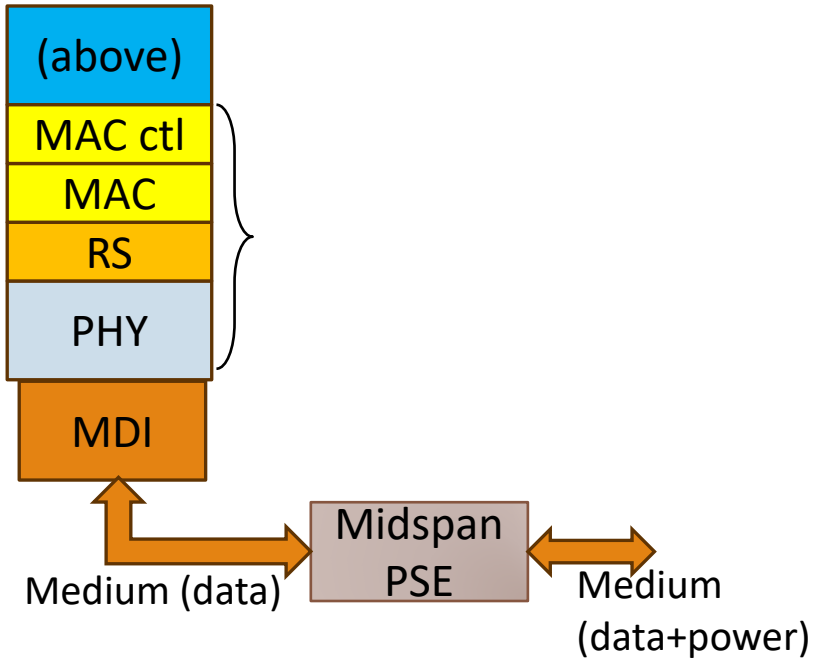
- BUT: Data shows FMP may not be as transparent to Ethernet signals as PoE
  - May benefit from interactions with the data plane at the MAC and/or the Physical Layer
  - Such interactions imply “non-MAC” clients, similar to TSSI or EEE

Layer Stacks for PoE

Endpoint PoE



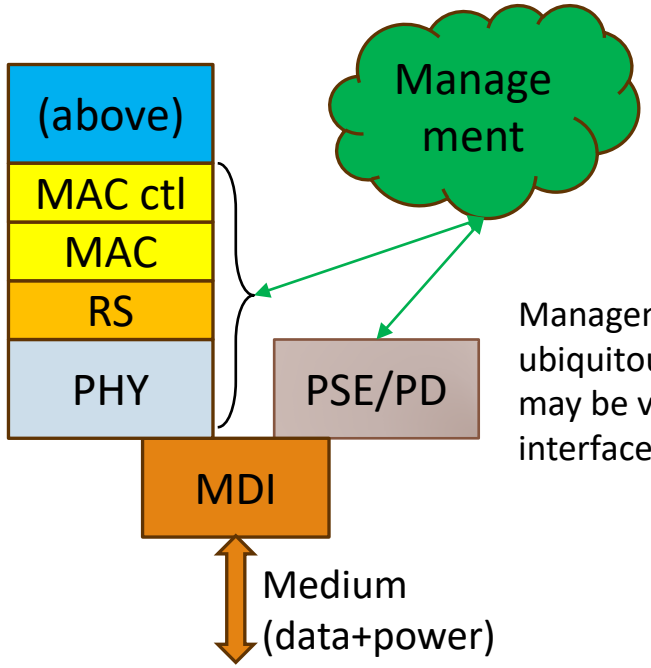
Midspan PoE



Power may be on same conductors (or not), but model facilitates both methods – and PoE does both!

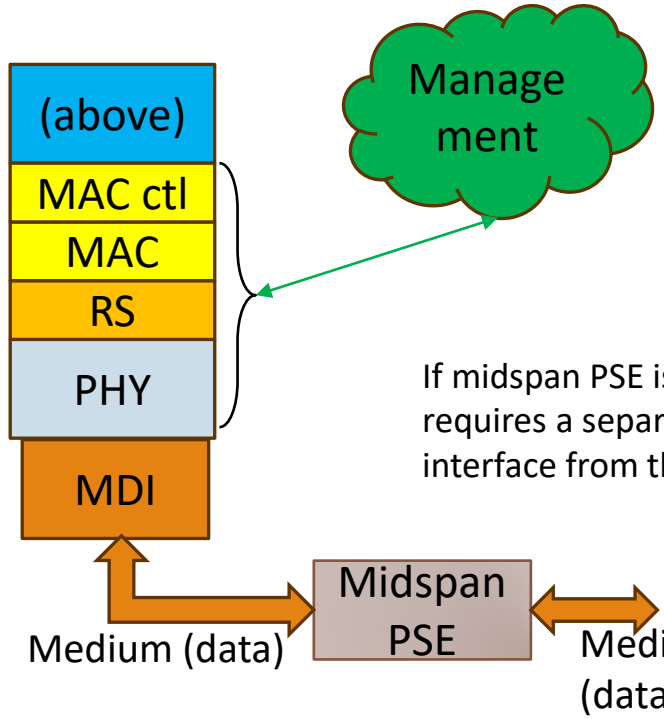
Layer Stacks & Management of PoE

Endpoint PoE



Management of PSE/PD is through ubiquitous management entity, but may be via the same network interface as the Ethernet port

Midspan PoE

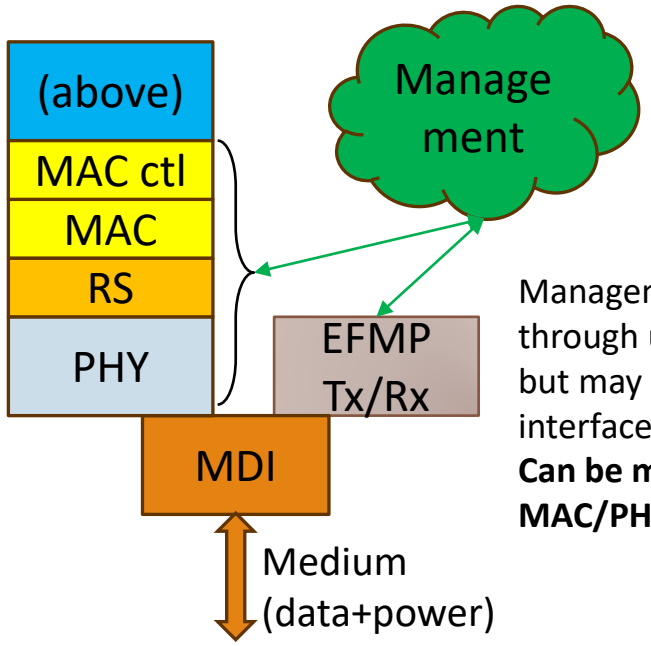


If midspan PSE is managed, it requires a separate Ethernet interface from the Ethernet port

Power may be on same conductors (or not), but model facilitates both methods – and PoE does both!

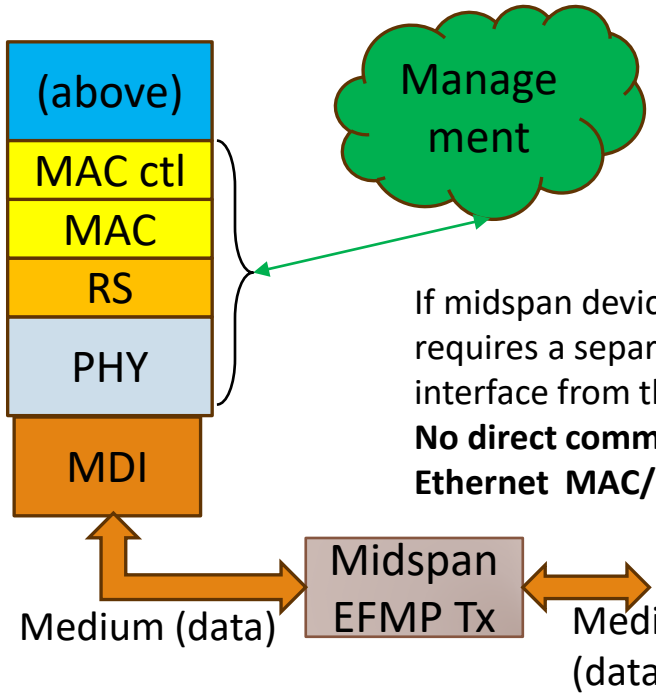
EFMP Layer Stacks & Management

Endpoint EFMP



Management of EFPM tx or rx is through ubiquitous management entity, but may be via the same network interface as the Ethernet port
Can be managed directly with Ethernet MAC/PHY & client (if present)

Midspan EFMP?



If midspan device is managed, it requires a separate Ethernet interface from the Ethernet port
No direct communication with Ethernet MAC/PHY

Power may be on same conductors (or not), but model facilitates both methods – that decision is independent of this!

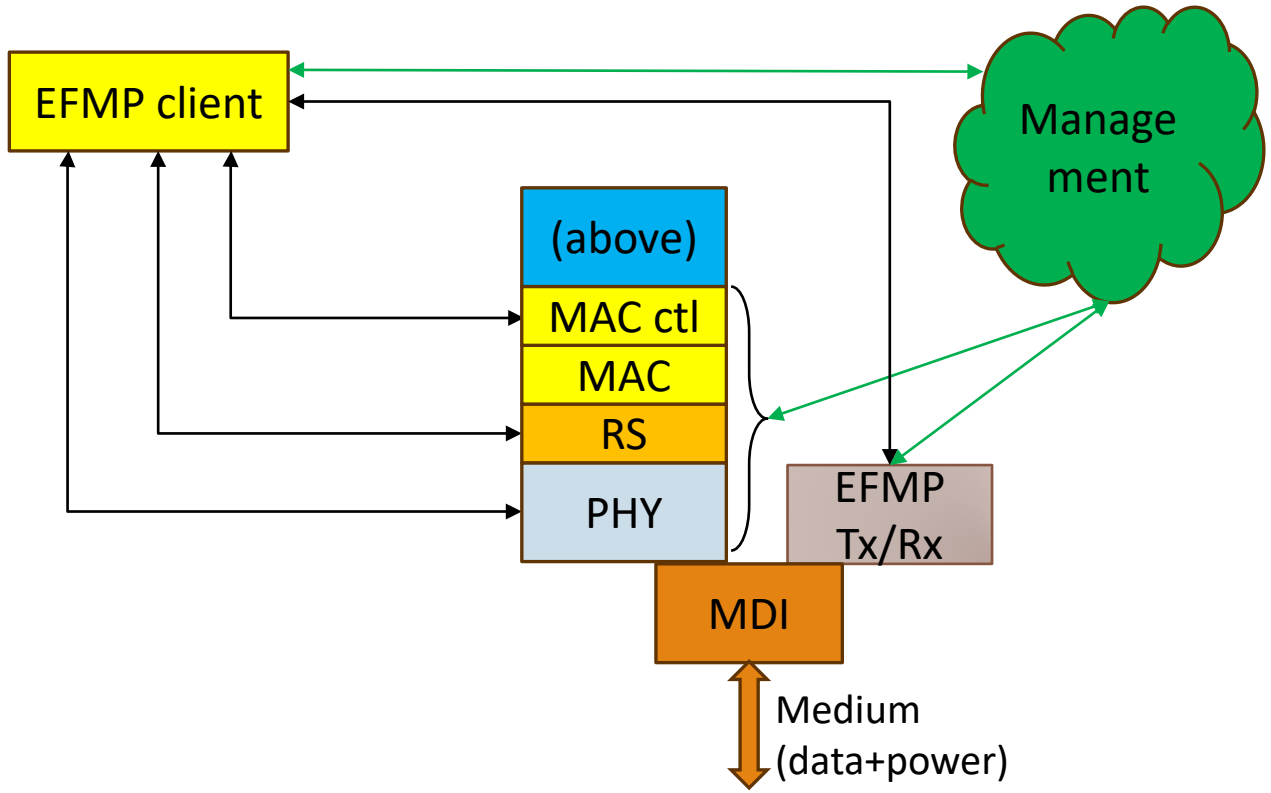
EFMP Interaction with the Data Plane

Client/Primitive Model: See, e.g., 802.3 clauses 78 (EEE) or 90 (timesync)

EFMP may utilize client to notify Ethernet sublayers of FMP activity

Example primitives

- Control MAC PAUSE
- Indications of FMP pulsing
- Flow control traffic at RS
- Sensed line activity from PHY



Potential Primitives & an EFMP client

Primitives would be processed by an EFMP client

- Similar to EEE, the internals of the EFMP client would not be specified
- Whether to send or take action based on any particular primitive signal would be FMP and PHY technology dependent

Potential primitive signals to consider:

- FMP disruption coming (from EFMP tx or rx)
- FMP disruption detected (from EFMP rx)
- Pause data requested (to MAC Control)
- Resume data requested (from MAC Control)
- Media temporarily unreliable (to PHY)
- Media interruption detected (from PHY)

Others? (Brainstorming planned during discussion)

Management

Decision to be made: do we mirror PoE Objects (30.9 one per port, 30.10 adds Midspan groups), or MPoE Objects (30.17, 802.3da and supports multidrop)?

- 30.10 (PoE) provides only management for PSEs, power & data ports are always linked to the same port
- Recommend we adapt 30.17 structure: Supports power without data on the pair, and manages PDs

Attributes/actions to mirror are substantially the same:

- Attributes for ID, Detection status (states of power up or fault), AdminState and action for AdminControl (enable/disable)

Additional attributes which we might specify for interoperability: Classification

Monitoring attributes:

- Management counters: faults (separating fault types detected?), power denied, invalid detections,…
- Power & energy delivered: Actual power, Power accuracy, Cumulative energy
- Do we want to add monitoring of any data events detected?

Discussion

Brainstorming

- What have I missed?
- Where have I gone too far?
- Thoughts on alternative structure?

CME Consulting
Experts in Advanced PHYsical Communications Technology

Thank you