IEEE802.3 4P Study Group

PD Behavior in Undefined 20.5V~30V Area

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Goal of this Presentation

- Describe the behavior of Type1 and Type2 PD in undefined area
- Address the concerns
  - 2-Level Classification (Kanata, September 2014)

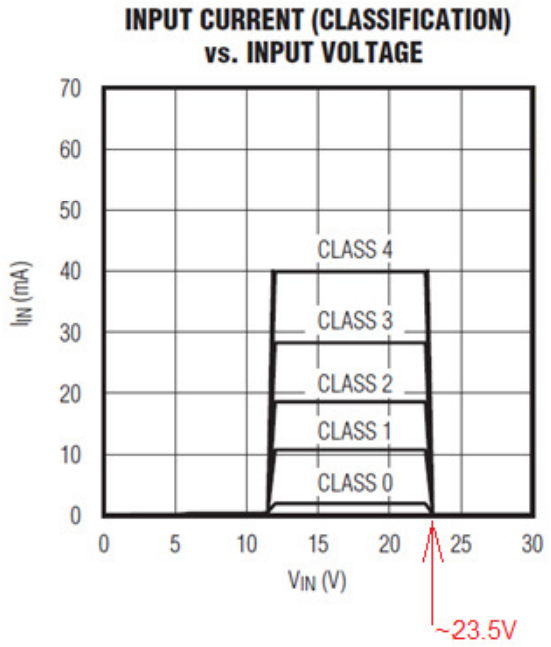
Main Concerns/Issues

- "Known Issue" of Classification
  - > PD shall NOT respond with different current provided with the same classification voltage
    - 4P PoE systems use cases and proposed requirements, Yair Darshan, Jan 2014
    - Class 5, 3-Event Classification, Gaoling Zou, Mar 2014
    - Classification Current Width Modulation, Gaoling Zou, May 2014
    - Classification Current Width Modulation, Gaoling Zou, Jul 2014
    - IEEE P802.3bt Mutual Identification, David Abramson, Sep 2014
    - Classification Using Hysteresis, David Dwelley, Sep 2014

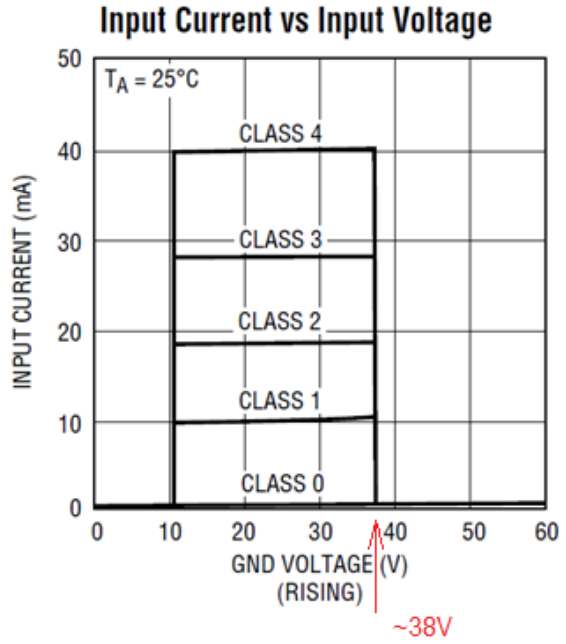
- Voltage from 20.5V up to the PD UVLO turn ON, is undefined area in 3af/3at Standard.
  - > Second Level Classification voltage is in this area and may have backward compatible issue
    - 2-Level Classification, Gaoling Zou, Sep 2014

Type1/Type2 PD Behaviors

Case1



Case2



The PD responds with either no/low (couple of mA) current or class current when operated in the undefined region.

Things to Clarify in 2nd Level Classification

- When detecting Class0-3 in the 1st finger, Type3 PSE will power up the Type1 PD by skipping the 2nd and 3rd finger. Type1 PD can be detected;
- If it is Class4 (case2 in undefined area) in the 3rd finger, the type3 PSE will stop the classification once it detects 40mA current. Then Type3 PSE limits the power within 30W;
- Or if it is Class4 (case1 in undefined area) in the 3rd finger, the type3 PSE will stop the classification once it detects very low current (<5mA). Then Type3 PSE limits the power within 30W;
- No issue w/ Type1/2 PD in the undefined area.

Discussions on the New Proposed Multi-Event

- Long 1st class event timing (85~100ms)
  - > Power loss on Type 2 PD
- Signature of Type3/4 for new MPS
  - > New “Type1” PD w/ Power <13W but need to receive 4P
  - > Detected by the Voltage/current through the 2nd Rclass?
- Can 2nd Level Classification help?

Annex-
Factors to Select 2nd Level Classification Voltage

PSE Side

- The lower limit of 26.5V
  - > Classification Disable Threshold * at PD controller side
  - > 2xVF of the input diode bridge.
- The upper limit of 29.5V
  - > PD power supply turn off voltage Voff (30V in 3at standard)

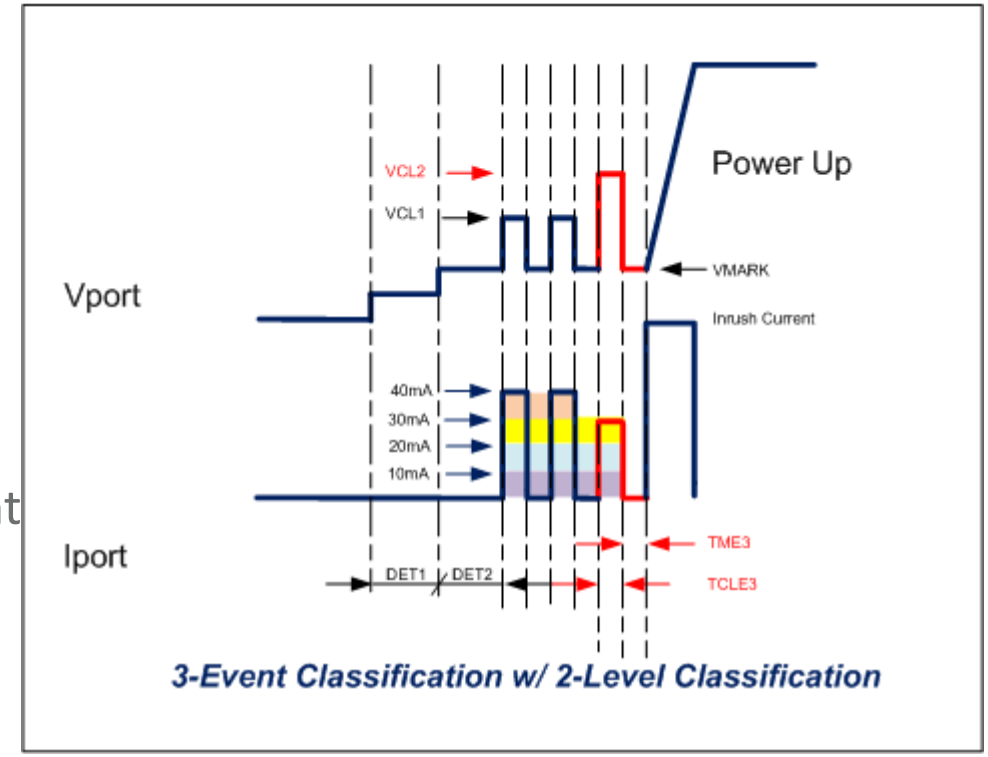
PD Side

- The lower limit of 25.5V
  - > The min of PSE VCLE
  - > 2xVF at the input diode bridge
- The upper limit of 29.5V
  - > The max of PSE VCLE
  - > Very minimum of VF at active bridge

*The Classification current will be turned OFF when PD input voltage is greater than the threshold (refer to the picture in CASE1 at page4).

3-Event w/ 2-Level Classification

- Type3 PD needs to provide 40mA in first 2-Event classification as 3at.
- Type3 PSE probes 2nd Level Classification Voltage between 26.5~29.5V
- Type3 PSE uses the same Classification Event Timing and Mark Event Timing as in 2-Event



3-Event Classification w/ 2-Level Classification

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Type1 Class Table

Type1 Class	Iclass1(mA) @VClass=18V	Power (W)
0	0	15.4
1	10	4
1	10	4
2	20	7
2	20	7
3	30	15.4
3	30	15.4

1. Type3 PSE will consider the PD as a legacy PD when it responds with the same current in the first two fingers (covering both 12.5V~20.5V and 26.5V~29.5V)

2. Type3 PSE will perform 3at 2-Event classification once it detects 40mA in the 1st finger.

Type2 Class Table

Type2 Class	Iclass1(mA) @VClass=18V	Iclass2(mA) @VClass=18V	Iclass2(mA) @VClass=28V	Power (W)
4	40	40	40	30
4	40	40	0	30

Type3/Class5 Table (TBD)

Class5 Granularity	Iclass1(mA) @VClass=18V	Iclass2(mA) @VClass=18V	Iclass3(mA) @VClass=28V	Power (W)
1	40	40	10	45
2	40	40	20	60
3	40	40	30	AUTO