Universal Power Adapter for Mobile Devices
IEEE P1823 UPAMD
Communications Subcommittee

8 February 7:00 a.m. PST UTC-8 (1500GMT/Zulu)


Unapproved Meeting Minutes

Call to Order, UPAMD Communications Subcommittee meeting - Edgar Brown 1515Z

I. Approval of Agenda.
   M: Bob, S: Paul.

II. Approval of Minutes from 11 January 2011 meeting
   M: Lee Atkinson, S: Bob

III. IEEE Patent slides presented.
     See https://development.standards.ieee.org/myproject/Public/mytools/mob/slideset.pdf

IV. Support document: State machine representation(s) of adapter and devices

V. Device detection methods cost and safety implications
   A. Analog detection 2-wires only (power-only)
   B. “Digital” detection 3+ wires (1+ communications)

Document by Lee Atkinson showing the detection methods used by several vendors: uses of the ID (third) pin in the adapter: Of the 4 vendors Lenovo is not using the ID pin, Dell, HP, and Apple use different methods. HP uses a pull-up for static ID, the sink can determine power capabilities of the AC adapter and conform its power adequately. Dynamic signaling occurs by modifying the ID signal if the adapter is close to the ~95% of rated capability, only an ammeter in the adapter can provide this information about the loads. Gary: Response time for over-current condition has to specified. Some legal regulations require specific response times for the specific adapter rating or you would be in violation of the law. Bob: Communications should be able to renegotiate power fast enough to avoid this issue. Lee/Gary: Microcontrollers are not needed to react to these issues, all of this is currently done with simple analog circuits.

Side Note: To accommodate mid-point devices (e.g., HP’s docks places a load in the power lines between adapter and a laptop) it might be worthwhile to revisit the point-to-point specification in the communications goals. In HP’s case the Docks have no configurability of load capability and are a relatively low-power parallel load to the main load of the laptop. As long as the impact on the system is detectable, it might not need its own channel of communications. Lee/Gary: In the context of UPAMD, it might be desirable to specify that every load in a single power line should be declared (communicate). Edgar: Under the CAN communication specification, scenarios such as these should be reasonably easy to address. Bob: The Dock represents an unknown load to the system otherwise. It assumes priority as it could take down an authorized load by just powering on. Lee: It might be desirable that every “significant” power consumer [e.g., >10W] should have communications capability. Gary/Bob: A Dock could have an independent channel of communications to the laptop. Lee: If the laptop knows the specifications of an attached dock (via a
separate channel) it can change its power requests appropriately. Gary: From a flexibility stand-point a multi-drop environment should probably be considered. Bob: A docking station can act as a separate adapter (sink to the adapter side, source to the laptop side).

Lee: Apple’s scheme is completely different to Dell & HP. The adapter detects a very low load (~300kΩ), as soon as this happens the adapter goes to full power. The final voltage is used to indicate the capabilities of the adapter. Bob: Any of these schemes, except Apple’s, requires more than two wires total. Lee: We need to specify what is needed for safety sake and compliance, HP’s and Dell’s methods are sufficient to notify the capability of the adapter but these might not meet the additional safety requirements.

Bob/Lee: A ‘dumb’ adapter can use the communications voltage to signal its capabilities (e.g., 75W adapter), the problem is how to signal disconnection. Lee: It would still require the third wire to detect disconnection. Nonetheless, the safety implications of disconnection might be too high to mandate. Edgar/Lee: We should design the standard such that if a vendor wants to design a ‘safe or medical-qualified’ adapter, the UPAMD standard does not preclude that possibility. Bob/Lee/ Paul: The definition of spark-free is incorrect, as nothing can be spark-free, the most we could try to ensure is ‘low-energy-disconnect’ we need to find a different terminology for this. Lee: ‘low-energy-disconnect’ seems to be a reasonable term. Bob: Talking to UL we could claim ‘coincidentally safe’, meaning that it is not intended to be used in ‘safe’ environments and we are not claiming compliance with 60601, but it does not preclude its use as long as the rest of 60601-1 is implemented. Lee: As long as communications power remains compliant, a device could still reject connection if the adapter is not in the right ‘safe’ class.

Edgar: There are two issues: (1) number of wires and (2) detection method. We can agree on the need for at least one more wire, otherwise we cannot satisfy our current definition of ‘coincidentally safe’ on disconnect.

Lee: Only adapters with attached cables could take some shortcuts on signaling. UPAMD-certified cables must have the one or two extra wires. Bob: Having both methods (communications and analog signaling) available would require that every ‘smart’ adapter or device would need to implement both; adding to the cost of the adapter. Otherwise it would not be a standard. Lee: Analog signaling can be implemented with ‘analog logic’ for less than $0.1. Bob/Edgar: $0.1 would be the cost of a microcontroller. Lee: We have to rationalize the need for low-energy disconnect vs. Lower cost and lower complexity of the connector and the system.

1. CAN-based differential scheme.

Bob presented two analog detection schemes by using the current over the CAN lines. Some issues remains as to how to communicate at the same time without interrupting detection.
VI. Restrictions in “cost classes” of expected UPAMD adapters, cables, and devices
   A. Adapters:
      1. “Dumb”; low power (for lamps and such)
      2. “Smart”; e.g., laptop supplies
   B. Devices:
      1. “Dumb”; e.g., lamps, hubs, home network devices
      2. “Smart”; e.g., laptops, printers

   Edgar: We should flesh-out what each type of device or adapter means. Bob: If any adapter is available, a sink must need to have both methods of detection. Lee: Only ‘safe adapters’ would need to. Edgar/Paul: We should flesh-out what are we proposing as use cases between adapters and loads. Bob: The use cases should include the cost differential.

VII. Review of proposals on device detection and communications (as summarized by Lee Atkinson):
   A. “Simple pull-up” proposal 0.1 (part of what HP does).
   B. Digital communications methods 1 and 2 (like Dell’s use of One-wire, or any other bus).
   C. Use of the no-load voltage positioning (proposal 3).
   D. (analog communications method #2) -- HP Smart Adapter

VIII. New Business

IX. Next communications meetings will be on Feb 22 @ 5pm Pacific.
   A. Ongoing e-mail discussion regarding communication requirements and proposals.

X. Adjournment.

   M: Lee. Meeting adjourned, 1700Z

IEEE P1823 UPAMD website.

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