



Connection Check & Detection Sequencing & Timing

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July 2015

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 progress on state diagram for September

CC & Detection Sequencing

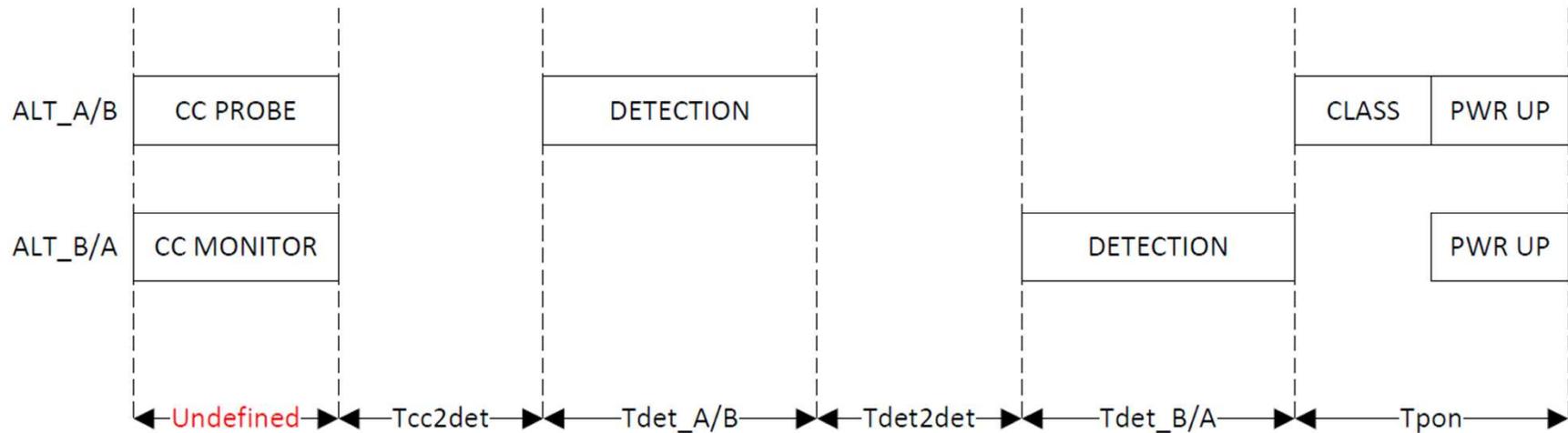
- Currently, there are **4** permitted sequences for CC and detection
 - 1) CC → detection
 - 2) Detection ALT_A/B → CC → detection ALT_B/A
 - 3) Detection → CC
 - 4) Simultaneous*

*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...

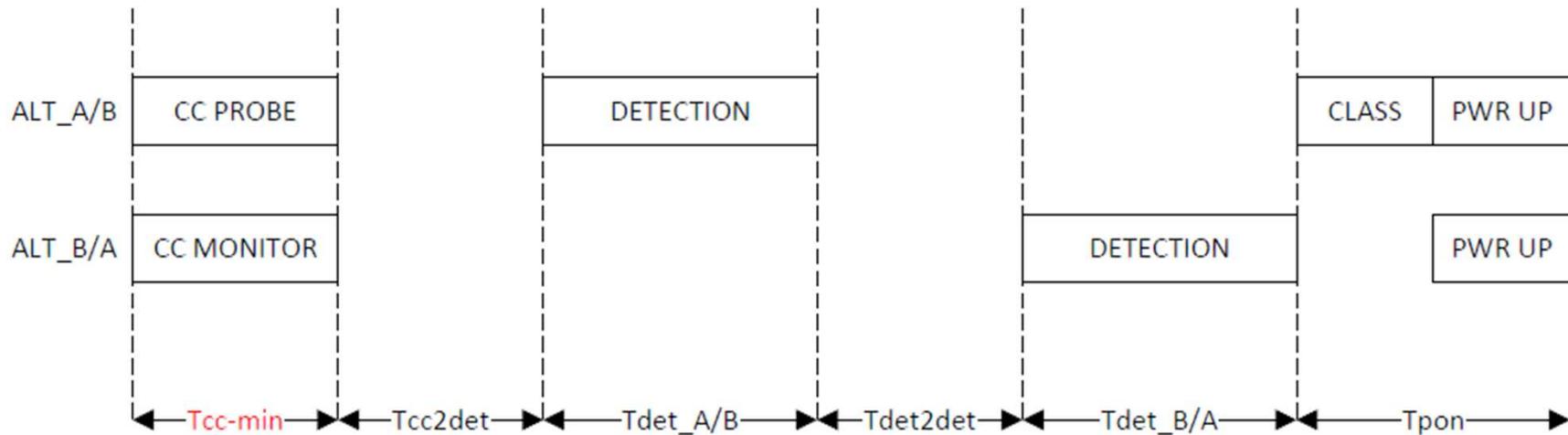
Theoretical Mid-CC Cable-plug Example

- 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
- One 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)

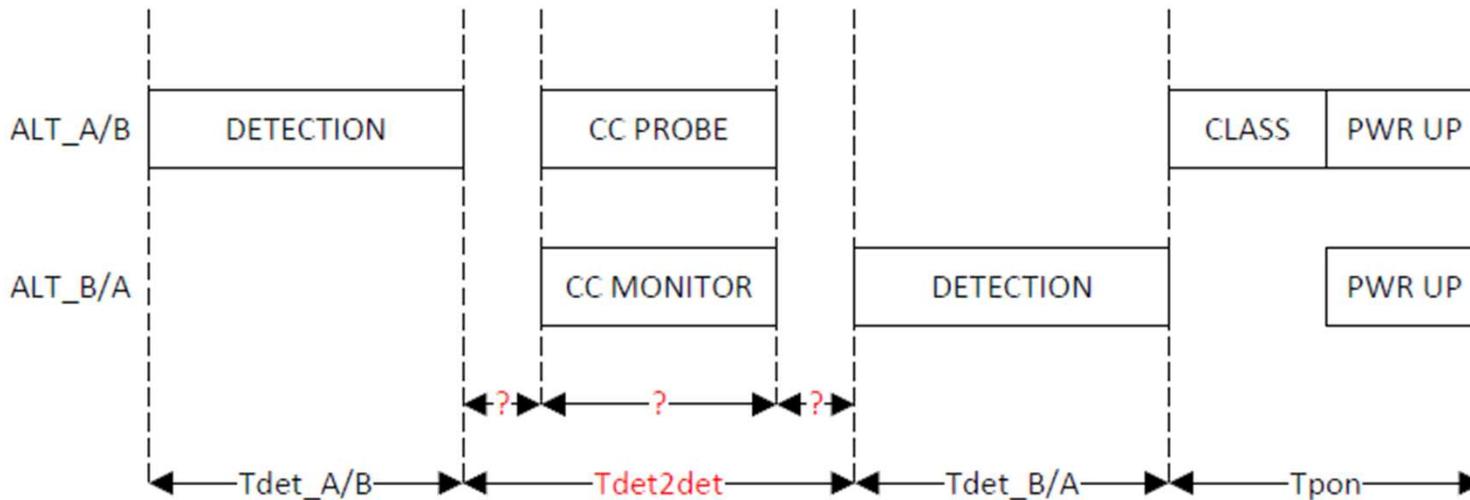


- Assuming Tcc-min can be specified with confidence, this sequence remains viable and most of the implementation details are left to the reader

Sequence 2:

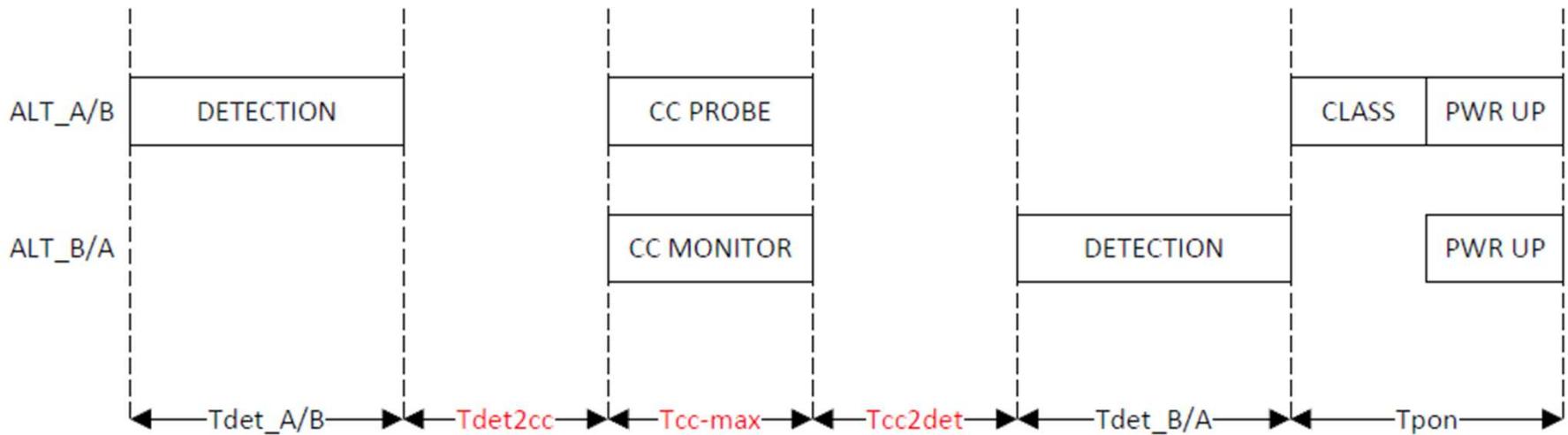
Detection ALT_A/B → CC → Detection ALT_B/A

DET → CC → DET (SS PD)



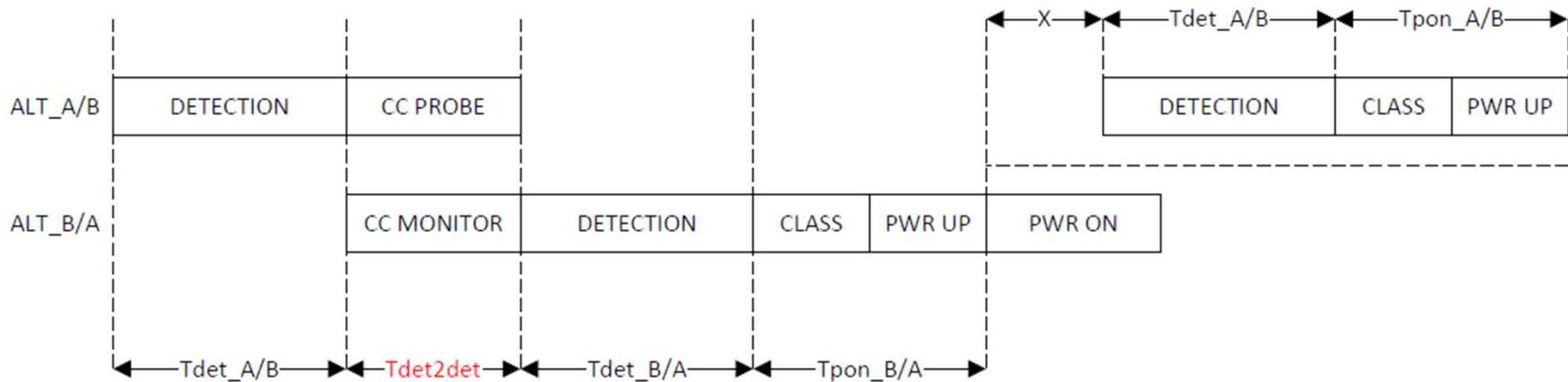
- CC timing for this sequence is more stringent than for Sequence 1, but this sequence is inherently impervious to cable-plug
- At the expense of further complexity, other timing parameters can be defined to potentially make this sequence more attractive

DET → CC → DET (SS PD, Relaxed Timing)



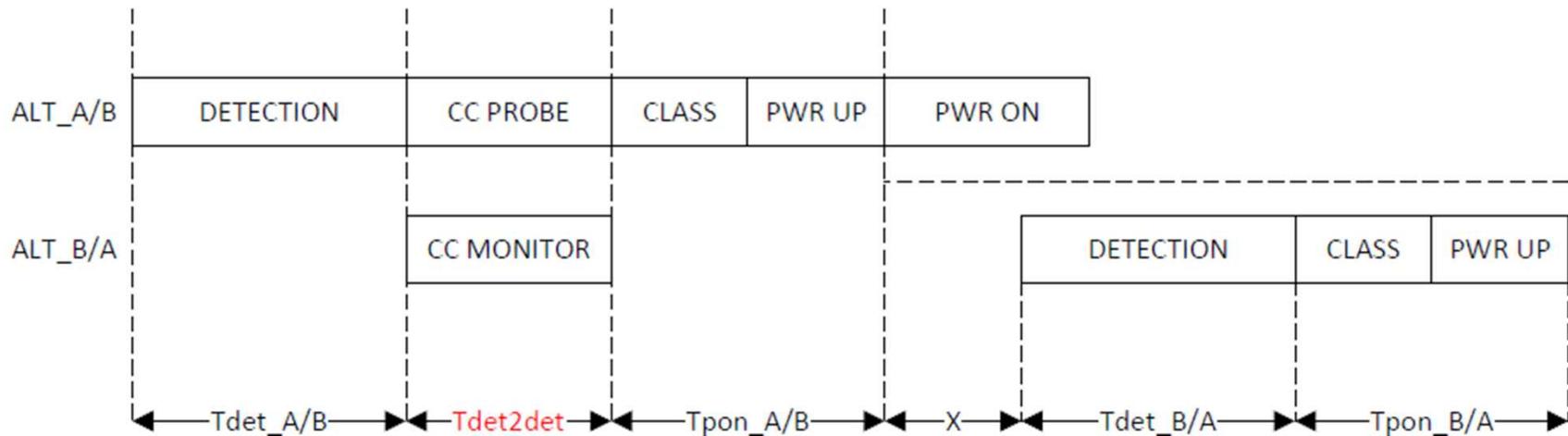
- T_{cc2det} exists, and T_{cc-min} (not necessarily applicable) can be paired with a max value, $T_{cc-max} = 400ms$
- $T_{det2cc} = T_{cc2det} = 400ms$
- Safely transition from first to second Detection with increased timing budget, but worth the added complexity?

DET → CC → DET (DS PD, Ex. 1)



- D1.1 states that $T_{det2det}$ “Applies only when connected to a single-signature PD.”
- For this sequence to support DS, $T_{det2det}$ must be applicable if more timing parameters aren’t created

DET → CC → DET (DS PD, Ex. 2)

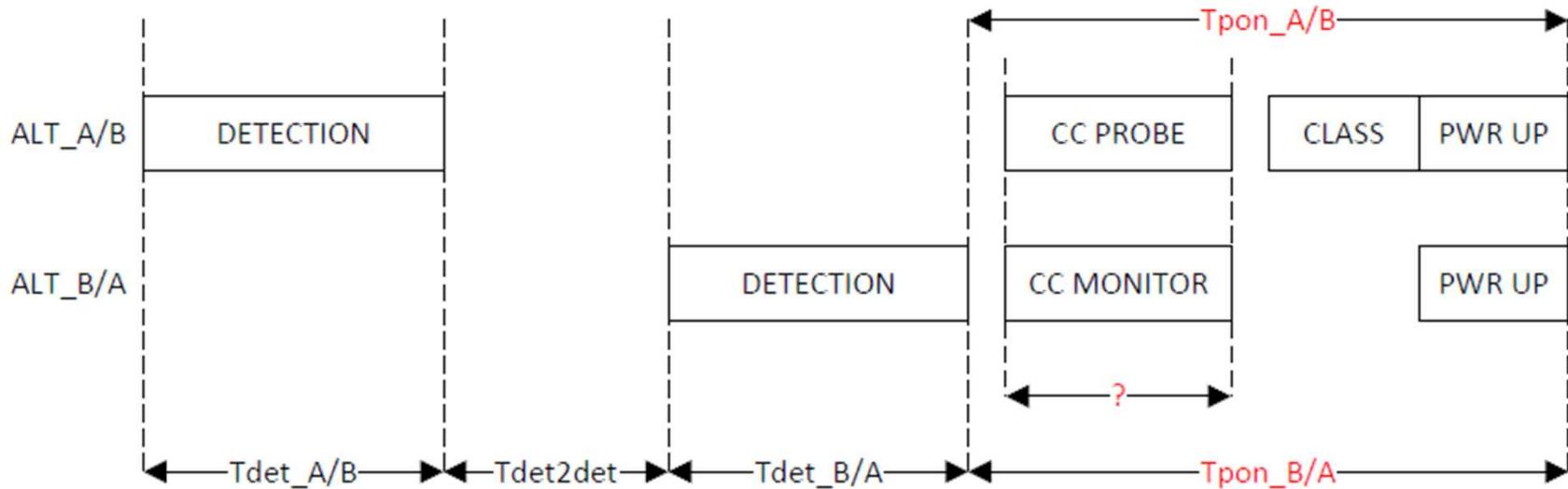


- $T_{det2det}$ is the right value, but it looks wrong in name
- Do we modify the definition of $T_{det2det}$, rename $T_{det2det}$ ($T_{vpd2vpd}$), or add a new parameter ($T_{det2cls}$?) to legitimize this sequence?
- Further, do we expand the definition of T_{pon} to include the possibility of starting after a valid CC?

Sequence 3:

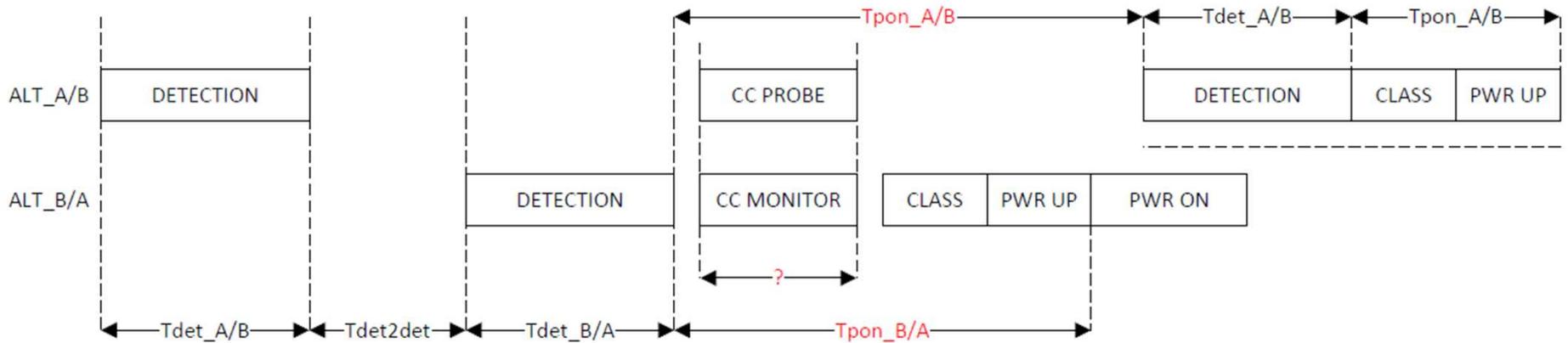
Detection → CC

DET → CC (SS PD)



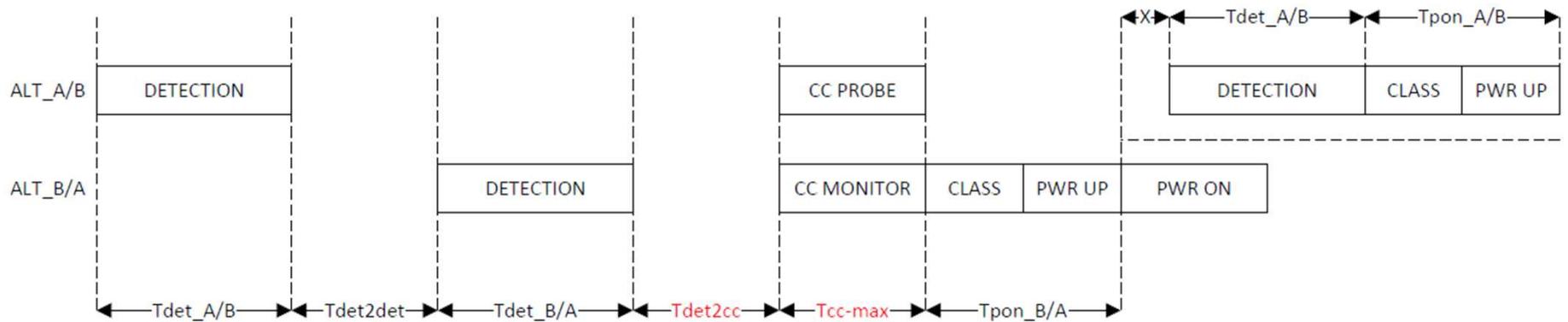
- Tightest timing because CC must be wedged into Tpon per D1.1
- Assuming timing can be met, this sequence appears feasible for SS

DET → CC (Type 1/Type 2 DS PD)



- **Potential Problem:** 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
Walker, Dylan Cisco

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.

Suggested Remedy

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