IEEE P802.3at Task Force
Power Via MDI Enhancements

Simultaneous Operation of ALT A and B

4P Adhoc

Suggested Remedy for all 4P comments + Addressing Task Force questions

July 2008

Previous meeting ad hoc attendees

Ken bennett	Sifos
Ionel Marius Vladan	AMIS
David Law	3COM
Rick Frosch	Phihong
Keith Hopwood	Phihong
Frank Yang	Commscope
Gaoling Zou	Maxim
Thuyen Dinh	Pulse
Eran Bello	Microsemi
Sanita' Gianluca	NSN
Stephen Sedio	Foxconn
Reshef Tamir	Microsemi
Pavlik Reimboim	Microsemi
Larry Shorthill	NXP
Mo Saboori	Pulse
Steve Sedio	Foxconn
Thong Huynh	Maxim
Harmik Singh	Maxim
Geoff Thompson	Nortel

May-June ad hoc Meeting attendees

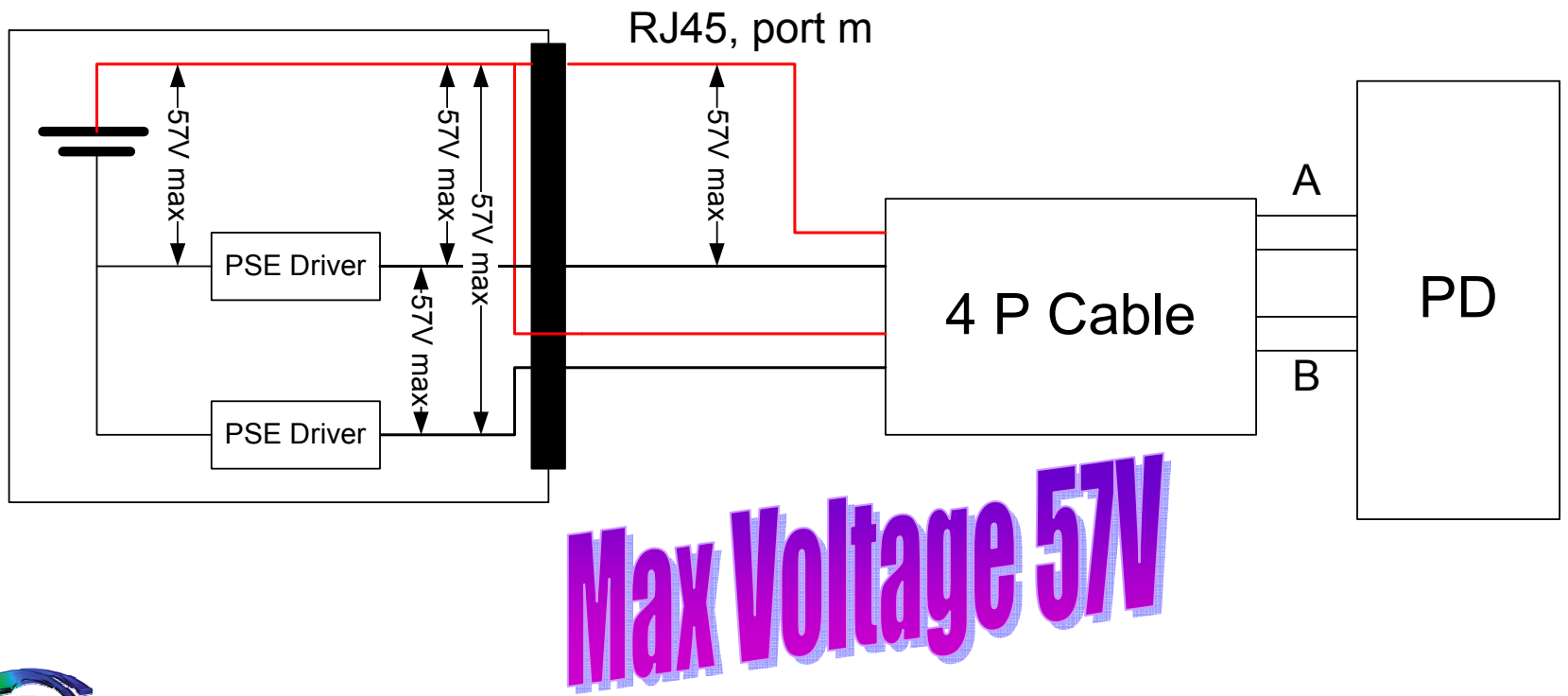
Rick Frosch	Phihong
Clay Stanford	LT
James Lundberg	Intermec Corporation
Ionel Marius Vladan	AMIS
Gaoling Zou	Maxim
Mohamad Saboori	Pulse
Randy Rannow	Tyco electronics
Keith Hopwood	Phihong
Christophe Gouwy	ON Semiconductor Belgium

Addressing Task Force questions
July 16, 2008

Isolation and 120V issue

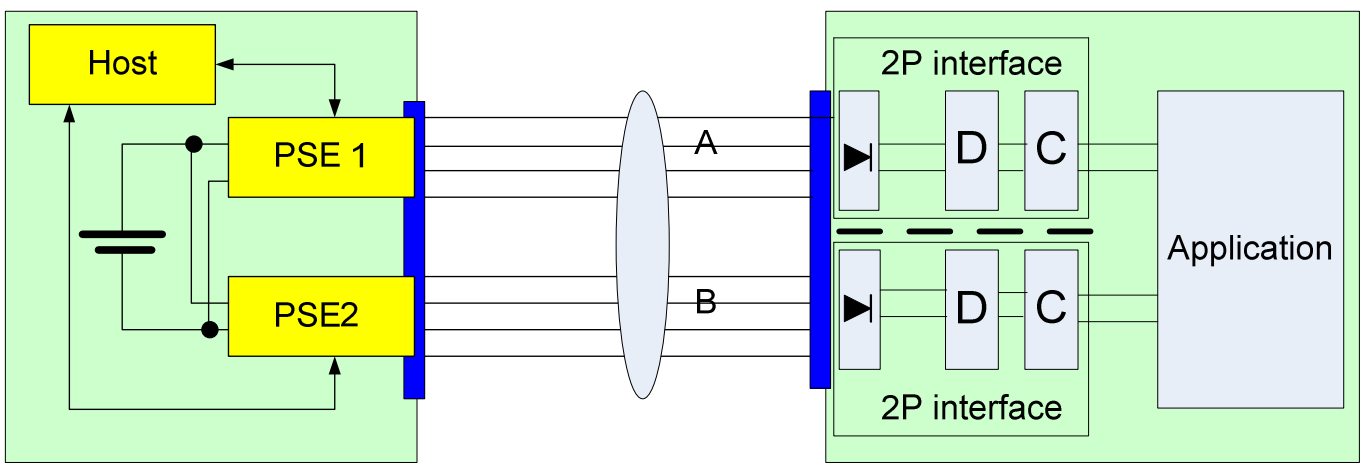
- Per the proposal: Simultaneous operation ALT A and B PSE sources that are located at different link segments are not allowed.

  Only the following configuration is allowed.



L1 , L2 Operation

- These are TWO power system. BOTH have Detection, Classification, Powerup and Power ON states.
- PSE 1 ALT A – 2F **or** L2+1F **or** L2+2F:Detect, Classify, Power ON ➔ Works
- PSE 2 ALT B - 2F **or** L2+1F **or** L2+2F:Detect, Classify, Power ON ➔ Works
- PD ALT A input: Supports L1-2F and L2
- PD ALT B input: Supports L1-2F and L2
- Data of Status, Indications etc. may be passed via internal communication in PSE and PD ➔ Implementation. **THE IDEA IS: EACH 2P MUST MEET THE 2P SPEC!**



PD – PSE interoperability

- PD work with all PSEs if PD implementer wants this option.
  No different than the current status.

PSE	PD	Operation	Compliance with:/Notes
Type 1	Type 1	Works	802.3af
Type 2	Type 2	Works	802.3at
Type 2	Type 1	Works	802.3at
Type 1	Type 2	Will not work	802.3at
		Works	-802.3at -If **PD** designed for dual mode
Type 1	2 x Type 2	Works	-If **PD** designed for Triple mode
Type 2	2 x Type 2	Works	-If **PD** designed for Triple mode
2 x Type 2	2 x Type 2	Works	-

Dual Mode: Works at <12.95W. Enhanced set of features at >12.95W

Triple Mode: Works at <12.95W. Enhanced set of features at >12.95W, More features with 2x2P

Current text of 802.3 and suggested Remedy – Proposal for Discussion

PSE section: 33.2.2 Page 22 line 49-52:

A PSE shall implement Alternative A or Alternative B, or both.

While a PSE may be capable of both Alternative A and Alternative B, PSEs shall not deliver power on ~~operate~~ both Alternative A and Alternative B simultaneously ~~on the same segment~~

If Alternative A and Alternative B are operated from different link segments or different power systems or from Type 1 PSE.

For Type 2 PSEs, simultaneous operation of Alternative A and Alternative B on the same link segment is out of scope of the standard.

PD section: 33.3.1 Page 49 line 41-42:

NOTE—PDs that implement only Mode A or Mode B are specifically not allowed by this standard. PDs that may simultaneously receive ~~require~~ power from both Mode A and Mode B are ~~specifically not allowed by~~ out of scope of this standard.

Original Text

~~Suggested to delete~~

New text

Previous Material

Agenda

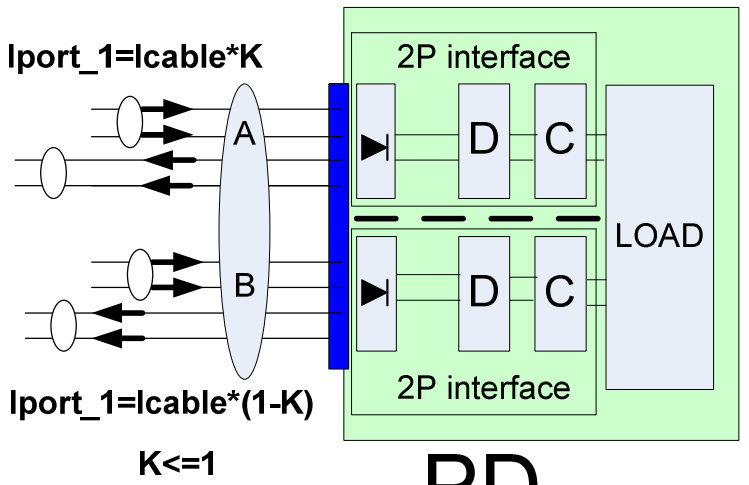
- Background
- Demonstration of IEEE802.3af current text. Figure 1
- Current text after May 2008 comment resolution
- Updated Group Consensus from March 2008
- Suggested Remedy options
- Current text of 802.3 and suggested Remedy – Proposal for Discussion
- Discussion
- Previous reference material

Background

- In January interim a proposal was made for resolving the 4P bucket.
- The proposal was based on treating the simultaneous operation of ALT A and ALT B both in PSE or PD as “out of scope of the standard” in similar way to the 1G Midspan in the 802.3af.
- The ideas behind this approach according to the supporters:
  - Reduce the amount of new requirements to the specification.
  - Not to disallow solutions that are feasible and coexist with 802.3
- Some members of the group raise questions regarding if there are interoperability issues if we leave the text just as “out of scope” and may be we should add some text to exclude some configurations.
- The purpose of the ad hoc is to learn the subject and come up with recommendations for the desired text.
- On March 2008 we agreed that if ALT A and B are coming from the same segment/box/power supply/Type 2 PSE it works. The other configurations should be excluded.

Demonstration of IEEE802.3af current text. Figure 1

This PD is equivalent in power requirements to figure 1-1. The difference is different implementation.



However according to the current text, we can't do it..

Figure 1-2

This is what we allow today

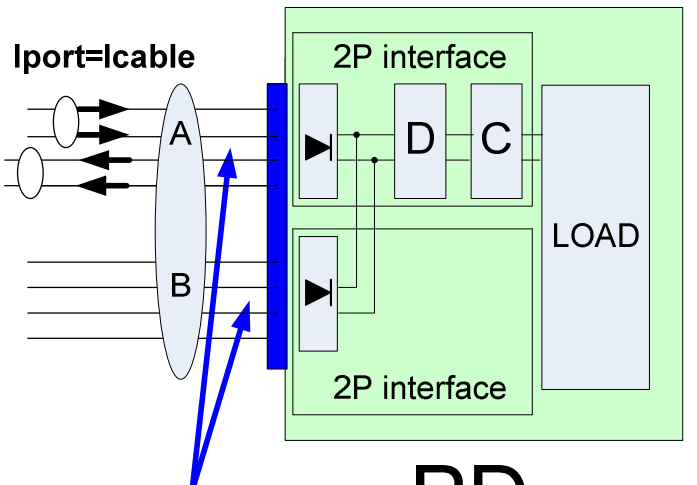


Figure 1-1

Both PDs will work with any PSE (2P, 2x2P)

Adhoc agrees

Current text of Draft D3.0 after May 2008 comment resolution

- **PSE section: 33.2.2 Page 22 line 49-52:**
- A PSE shall implement Alternative A or Alternative B, or both. ~~, provided the PSE meets the constraints of 33.2.3. Implementors are free to implement either alternative or both.~~

  While a PSE may be capable of both Alternative A and Alternative B, *PSEs shall not operate both Alternative A and Alternative B on the same link segment simultaneously.*

- **PD section: 33.3.1 Page 49 line 41-42:**

  NOTE—PDs that implement only Mode A or Mode B are specifically not allowed by this standard. PDs that may simultaneously require power from both Mode A and Mode B are specifically not allowed by this this standard.

Adhoc agrees

Updated Group Consensus from March 2008

- Resolving N x 2P comments

  (1) With minimal changes in 802.3

  (2) No additional requirements for 2P PSE or PD specifications

  (3) allows flexible PD implementations and applications

  (4) allows simple and clear standard

- *To disallow the use of* configurations which include

  (1) Type 1 PSE

  (2) ALT A and ALT B that are coming from different segments and different power supplies

- To allow the configuration that meets the following requirements
  - ALT A and ALT B are both Type 2.
  - ALT A and ALT B are coming from the same port/box/segment.

Adhoc agrees

Suggested Remedy options

- (1) Disallow only specific configurations that may exhibit interoperability issues
- (2) Make simultaneous operation of ALT A and ALT B on the same segment “out of scope of the standard”
- (3) Delete the whole text referring to simultaneous operation
- (4) = (1) + (2) Preferred by the ad hoc
- (5) = (1) + Make simultaneous operation of ALT A and ALT B on the same segment optional 2nd best
- (6) other option ?

Ad hoc discuused all 5 options.
No other options were suggested.
Ad hoc prefers option 4.

Current text of 802.3 and suggested Remedy – Proposal for Discussion

PSE section: 33.2.2 Page 22 line 49-52:

A PSE shall implement Alternative A or Alternative B, or both.

While a PSE may be capable of both Alternative A and Alternative B, PSEs shall not operate both Alternative A and Alternative B simultaneously ~~on the same segment~~ if Alternative A and Alternative B are coming from different link segments or different power systems or from Type 1 PSE.

For Type 2 PSEs, simultaneous operation of Alternative A and Alternative B on the same link segment is out of scope of the standard.

PD section: 33.3.1 Page 49 line 41-42:

NOTE—PDs that implement only Mode A or Mode B are specifically not allowed by this standard. PDs that may simultaneously receive ~~require~~ power from both Mode A and Mode B are ~~specifically not allowed by~~ out of scope of this this standard.

Original Text

~~Suggested to delete~~

New text

Adhoc agrees

Discussion

Previous Material

Background - Previous work - 802.3af

- Technical work regarding simulations operation of ALT A and ALT B was not done at the 802.3af project.
  - A 4P concept were presented on single slide w/o detailed discussion (confirmed with the presenter).
  - Popularity of 2P CAT3 cables installations were discussed as a potential reason for interoperability issues however this argument was not examined for potential solutions such 2x2P concept. In addition 2P cable argument is not relevant today as 4P cable installations are required (10/100/1000BT) and 2P cables are out of scope of the standard.
  - See CFI presentations
    - See page 10 at http://www.ieee802.org/3/power_study/public/july99/stapleton_1_0799.pdf
    - See page 8 at http://www.ieee802.org/3/power_study/public/july99/lehr_1_0799.pdf
  - No further discussions at Study group or Task Force
    - The reason was the belief that 15.4W is sufficient for most applications so we didn't invest time on it
    - It was not in the objectives nor at the promises of the CFI
    - Time pressure to meet the objectives and project time table hence no body bother to check or verify or discuss on it.
- If somebody has documented information on the subject from the 802.3af project, please send it to the 4P ad hoc.

Adhoc agrees

Background - Previous work - 802.3at

- Two concepts were discussed
- 1st concept: 4P PD as special PD type e.g. AF PD, 2P AT PD, 4P AT PD.
- 2nd concept: After a year or so of discussions we made a progress by recommending of more general approach which is Nx2P while 2P is the basic building block (see reference 3.10 at page 17) . This approach is significantly reducing the amount of work required to specify a 4P PD operation by requiring the PD will meet the requirements of 2P operation over each two pairs.
- See the reference list at the end of this presentation which addresses the following topics discussed at the group:
  - Technical feasibility
  - Economical feasibility
  - Market need and applications
  - Motions, Decisions and straw polls

Adhoc agrees

Proposed Coarse of action

- Investigating the "out of scope" proposal in addition to investigate interoperability issues in case we would like to exclude some configurations or all, or supply information at the informative section of the standard

Adhoc agrees

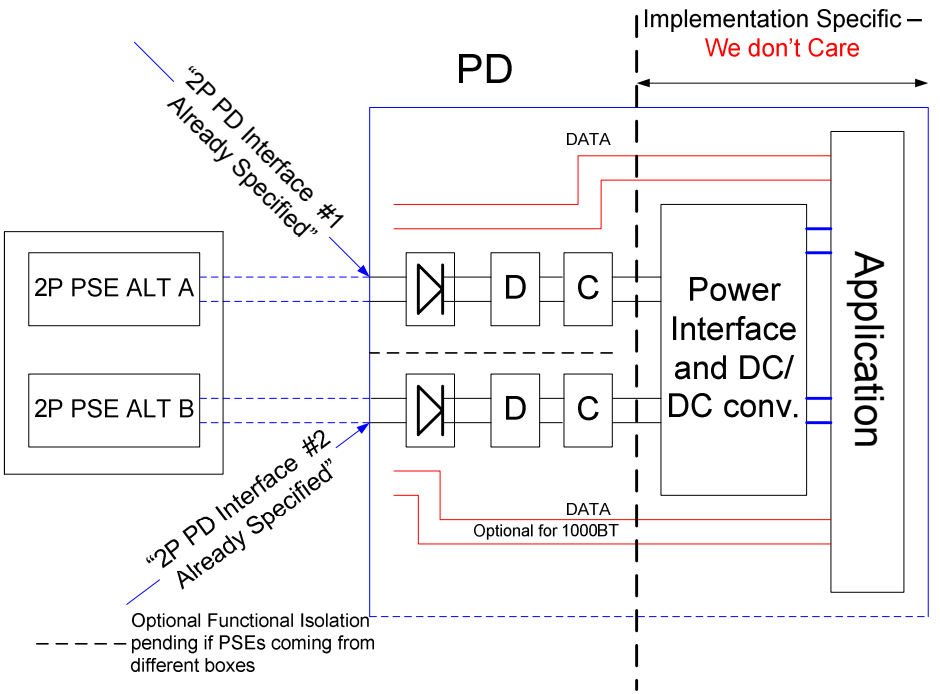
Changing Focus from March 2008 meeting

- During the add hoc meeting we had a consensus to limit the number of system configurations to 1.
  - Only 2x2P Type 2 allowed
  - All 2P pairs coming from the same box, same segment
  - The above allows interoperable configuration in 10/100/1000BT
  - No issues with L1, L2

Adhoc agrees

Proposed baseline concept for discussion

- PD
  - Receives multiple 2P power source
  - Each 2P in the PD has 2P interface and meets 2P system requirements
  - Power levels, Power partition and Power combining are the PD business pending on power level, applications and implementations as usual.
- PSE
  - Each PSE power source has to meet 2P requirements.

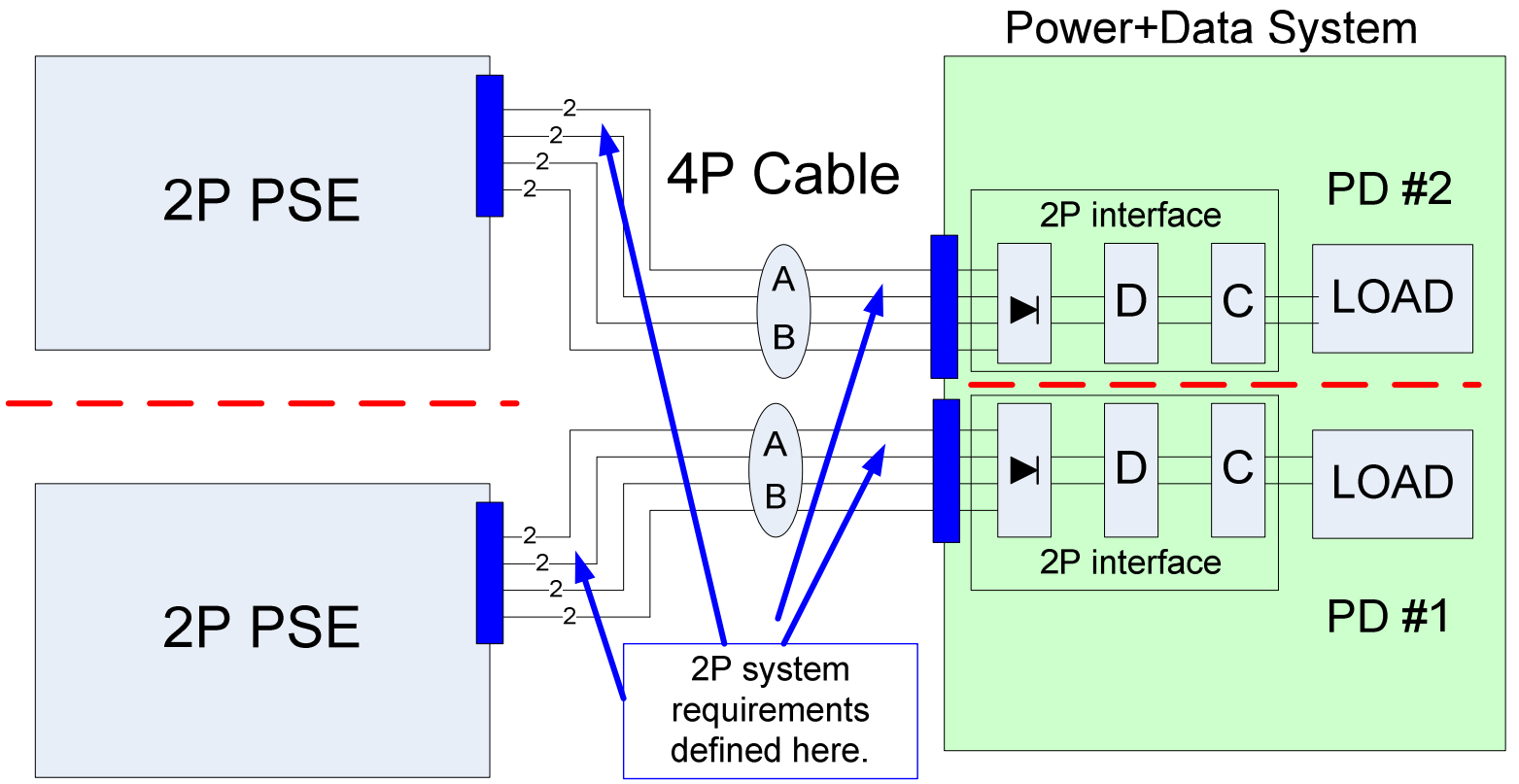


Adhoc agrees

2 x 2P concept Summary

- Due too the need that PD will support both ALT A or ALT B (33.3.1), current 802.3af/at is a 4P interface in any case. It is always 2x 2P interface.
- At each 2P at the RJ45, we see Detection, Classification, PD indication etc.
- 2P System is the basic building block. 4P powering system may be constructed by 2x2P independent systems
- N Pairs systems is constructed by N x 2P systems.
- Hence a PD that requires power over 4 pairs is actually a PD that is connected to 2x2P systems and each 2P system has all 2P functions.
- As a result, questions such:
  - Current sharing or not?
  - Current Balancing or not?
  - Interoperability issues
- Became easy to answer due to the fact that the multi 2P powering systems that is suggested herein doe's not require any correlation between the individual 2P powering sub system. Such correlation may be an implementation feature of the PD which is beyond the scope of this standard like any other implementation specific feature.

Today We Can Do The Following….Figure 2



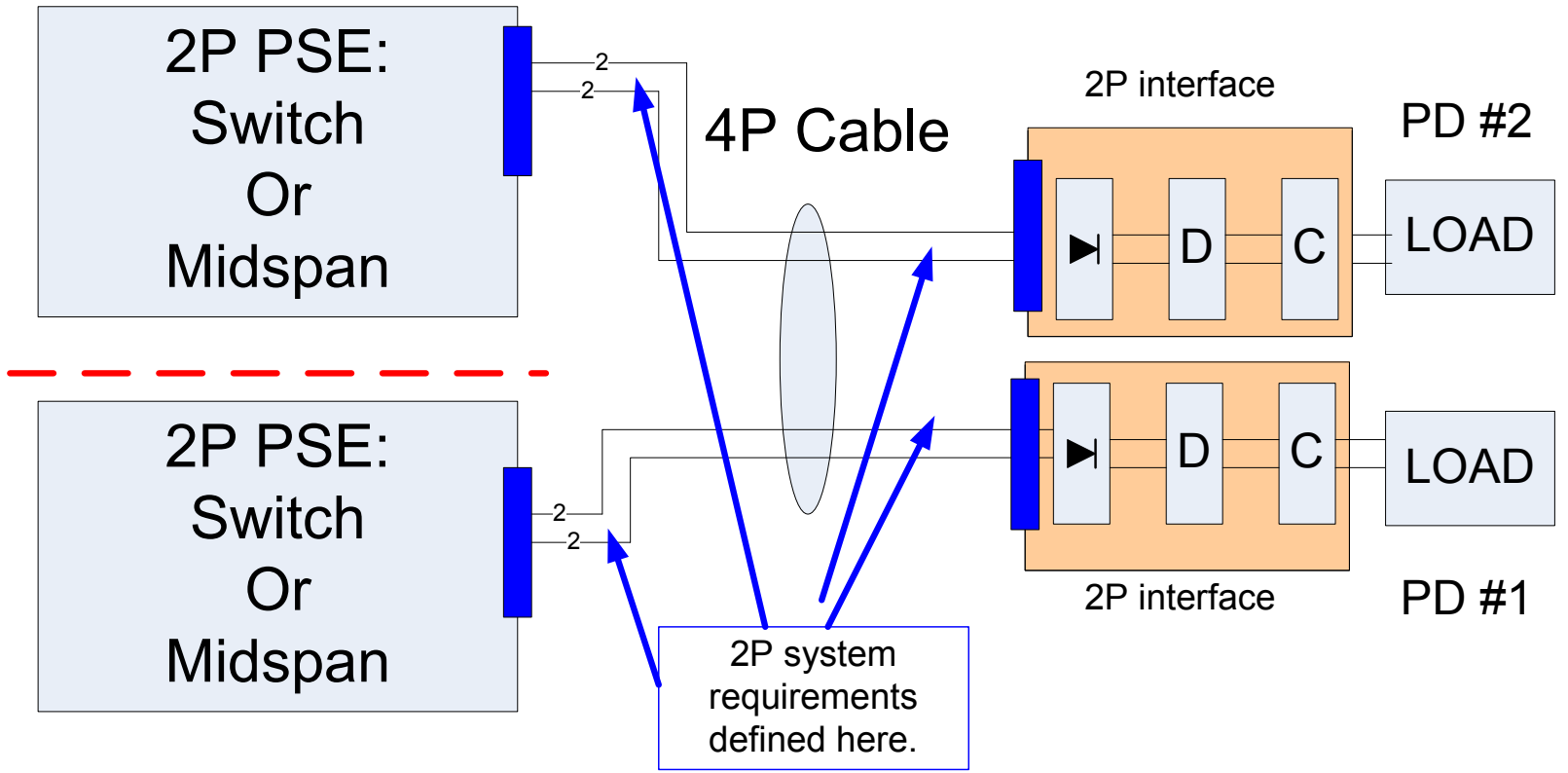
Environment A or B isolation as defined by IEEE802.3af

Connector. The 2 x 2P PSE may be located in the same or different box.

2 Cables. May be integrated to a single cables. All cables are simultaneously powered.

Adhoc agrees

The spec is not prohibiting Y connection – Figure 3



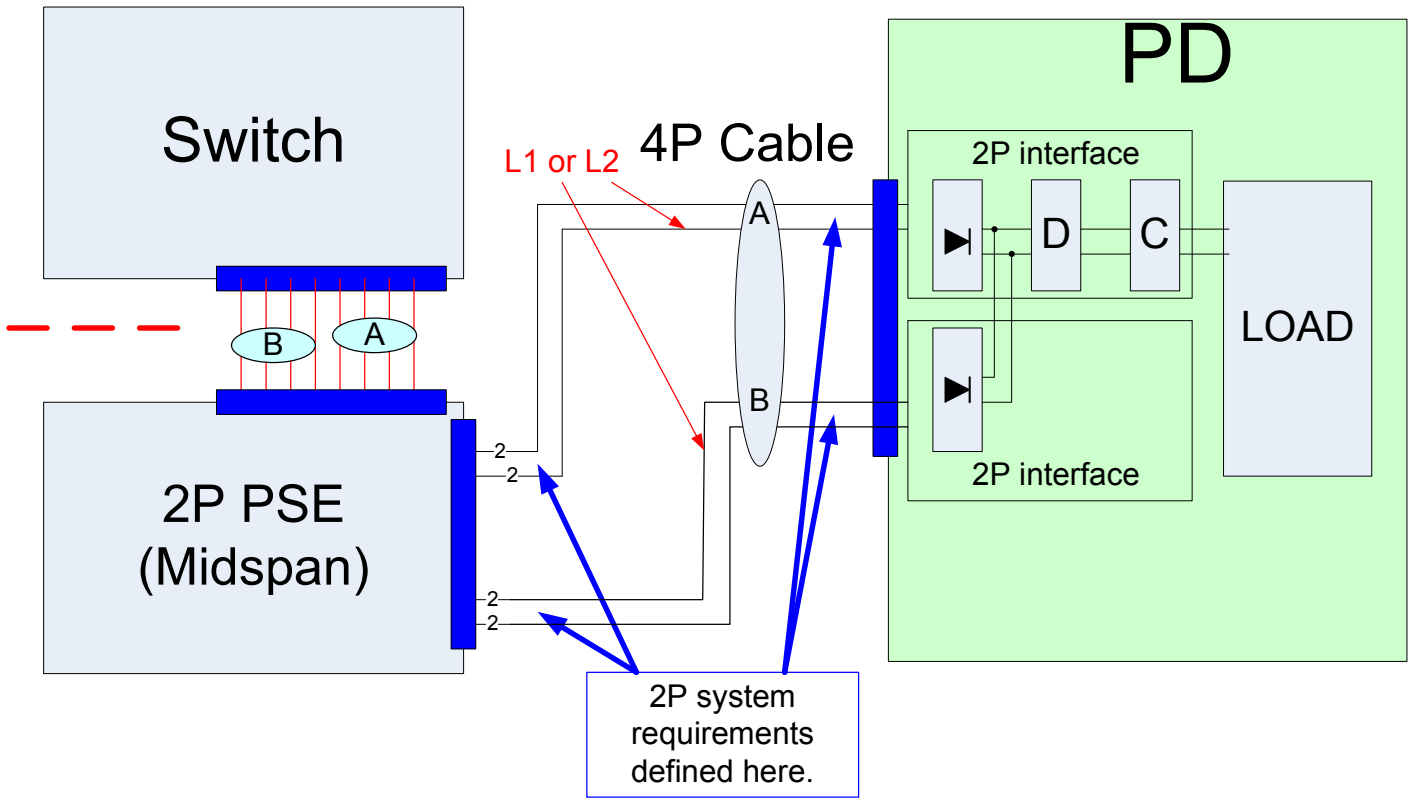
Environment A or B isolation as defined by IEEE802.3af

Connector. The 2 x 2P PSE may be located in the same or different box, on the same cable.

Simultaneous power all pairs.

Adhoc agrees

Mispan-Switch Combinations – Figure 4



Environment A or B isolation as defined by IEEE802.3af

Connector. The 2 x 2P PSE may be located in the same or different box, on the same cable.

Adhoc agrees.

List of references and previous discussions – preliminary

- **1. Market opportunities**
- http://www.ieee802.org/3/poep_study/public/nov04/Feldman_1_1104.pdf
- http://www.ieee802.org/3/poep_study/public/jan05/feldman_1_0105.pdf
- http://www.ieee802.org/3/at/public/jan06/darshan_1_0106.pdf
- http://www.ieee802.org/3/at/public/nov06/feldman_1_1106.pdf
- 2. **Economical Feasibility**
- http://www.ieee802.org/3/poep_study/public/jan05/darshan_1_0105.pdf
- http://www.ieee802.org/3/poep_study/public/mar05/darshan_1_0305.pdf
- http://www.ieee802.org/3/at/public/jan06/darshan_2_0106.pdf
- **3. Technical Discussions**
- http://www.ieee802.org/3/poep_study/public/mar05/darshan_1_0305.pdf
- http://www.ieee802.org/3/poep_study/public/may05/stanford_1_0505.pdf
- http://www.ieee802.org/3/poep_study/public/sep05/darshan_4_0905.pdf
- http://www.ieee802.org/3/poep_study/public/jul05/darshan_1_0705.pdf
- http://www.ieee802.org/3/at/public/nov05/dwelley_1_1105.pdf
- http://www.ieee802.org/3/poep_study/public/sep05/thompson_1_0905.pdf
- http://www.ieee802.org/3/at/public/jan06/darshan_1_0106.pdf
- http://www.ieee802.org/3/at/public/may06/darshan_1_0506.pdf
- http://www.ieee802.org/3/at/public/may06/altmann_1_0506.pdf
- ***http://www.ieee802.org/3/at/public/jul06/darshan_2_0706.pdf***
- **4. Technical Feasibility Demonstration**
- http://www.ieee802.org/3/poep_study/public/mar05/dupuis_1_0305.pdf
- http://www.ieee802.org/3/poep_study/public/mar05/nordin_1_0305.pdf
- **5. Consensus Proposals**
- http://www.ieee802.org/3/at/public/nov05/darshan_2_1105.pdf
- **6. Straw polls and motions for having 4P in the standard**
- http://www.ieee802.org/3/poep_study/public/sep05/minutes_0905.pdf