

AES High-Res Audio Technical Committee Meeting, 151st Convention
Monday, Oct 18 10:00 a.m EDT (Zoom)

Attending:

Jamie Angus
Bob Stuart
Bob Katz
Hyunkook Lee
Hans van Maanen
David Rich
John Grant
Louis Martinez
Vicki Melchior
+ 2 others

Events of interest at this convention:

- a. "A Deep Dive into DAW Digits: Can Floating Point Save You?" by Bob Stuart and Jamie Angus. 11 p.m. EDT, Thursday, October 21. How floating point works.
- b. "Streaming: Mastering, Preparation, Aggregation, Distribution, and Delivery of Files" by Bob Katz, Anna Frick, and a panel of representatives from streaming services. 12 p.m. EDT, Friday, October 22. This will include the new AES loudness normalization standard for streaming.

Both are of real interest to mastering engineers.

Overall News relating to high res and streaming:

- a. Apple entered the lossless streaming fray this spring, introducing CD and high res audio, and Dolby Atmos. Progress is mixed but occurring. Atmos 2-channel mixes have been criticized on sound quality.
- b. Buyouts and consolidation:
 - Apple bought Primephonic, say will release a standalone app for classical music in 6 months
 - Qobuz reduced subscription prices and bought e-Onkyo to access the Japanese streaming market
 - Deezer bought several live streaming companies
- c. Tidal catalog of masters has substantially expanded as Sony has finally released their back catalog encoded in MQA.

- d. Qualcomm promises a CD service for AptX using the new Bluetooth standard, which can finally accommodate Bluetooth data rates beyond lossy.

Discussion of new things to do:

There is no shortage of options as so much is happening in this area. This meeting is to consider directions; we can decide later for 2022 via Zoom or reflector.

a. Previous suggestions for tutorials:

1. Loudspeaker talk on current vs voltage drive by Bruno Putzeys. Did not work out for the 151st but welcome later.
2. Loudspeaker talk on active DSP loudspeakers and their strong advantages, by Bob Stuart.
3. Dither tutorial by Bob Stuart based on Bob and Peter's paper from 2019, including sound examples showing distortion from not dithering.

b. Other events (unspecified format):

4. "What is High Resolution?"

We have discussed this previously. It's important and timely but has to be done well in order to avoid the oft-uninformed opinion of the past 25 years. Before considering "high" resolution, there should be a framework of "what is resolution". This includes resolution of equipment and digital processing (frequency, dynamic range, time), but also of the human auditory system, and of recording and production, meaning of mikes, preamps, and venue noise. Needed are Shannon diagrams, information limit diagrams. How best to do this?

The primary work in this area (over decades) has been that of Bob Stuart and his Meridian and MQA colleagues. Bob did a recent 2-hour webinar for the IET/AES U.K. section, that lays out much of this foundation: See: <https://www.youtube.com/watch?v=SuSGN8yVrcU>. The first hour is an extended discussion of the human auditory system.

Open discussion on this topic amongst the TC raised various ideas –

- HRA also includes perceptual resolution related to room acoustics, physical environment, and reverb
- translation from physical resolution (parameters) into perceptual resolution
- true "high resolution" occurs at an acoustic concert, no mikes or amplification
- should probably drop the term "high resolution"; it's a marketing buzzword
- ultrasonic frequencies, yes or no and why
- early work on time-frequency balance from Cambridge group supported HR formats
- Bob Katz: acoustical time resolution involves early reflections and reflection-free zone
- Jamie: suggested a series of tutorials as a means of presentation

5. Possible immersive audio event relating to binaural mix down algorithms, since most people only hear immersive audio in 2 channels. Many complaints about Atmos mix down quality. Hyunkook discussed his research on binauralization. Conclusions:

- full binaural doesn't necessarily sound better than stereo
- binauralization doesn't automatically produce an immersive experience
- various factors involved: psychoacoustic parameters, room acoustics, HRTF equalization, etc
- diffuse field equalization
- much research to be done