SEGMENT: Multiplatform Audio Tour Stop 4
COMPANY NAMES: Dolby, Fraunhofer (Futures Park)
CATEGORY: Immersive Theatrical Audio
HALL: South Hall Upper, Front, Back
BOOTH NUMBERS: SU1702, Futures Park SU15809

At our last stop, we spoke in detail about how high-resolution 4K, high contrast and wide

color gamut HDR images were vastly improving our visual image experience across a

wide range of platforms from cell phones to giant OLED monitors in our homes. But as

any true movie buff will tell you, video is less than half the experience. Good storytelling

demands good audio. Lucky for us, audio quality improvements have been every bit as

dramatic as those on the visual side—and these improvements are shaping up on every

platform of our multiplatform content universe. These improvements largely come in

two specific areas. One area of improvement is called immersive audio—which is

similar to surround audio, other than it contains an "upward" component either featuring

speakers mounted on the ceiling or audio that is bounced off the ceiling. Another area of

improvement is that of "object oriented" audio, which refers to audio in which specific

sounds are separated as objects, which can be discretely manipulated and can appear to

move around the audio space. Both of these improvements deftly demonstrate the trend

towards more immersive formats.

We'll begin here in the Dolby booth at the front of South Hall behind the Avid booth in

SU1702. Dolby has a horse in virtually every platform audio race. For the vast majority

those races, the horse has the same name—Dolby Atmos. Dolby Atmos is both

immersive and object oriented. It is immersive because it has an upward component. In

professional cinemas, that upward component is realized via speakers mounted to the

ceiling. In home theater environments, that upward component manifests as several speakers that face straight up and bounce sound off the ceiling of the room and down to the listeners. Dolby's Atmos is also object oriented. This means a specific sound can be manipulated to move throughout a space. For example, let's imagine that a scene features a buzzing bee. The sound of the bee buzzing is an "object" that can be moved around the configuration of speakers to give the audience the impression that the bee is "moving" throughout the home theater or cinema environment. This sensation of object-oriented audio can also be replicated binaurally—meaning over two speakers like those found in headphones. There is a version of Dolby Atmos for each of these environments. Dolby Atmos for cinema has been around for quite some time. It's main competitors are Barco's Auro 3D and the new upstart DTS:X.   Barco's Auro 3D is a immersive audio format but doesn't implement a true object oriented audio approach. In Dolby's Atmos format, the theater's speaker system is mapped into a 3D sound model. Sound objects can be "moved" from one part of the theater to the other by mapping to a general area of that 3D sound model which can be overlaid onto a variety of speaker configurations. Barco's Auro system works a little differently. In this scenario, each speaker in the theater is assigned a different audio track on the audio editing timeline. This makes the sound mixer responsible for manually moving sounds from speaker to speaker as they edit. This is an arduous task, and may be responsible in part for slowed growth of the Barco Auro 3D standard. Meanwhile another object oriented audio format has joined the fray. Last year, cinema audio giant DTS unveiled their DTS:X audio format for cinemas and home theaters. Since the format is fairly new, it has not yet been deployed to a large number of cinemas. Only a few big new movies have been released in this format

including Lionsgate's *American Ultra*, *Sicario* and *The Hunger Games Mockingjay Part 2*. When compared with the over 200 major movies that have been released in the Dolby Atmos format, it's clear that newcomer DTS:X has some catching up to do before it could overtake Dolby Atmos as a professional digital cinema format. By the way, you can visit the DTS booth here in South Upper Hall in booth SU3714.

Things look a bit different in the home theater environment however. DTS:X offers two distinct features not found in Dolby Atmos. First, it allows viewers to treat the dialog as a sound object—and thus manipulate the dialog as a separate track in the surround mix. This is important as many surround mixes have a huge dynamic range (think range between the softest sounds and the loudest sounds). This range means that if you turn the sound up enough to clearly hear the dialog, you're blowing your next-door neighbor away with the volume on the chase sequences and the explosions. With DTS:X you can just amp the dialog object up in relation to the rest of the sound, so you don't have to sit with your thumb on the volume button on the remote or field complaints from your neighbors. The other feature that DTS:X offers is the ability to map to a wide variety of speaker configurations. Dolby's Atmos system expects your home theater to be configured in a very specific way, with a minimum speaker setup of 7.1—5 speakers around, 2 speakers facing the ceiling and a subwoofer. The DTS:X system uses the speaker system you've got and makes the best of it--however it's configured.

A number of Ultra Blu-ray titles are expected to be released in DTS:X for Ultra Blue-ray including *Crimson Peak*, *Ex Machina*, *The Last Witch Hunter*, *The Big Short* and

Daddy's Home. The question of which format will "win" looks a bit different on the

home audio front especially in light of the new 4K, HDR, WCG, Surround Audio Blu-ray

format known as Ultra HD Blu-ray—yet another example of bringing high impact

formats into the home. Recently the Blu-ray Disc Association announced the final

version of the Ultra Blu-ray standard. This standard supports both the Dolby Atmos and

the DTS:X format for audio. The majority of new, high-end audio receivers for home

theater also support both formats. The net result is that whether home viewers play their

UHD content from a disc on their shiny new Ultra HD Blu-ray player or stream it, they

will probably be able to handle both Dolby Atmos and DTS:X audio. This means audio

formatting will largely come down to a matter of choice for content creators. Will they

author their films and will they mix their home video releases for DTS:X or Dolby

Atmos? Time will tell.

Immersive sound is also integral to the virtual reality experience both in games and in

storytelling. Binaural and ambisonic microphones, spatial and object oriented sound all

play into the experience, Creators of VR acknowledge that both sound and light must be

used to move a user through the experience. Start-up company VisiSonics uses

RealSpace™ 3D Audio to create natural dimensional sound for games and VR

Storytelling. Another start-up, Two Big Ears has created an entirely scalable audio engine

called 3Dception.

While we're talking about audio formats for the home, now would be a great time to

briefly mention home broadcasting standards for audio and video. At the moment, the

proposed new broadcast standard will be called ATSC 3.0.   Let's head now to the NAB

Futures Park where you will also find the ATSC 3.0 Pavilion. This is located all the way

on the other end of the hall from the Dolby Laboratories booth. We're going to stop at

the Fraunhofer booth inside the ATSC 3.0 pavilion at booth SU15809.

ATSC 3.0 is a proposed next-generation broadcasting standard marketed as a tool to

bring improvements to the home viewing experience.   The main impetus for this

standard however is the huge bottleneck in spectrum allocation. Right now radio and

television share frequencies or spectrum with a number of other competing technologies

including broadband mobile communications. The need for broadband frequencies is

exploding and fueling huge entrepreneurial efforts in the U.S. economy. This year, the

FCC will host a series of auctions where traditional TV stations can auction off their

spectrum and broadband companies can buy it. This will mean that TV stations will need

to shuffle around to lower frequencies and employ more efficient techniques for handling

spectrum. Which means a movement to ATSC 3.0, which will make the DTV tuner you

bought so you could watch terrestrial TV into another doorstop or extra large

paperweight. To help ease the pain, the ATSC 3.0 standard will host some new features

for viewers. Some of these features include the ability to receive a 4K (and someday an

8K) resolution video signal, and a much tighter integration of television broadcast with

multiplatform devices like cellphones, tablets, smart appliances and even your car.

Another key benefit is the integration of interactive audio. Here again there are two

major players. One of them is Dolby with their AC-4 audio codec. The other is MPEG-

H—a standard championed by an alliance of companies including Technicolor,

Qualcomm and Fraunhofer. Here in the ATSC 3.0 pavilion, Fraunhofer will undoubtedly be demoing some of the key features of the MPEG-H standard. One of these is object-oriented sound. In this case, dialog can be treated like an individual object and can be raised or lowered in relation to the rest of the audio in the program. In addition, viewers will be able to choose whether they would prefer to hear more or less of certain things. So if they are watching a sports match, they can choose whether they would prefer to hear more of the announcers, the sounds on the field or the sounds from the fans in the stands. MPEG-H also supports immersive sound from speakers both around and above the listener—as well as a method for imitating immersive sound using a series of soundbars positioned around a flatscreen. The ATSC is also considering Dolby's AC-4 as the audio format for ATSC 3.0. In terms of functionality, AC-4 and MPEG-H are fairly similar. MPEG-H is a standard being put forward by a group of companies whereas Dolby AC-4 is a single company. That single company approach may work out to be an advantage on the price side as Dolby has already announced specific pricing for the license fees while MPEG-H will utilize a patent pool. At this point it's somewhat less clear what the licensing fees from the patent pool will be. This important area of the future of broadcast technology is an important one to watch. But we'd like to move on now to discuss the future of audio in a few other key platforms, namely gaming and Virtual Reality. We're going to move along now to Fraunhofer's main booth now in the center of South Hall Upper. To get there, move to the center of the hall and just past the stairwell to booth SU6716.