AVBTP layering and data transfer processing study Draft 0.00

Alan K. Bartky, Bartky Networks
alan@bartky.net
www.bartky.net

Notice of copyright release

- **Notice:**
  - This document has been prepared to assist the work of the IEEE 1722 Working Group. It is offered as a basis for discussion and is not binding on the contributing individual(s) or organization(s). The material in this document is subject to change in form and content after further study. The contributor(s) reserve(s) the right to add, amend or withdraw material contained herein.
- **Copyright Release to IEEE:**
  - The contributor grants a free, irrevocable license to the IEEE to incorporate material contained in this contribution, and any modifications thereof, in the creation of an IEEE Standards publication; to copyright in the IEEE's name any IEEE Standards publication even though it may include portions of this contribution; and at the IEEE's sole discretion to permit others to reproduce in whole or in part the resulting IEEE Standards publication. The contributor also acknowledges and accepts that this contribution may be made public by the IEEE 1722 Working Group.

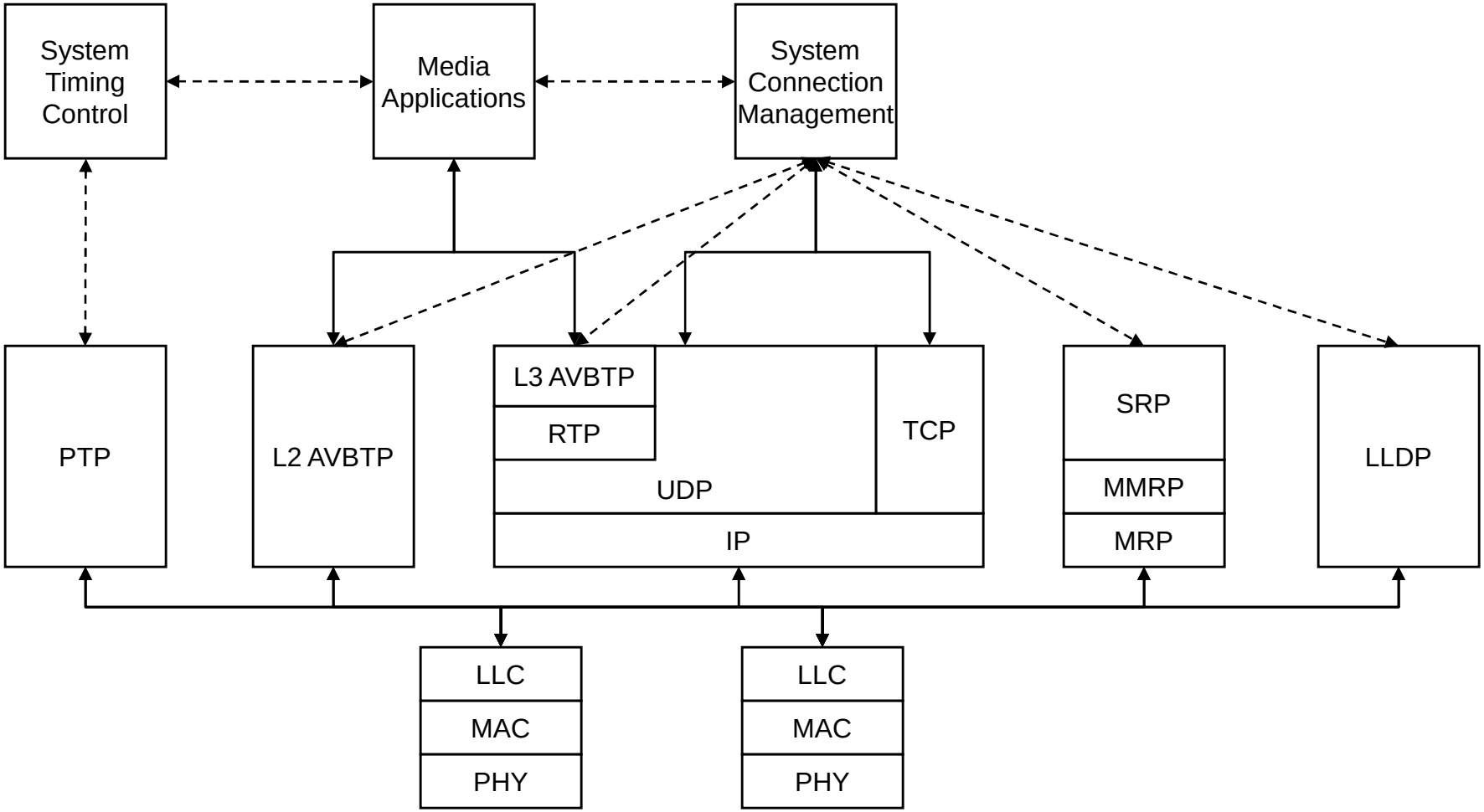
Revision History

Rev	Date	Comments
0.0	2007-04-27	First version for comments

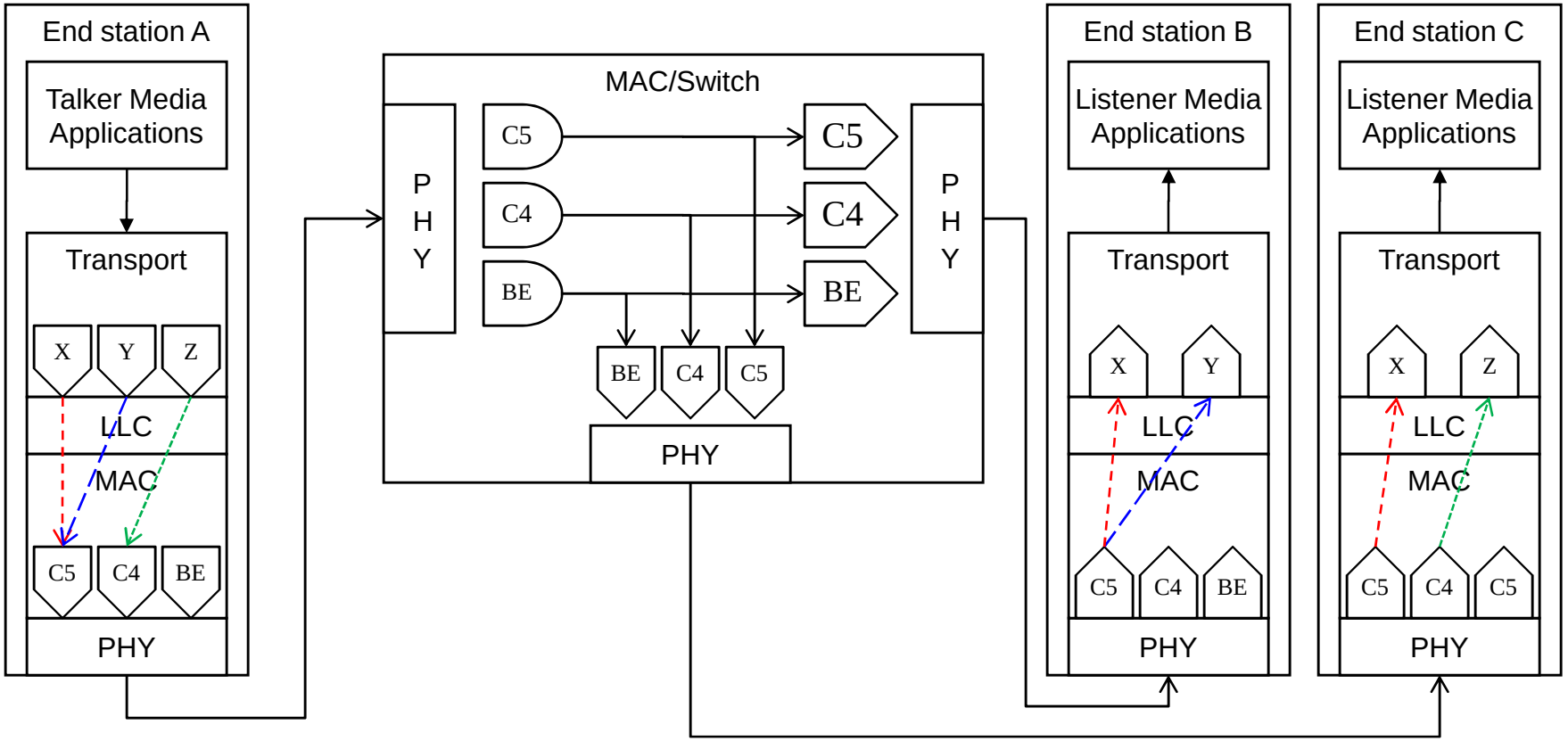
Overview

- Disclaimer: “brainstorming” mode.
- Goal for this presentation is to model at a high level layering and stream data transfer processing between AVB/AVBTP layers and to work out and possibly help verify layer responsibilities and interaction between layers.
  - Focus on end station, but hopefully verify assumptions of operations of the bridge.
  - Hopefully help verify operation of service interfaces, state machines and layer responsibilities
  - Presentation intentionally has lots of options, need to start removing options, but goal is to discuss them and get consensus on removing them.

AV end station layering



AV stream queuing/policing

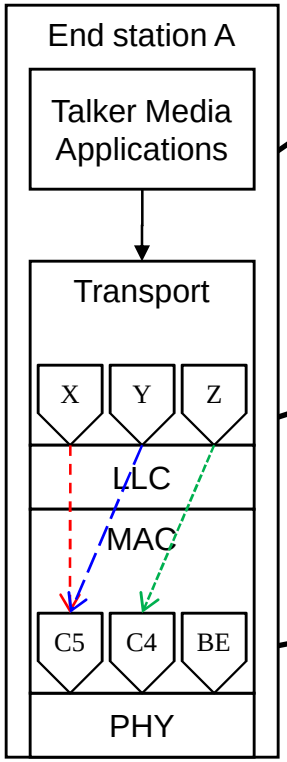


Key:
BE: Best Effort; C4: Class 4; C5 Class 5
X: Stream X; Y: Stream Y; Z: Stream Z

Police:

Queue, Shape and/or Schedule:

Talker Details



1) Interface between talker applications sends stream packets at a rate controlled by application, transport , some local clock frequency or the frequency from global clock.
2) Packets optionally associated with global time by application or transport, either:
   a) Application reference time
   b) Requested transport presentation time
   c) None

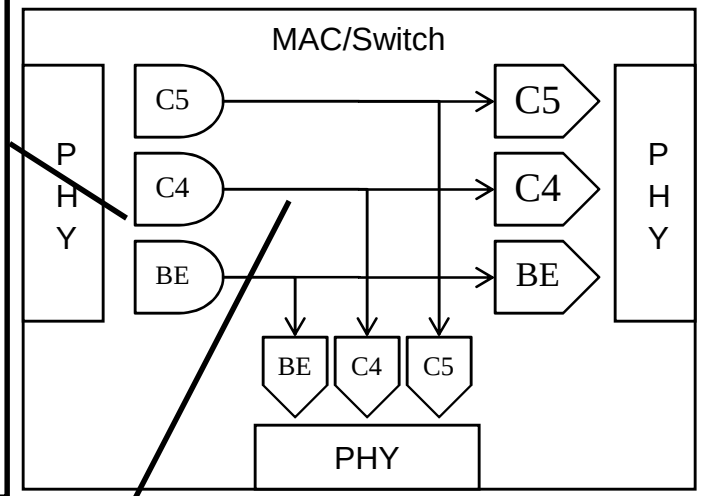
3) Transport shapes each stream on a per stream basis to requirements of 802.1Qav (if not already shaped from application that can meet Qav requirements).

4) MAC schedules class 5, class 4 and other non-AVB traffic (Best effort) for transmission to the PHY. Shaping is not required here as streams are already pre-shaped, so simple priority should suffice.

5) Stream frames exit talker end station meeting 802.1Qav requirements on a per stream and per class basis.

Switch Details

1) Frames enter switch from end station shaped on a per stream and per class basis, or from another bridge on a per class basis.
2) Frames are policed on a per class basis based on the aggregate values of all streams for a given class, for this example:
   - C5 = X + Y
   - C4 = Z



3) Data from streams not discarded due to policing are multicast to one of more ports of the switch to their respective class queues based on their destination MAC multicast group address.

4) Data is shaped on egress on a per class basis based on the on all streams for a given class, for this example
   1) Port to End station B:
      1) C5 = X+Y
      2) C4 = 0
   2) Port to End station B:
      1) C5 = X
      2) C4 = Z

5) Stream data exits switch shaped on a per class basis.

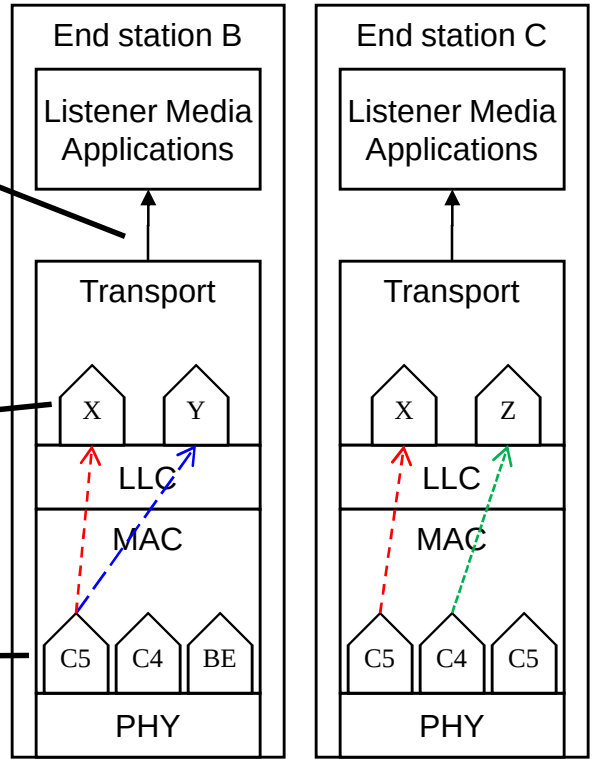
Talker Details

5) Transport sends stream packets at a rate controlled by application, transport, some local clock frequency or the frequency from global clock.
6) For each packet, any transport level associated time information is passed to the application for its information and possible use.

3) Transport optionally re-shapes each stream on a per stream basis to the characteristics of the original stream or to the requirements (timing/frequency) of the receiving device.
4) Transport optionally delays data in the queue for a given stream until ready to present to the application based on presentation time (i.e. option where transport is taking care of these delays rather than the application.

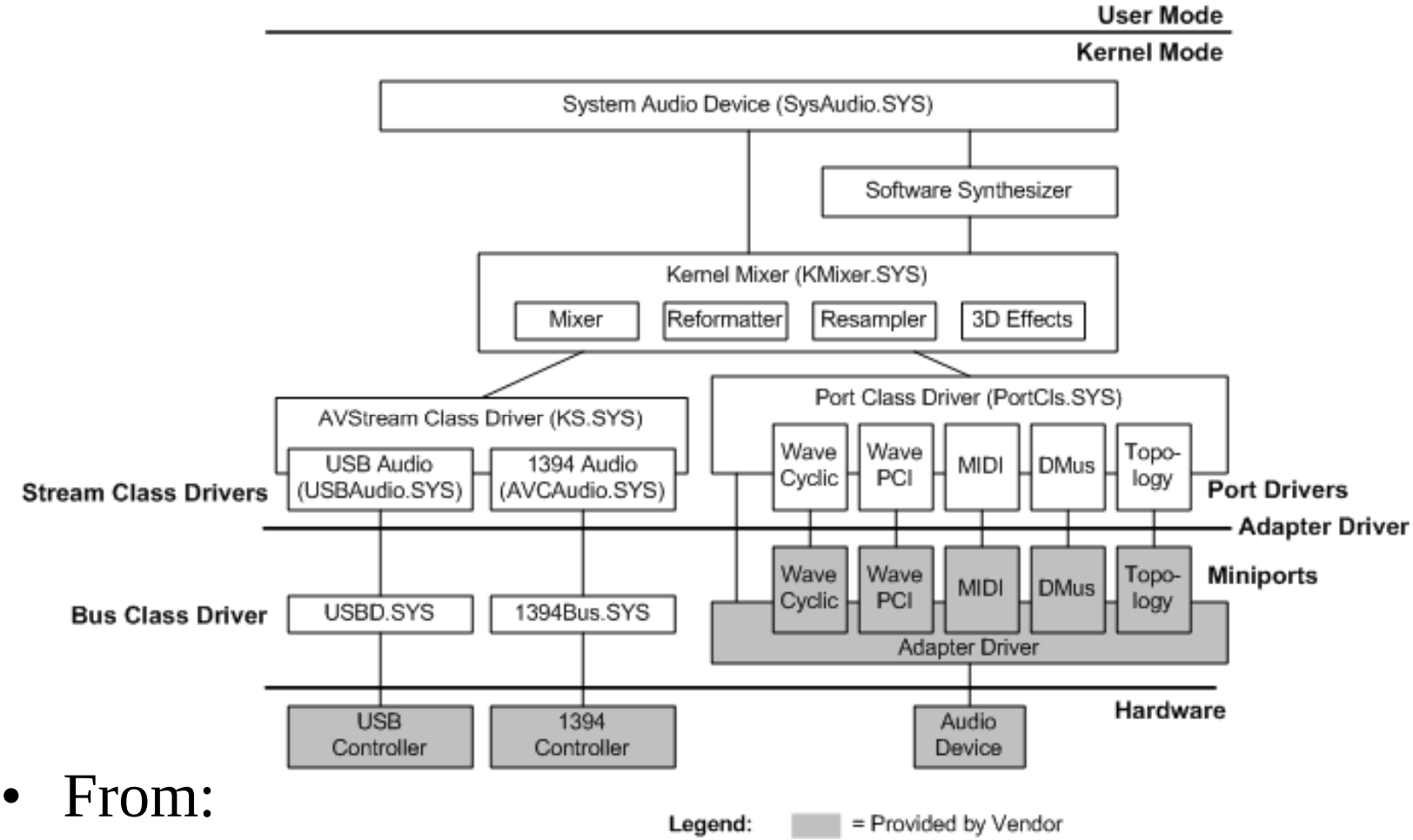
2) MAC Layer optionally prioritizes internal servicing of frames by upper layers by scheduling processing of streams with higher priority than best effort traffic.
>> Editor's note: This is not part of the MAC reference model to my knowledge, but is supported by some MAC level devices.

1) Data enters end station shaped on a per class basis if attached to a switch, or per stream and class basis if attached to an end station
>> Editor's Note: In theory, it has been discussed that as long as all end stations shape their streams properly and switches shape their classes, then the streams exiting the switch should be as well shaped as when they cam from the end station (can this be proved, and also can we trust all end stations to properly shape??).



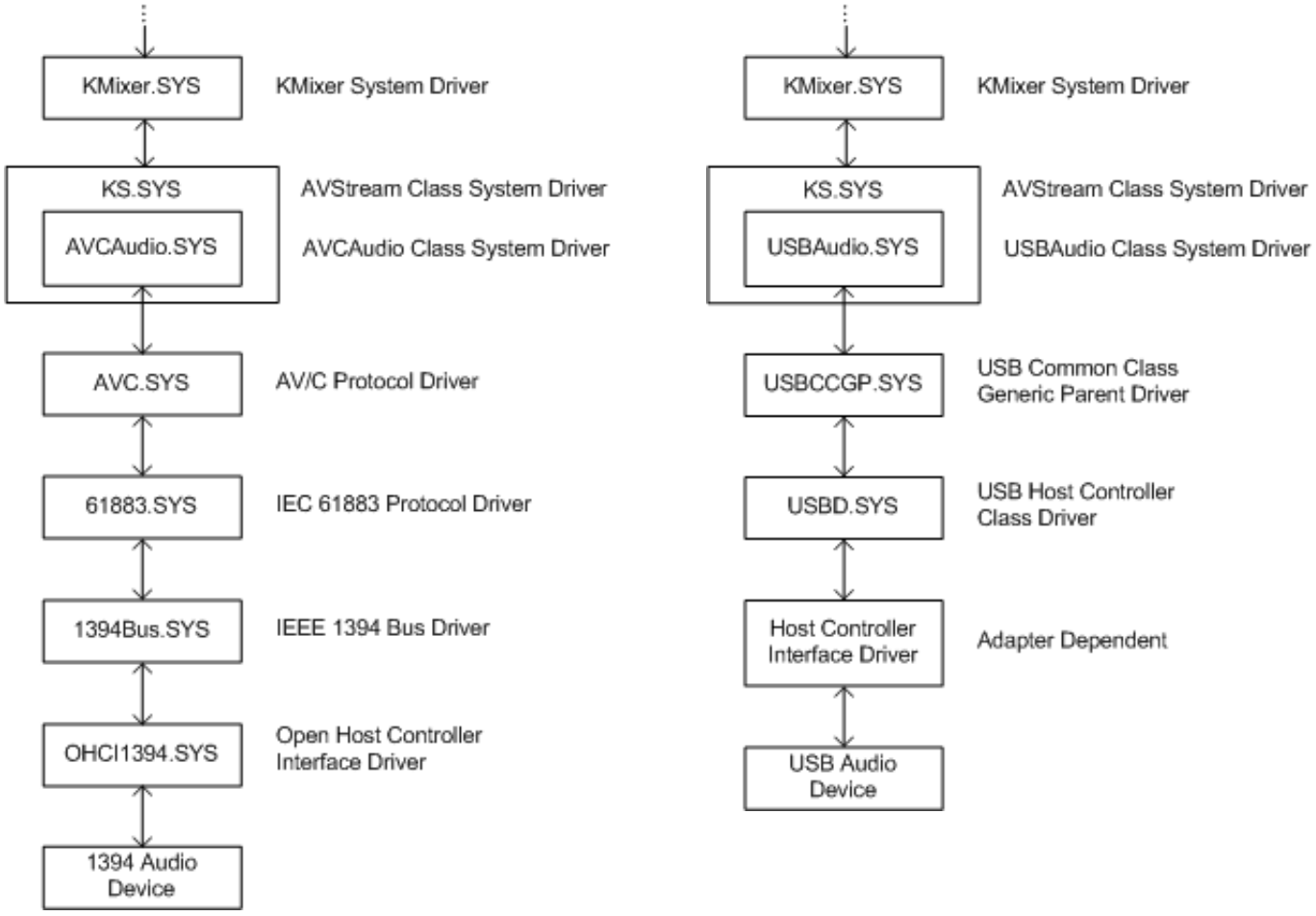
Backup

Microsoft Audio Layering



- From:
  - http://msdn2.microsoft.com/en-us/library/ms790577.aspx

Microsoft detailed AV/C & USB audio layering



- From: http://msdn2.microsoft.com/en-us/library/ms789375.aspx