8802-3/802.3 REVISION REQUEST

DATE: 21 May 2017
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REQUESTED REVISION:
  STANDARD: 802.3bu
  CLAUSE NUMBER: 104.4.4.1
  CLAUSE TITLE: Detection probe requirements
PROPOSED REVISION TEXT:

Change the max limit for item 5 in Table 104-3 PSE PI detection state electrical output requirements from 200nF to 2.64uF. 2.2uF+20% = 2.64uF.

RATIONALE FOR REVISION:

The 200nF maximum limit on a PSE's Cout is limiting. The current maximum limit in some common circuit configurations can cause stability issues. The attached analysis demonstrates that the proposed change does not create the potential for one PSE to detect another PSE as a valid PD. In addition, since no other detection parameters are affected, there is no impact on interoperability of existing PoDL networks.

IMPACT ON EXISTING NETWORKS:

No impact is anticipated. Networks that meet the existing spec will also be able to meet the relaxed specification.

Please attach supporting material, if any
Submit to:- David Law, Chair IEEE 802.3
and copy:- Adam Healey, Vice-Chair IEEE 802.3

At:- E-Mail: stds-802-3-maint-req@ieee.org

For official 802.3 use
REV REQ NUMBER: 1308
DATE RECEIVED: 21st May 2017
EDITORIAL/TECHNICAL
ACCEPTED/DENIED
BALLOT REQ'D YES/NO
COMMENTS:

For information about this Revision Request see -
http://www.ieee802.org/3/maint/requests/revision history.html#REQ1308

Analysis of Proposed Change to C_{out} Maximum Limit in Table 104-3

Objective

To demonstrate that the output capacitance (C_{out}) maximum limit on a PSE in Table 104-3 can be increased from 200nF to 2.64µF during detection without creating the potential for a PSE to detect another PSE as a valid PD.

Justification

The existing PSE 200nF C_{out} max limit in Table 104-3 is limiting and can cause stability issues with some common PoDL circuit configurations.

Analysis of a PSE during DETECTION

A PSE that implements detection is required to meet the electrical specifications in Table 104-3 (shown below). In addition, a PSE is required to have an output with attributes that will prevent it from being detected as a valid PD by another PSE (see 104.4.6 PSE output requirements).

Table 104–3—PSE PI detection state electrical output requirements

Item	Parameter	Symbol	Unit	Min	Max	Additional information
1	Open circuit voltage	V_{OC}	V	4.75	5.5	
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	V_{oc}–0.05	—	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

The C_{out} maximum limit may be increased from 200nF to 2.64µF without creating the potential for one PSE to mis-detect another PSE as a valid PD.

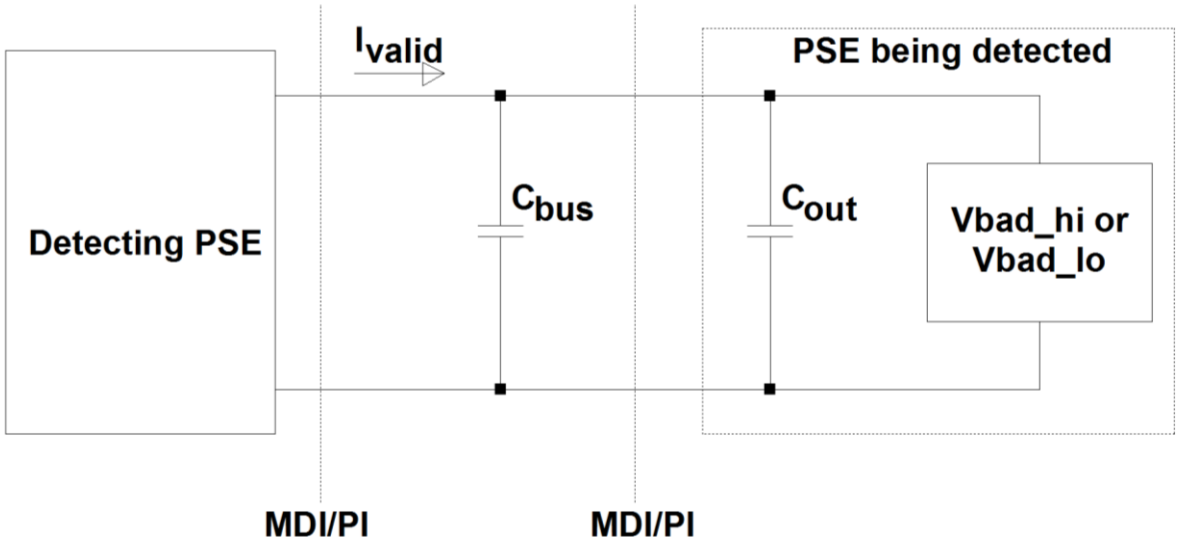

Figure 1 – Circuit Model of PSE Detection of another PSE

Figure 1 illustrates a circuit model of a PSE attempting to detect another PSE. Ranges for values of I_{valid} and C_{out} are given in Table 104-3. C_{bus} is constrained to be less than 6nF by Item 19 in Table 104-8 (SCCP electrical requirements).

In order to guarantee that a PSE cannot detect another PSE as a valid PD, the total amount of capacitance seen by the detecting PSE (C_{bus}+C_{out}) must be low enough so as to ensure that the voltage at the MDI/PI of the detecting PSE does not remain in the window $V_{bad\_lo\_PSE}$ max to $V_{bad\_hi\_PSE}$ min for more than T_{sig_hold} min. The expression for the amount of time spent in the window, $t_{bad\_lo\_hi}$, is given by Equation 1.

$$t_{bad\_lo\_hi} = \left(V_{bad\_hi\_PSE} - V_{bad\_lo\_PSE}\right) \times \left(C_{bus} + C_{out}\right)/I_{valid} \quad \text{(Equation 1)}$$

The maximum value of $t_{bad\_lo\_hi}$ occurs when $V_{bad\_hi\_PSE}$ = 5.45V, $V_{bad\_lo\_PSE}$=3.7V, I_{valid}=9mA, C_{bus}=6nF, and C_{out} is at the maximum allowed value. Substituting 2.64µF for C_{out} yields $t_{bad\_lo\_hi}$=515us which is substantially less than the T_{sig_hold} min value of 1ms.

Conclusion

Increasing the maximum limit for C_{out} from 200nF to 2.64µF in Table 104-3 allows PSEs to be implemented at lower cost and complexity without creating the potential for one PSE to detect another PSE as a valid PD.