IEEE 1394.1 Bridge Standards Meeting

AGENDA for June 9-10, 1998
St. Petersburg, Florida

Chair: Dick Scheel, dicks@lsi.sel.sony.com
Editor: Peter Johansson, pjohansson@aol.com
Secretary: Subrata Banerjee, sub@philabs.research.philips.com

1. Administrative:
- 1.1. Minutes of April 27-28, 1998 Meeting
- 1.2. Future meeting schedule
  - 1.2.1. Overlap with other groups
- 1.3. IEEE Standard Association information
- 1.4. Web page

2. Technical topics
- 2.1. Virtual node ids – Johansson
- 2.2. Net Manager selection algorithm – Akahane
- 2.3. 1394 Wireless Bridge with Virtual Bus – Sato
- 2.4. New quarantine idea (change bus id)

3. Assignment of Action Items

Minutes of June 9-10, 1998 Meeting

Administrative

Hard copies of minutes from the previous meeting (April 27-28, 1998) were made available. Dave Wooten moved that the minutes be approved. Peter Johansson seconded the motion. The minutes passed unanimously.

Dick Scheel announced that Subrata Banerjee will help him to get the minutes posted on the web in a timely fashion. Hosting of the P1394.1 standardization related documents on an IEEE web site is being investigated.

Future meeting dates: December meeting will be in Monterrey Bay area, California. Mike Teener will make the hotel arrangements. Exact dates will be announced later. First week of December is preferred. It was decided by a show of hands that only a few but 'active' 1394.1 bridge standard meeting attendees are also attending other 1394 related meetings.

IEEE Standards Association (IEEE-SA) Information: Information on IEEE Standards Association was made available (hard copy handouts). One has to be a member of IEEE-SA in order to participate with voting status in any new ballots established on or after June 1, 1998. Non-members may participate as "observers" for a fee. See http://standards.ieee.org/sa/index.html for membership application form and other details.

Web page: IEEE-SA provides web-page hosting facility for IEEE working groups. Subrata Banerjee is looking into the possibility of hosting the p1394.1 related documents on an IEEE-SA web site.

Dick called for any additional agenda items – none proposed.

Technical Topics

June 9, 1998: Morning Session

Talk Title: Virtual Node Ids
Presenter: ***Peter Johansson***

Peter Johansson led a discussion on some aspects of virtual node IDs; the slides are available as BR025r00 on the FTP site. The topics included a recap of how bridges would map a virtual (soft) node ID to the 16-bit physical ID used on a local bus. The open issues are:

a) do virtual node IDs work if request(s) and response(s) follow different paths through bridges;
b) how is synchronization of virtual node IDs performed if they cannot vary according to route;
c) how virtual node IDs interact with bus resets (i.e., what are the responsibilities of the bridge portal that observed the reset);
d) the life cycle of a virtual node ID (expiration of stale IDs); and
e) are directory services necessary from a central location.

Peter showed that virtual node id. will not work in a system with multiple bridges between a pair of buses if each bridge has its independent mapping of physical to virtual node ids. In such cases a centralized shared virtual node id. database is required. Attendees questioned if multiple bridges between a pair of buses are allowed. It was argued that multiple bridges might be required to increase interbus capacity if and when required. Load sharing amongst multiple bridges is an open issue. There was extensive discussion on how virtual node ids. may be implemented. Some sort of directory service was proposed. Also, it was suggested that validity of a virtual node id. at a remote requester expire if the remote requester does not access the node in *n* time units (*n* to be

determined). However, at the local bridge portal the virtual node id. may still be valid. After a reset, it was proposed that bridge portal wait for *n* time units before assigning the virtual node id. to another (physical) node. Dave Wooten will work at the details of this topic.

Talk Title: Bridge Congestion
Presenter: ***Peter Jahansson***
Congestion might develop in a bridged 1394 network when physical resources (*e.g.*, buffer space, bandwidth etc.) at a 1394 bridge gets exhausted. A mechanism needs to be in place to detect the location of congestion and then to take appropriate action. It was suggested that a congested bridge send a (broadcast?) resp_conflict_error packet containing its own virtual node id. so that a network management process may take appropriate action. This topic is an open issue to be addressed.

June 9, 1998: Afternoon Session

Talk Title: Study on Net Manager Selection Algorithm
Presenter: ***Masa Akahane*****, Sony Corp.** (Handout distributed)

In a bridged network with subnets, subnet manager for each subnet and a net manager for the entire 1394 connected network need to be selected. In this talk a Net Manager selection algorithm for bridged 1394 network with loops was proposed. The node with highest rank wins as the Net Manager. It has not been determined how ranks of the nodes are initially assigned. The speaker noted that software version is a possible candidate. The group questioned whether the algorithm is free from infinite loops. The speaker has checked that it is. The group also wanted to know the running time of this net manager selection process. This needs to be investigated. Mike Teener was concerned about this approach, he preferred a "as flat as possible" self-reconfigurable architecture. In the related discussion it was mentioned that few kilobytes of additional on-chip memory is not an issue. One of the benefits of the subnet idea appears to be the savings in the memory space for the routing table.

Talk Title: 1394 Wireless Bridge with Virtual Bus"
Presenter: ***Takashi Sato*****, Philips Research – Briarcliff** (Handout Distributed)

To wirelessly interconnect *n* 1394.1 buses with two-portal bridges 2(*n*-1) wireless terminals are needed. Takashi showed that using virtual proxy nodes only *n* wireless terminals could interconnect *n* buses. In the proposed approach, a bridge creates a proxy model (via software emulation) of each wireless terminal (node) within its reach. The emulated nodes form a virtual 1394 bus. Thus, a wireless bridge portal can communicate with multiple other bridge portals *via* the virtual 1394 bus. This proposal allows efficient use of the wireless resources without requiring multiportal bridges.

It was noted that a physical obstruction might prohibit all the virtual nodes from communicating directly with each other over the wireless medium. In such cases true 1394 (virtual) bus behavior may not be emulated. It has to be determined if this will present any problem to the devices that are outside the virtual bus. Internal routing of packets inside the virtual bus *via bridges* was also discussed. If a particular wireless path in the virtual bus is broken can a bridge provide alternate routing? If so then the alternate path might have a larger delay. One way to get around this is to make all paths look like the longest path via buffering of the packets. The group wondered how much buffer space will be required to introduce the artificial delays and if it is economical.

A straw poll was taken on the following issue.

> If a node on Bus *A* can exchange packets with a node on another Bus *B*, and a node on Bus *B* can exchange packets with another Bus *C, then* nodes on Bus *A* shall be able to exchange packets with nodes on Bus *C* (within finite time).

Agree: 15
Disagree: 0
Let us not decide now: 1

June 10, 1998: Morning Session (half-day meeting)

The following topics were noted for consideration. Dick solicited inputs on these topics – in the form of presentations and/or written text that may be included in the standard (after editing).

1. **Virtual Node Ids:**
   1.1. Protocol between bridges (normative)
   1.2. Is it practical to implement? We need to make sure that it is not too hard to implement. This issue has to be considered in the context of other issues such as bridge manager, subnetting.
   1.3. David Wooten will be working at it.

2. **Multiple bridges connecting a pair of bridges:**
   2.1. Should 1394.1 architecture allow for multiple bridges between a pair of buses?
   2.2. If so how traffic load will be shared among the bridges?

3. **Should a request and its response follow the same path?**

4. Shall we allow **looping paths** involving multiple buses and bridges?
   4.1. At what speed to forward requests and responses between bridges? At worst-case speed?

5. **How commands and responses will be passed from one bridge to another?**
   5.1. Connect with P1212r on CSR message area?
   5.2. Learn from others – SBP2, FCP? SBP2, FCP have problems but we know how to solve those (Dick).
   5.3. Build a list of commands of our own.

6. **What functions a bridge manager and a net manager shall perform?**
   6.1. Set bus ids and routing information, heart beat function
   6.2. How to select bus manager and net manager?
   6.3. Look at old list – Dick will look into the "
7. **Configuration issues**
   7.1. How routing tables are to be set-up? Something similar to Internet routing with automatic discovery of neighbors?

8. Will we use **subnet** architecture?

9. **Reset Notification**
   9.1. When is it required?
   9.2. When can we avoid propagating bus-reset events in the network?

10. **Clock Synchronization Issue.**
    10.1. Phase and frequency locks? (within a certain tolerance)
    10.2. Dick asked if any attendee does not support freq. locked, phase locked solution – no challenge. Decision of committee was to do go for phase lock and freq. lock based solution.

11. **How to implement cycle frequency lock?**
    11.1. Send go_fast/go_slow commands over an isochronous channel?

11.2. Need detailed proposal/solution. – Mike Teener will work on it.

12. Bridge Congestion

12.1. May be caused by asynchronous traffic only. (Isochronous traffic needs to make reservations.)
12.2. Intelligence for dealing with congestion has to be in the bridges and not in the end devices.
12.3. Dual Phase Retry based solution?
(A problem has been found with the Dual-Phase Retry scheme but it will be fixed in 1394a. David James has some ideas to address the problem.
12.4. Deadlock avoidance issue also needs to be considered.

13. Virtual Bus Issue – should look like a normal bus from the wired side

13.1. Properties expected of 1394 buses. (Informative Annex, or for our internal use).

14. Shall we define behavior of a 1394.1 bridge during short interruptions/reconfigurations (*e.g.*, in wireless environment)?

15. Details of how bridges process isochronous packets, *e.g.*, timestamp adjustment
15.1. David Wooten will work on it.

16. Dick will look into the "old to-do" list for any additional issues to be addressed.

17. Scat man– Neil Morrow.

Dick solicited contributions on these topics. In addition, write-ups for editor will be appreciated.

Voting:
The following procedure was suggested:

- *Normative:* To be eliible to vote one should attend at least 2 out of the last 3 meetings.
- *Informative:* If you don't understand the issue then please don't vote.

Dick solicited input on:

- P1394 Developers Conference:
  - Subrata Banerjee's talk on "1394 Bridge Design Issues"
  - Dick Scheel's talk on compatibility of 1394 end devices with 1394.1 bridge specifications

Following schedule for completion of the 1394.1 standardization work was discussed:

• July 1998:	Bath	Resolve the outstanding technical issues
• August 1998	Portland	Resolve the outstanding technical issues
• September 1998:	Chicago	Intense Review of a draft document that addresses all the relevant issues.
• October 1998	Maui	Update draft.
• December 1998	Monterrey	Standardization work completed. Draft ready for vote.

The group questioned if this schedule is realistic. It was discussed if we should synchronize our completion timeframe with that of 1394b and 1212. No decision was made.

Meeting was adjourned around 12noon.

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