Coming to Grips with -2p

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The Problem

- Several parameters had -2p added to their names to emphasize that there may be differences in values from pair to pair
 - This makes sense for some parameters
 - Currents where current is limited on a per-pair basis
 - Voltages at the PD inputs when currents are mismatched
 - This doesn't make sense for some other parameters
 - PD total current or power
 - PSE voltage where mismatch is limited by the Vdiff parameter
 - Timers where the parameters are limits
- -2p labels aren't always the most intuitive
 - Do they refer to a pair or a pairset?
- -2p labels break continuity with previous revisions of the spec

Parameters with -2p Added

- I_{CON-2P} (and variants Icon-2p-unb, and Icont-*)
- V_{PORT PSE-2P} (and related Vpse-2p)
- V_{PORT PD-2P} (and related Vpd-2p)
- I_{PORT-2P}, I_{LIM-2P}, I_{CUT-2P}, T_{LIM-2P}, T_{CUT-2P}
- I_{PEAK-2P}, P_{PEAK-2P}
- I_{INRUSH-2P}, I_{INRUSH_PD-2P}, T_{INRUSH-2P}, T_{DELAY-2P}
- P_{PEAK_PD-2P}
- Several other minor parameters:
 - V_{TRAN_LO-2P}, V_{OVERLOAD-2P}
 - I_{PESIT-2P}, I_{PSEUT-2P}, I_{PSELT-2P}
 - pse_{ILIM-2P}, mdi_{ILIM-2P}

I_{PORT-2P}: Pairset Current

- I_{PORT} is the actual current in a pairset (defined on p211 as a state machine variable): -2p is technically correct
- I_{PAIR} might be better (new term, not used now)
- Best continuity with AF/AT could be achieved by using I_{PORT} for total port current and I_{PAIR} for pairset current
- Baseline text document uses I_{PORT-2P}
- I_{PORT} (without -2p) appears in 33.3.4, 33.3.7.2.1, 33.3.7.4, 33.3.7.5
 - Replace with I_{PAIR} in 33.3.4 if we use the I_{PORT}/I_{PAIR} solution
 - Add new I_{PAIR} definition to p211

V_{PORT PSE}, V_{PSE}: PSE Output Voltage

- PSE pairs should match to within V_{PORT_PSE_DIFF}
- PSE port voltage is therefore effectively a 4P spec
- I suggest removing -2P and converting to V_{PSE} throughout
 - It comes up in a lot of places...
- This parameter has had several names:
 - V_{PORT} in AF
 - V_{PORT PSE} in AT
 - V_{PSE} in Clause 1 and parts of AT and BT
- I prefer V_{PSE} (as used in 33.3.7.1), so the baseline text uses V_{PSE}
 - All parameters are measured at the port
 - Should be uniform (V_{PSE} or V_{PORT PSE}) in any case

V_{PORT PD}, V_{PD}: PD Input Voltage

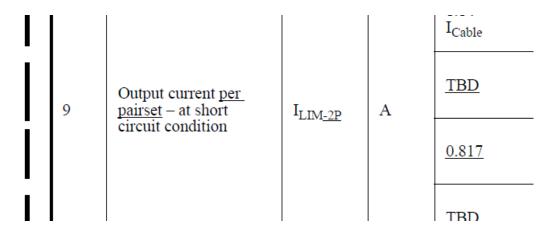
- This one is trickier since a dual-sig PD that draws unbalanced loads may see different voltages on each pair at the PD port
- Current language mixes V_{PORT PD}, V_{PD}, and V_{PORT PD-2P} liberally
- I suggest reverting to V_{PD} throughout and rewriting 33.3.7.1 and 33.3.7.4 to make clear that a dual-signature PD must treat each pairset independently see baseline text on p268

I_{CON}, I_{CON-2P}: Maximum Operating Current

- \bullet We changed $I_{\text{CON-2P}}$ to I_{CON} in Waikoloa in Table 33-11 to accommodate Type 1 and 2 systems
- I_{CON-2P-UNB} was kept (33-11 4a) but not carried into 33.2.7.4
- I suggest replacing $I_{\text{CON-2P-UNB}}$ with $I_{\text{CON-2P}}$ (which includes unbalance effects as explained in 33.2.7.4)
 - Could also use I_{CON PAIR}
 - $I_{CON-2P} = I_{CON}/2 + unbalance$, I_{CON-2P} is always $\ge I_{CON}/2$
- This gives:
 - I_{CON} = total PD current for all types
 - I_{CON-2P} = maximum current any pair must carry for Class 5 and up
 - I_{CON-2P} specs the maximum current a transformer must carry in a 4P system
- Baseline text document uses I_{CON-2P}

I_{CUT}, I_{PEAK}, I_{LIM}: Current Limits

- All are per-pair current specs: -2p is technically correct
- Again, better AF/AT continuity is maintained if we keep the old names (without -2p) and make the language clear
 - Baseline text removes -2p from these parameters
 - Example from Table 33-11:



I_{INRUSH}, I_{INRUSH_PD}

- These are unclear it depends how we define inrush current limits
- Leave unchanged for now

T_{LIM}, T_{CUT}, T_{INRUSH}, T_{DELAY}

- These are used to define maximum time intervals, not actual durations
- Because they represent time limits that apply to all pairs, -2p is not appropriate
 - Where needed, the "-2p" is carried by the current spec (Iport-2p, for example)
- Baseline text removes -2p from all
- $T_{DELAY-2P}$ makes some sense in Table 33-18, but the values of T_{DELAY} and $T_{DELAY-2P}$ are identical so I removed -2p here too

Minor Parameters

- V_{TRAN_LO-2P}, V_{OVERLOAD-2P}: defined but never used
 - Do we need these symbols at all? I removed both
- I_{PESUT-2P}, I_{PSEIT-2P}, I_{PSELT-2P}: defined and used locally only
- P_{PEAK PD-2P}: defined and used locally only (OK as is)
- pse_{ILIM-2P}, mdi_{ILIM-2P}: defined and used locally only
 - What does equation 33-14 do? It came from AT...
- Baseline text removes -2p from all these symbols except P_{PEAK_PD-2P} and modifies definition text as required

Baseline Text

• See marked-up draft: dwelley_2_0915.pdf