

Detection and Classification Proposal

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Presentation Objective

- Propose changes to baseline text and state diagrams in order to allow a PD that requires classification prior to the application of power to be compliant.
- All Editing Instructions are colored in blue.

Issue with D3.0 Detection and Classification

- Currently a PD is required to present a valid signature during detection; support for classification is optional
- Similarly, a PSE is required to detect a valid PD prior to application of power; support for classification is also optional
- This scheme creates the potential for a PD that supports classification to be powered by an incompatible PSE that doesn't support classification
- The remedy proposed herein allows a PD to present an invalid signature during detection in order force the PSE to perform classification before applying power

Summary of Proposed Changes

- PSE state diagram
- PSE overview and detection sub-clauses
- Table 104–2—PSE PI detection state electrical output requirements
- PD overview sub-clause
- PD state diagram variable ‘present_det_sig’
- PD signature sub-clause
- Fault tolerance sub-clause
- SCCP overview sub-clause

Proposed Changes to PSE SD

- PSEs that perform classification proceed to the CLASSIFICATION state regardless of the outcome of detection
- PSEs that can't perform classification are not allowed to power a PD with an invalid signature
- Editing Instruction: Make changes shown on right to Figure 104.4.3.6 (page 45, line 15)

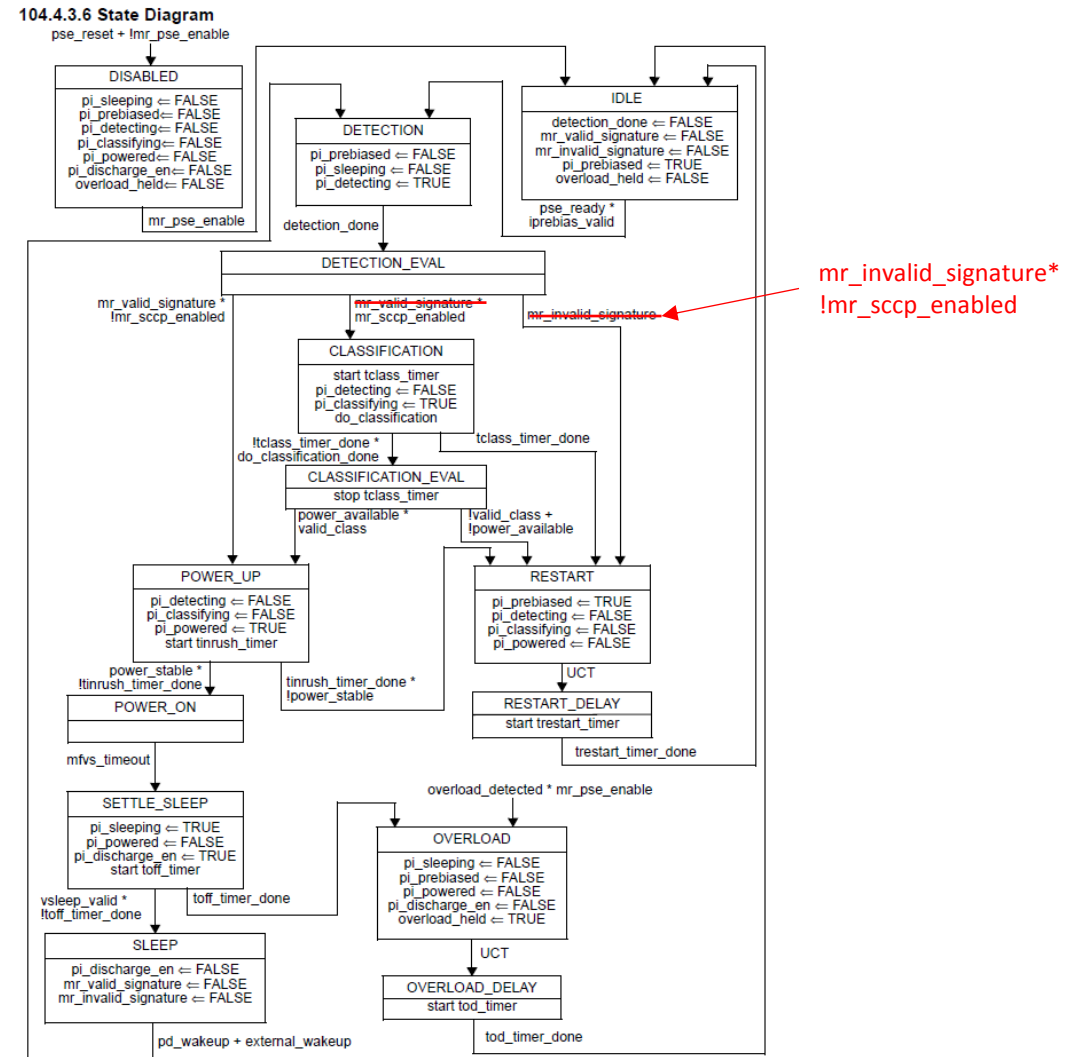


Figure 104-4—PSE state diagram

Proposed Changes to 104.4 (PSE)

Editing Instructions: Make the following changes to 104.4.3.1 (page 41, line 3)

104.4.3.1 Overview

Prior to application of operating voltage at the PI, the PSE performs detection in order to verify that a valid PD is present. A PSE may **apply operating voltage if it is able to successfully classify the PD using SCCP** ~~communicate with the PD prior to the application of operating voltage using SCCP.~~

After operating voltage has been applied, the PSE monitors the PI for a valid Maintain Full Voltage Signature (MFVS) from the PD. In the event a valid MFVS is not present, the PSE reduces the voltage at the PI to the range of V_{Sleep} . If an external wakeup request is received or if a valid wakeup current signature is detected at the PI, the PSE ~~confirms that a valid PD is present by re-performing~~ re-performs detection **and, if enabled, classification** before re-applying operating voltage to the PI.

Proposed Changes to 104.4 (PSE) cont'd

Editing Instructions: Make the following changes to 104.4.4 (page 47, line 3)

104.4.4 PSE detection of a PD

The PSE shall probe the PI as described in 104.4.4.1. The PSE is connected to a PD through the PIs and a link segment.

The PSE shall complete detection of a valid PD signature within T_{det} as specified in Table 104–2. If a valid signature is not detected **and classification is not enabled**, the PSE shall wait at least $T_{restart}$ before re-attempting detection. **If a valid signature is detected and classification is not enabled, the PSE may proceed to the POWER_UP state.** A PSE may successfully detect a PD but then opt not to power the detected PD. ~~If a valid signature is not detected~~ **classification is enabled**, the PSE shall complete classification.

Proposed Changes to 104.4 (PSE) cont'd

- The PSE needs to limit the detection open-circuit voltage to less than V_{ON} min for the 12V un-regulated class if a PD opts to present an invalid signature
- The $V_{bad_hi_PSE}$ min limit needs to be function of V_{OC} in order to conserve headroom
- **Editing Instructions:** Make changes to Items 1 and 8 shown on right to Table 104-2 (page 47, line 16).

Table 104–2—PSE PI detection state electrical output requirements

Item	Parameter	Symbol	Unit	Min	Max	Additional Information
1	Open circuit voltage	V_{OC}	V	4.75V	5.5 5.15V	
2	Short circuit current	I_{SC}	mA	—	24	
3	Valid test probe current	I_{valid}	mA	9	16	
4	Slew rate	I_{slew}	A/ms	—	1	
5	Output capacitance during detection	C_{out}	nF	—	200	
6	Maximum detection time	T_{det}	ms	—	3.11	See 104.4.4
7	Valid PD detection signature range measured at PSE PI	V_{good_PSE}	V	4.05	4.7	See 104.4.4.2
8	Invalid PD detection signature high range measured at PSE PI	$V_{bad_hi_PSE}$	V	5.15 $V_{OC}-50mV$	—	See 104.4.4.3
9	Invalid PD detection signature low range measured at PSE PI	$V_{bad_lo_PSE}$	V	—	3.7	
10	Signature hold timer for validity	T_{sig_hold}	ms	1	—	See 104.4.4.2

Proposed Changes to 104.4 (PSE) cont'd

Editing Instructions: Make following changes to 104.4.5 (page 48, line 3).

104.4.5 PSE classification of a PD

The ability for the PSE to query the PD in order to determine the PD type and power class requirements of that PD is called classification.

Classification is optional, and is performed using SCCP. Implementation of SCCP by a PSE is also optional.

A PSE with SCCP enabled shall complete classification after detection and prior to application of full operating voltage at the PI in a time less than T_{Class} as specified in Table 104-3. If classification is not completed before the T_{Class} timer expires, ~~a new detection cycle shall be completed before any subsequent application of full operating voltage,~~ **the PSE shall transition to the RESTART state.**

Proposed Changes to 104.5 (PD)

Editing Instructions: Remove “constant” from section 104.5.3.1 as shown below (page 53, line 3).

104.5.3.1 Overview

A falling-edge of the PD input voltage through $V_{\text{sig_enable}}$ enables a ~~constant~~ voltage signature, as defined in 104.5.4. When the input voltage rises through the $V_{\text{sig_disable}}$ the PD disables its constant-voltage signature.

A PD requests detection and wakeup while the ~~constant~~ voltage signature is enabled by presenting a valid wakeup current signature. SCCP may also be used for communication with the PD by the PSE when the ~~constant~~-voltage signature is enabled.

A rising edge through the V_{on} threshold causes the PD to enable MDI power after a delay of t_{powerdly} . A falling edge through the V_{off} threshold causes the PD to disable MDI power.

Proposed Changes to 104.5 (PD) cont'd

Editing Instructions: Make following changes to present_det_sig variable (page 53, line 51).

104.5.3.3 Variables

present_det_sig

A variable that controls the PD detection signature as specified in 104.5.4.

TRUE: the detection signature is to be applied to the PD PI.

FALSE: the detection signature is not to be applied to the PD PI.

Editing Instructions: Make following changes to 104.5.4 (page 55, line 39).

104.5.4 PD signature

A PD that does not implement classification shall present enable a valid detection signature when V_{PD} is in the range of less than V_{sig_enable} . A PD that presents an invalid detection signature greater than V_{bad_hi} max as specified in Table 104-5 shall implement classification as specified in 104.7.

When V_{PD} is greater than $V_{sig_disable}$ a PD shall remove the current draw of the detection signature.

Proposed Changes to 104.6.2 Fault tolerance

Editing Instructions: Make following changes to 104.6.2 (page 60, line 26).

104.6.2 Fault tolerance

The PI **for Type A, Type B, and Type C PSEs and PDs** shall meet the fault tolerance requirements as specified in 96.8.3.

A PD shall not be damaged when connected to any PSE as defined in sub-clause 104.4

The PSE PI shall withstand without damage the application of short circuits between the wires within the cable for an indefinite period of time.

Proposed Changes to 104.7 SCCP

Editing Instructions: Make following changes to 104.7 (page 63, line 19)

104.7 Serial communication classification protocol (SCCP)

Implementation of SCCP by ~~the PSE~~ PSEs and PDs that present a valid detection signature is optional. PDs that present an invalid detection signature as specified in Table 104-5 shall implement SCCP.

Conclusion

- Changes were proposed in slides 5-13 that allow a PD to present and invalid detection signature in order to require classification by a PSE prior to the application of power