FMP + Ethernet

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What does interop mean?

- First, that FMP power transmission does not negatively impact Ethernet and vice versa
- Second, any transmitter (TX) can power any receiver (RX)
- Third, all new interoperable combinations SHALL pass safety specifications, e.g., UL 1400-1
- A noble four is: any UL 1400-2 cable also passes 1400-1 with any combo of TX and RX

How to accomplish Ethernet + FMP interop?

- I think it's too early to answer that question
- Initially we need to figure out FMP interop and then analyze if any of the FMP interop requirements negatively impacts Ethernet
- As stated in the CFI consensus building slides, there are at least four options to allow Ethernet and FMP to coexist:
  - Existing PHYs without modification
  - Existing PHYs with interference avoidance (RS)
  - Existing PHYs with modification
  - New PHY derived from existing PHY

How to accomplish FMP interop?

- The simplest option is to pick one TX implementation and force that on all systems
  - This is the most restrictive
  - Stifles innovation
  - Competition simply based on manufacturing execution
- There are at least 4 vendor solutions in the market
  - Unclear if any of the multi-vendor combinations “work”
  - Doubtful that any testing has been done
  - At least one claims that its solution doesn’t “pulse” and this will be challenging to interoperate with the other solutions

Proposal for FMP interop

- Define the RX behavior in 802.3 and allow the TX vendors to decide how to adapt their system to ALSO allow the 802.3 FMP RX to work with their TX
- This allows system vendors to have their proprietary method AND the 802.3 interoperable method
- 802.3 would specify minimal TX requirements

Goals for TX requirements

- Continue the IEEE 802.3 tradition of “cold power”: TX output voltage is less than 30 V if no RX is present
  - This implies we specify a detection scheme
- TX voltage < 450 V under all circumstances
- TX does not violate current-duration curve in UL 1400-1 for any fault (i.e. complaint to UL 1400-1)
- Data: need channel requirements
- Coupling network
- Specification for noise fed onto the cable in the PHY bands of interest

Goals for RX requirements

- Define behavior for detection and startup
  - PoE like limits for input capacitance and inrush
- Define behavior to accommodate a safety interval
  - Could be dependent on voltage (i.e. lower voltage = longer interval)
- Spec for noise backfed from RX onto cable (borrow from 145, 104, 189?)
- Coupling network (should be same as TX)

- Systems that don’t require a safety interval – any thoughts on how to accommodate?

Other considerations

- Power management and policing: Do we define a classification scheme?
  - Why? To confirm that the TX has the power required by the RX, and the RX stays within the negotiated limits
- Do we tackle “FMPoE” (4-pair PoE like FMP)
  - 300 V limit of cable is problematic, requires external cert and reg effort
- Include multi-drop?
- Embedded versus external RX
  - Known load versus unknown load

- Anything else?

Possible Objective Outlines

- What statements made in this presentation can be adapted to objectives?
  - FMP power transmission does not negatively impact Ethernet and vice versa
  - Any transmitter (TX) can power any receiver (RX)
  - All new interoperable combinations SHALL pass safety specifications, e.g., UL 1400-1
  - Any UL 1400-2 cable also passes 1400-1 with any combo of TX and RX
  - Define the RX behavior in 802.3 and allow the TX vendors to decide how to adapt their system to ALSO allow the 802.3 FMP RX to work with their TX
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Possible PHY Objectives

- As stated in the CFI consensus building slides, there are at least four options to allow Ethernet and FMP to coexist:
  - Existing PHYs without modification
  - Existing PHYs with interference avoidance (RS)
  - Existing PHYs with modification
  - New PHY derived from existing PHY
- Personally, I would not want to develop a new PHY for EFMP
  - The market is moving and can’t wait for a new PHY for interop requirements
- Objective to only do one of the first three bullets?

THANK YOU