

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

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Supporters and Contributors

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_adhoc_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**

Class	12 V unregulated PSE		12 V regulated PSE		24 V unregulated PSE		24 V regulated PSE		48 V regulated PSE	
	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?