IEEE 802.3 Single Pair Ethernet Powering Cabling Restrictions
Call for Interest Consensus Building Meeting

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Why are we here?

The IEEE 802.3 Working Group (WG) became aware that SC25/WG3 is drafting standards and technical reports (e.g. ISO/IEC 11801-1 Amd1 and ISO/IEC TR 11801-9911) that support use and reuse of 4P Category cable to be used in the 1P applications with the restriction of 0.75 A per pair. Additionally, they have defined a 23 AWG single pair channel that only supports 0.75 A.

This restriction breaks the IEEE 802.3 'plug-and-play' interoperability model, something that hasn't happened before as the work between the two groups has always had common goals.

A bit of history

- More background can be found here:
- https://www.ieee802.org/3/ad_hoc/PDCC/public/2022/IEEE_802d3_contribution_to_SC25_Sept_2022.pdf
- https://www.ieee802.org/3/ad_hoc/PDCC/public/2022/PDCC_ad_hoc_report_1122.pdf
- https://www.ieee802.org/3/ad_hoc/PDCC/public/2023/Larsen%20heating%20and%20installation%201-pr%2014763-2%20a.pdf
- https://www.ieee802.org/3/ad_hoc/PDCC/public/2023/PoDL%20Support%20for%20RP%20levels_Withey_15_05_23.pdf

What is in Clause 104

Two sets of power classes:
one set added in 802.3bu for short / low resistance (automotive) links (classes 0-9, < 6.5 ohms)
one set added in 802.3cg for longer (automation) links (classes 10-15, 9.5 to 65 ohms)

Table 104–1—Class power requirements matrix for PSE, PI, and PD for classes 0 through 9

	12 V unregulated PSE		12 V regulated PSE		24 V unregulated PSE		24 V regulated PSE		48 V regulated PSE	
Class	0	1	2	3	4	5	6	7	8	9
$V_{PSE(max)}$ (V)[a]	18	18	18	18	36	36	36	36	60	60
$V_{PSE\_OC(min)}$ (V)[b]	6	6	14.4	14.4	12	12	26	26	48	48
$V_{PSE(min)}$ (V)	5.6	5.77	14.4	14.4	11.7	11.7	26	26	48	48
$I_{PI(max)}$ (mA)[c]	101	227	249	471	97	339	215	461	735	1 360
$P_{Class(min)}$ (W)[d]	0.566	1.31	3.59	6.79	1.14	3.97	5.59	12	35.3	65.3

Table 104–2—Class power requirements matrix for PSE, PI, and PD for classes 10 through 15

Class	10	11	12	13	14	15
$V_{PSE(max)}$ (V)	30	30	30	58	58	58
$V_{PSE\_OC(min)}$ (V)	20	20	20	50	50	50
$V_{PSE(min)}$ (V)	20	20	20	50	50	50
$I_{PI(max)}$ (mA)	92	240	632	231	600	1579
$P_{class(min)}$ (W)	1.85	4.8	12.63	11.54	30	79
$V_{PD(min)}$ (V)	14	14	14	35	35	35
$P_{PD(max)}$ (W)	1.23	3.2	8.4	7.7	20	52

The PD power is 12 W or less for all but two 750 mA cases.

Upcoming in 802.3da: What is in Clause 169

- There are two Types, 0 and 1; 24 V and 50 V respectively
- Both are specified at 1 A presently
  - Work is ongoing exploring raising the current to 2 A

- Clause 169 cannot use the 750 mA channel
  - Multidrop requires the cable to support the current going to all nodes on the segment, multiplying the use by the number of nodes...

Evolution of ISO/IEC 11801

- Initially started at 2 A channels as requested by IEEE 802.3 (50 V, 2 A, 100 W)

- Added shared sheath language and added a 750 mA channel

- Agreed to require keyed connectors to prevent a 750 mA channel from being connected to a 2 A PSE (Sept. 2023)

- Rescinded keyed connector requirement (Mar. 2024)

- Latest version recommends administration (color coding, labeling, etc.)

Fundamental Issue

- A user may not know (even with administration) that they have a 750 mA channel or to even be concerned with the current capacity of the channel

- A 2 A PSE on a 750 mA channel can prematurely age the cable, causing premature failure

- IEEE 802.3 users are accustomed to "it just works" plug and play

- Has the potential to water down the market to the lowest common denominator as inspection types can disallow things that make their job harder

What would the TF do?

- The TF would develop text to add to the SPE clauses warning users of the existence of two ISO/IEC compliant channel classes, guiding that one option does not support the IEEE 802.3 goal of plug and play. This would require text in multiple clauses.

- It was considered to do this via a maintenance request, but the complexity calls for the visibility of the more formal CFI process.
  - Hence, this CFI and request for a project

Questions?