802.3da Power Bus Simplification

Proposal to remove 802.3da Objective 10

Jason Potterf
Affiliated with Cisco
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Recap of Previous Presentation

- Suggested the following objective change:

Objective 10. PSE shall only energize the mixing segment when at least one PD is connected **and shall deenergize the mixing segment when a topology change is detected**

~~Objective 11. Support addition and removal of a node or set of nodes to a continuously operating powered mixing segment~~

- During discussion, use cases were brought forward in defense of keeping power on during a topology change

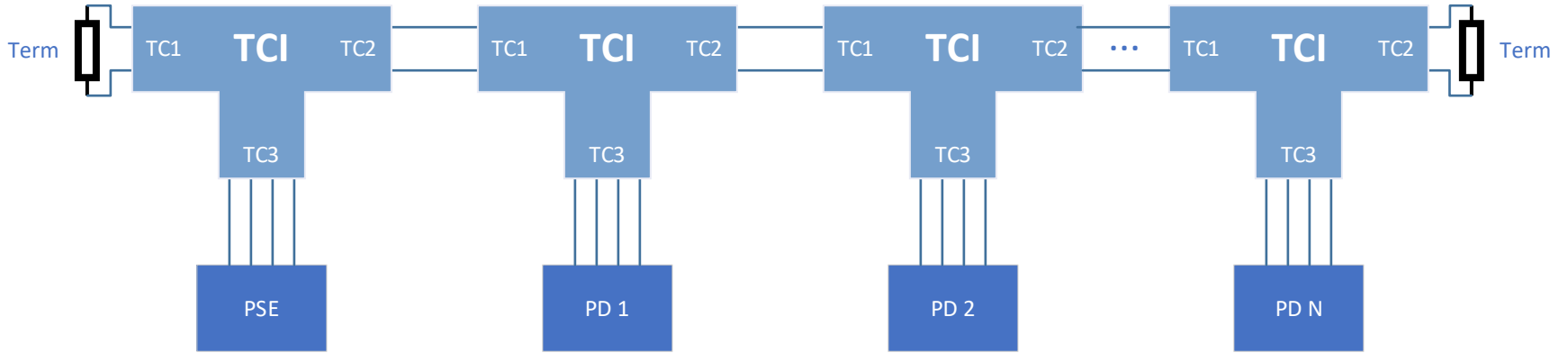- Objective 10 was not discussed at length during San Antonio Interim

Reconsidered Proposal

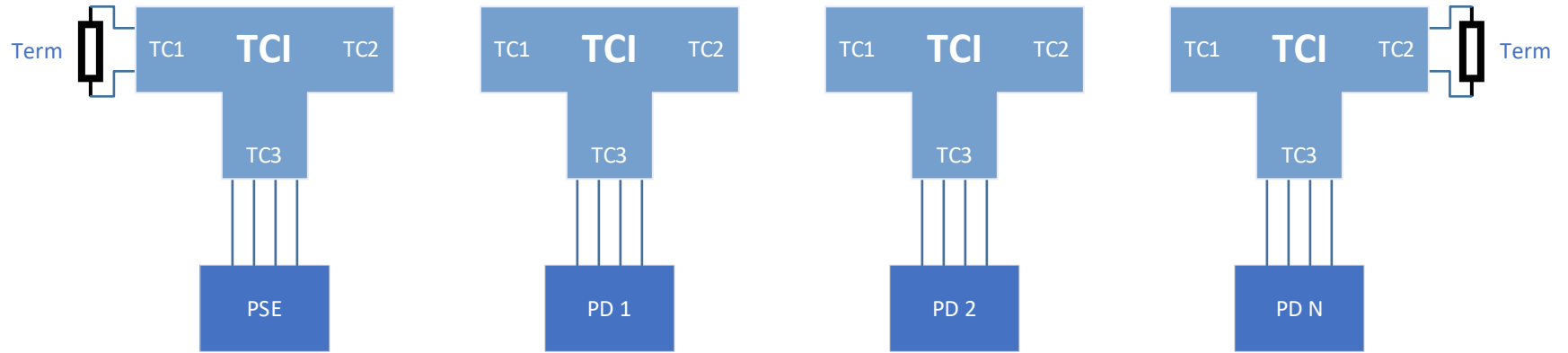- Now suggesting the following objective change:

~~Objective 10. PSE shall only energize the mixing segment when at least one PD is connected~~

Objective 11. Support addition and removal of a node or set of nodes to a continuously operating powered mixing segment
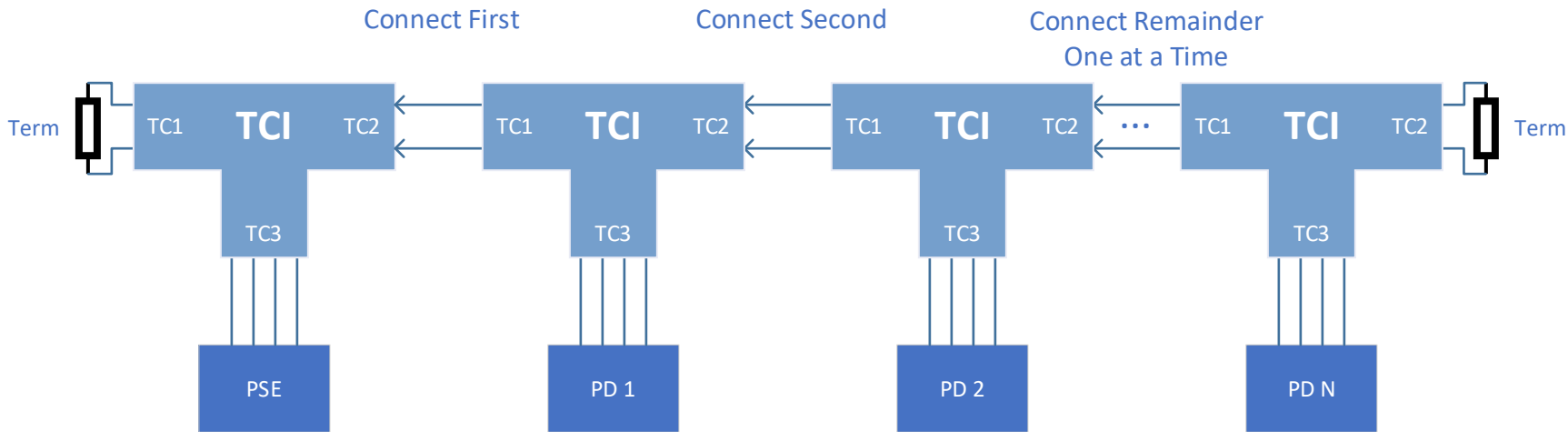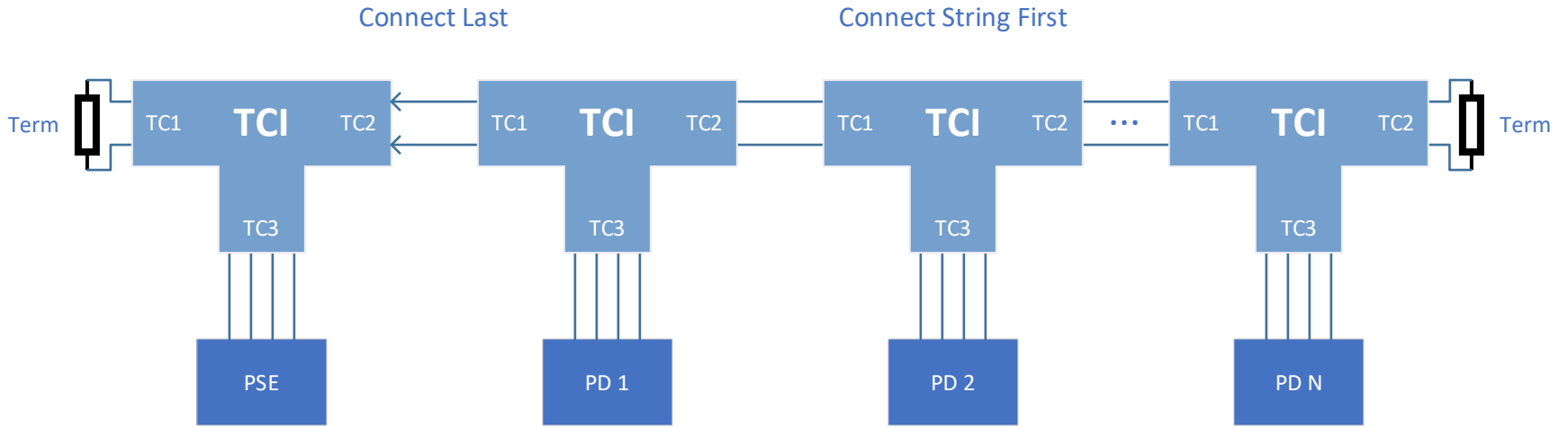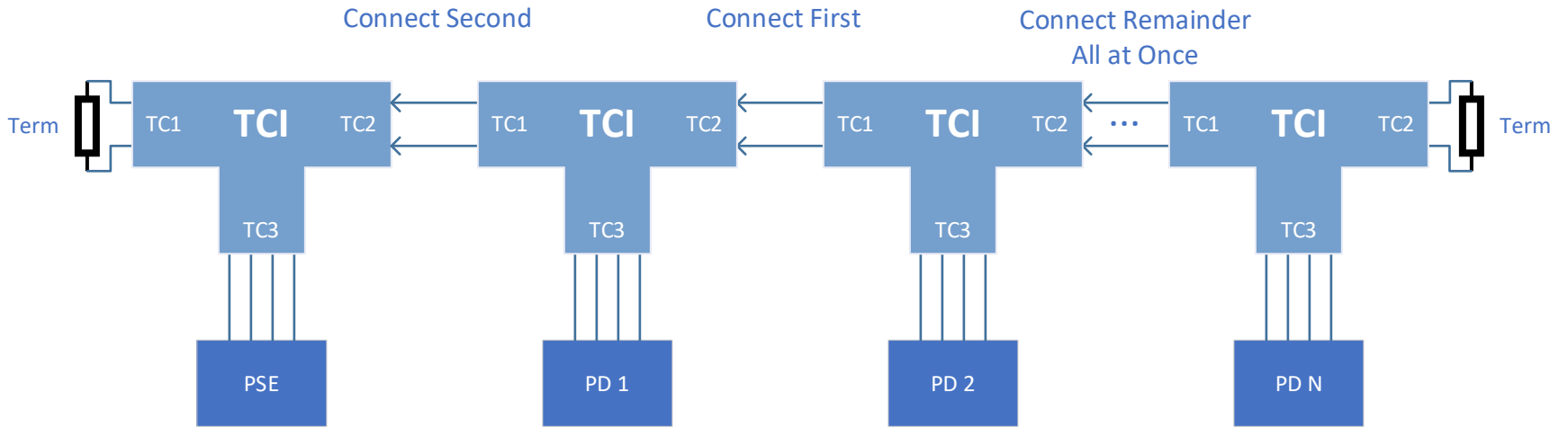
Rationale

Final mixing segment configuration

Initial mixing segment configuration

Connect First   Connect Second   Connect Remainder
                                           One at a Time

Term | TC1 | **TCI** | TC2 | TC1 | **TCI** | TC2 | TC1 | **TCI** | TC2 | ··· | TC1 | **TCI** | TC2 | Term

TC3   TC3   TC3   TC3

PSE   PD 1   PD 2   PD N

Can assemble one by one…

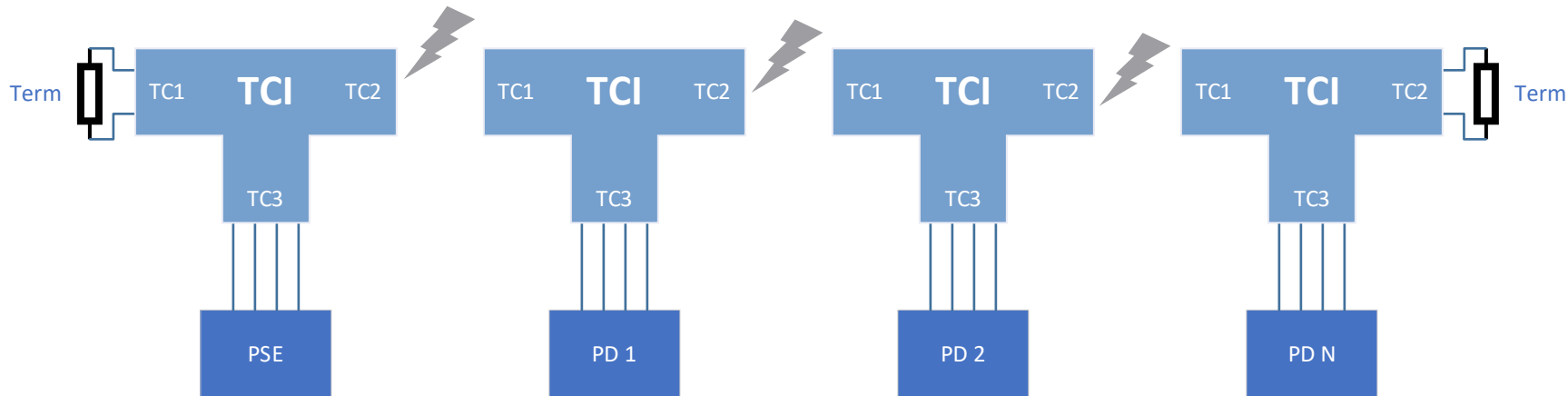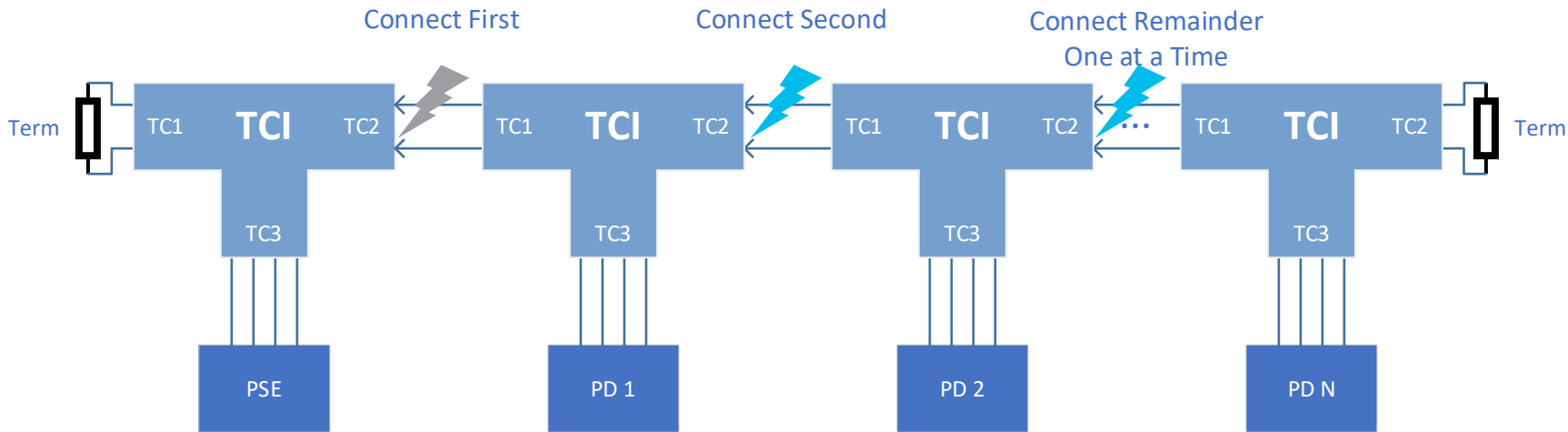Or assemble string, then connect PSE

Or any permutation of this…

What about Objective 10?

- Objective 10 asks us to only energize the mixing segment when at least one node is present
  - This was intended to prevent energized terminals from being exposed

- Well meaning, but doesn't solve a real problem

- Let's review the connection scenarios **with** Objective 10, but this time identifying the energized terminals with this symbol ⚡ and deenergized terminals with ⚡
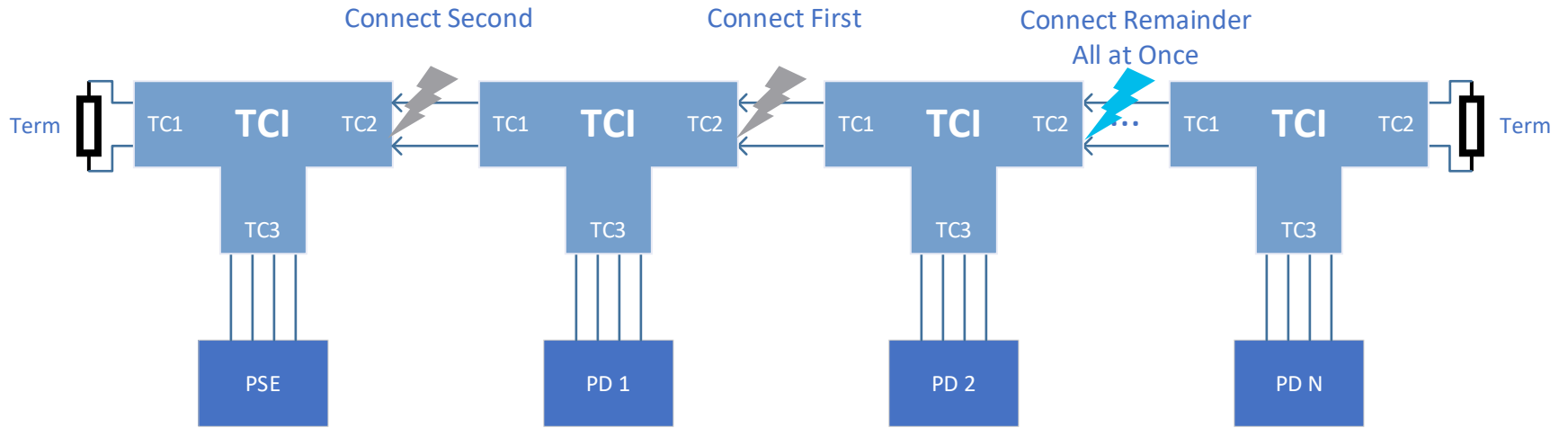 - Note: Icons are used to indicate state of terminals at the time of physical connection

Initial mixing segment configuration

Can assemble one by one…
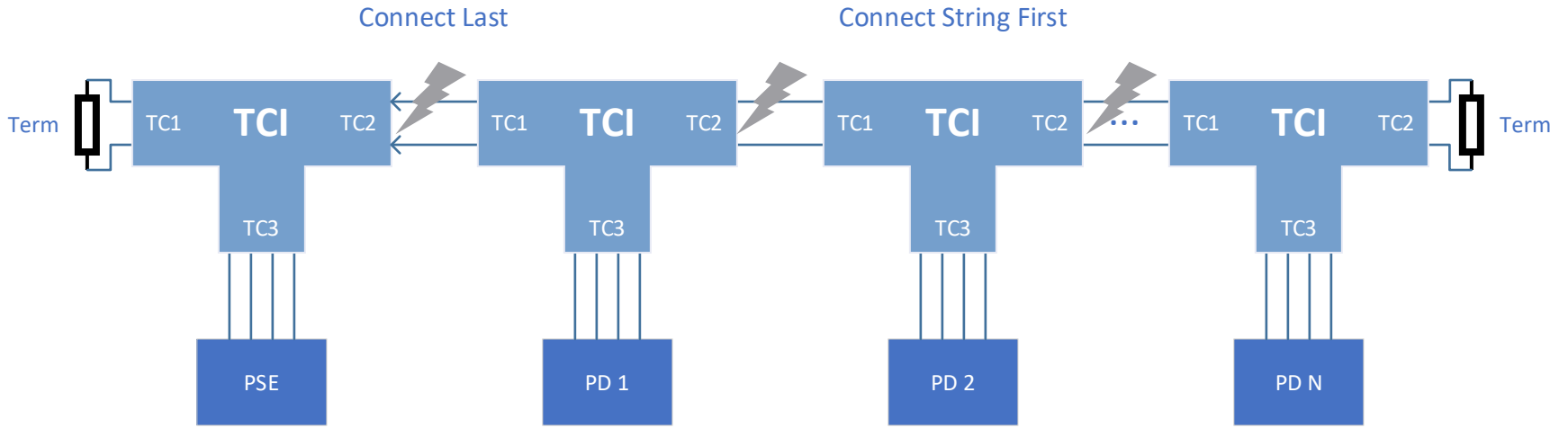
Or assemble string, then connect PSE

Or any permutation of this…
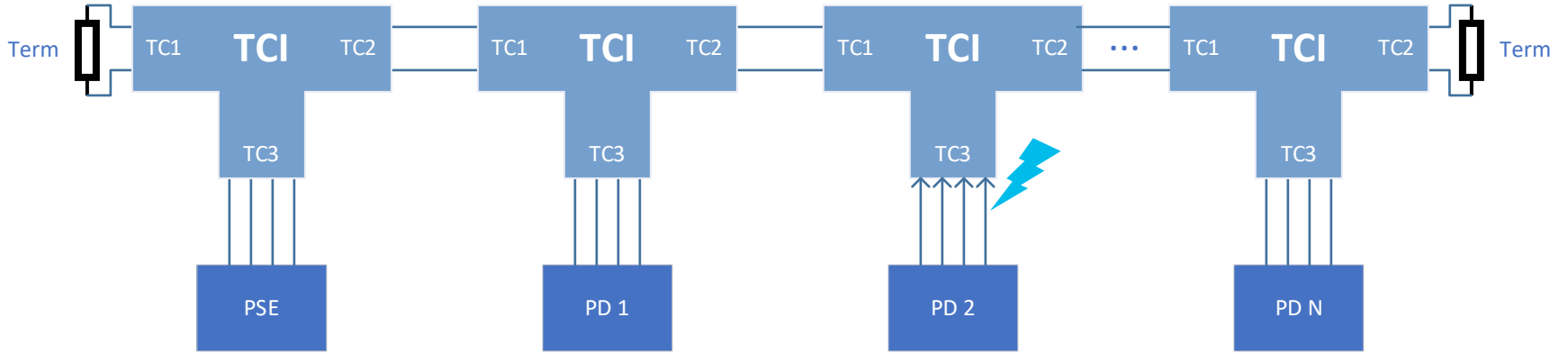
Other outcomes exist when PDs are replaced at TC3

Outcome of Following Objective 10

- State of terminal energization is difficult to predict

- Detecting and turning on when the first group of any size (1, 2, … N nodes) is attached only addresses a minority of topology changes

- All other topology changes result in exposed terminals and no detection is performed

Proposal – Drop Objective 10 Entirely

- Consistency and predictability of system behavior is more valuable than additional safeguards on a fraction of topology change cases

- Results in lower PSE implementation complexity
  - PSE enforces current limits only

- Results in roughly the same PD implementation complexity
  - No detection signature required (minor)
  - Inrush limiting required to avoid disrupting the operating powered segment, but this is required even with Objective 10

Safety Concerns

- The removal of detection only increases the number of cases with energized terminals, which was already non-zero

- Existing voltage classes meet SELV and LPS limits, so from a product safety perspective, there is no hazard

- From a guarding perspective, numerous solutions exist to meet the 50V OSHA guarding requirement:
  - Connectors which guard terminals
  - Choosing to operate at 30V
  - Define new power classes < 50V for wider compliance

Objective Modification Draft

Proposed Objective Changes

~~Objective 10. PSE shall only energize the mixing segment when at least one PD is connected~~

Objective 11. Support addition and removal of a node or set of nodes to a continuously operating powered mixing segment

- Objective 11 is under review as part of the larger objective review and this is not to be considered an endorsement of leaving that text unchanged, but instead a deferral to the group's will in making appropriate modifications to Objective 11.

Questions and Discussion