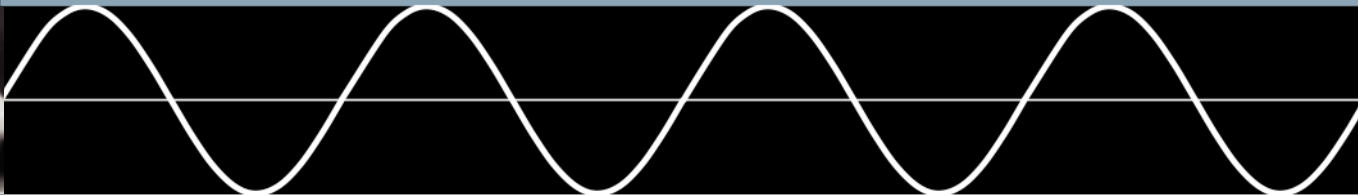# PD Architecture Proposal

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Indian Wells, CA January 2014

Nomenclature

- Defining nomenclature at this stage avoids confusion when competing proposals are discussed

- Proposed nomenclature may or may not be used in final draft of standard

N-by-N

- N_i denotes the number of PSE and PD power channels as (N_{PSE} – by - N_{PD}), e.g.:
  - **1-by-1** denotes a single power channel PSE connected to a single power channel PD (like LTC LTPoE++ or legacy AT/AF)
  - **2-by-2** denotes a two power channel PSE connected to 2 power channel PD (like Cisco UPoE)
  - **2-by-1** denotes a two power channel PSE connected to a single power channel PD (like a UPoE PSE connected to a legacy AT/AF PD)
- N denotes number of power channels present, not number of power channels actually operating
  - A 2-by-1 system might have only one PSE power channel operating in some cases

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If All 4 Pairs Don't Go to the Same Place…

- 1000Base-T and up don't work
  - 1000Base-T is the most commonly installed edge-router speed

- Improved-efficiency AT doesn't work
  - 1st argument in CFI and PAR

- Classification and power delivery are more complicated
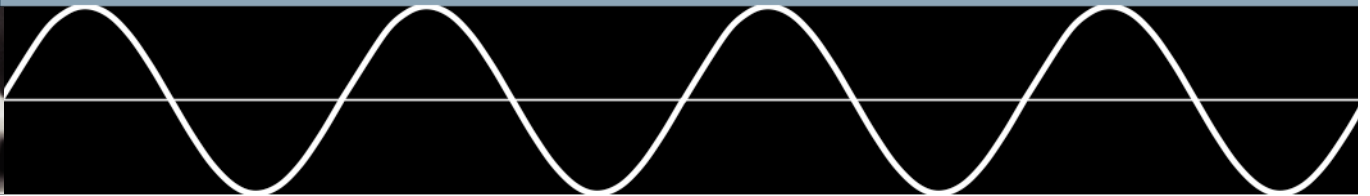 - May have AF on one pairset and BT on the other

Y-Cables are Becoming Rarer

- Many structured wiring plants and virtually all patch cords are 4-pair clean

- 2-pair wiring plants and Y-cables break modern data schemes

  - Can't be used above 100Base-TX

- Nearly all corner cases interoperate to some degree

- Even the worst corner cases fail benignly

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Straw Poll

- Channels that are not 4-pair clean shall be out-of-scope for Type 3/4 802.3bt systems
    - Y: (withdrawn)
    - N:
    - A:

    - Possible edits:
        - Channels (not including channels with midspans)…
        - Link segments used in BT shall be 4-pair clean
        - Link segments that allow unconnected MDI connections to be powered are out of scope
        - Y-cables (not split cables) are out of scope

So: N-by-1 or N-by-2 PDs?

P802.3bt Founding Documents

- ## P802.3bt PAR 5.5:

    "Since the publication of IEEE Std 802.3at-2009, significant market demand has emerged for more efficient power delivery and for applications with power levels greater than those defined in the standard."

- ## P802.3bt Distinct Identity Criterion 3b:

    "One unique solution per problem (not two solutions to a problem)."

- ## P802.3bt Objective 10:

    "4PPoE PSEs will be backwards compatible with IEEE 802.3-2012 PDs."

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This leads us to…

- Must support AT PDs with all 4 pairs powered
    - N-by-1 PDs must be fully supported
    - PAR uses 4P efficiency as 1st argument
- The N-by-1 architecture also works well at higher power levels
    - Used by multiple proprietary schemes today
- One unique solution per problem is mandated unless there is a compelling technical reason for a second option

Straw Poll

- One valid 802.3bt PD architecture shall be the same N-by-1 architecture as 802.3at PDs
  - Y:
  - N:
  - A: