
Optional Power Distribution Concept IEEE 802.3 10 Mb/s Single Twisted Pair Ethernet Task Force

Vancouver, BC

March 2017

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Purpose

- **Scope**

- **Optional Power Distribution Concept consistent with Link Segment DCR and use case power requirements.**

IEEE 802.3cg: Adopted Objectives

Objectives (2)

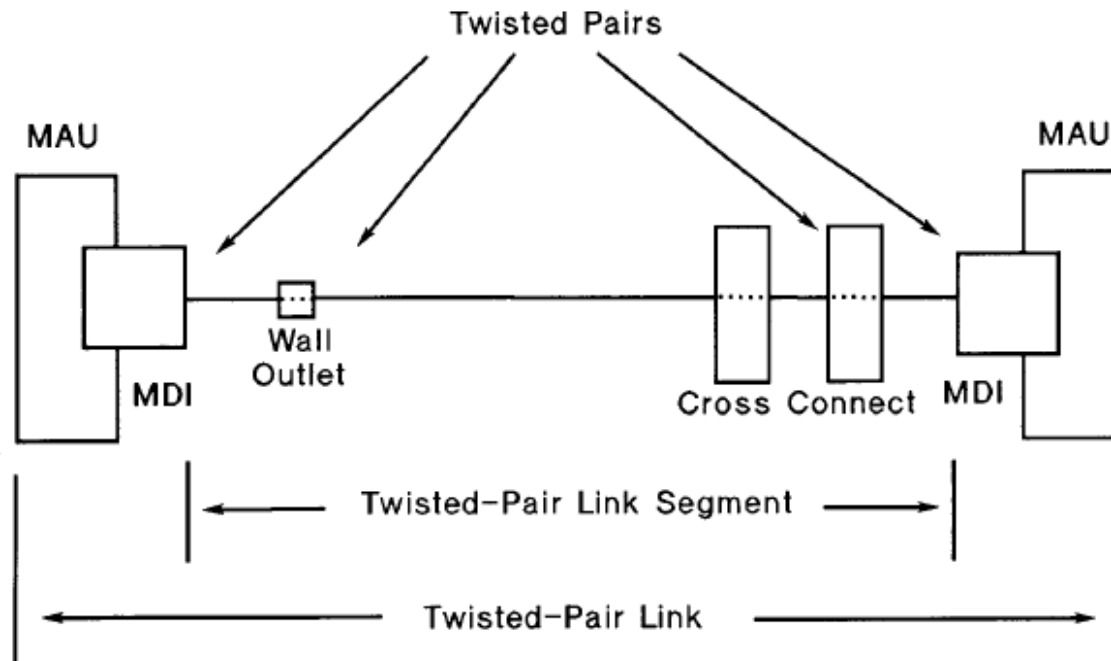
11. Define the performance characteristics of a link segment and a PHY to support operation over this link segment with single twisted pair supporting up to four inline connectors using balanced cabling for up to at least 15 m reach
12. Define the performance characteristics of a link segment and a PHY to support point-to-point operation over this link segment with single twisted pair supporting up to 10 inline connectors using balanced cabling for up to at least 1 km reach
13. Support fast-startup operation using predetermined configurations which enables the time from power_on**=FALSE to a state capable of transmitting and receiving valid data to be less than 100ms
14. Maintain a bit error ratio (BER) at the MAC/PLS service interface of less than or equal to 10^{-10} on link segments up to at least 15m, and 10^{-9} on link segments up to at least 1km
15. Specify one or more optional power distribution techniques for use over the 10 Mb/s single balanced twisted-pair link segments, in conjunction with 10 Mb/s single balanced twisted-pair PHYs, in the automotive and industrial environments

Source: http://www.ieee802.org/3/10SPE/objectives_10SPE_111016.pdf

Link Segment

1.4.242 link segment: The point-to-point full-duplex medium connection between two and only two Medium Dependent Interfaces (MDIs).

- **Example 10BASE-T**



(b)

Figure 14-2—Twisted-pair link

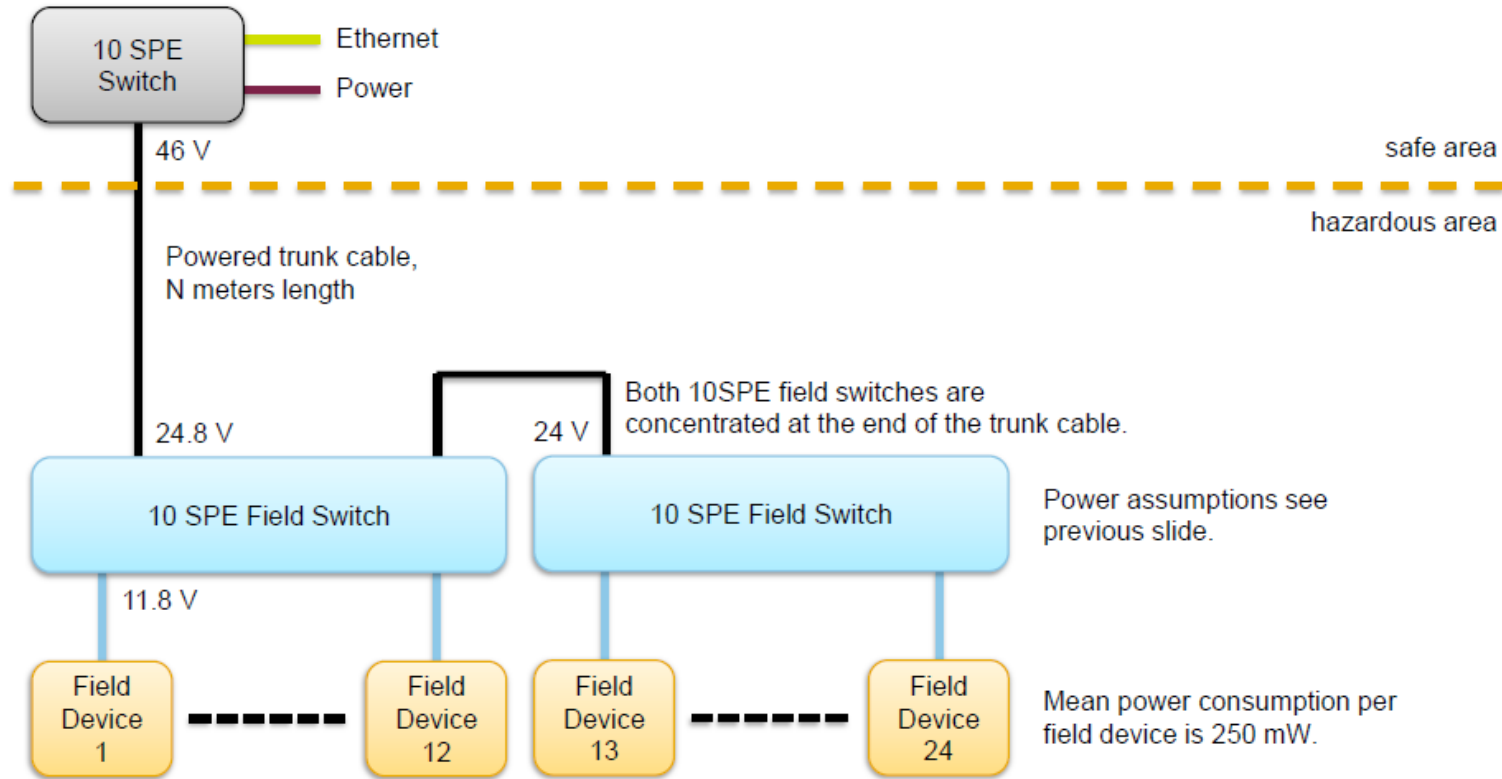
802.3cg Link Segment Proposal - DCR

AWG	Diameter(in)	Diameter(mm)	Diameter(m)	area (m ²)	Resistance per meter (ohm)	Length @ IL limit (m)	Conductor resistance @ IL limit (ohm)	Loop resistance @ IL limit (ohm)	10 connector DCR	Link segment resistance @ IL limit (ohm)
14	0.064085	1.627754	0.001627754	2.08098E-06	0.0092	1589	14.67	29.33	4.00	33.33
15	0.057069	1.449551	0.001449551	1.65028E-06	0.0116	1415	16.47	32.94	4.00	36.94
16	0.050821	1.290858	0.001290858	1.30872E-06	0.0147	1261	18.50	37.00	4.00	41.00
17	0.045257	1.149538	0.001149538	1.03785E-06	0.0185	1123	20.78	41.55	4.00	45.55
18	0.040303	1.023689	0.001023689	8.2305E-07	0.0233	1000	23.33	46.66	4.00	50.66
19	0.035890	0.911618	0.000911618	6.52703E-07	0.0294	891	26.20	52.40	4.00	56.40
20	0.031961	0.811816	0.000811816	5.17614E-07	0.0371	793	29.42	58.84	4.00	62.84
21	0.028462	0.722941	0.000722941	4.10483E-07	0.0468	706	33.04	66.07	4.00	70.07
22	0.025346	0.643795	0.000643795	3.25526E-07	0.0590	629	37.10	74.19	4.00	78.19
23	0.022571	0.573314	0.000573314	2.58152E-07	0.0744	560	41.66	83.31	4.00	87.31
24	0.020100	0.510549	0.000510549	2.04722E-07	0.0938	499	46.78	93.55	4.00	97.55
25	0.017900	0.454655	0.000454655	1.62351E-07	0.1183	444	52.53	105.05	4.00	109.05
26	0.015940	0.404881	0.000404881	1.28749E-07	0.1492	395	58.98	117.96	4.00	121.96
27	0.014195	0.360555	0.000360555	1.02102E-07	0.1881	352	66.23	132.46	4.00	136.46
28	0.012641	0.321083	0.000321083	8.09698E-08	0.2372	314	74.37	148.74	4.00	152.74
29	0.011257	0.285931	0.000285931	6.42115E-08	0.30	279	83.51	167.02	4.00	171.02
30	0.010025	0.254628	0.000254628	5.09217E-08	0.38	249	93.78	187.55	4.00	191.55
31	0.008927	0.226752	0.000226752	4.03824E-08	0.48	221	105.30	210.60	4.00	214.60
32	0.007950	0.201928	0.000201928	3.20245E-08	0.60	197	118.24	236.49	4.00	240.49

- Use Table xx as 802.3cg link segment DCR characteristics.

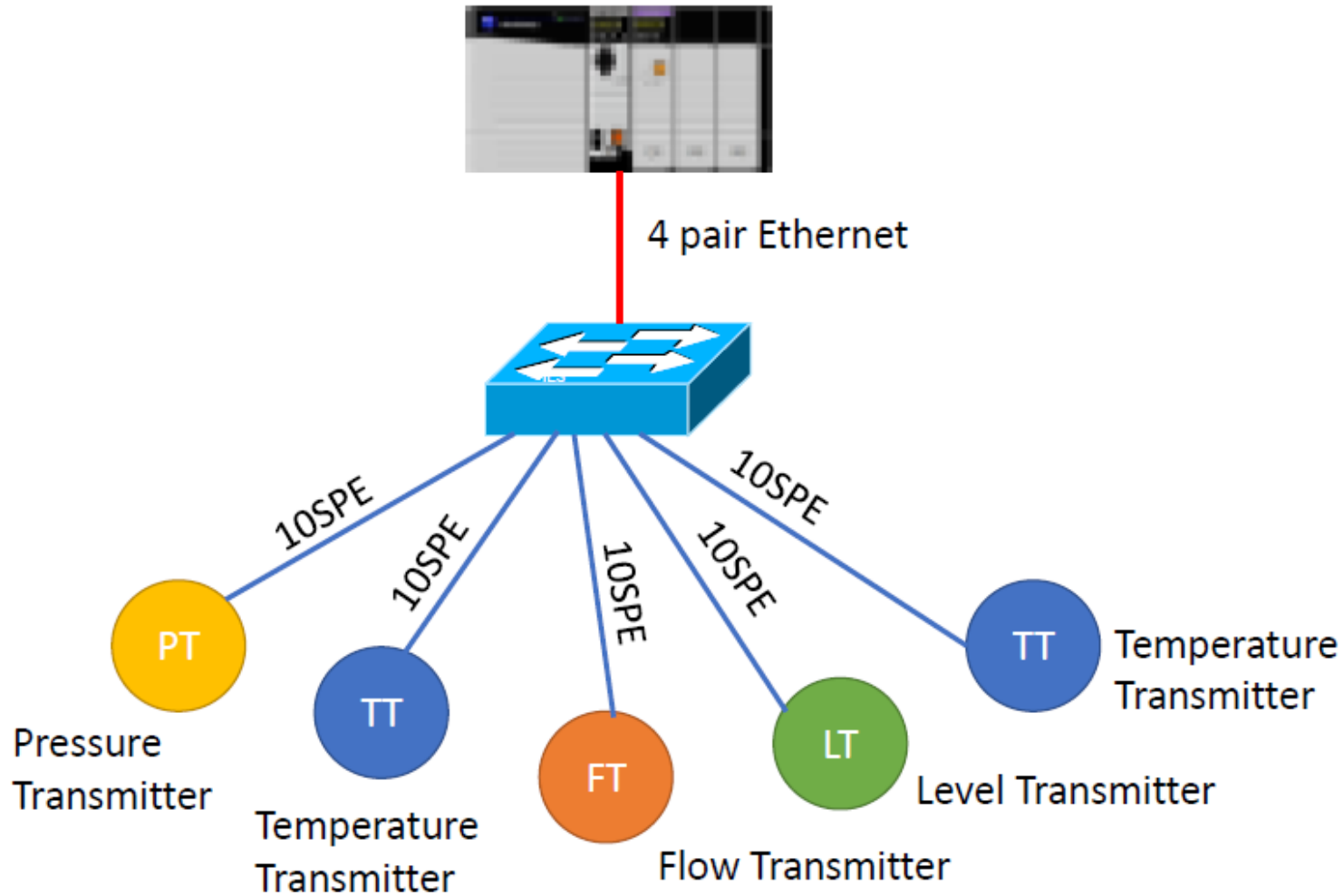
802.3cg DC Powering Use Cases

10SPE Calculation Example



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

802.3cg DC Powering Use Cases



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

Optional Power Distribution Concept

- **Link Segment DCR and length @ IL limit different for each AWG.**
- **Variety of voltages, currents and power for “use cases” presented.**
- **Optional power distribution concept;**
 - **Specify power/voltage/current/DCR for a link segment topology* (plug-and-play).**
 - **Specify “Best effort” power delivery for other topologies*.**

***Topology with DCR less than or equal to DCR and length @ IL limit.**