

IEEE P1722 AVBTP assumptions

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Revision History

Rev	Date	Comments
0.00	2007-06-14	First version for comments, created from previous AVBTP presentations and key assumptions from Don Pannell's AVB assumptions presentation
0.01	2007-06-24	Changed due to comments and discussions during June 20, 2007 face to face meeting. Made changes based on my notes and also updated slides from John Nels Fuller. Removed detailed encapsulations and comments/changes thereof to first draft AVBTP specification.
0.02	2007-06-25	Edited in changes based on review during teleconference 2007-06-25 and edited in summary proposals/discussions from Chuck Harrison & Alan Bartky (included reference to new encapsulation presentation with additional info).
0.03	2007-07-02	Edited in changes based on review during teleconference 2007-06-25
0.04	2007-10-11	Changed source document from PowerPoint to Word in order to better track revisions.
<u>0.05</u>	<u>2007-11-27</u>	<u>Updates based on last face to face in San Jose CA. Incorporated changes based on John Fuller's and Craig Gunther's presentations.</u>

References:

IEEE P1722 Draft 0.04 specification

<http://www.avbtp.org/contributions/avbtp-bartky-p1722-draft-v0-04-2007-10-05.pdf>

<<Editor's note: will have draft version 0.05 released prior to Fremont CA face to face meeting>>

Audio Video Bridging (AVB) Assumptions, Version 6 (Don Pannell)

<http://www.ieee802.org/1/files/public/docs2007/avb-pannell-assumptions-1107-v9.pdf>

AVBTP Presentation Time (Dave Olsen)

<http://www.avbtp.org/contributions/avbtp-olsen-presentation-time-0507.pdf>

AVB/AVBTP layering, management objects and data transfer processing study Draft 0.01 (Alan Bartky)

<http://www.avbtp.org/contributions/avb-bartky-end-station-study-0507-v1.pdf>

AVBTP encapsulation assumptions Draft 0.09 (Alan Bartky):

<http://www.avbtp.org/contributions/avbtp-bartky-encapsulation-v0-09-2007-11-27.pdf>

P1722 Presentation time (Craig Gunther):

<http://www.avbtp.org/contributions/avbtp-cgunther-presentation-time-v2-2007-10-18.pdf>

Command Transport Protocol (John Nels Fuller):

<http://www.avbtp.org/contributions/avbtp-fuller-command-transport-protocol-r0-00-2007-10-13.pdf>

Overview

- This document is to collect high level requirements, ideas, concepts, etc. for Audio/Video Bridging Transport Protocol (AVBTP) for use in:
 - Building and verifying Consensus on key items
 - Documenting those key items for work on the main specification and other documents/contributions
 - Using as a checklist to make sure that key items are taken care of.

Overview (continued)

This document is broken up into major sections as follows:

- General (leader: Alan Bartky)
- Encapsulation (leader: Alan Bartky)
- Timing and Synchronization (leader: Matt Mora)
- Session Management (leader: John Fuller)
- Protocol layering and selected options from other protocols (e.g. 802.1AS, 802.1Qat, 802.1Qav, etc.) (leader: Alan Bartky?)

Overview (continued)

For each assumption, it will be identified as an item that is:

- Approved by Consensus
- Proposal
- Question
- Open
- Closed
- Work Item

General Assumptions

Approved by consensus:

- AVB class A together with AVB class B cannot use more than 75% of a link's bandwidth
- The Remaining 25% (or more) is used for Legacy (non-AVB) flows
- Keep the AVBTP document “simple and pure”. No control/discovery/etc.\
 - i.e. we keep within our own layer

General Assumptions

Approved by consensus:

- Goal: Keep the protocol simple and close enough to 61883 that bridging to/from the most common forms of 1394 isochronous streams is a straight-forward problem that can easily be done in hardware.
 - Potential issue with complexity of timestamp mapping between 1394 and Ethernet.

- **General Assumptions**

- **Approved by consensus:**
- Functional device type names
 - AVBTP will have Talkers, Listeners and Controllers
 - AVBTP will interoperate with AVB 802.1 bridges.
 - A Talker is the source of a stream
 - A Listener is a receiver of a stream
 - A Controller is a device that introduces and manages talkers and listeners, and manages groups of sessions.
 - Any physical device can be any combination of these
- An AVBTP stream is between one talker and one or more listeners

General Assumptions

Approved by consensus:

AVBTP will adapt the following 1394/61883 type protocols to run in an IEEE 802 environment.

- 61883-2 (SD-DVCR)
- 61883-4 (MPEG2 Compressed Audio/Video)
- 61883-6 (Uncompressed Audio/Music)
- 61883-7 (Satellite TV MPEG)
- BT.601 (*to become 61883-8*) (Uncompressed Video)
- IIDC (Uncompressed Industrial Cameras)

○ *Note: At Santa Clara meeting, some members suggested we not work on this or put this on hold. Editor has agreed to hold off any major work here until further discussed.*

General Assumptions

Approved by Consensus:

- Scope: Keep AVBTP protocol as simple as possible. AVBTP should be a virtual cable.
- Keep the AVBTP document “simple and pure”. No control/discovery/etc.
 - i.e. we keep within our own layer
- Goal: Keep the protocol simple and close enough to 61883 that bridging to/from the most common forms of 1394 isochronous streams is a straight-forward problem that can easily be done in hardware.
 - Potential issue with complexity of timestamp mapping between 1394 and Ethernet.

General Assumptions

Questions:

Open:

- None at this time.

Closed:

- Will AVBTB have to do any policing or scheduling? Do we need a group to study this, or should we add this to the work of things to do in the Timing/Synchronization team?
 - *No, will be done in 802.1Qav which will handle per stream shaping. AVBTP will refer to it.*

General Assumptions

Work Items:

- Possibly work on a MIB/Management interface definition

Timing and Synchronization

Approved by Consensus:

- AVBTP shall use 802.1AS for time base
- AVBTP shall be able to react to change in 802.1AS time (user changing time of day, change in Grandmaster, etc. (see 802.1AS assumptions from AVB document)).
- AVBTP will use the timestamp field for Presentation time.
 - Format 32 bit unsigned Nanoseconds
- On loss of external Grandmaster, AVBTP end stations shall remember and maintain the frequency of that Grandmaster until the time a new Grandmaster takes over.

- **Timing and Synchronization**

- **Approved by Consensus:**

- For 61883 over AVBTP format, AVBTP end stations will support presentation time using the AVBTP timestamp field instead of the SYT field in the CIP packet.

- <<Editor's note: This will work OK for all formats except 61883-4 and 61883-7 which use an SYT field that is in one or more source packets (SPH=1 format). This will need to be worked out further for these protocols (see work item).>>

Timing and Synchronization

Approved by consensus:

- Presentation time assumptions/proposals:
 - The Presentation Time has the following purposes:
 - Reconstruction of the media clock
 - Account for link latency
 - Possible Synchronization of streams
- Ingress time is when the sample is sent by the talker application to the AVBTP layer For example, on an I2S interface this is an 802.1AS timestamp of the word clock transition for the received sample.
- Presentation time is the Ingress time plus a delay constant

Timing and Synchronization

Approved by consensus:

- Default presentation time offset of 2 milliseconds for Class A traffic.
 - This means listeners are required to have at least 2 milliseconds worth of buffering capability.
- AVBTP Presentation time is only associated with a single AVBTP stream

Timing and Synchronization

Proposals:

- *None at this time.*

Timing and Synchronization

Questions:

Open:

- *None at this time*

Timing and Synchronization

Questions:

Closed:

- Should this team also work on queuing, policing and scheduling topics?
 - Not at this time. We assume that it will be handled by 802.1Qat
- What will be the relation (if any) between AVBTP 61883 presentation time and the 802.1AS clock?
 - Have agreed in principal to Craig Gunther's contribution. SYT field will only be used in 1394/61883 to 1722/61883 Interworking Units. Will need to work out the details for 61883-4 and 61883-7

Timing and Synchronization

Work Items:

- Need to work out how to use the AVBTP timestamp and/or the source packet SYT field for handling of 61883-4 & 61883-7 Source Packet Header format type packets.
- Define what is or isn't done by transport layer (i.e. what is done by applications versus the transport layer itself)
- Design and specify timing/synchronization methods, protocols, formats, etc.
- Design Timing/Synchronization service interface.
- Verify timing and synchronization methods are implementable in hardware.

o *Michael has volunteered to work on this.*

Timing and Synchronization

Work Items:

- Need to work out default presentation time for Class B traffic
 - Current AVB team consensus is for a maximum 20 millisecond end to end worse case for latency for this traffic class

Session Management

Approved by Consensus:

- Shall use LLDP(802.1AB), MSRP(802.1Qat) as protocols of the Session management protocols and procedures.
- Provide interface to Zeroconf as an example
- Adapt 1394 AV/C Function Control Protocol (FCP) for use in 61883 over AVBTP.
- Architecture will support other protocols in the future besides AV/C, but we will define AV/C first.

Session management

Approved by Consensus

- Function Control Protocol is IN
- AV/C will just be the first command set supported
- Intention is to not carry 1394 bus resets (use 1394.1 model)
- Plug Control Registers are IN
 - Some equivalent to Plug Registers for managing stream connections
- Connection Management Procedures are IN
 - Must reflect our “Plugs”
- Multicast DA Assignment is IN if not defined in 802.1
 - Needed to complete our “Plugs” and CMP

Session management

Approved by Consensus

- IRM emulation is IN for AV/C
- Service Discovery is IN for each command set supported
 - (i.e. AV/C will recommend Bonjour, but other protocols will be allowed).
- AVBTP session management will use a Talker-Controller-Listener model for 61883 subtype protocol.
 - Goal to put additional complexity in the controller to keep Talkers and Listener functions simpler.
 - i.e. Error reporting and recovery, User Interface, etc.
-

Session Management

Proposals:

- Support for changing bandwidth reservations while a stream is running
 - I hesitate to say “dynamic” as this should be only an occasional thing.
 - Probably OUT for first AV/C version, but IN for planned follow on work

Session Management

Questions

Open

- Are there other protocols needed at lower layers?
- Are there other protocols we should provide a service interface to?

Session Management

Questions

- How is latency management supported by session management?

Session Management

Work Items:

- Define transport
- Protocol/procedure
- State Machine(s)
- Service Interface(s)
- Look into using UDP with AV/C
 - Matt and Andy to look into this.
 - Work continuing.
- Define plugs
- IRM equivalent?? Mapping of Channel ID??

Protocol layering/options

Approved by Consensus:

Shall directly interface with the following protocols

- LLDP(802.1AB)
- SRP(802.1Qat)
- LLC Ethertype option only (no length/DSAP/SSAP/etc. support).
- Shall require use in the AVBTP end station of:
 - PTP(802.1AS)
 - 802.1Qav (queuing and scheduling)

Protocol layering/options

Proposals:

- *None at this time.*

Protocol layering/options

Questions:

- Will we define any interface to use PTP via a system time interface (or will all PTP time aspects be outside of the scope of the transport layer and instead part of the application layer)?
 - At minimum need a notification of Grandmaster time change.
 - Work proceeding in 802.1AS to address service interface.

Work Items:

- Ensure all service interfaces are defined for all layers needed by AVBTP either in the AVBTP document or in other documents.

Encapsulation Assumptions

Approved by Consensus:

- For AVBTP stream data frames, it will use MAC Destination Addresses as per standard 802.1Qat.
- For AVBTP stream control frames, MAC Destination Address may be unicast, multicast or broadcast depending on the specification of the usage of each AVBTP control frame.

Encapsulation Assumptions

Approved by Consensus:

- All talkers shall always send stream data frames in an 802.1Q tagged format
 - 1st Ethertype field set to 0x8100 for 802.1Q type.
 - VLAN ID field
 - VID is a VLAN and not a stream identifier
 - CFI of zero (one is not supported)
 - Listeners shall ignore this field.
 - Priority field set to value for Class A or Class B traffic.
- For AVBTP, talkers and controllers are not required to send stream control frames with an 802.1Q tag.

Encapsulation Assumptions

Approved by Consensus:

- All devices must always be able to accept data and control frames with an 802.1Q tag.
 - When fragmenting from large CIP packets from an application, AVBTP talkers shall fragment on event boundaries of Data Blocks or 61883-4/7 Source Packets.
 - The DBC increments so you know when your timestamp applies.
- <<Note: Editor to work text for Generic and 61883 specific fragmentation sections>>
- <<Comment from team: Probably will also have to reassemble them if going back to 1394 in the same packet.>>

Encapsulation Assumptions

Proposals:

- *None at this time.*

Encapsulation Assumptions

Questions:

Open

- Should we standardize the length field for all AVBTP formats?
 - Latest proposal from editor now also has a standard length field as part of the control frames' fields. Will poll for consensus at Fremont CA face to face meeting.

Encapsulation Assumptions

Questions:

Closed

- Is there other control traffic that will need other encapsulation options?
 - *Consensus: Yes, 61883 over AVBTP will need one for stream control and one for AVC. See current encapsulation proposal for details. Other future protocols over AVBTP will need them as well.*
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Encapsulation Assumptions

Work Items:

- Need to work encapsulation details for 61883-4 and 61883-7 traffic based on coming up with a timing/synchronization for synchronizing the MPEG source packet timestamps using the AVBTP timestamp and/or the Source Packets' SYT field(s).