USB-⋆ – New Extensions for the Universal Serial Bus

Jim McCann*
Carnegie Mellon University

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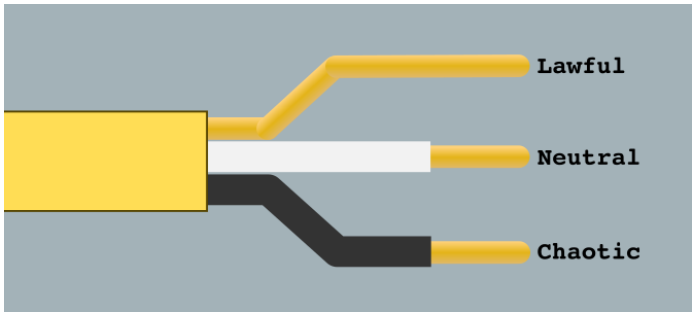

Figure 1: I didn't have an image to put here so here's a thematically related post on mastodon. Please boost it at https://social.wub.site/@ix/111622212515662074.

Abstract

The great thing about standards, the old saying goes, is that there are so many to choose from. USB embodies this expression within one family of interconnects, with a wide range of connector types (A, B, Mini-A, Mini-B, Mini-AB, Micro-A, Micro-B, Micro-AB, 3.0-A, 3.0-B, 3.0-Micro-A, 3.0-Micro-B, 3.0-Micro-AB, C, ...), protocol speeds (Low-Speed, Full-Speed, High-Speed, Gen 1, Gen 2, Gen 2x2, Gen 3x2, Gen 4, ...), conductor counts (2-24), and optional features (power delivery, battery charging, displayport, "thunderbolt", PCI-express, ...). Indeed, the term "USB cable" and "USB port" have become so generic as to be meaningless.

What better way to celebrate the horror of this specification family than by adding a few more logs to the train wreck?

1 USB-HV(DD) – High Voltage / Device Disabling

The purpose of a USB-HV(DD) device is to render any attached devices permanently inoperable. To achieve this aim, a USB-HV(DD) device shall deliver at least 400v of alternating current across at least one pair of pins. Higher voltages are, of course, more effective at arcing between traces and wreaking electrical havoc.

HV(DD) is compatible with any connector or cable standard, and USB-HV(DD) endpoints may be hosts, devices, hubs, or cables. (Even a passive cable can become USB-HV(DD) compatible if a rapidly rotating magnetic field is introduced.)

USB-HV(DD) devices may choose to limit their output current to remain human-safe, but are probably a pretty bad idea regardless of this. Especially because, for maximum chaos, it is recommended that HV(DD) devices contain no special markings.

*ix@tchow.com

2 USB-HC(DD) – High Current / Device Disabling

USB-HC(DD) attempts to accomplish the same aim as USB-HV(DD), but via high current and low voltage. This is likely to fail to disable any USB host or device, but can be useful for disabling cables.

Therefore, USB-HC(DD) devices should be constructed such that a cable connected between two ports of the same device is subjected to sufficient current to be melted through joule heating. Some care should be taken to avoid welding inserted cables to the usb connectors available on the device, unless the USB-HC(DD) device is meant to additionally be self-disabling.

HC(DD) devices should not be labeled, though pictograms suggesting self-loop cable connections might be useful to tempt the unwary.

3 USB-Sea

The USB-Sea protocol replaces electrical signaling with pressure variation in tubes of salt water. (Salt water is used to allow limited power transmission, of course.) What this lacks in data transmission speed, robustness, portability, utility, electrical fidelity, and sensibility it makes up for in corrosiveness.

4 USB-NC – No Connector

The USB No Connector extension avoids the pitfalls associated with USB's many connector standards. A USB-NC host, device, or cable does not end in either a plug or a socket, but – rather – in a pigtail of bare wire ends. A small label affixed near the pigtail indicates that wires should be twisted together with same-color wires.

In the spirit of the USB specification so far, USB-NC does not specify how the wires should be color-coded, leaving manufacturers to independently arrive at inconsistent selections.

A pair of wire strippers or a sharp knife may be used to retrofit any existing USB cable into a USB-NC adaptor cable.

5 USB-PrM – Preemptive Mode

The USB ecosystem generally operates in a "cooperative multi-device" setting, where multiplexing USB host ports between devices is handled by manually time-slicing the devices (adding/removing cables). Of course, such cooperative multitasking is outmoded, not to mention unresponsive.

Preemptive USB devices are designed to support automatic time-slicing between devices with long-range magnetic cables and electromagnetic ports that can be activated by devices to eject or attract nearby cables. (Not to mention finally making "ejecting" a USB drive from an OS context menu do what you'd expect it to.)

6 Data-Only USB

The prevalence of USB as a 5v charging standard led to the creation of many "power-only" USB cables that omit all lines except for 5v and ground in order to save on copper and thus cost. Like donuts and electrons, data-only USB cables provide the formal complement and omit all power transmission lines.

With a power-only, data-only, and two power/data splitter adaptors one can replicate the function of a single USB cable with a messy combination of four devices.

7 Wireless USB

Wireless USB combines the best features of power-only and data-only cables: the missing wires. Wireless USB cables provide neither power nor data transmission, and are expected to be even cheaper to produce than either power-only or data-only cables. These cables, therefore, only form a physical tether with no electrical consequences.

We expect that the availability of wireless USB cables will also spur the development of wire/no-wire splitting adaptors.

Wireless USB cables are not compatible with the USB-NC extension, unless you count tying to plastic cords together as twisting wires.

8 USB Gen 4x4 – Off-Road

USB Gen 4x4 extends USB Gen 2x2 with better off-road capabilities. Whereas USB Gen 2x2 provides two 10Gbps lanes for data transfer, USB Gen 4x4 is an automotive standard requiring that a vehicle have four wheels, of which are powered. (And, strangely, that the vehicle has roughly the overall shape of a Mini-AB connector.)

It is possible to refer to USB Gen 4x4 vehicles as "USB 3.3 Gen 4x4," but, really, it is possible to refer to a vehicle as anything, like "Maude" or "a fast rock," as long as the antecedent is clear from context. So there's that, I guess.

Acknowledgments

Early and often.

References

No.