

IEEE P1394.1 Bridge Standards Meeting

February 11-12, 1999
Huntington Beach, California, USA

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AGENDA

1. Administrative: (see handout)

- 1.1. Minutes of December 10-11, 1998 meeting
- 1.2. Future Meeting schedules
 - 1.2.1. Match 25-26, 1999: Phoenix, Arizona (2 full days)
 - 1.2.2. April 1999 <we need a host>
- 1.3. Call for patents

2. Liaison reports

- 2.1. Status of P1394a, including GASP – Peter Johansson
- 2.2. Status of 1212r, including messaging – David James

3. Technical topics (see handout)

- 3.1. Autoreconfiguration (document BR046R02) – Harwood
- 3.2. Draft Text Submission (document BR047R00) – James
- 3.3. Functions and features supported by 1394 virtual bus - Banerjee
- 3.4. Review of SCAT
- 3.5. <any other topics, if there is time>

Minutes of the February 11-12, 1999 Meeting

Administrative Topics

- 1.1. Printed copies of Dec. 1998 meeting minutes were not available. Approval of Dec. '98 meeting minutes will be considered during the next P1394.1 meeting (March 1999).
- 1.2. P1394.1 meeting in April will most probably be held in San Jose at Sony facility during the last week of April, *i.e.*, one week after TA meeting in Osaka. This meeting may be postponed to second week of May to have more time after the March meeting and to avoid the golden week in Japan.
- 1.3. Call for patents. – None.

Technical Topics

February 11, 1999, Thursday: Morning Session

- A. Presentation Topic: **Liaison Report: P1394a, including GASP**
Presenter: **Peter Johansson, Congruent Software**

Generalized Asynchronous Stream Packet (GASP) format proposed in the previous meeting has been included in the P1394a standardization document. Note that, Tag=1 will indicate GSAP whereas Tag=0 indicates unformatted data. The tag value is interpreted in conjunction with the channel number. Possible use of sy field to indicate if packets are to be forwarded by bridges was mentioned. Note that, sy field is application specific and its use is not restricted in P1394-1995 standard. However, P1394a can restrict its use for GASP.

- B. Presentation Topic: **Liaison Report: Status of P1212r, including messaging**
Presenter: **David James, Sony**

In Sec. 7 of document BR047R01 message formats for inter-bridge communication is proposed. Message formats for bridge generated read and write responses, events, and clock adjustments were discussed. Note that format of the first two quadlets in Fig. 21 in BR047R01 was agreed upon by the CSR group in Feb. 10th meeting. The proposed format seems to have some unnecessary overheads for dedicated. P1394.1 group has not yet decided if CSR space will be used for inter-bridge communication.

February 11, 1998, Thursday: Afternoon Session

- C. Presentation Topic: **Bus Number Assignment and Maintenance Using Broadcasts**
(Presentation Slides available as BR046R02.pdf)
Presenter: **Joseph D. Harwood**

In this presentation Joe presented a summary of his submission BR046R02 on bus number assignment and maintenance using broadcasts. His conclusion was that broadcast could be used to initialize and manage bus numbers. In this approach the prime portal (PP) periodically broadcasts packets to find status of all the buses in its network. Duplicate bus numbers may exist for a transient amount of time. Although duplicate detection may take long, eventually this algorithm will eliminate all duplicate bus numbers. Since duplicate detection may take long quarantining remote transactions while there are duplicate bus numbers was suggested. Loops are broken by loop detection packets that are sent periodically. Broadcast packet will be protected from loops by a hop count field, which will be decremented by each portal it passes through. It was noted that it is preferable to drop a packet than to send it to a wrong device. For further details see document no. BR046R02 on the P1394.1 web site.

D. Presentation Topic: Draft Text Submission
Presenter: **David James, Sony**

Following are the important topics discussed in this presentation. For detailed description see document BR047R01 on the P1394.1 web site.

- (1) Bridge queues
- (2) Asynchronous and Isochronous packet routing
- (3) Clock Synchronization
- (4) Packet conversions – CIP pkts., asynchronous speed conversions, error & retry handling
- (5) Virtual Ids
- (6) BusID assignments
- (7) Packet formats
- (8) Congestion management
- (9) Bridge CSR

In BR047R00 several topics that were discussed in previous P1394.1 meetings were documented. BR047R00 also includes some new proposals from David James, including the ones in the SCAT list for which D. James were responsible. BR047R00 was revised and edited during this presentation to yield BR047R01. In this presentation some sections of the document were discussed in greater detail to iron out the details and to see if the write-up accurately captures the consensus reached in earlier meetings. Content of these discussions are outlines below:

Section 1.3.2: Transaction/subaction time-out: Remote time-out is expressed as sum of split timeouts for the number of hops. There are two time-out values – *Remote* time-out as discussed before, and *Local* time-out is split timeout for the local bus. Busy/Retry timeout and residency timeout should be same. Legacy devices have split timeout and busy/retry timeout.

Option (a) SPLIT timeout on local buses set as remote time-out for the whole network. Local timeout is interpreted as busy retry timeout. Disadvantage of using SPLIT TIME for local transaction is that packets might have to wait very long. Note that, this proposal redefines well-known names such as SPLIT TIMEOUT. Remote time-out is two times the sum of maximum forwarding time. Thus Remote time-out has to be bigger than split time-out and hence it can't be stored in split timeout. Max value split time-out field can store is 8sec. And that may not be large enough for remote transactions. The group rejected option (a).

Option (b) was to follow 1394a specifications.

Section 1.3.3: Presents assumed bridge components. Initialization is assumed to take place at low speed, while packet forwarding takes place at high-speed.

There was a discussion on whether a bridge can be a multifunction node. Note that, a bridge should operate in a tight security node since it employs snooping and spoofing.

Peter Johansson made the following motion, which was seconded by John Fuller: *“Ban unit directories other than those defined by P1394.1 from Bridge Configuration ROM.”* The motion was *passed* unanimously. However, this restriction may be reconsidered if and when required.

Clock reference: Node best suited for being the Cycle Master may not have the best clock. So we may need to choose a different node as Clock master. Each bus will have a clock master and cycle master. Also one of the clock master will be clock monster (net clock master). It was asked *if any Node other than the Prime Portal can be the net clock master?* This has to be decided.

Section 4.2: How to figure out the maximum packet size and right speed for remote transactions. David James suggested limiting packet size to 512 bytes *i.e.*, at slowest speed. This may be too restrictive. Using previously discussed trial-and-error method a better initial value may be obtained.

It was argued that If larger packet size is possible then the standard should allow that. One option is to require that bridges support packet sizes of at least 512 bytes but they may do better.

December 9, 1998, Thursday: Afternoon Session

D. Continued

Quad read response format: Responder ID was included for diagnosis for bridge synthesized responses. Do we also need to put ack for that packet in the response packet? See Fig. 22 Block Generated Read Responses (ac = acknowledgment code). ACK field = 0 means there was no ack. The group noted that there might be other use of this reserved field.

Error count provides a way of error handling without going into too many details.

We need to elaborate on legacy device support so that AV/C people can verify that what we intended to work will work. Another approach to this is for the AV/C device people will take the initiative. Quarantine bit was previously proposed for legacy devices. Quarantine bit may be expanded to a two-bit field to indicate – quarantine all, posted write allowed, or none. After a bus reset on the local bus all requests at legacy devices are canceled. Note that we had decided earlier that all legacy devices are allowed to respond to remote requesters(e.g., configuration ROM reads).

Section 6.1.3: Deadlock free loops allowed. Routing algorithm we specify may not use this to its advantage.

ANNEX:

Cut through bridging was described in section D.1.

Multiportal bridge as two portal bridge: N portal bridge can be emulated as N two portal bridge. However, this approach limits the number of portals to 64. Applications in Video studio may require 256 portals. It may also be difficult to simulate a multiportal bridge as N two-portal bridges requiring complex software and redundant hardware.

E. Presentation Topic: Functions and Features of 1394 Virtual Bus

Presenter: **Subrata Banerjee, Philips Research**

Properties and features of 1394 virtual bus were discussed. First part of the presentation outlined how a 1394 virtual bus will differ from a 1394 bus to facilitate multiportal wireless bridge implementation. The second part of the presentation described the support that may be needed from P1394.1 standard to efficiently implement a virtual bus. It appears that P1394.1 will only standardize two-portal bridges. To avoid bandwidth inefficiency of two-portal bridges in a wireless environment, virtual 1394 bus was proposed as a way of hiding the multiportal wireless bridge from their wired counterparts. The presentation described how isochronous stream set-up procedure has to accommodate wireless bridges (or virtual buses) in the set-up path. It was also noted that, unlike in 1394 bus, in a virtual 1394 bus available capacity and delay between different bridge portals might be different. This issue will be addressed when isochronous stream setup procedure gets standardized.

F. Presentation Topic: Discussion on P1394.1 Draft Version 0.4

Presenter: **Peter Johansson, Congruent software**

New items in Draft version 0.04 were introduced. They include:

- (1) New items in glossary (Dec. 3)
- (2) New bridge model diagram, Fig. 4-1. This may be revised to show loosely coupled bridge portals as well.
- (3) Virtual Node Ids, Section 4.1.
- (4) Remote Time-out – Section 4.2. Table 4-1, which proposed, fixed remote time-out as a function of net size may be modified to allow remote time-out to vary depending on network size and congestion level.
- (5) CIP format time stamps – Sections 7.4

A new diagram of the bridge model was introduced. Some attendees suggested alternate bridge model with

distributed portals. Suggestion for bridge model diagrams should be sent to Peter. Note that Isochronous support in bridges is still optional, e.g., a bridge transporting only IP traffic.

There was a discussion on how to identify a bridge portal during the SelfID phase. One suggestion was to use $pwr=101$ to indicate bridge portal node, however it was not acceptable. Another suggestion was to change reserved bits in SelfID packet to non-zero value to identify bridge portal, however this solution requires new PHY chips. The committee is still looking for ways to identify bridge portals via SelfID packets, preferably using the first quadlet.

The new draft also includes description of the concept of Virtual ID and its management. In the new draft *constants* were suggested for maximum remote time-outs in Table 4-1. David James however argued that remote time-outs should be programmable based on dynamic network parameters such as traffic loads. Defining a constant value for maximum remote time-out might also restrict wireless bridge designs. This issue needs further analysis and detailed proposals.

Bridge facilities section is mostly the same as the previous draft version. We may need to know more about Isochronous delay for wireless bridges. Note that, isochronous delay is variable and negotiable and there may be bridges with different capabilities. It was argued that information on buffer resources is more important than that of streams. Use of the stream field in bridge configuration space is also not known.

The new draft assumes command based communication model of bridges. Hence some CSRs are removed. Note that broadcast channel (234h) came out of IETF WG. In command based communication model the data structures are visible only through commands and hence their implementations may vary. Command based bridge interface will be included in the next draft version probably as C code. We still need to decide on commands that will be affecting these data structures.

The draft editor requested careful review of Table 6-2. Although quarantine related information is not included in this draft it will be here in a later draft version. Asynchronous packets, including asynchronous stream packets share the same asynchronous request queue. If there is a reason to favor asynchronous stream packets over other asynchronous packets then separate queue would be required.

Sec. 7-1 remains the same as in the previous draft version. However, this section also needs to be worked on. An updated version of the draft may be released around the next 1394.1 meeting, i.e., last week of March.

G. Discussion on SCAT List:

Updated SCAT list will be available on the P1394.1 web site as document no. BR0035R04. A brief summary of these updates is given below.

- (a) Items 29-32 were added.
- (b) SCAT item 5 is now in Draft V0.04.
- (c) SCAT item 6- new proposal to accommodate preferred clock source was made. This proposal will be considered as part of SCAT item 32 - Clock Master Selection
- (d) SCAT item 13 - Dave James who was working on this item suggests using maximum packet size of 512 bytes. This may not be acceptable, and we may need new proposal for more flexibility. Trial and Error for finding the proper packet size is another approach. When we start to work on commands we may have better understanding of this issue.
- (e) SCAT item 16 – Use Busy A Busy B as defined in 1394a. We may also need some other approach for network-wide congestion handling. This needs further investigation.

David James made the following motion: "Bridges shall implement dual phase retry as specified in 1394a." John Fuller seconded the motion. In the discussion that followed concern was raised if this feature can be implemented economically. David Wooten moved to table the motion until its effect on implementation has been fully understood. The motion was tabled.

- (f) SCAT item 19 – David James is the new owner
- (g) SCAT item 20 & 21 - Peter Johansson is new co-owner

- (h) SCAT item 30 – How we can identify bridge portals during the self ID phase, preferably from the first quadlet of the SelfID packet.
- (i) SCAT items 17 and 18 are removed from the list since the group doesn't have any responsibility. If there is some P1394.1 specific item then the group may get involved.

H. Command Interface to the bridge.

Peter Johansson initiated a discussion on command based bridge interface. Issues raised included:

- (a) Should the command interface be single threaded, i.e., deal with only one command at a time.
It was noted that some command may take a while to be executed.
- (b) Responses to some command may be large e.g., reading a routing table. Instead of sending large amount of data in a command response packet a pointer to the requested data can be sent. Then the other bridge can fetch the data by using a block read request, for example. However, small amount of data, e.g., up to 64bytes can be sent in a command response packet. Pointer based approach will be reconsidered when we encounter situations involving exchange of large amount of data between bridge portals.

I. Standard Completion SCHEDULE:

First we need a draft with all issues covered. Next task will be to clean up the draft and fix up the details. Since quite a bit of "inventions" have to be done to address all relevant issues, it is now difficult to estimate exactly how long that will take. Nevertheless, the group agreed that the following schedule is doable:

April	'99	-	Decide on directions on unresolved issues
June	'99	-	Draft with all sections filled in, <i>functionally complete</i> , but may be lot of open issues
December	'99	-	All sections approximately correct (ready for vote)

Recruiting a core group of people who can spend time on writing/reviewing draft texts was suggested.

Meeting was adjourned at around 12:00noon.

Handouts distributed at the meeting:

- (1) Agenda (see Pg. 1)
- (2) IEEE 1394.1 SCAT (Document BR035R03)

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