TDL #44 D2.1- Extended power Class 6 and Class 8 unbalance requirements

Addressing comment 90# and #112 in D2.2

TDL#44 D2.1 Action item (Comment #112 in D2.2):

ACCEPT IN PRINCIPLE. Add TDL (Yair): To add to the spec the equations for extended power for class 6 and 8 and modify the above text accordingly.

Comment #90 D2.2:

Currently PSE has no unbalance requirements for extended power class 6 and 8 that will guarantee interoperability as we did for the class 5-8 non-extended power case.

Proposed Remedy:

Update equations for the extended power case for Equation 33-15 and Equation 33A-4.

See more comments in darshan_07_0117PartB.pdf regarding extended power.

The following is the current rules in D2.2 to support extended power class 6 and 8 to meet unbalance requirements.

✓	No increase in Icon-2P_unb min capacity
✓	Total current over 4-pairs is kept =Pclass/Vport_PSE-2P
✓	No change in magnetic components for PSE and PD that supports extended power compare to PDs that doesn't support extended power
✓	No changes in Ipeak and Ipeak-2P_unb requirements
❖	Requires PSE and PDs to meet tighter Rpse_min, Rpse_max Rpair_PD_min and Rpair_PD_max requirements. See Annex A.

Proposed base line for extended power class 6 and class 8.

1. Add the following lines to Equation 33-15:

$$0 < R_{PSE\_\max} \leq \begin{cases} \\ 1.318 \times R_{PSE\_\min} + 0.010 \quad for \quad Class\ 6\ per\ 33.3.8.2.1 \\ 1.172 \times R_{PSE\_\min} + 0.014 \quad for \quad Class\ 8\ per\ 33.3.8.2.1 \end{cases}$$

----------Baseline is ended at this point for this page only----------

Discussion:

Lennart: How can the PSE know if the PD will follow 33.3.8.2.1 or the regular 33.3.8.2.
Yair: The PSE can't know but if it wants to support extended power it must follow Rpse_min/max (to keep interoperability with all PDs that wants to work with extended power) requirements that are more stringent than for the typical case so there is no problem.
Lennart: Adding this would make it mandatory for all PSEs.
Yair: No, it is mandatory just for PSE that wants to support this feature. *(See next page that addresses this point)*
Lennart: The principle behind extended power is that there are now additional PSE requirements, that it is the PDs job to fit inside of a non-extended envelope.
Yair: This principle is only applied to Icon_2P_unb. In order to make it apply for Icon_2P_unb we need to specify Rpse_min/max for extended power in the PSE.
Simulations shows that if PD.
Yair: Currently, even if Class 8 PD that has PD_Vdiff=0 will generate Icon_2P_unb as in normal Class 8 PD. But this will happen only with the Rpse_min/max for extended power as shown above. Other way is to ask PD to have active current sharing so it will take full reasponsibility to balance the current.

2. Add the following text in clause 33.2.8.5.1 page 125 line 24:

"PSEs that do not support the exceptions in 33.3.8.2.1 are not required to meet RPSE_max and RPSE_min in equation 33-15 for class 6 and class 8 PDs that are operating under the conditions specified in 33.3.8.2.1."

3. Add the following lines to Equation 33A-4.

$$0 < R_{Pair\_PD\_\max} = \begin{cases} 1.318 \times R_{Pair\_PD\_\min} + 0.004 & for\ Class\ 6\ per\ 33.3.8.2.1 \\ 1.172 \times R_{Pair\_PD\_\min} - 0.013 & for\ Class\ 8\ per\ 33.3.8.2.1 \end{cases}_{\Omega}$$

4. Delete the text in page 261 lines 1-2:

"Smaller constants α and β in the equation RPair_PD_max = α × RPair_PD_min + β ensure that ICon-2P-unb is not exceeded for PD power consumption above the values in Table 33–26."

5. Add the following lines to Table 33-B1a. Editor to merge Table 33B1a with Table 33-B1.

PSE Class	RCH_min, [Ω]	RCH_max, [Ω]	RPair_PD_min, [Ω]	RPair_PD_max, [Ω]	Rload_min, [Ω]	Rload_max, [Ω]	Additional Information
Extended Class 6 per 33.3.8.2.1	0.087	0.101	0.645	0.854	0.732	0.955	Rload is at low channel resistance conditions
Extended Class 8 per 33.3.8.2.1			0.538	0.619	0.626	0.719	
Extended Class 6 per 33.3.8.2.1	5.405	6.250	0.663	0.799	6.068	7.049	Rload is at high channel resistance conditions
Extended Class 8 per 33.3.8.2.1			0.541	0.616	5.945	6.865	

End of Base Line

❖ Annex A: What if we loosen PD P2PRunb requirements in the extended power case by allowing higher Icon-2P_unb?

❖	Increase Icon-2P_unb min capacity for extended power case
✓	Total current over 4-pairs is kept =Pclass/Vport_PSE-2P
❖	Magnetics components for PSE and PD that supports extended power will have to be bigger by 10%.
❖	Ipeak and Ipeak-2P_unb will be higher. *Class 8 will have smaller margin from 100W and from 1A maximum current wire target.*
✓	Same Rpse_min, Rpse_max Rpair_PD_min and Rpair_PD_max requirements as in the non-extended power case

-Most of the applications will not use extended power therefore no need to add burden on PSE.

-PDs job is to ensure that their implementation specifics of their design will ensure that PD meets Icon-2P_unb as is in the current standard.