Connection Check & Detection
Sequencing & Timing

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Background

- Many implementation details of Connection Check (CC) have been left to the reader

- Provides implementation flexibility – a noble goal

- However, flexibility burdens the standard in other ways (e.g. state diagram), and potentially leads to poor implementations

- Goals:

  ➢ Provide rationale behind comments 176 & 178
  ➢ Generate discussion within the Task Force on how best to balance flexibility and complexity, building up to new baseline text and state diagram for September
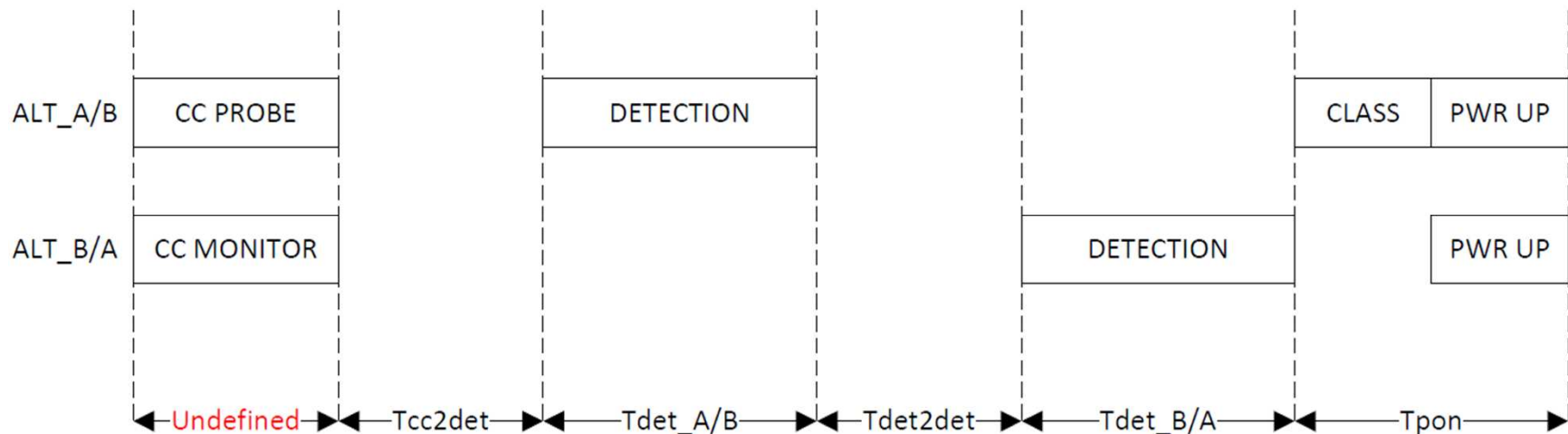
CC & Detection Sequencing

- Currently, there are **4** permitted sequences for CC and detection

  1) CC → detection

  2) Detection ALT_A/B → CC → detection ALT_B/A

  3) Detection → CC

  4) Simultaneous*

  *Not covered since timing is straightforward – CC fits within Tdet, with or without parallel detection

Sequence 1:
CC → Detection

CC → DET (SS PD, D1.1)

- Duration of CC has not been specified, and it seemingly need not be
- However, a cable-plug mid-CC could possibly fool some implementations...
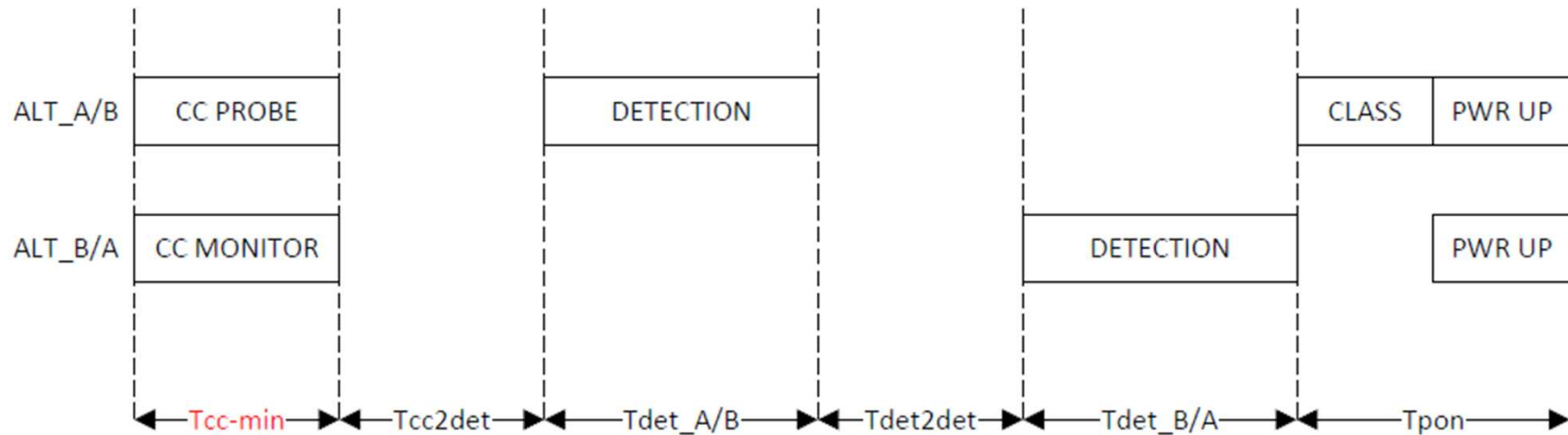
Theoretical Mid-CC Cable-plug Example

- In reality, the RJ45 pins will mate at different times

- Investigation of the upper bound of the delta underway, but on the order of milliseconds seems reasonable

- <u>One</u> implementation-specific, problematic sequence:
  1) ALT_A connects
  2) CC probes ALT_A
  3) CC determines ALT_A is not open circuit
  4) CC probes ALT_B
  5) CC sees that probing ALT_B has no bearing on ALT_A
  6) PSE transitions to Detection as ALT_B connects
  7) Detection returns "valid_AB"
  8) PSE wrongly concludes DS (2 pairsets can meet Tpon independently)

Mid-CC Cable-plug Prevention

- May be a rare occurrence, but the intermittence makes it challenging to troubleshoot and may be perceived as an interop issue

- So, some options for prevention:

  1) Require a detection prior to CC (i.e. outlaw this seq.)

  2) Define CC mechanism to the extent that any implementation will not be susceptible to a cable-plug

  3) Specify a minimum CC timing parameter (Tcc-min) – with informative text or annex explaining its existence – that exceeds the worst-case cable-plug mating delta

CC → DET (SS PD, Option 3)

| ALT_A/B | CC PROBE | | DETECTION | | | CLASS | PWR UP |
| ALT_B/A | CC MONITOR | | | | DETECTION | | PWR UP |

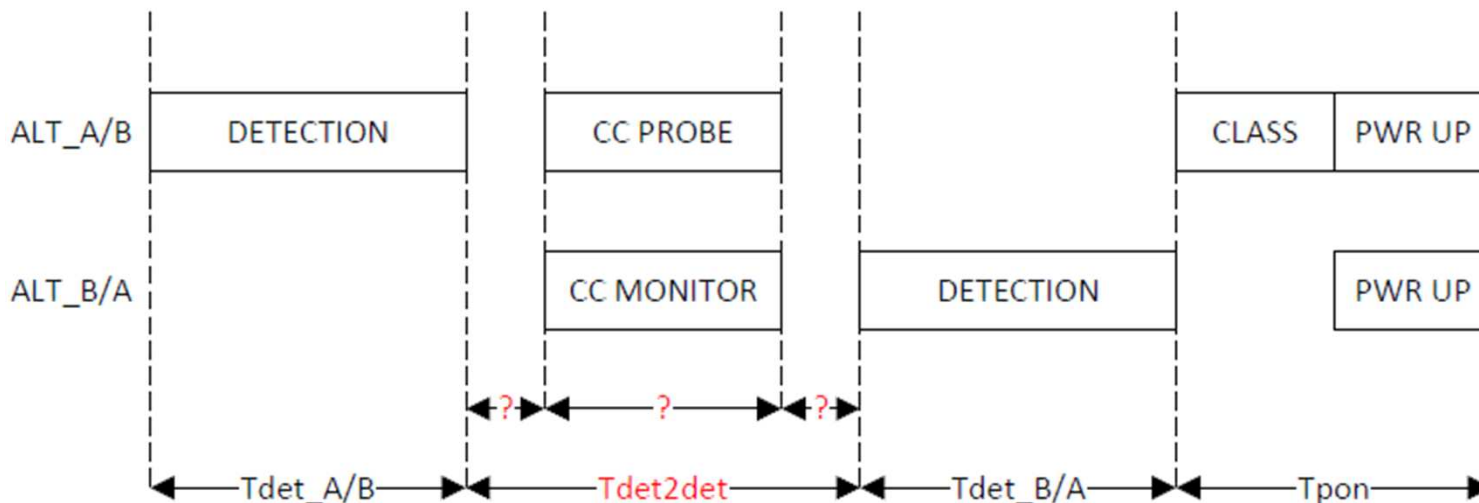Tcc-min — Tcc2det — Tdet_A/B — Tdet2det — Tdet_B/A — Tpon

- Assuming Tcc-min can be specified with confidence, this sequence remains viable and most of the implementation details are left to the reader
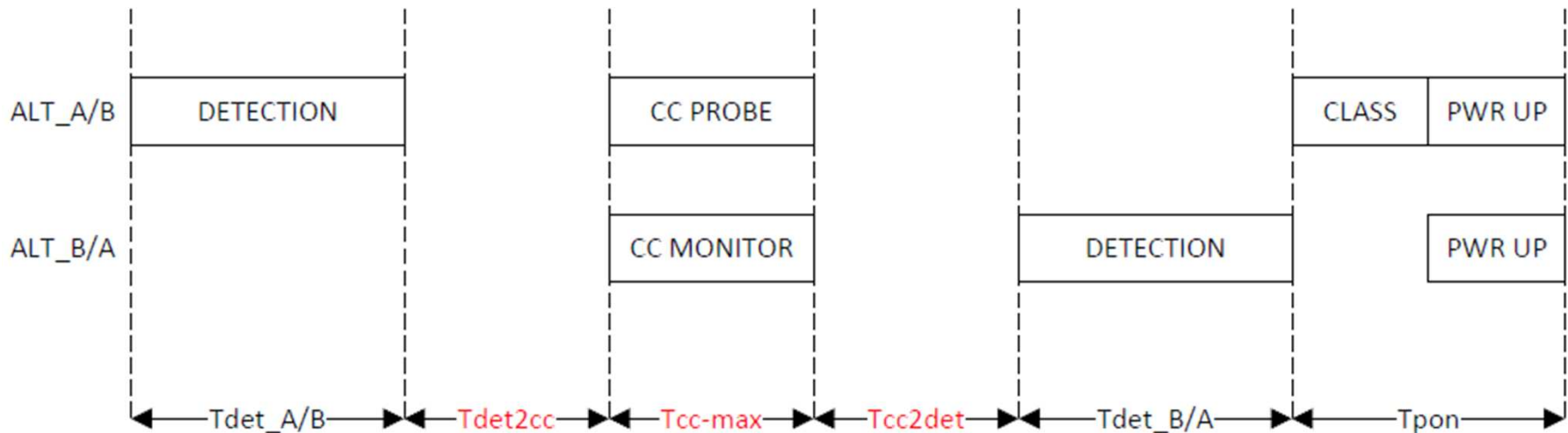
Sequence 2:
Detection ALT_A/B → CC → Detection ALT_B/A

DET → CC → DET (SS PD)

- CC timing for this sequence is more stringent than for Sequence 1, but this sequence is inherently impervious to cable-plug
- At the expense of further complexity, other timing parameters can be defined to potentially make this sequence more attractive
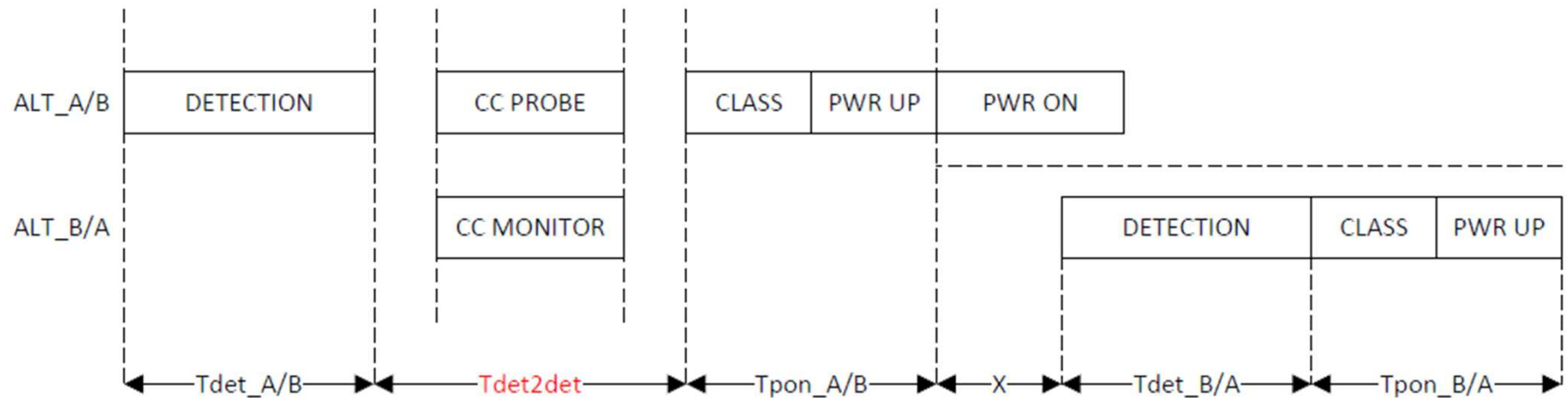
DET → CC → DET (SS PD, Relaxed Timing)

- Tcc2det exists, and Tcc-min (not necessarily applicable) can be paired with a max value, Tcc-max = 400ms
- Tdet2cc = Tcc2det = 400ms
- Safely transition to Class and Power Up with increased timing budget, but worth the added complexity?

DET → CC → DET (DS PD, Ex. 1)
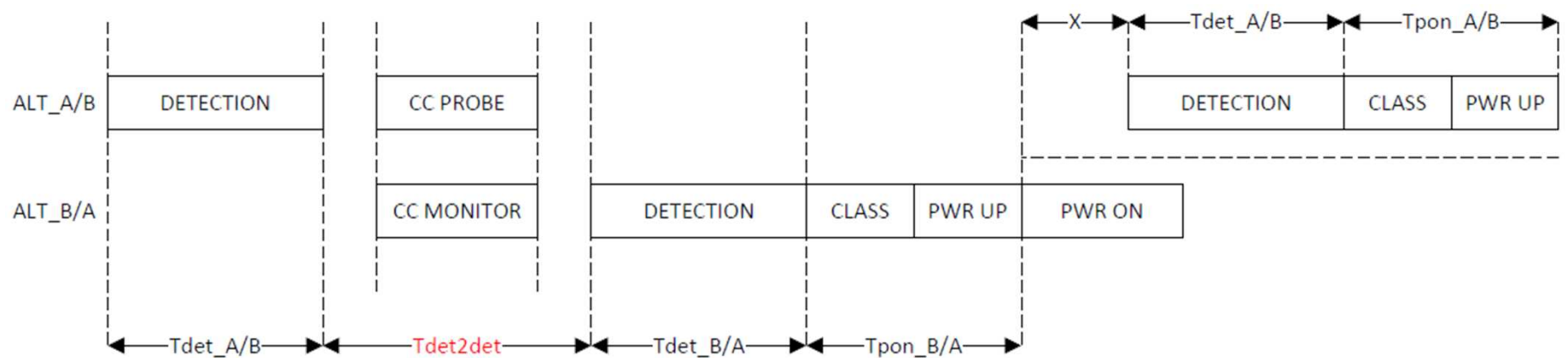
- D1.1 states that Tdet2det "Applies only when connected to a single-signature PD."
- For this sequence to support DS, Tdet2det must be applicable
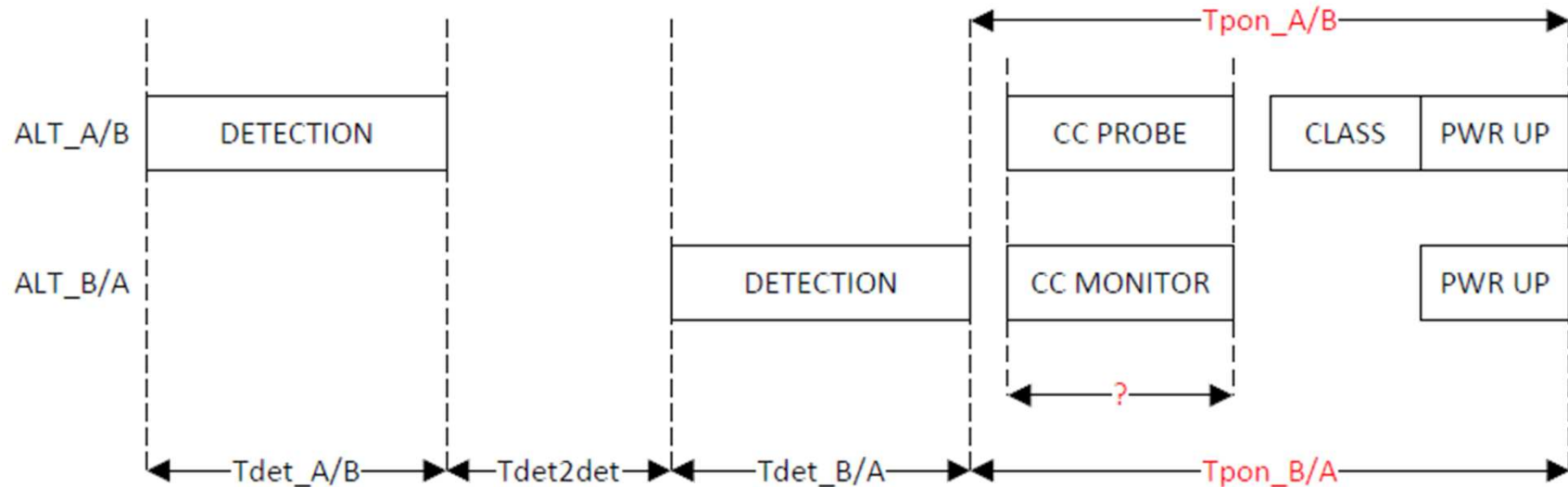
DET → CC → DET (DS PD, Ex. 2)

ALT_A/B	DETECTION		CC PROBE		CLASS	PWR UP	PWR ON			

ALT_B/A			CC MONITOR					DETECTION	CLASS	PWR UP

←—Tdet_A/B—→ ←—Tdet2det—→ ←—Tpon_A/B—→ ←—X—→ ←—Tdet_B/A—→ ←—Tpon_B/A—→

- Tdet2det is the right value, but it looks wrong in name
- Do we modify the definition of Tdet2det or add a new parameter (Tcc2cls?) to legitimize this sequence?
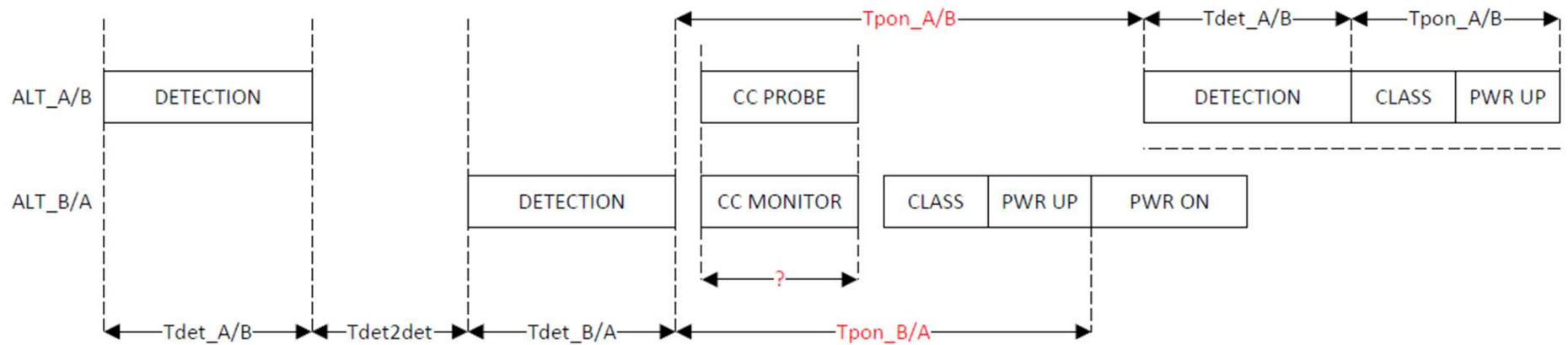
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13

Sequence 3:
Detection → CC

DET → CC (SS PD)

- Tightest timing because CC must be wedged into Tpon per D1.1
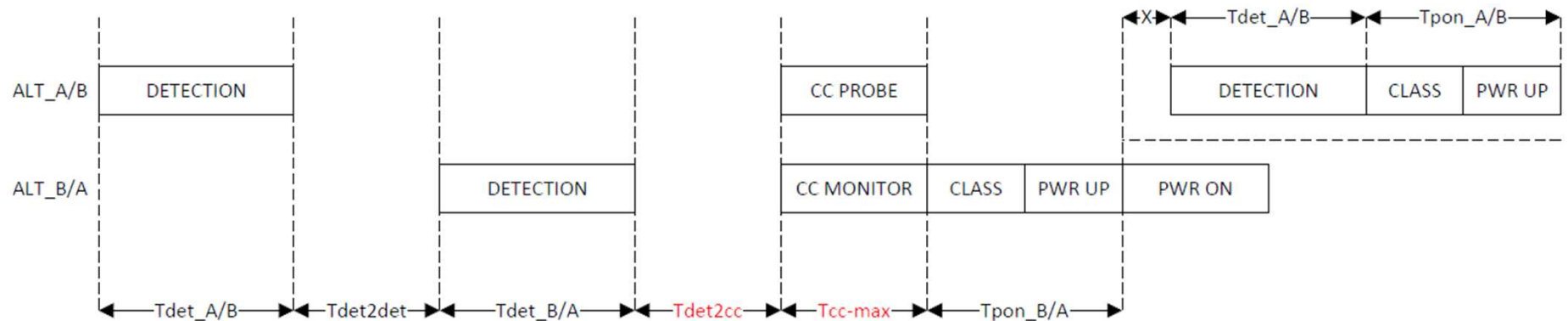- Assuming timing can be met, this sequence appears feasible for SS

DET → CC (Type 1/Type 2 DS PD)

- <u>Potential Problem</u>: Tpon must be started on both pairsets before DS identified
  - CC, Class, Power Up, and margin to Power On must fall within Tpon
  - Tpon bridges to a re-Detection instead of Power On for 1 pairset

DET → CC (Type 1/Type 2 DS PD w/ Fix?)

- Tcc-min (not necessarily applicable) can be paired with a max value, Tcc-max = 400ms

- Tdet2cc = Tcc2det = 400ms

- Safely transition to Class and Power Up with increased timing budget and no unnatural Tpon bridge to re-Detection, but worth the added complexity?

D1.1 Comments
CC & State Diagram

Comment #176

CI **33**   SC **33.2.4.3**   P **34**   L **29**   # 176

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Comment Type   **TR**   Comment Status   **X**

To allow for PSEs that perform connection check before, during, between, or after detection, a new constant is needed to define the disparate pathways these PSEs take through the state diagram and their associated timing requirements.

SuggestedRemedy

Add constant "PSE_CC_DET_SEQ" as follows:

PSE_CC_DET_SEQ
A constant indicating the sequence in which the PSE performs connection check and detection.
Values: 1: Connection check and detection performed simultaneously
2: Connection check performed prior to detection
3: Connection check performed between detections
4: Connection check performed after detection

Comment #178

CI **33**   SC **33.2.5.0a**   P **53**   L **34**   # 178

Walker, Dylan   Cisco

Comment Type   **TR**   Comment Status **X**

In Table 33-3a, under Additional Information for Item 2, it's stated that "Applies only when connected to a single-signature PD."

This may not be true if we allow connection check to occur between the 2 detections and don't want to create new timing parameters.

SuggestedRemedy

Presentation forthcoming to cover this and other aspects of connection check.

References

References

- http://www.ieee802.org/3/bt/public/jun15/abramson_01bt_0615.pdf

- http://www.ieee802.org/3/bt/public/sep14/dwelley_01_0914.pdf