IEEE 802.3 Ethernet Working Group
DRAFT Liaison Communication

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Dear Dr. Oehler,

We would like to thank you for your liaison communication JTC 1/SC 25/WG 3 N 1330. We notice that you ask for information on three separate points:

- predicted average lengths of installed cabling and length expectations for 1 pair remote powering
- cabling structures, e.g., connected via plug or fixed cabling
- use cases for 1 pair remote powering, especially applications requiring 2 A

We will address the three of these separately.

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For predicted average lengths, IEEE 802.3 does not specify lengths of cabling for powering, but instead specifies the loop resistance. Because we do not specify the construction of cabling, including such factors as the gauge and materials of the wiring, these are not directly translatable to length. Furthermore, we specify a maximum resistance and therefore do not have information to offer you on average lengths of cable used for 802.3 powering applications. We would appreciate WG3's assistance in providing generic cabling specifications to meet the loop resistance specifications found in Clause 104 of IEEE Std 802.3-2022.

Regarding cabling structures, generally IEEE 802.3 looks to other standards bodies, including ISO/IEC SC25 WG3, to define the construction and structure of the cabling. However, any link segment which meets the performance requirements specified in IEEE Std 802.3 would be compliant. The cabling technology used to implement IEEE 802.3 systems can vary substantially by use case. For example, the IEEE P802.3dg Task Force has recently seen discussions of the construction of special purpose cabling used in motor control applications which is significantly different than the generic cabling we might normally consider. One can see that our constructions could be very broad ranging.

Industry groups outside of IEEE 802.3 and ISO/IEC JTC1 SC25 WG3 are incorporating SPE technologies into their own application specifications. One significant application adopting IEEE 802.3 10BASE-T1L specifications is the Ethernet-APL specification. Ethernet-APL has a Port Profile specification. Annex A, "Connectors", line 600, Table A.2 – Electrical requirements terminal block / connector requires a minimum current rating per contact of 4 amps. This current rating is uniform for screw/compression terminals, M8, and M12 connectors. https://library.fieldcommgroup.org/10186/TS10186/1.1/#page=30

For use cases, we offer several sources to consider.

Please find the 'use case library' compiled by the Single Pair Multidrop Study Group: https://www.ieee802.org/3/SPMD/usecase/SPMD_Usecase_Library.pdf. The consensus is the use cases listed on slide two of the presentation are generally applicable to point-to-point cases in addition to multidrop use cases.

The 802.3cg Task Force compiled use cases and these are available on the archived site:

https://www.ieee802.org/3/cg/public/Jan2017/10SPE_Powering_Use_Cases_BV.pdf

https://www.ieee802.org/3/cg/public/Jan2017/Graber_10SPE_09a_0117.pdf

SPE Client Device Power Demand – Building Automation: Like Industrial Automation, network edge devices are expected to transition away from legacy protocols and local power to SPE. (can we cite examples) These devices can also demand, in many cases, greater than 500 milliamps to function. An examination of these use cases can be found at: https://www.ieee802.org/3/cg/public/May2017/herbst_3cg_01a_0517.pdf.

Use cases are available from the Ethernet-APL Engineering Guideline: https://www.ethernet-apl.org/wp-content/uploads/APL-Engineering-Guideline-V114_1.14.pdf

Page 39, Paragraph 4.3.3 Power classes, states “The power class describes the amount of power that a source port can drive, or a load port sinks. Table 4-5 shows the APL power classes and permitted combinations.” Note that Power class 3 and 4 require 57.5W @ 46 VDC min (1.25 amps) and 92 W @ 46 VDC min (2.0 amps) respectively.

SPE Client Device Power Demand: Many network edge devices are today controlled by legacy protocols and powered by local 24 VDC power sources. Regulations and practices in both the industrial environment and commercial building environment specify 30V or less as the maximum voltage in many use cases. (can we cite a couple of examples) As these devices are modernized and SPE is adopted, the consumer expectation is that both power and data will be transmitted, eliminating the need for local power supplies. Given the low voltage of the power source (and therefore the low input voltage of the load), current levels are significantly increased to deliver the required amounts of power. Known applications have driven SPE powering levels above 500 milliamps for classes 12, 14, and 15 (Table 104-1a – Class power requirements matrix for PSE, PI, and PD for classes 10-15, IEEE 802.3cg-2019). Industry expectations indicate requirements as high as 2 amps will be required to meet application demands.

A presentation was given to the IEEE 802.3 PDCC Ad Hoc on 29 March 2023: https://www.ieee802.org/3/ad_hoc/PDCC/public/graber_PDCC_01_03292023.pdf

Some of these use cases may not be appropriate for WG3, and we look to WG3 for guidance as to which of these falls within their scope.

Thank you for your continued collaboration with the IEEE 802.3 Working Group.

Sincerely,

David Law

Chair, IEEE 802.3 Ethernet Working Group

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