Misinterpreting Vendor-Specific Bits in 802.3dm

Problem definition and possible OUI-based solutions

Alireza Razavi · Eliyan

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Problem and Goal

- Auto-Negotiation may be bypassed or not defined.
- Each side may not identify the vendor of the remote PHY.
- Vendor-specific bits may be interpreted differently by different vendors.
- This creates an interoperability risk.

- Use a 24-bit Organizationally Unique Identifier (OUI). OUI is used in auto-negg.
- OUI = 3 octets, matching the field need.
- Use OUI as a namespace for vendor-specific interpretation.
- Apply consistently to both HS_PATH and LS_PATH.

LS_PATH Solution — Use Reserved Octets 2/3/4

Changed fields are highlighted in green.

Before

9-bit SFD C/D+0x5A	Oct2 Reserved	Oct3 Reserved	Oct4 Reserved	Oct5 Msg	Oct6/7/8 PHY Cap

After

9-bit SFD C/D+0x5A	**Oct2** **OUI[7:0]**	**Oct3** **OUI[15:8]**	**Oct4** **OUI[23:16]**	Oct5 Msg	Oct6/7/8 PHY Cap

- Fully contiguous OUI.
- Uses reserved octets.

HS_PATH Option 1 — Oct2/3 + First VSD Octet

Changed fields are highlighted in green; remaining vendor-specific field is highlighted in light blue.

Before

1	2	3	4/5/6	7	8	9	10	11/12
0xBB	0xA7	0x00	PFC24	Msg	VSD[7:0]	VSD[15:8]	Ctrl	CRC16

After

1	2	3	4/5/6	7	8	9	10	11/12
0x5A/0xA5	**OUI[7:0]**	**OUI[15:8]**	PFC24	Msg	**OUI[23:16]**	VSD[15:8]	Ctrl	CRC16

- Preserves current PFC24 and Message field positions.
- Tradeoff: OUI is noncontiguous.

HS_PATH Option 2 — Contiguous OUI via Field Shift

Changed fields are highlighted in green; remaining vendor-specific field is highlighted in light blue.

Before

1	2	3	4/5/6	7	8	9	10	11/12
0xBB	0xA7	0x00	PFC24	Msg	VSD[7:0]	VSD[15:8]	Ctrl	CRC16

After

1	2	3	4	5/6/7	8	9	10	11/12
0x5A/0xA5	**OUI[7:0]**	**OUI[15:8]**	**OUI[23:16]**	PFC24	Msg	VSD[7:0]	Ctrl	CRC16

- Creates a contiguous 24-bit OUI.
- Tradeoff: PFC24 and Message fields shift by one octet; still fits in the 12-octet frame.

CRC16 Extension — 7 Octets to 9 Octets

Same polynomial; only the coverage window changes.

Polynomial unchanged: $(x + 1)(x^{15} + x + 1) = x^{16} + x^{15} + x^2 + 1$

Current CRC coverage: 7 octets

Proposed CRC coverage: 9 octets

- Single-bit, odd-bit, and burst ≤16-bit detection properties are preserved.
- Hardware impact is limited to starting the CRC window at Oct2 instead of Oct4.
- Spec change is primarily a window-definition update in §201.5.2.4.7.
- No new polynomial is required.

Summary & Proposed Direction

- Problem: vendor-specific bits may be misinterpreted when the link partner’s PHY vendor is unknown.
- Add a 24-bit OUI to both HS_PATH and LS_PATH info fields.
- LS_PATH: repurpose reserved Oct2/3/4 for a contiguous OUI.
- HS_PATH Option 1: use Oct2/3 plus first VSD octet; preserves current PFC24/Msg positions but OUI is non-contiguous.
- HS_PATH Option 2: shift PFC24/Msg by one octet; provides a contiguous OUI.
- Keep the CRC polynomial unchanged; update only the CRC coverage window.

same solution can be applied to 202