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Introduction

The action item that I was tasked with following the LLPD ad hoc meeting on July 5, 2017 was to suggest text that described how PSEs and PDs get in sync when exchanging LLDPDUs. As I considered what was required to provide that 'knowledge' at either end of the connection, I determined that this will also require changes to State diagrams and additional variables.

I don't have a source copy of the state diagrams (also don't have access to Frame Maker), so I have captured the new variable definitions below, along with a discussion of the related conditions and suggestions for where they would be used in the state diagrams. This is just a starting point to get the conversation started regarding the topic of transitioning between 2 pair and 4 pair powering - I fully expect that this will require additional work outside the scope of simply suggesting text (see comments below).

Overall premise of the suggested language: a PSE is the entity that furnishes power, and is the only entity that chooses whether the power is furnished via 2 pairs or 4 pairs.

The crucial piece of information that is missing from the existing LLDP state diagrams, related variables, functions, and text that describes state transitions across a link is how the PSE is furnishing power – i.e. over 2 pairs or 4 pairs.

Clause number and figure references are from the document IEEE_P8023bt_DRAFT_2p5.pdf, 16 June 2017.

Text to be added to the specification shown below in a text boxes with light gray background.

State Diagram Condition that governs which PSE State Diagram is used for Dual Signature PD

Need new variables, to be added to 145.5.3.3.1, and 145.5.3.6.1:

power_pairsx

A variable which represents the value of the Power status field PSE power pairs bits.

Values:
both
A
B

Mirroredpower_pairsxEcho

The copy of the Power status field PSE power pairs bits received from the remote system.

The condition that controls initial use of the state diagram Figure 145-39 needs to be extended to correspond to the existing text in the paragraph immediately below 145.5.3.3:

sig_type = single + (sig_type = dual * !power_pairsx = both)

MISSING TRANSITION

Condition and related state transition that defines what to do when changing power_pairsx from ***A*** or ***B*** to ***both***. This would require a transition to the state diagram in Figure 145-43 based on this condition:

(sig_type = dual * power_pairsx = both)

It appears that this would be a transition from PSE_POWER_REVIEW, which would have been initiated by the change from 2 pair to 4 pair causing 'local_system_change' to be set TRUE.

NOTE that the title of Figure 145-39 in 145.5.3.3.3 needs to be extended to:

Figure 145–39—PSE power control state diagram for single-signature PDs or dual-signature PDs when powered over 2 pairs.

The condition that controls initial use of the state diagram Figure 145-43 needs to be extended:

(sig_type = dual * power_pairsx = both)

MISSING TRANSITION

Condition and related state transition that defines what to do when changing power_pairsx from ***both*** to ***A*** or ***B***. This will require a transition to the state diagram in Figure 145-39 based on this condition:

(!power_pairsx = both)

It appears that this would be a transition from PSE_POWER_REVIEW, which would have been initiated by the change from 4 pair to 2 pair causing 'local_system_change_alt(X)' to be set TRUE.

PD State Diagram changed for Dual Signature PD

Need new variables to be added to 145.5.3.4.2 and 145.5.3.7.2, to be consistent with the proposed changes adding them as a mechanism to insure that the PSE and PD are in sync:

power_pairsx

A variable which represents the value of the Power status field PSE power pairs bits received from the remote system.

Values:
both
A
B

Mirroredpower_pairsx

The copy of the Power status field PSE power pairs bits last echoed to the remote system.

As discussed during the ad hoc, when the Dual Signature PD is furnished power over 2 pairs, it needs to start using PDRequestedPowerValue, PSEAllocatedPowerValueEcho, etc.., effectively following the Single-signature PD State diagram (Figure 145–41). However, that diagram has no concept of pulling the PDRequestedPowerValue from PDRequestedPowerValue_mode(X) (which is where the ad hoc has determined this comes from when powered over 2 pairs), so either the Single-signature PD State diagram needs to be modified to show these variables being used, or the Dual-signature PD State diagram (Figure 145–44) needs to be modified to include the states that model the behavior when being furnished power over 2 pairs instead of 4 pairs.

802.3bt D2.5 State Change procedure description text

145.5.4.1 PSE state change procedure across a link (single-signature)

A PSE is considered to be in sync with the PD when the value of PSEAllocatedPowerValue matches the value of MirroredPSEAllocatedPowerValueEcho. When the PSE is not in sync with the PD, the PSE is allowed to change its power allocation.

Suggest that this should be changed to:

> A PSE is considered to be in sync with the PD when the value of PSEAllocatedPowerValue matches the value of MirroredPSEAllocatedPowerValueEcho, and power_pairsx = Mirroredpower_pairsxEcho. When the PSE is not in sync with the PD, the PSE is allowed to change its power allocation.
>
> If transitioning from 2 pair to 4 pair powering, the PSE will initially signal the transition by changing the value of power_pairsx to **both**. From this point, the PSE will use the PSE state change procedure across a link defined in 145.5.5.1

There is still missing information, such as how this change interacts with the L1 State diagrams. For example, wouldn't the action of deciding to furnish power to the pairset that up to this point has not been powered cause a traversal of the relevant states in the State diagram in 145.2.5.7? Wouldn't it be prudent for the LLDP power management layer to hold off, and NOT indicate that power_pairsx = both until power has been successfully furnished at L1? What if something has occurred in the PD that leads to a class error, over current error...when re-powering?

145.5.4.2 PD state change procedure across a link (single-signature)

A PD is considered to be in sync with the PSE when the value of PDRequestedPowerValue matches the value of MirroredPDRequestedPowerValueEcho. The PD is not allowed to change its maximum power draw or the requested power value when it is not in sync with the PSE.

Suggest that this should be changed to:

> A PD is considered to be in sync with the PSE when the value of PDRequestedPowerValue matches the value of MirroredPDRequestedPowerValueEcho, and power_pairsx = Mirroredpower_pairsx. The PD is not allowed to change its maximum power draw or the requested power value when it is not in sync with the PSE.

145.5.5.1 PSE state change procedure across a link (dual-signature)

A PSE is considered to be in sync with the PD when the value of PSEAllocatedPowerValue_alt(X) matches the value of MirroredPSEAllocatedPowerValueEcho_alt(X). When the PSE is not in sync with the PD, the PSE is allowed to change its power allocation.

Suggest that this should be changed to:

A PSE is considered to be in sync with the PD when the value of PSEAllocatedPowerValue_alt(X) matches the value of MirroredPSEAllocatedPowerValueEcho_alt(X), for both Alternatives A and B, and power_pairsx = Mirroredpower_pairsx. When the PSE is not in sync with the PD, the PSE is allowed to change its power allocation.

If transitioning from 4 pair to 2 pair powering, the PSE will initially signal the transition by changing the value of power_pairsx to **A** or **B**. From this point, the PSE will use the PSE state change procedure across a link defined in 145.5.4.1.

Since power is being removed, this case does not have all of the additional error possibilities that arise when going from 2 pair to 4 pair powering. However, there is still a question of timing - does the PSE change power_pairsx, wait for sync, then remove power?

145.5.5.2 PD state change procedure across a link (dual-signature)

A PD is considered to be in sync with the PSE when the value of PDRequestedPowerValue_mode(X) matches the value of MirroredPDRequestedPowerValueEcho_mode(X). The PD is not allowed to change its maximum power draw or the requested power value when it is not in sync with the PSE.

Suggest that this should be changed to:

A PD is considered to be in sync with the PSE when the value of PDRequestedPowerValue_mode(X) matches the value of MirroredPDRequestedPowerValueEcho_mode(X), and power_pairsx = Mirroredpower_pairsx. The PD is not allowed to change its maximum power draw or the requested power value when it is not in sync with the PSE.