1394 Power Mongers Study Group Meeting
Jantzen Beach, OR, 8/18/98

Note: These minutes are the work of Mark Williams from Microsoft (markwi@microsoft.com). If you are short on time, all you have to read is the Summary section at the beginning and any sentences that are in boldface type that are scattered throughout the Details. A list of meeting attendees is on the last page of these minutes.

Summary

The Chair for the meeting, John Nels Fuller from Microsoft, came into this meeting, the first ever for this group, with three agenda items:

1. Establish participation and voting rules for future meetings.
2. Get group's approval to start the process of becoming an IEEE Working Group.
3. Generate 1394 bus usage scenarios that can lead to the 1394 bus power management spec that needs to be generated by this group.

Agenda item 1. The following voting rule was established for this group: If you are at a meeting and you also attended one of two previous meetings, you can vote.

Agenda item 2. Study Group wants to become a Working Group, which needs a PAR, so Study Group authorized John Nels Fuller (Microsoft) to write a PAR. Vote was 24 yes, 0 no, 3 abstain. John's intent is to bring the fist-draft PAR back to Study Group for review before submitting it to IEEE.

A general charter for this group could be to provide mechanisms and information, which is a way of saying CSR information, that enable an intelligent entity on the bus to control power states and manage power distribution – or, it could be said, power budgeting.

Agenda item 3. Steve Bard (Intel) shared a drawing with the group that can be used as a test case for proposed power management implementations and policies – as a standard model for discussion of 1394 usage scenarios and power management. Devices shown in the drawing have been carefully chosen to be interesting for power management discussions. **A PDF file containing the drawing can be downloaded from ftp://ftp.zayante.com/ftp/pub/p1394b/pmonger. The name of the file to download is sb980818-psm-topo.pdf.**

The drawing is a test case for proposals, the common foundation for all our discussions, so as we're talking about things the drawing is what refer to, so it's very clear to everybody. And then if somebody comes up and says this or that is broken in a test case because of the drawing, we'll change the drawing to make a more appropriate foundation.

John Fuller asked if anybody in the room was against using Steve's drawing as the standard foundation for our discussions of power management. When nobody objected, so the group started looking at the drawing.

During the discussion, several guidelines and goals for future work by this group were captured:

- This group should just specify crisp and specific behavioral requirements we expect in order to be compliant and leave implementation to the various OEMs – we don't care how they do it as long as they meet the behavioral requirements in a specific set of circumstances.
- One of the goals of this group must be to specify for devices that were implemented before this group's spec exists, how these devices behave in the power managed environment -- even though they aren't participants in that environment (how could they be? our spec doesn't exist yet).
- This group must not require a PC node to have global bus power management, devices other than PCs must be able to direct global bus power management. The group agreed on this architecture element; for example, looking at the foundation drawing, any node shown in that drawing should be able to be removed and global bus power management, at some level of capability and intelligence, will be possible.

One scenario was generated, based on Steve's drawing:

> A family comes home from vacation with a DVD recorder full of pictures and they want to look at all of them and then print hard copies of the best digital images they find. Everything is off [all the nodes on the 1394 network appear to be off]. What's the easiest way for them to do this? The Desktop PC is off. The Mobile PC was taken on the trip and isn't unpacked yet so it's not even part of the network. And, looking at the drawing, isn't the external Device Bay is pretty much

useless without the Desktop PC turned on? So, let's say the family plugs the digital camera from the trip into a free 1394 port on the DVD player shown in the picture – what happens from there?

Meeting Closure: This face-to-face meeting ran out of time before any more scenarios could be generated, so everybody was encouraged to start putting their scenarios on the group's reflector. **This group's reflector address is pmonger@zayante.com. All people are invited to submit other scenarios based on this drawing to the reflector. To register yourself with the reflector, use majordomo@zayante.com.**

When is this group's next meeting? With a straw poll, it was determined that **the next meeting for this group will be at the next 1394b meeting**. It is obvious from this meeting that we will have to schedule more time for future meetings.

Details

The meeting started on time, and since this was the first meeting on the first day of the Jantzen Beach meetings, John Fuller introduced Steve Finch to talk about hotel logistics. After that, John started walking down the agenda.

Agenda item 1:

Background: Since this was the first meeting of the IEEE study group, rules for participation and voting must be established.
Discussion: As the Chair, John Fuller proposed the following formal voting rule: in order to vote, a person must have attended 2 of the last 3 meetings, including the current meeting, you can vote. In other words, if you are at a meeting and also attended one of the two previous meetings, you can vote.
Vote: Moved, seconded, and carried without a dissenting vote.

Agenda item 2

Background: At the last meeting of the 1394b Task Group, the group voted to investigate disassociating from 1394b avoid confusion, and to look into associating this group with either 1212r or becoming a separate standards committee. As a result of that meeting, the group officially became a Study Group with the charter to look into those two possibilities.
So this was brought up at the last 1212 meeting, but it was decided this group really didn't belong there because it is too bus-specific.
Therefore, John entertained a motion that this group write a PAR. It was moved and seconded.

Discussion: What is the scope of this group's work? **A general charter for this group could be to provide mechanisms and information, which is a way of saying CSR information, that enable an intelligent entity on the bus to control power states and manage power distribution – or, it could be said, power budgeting.**

What is the scope of this group's work? Does it apply to the entire 1394 environment or just a subset of the 1394 environment? We are probably looking at something that is optional because **it looks like Consumer Electronics vendors don't think they need any power management stuff and Computer System vendors think they do need it – yet both types of devices must coexist on the bus. So it looks like the market place will decide which types of devices on the bus have to have power management and which don't.** Now we might go so far as to say, in the future, that if a device is drawing power from the bus then it must participate in the power management scheme, but that's yet to be decided.
What is relationship of this Study Group, especially if we go ahead write this PAR, with the 1394 Trade Association Energy Conservation Working Group (ECWG)? Is there some kind of complimentary relationship there? One way of looking at it is that the TA ECWG is primarily looking at power policy: for example, for recommending that the device wants to turn down the power level after 20 seconds of activity. This group defines the mechanisms and information. This means providing a way of throwing the power switch and a way of finding out what the switches mean by looking at CSR space – but a statement that the device should do this after 20 seconds of inactivity doesn't belong in this group's specification. Claude Cruz (Intel) spoke up in his role as ECWG

Chair and said that sounded like a good relationship between the two groups except ECWG has to be able to come to this group and get the mechanisms needed to carry out the policies. For example, the ECWG believes a Suspend state for entities on the bus is absolutely essential so ECWG needs to come to this group and make sure the mechanisms for getting in and out of that state are available. Claude also pointed out that because there is going to be a lot of cross-membership between the two groups, it is really important to define what is trying to be done here and what is trying to be done there.

John Fuller started discussing the motion itself. He said that a yes vote for the motion authorized him, as this group's Chair, to start writing a PAR, but not to submit it. John will bring the first draft of the PAR back to this group for approval before submitting it.

The motion was amended to be a little more explicit and to reflect the discussion that had taken place. The motion became that this group wants to become a Working Group, and that requires a PAR to be written, so John Fuller is authorized to write a PAR for this group's approval to start that process.

The group brought up some more questions about the scope of this group's work. Is it really a good idea to exclude Consumer Electronics devices from this group's work? Consensus was the "excluding" is inaccurate term, what is meant is that any device on the bus that is not consuming cable power can opt out of complying with mechanisms we define. If a device is not consuming cable power, it can "do its own thing."

What does becoming a Working Group mean? It means we get our own standard number for one thing, IEEE-1394.3, for example.

At the Chair's request, the secretary read the motion prior to the vote: We want to start moving from being a Study Group to being a Working Group, which needs a PAR, so this authorizes John Nels Fuller to go write a PAR."

It was pointed out that the motion, the way it was read by the secretary, did not include anything about John bringing the PAR back to this group for approval before submitting it. John assured the group that that was certainly his intent, so the group voted on the motion as read by the secretary.

Vote: 24 for, 0 no, 3 abstain.

Agenda item 3

This agenda item called for the group to begin brain-storming scenarios for power state management.

Steve Bard (Intel) presented a drawing that represents a 1394 bus topology example with various devices attached and the devices were chosen to enable discussion of power management stuff.

Everyone at the meeting was given a paper copy of Steve's drawing. **A PDF file containing the drawing can be downloaded from ftp://ftp.zayante.com/ftp/pub/p1394b/pmonger. The name of the file to download is sb980818-psm-topo.pdf.**

The drawing shows a digital TV connected to the bus and a DVD player, so there are a couple Consumer Electronics devices. There is also a power brick, so there is a naked PHY thing, and there is a printer. And there is a Mobile PC and an external Device Bay out on the bus and a Desktop PC. And when you look at how all these things are connected we have some PHY ports that aren't connected to anything. And in the Mobile PC there is an internal device and in the Desktop we have an internal device. This is just a drawing to help the group resolve proposals as they come up, that's all this is, it's not a proposal of any kind. So as we're discussing proposals for standardizing power state management cable power distribution, both in this group and in the TA ECWG, we could use this drawing as a point of discussion.

It was suggested that the drawing looked primarily useful for discussing power state management and not cable power distribution, and that's okay because the two discussions should be separate from each other anyway.

Quite a bit of discussion then took place about whether discussions of cable power distribution and power state management can be kept separate from each other. This led to the idea that operationally, what this might mean when the group used the drawing, was that before starting to discuss power state management a set of cable power distribution assumptions would be laid down, right at the start. Then not discussed as an issue again while power state management discussions took place. One of the reasons offered to support this method is that the TA ECWG has seen power state management discussion go into a black hole when cable power distribution issues were brought in, too.

It was pointed out that a weakness in this method of working is that there are multiple cable power distribution implementations that a power state management scenario can take place in.
Finally, **the suggestion to separate cable power distribution and power state management discussions was withdrawn.**
At this point, the discussion returned to the purpose of the drawing. It is a test case for proposals, right? Right, the active proposal here is to adopt this drawing as the common foundation for all our discussions, so as we're talking about things this is what refer to, so it's very clear to everybody. And then if somebody comes up and says this or that is broken in a test case because of the drawing, we'll change the drawing to make a more appropriate foundation.
John Fuller asked if anybody in the room was against using Steve's drawing as the standard foundation for our discussions of power management. When nobody objected, the group started looking at the drawing. Someone suggested getting T-shirts made with the drawing on it for everybody in the group (laughter).

It was pointed out that the drawing has several interesting classes of devices in it. There is a Desktop PC and a Mobile PC both, because each tends to have vastly different requirements for power. So one way to approach this drawing is to look at each of the blocks and explore what the power management **mechanism** requirements are for that type of device. For example, the Desktop PC tends to be what it is all the time, it's either a power provider or it's not, it doesn't change. But the Mobile PC could be, at various times, a power provider, a power consumer, or both.
This started a discussion as to whether the Desktop PC really is unchanging in its role. For example, if another Desktop PC is attached to the bus, the Desktop PC currently connected to the bus might want to change its role based on the capabilities of the other Desktop PC. For another example, a Desktop PC might go from power-on to power-off, so would no longer be a power provider, say. And furthermore, that Desktop PC might want to go into a power-off state that keeps its PHY alive so as not to break the bus. But certainly it's not a power provider any more.
The question was asked whether the diodes shown in the 1394a draft spec [that enable the PC to do this] are normative or informative. Currently, they are normative but some people want these to become informative – we'll have to see how that turns out.
It was pointed out that the TA ECWG Cable Power Distribution spec says the PHY can be cable-powered or trickle-powered for a Desktop PC. So this brings up a question of scope for this group. In this spec do we want to specify only one way to build this device or do we want to specify both ways?
The point was made that this group should just specify crisp and specific behavioral requirements we expect in order to be compliant and leave implementation to the various OEMs – we don't care how they do it as long as they meet the behavioral requirements in a specific set of circumstances.
The importance of the phrase "in a specific set of circumstances" was made. This is important, for one thing, because it doesn't limit our spec to just one set of behaviors, which are then unmanageable for OEMs. Also, one set of circumstances this group must recognize is an existing implementation – **one of the goals of this group must be to specify for devices that were implemented before this group's spec exists, how these devices behave in the power managed environment -- even though they aren't participants in that environment (how could they be? our spec doesn't exist yet) . The Chair instructed the secretary to capture the working principle and the corollary goal shown above in boldface type, so the group cannot forget them.**
Looking back at the Desktop PC block in the drawing, John Fuller put on his hat as the representative of an Operating System vendor. He declared that normally a Desktop PC wants to be the master of power management policy for all the devices inside the Desktop environment and this spec needs to recognize that.
Does that mean the PC shields internal devices from global bus power management policies? Yes, that's what that means. However, it was pointed out that a PC vendor out there could come up with a scheme to include his PC internal devices into global bus power scheme.
The point was made that the architecture underlying global power management on 1394 bus can be pictured as a global resource pool with potentially 63 different modules sharing that pool – a debugging nightmare. The saving grace of 1394 is this: if something bad happens because of the way things are connected, then it's the user's fault (laughter).
It was pointed out that in a home networking situation, maybe don't want a PC – what entity will manage power? **This group must not require a PC node to have global bus power management , devices other**

than PCs must be able to direct global bus power management. The group agreed on this architecture element; for example, looking at the foundation drawing, any node shown in that drawing should be able to be removed and global bus power management, at some level of capability and intelligence, will be possible.

So is the basic architecture model were focusing on is one where the central locus of control can float around, but there is a central locus of control? We're not looking at some sort of "zoo-ey" peer-to-peer situation, are we? Are we looking at a basic architecture where one node centrally manages cable power distribution while another node could be the one that centrally manages power state transitions? Or are pair-wise interactions between nodes going to control power states somehow? We don't know yet. But let's not rule out any architecture model yet. Let's start working with scenarios and see what architecture model comes out of that.

Okay, here's a scenario to get things started [using the drawing]. **A family comes home from vacation with a DVD recorder full of pictures and they want to look at all of them and then print hard copies of the best digital images they find. Everything is off [all the nodes on the 1394 network appear to be off]. What's the easiest way for them to do this? The Desktop PC is off. The Mobile PC was taken on the trip and isn't unpacked yet so it's not even part of the network. And, looking at the drawing, isn't the external Device Bay is pretty much useless without the Desktop PC turned on?**

Can we capture some other scenarios? There's lots of people in the room with different backgrounds so we should be able to generate lots of other interesting scenarios [based on this picture].

Is the external Device Bay useless when the Desktop PC it is connected to over 1394 is off? The USB connection between the Desktop PC and the external Device Bay, the connection that controls the external Device Bay, is not shown in the foundation drawing. However, even if it was shown, the Device Bay itself is silent about what happens to an external Device Bay when the PC that has configured that Device Bay is turned off so we don't know if the family can use the external Device Bay in this scenario or not.

Well, for the beginning of the scenario that's already been suggested, then, let's ignore the external Device Bay and **let's say the family plugs the digital camera from the trip into a free 1394 port on the DVD player shown in the picture – what happens from there?**

Well, looking at this drawing, if the PHY is not on in the Desktop PC, with the digital camera plugged into the DVD player, the DVD player can't talk to the printer to print out images. If the Desktop PC PHY isn't powered, the part of the bus the printer is connected to just doesn't exist. This scenario implies that a power management policy must be that a Desktop PC PHY shall (or "strong should") always be powered, with trickle power at least – that PHY must be able to pass transaction packets at all times.

Well, we can't do anything more with this scenario unless we have to assume the PC Desktop PHY is on, but that's different than putting a requirement in our spec that the PHY must be on. But it does look like in our spec we need to accommodate different levels of power providers.

It was pointed out that the time allotted for the meeting was all used up.

Closing the Meeting

How can we capture some other scenarios [based on this picture]? Since we're out of time in this face-to-face meeting, can everybody in the room start putting their scenarios on the group's reflector? **This group's reflector address is pmonger@zayante.com. All people are invited to submit other scenarios based on this drawing to the reflector. To register yourself with the reflector, use majordomo@zayante.com.**

When is this group's next meeting? With a straw poll, it was determined that **the next meeting for this group will be at the next 1394b meeting**. It is obvious from this meeting that we will have to schedule more time for future meetings.

Attendees (apologies for any mispelled names)

Tetsuya Sato, Sony
Stephen Finch, TI
Jim Skidmore, TI
Steve Bard, Intel
Claude Cruz, Intel
Eric Hannah, Intel
Mike Coletta, Harris
Thomas Hamilton, AMD
Dao-Long Chen, LSI Logic
James Kuo, National
Colin Whitby-Stevens, ST
Matt Rooke, Fujitsu
Duncan Wall, 3Com
Shuntaro Yamazaki, NEC
Wataru Domon, NEC
Takayuki Nyu, NEC
Tomoki Saito, NEC
Keith W. Heilmann, IBM
David Wooten, Compaq
Alistair Coles, HP
Del Hanson, HP
John Nels Fuller, Microsoft
Mark Williams, Microsoft
Paul Wiener, Raychem
Sean Killeen, SSL
Rich Bowers, OSI
D.C. Sessions, VLSI Technology
Anuradha Bommaji, Sand Microelectronics
David Zalatimo, Filanet
Jinghui Lu, Rocketchips
Michael Teener, Zayante
Paul Polishuk, IGI