

11801 and Cable Reuse

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Issue at hand

The IEEE 802.3 Working Group (WG) is aware that SC25/WG3 is drafting standards and technical reports (e.g. ISO/IEC 11801-1Amd1 and ISO/IEC TR 11801-9911) that support use and reuse of 4P Category cable to be used in the 1P applications with the restriction of 0.75A per pair.

This restriction breaks the IEEE 802.3 'plug-and-play' interoperability model. As such, the WG feels the need to make a presentation to ISO/IEC JTC 1/SC 25, something that hasn't happened before as the work between the two groups has always had common goals.

The problem with 0.75A

- A PSE can't know what kind of cabling is connected. Allowing a 0.75A option waters ALL options down to 0.75A – which is well below the current needed to deliver the power levels desired, for both current classes and future planned classes.
 - Note that this is a problem with having any two levels of maximum current
- An additional problem is cable heating. A lot of work has gone into appropriate bundle sizing for 4P cabling, designed around the worst case 90W PoE current of 0.443A (particularly in the NEC in the US). A 'second tier' of 0.75A complicates this carefully crafted guidance.
 - *Complications such as the possibility of 1 or 3 pairs being energized in shared-sheath cabling as well as grounding issues further complicate the guidance.*

Future SPoE Plans

- Similar to 4P PoE, there are plans to raise the power from an SPE PSE to the max that LPS will allow, i.e. 100W max - but more likely closer to 90W to allow for guaranteed power policing and LPS compliance
- Of course, this power is only extended to systems that can efficiently provide the power. This implies a max allowed loop resistance which further implies reach limitations. This is a long way of saying the 1km SPE links won't be able to provide this power.
- The present requirements of Clause 104 are only a single example. Other powering schemes, outside of IEEE Std 802.3 use the full extent of NEC Class 2 limits of 2A. Today, non-802.3 power sources dominate the single-pair powering landscape.
- Limiting SPoE to 0.75A will keep 11801-1 cabling and perhaps SPoE from addressing the full market

Use Cases

- Powering beyond 20W delivered are required for a variety of applications
 - Media converters extending line powering to existing Class 4 PoE devices will require this
 - Line-powered PoE field switches, will require greater than 20W even with minimal PoE capability
 - Many sensors, such as field cameras with pan-tilt-zoom or heated capability today require > 20 W delivered
 - High-transient-current actuators would require additional cost of local energy storage without the ability to provide > 0.75 A
- Class 2 power supplies today are used for a variety of non-Ethernet applications on single pairs that SPE seeks to replace
- Experience with 4-pair PoE have shown a need to deliver as much power as possible. This is only the beginning.

IEEE Request

- The WG would request that this cable reuse be abandoned. The addition of cable reuse adds the ability to have sections of the cable plant that don't meet the full requirements, converting this from a plug and play system to an engineered system.
- That being said, the WG understands the attractiveness of reuse of installed cable – and would recommend that this is limited to reuse and not recommended for new installs

Suggestions for reuse requirements

- **Principle #1: NO HIDDEN GAUGE REDUCTIONS**
 - Wire gauge shall match end-to-end, or at least be no smaller than that presented at the user interfaces
 - Disallow hiding smaller wire gauge behind a larger gauge at the user interface
- **Principle #2: CLEARLY IDENTIFY ANY RESTRICTED CAPACITY CHANNELS, IF ALLOWED**
 - Label to clearly indicate a restricted channel
- **Principle #3: PREVENT ACCIDENTAL MISCONFIGURATION**
 - Different connectors that disallows interconnection of the disparate channels
 - Keyed connectors that prevent 0.75A channels connecting to 2.0A channels and vice versa
 - One might think it's ok to plug a 0.75A cable into a 2.0A as the 2.0A channel can support the 0.75A requirements, but we need to disallow a 2.0A cable being the visible connection with 0.75A in the horizontal.

Some notes on previous experience and scope of IEEE 802.3

- Some have suggested that multiple current capabilities is no different than having different category cables for performance rendering a link the lower category, or too great of cable resistance for PoE
 - IEEE Std 802.3 is an interoperability standard – this is in scope for us
 - The primary effect of either of these is that the system does not perform to IEEE Std 802.3 specifications – no harm is done, and within the scope of 802.3
- Allowing reduced current carrying capacity could create a situation where the current carrying capacity of the link is exceeded by the attached application
 - Requiring IEEE Std 802.3 to disallow easily misconfigured cabling which might result in a **safety** standard
 - Going further is likely outside the scope of IEEE Std 802.3
 - While other groups can go further, they can't rewrite IEEE Std 802.3 – but they can prohibit IEEE 802.3 SPoE on these channels if we don't act correctly.

- Do we request that the SPE doc is separate from 4P?
- Any other ~~safety~~ risks I've overlooked?