Blending PoDL and PoC in Clause 104 of IEEE 802.3dm Draft Specification

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Austin, USA - January 20, 2026

Motivation

- There are already six PSE/PD types, namely Type A, B, C, D, E, and F; defined for the BASE-T1 PHYs
- They are all for PoDL, which are meant for differential signaling PHYs
- Legacy PHY (IEEE 802.ch) PSE and PD Type compatibility with .3dm xGBASE-T1 PHYs?
- Power delivery over single-ended PHYs, which is Power-over-Coax (PoC) is something new to IEEE 802.3
- Can PoC specification be simply glued with existing PoDL Clause 104?
- The goal of this contribution is to have some discussion within a task force for Clause 104

PSE Definition in Clause 1.4.338

1.4.338 Power Sourcing Equipment (PSE): A DTE or midspan device that provides the power to a single link section. PSEs are defined for use with two different types of balanced twisted-pair PHYs. When used with 2 or 4 pair balanced twisted-pair (BASE-T) PHYs, (see IEEE Std 802.3, Clause 33), DTE powering is intended to provide a single 10BASE-T, 100BASE-TX, or 1000BASE-T device with a unified interface for both the data it requires and the power to process these data. When used with single balanced twisted-pair (BASE-T1) PHYs (see IEEE Std 802.3, Clause 104), DTE powering is intended to provide a single 100BASE-T1 or 1000BASE-T1 device with a unified interface for both the data it requires and the power to process these data. A PSE used with balanced single twisted-pair PHYs is also referred to as a PoDL PSE.

- Current definition of PSE/PD is for the balanced twisted-pair PHYs
- PHYs that operate on Coax is single-ended thus unbalanced
- Suggestion to add
- Change 1.4.338 by adding following line at the end …
  - A PSE used with single-ended PHYs is referred to as a PoC PSE.

Clause 30 for IEEE 802.3dm

- Are Type F PSE and Type F PD compatible with .3dm xGBASE-T1 PHYs?
- If yes, then add xGBASE-T1 PHYs in 104.1.3 PoDL system types
- If no, then we need to add new Type in Clause 30

PHYs Compatibility within .3dm

- Single-ended and differential PHYs are not compatible
- It's likely, one more PSE/PD type is needed for single ended (PoC)

- 30.15.2? PoC PSE managed object class
- Need for a new PoC PSE/PD types for IEEE 802.3dm
  - Type X
- Add Clause 30.15.2.1.4 aPoCPSEType
  - typeX Type X PoC PSE
- Add Clause 30.15.2.1.5 aPoCPSEDetectedPDType
  - typeX Type X PoC PD

Clause 45

- **Clause 45.2.9 Power Unit Registers**
- Table 45-340—PoDL/PoC Status 1 register bit definitions

- Clause 45.2.9.2.7 PSE Type (13.1.9:7) add text as …
  - When read as 110, a Type X PSE is indicated; when read as 111, a Type XX PSE is indicated.

Table 45–340—PoDL PSE Status 1 register bit definitions

Bit(s)	Name	Description	R/W[a]
…			
13.1.9:7	PSE Type	1 1 1 = Type XX PSE 1 1 x = Reserved Type X PSE 1 0 1 = Type F PSE ~~Reserved~~ 1 0 0 = Type E PSE 0 1 1 = Type D PSE 0 1 0 = Type C PSE 0 0 1 = Type B PSE 0 0 0 = Type A PSE	RO
…			

[a]RO = Read Only, LH = Latching High

Clause 45

Table 45–341—~~PoDL~~ PoDL/PoC PSE Status 2 register bit definitions

Bit(s)	Name	Description	R/W[a]
…			
13.2.2:0	PD Type	1 1 1 = Type XX PD 1 1 0 = Type X PD 1 1 1 = Type XX 1 1 0 = Reserved 1 0 1 = Type F PD~~Reserved~~ 1 0 0 = Type E PD 0 1 1 = Type D PD 0 1 0 = Type C PD 0 0 1 = Type B PD 0 0 0 = Type A PD	RO

[a]RO = Read Only, LH = Latching High

- 45.2.9.3 PoDL/PoC Status 2 register (Register 13.2)
- Clause 45.2.9.3.2 PD Type (13.2.2:0) add text as …
  - When read as 110, a Type X PD is indicated; when read as 111, a Type XX PD is indicated.

Clause 104

- 104.1.3 PoDL/PoC system types
  - A Type x PSE and Type x PD are compatible with BASE-T1 PHYs
  - A Type xx PSE and Type xx PD are compatible with BASE-V1 PHYs

- 104.4.1 PSE types
  - Add PSEs types …

- 104.4.6 PSE output requirements
  - Take IEEE 802.3ch Table 104-4– PSE output requirements as a baseline

Clause 104

- xGBASE-T1 PHY PoDL ripple voltage measurement can be adopted from .3ch
- xGBASE-V1 PHY PoC ripple voltage measurement can be also adopted from .3ch considering single-ended with 50Ω impedance
- Same goes for 104.5.6 PD Power …

Table 104–4—PSE output requirements

Item	Parameter	Symbol	Unit	Min	Max	Class	Type	Additional information
…								
3	Output slew rate dV/dt		V/ms	—	22	All	A, C	See 104.4.6.3
				—	2	All	E	See 104.4.6.3
				—	40	All	A, C, E	During inrush only
				—	200	All	B, F	See 104.4.6.3
…								
4a	1 kHz < *f* < 10 MHz		V_{p-p}	—	0.1	All	~~All~~ A, B, C, D, E	See 104.4.6.3
					0.066		F	
4b	1 kHz < *f* < 10 MHz			—	0.01	All	~~All~~ A, B, C, D, E	
					0.0066		F	
…								

Summary

- For IEEE 802.3dm BASE-T1 PHYs, Clause 104 can be adopted from IEEE 802.3ch with some adjustment if needed
- Power-over-Coax (PoC) and its landing in the draft seems feasible in Clause 104 with some change in Clause 1.4.338
- Single-ended and differential PHYs are not compatible thus needs for a new PSE/PD Type XX with a new Clause 30.15.2?
- Ripple noise and measurement parameters can be also borrowed from IEEE 802.3ch for PoC but considering the single-ended system

References

- [1] Power-over-Coax Related High Pass Filter Parameters for IEEE 802.3dm, Sujan Pandey, Sept. 2025.
- [2] Data Terminal Equipment (DTE) Power via Media Dependent Interface (MDI), IEEE Standard for Ethernet Section Two.
- [3] Power-over-Coax Injected Noise Limit for IEEE 802.3dm PHY, Sujan Pandey, Nov. 2025.
- [4] Combined PSE and PD Injected PoC Noise Limit for IEEE 802.3dm, Sujan Pandey, Jan. 2026.

Thank You!