

Pair-set Coherency

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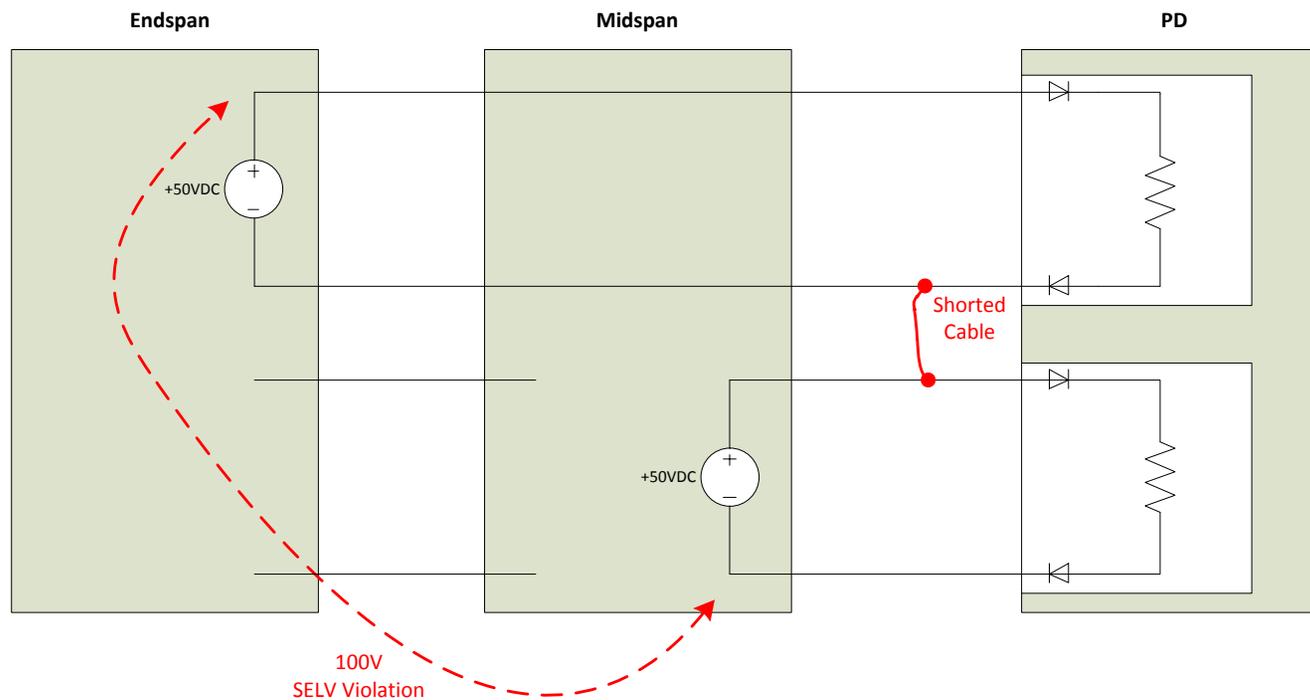


Purpose

- Ensure pair-sets act in coordination
 - To address SELV violations
 - To avoid multiplicity of pair-set states

SELV Violation

- As discussed in IEEE 4-Pair task force simultaneously powering a cable with an Endspan and Midspan PSE can lead to SELV violations



How to Avoid 4P SELV Problems

- Shorten or Remove T_{PON} for Type 3/4
- Modify PD state machine definition of present_det_sig
 - Dual PD signatures must corrupt pair-set B signature if pair-set A is $V_{PD} > V_{Reset}$
 - And vice versa
- Type 3/4 PSEs with dual detection capability shall not power an Rgood – !Rgood combination

Multiplicity of Pair-set States

- PSE and PD state machines present and react to the electrical state of the link
 - Pair-sets inherently have fully orthogonal electrical states
 - A single PSE (or PD) state machine cannot be in two states simultaneously
- Changing the 802.3 Layer Management one-to-one relationships has repercussions for the larger 802.3 committee

State Machine or Machines?

- Two options exist:
 - One state machine shuts power off if either pair-set experiences a fault
- Or
- Two state machines, one per pair-set

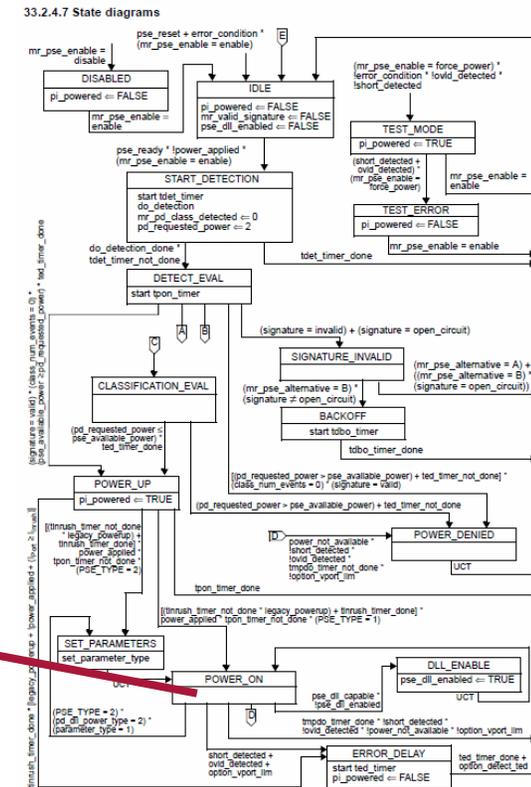
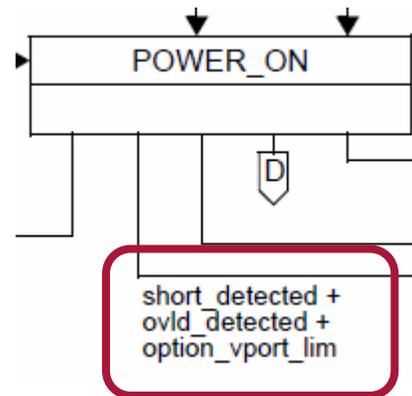


Figure 33-9—PSE state diagram

IEEE 802.3 Layer Management

- 802.3-2012 has defined data structures and objects to describe and relate CSMA/CD sub-systems
- As specified today, the data object (oPHY) is the parent of exactly:
 - 1 PSE object (oPSE)
 - 1 PD object (oPD)

Existing Data Structures are 1-to-1

- 1 oPHY relates to:
 - Exactly 1 oPSE
 - Exactly 1 oPD

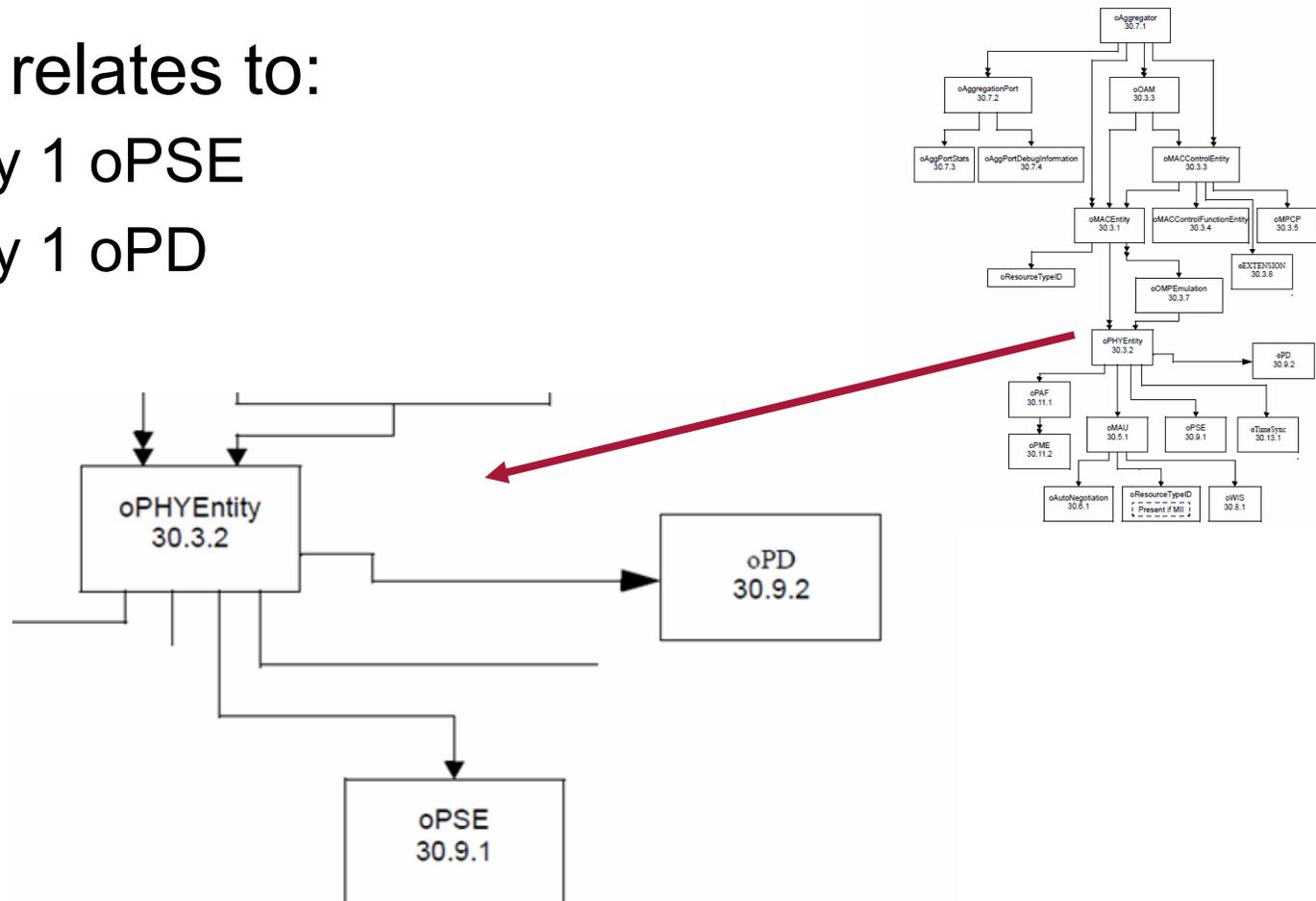


Figure 30-3— DTE System entity relationship diagram

oPSE Data Structure Field Example

aPSEPowerDetectionStatus has 6 possible states

30.9.1.1.5 aPSEPowerDetectionStatus

ATTRIBUTE

APPROPRIATE SYNTAX:

An ENUMERATED VALUE that has one of the following entries:

disabledPSE disabled

searchingPSE searching

deliveringPowerPSE delivering power

testPSE test mode

faultPSE fault detected

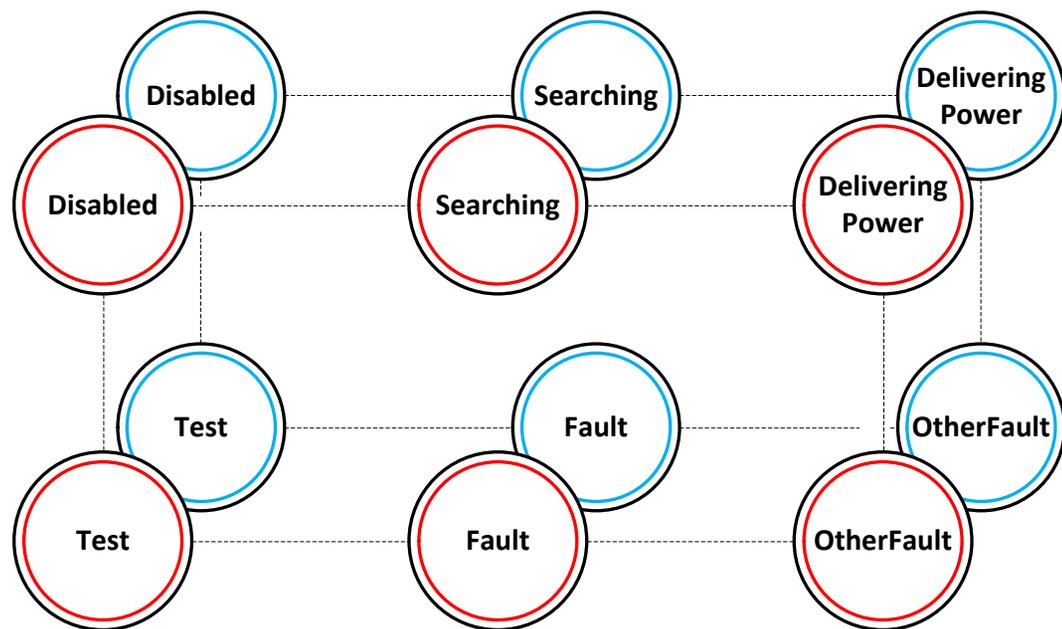
otherFaultPSE implementation specific fault detected



Multiplicity– Two State Machines

If two state machines are used to track Alt A vs Alt B state the existing IEEE 802.3 Layer Management structure is violated

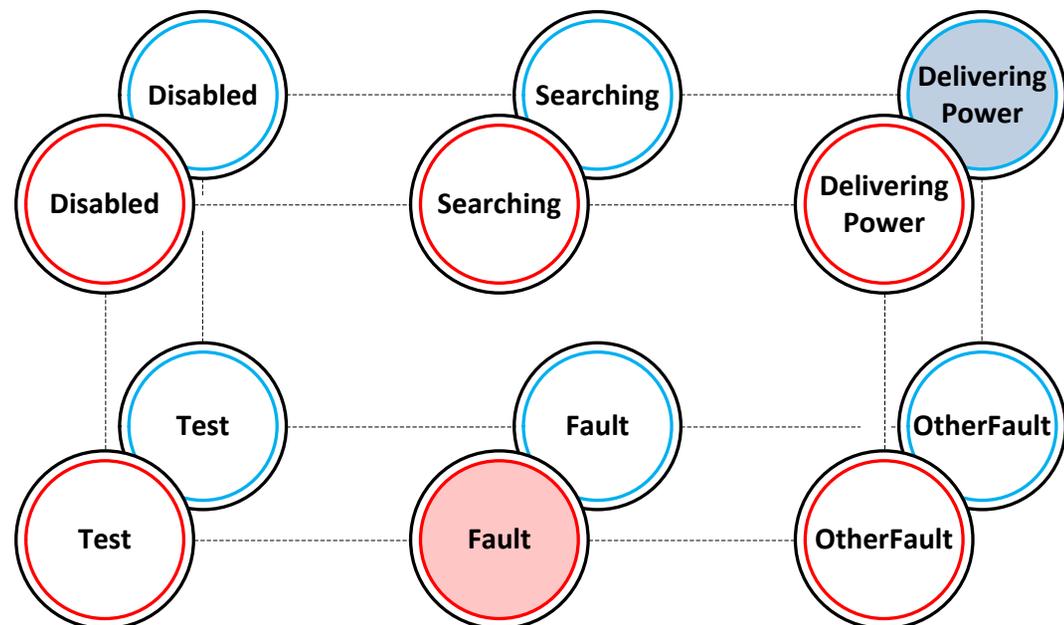
Alt A State
Alt B State



Fault Event – Two State Machines

- A fault on Alt A results in incoherent states
 - oPSE(A). aPSEPowerDetectionStatus = faultPSE
 - oPSE(B). aPSEPowerDetectionStatus = deliveringPowerPSE

What state is the PSE in?



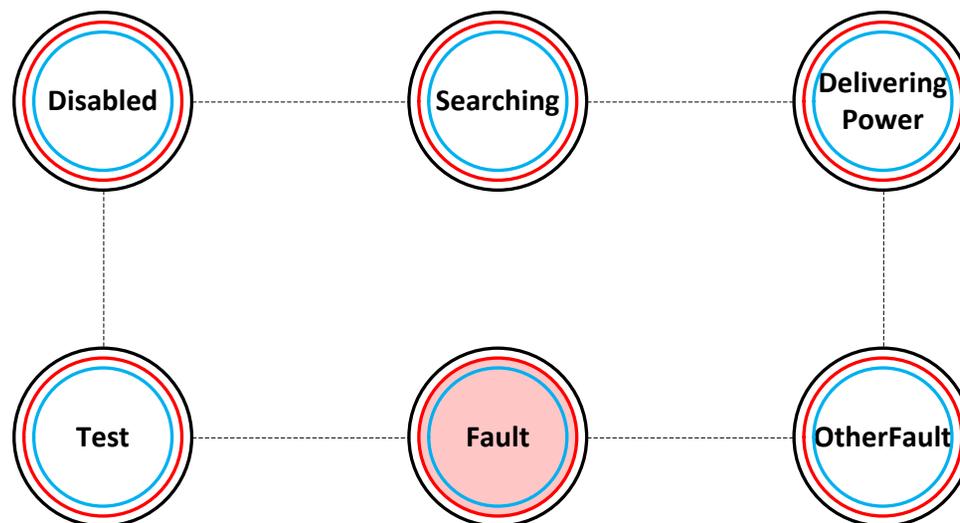
Alt A State

Alt B State

Fault Event – One State Machine

- Fault on Alt A turns off power on Alt A & B
 - oPSE. aPSEPowerDetectionStatus = faultPSE
- One oPSE object and one PSE State Machine
 - Power Alt A & B on together
 - Fault Alt A & B off together

Alt A State
Alt B State



Conclusion

- Specify one and only one oPSE and oPD
- Specify one and only one PSE and PD state machine
- Turn pair-sets on together
- Fault pair-sets off together
 - OR'ed fault response
- Only apply power if both pair-sets report R_{GOOD}