



IEEE802.3 4P Study Group

Classification Current Width Modulation

A New Classification Approach for 3bt PoE

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Goal of this Presentation

- Continue on the topic of 3-Event/Class5 classification and address the concerns on the slides in Beijing
- Propose the Classification Current Width Modulation (CCWM) method for the classification event as Mutual IDs of PSE and PD.

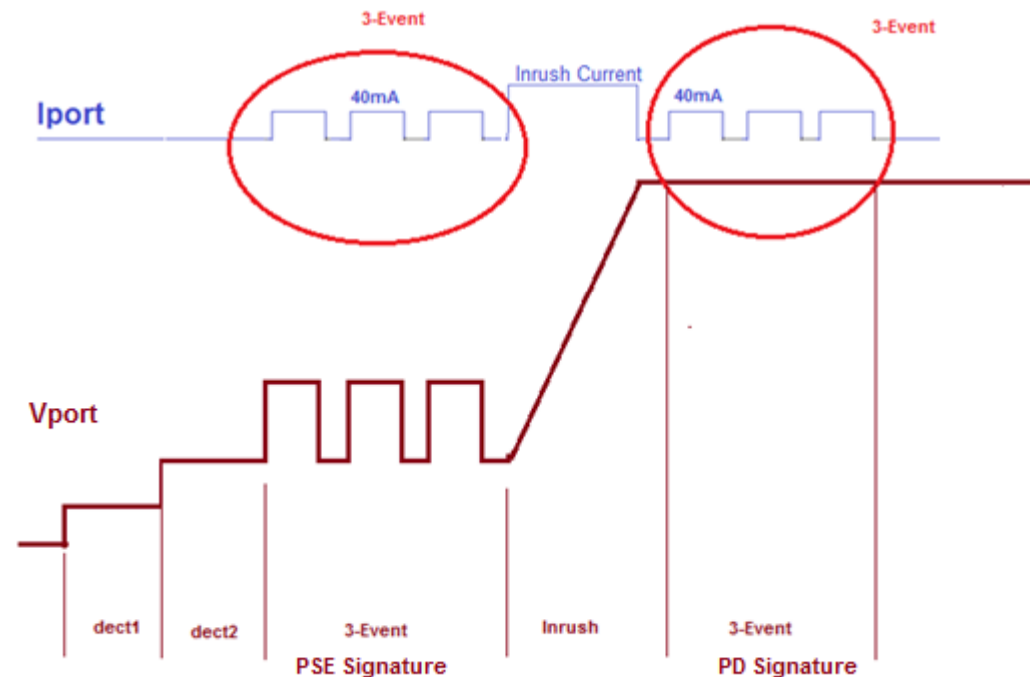
Glossaries

- Type3: Output power between 30W~60W at PSE;
- Type4: Output power between 60W~TBDW at PSE;
- Class5: 40mA classification current with 3-Event;
- Class6 :40mA classification current with 4-Event.

Previous Proposal in Beijing Plenary

3-Event Physical Layer classification

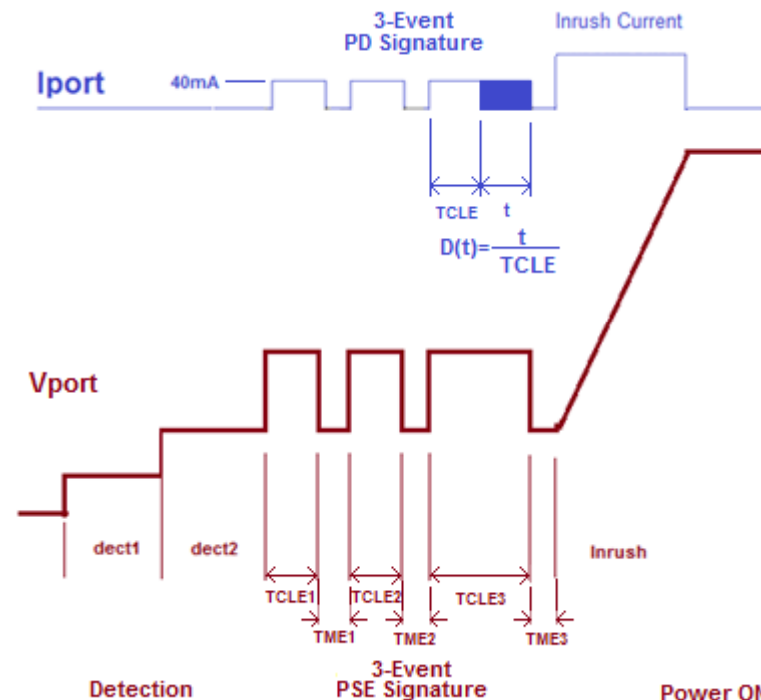
- $I_{Class}=40mA$
- Same Class/Mark Event Voltage
- Same IMark Limit
- Same Class/Mark Event timer
- One more Class/Mark Event than 2-Event Classification
- 3-Event is provided by a Type3 PSE when detecting 40mA Classification current
- 3-Event is repeated to provide Type3 PD signature after PD is fully ON



New Approach-CCWM

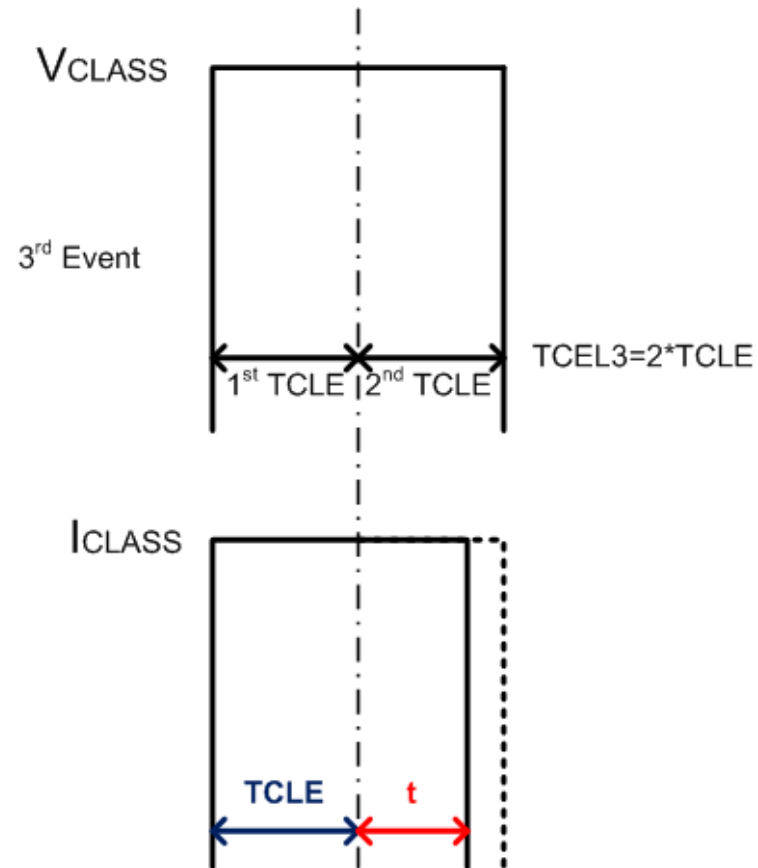
- After successful detection, Type3 PSE checks if Classification Current is 40mA;
 - If YES, Initiates 3-Event;
 - If NO, probes 1-Event;
- The first-two-Event is the same as 3at;
- The 3rd Mark Event Timing TME3 is the same as TME1/TME2;
- The 3rd Class Event Timing TCLE3
 - $TCLE3 = 2 \times TCLE^* \rightarrow 60W$ (PSE);
- PSE Checks the Classification Current Width Ratio (CCWR) of the 3rd Event

*TCLE=TCLE1=TCLE2



PD Classification Current Width Ratio (CCWR)

- In the 3rd Event, the Type3 PD responds to PSE with D(t);
 - > $D(t) = t/TCLE$
Here, t is the time when the PD provides classification current in the 2nd TCLE of TCLE3.
 - > t is based on how PD is configured.
- The D(t) specifies/supports the followings of PD
 - > Max Input Power
 - > Green MPS
 - > Auto Power Class



Type3 Classifications (TBR)

| D(%)@PD | PD Type | Class | Power (W) |
|---------|---------|----------|-----------|
| 96~100 | 2 | 4 | 30 |
| 91~95 | 2 or 3 | 4 or 51 | |
| 86~90 | 3 | 51 | 37.5 |
| 81~85 | 3 | 51 or 52 | |
| 76~80 | 3 | 52 | 45 |
| 71~75 | 3 | 52 or 53 | |
| 66~70 | 3 | 53 | 52.5 |
| 61~65 | 3 | 53 or 54 | |
| 56~60 | 3 | 54 | 60 |
| 51~55 | 3 or 4 | 54 or 61 | AUTO |
| 46~50 | 4 | 61 | 67.5 |
| 41~45 | 4 | 61 or 62 | |
| 36~40 | 4 | 62 | 75 |
| 31~35 | 4 | 62 or 63 | |
| 26~30 | 4 | 63 | 82.5 |
| 21~25 | 4 | 63 or 64 | |
| 16~20 | 4 | 64 | 90 |
| 11~15 | 4 | 64 or 65 | |
| 6~10 | 4 | 65 | 97.5 |
| 0~5 | 4 | 66 | AUTO |

 Type3

 Reserved for Type4

Benefits

- Provide Type3 Signature for both PSE and PD
- Backwards compatible with Type1 and Type2 PoE
- Reliable on CCWR Check
- Capable of providing more options for Mutual-Identification
- Easily to be extended to Type4 PD with $D(t)$ between 0~50%

Classification Table

| Measured I_{Class} | Classification (Type2) | Classification (Type3) | Classification (Type4) |
|-------------------------|---------------------------|---------------------------------|---------------------------------|
| 0 mA to 5.00 mA | Class 0 | Class 0 | Class 0 |
| > 5.00 mA and < 8.00 mA | May be Class 0 or 1 | May be Class 0 or 1 | May be Class 0 or 1 |
| 8.00 mA to 13.0 mA | Class 1 | Class 1 | Class 1 |
| > 13.0 mA and < 16.0 mA | Either Class 1 or 2 | Either Class 1 or 2 | Either Class 1 or 2 |
| 16.0 mA to 21.0 mA | Class 2 | Class 2 | Class 2 |
| > 21.0 mA and < 25.0 mA | Either Class 2 or 3 | Either Class 2 or 3 | Either Class 2 or 3 |
| 25.0 mA to 31.0 mA | Class 3 | Class 3 | Class 3 |
| > 31.0 mA and < 35.0 mA | Either Class 3 or 4 | Either Class 3 or 4 | Either Class 3 or 4 |
| 35.0 mA to 45.0 mA | Class 4 | Class 5 | Class 6 |
| > 45.0 mA and < 51.0 mA | Either Class 4 or invalid | Either Class 4 or invalid class | Either Class 4 or invalid class |

NOTE—A Type 1 PSE may ignore I_{Class} and report Class 0.