Universal Power Adapter for Mobile Devices
IEEE P1823 UPAMD
Communications Subcommittee

Start Times:
          25 January   5:00 p.m. PST   UTC-8 (0100GMT/Zulu)

In attendance: Paul Penepinto, Ignatius Lee, Bob Davis, Edgar Brown.

Meeting Notes

UPAMD Communications Subcommittee informal meeting - Edgar Brown   0100Z

I.   State machine representation(s) of adapter and devices provided by Bob Davis.

The presentation of the state machine was discussed, regarding hierarchy presentation vs. Full representation. Edgar will attempt to simplify presentation by making it a hierarchical set of states. Initial detection of two power sources connected together was discussed, whoever priority is higher determines what the attached element should do (assuming it is in its capabilities). Meaning of 'priority' is interpreted as the master device (the one that is in charge of making decisions in the link). CAN's capabilities, under some basic constraints, would ensure that a higher-priority device communicates first. Identical priorities should employ some self-promotion capabilities. Priority could encode some information such as battery charge status.

Some discussion regarding voltage levels for detection was started, including use of CAN lines differentially for detection. Differential use of CAN for detection can be considered problematic for some committee members. Most of the voltage values were deemed arbitrary and selected for detection by using A/Ds on a microcontroller. Detection details, and have to be further explored.

The use of Heartbeat packages, given a separate detection method was considered. These are not needed once detection is done by a separate mechanism, but these can be converted into status packages, communicating priority, capacity, or similar information.

Minimum 'intelligence' of a power source was discussed. The state diagram implies that the minimum power source would require some level of intelligence, although a device can be 'dumb.'

    A. Two power adapter use cases:
        1. A 40W power adapter with full UPAMD communications can be UPAMD-compliant (even though it provides less than 130W).

[Any adapter is UPAMD compliant if it has communication and can supply power. Every compliant power supply will have a design maximum and that maximum can be anywhere in the range of 10W to 130W(240W?). The load/device must work with the adapter to figure out how to best use the power available.]

        2. A 20W power adapter with no UPAMD communications should not be UPAMD-compliant?

A smart device should know what it is connected to, thus insisting on a smart adapter. This scenario, as well as breakage of the communications wires, requires further discussion.

II.   Spice simulation of a power switching scheme was presented by Bob Davis

   Power supply implementation that can provide communications power, full power (21V @ 6.4A), followed by a power-down (at full load) within 350µs. Power-down in this simulation is controlled by the magnitude of the load.

III.   Communication voltage of 12V @ 25mA max (300mW)

   Allow for the possibility of medical standards (60601-1) requires guaranteeing maximum energy to avoid ignition. Hydrogen ignition can occur at energies down to 17µJ. 60601-1 curves (Figures 33 and 34) restrict energy to below 10µJ. These imply up to 0.1µF exposed capacitance with 12V, and up to 10mHy with 25mA. Using 12V@25mA provides close to the maximum power while remaining under both curves. Most existing small microcontrollers can operate well below this level (even if driving several LEDs).

IV.   Exploring communications (CAN) DC coupling power requirements

   Some documents from NASA have shown an alternative for transformer-coupled CAN. Using something like this would solve two issues: (1) differential cabling polarity detection is not needed, (2) it requires only one power-domain in the adapter (i.e., the adapter has only the primary power supply, while its secondary could be completely passive). This design would simplify the adapter but requires additional magnetics in both the adapter and the device. The Dell one-wire implementation was discussed in this context. It avoids this problem by supplying communication power from the device side.

V.   Next communications meetings is on Feb 8 @ 7am Pacific.

IEEE P1823 UPAMD website.

Please send any changes or additions to Edgar Brown ebrown@axionbio.com.