

IEEE 802.3 Ethernet Working Group
DRAFT Liaison Communication

Source: IEEE 802.3 Working Group¹

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From: David Law Chair, IEEE 802.3 Ethernet Working Group
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Subject: Reply to Incoming Liaison JTC 1/SC 25/3073/INF

Approval: Agreed to at IEEE 802.3 Working Group meeting, Teleconference, 20 Jan 2022

Dear Dr. Oehler,

We would like to thank you for the preview of JTC1-SC25/3068/CD, ISO/IEC 11801-1/AMD1 ED1. The IEEE 802.3 Working Group (the WG) has some comments on the draft:

TOPIC ONE: Current Carrying Limits

Lines 362 – 363: Our main concern relates to cabling and current carrying requirements.

¹ This document solely represents the views of the IEEE 802.3 Working Group and does not necessarily represent a position of the IEEE, the IEEE Standards Association, or IEEE 802.

The WG has a major concern with the text on line 362, which gives a permitted deviation down to 0,75 A.

Our main concern is that a PSE will have no way of knowing if it is connected to cabling installations incapable of carrying the current available from said PSE. The effect will be to artificially limit *ALL* PSE installations to the minimum number, effectively lowering the desired available current from 2,0 A to 0,75 A. Please specify the current capacity of the single-pair channel in such a way that it is clear that all channels must support a current capacity of 2,0 A.

The WG would recommend against a permitted deviation that goes below the current carrying capabilities of IEEE 802.3 SPE, perhaps going as far as disallowing the use of a cabling class that included this deviation for IEEE 802.3 applications.

The remedy is to delete lines 362 – 363.

TOPIC TWO: Cable Sharing

Lines 487 – 488 are written in a confusing manner: first sentence – “you can use it”; second sentence – “the use is not assured”. This is an admitted engineered solution (see line 490) which is better left out of a generic cabling specification.

If this is information that ISO/IEC JTC1-SC25 wants to share with readers of ISO/IEC 11801, it is better left to an informative annex on shared sheath engineered solutions. This can be done moving section 6.6.4 to a new Annex H with the proper editing to transform to informative text.

Topic Three: Transcription of IEEE Std 802.3 requirements into Annex G

Line 1015: Annex G: There are multiple issues with this section.

First, a disclaimer that the source of the information is IEEE Std 802.3 is required in the event the numbers in 802.3 change in the future. The WG suggests:

“The information provided in this annex on IEEE Std 802.3 single pair powering is for reference only. For additional information please see the latest edition of IEEE Std 802.3, Clause 104. The values in IEEE Std 802.3 take precedence in the case of discrepancy between IEEE Std 802.3 and these values.”

Second, Table G.1 has errors in the Maximum current column (these appear to be significant digit rounding errors). Also, two column headings need title refinement as voltage and power need to identify where they’re measured. The WG provides a markup of the table:

Table G.1 – Remote powering information for single pair balanced cabling

IEEE 802.3 Clause 104 Class	Minimum PSE Voltage V	Maximum loop resistance Ω	Maximum PD Power W	Maximum current A	Comments
10	20	65	1,2	0,092	Low voltage
11	20	25	3,2	0,240	Low voltage
12	20	9,5	8,4	0,632	Low voltage
13	50	65	7,7	0,231	
14	50	25	20	0,600	
15	50	9,5	52	1,579	

Third, Table G2. The addition of the loop resistance to the column heading would be a service to the reader, helping to understand the derivation of the numbers (see the markup below). The last column, Max current (2A), doesn't make sense to the WG. An explanation is needed to the derivation of these numbers and should answer such questions as "what's the source voltage?" and "what's the target cable voltage drop?". Further, the numbers highlighted in the marked-up table below don't make sense to the WG. Explanation on the derivation of these numbers would be useful. For example, explain why T1-A-400 (Class 11,14) is 1 meter shorter than T1-A-250 (class 11,14).

Table G.2 – Maximum channel length information for single pair balanced

Class	Maximum Channel Length (m)			
	Powering Class 10, 13 65 ohm	Powering Class 11, 14 25 ohm	Powering Class 12, 15 9,5 ohm	Max current (2A)
T1-A-1000	1000	444	157	120
T1-A-400	400	151	52	40
T1-A-250	250	152	53	40
T1-A-100	100	100	53	40
T1-B	100	100	53	40
T1-C	100	100	53	40

TOPIC FOUR: Cable Transmission Performance

Lines 304 – 306 (Please find a presentation attached expanding on the commentary): The three cable classes are poorly aligned with IEEE 802.3 PHY technologies.

Class T1-A is specified only to the frequency extent of 10BASE-T1L. It would be useful to have a class that extends the specifications to at least 66 MHz and possibly 100 MHz to align with 100BASE-T1 (at shorter reaches) and discussions in the IEEE 802.3 Greater than 10 Mb/s long-reach SPE Study Group about a possible 100BASE-T1L. The WG looks forward to working with SC25 to define requirements for anticipated cabling supporting a long reach 100Mb single pair PHY.

Class T1-B has a bandwidth of 600 MHz which aligns with 1000BASE-T1, but the PSAACR-F (alien far end crosstalk) spec does not align with either segment A or optional segment B. Class T1-B is substantially over specified for 100BASE-T1. It is observed that some specification involving length scaling might accomplish this; however, the PSAACR-F spec in the document is not currently subject to length adjustment. The WG recommends aligning

this specification with segment A (since it is close), which is a minor adjustment to the specification.

Class T1-C would meet the 1000BASE-T1 link segment A specification but is over specified both in bandwidth and crosstalk. Similar to the relation between the Class T1-B and 1000BASE-T1 link segment A, Class T1-C and 1000BASE-T1 link segment B specifications fail alien FEXT (PSAACR-F). This seems to require a minor modification, possibly by length-scaling. The bandwidth is another issue, as the cabling is over specified for the application and would be confusing to the user. Class T1-C doesn't seem to have a good match in IEEE 802.3 as it is either under or over specified for the existing and anticipated applications, except at very short reaches. It's not apparent to the WG for what applications Class T1-C would be suitable. We recommend that one of the following three options are implemented:

1. Delete Class T1-C
2. Align with 1000BASE-T1 link segment B
3. Align with 2.5GBASE-T1, noting that this is an automotive specification

Please do not hesitate to reach out if there are any further question on our review.

Thank you for your consideration.

Sincerely,

David Law

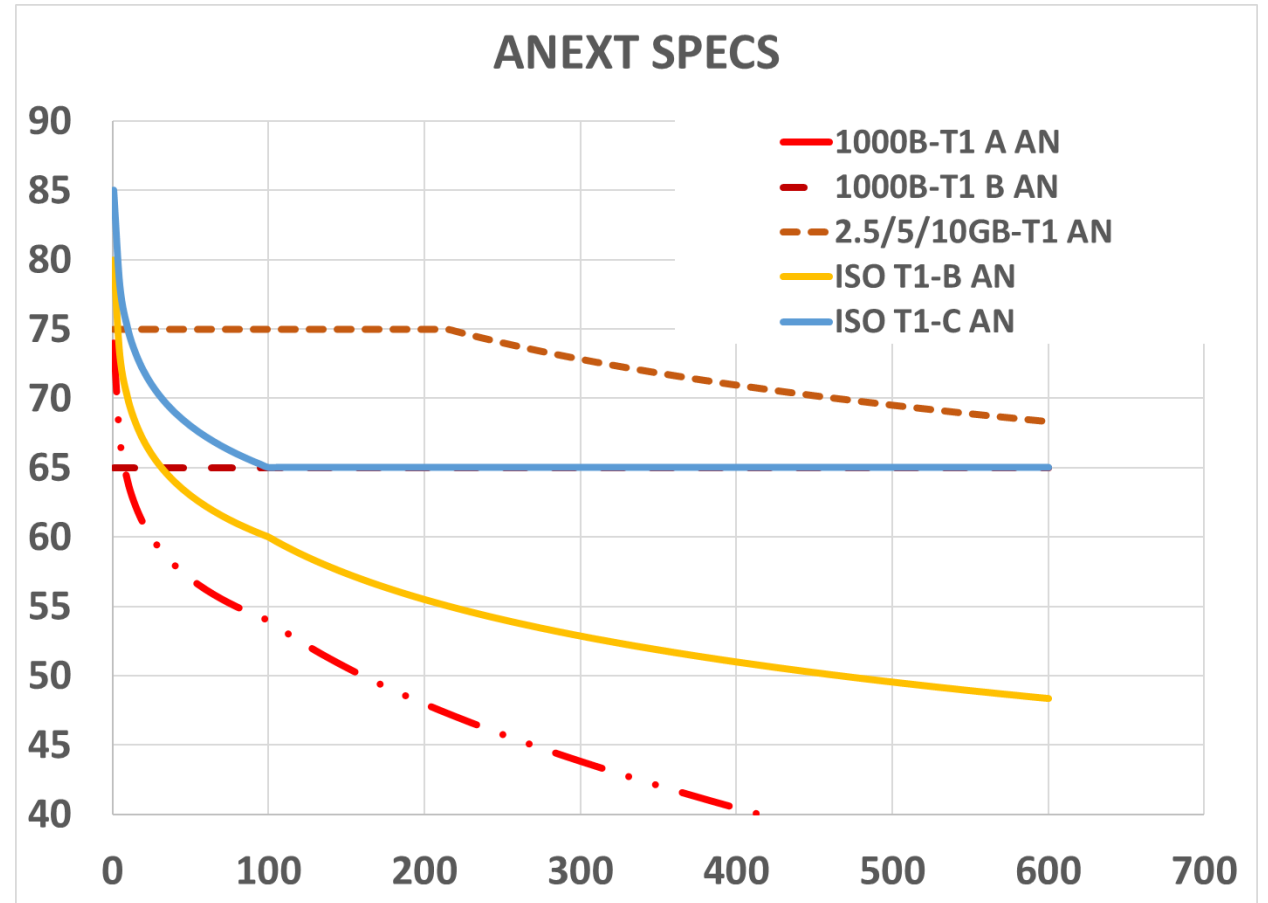
Chair, IEEE 802.3 Ethernet Working Group

Issue – alignment of alien crosstalk specs

- ISO/IEC 11801-1 amendment defines two new channels
 - T1-B up to 600 MHz
 - T1-C up to 1250 MHz
- Alien crosstalk specifications for wideband PHYs in 802.3
 - 1000BASE-T1 (600 MHz)
 - 1000BASE-T1 has 2 specs: A (15m), and an options B (40m)
 - 2.5G/5G/10GBASE-T1 (4000 MHz)
 - (bandwidth of alien crosstalk spec is independent of rate)
- ISO specs appear to match neither
 - While they are sufficient for 100BASE-T1 (66 MHz), even T1-B is substantially overspecified both in frequency and crosstalk

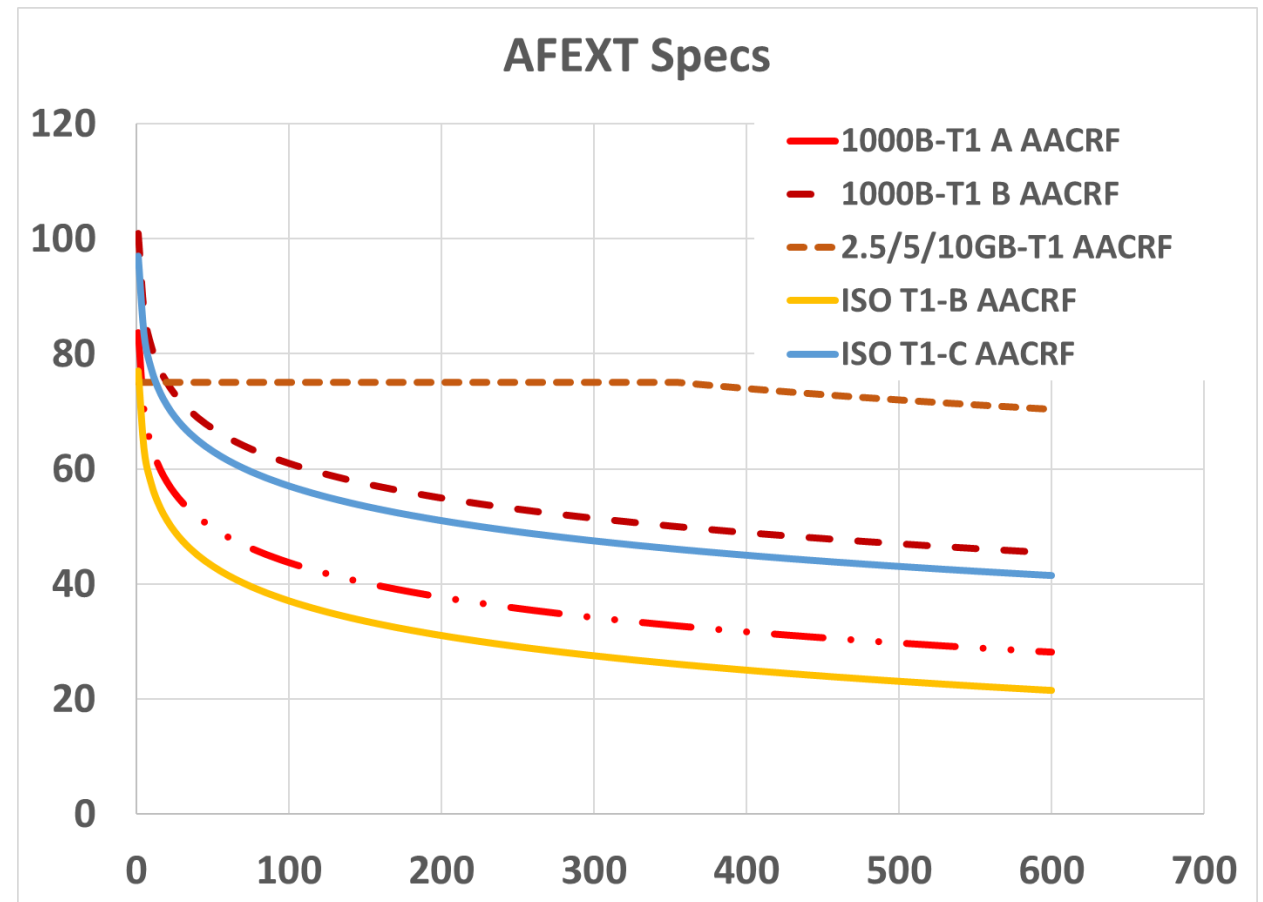
PSANEXT SPEC

- T1-B ANEXT:
 - Meets 1000BASE-T1 seg A
 - Fails 1000BASE-T1 seg B, 2.5/5/10GBASE-T1
- T1-C ANEXT
 - Meets 1000BASE-T1 seg A, B
 - But is excessive on frequency
 - Fails 2.5/5/10GBASE-T1



PSAACR-F SPEC

- T1-B PSAACR-F:
 - Fails 1000BASE-T1 seg A
 - Fails 1000BASE-T1 seg B, 2.5/5/10GBASE-T1
- T1-C PSAACR-F:
 - Meets 1000BASE-T1 seg A
 - But is excessive on frequency
 - Fails 1000BASE-T1 seg B, 2.5/5/10GBASE-T1



Note: neither specification defines length scaling for this parameter, so none is applied.

Summary & Recommendations

- ISO T1-B has frequency range fitting 1000BASE-T1 applications, but has insufficient PSAACR-F specifications
 - Noting that T1-B PSAACR-F is marked ffs, recommend aligning to meet 1000BASE-T1 link segment A specifications (Eqn 97-24 in IEEE P802.3dc D3.0)

$$\text{PSAACRF}(f) \geq -20 \log_{10} \left(10^{\frac{(-10) \log_{10} 0.15 + 38.2 - 20 \log_{10} \left(\frac{f}{100} \right)}{-20}} + 4 \times 10^{\frac{67 - 20 \log_{10} \left(\frac{f}{100} \right)}{-20}} \right) \text{ dB} \quad (97-24)$$

- ISO T1-C has insufficient frequency range for 802.3 PHYs faster than 1 Gb/s, and excessive for 1 Gb/s or less
 - Meets alien crosstalk specs for 1000BASE-T1 type A link segment at 2x the frequency insufficient for 1000BASE-T1 type B and 2.5/5/10GBASE-T1
 - Recommend EITHER: (1) deleting T1-C, (2) adjusting PSAACR-F to align with 1000BASE-T1 segment B, or (3) Redefining all parameters and frequency to align with 2.5G, 5G, or 10GBASE-T1
- While ISO T1-A aligns with 10BASE-T1L, it may be useful to extend the frequency:
 - At least 66 MHz would align additionally with Clause 96 100BASE-T1 and a possible future BASE-T1L PHY project being considered in the IEEE 802.3 Greater than 10 Mb/s Study Group