Clarifying EPD and LPD with an HLPDE Protocol

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Abstract:
This document proposes a way forward to handle inconsistencies in the description of EtherType protocol discrimination (EPD) and LLC protocol discrimination (LPD) among IEEE Std 802-2014, IEEE Std 802.1AC-2016, and IEEE Std 802.1Q-2018. It is a followup to maint-Marks-epd-lpd-0719-v02. The proposal involves creating a specification of the higher layer protocol discrimination entity (HLPDE).

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2019-09-03
IEEE 802.1 Maintenance TG

with gratitude to Norm Finn for discussion and insights, though there hasn’t been time for Norm to review this proposal

Summary

- EtherType protocol discrimination (EPD) and LLC protocol discrimination (LPD) are discussed in IEEE Std 802, IEEE Std 802.1AC, and IEEE Std 802.1Q; IEEE Std 802.11 too.

- Overall, the descriptions are imprecise, inconsistent, and confusing.

- It's a problem for various reasons, particularly because new standards are supposed to support EPD, but we don't really know what that means.

- Issues were detailed in maint-Marks-epd-lpd-0719-v02.pdf

High-level Summary of maint-Marks-epd-lpd-0719-v02.pdf

- Per IEEE Std 802, Ethernet supports EPD and LPD methods.
- Per IEEE Std 802.1AC, an EPD medium supports EPD and LPD methods; an LPD medium only LPD (in each case, using only one of the frame formats described in IEEE Std 802).
- Per the IEEE Std 802.1Q definitions, Ethernet supports EPD using Type encapsulation; Length encapsulation is neither EPD nor LPD. Per other parts of 802.1Q, a “Length/Type medium” supports Type-encapsulated EPD and Length-encapsulated LPD, as well as a method using LPD+EPD.
- In IEEE Std 802.11, EPD encoding supports both EPD and LPD methods.
- For networks without EtherTypes at the MAC layer, the situation is a bit more difficult to summarize.

HLPDE in LLC

IEEE Std 802 Figure 6 shows the role of the HLPDE as an entity within the LLC sublayer.

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HLPDE in IEEE Std 802

In IEEE Std 802 (subclause 5.2.2), HLPDE is described generally, as part of the LLC, but not specified:

> *A quotation describing HPLDE, EPD, and LPD is Copyright IEEE and therefore redacted pending written permission.*

Proposal

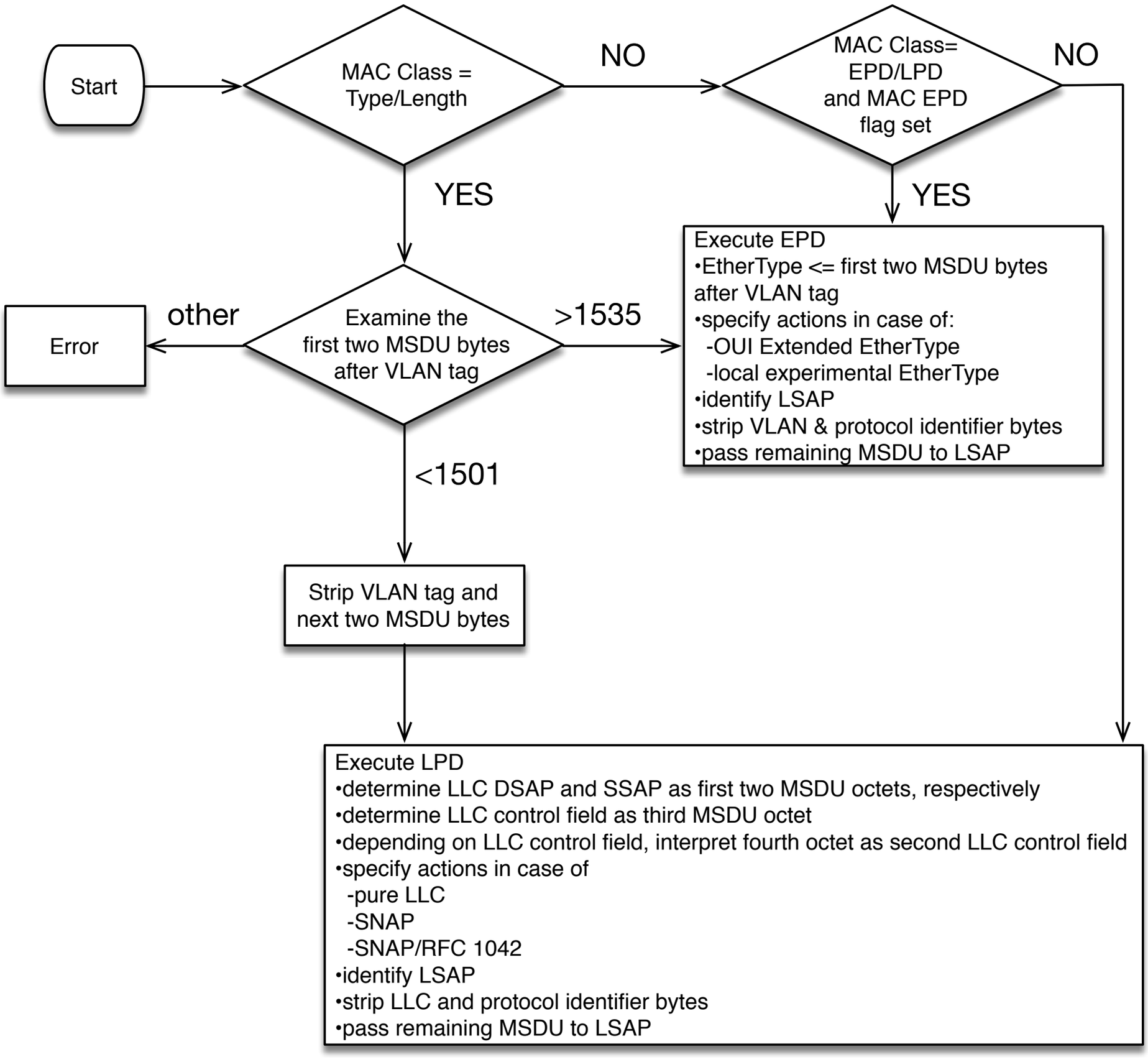
- Revise IEEE Std 802:
  - specify the higher layer protocol discrimination entity (HLPDE), which includes specifying the EPD and LPD functions
  - Specify class MAC classes
    - Type/Length Class: selects EPD or LPD depending on value of Type/Length field
    - EDP/LDP Class: selects EPD or LPD based on MAC EPD flag bits outside MSDU
    - LDP Class: supports only LPD in HLPDE
  - Specify all allowed MSDU formats
  - Specify the procedure to transform among frame formats (especially to “LPD Class”)
- Revise 802.1AC and 802.1Q to match IEEE Std 802 and fix bugs.

MSDU Formats

MSDU frame formats per IEEE Std 802:

Format	Type/Length Class	EPD/LPD Class	LPD Class
EtherType	yes	yes	no
Local Experimental EtherType	yes	yes	no
OUI Extended EtherType	yes	yes	no
OUI Extended EtherType in SNAP	Length-Encapsulated	yes	no
Pure LLC	Length-Encapsulated	yes	yes
SNAP/OUI	Length-Encapsulated	yes	yes
SNAP/RFC1042	Length-Encapsulated	yes	yes

Proposed HLPDE Protocol (overview)



Conclusion

- The standards are inconsistent.
- 802 is no longer reliant on the 802.2 LLC
- The *de facto* LLC is the HLPDE.
- The root of the problem is that the HLPDE is not specified.
- It should possible to specify the HLPDE for clarification, without altering current understanding of the expected operation.