

IEEE 802.3cg MDI connector Limitations

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Background

- IEEE 802.3cg D2p2 clauses 146.8.1 and 147.9.1 specifies MDI connectors that may be used for Single Pair Balanced cabling meeting the requirements of IEC 63171-1 (MICE 1 environments) or IEC 61076-3 (MICE 2/3 environments). The plug connector is used on the balanced cabling and MDI Jack connector on the PHY (end device for example a switch)
- Current IEC 63171-1 and IEC-61076-3 do not cover expected use cases

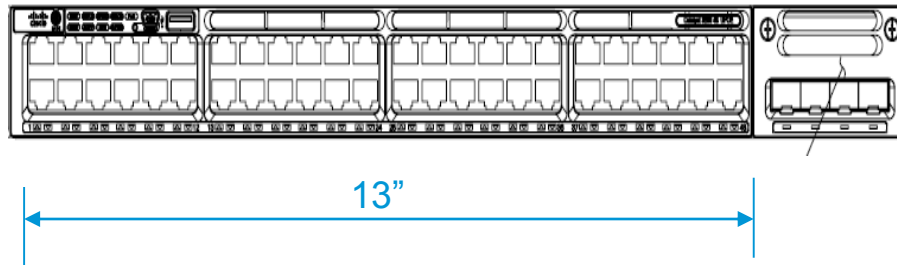
Problems

- IEC 63171-1 specified connector size does not support 18 AWG cable. 18AWG is a significant use case for installed and new cabling. Requiring a patch panel or cable adapter to support 18AWG is a significant burden to system vendors and users (D2p2 comment #279)
- IEC 63171-1 does not support MICE 2 – Industry common practice uses the same connector for MICE 1 and MICE 2. Using a different connector in these environments is a significant burden to system vendors and users (D2p2 comment #280)
- No PHYSICAL interoperability (mating surface and pin pitch are different) between IEC 63171 and IEC 61076 and other configurations such as 1x2, 2x2 etc. (D2p2 comment #281)

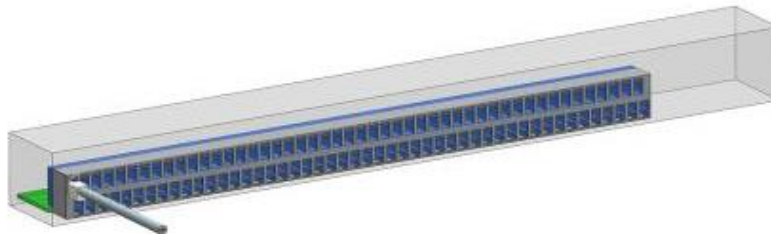
Enabling wide adoption of Single Pair Ethernet

- Support same connector for 18 – 26 AWG capable of high port density on a switch

Current 48 port Switch (1RU) using 4 Pair Stacked RJ45



Future 96 port Switch (1RU) using Single Pair Stacked connectors 22 AWG to 26 AWG



Same switch using every second port with 18 AWG, but same connector/pin pitch

Enabling wide adoption of Single Pair Ethernet

- Current Ethernet equipment does not use full MICE 1/2/3 requirements – BUT uses subset of feature based on the application
 - (M1, I1, C1, E1) OR (M1, I2, C1, E2). (M3, I3, C3, E3) is a very small use case for high industrial applications
 - Current Ethernet equipment uses IP66/IP67 for “I” in MICE
- MICE 1/2/3 should have same mating surfaces and pin pitch. External body of the connect can be adopted to meet M3, I3, C3, E3 for Industrial applications
- Examples



IP67-rated weatherproof stranded STP CAT6 cable assembly provides watertight industrial Ethernet connectivity in harsh environments

What are the critical requirements for the connector?

- Electrical requirements - Insertion Loss/Return etc, defined in clause 146.8
- Mechanical Dimensions – pin pitch and mating surfaces
- Electromagnetic Compatibility – EMC Emissions and EMC Immunity
 - Connector require non-shield (E1 and E2) and shielded cable (E1/E2/E3) options
 - All other requirements are at system level – based on local, state and country requirements
- Connector should allow higher current capacity (2A) and electrical performance for up to 10G beyond 802.3cg requirements for the future
- Ability to terminate connector/cable in the field (like RJ45 with simple tool)
- Latch/locking mechanisms

Advantages of a Common Connector

- Re-use of the switches and end devices across different applications
- Lower cost due to larger combined volumes
- Avoid patch panels and special patch cables
- Avoid different cable/connector termination schemes

Summary

- IEEE 802.3cg D2p2 clauses 146.8.1 and 147.9.1 specified MDI connectors do not meet wide market adoption
- Further work is required to address 10SPE use cases.

Thank you.

