Immersive Audio
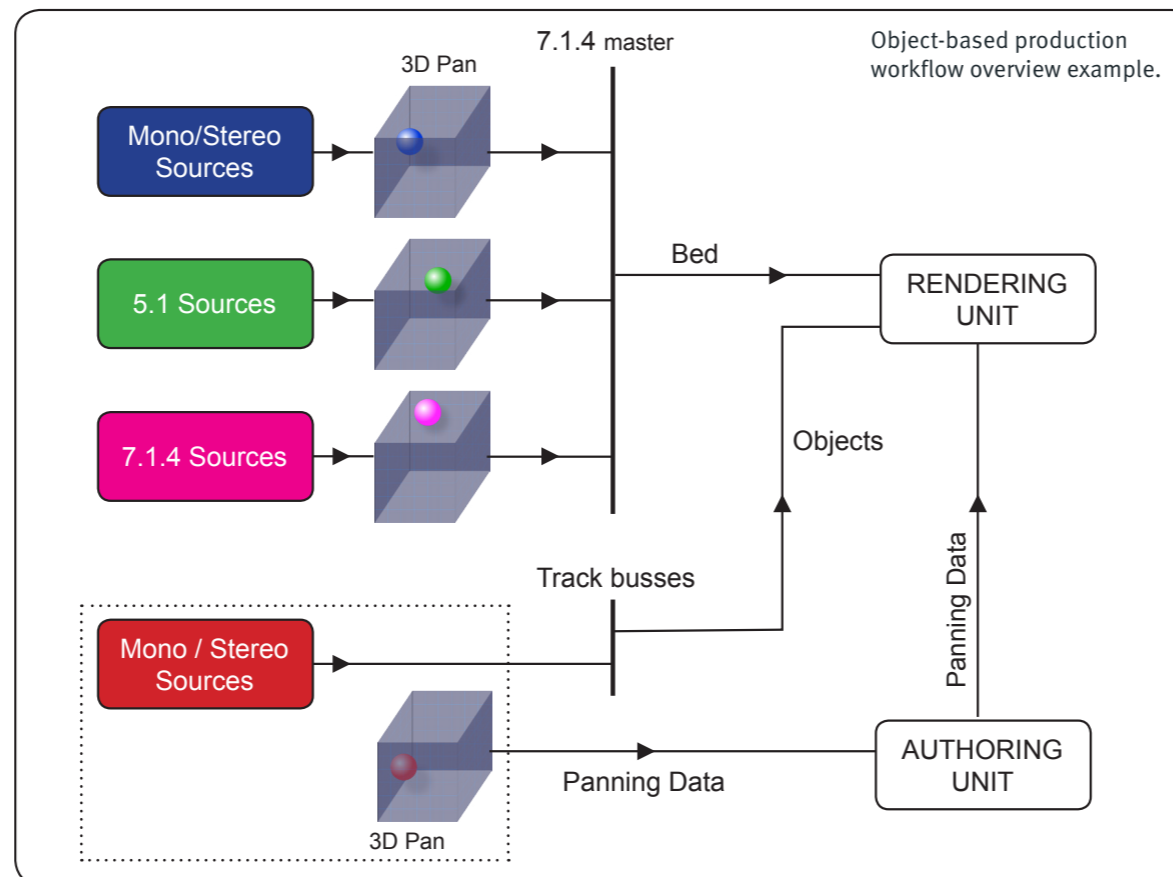## Broadcast Production For Next-Gen Audio

Solid State Logic
SOUND | | VISION

Our industry has big ambitions for Next-Gen Audio. Broadcasters are seeking to gain a commercial edge by providing an ever-richer experience to a wider range of devices that includes mobile TV and VR alongside traditional TV and home theatre. ATSC 3.0 is a forward-looking standard that already incorporates key new video, audio, and data capabilities that make these expanded user experiences possible - and immersive audio is in the mix via support for the Dolby AC-4 and MPEG-H immersive audio formats.

In broadcast, the term 'immersive audio' has much wider implications than a new ambient experience. It also implies a variety of user selectable experiences and options, with new production workflows and delivery options designed to deliver that variety to consumers in a flexible, tailored, and personal way. As well as higher-channel counts, height information, and even scene-based immersion for Virtual Reality, objects such as alternative languages and commentaries, multiple points-of-view, and accessibility objects are all parts of the new immersive audio eco-system.

Object and scene-based immersive audio approaches - and combinations of both - offer a production toolkit that can adapt to any content. The dynamic objects and intense beds of dramatic content will inspire viewers wherever they are; the visceral atmospherics of a live sports event will put fans in the action, and object enhancements will bring versatility to programming for wider potential audiences.

It is time to get immersed.

Object-based production workflow overview example.

Intelligent downmixing means that conventional 5.1, stereo, and mono mixes can be created simply by routing a 3D channel or stem to a suitably formatted master bus. Downmix coefficient control of the overhead (top) to floor (bottom) mix and the side channels to front and rear, permits user adjustment of the system derived defaults. An elegant unified approach to divergence processing eliminates the complexity often found in the panning solutions offered on workstations and other digital consoles, which require multiple parameters to determine the balance between the discrete and phantom components of the centre and side channel signals.

3D Monitoring

Partnering the new 3D channel and bus formats is a 12-channel monitoring section. This includes 49 12-channel monitor inputs, configured as a primary monitor input and two 24-channel pre-selectors, together with a 12-channel AFL monitor

Immersive Audio in System T

SSL's immersive audio implementation for System T places support of immersive audio for ATSC 3.0, Dolby Atmos, and MPEG-H at the heart of the console architecture.

SSL's new three-axis coordinate panning for System T incorporates two or four overhead speakers into the available channel and bus formats. As well as positioning mono and stereo sources in a 3D sound field, System T can accept multichannel 3D sources and fine tune their spatial components as they are added to the final production mix. This is essential in multilingual sports productions where effects and ambience

multichannel 3D beds will be used extensively as the basis of the individual program mixes.

Supported formats include 5.1.2 and 5.1.4, 7.1.2 and 7.1.4 (with side channels as well as rear channels). A novel 4.0.4 format designed primarily for beds and stems ensures that the centre channel remains exclusively available for dialogue and commentary. The 4.0.4 format is also ideal for the output of the new generation of VR mics that capture a 4-channel ambisonics scene representation. This can then be rendered in a multichannel format for incorporation into an 'object/bed' based immersive mix.

The new three-axis coordinate panning for System T.

bus, and a pair of 12-channel insert points for external processing and rendering engine returns, offering all the monitoring tools required in a 3D production environment. An additional secondary main monitor output allows use of both conventional monitor speakers as well as a secondary sound bar or other domestic style monitor setup for real-world quality checking. A further two stereo Alt outputs can be used for nearfield monitors or for simultaneous secondary program monitoring in multi-language productions. Independent channel level and delay adjustment is available for both main monitor outputs.

Completing the immersive feature set in System T is an extensive collection of processing tools. In addition to all the standard path processing (EQ, Filters, Dynamics 1, Dynamics 2, Delay) including up to 7.1.4 capability, the System T FX rack includes immersive format versions of the Bus Compressor, Multiband Compressor, Enhancer, Dynamic EQ, G flex EQ, All Pass Filter, De-Noiser and Summing Module.

System T - Future-Proofed

SSL's System T broadcast environment, with Native networking infrastructure and the powerful Tempest engine, is agile enough to navigate a changing landscape of immersive audio production. The new V2.0 software provides the tools to produce the immersive content already being broadcast for ATSC 3.0, and as scene-based, ambisonics, binaural and 360° workflows are more clearly defined, SSL has the tools available to bring these into the real-time production workflow.

More Information

For more information on SSL's broadcast products abd technologies visit

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Glossary

Object-based
Object-based immersive audio provides a mixture of channel-based beds, and audio objects. A 5.1.4 bed, for example, would provide five surround channels, one sub,and four 'height' speakers. Audio objects are single feeds of specifc objects - such as dialogue options, accessibility channels, and other 'positional' objects. This mixture of channel-based beds and objects means that mixes are correct on a variety of replay systems and mixes do not have to be tailed for a particular format.

Soundbars with Atmos, MPEG-H, and DTS:X are already available, as are solutions for rendering object-based audio to binaural feeds for mobile media, for example.

Scene-based
This approach to immersive audio is distinctive from the the discrete object-based immersive audio in that it encapsultates both natural sound fields, recorded at source, and encoding systems that emulate that approach. Ambisonics is one example. First-order ambisonics is a three-dimensional mid-side technique that includes height and depth information. Higher-order ambisoncs add additional directional components. YouTube supports a 1st Order encoded ambisonic mix embedded with VR video, and MPEG-H suports up to 3rd-order ambisonics.

MPEG-H 3D Audio
Part of the MPEG-H group of standards that supports both object-based and Scene-based (High Order Ambisonics) audio, and originally proposed by Fraunhofer, Qualcomm and Technicolor.

Interactive objects, beds, and Ambisonic components can be combined. Binaural rendering of sound for headphone listening is also supported.

Dolby AC-4 / Dolby Atmos
AC-4 is Dolby's newest broadcast audio format with aspects such as better compression efficiency, new dialogue, dynamic range, and loudness control features, as well as flexible, object-based immersive audio provision, up to full Dolby Atmos for broadcast.

Dolby Atmos is an object-based format originally developed for cinemas, now with implementations for home and mobile applications.

Broadcasters and streaming services already transmitting Dolby Atmos include Netflix, VuDu, Sky Sports (Sky Q), BT Sport, Canal+, NBC, Globo-sat, Comcast, and Orange France.