

Mutual ID Baseline Text: An Overview

David Abramson, Texas Instruments

IEEE 802.3bt Task Force

November 2014

Mutual ID: Where we are

- After multiple Mutual ID proposals, including 3 at the last meeting, a straw-poll showed strong support for my presentation (abramson_01_0914.pdf).
- I have taken my proposal and edited the appropriate sections of Clause 33 in order to create baseline text.
 - Please see abramson_02_0914.pdf for the PSE related text.
 - Please see abramson_03_0914.pdf for the PD related text.
- This presentation will not cover every change contained in the documents listed above.
 - The documents show my best effort to put my proposal into baseline text in the most straightforward way.
 - I have documented the things not yet addressed, major changes from the current standard, and some of the challenges I faced when writing the text.

A Quick Review of the Proposal (1)

- In order for PDs operating above .3at power levels ($>25.5\text{W}$) to be powered up by Type 1 and Type 2 PSEs, they must present class 4 for the first two class events.
 - They will be powered at the maximum power level the PSE is capable of.
- Thus, Type 3 and Type 4 PDs will request their required power level on the 3rd event. The existing class levels will be used to do this and the same class used for the 3rd event will be repeated during any additional events.
 - This allows the PD implementation to use only 2 class resistors.
- Since Type 3 will encompass multiple class levels, a additional class event will be needed to confirm the PSE can supply the power requested by the PD.
 - Example: The PSE has 50W left in its power budget.
 - If a PD requests 60W on the 3rd event, the PSE powers on after the 3rd event indicating that it does not have the power available and that it will provide 30W.
 - If a PD requests 45W on the 3rd event, the PSE provides a 4th event before powering on as a confirmation that it will supply the requested power.

A Quick Review of the Proposal (2)

PD Type	Class	Power Sourced*	Event 1 (Class)	Event 2 (Class)	Event 3 (Class)	Event 4 (Class)	Event 5 (Class)
Power Level Indicated by Event			2/4-Pair 15W	2/4-Pair 30W	4-Pair 30W	4-Pair Up to 60W	4-Pair 90W
1	0-3	< 15W	0-3	0-3	0-3	0-3	0-3
2	4	30W	4	4	4	4	4
3	5	45W	4	4	1	1	1
3	6	60W	4	4	2	2	2
4	7	90W	4	4	3	3	3

*All power levels referenced to PSE PI.

- There is an additional code (4,4,0,0,0) that is currently unused.
 - Should we use it to add another power level? We could make the available power levels:
 - 15W, 30W, 40W, 50W, 60W, 90W or
 - 15W, 30W, 45W, 60W, 75W, 90W
 - Should we use it to enable AutoClass?

A Quick Review of the Proposal (3)

PD Type \ PSE Type	1	3 (15W)	2	3 (30W)	3 (45/60W)	4 (90W)
1	1 Event 0-3 Power ≤ 15W	1 Event 0-3 Power ≤ 15W	1 Event 4 Power = 15W	1 Event 4 Power = 15W	1 Event 4 Power = 15W	1 Event 4 Power = 15W
3 (15W)	1 Event <i>0-3</i> Power ≤ 15W	1 Events <i>0-3</i> Power ≤ <u>15W</u>	1 Event <i>4</i> Power = 15W	1 Event <i>4</i> Power = <u>15W</u>	1 Event <i>4</i> Power = <u>15W</u>	1 Event <i>4</i> Power = <u>15W</u>
2	1 Event 0-3 Power ≤ 15W	1 Event 0-3 Power ≤ 15W	2 Events 4, 4 Power = 30W	2 Events 4, 4 Power = 30W	2 Events 4, 4 Power = 30W	2 Events 4, 4 Power = 30W
3 (30W)	1 Event <i>0-3</i> Power ≤ 15W	1 Event <i>0-3</i> Power ≤ <u>15W</u>	2 Events <i>4, 4</i> Power = 30W	2 Events <i>4, 4</i> Power = <u>30W</u>	2 Events <i>4, 4</i> Power = <u>30W</u>	2 Events <i>4, 4</i> Power = <u>30W</u>
3 (45/60W)	1 Event <i>0-3</i> Power ≤ 15W	1 Event <i>0-3</i> Power ≤ <u>15W</u>	3 Events <i>4, 4, 4</i> Power = 30W	3 Events <i>4,4,4</i> Power = <u>30W</u>	4 Events <i>4,4,1/2,1/2</i> Power = <u>45/60W</u>	4 Events <i>4,4,3,3</i> Power = <u>60W</u>
4 (90W)	1 Event <i>0-3</i> Power ≤ 15W	1 Event <i>0-3</i> Power ≤ <u>15W</u>	3 Events <i>4, 4, 4</i> Power = 30W	3 Events <i>4,4,4</i> Power = <u>30W</u>	4 Events <i>4,4,1/2,1/2</i> Power = <u>45/60W</u>	5 Events <i>4,4,3,3,3</i> Power = <u>90W</u>

Note: Class events marked in *red italics* indicate long class event used to identify PSE as Type 3 or 4.

Power levels shown with underline indicates PD can use new Type 3 or 4 functions (MPS timings).

Things NOT Addressed in the Baseline Text

- The following items have not been addressed in the current text and more work will need to be done to address them:
 - Connection check: Waiting for outcome of L1 ad hoc.
 - PD Power levels: Need to define what power levels are possible at the PD end of the cable.
 - Dual PDs: Power Levels, Classes allowed, etc.
 - Layer 2 Mutual ID (LLDP).
 - AutoClass: There is still one unused code (4,4,0).
 - Any text that is not directly related to Mutual ID.

Major Changes from the Current Standard

- We have made it mandatory for Type 3 and Type 4 PSEs to exit Multiple-Event Physical Layer classification early.
 - This simplifies the mutual ID process by requiring the PSE to do less checks after each class event. At the most, only a mismatch check is required after a class event.
 - This will allow PDs to encode the power level easier.
- Added a new function “do_class_timing” to the first class event for Type 3 and Type 4 PDs.
 - It is not mandatory, but I have put it in the PD state diagram. I am not sure this is the best way to handle the measurement of the class pulse by the PD, but needed to include it somewhere. We could remove it from the state diagram and add it directly to the text in the MPS section.
- I have proposed 15ms for the maximum time for the 3rd, 4th, and 5th class event.

Challenges Faced and Proposed Solutions

- What should we call the new classes? In the current standard there is a link between power class and class signature. We need to make sure the distinction between class signature and power level is clear.
 - The new classes are named 5, 6, 7. These are related to the power level the PD is requesting.
 - The class signatures remain 0, 1, 2, 3, and 4. These are the signatures that a PD presents during a given class event.
- How do we handle the `mr_pd_class_detected` definition?
 - The definition has been changed to indicate the class signature detected during a single class event.
- How do we handle the `pse_power_type` definition?
 - I have replaced it with `pse_power_level` which is more appropriate now that Type 3 PSEs may operate at 15W, 30W, or 60W.

Challenges Faced and Proposed Solutions (2)

- What do we do about the Power section (page 2) of the PD state diagram?
 - The setting of pse_power_type/level to 2 in the MDI_POWER2 block no longer makes sense. The assignment should really take place inside the DLL block.
 - I have made these changes as a placeholder, but a DLL expert should review them.
- How do we handle Type 3/4 PSEs powering Type 1/2 PDs in terms of Ilim, etc.?
 - I do not believe any changes are needed (not directly mutual ID, but comments addressing this topic are in the mutual ID section).
 - PDs should control the amount of current they draw (they cannot damage themselves when hooked up to the PSE voltage).
- Should a two finger turn on followed by LLDP be considered a valid way to turn on? Is there an advantage to this over one finger if PDs are still required to support LLDP?
 - This would need to be incorporated into the state diagram, but is not addressed as of now.

Questions?