802.3da Hot Add Objectives

Proposal to replace 802.3da Objectives 10 & 11

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Objective

Objective 10

- Great objective

- Builds on the safety story currently used to encourage PoE adoption

- Avoids unguarded contacts over 50V which is a current topic of debate in the regulatory domain

PSE shall only energize the mixing segment when at least one PD is connected

Objective

- Defeats the safety feature provided in Objective 10

- Ignores the disruption of the data channel due to termination removal

- Final system will most likely not have the user experience intended by Objective 11

Objective 11

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

Proposed Alternative Approach

Safety Criteria around Guarding

- The North American National Electrical Code (NEC) and the United States Occupational Safety and Health Administration (OSHA) both have requirements around guarding

- Definition of Guarded Per NEC:
    Covered, shielded, fenced, enclosed, or otherwise protected by means of suitable covers, casings, barriers, rails, screens, mats, or platforms to remove the likelihood of approach or contact by persons or objects to a point of danger.

- A mated connector pair meets this criteria

- The voltage threshold for unguarded contacts is 50 V AC or DC

- **Current Clause 104 Powering (PoDL) is under this threshold during detection and classification**

Concerns for "Hot Add" in SPMD Mixing Segments

- A functioning mixing segment is terminated at both ends, and addition of a new node or string of nodes requires removal of this termination
  - The timeframe of these events in anywhere from seconds to minutes
  - During this time, all nodes downstream of the insertion point are powered down
  - During this time, communications is disrupted and perhaps impossible

- Upon reassembly of the mixing segment, any network management entity will have to reevaluate the mixing segment to detect changes in topology, DPLCA/PLCA posture, and power budgeting

- Leaving the power on during this topology change event is likely to violate guarding requirements when >50V power classes are used
  - This is primarily caused by the "out" port of the last powered device

Possible Solutions

- "Tourniquet" approach
  - All nodes equipped with a switching element on their output
  - When downstream nodes are lost (mechanism of detection TBD) the last node in line turns off the output switch to deenergize the output port and engages termination automatically to keep the segment alive
  - When a new device is reattached, the last node in the topology performs detection and classification as prescribed the standard and turns on the output switch as directed

- Full reset approach
  - When downstream nodes are lost (mechanism of detection TBD) the PSE removes power from the mixing segment
  - When the mixing segment has been reassembled, the system repeats the cold start procedure instead of executing a specialized hot add procedure

Challenges Around Topology Change Detection

- Detecting a topology change using protocol may take significant time, potentially negating the benefits of the cold start and violating guarding requirements

- Detecting topology changes based on the power posture may prove onerous when attempting to differentiate between a segment which has had powered nodes removed and one which simply no longer requires power due to secondary power sources

- Detecting loss of termination may be our best approach, but also may be easier said then done

Objective Modification Draft

Proposed Objective Changes

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~~

Questions and Discussion