NOPOWER, V_{On_PD}, and V_{Off_PD} v122

Info (not part of baseline)

This comment addresses r01-450, 449, 347, 451, 348, 349, 452, 227, 314, 353, and 238.

There is a discrepancy between the text in 145.3.8.1, dealing with PD turn-on and turn-off behavior and the behavior of the state diagram. The specification V_{Off_PD} and V_{On_PD} is intended for steady state condition, excluding peak power draw and transient events. After all, a PD that is drawing peak power may have a V_{PD} that is outside of the $V_{Port\_PD\text{-}2P}$ range, and as such the PD would be permitted to turn off.

The state diagram implements this turning off of the PD with the NOPOWER state. Because the state diagram reacts instantaneously, depending on the value of V_{Off_PD}, it can happen that peak power draw, or a transient event causes the PD to transition to NOPOWER. Because NOPOWER is also used to specify behavior for PDs that are intentionally drawn back into mark/class/V_{Off_PD} range, a conflict arises, because a pass through the NOPOWER state allows the PD to change it class event counter.

Another way to make an unwarranted pass through NOPOWER is for the PD the intentionally transition from INRUSH to POWER_DELAY before V_{PD} is in the $V_{Port\_PD\text{-}2P}$ range. This must also be prevented.

To solve this:
- the PD state diagram is forced to spend precisely 50 msin INRUSH (the state, not the condition).
- the entry logic into NOPOWER is changed to be $V_{PD} < V_{Off\_PD}$ min.
- Add requirement that states a PD can't turn off due to compliant peak power draw or transients.

145.3.3.4 Single-signature PD variables

Change variable nopower as follows:

nopower

A variable that indicates the PD has been in NOPOWER, which indicates V_{PD} was below V_{Off_PD} min while being powered, since the last time V_{PD} was below V_{Reset} for at least T_{Reset}.
Values:

FALSE: The PD has not been in NOPOWER.
~~FALSE~~ TRUE: The PD has been in NOPOWER.

Add the following variable:

pd_overload

A variable that indicates if the PD is drawing peak power in excess of P_{Class_PD}, as defined in 145.3.8.4, or when the PD is exposed to a transient condition as defined in 145.3.8.6.
Values:

FALSE: The PD is not drawing peak power or is exposed to a transient condition.
TRUE: The PD is drawing peak power and is not exposed to a transient condition.

145.3.3.5 Single-signature PD timers

tinrushpdmax_timer

A timer used to determine when the PD exits INRUSH and meets the requirements of POWER_DELAY; see T_{Inrush_PD} max in Table 145–29.

145.3.3.9 Dual-signature PD variables

Add variable nopower_mode(X) as follows:

A variable that indicates the PD has been in NOPOWER for Mode X, which indicates V_{PD} was below V_{Off_PD} min while being powered, since the last time V_{PD} was below V_{Reset} for at least T_{Reset} on that Mode.
Values:

FALSE: The PD has not been in NOPOWER.
TRUE: The PD has been in NOPOWER.

Add the following variable:

pd_overload_mode(X)

A variable that indicates if the PD is drawing peak power in excess of P_{Class_PD}, as defined in 145.3.8.4, or when the PD is exposed to a transient condition as defined in 145.3.8.6 on Mode X.
Values:

FALSE: The PD is not drawing peak power or is exposed to a transient condition.
TRUE: The PD is drawing peak power and is not exposed to a transient condition.

145.3.3.10 Dual-signature PD timers

tinrushpdmax_timer_mode(X)

A timer used to determine when the PD exits INRUSH over Mode X and meets the requirements of POWER_DELAY; see T_{Inrush_PD} max in Table 145–29.

145.3.3.7 Single-signature PD state diagrams

Change Figure 145–26 as follows:

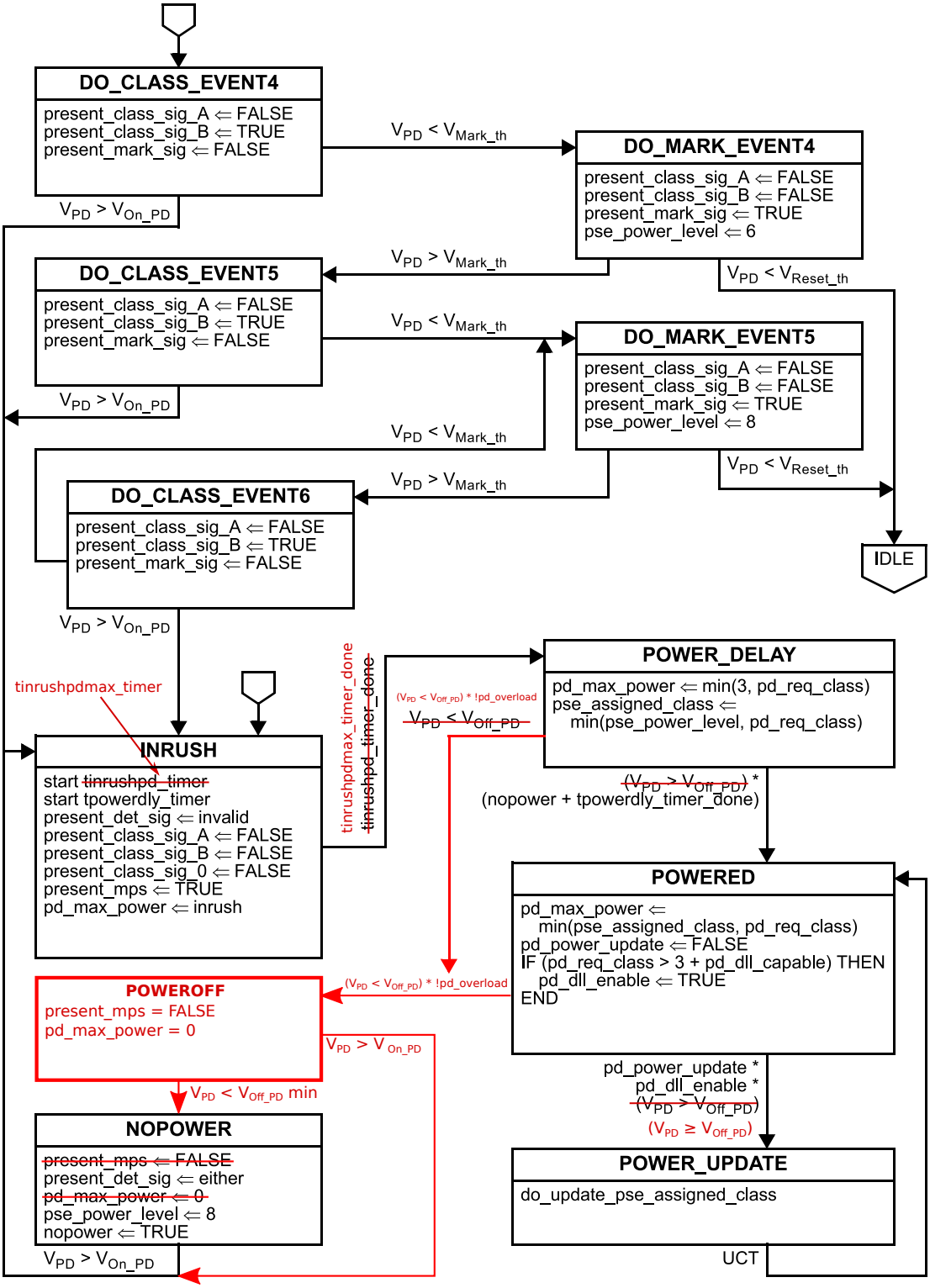

Figure 145–26—Single-signature PD state diagram *(continued)*

145.3.3.12 Dual-signature PD state diagrams

Update Figure 145–24 in the same manner as Figure 145–26.

145.3.8.1 Input voltage

Change 145.3.8.1 as follows:

The specification for $V_{Port\_PD\text{-}2P}$ in Table 145–29 is for the input voltage range after startup (see 145.3.8.3), and accounts for loss in the cabling plant.

The PD shall turn on at a voltage in the range of V_{On_PD}. After the PD turns on, the PD shall stay on over the entire $V_{Port\_PD\text{-}2P}$ range. The PD shall turn off at a voltage in the range of V_{Off_PD}. For dual-signature PDs the requirements for V_{On_PD} and V_{Off_PD} apply to each pairset individually. A PD shall not turn off due to peak power draw, causing V_{PD} to go as low as $V_{Overload\text{-}2P}$, as specified in 145.3.8.4, or due to a voltage transient as defined in 145.3.8.6. This behavior is encoded in the variable pd_overload and pd_overload_mode(X).

...

When the PD is in POWER_DELAY or POWERED and V_{PD} falls below V_{Off_PD}, the PD transitions to NOPOWER and may show a valid or invalid detection signature, and may or may not draw mark current, draw any class current, and show MPS. When nopower is TRUE interoperability between PSE and PD is no longer guaranteed.