IEEE802.3at Task Force

802.3at Classification Ad Hoc

Possible PDs Market. Support it or not? This is the question.

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PowerDsine

Purpose of this presentation

- Focusing on the fact that what ever we do should meet our List of Objectives and 5 criteria.
- One of 5 Criteria requires Broad PDs Market.
- Broad PD market requires PDs Driven Architecture
- PDs Driven Architecture means
  - Flexible PD implementations as long as technically and economically feasible (also one of 5 Criteria)
  - Ensuring interoperability
  - Functional reliability
  - Safety
  - Keep Heat Dissipation Low
- Resulting with More ports in PDs market
- More PSE/Ethernet port

Questions such..

- Single signature or Dual signature
- Current sharing or not
- Where to locate current sharing
- And may be others
- Are secondary in importance and are function of PD or System Configuration needed to be supported.

- Hence first we need to decide:
  - Which PD architecture we wish to support
  - What System configuration need to be supported.
  - Then we will reduce the amount of work and unknowns ..

Terms and Abbreviations

- MP = Medium Power
- HP= High Power = 2x MP
- P=Power [W]
- O = Need to be met by objectives
- 5C= Need to be met by 5 Criteria

Possible PD implementations in the market

PSE Port	PD type	PD load	Cable	Requires Current Sharing
802.3af	-802.3af (O,5C)	single	2P or 4P	NO
802.3at 2PMP	-802.3af (O,5C) -802.3at 2PMP	single	2P or 4P	
802.3at 4PHP	-802.3af (O,5C)	single	2P	
	-802.3at 2PMP		2P?, 4P	
802.3at 4PHP	-802.3at 4PHP	single	4P	YES if TBD<P<MP NO if P<TBD

Possible PD implementations in the market

PSE Port	PD type	PD load	Cable	Requires Current Sharing
802.3at 4PHP (Same Box, Port and Ground. Voltage Diff<TBD)	2 x 802.3af	Dual independent	4P	YES if TBD<P<MP NO if P<TBD
				NO if each channel is functionally isolated
802.3at 4PHP (Same Box, Port and Ground. Voltage Diff<TBD)	802.3at 4P HP	Dual independent	4P	YES if TBD<P<MP NO if P<TBD
				NO if each channel is functionally isolated
802.3at 4PHP (Same Box, Port and Ground. Voltage Diff<TBD)	802.3at 4P MP*	single	4P	YES for any P *Always minimum power loss -Benefits are not clear
2 x 802.3at 2PMP **Different boxes	802.3at 4P HP	Dual independent	4P	NO
2 x 802.3at 2PMP **Different boxes	802.3at 4P HP	single	4P	YES for any P. ** -Requires ENV B isolation. -Reduced available power -Increase power dissipation -Increased cost. -No issue if in PD and is not precluded by the standard

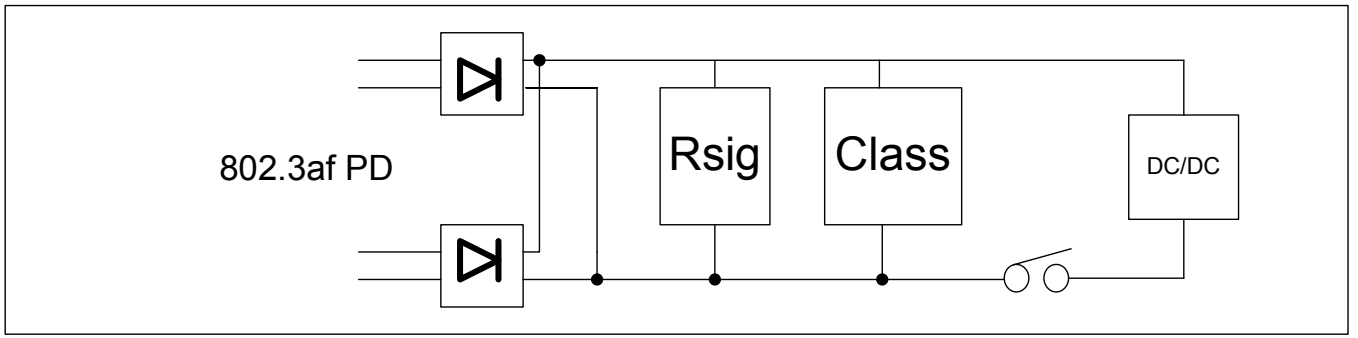
Possible non operational conditions

PSE Port	PD type	PD load	Cable	Comments
802.3af	802.3at 2PMP	single	2P or 4P	-May not work. -PD indication is issued. (O)
	802.3at 4PHP	Single or Dual	2P or 4P	-May not work. -PD indication is issued. (O) -Do we need separate indication for 4P?
802.3at 2PMP	802.3at 4PHP	Single	4P	
802.3at 2PMP	802.3at 4PHP	dual	4P	-May work

802.3af PDs – PD side

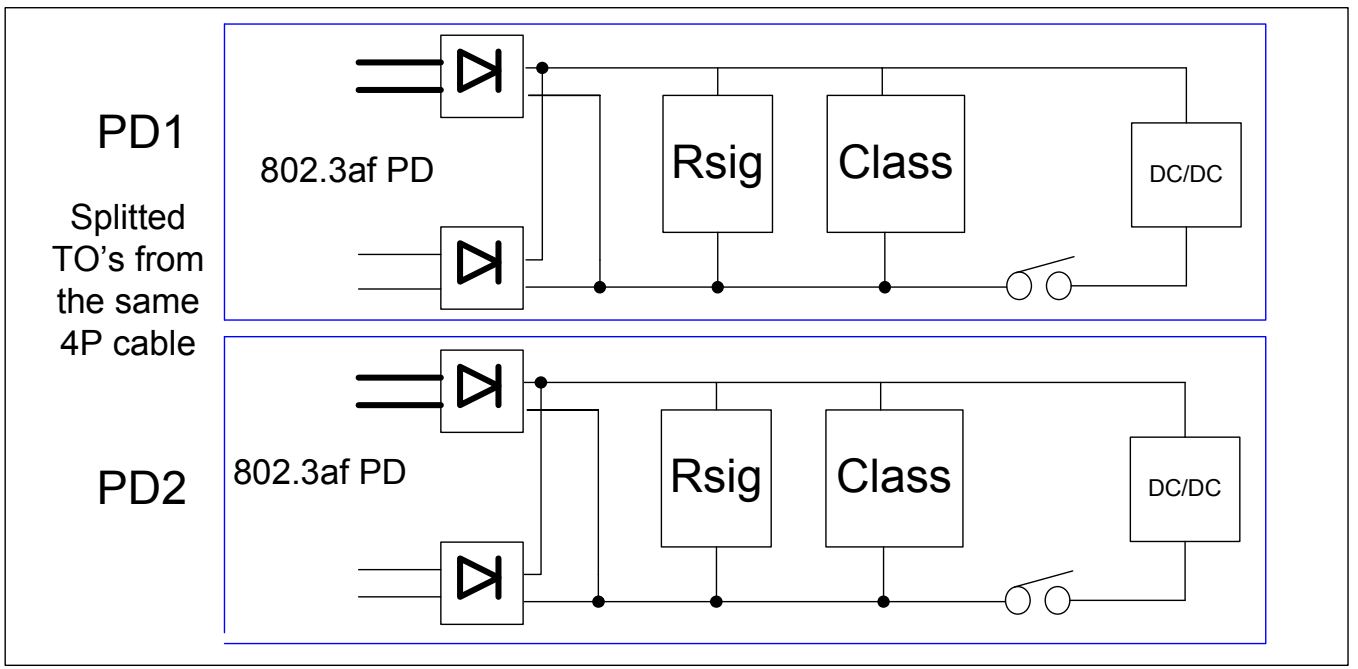
-Single Signature

-Need to be supported by objectives

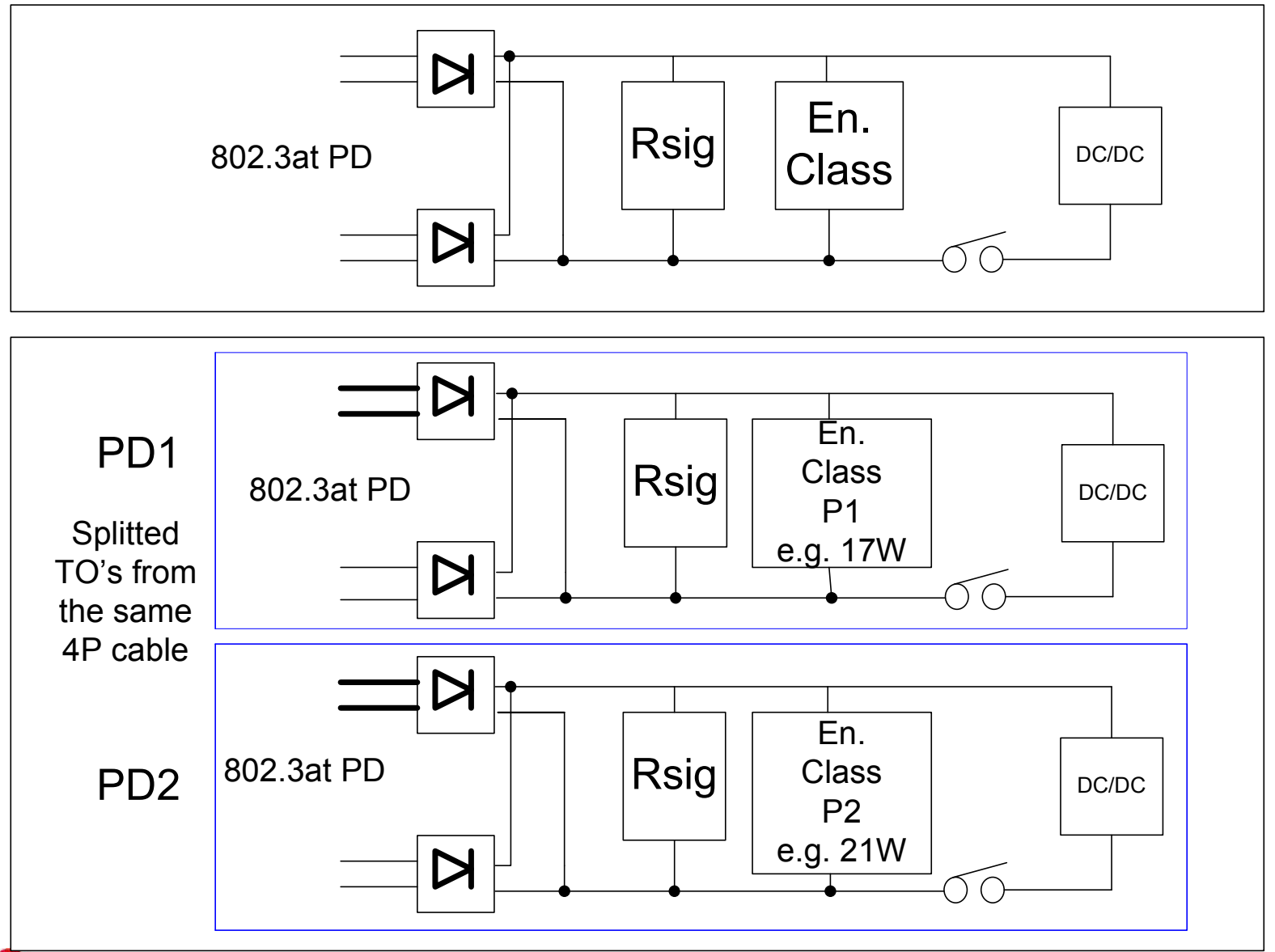


-Single Signature

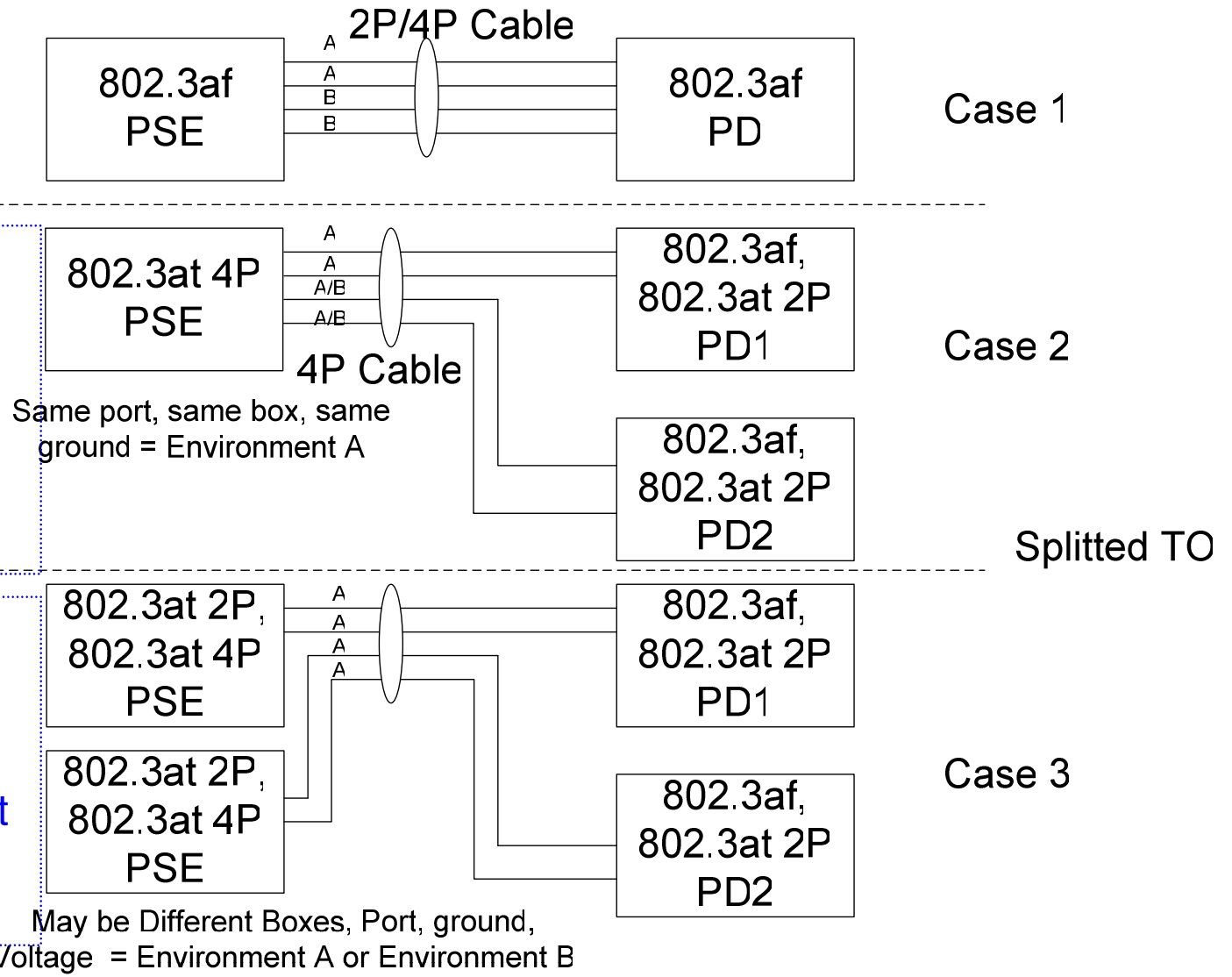
-Need to be discussed



802.3at 2P MP PDs – PD side



802.3af, 802.3at 2P MP PDs – System Description



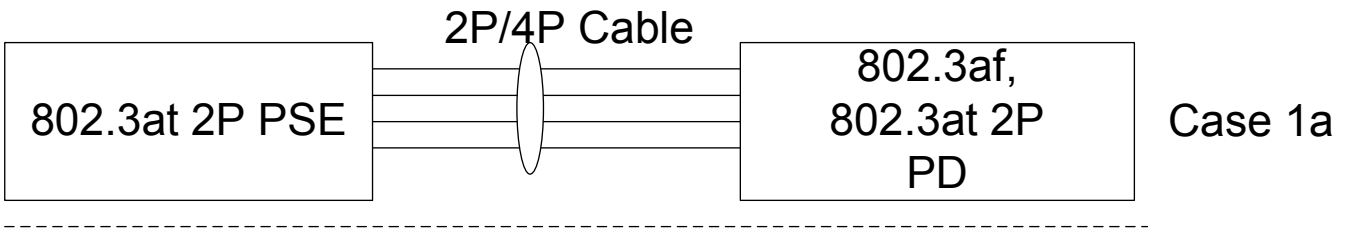
-Need to be discussed if it is "legal" Ethernet configuration in 10/100 or 1G ?

-Layer 2 issues?

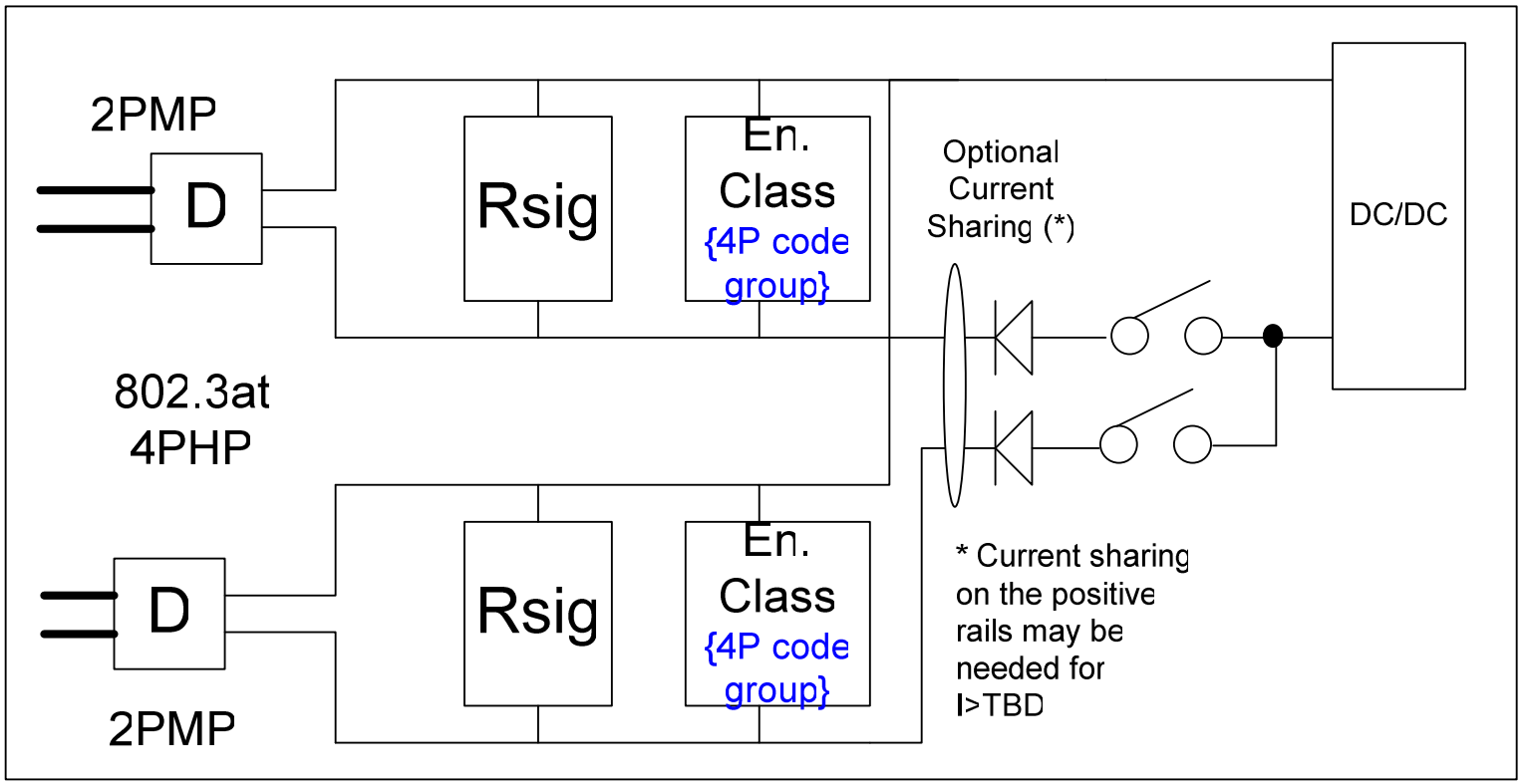
-No known technical issues.

-Exists today for 802.3af and is not precluded by 802.3af

802.3at 2P MP PDs – System Description



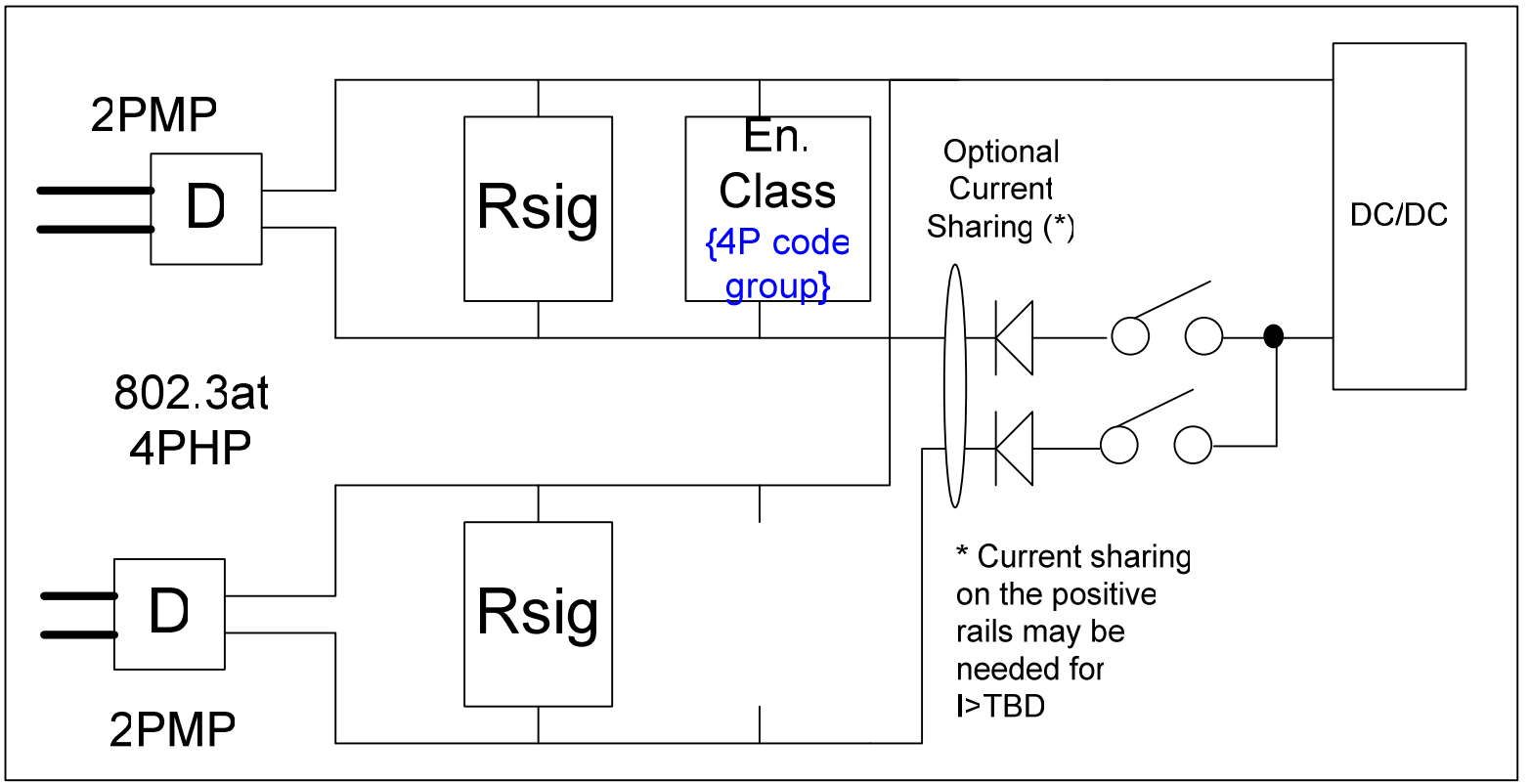
802.3at 4P HP PDs – PD side, dual class sig.



In this example each 2P advertise a 4P class on each pair. e.g for 60W PD, each 2P advertise Class 60W which is detected as 30W per each 2P.

Unique identification between single load 4P PD and 4P PD with dual independent loads

802.3at 4P HP PDs – PD side, single class sig.

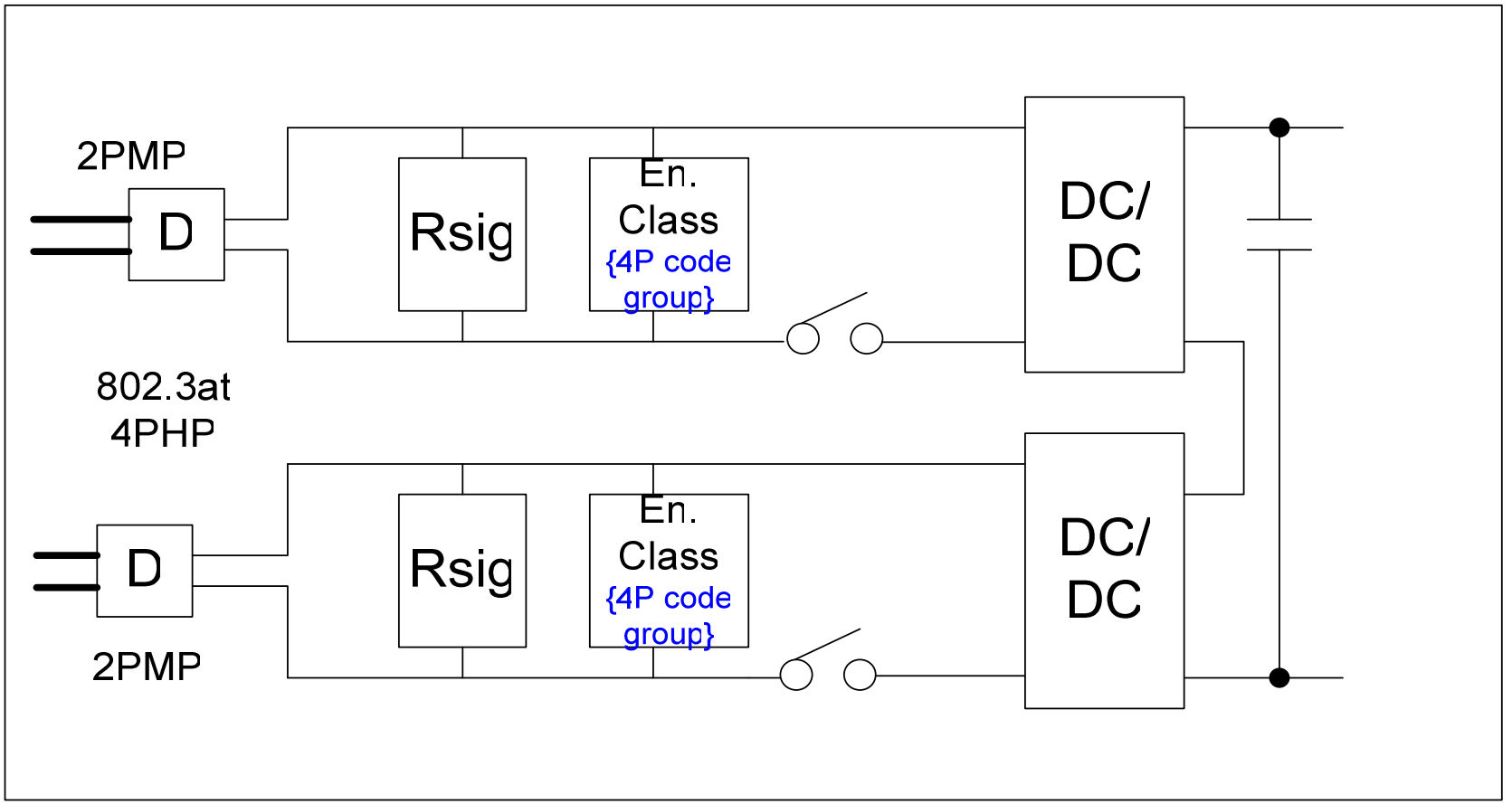


In this example single class is used to identify 60W single load PD.

Problem: If current sharing in PSE, overload problems or excessive heat in PSE when 4P PD with independent loads is used.

Possible Solution: Current sharing in PD and 4P classification code (distinguish between splitted TOs used for 2P PD and 4P PD) and Dual Class (distinguish between splitted TOs and 4P single load)

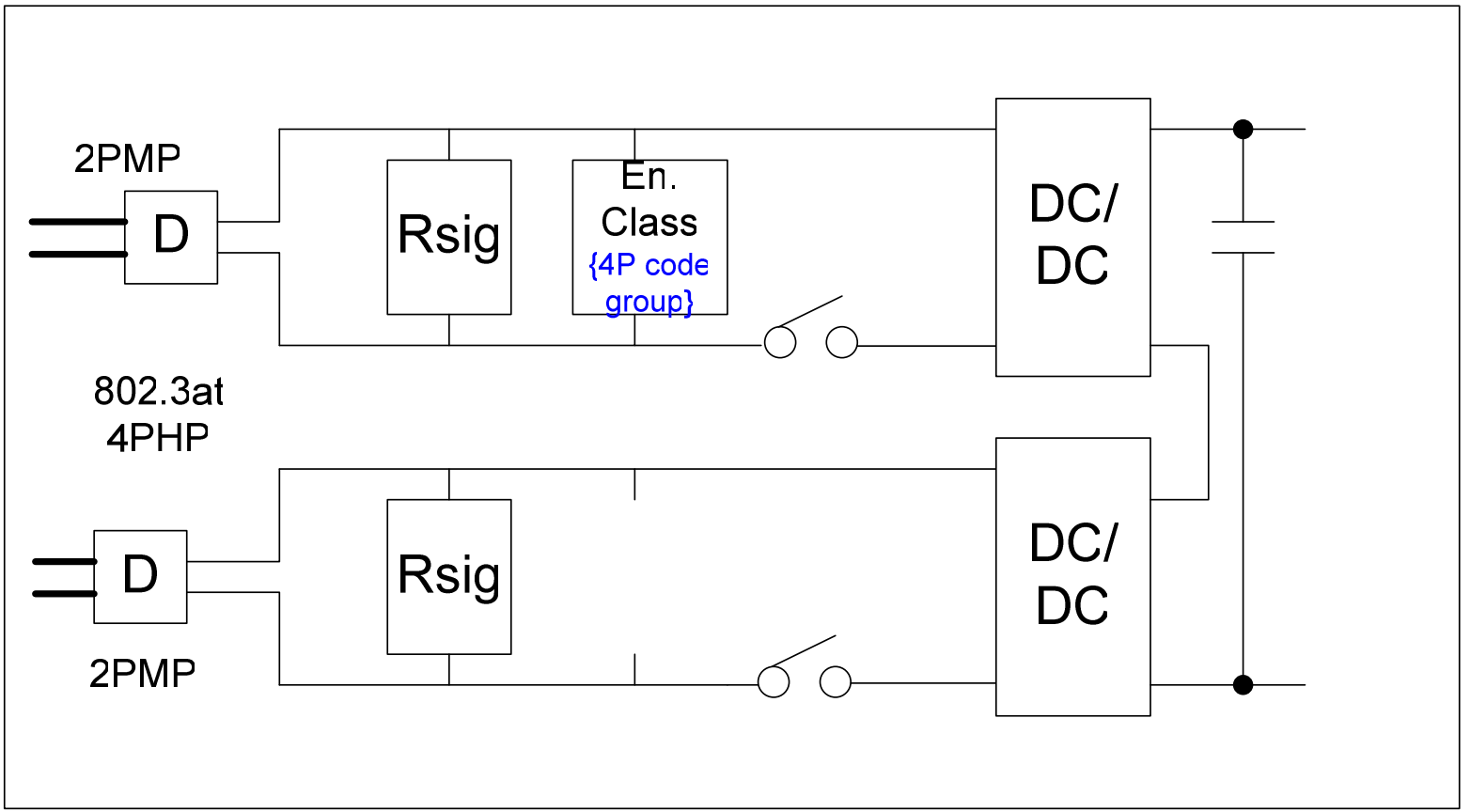
802.3at 4P HP PDs – PD side , dual class sig.



Simplified 4P PD without the need for Active Current Sharing in most high power applications

In this example each 2P has DC/DC however they operate as a single 4P PD (Single load) uniquely identified by special 4P class code.

802.3at 4P HP PDs – PD side , single class sig.

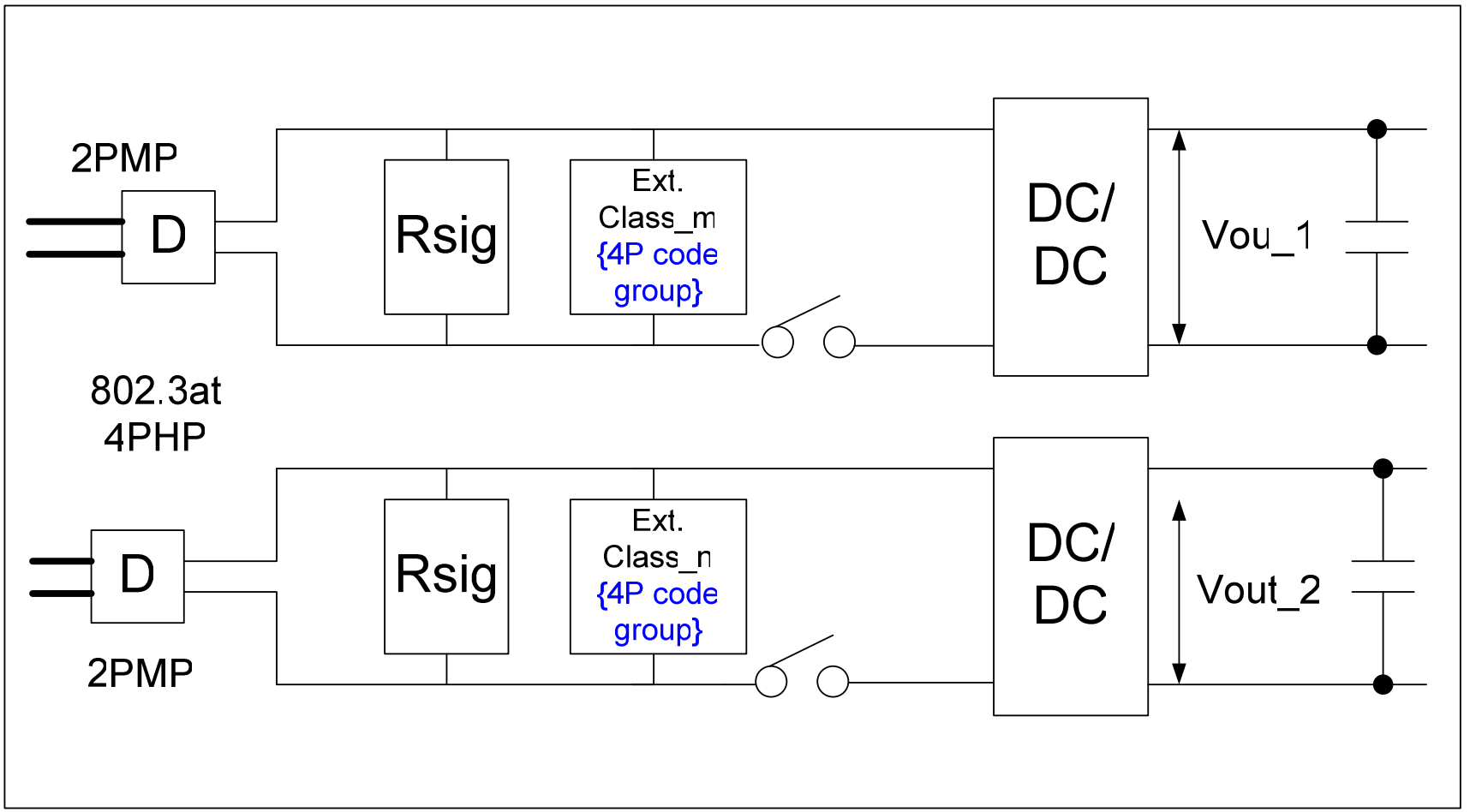


Simplified 4P PD without the need for Active Current Sharing in most high power applications

In this example each 2P has DC/DC however they operate as a single 4P PD (Single load) .

Problem: how to distinguish between single load 4P PD and dual load 4P PD?

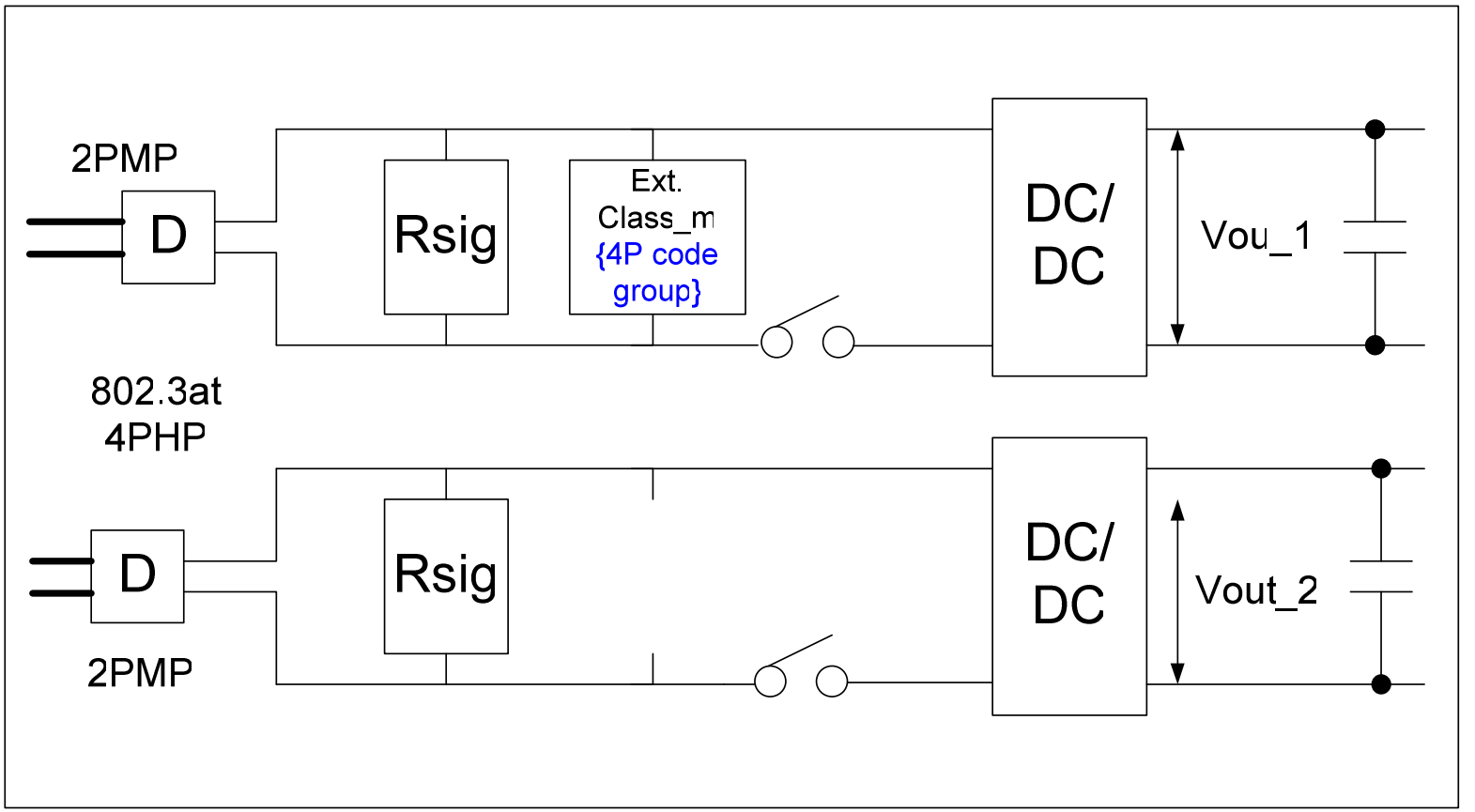
802.3at 4P HP PDs – PD side , dual class sig.



Simplified 4P PD without the need for Active Current Sharing in most cases

In this example each 2P has DC/DC supporting independent loads however they operate as a single 4P PD uniquely identified by special 4P class.

802.3at 4P HP PDs – PD side, single class sig.

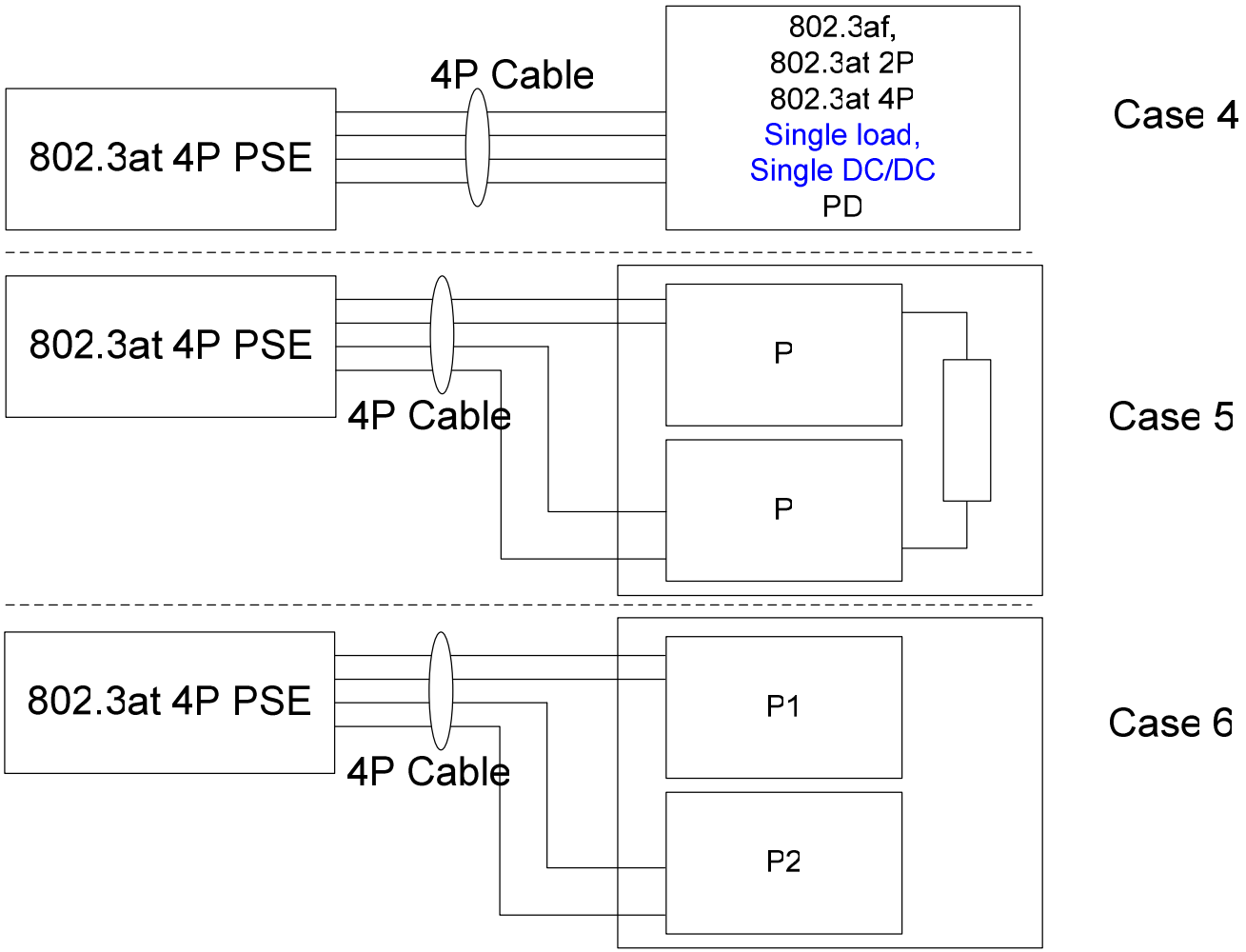


Simplified 4P PD without the need for Active Current Sharing in most cases

In this example each 2P has DC/DC supporting independent loads however they operate as a single 4P PD uniquely identified by special 4P class.

Problem: With single signature how we know how much power to allocate for each 2P? Is it single load 4P PD (60W, current share) or splitted TO (P1,P2 for each 2P w/o current sharing) or dual load 4P PD etc.

802.3at 4P HP PDs – System Description



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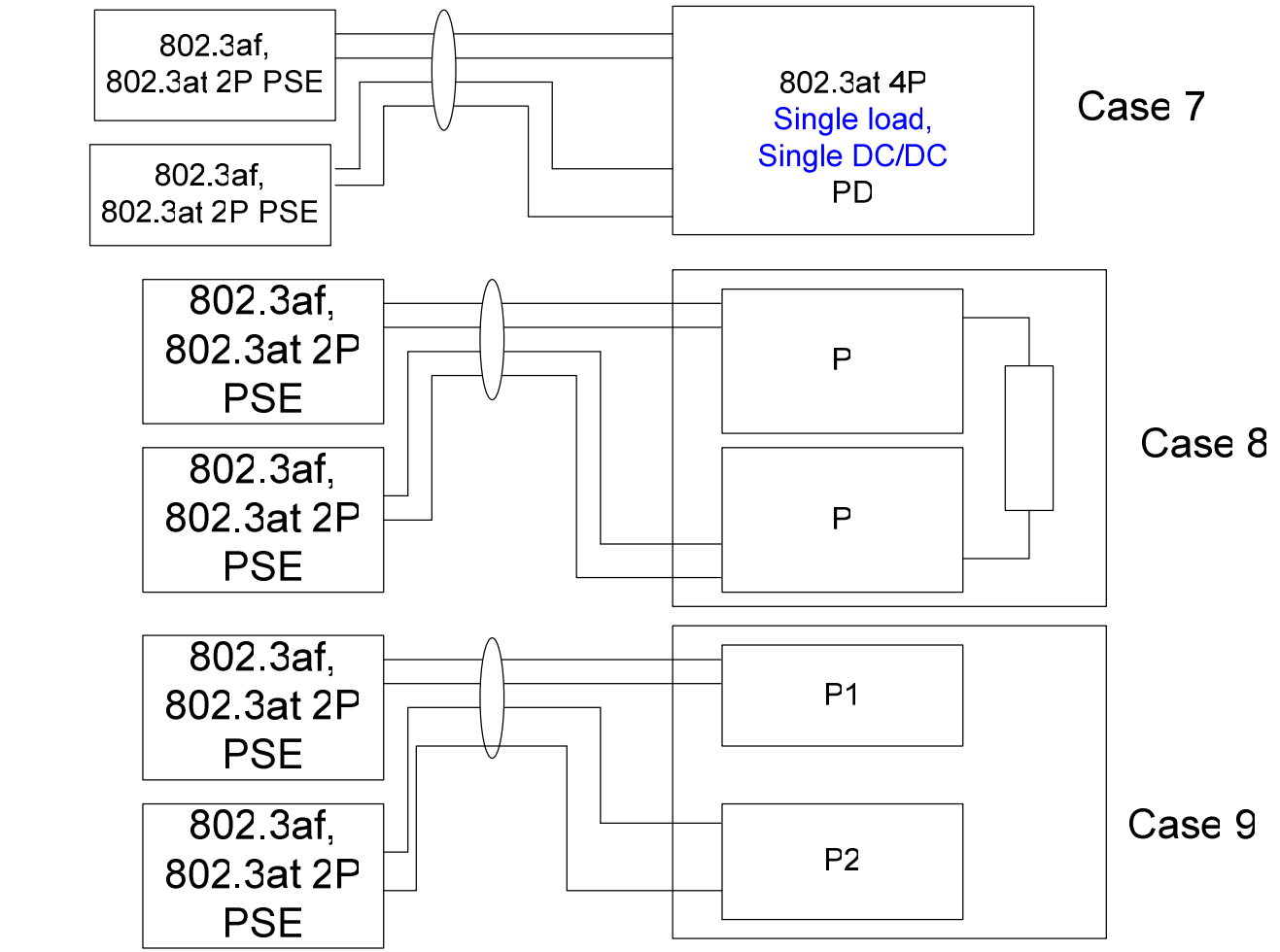
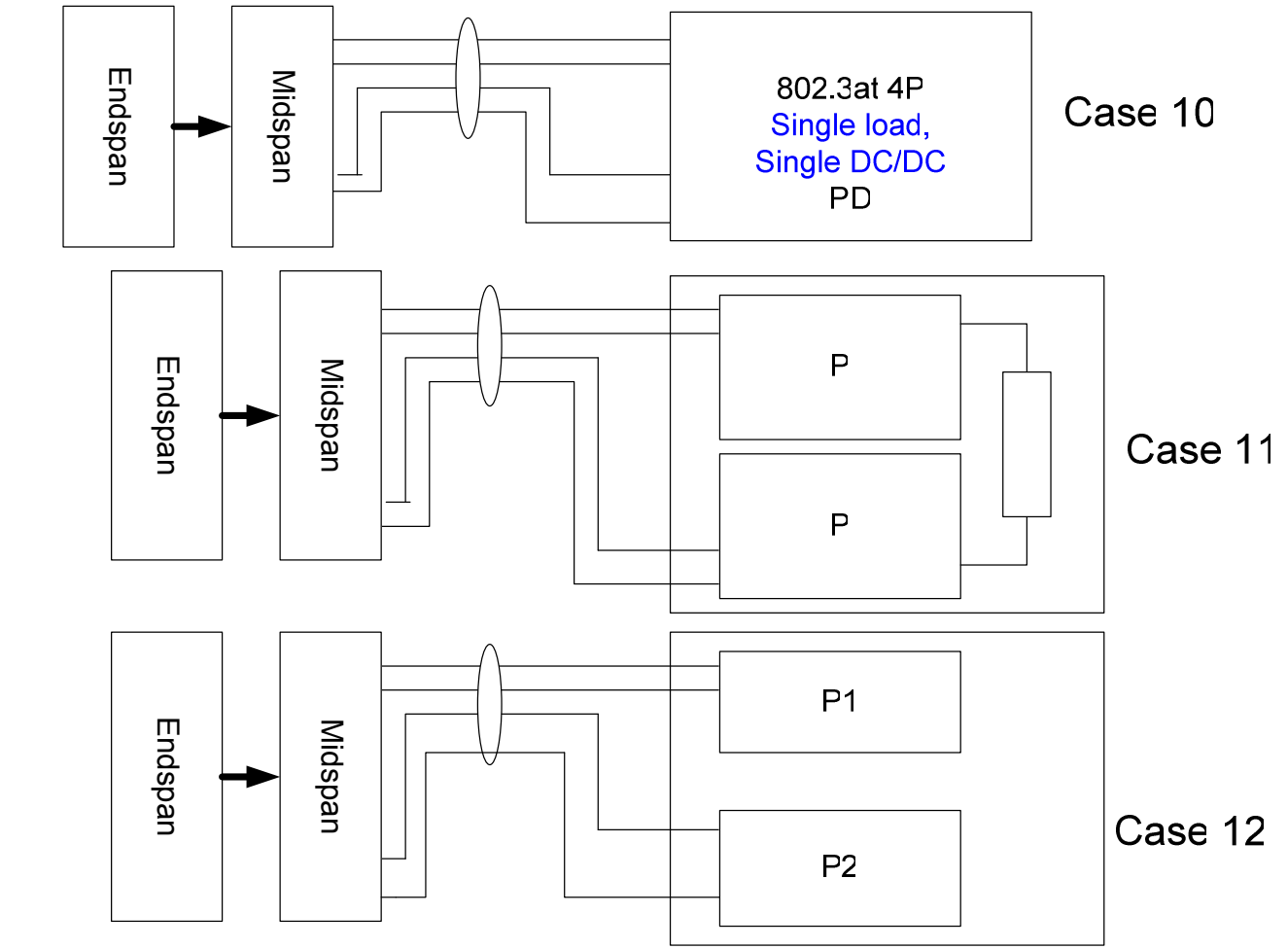


Different Boxes, Port, ground, Voltage = Environment B

802.3at 4P HP PDs – System Description



Different Boxes, Port, ground, Voltage = Environment B

Summary

- PDs can be implemented in many ways according to application
- Systems may be configured in many ways as well
- We need first to sort out which system configuration we don't want to support in the standard
  - We should try to support all as long as it is technically and economically feasible
- Next step: to address the other questions

Proposed PDs/System Configuration filtering process

- Step 1: Those who required by Objectives/5C
- Step 2: Required by Market Needs
- Step 3: Those who we don't want to preclude from the standard.
- Step 4: Not support those who violating Objectives/5C and prior decisions

Annex

Classification Table - Example

Class code #	PD type	2P MP	4P HP	PD Power[W]	Notes
0	802.3af	802.3at 2P		0.44 – 12.95	
1	802.3af	802.3at 2P		3.84	
2	802.3af	802.3at 2P		6.49	
3	802.3af	802.3at 2P		12.95	
4		802.3at 2P		2	
5		802.3at 2P		9	
6		802.3at 2P		15	
7		802.3at 2P		20	
8		802.3at 2P		25	
9		802.3at 2P		30	
10		802.3at 2P		Reserved	
11		802.3at 2P		Reserved	
12			802.3at 4P	20	Do we want to support lower value for overlapping in order to increased efficiency and utilization?
13			802.3at 4P	25	
14			802.3at 4P	30	
15			802.3at 4P	35	
16			802.3at 4P	40	
17			802.3at 4P	45	
18			802.3at 4P	50	
19			802.3at 4P	60	
20			802.3at 4P	Reserved	