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CEA Publishes Recommended Practice on A/V Synchronization Implementation in Receivers

The Consumer Electronics Association recently published a Recommended Practice on A/V Synchronization Implementation in receivers, CEA-CEB20. This document was developed by CEA R4WG15, a working group of the R4 Video Systems Committee, under the chairmanship of Adam Goldberg. Adam has written the following contribution *for TV TechCheck*, covering the purpose of the RP and its main recommendations.

"Since the launch of over-the-air digital television (DTV) in the U.S., there has been some difficulty in maintaining accurate audio and video synchronization in television programming delivered to viewers. There have been (and still are) many reasons for this, including production, distribution and reception equipment each contributing to the varying delays of audio and video rendering. In mid-2008, there was growing concern that some DTV receivers were not using the MPEG-2 audio/video synchronization mechanisms properly. In response, the R4 standards committee in CEA began work on a document which sets out to explain to receiver designers who are familiar with, but perhaps not expert on, how synchronization provided for in the MPEG-2 Systems standard should be implemented.

There are some receivers/decoders which yield poor A/V synchronization, even in the presence of perfect streams. There are many reasons for this, among them poor or naive design choices, an imperfect understanding of how the synchronization mechanisms should work, or merely buggy implementations. Unfortunately, it is often the endpoint which gets blamed for problems which may be at the endpoint or may be upstream.

In order to provide direction for receiver engineers, as well as attempt to limit the synchronization errors and allow better debugging of upstream problems, CEB20 was written to recommend the proper MPEG tools and how to use them to achieve A/V
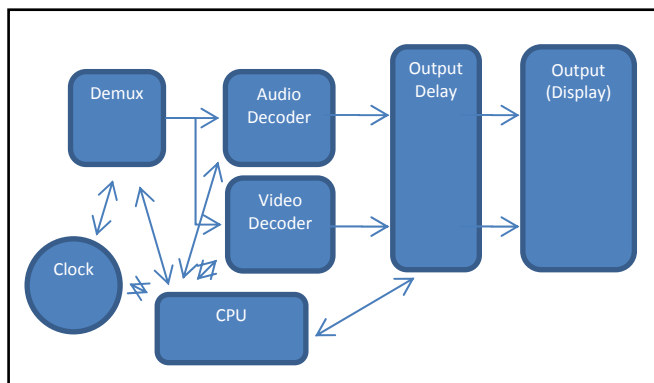
Hardware Components Discussed in CEB20

synchronization correctly. The document is aimed at receiver implementers who have some knowledge of MPEG-2 synchronization tools, but aren't expert on the subject. Internally, we described this as "AV Sync 401" (an upper-division undergraduate course).

The document recommends specific hardware and software processing and explains how the MPEG timestamps (PCR and PTS) should be used. One of the specific industry concerns was that some receivers were only comparing PTS and system time once (at channel acquisition time), that yields A/V synchronization which drifts over time.

The hardware recommendations include specific functionality for the demultiplexer, and that receivers should include both a variable-rate oscillator driven hardware 27MHz clock and output delay hardware (buffers). The software recommendations include specific recommendation on how the encoder's 27MHz clock (the 'system time clock') should be recovered and maintained (using the PCRs in the stream) and that processing should continue over time (not just at acquisition time).

Finally, the document recommends against an overzealous reading of the MPEG-2 standard. Receiver designers should be aware of the theoretical operation of a receiver that is receiving perfect streams with idealized perfect hardware, but also should be aware of the practical considerations of a real-world system. Among other things, receivers should not attempt to detect every possible error and fail if any of them is received."

CEA-CEB20 is available for purchase on-line from the IHS Standards Store at this link.

Adam Goldberg has more than a 15 years experience in various facets of digital television, including the over-the-air digital transition, cable television, digital telecommunications activities, and home entertainment in general. He has been intimately involved with many aspects of DTV receivers, receiver silicon and broadcast equipment. He has held engineering, project management, strategic planning, standards and government relations roles for software vendors, decoder and silicon manufacturers, network and head-end vendors and consumer electronics companies. Now an independent consultant, he can be reached at adam@agp-llc.com or via www.agp-llc.com.

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October 5 - 8, 2009 •Washington, DC

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This four-day course is designed to instruct about uplink operational practices, which minimize the risk of satellite transmission interference. This is an important course since the FCC rules require that a trained operator be present at all times during transmissions, either an earth station site or designated remote control point. Go to http://www.nab.org/satelliteSeminar/ or Contact NAB Science & Technology Department at (202) 429-5346 or ccolerid@nab.org for information about the NAB Satellite Uplink Operators Training Seminar. If you are interested in sponsorship opportunities for this event contact NAB Advertising at (800) 521-8624 or advertising@nab.org.

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The first-ever online Bayliss Foundation auction benefiting the Foundation's scholarship and internship programs is underway until Wednesday, August 12, 2009. The auction includes donated new and previously owned radio and broadcast equipment including transmitters, studio, editing, remote and production equipment for radio, TV, video and other broadcast applications.

For complete details visit The Bayliss Online Auction on the Internet at http://rasmus.com/auction_detail.php?ID=401658. Note that there are no minimum bids or reserves for this auction.

The top priority at the Bayliss Foundation is to encourage aspiring young talent in radio and help develop them into tomorrow's industry leaders. Winning bids will provide critical funding for the Foundation's scholarship and internship programs. For additional information on the Bayliss Foundation visit their Web site at www.baylissfoundation.org.