IEEE 802.3 SPEP2P SG: Target cabling for buildings: What's currently recommended

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Overview

- Building Automation is a target market, e.g., from the Broad Market Potential CSD
 - "...use cases in process control, industrial automation, building automation..."
- Process Automation cabling discussed in

https://www.ieee802.org/3/SPEP2P/public/graber_3SPEP2P_01a_06232021.pdf

https://www.ieee802.org/3/GT10MSPE/public/graber_GT10MSPE_01_11082021.pdf

- Building Automation cabling quite different to Industrial Automation cabling, especially Process Automation.
- Activity in cabling groups, e.g., ANSI/TIA-568.5, "Single Twisted-Pair Cabling and Components Standard" as mentioned in https://www.ieee802.org/3/minutes/nov21/1121_TIA_TR42_report_to_802d3.pdf
- Building Cabling not really discussed in the group yet.
- This is a quick look at cabling currently recommended in this space

Current Technology

- There are many control protocols currently used for Building Automation, common protocols include BACnet, KNX, Modbus and LONWorks.
 - There is a good short comparison of the three protocols titled "What is the difference between BACnet, Modbus and LonWorks?"¹
- BSRIA published a report in 2018² on the market shares of the various protocols.
 - The report has a "flyer" available that includes the graph on the right showing BACnet had a dominant and growing market share
- The report was discussed in an article posted on the "Engineered Systems" website³ which included the following:

"Along with reporting that BACnet's share of the global market is 64 percent, it also projects continued growth in BACnet market share through 2022

- BACnet is a good place to start for current Building Automation cabling recommendations
- 1. <u>https://www.setra.com/blog/what-is-the-difference-between-bacnet-modbus-and-lonworks</u>
- 2. https://www.bsria.com/us/product/B647Pn/world_penetration_of_communications_protocols_2018_8a707622/
- 3. https://www.esmagazine.com/articles/98930-bacnet-market-adoption-report-2012-2022



Source: BSRIA Inc.

BACnet system Vendors

- BACnet systems are sold by many of the major building automation companies, including:
 - Honeywell
 - Siemens
 - Johnson Controls
 - Schneider Electric
 - Carrier
- Each one of these companies provides cabling recommendations

Recommendation documents

| Company | Selected Recommendations | link |
|-------------------------------|--|--|
| Honeywell (Trend Controls) | TP/1/1/22/HF/200-600V. Screened single twisted pair, 22 AWG, 200 m (*Belden equivalent 8761NH). TP/2/2/22/HF/200-600V. Screened twin twisted pair, 22 AWG, 200m (*Belden equivalent 8723NH). TP/1/1/24/HF/305-600V. Screened twin twisted pair, 24 AWG, 305 m (*enhancement of Belden equivalent 9841NH). | https://partners.trendcontrols.com/trendprodu cts/cd/it/pdf/en-ta200541-uk0yr0321i.pdf |
| Siemens | 1.5-Pair (1 TP & 1 Conductor) w/overall Shield and drain wire, 22 AWG – 24 AWG (stranded) | https://sid.siemens.com/go/A6V10308296 |
| Johnson Controls | Field Controller Bus: 22 AWG Stranded, 3-Wire Twisted Shielded Cable – Non Plenum - Belden: B5501FE, Plenum Belden: B6501FE Sensor Actuator Bus (Terminal Block): 22 AWG Stranded, 4-Wire, 2 Twisted- Pair Shielded Cable – Non Plenum - Belden: B5541FE, Plenum Belden: B6541FE | https://cgproducts.johnsoncontrols.com/met_p df/12011908.pdf?x=95&x=95 |
| Schneider Electric | 22 AWG to 24 AWG (0.33 mm² to 0.20 mm²) Non Plenum - Belden 3105A 22 AWG, Belden 9841 24 AWG, Plenum – Belden 82841 24 AWG, Belden 82842 24 AWG | https://ecostruxure-building- help.se.com/bms/topics/show.castle?id=10102 &locale=en-US&productversion=1.6 |
| Carrier | 22 AWG, single twisted shielded pair, low capacitance, CL2P, TC foam FEP, plenum rated Connect Air International - W221P-2227 24 AWG, single twisted shielded pair, low capacitance, CL2P, TC foam FEP, plenum rated. – Belden 82841 | https://www.shareddocs.com/hvac/docs/1000/ Public/0F/11-808-461-01.pdf |

Ask

• Speed-Specific Objective 4 says

Define performance characteristics of a link segment with a single balanced pair of conductors supporting up to 5 inline connectors for up to at least 500m reach, and a PHY supporting point-to-point full duplex operation over the link segment.

- We should evaluate the proposed link segment against the "recommended" BACnet cabling types to evaluate what reaches can be obtained using these cable types.
- We should compare the expected reach on the "recommended cables" to the "best practices" rules for building automation cable plants today.

NOTE: I'm sure that there is a lot more information about recommended cabling infrastructure, but I included what was easy to find.

