MEETING 6 Minutes:

Call to Order UPAMD Power Subgroup meeting – Paul Panepinto 7am Pacific 16 December 2010

I. Introductions/Attendance
Attendees: Lee Atkinson, Gary Verdun, Bob Davis, Edgar Brown, Paul Panepinto

II. Approval of 12/02/2010 Power Subgroup Meeting Notes
Read. Motion to Approve: Lee Atkinson; Seconded: Gary Verdun

III. Approval of Agenda
Given the many issues raised on the email reflector, the agenda was modified as shown below under Other Requirements.

IV. IEEE Call for Patents. See http://standards.ieee.org/board/pat/pat-slideset.ppt

V. Review template for UPAMD power requirements (supplied by Lee Atkinson)
We did not yet review the template provided by Lee.

VI. Other requirements to discuss:

Edgar's State Machine – This was the primary discussion topic, but it did touch on the other points below.

There was general agreement that if the communication mechanism, analog or digital, fails, the system should still be robust enough to work in a minimum and safe mode. We should not require a working communication wire for compliance with the non-ignition source requirements of IEC 60601-1.

Lee and Gary indicated a requirement for 2 communication pins may be a problem for vendors to adopt for cost and reliability reasons.

We identified three potential ignition sources:

- Disconnecting a sink
- Connecting a sink
- ESD unrelated to our source, can happen whenever two bodies come in contact.

IEC 60601-1 does not have requirements for ESD ignition potential and the group generally agrees it can design to be a non-ignition source as defined in 60601-1. Bob Davis did some quick calculations where operating in pre-connection mode (12V @ 25mA max output power) or connected mode without communication (20V @ 1A max output power) would fall in the guidelines of being a non-ignition source if designed properly.

Digital communication must be present in order for power to be negotiated to a higher level. To be compliant with IEC 60601-1, that would also mean communication would have to allow the power supply to discharge the energy in the cable and load within the time it could take for a rapid disconnect scenario. For example, a 90W laptop could be powered by a UPAMD source and someone could accidentally trip over the power cord, disconnecting it from the sink. That might happen in as little as 0.5ms. Communication (digital) would have to be guaranteed to signal the power supply in fewer than 0.5ms to discharge the power to ensure the UPAMD adapter does not become an ignition source.

In exploring the minimal state diagram Edgar sent to all of us, we developed two options to consider for detecting a sink is connected to the UPAMD power supply, for devices where digital communication are not supported.

- Option A – Have at least 1 com wire grounded. If so, the UPAMD power adapter knows a device is connected and it can safely apply minimum power (20V @ 1A max.)
- Option B – Define a load as being 5-10mA on the power pin. If this is detected, we can assume it is safe to apply the minimum power (20V @ 1A max.) The UPAMD power adapter will always start with 12V @ 25mA max power on the com wire for negotiating power on the power pin, if the presence of a connected sink is detected. It was discussed that such a model might have a negative impact on vampire power consumption, but comments were made that there are ways to mitigate that, especially if a latency period was acceptable in the time to detect a device being connected. (The line could always be at 1V and get connected to a 12V pull-up resistor in the sink as just one of many possibilities.)

Additional options will be considered and proposed. Then, the group can evaluate all reasonable options and vote.

As follow-up, the group needs to discuss how exactly to do the detection mechanisms described in Options A and B. UPAMD members need to propose written solutions for me to be able to capture them as part of the formal record.

Digital communication is required to signal the UPAMD to provide higher power than the 20V @ 1A limit. At any time digital communication goes away, the UPAMD power adapter must in under 0.5ms go into a low power state (20V @ 1A max output power) in order to ensure it will not become a potential ignition source.

Whenever a sink device is not detected to be connected, the maximum output power is very low, ~12V @ 25mA max. Whenever a sink is detected (connected), the maximum power will be 20V @ 1A.

The group must settle on the following:

- How does one detect the presence of a sink?
- Will the UPAMD support a 2-wire implementation (no communication pin)?
- If the communication or analog sensing pin or wire breaks, can the UPAMD still determine a load is connected via current draw such that it can safely remain in 20V @ 1A max output mode?

Non-Sparking

HP's template for power

Bob's Spice Fully Working Simulation Circuit

Allowance for higher power – Given the discussion on robustness in terms of enabling a safe power mode of 20V with at most 1A of current if communications fails or for low-cost devices that do not implement digital communications, we should definitely discuss the implications of allowing use for systems where a higher voltage level is also to be supported.

The issues below were removed from this meeting's agenda and will be revisited later.

1. Grounding (example of two pieces of equipment connected across hospital floor with 0.7V difference)
2. How to measure voltage and current
3. Voltage and power requirements for communications channel

VII. Adjourn

Edgar Motioned to adjourn at 8:36am Pacific. There will be no other Power Subgroup meeting in December. The next scheduled Power Subgroup meeting is January 13th at 7am Pacific.