An Interview with Dr. Tom Kite

Tom Kite holds a B.A. in Physics from Oxford University, and MSEE and Ph.D. degrees from The University of Texas at Austin, where he specialized in acoustics and signal processing. He is a member of the Audio Engineering Society, and has published and presented works at the AES, the ASA, IEEE, and in trade journals.

How do you see Audio Precision working in the Smartphone industry?

We've seen a lot of convergence to the smartphone - people carry them around and put everything on them - photos, music, audio recordings, movies; and they expect them to work. These devices contain an amazing number of interfaces, and the new APx line of audio analyzers is perfectly geared to help designers get the most out of each one.

AP has had the ability to get to digital audio inside the smartphone for a long time, using conventional Digital Serial I/O - I2S and the like - but now we've expanded our capabilities to non-I2S data such as PDM (Pulse Density Modulation), Bluetooth and HDMI. Designers of phones and phone accessories need to get into all the "guts", and AP is putting those tools directly into the audio analyzer.

What is Audio Precision doing with Bluetooth devices, such as hands-free headsets?

The APx Bluetooth option is completely integrated with APx analyzers, and includes its own built-in radio for both source and sink operation. It fully supports A2DP (Advanced Audio Distribution Profile), HFP (Hands-Free Profile) and HSP (Headset profile) in all modes, with complete control over parameters such as sample rate, codec, etc. This allows designers to completely test the audio to and from handsfree accessories in the familiar AP software environment.

The advantage we offer is systematic test. Unplugfests have value, but to really know your design is going to work in the real world, you have to programmatically test every signal path, against every codec against every use case. That's next to impossible without dedicated test gear.

Is Audio Precision addressing the new Wide-Band Voice codec?

Yes, we are. Newer editions of Bluetooth support a newer, higher quality codec called mSBC (16kHz sample rate, 8kHz bandwidth), also known as the "wide band speech" codec. When compared to CVSD, it's like the difference between AM and FM radio. APx will be supporting this new standard with firmware and software updates going forward.

Is the Audio Precision Bluetooth option suitable for testing higher quality

audio, such as music?

Absolutely. The AP Bluetooth option fully supports A2DP, a Bluetooth profile designed for one-way transport of stereo music. We're seeing more and more devices employing A2DP, as users demand the convenience of wireless connections from their smartphones to playback systems in the home and car.

A2DP requires SBC (Sub-Band Codec), but can employ other codecs as well. For example, aptX is a new, efficient codec that permits stereo music to be sent over Bluetooth links at higher quality levels than SBC, while staying within bandwidth requirements. AP is staying ahead of the curve with high quality audio and so we've included the aptX codec from CSR.

Our implementation also supports AVRCP (Audio Video Remote Control Profile), which allows for full testing of Bluetooth transmitted control signals for common devices, things like play/pause, volume up/down, etc. That means that devices with remote control capabilities can be fully tested within a single AP project.

Beyond standard audio measurements, does Audio Precision support Perceptual Audio tests, such as PESQ?

This is an incredibly important area. Perceptual audio has become a huge factor in the telecommunications industry - what matters most isn't a spec, but the satisfaction of customers using voice products.

We've implemented PESQ (Perceptual Evaluation of Speech Quality) as a software option for APx500 3.0. Many of the audio interfaces used in telephony, such as Bluetooth headsets, return almost meaningless results if one applies traditional audio measurements such as THD+N or SNR. Measurements like PESQ simulate the results of real human group testing in order to give designers a sense of the real-world usability of their speech-oriented products. PESQ results are given on a simple 5-point MOS (Mean Opinion Score) that represents typical listener results.

Smartphones and tablets now commonly use multiple MEMS mics. How can engineers measure the behavior of these in a meaningful way?

MEMS mics usage is absolutely exploding, with digital interfaces poised to overtake analog in the very near future. Over a billion MEMS mics are being sold this year.

Digital MEMS mics have presented a special problem, as they typically use a PDM (Pulse Density Modulation) format. This is a 1-bit datastream that runs at a very high bitrate, and makes for a very efficient and low cost interface to chipsets. Until now, designers had to feed this output into a home-made decimator to see the audio payload. That's not the case with APx - we've developed a new PDM option that allows mic designers and implementers to both source and sink PDM devices. Instead of seeing only results processed by some outboard box, APx can display everything in the PDM datastream, from audio to the noise shaping above the pass band. This is essential when solving issues with EMI or unwanted aliasing of high frequencies.

We've also included a built-in power supply to make connections quick, easy and reliable, and this power supply can be modulated with standard sine waves and variable-duty square waves to test PSR (Power Supply Rejection) - a key spec for MEMS mics in noisy GSM phone environments.

Where is the focus for Audio Precision going forward?

There is little doubt that the current wave of mobile computing will continue to expand and have an enormous effect upon the audio industry in many dimensions. Audio Precision is committed to maintaining our role as the recognized standard in audio test, and we will continue to develop and refine world-class solutions for engineers who are trying to make the world a better sounding place.

www.audioprecision.com [1]

Posted by Janine E. Mooney, Editor

March 20, 2012

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