

The World's First 3D Audio Standard ECMA-407 Showcased in IBC 2014's "FUTURE ZONE"

FOR IMMEDIATE RELEASE

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France Télévisions, SES and Swissaudec showcase ECMA-407, the world's first 3D audio standard, with stunning NHK 22.2 3D audio at 256kb/s over satellite and 4K HEVC - in co-operation with IBC, Ecma International, ATEME, Mayah Communications, New Audio Technology, EPF Lausanne and McGill University in Montreal.

UHD TV or Super-Hi-Vision uses elevated speakers as an extension to 2D Surround formats to render a three-dimensional immersive sound experience.

Swissaudec for the first time introduces a new conformant extension to ECMA-407, which requires no side information and can retrieve up to 16 additional channels inside an ECMA-407 decoder for full NHK 22.2 playout at high subjective quality.

Extended ECMA-407 requires less than 100 bits overhead for transporting several minutes of NHK 22.2 content over a 7.1 Surround satellite carrier, thanks to a model derived from astrophysics and forgotten discoveries of German mathematician David Hilbert.

In combination with HEVC and revolutionary fingerprint and loudness tools, the present ECMA-407 implementation, developed by Swissaudec in co-operation with Marco Mattavelli's research group at EPF Lausanne, yields NHK 22.2 and may target „second screens“.

Wieslaw Woszczyk's research group at McGill University's "Studio 22" has tuned the codec. „Studio 22" in Montreal is McGill's NHK 22.2 audio format compatible studio where also „Space Builder“, a 22.2 channel reverberation system, was designed in collaboration with Japanese broadcaster NHK.

France Télévisions Innovations & Developments thanks to its partnerships with the 4EVER and BiLi research consortiums, has crafted beautiful 4K live shots full of life, art and French „*savoir vivre*“, for which a genuine NHK 22.2 sound track was mixed at France Télévisions NHK 22.2 research facilities – jointly investigating future UHD TV aesthetics and technologies.

SES has provided satellite capacity especially for this UHD TV demonstration in the "Future Zone" of IBC 2014. Together with HEVC, extended ECMA-407 operates as low as 256kb/s..

The MPEG audio transport stream is crafted by Mayah Communications, and the ECMA-407/HEVC MUX by ATEME, which likewise provides the IRD infrastructure at the decoder side.

The MPEG audio transport stream is decoded by the latest version of Mayah Communications' Centauri VI 5000, equipped with extended ECMA-407, and originally designed to simultaneously transmit 64 channels over IP in a studio environment.

Full NHK 22.2 payout is achieved over a virtual speaker system on regular headphones provided by New Audio Technology.

The HEVC transport stream is directly decoded and showcased on a Samsung UE 55UH8500 Curved. For this demonstration external synchronization is used. However, thanks to the synchronization tools of ECMA-407, internal synchronization with an integrated ECMA-407/HEVC encoding and decoding system will offer the full advantages of the overall system, and particularly with "second screens".

Extended ECMA-407 offers sophisticated loudness tools conformant to ITU and EBU recommendations.

Extended ECMA-407, as a classical IT standard as is ECMAScript, better known as JavaScript, specifically targets satellite, terrestrial and Internet 3D transmission as a low-payload extension to codecs, which are already found on the marketplace, like, for instance, AAC and HE-AAC currently found in six billion devices.

In parallel, Swissaudec showcases the same decoded stream for iOS-, Android- and Windows-driven Smartphones and tablets:

The binaural payout, which has been optimized for the computational power of a Smartphone and a tablet, likewise is achieved by New Audio Technology's virtual speaker system. Linkage of these devices with ECMA-407's S5SyncTag will provide a perfect „second screen“ broadcasting scenario with parallel satellite or terrestrial transmission – and full 3D listening capabilities.

The consortium wishes to thank Music Network AG, Dietikon, for providing the RME binaural payout environment, which in a further stage may easily be substituted within a consumer device.

Partners



France Télévisions Innovations & Developments has been an early major driver of 3D audio technologies and content inside and outside the European Broadcasting Union (EBU). The BILI project, funded by the French Government, focuses on all aspects of 3D binaural decoding and rendering. In parallel, AES X-212 as a complementary standard for binaural data exchange was launched in Summer 2014. The 4EVER project focuses on the complementary visual part for immersive TV: Ultra HD production and HEVC coding... ECMA-407 was largely inspired by France Télévisions' requirements for future immersive broadcasting formats...



SES is a world-leading satellite operator, providing reliable and secure satellite communications solutions to broadcast, telecom, corporate and government customers worldwide. SES owns and operates a fleet of 54 geostationary satellites that are complemented by a network of teleports and offices located around the globe. This far-reaching infrastructure reaches 99% of the world's population and places SES at the heart of the global communications chain. SES is headquartered in Luxembourg and operates worldwide through dedicated regional teams. SES, due to the initiative of Thomas Wrede, Tom Christophory and Alexander Beresowskij provides a dedicated ECMA-407/HEVC UHD TV satellite transponder link for the "Future Zone" and Swisssaudec's booth 10.F45.



Swisssaudec, founded by Clemens Par (who studied under Rudolf E. Kálmán), Melanie Angélique Grümmer and Sylvain Rizzato in 2010, focuses on low-payload high-efficiency 3D audio coding algorithms for the satellite and broadcasting industry, as are standardized as ECMA-407. Its research activities in applied mathematics have led to major breakthroughs in electroacoustics and signalling theory. Swisssaudec's numerous patents received several international awards, including the WIPO Award „Best

Inventor“ 2009 in Moscow. Swissaudec is highly active in international standardization at MPEG and Ecma International. Its codecs are developed in close co-operation with leading industry partners and scientists in Europe, North America and Japan. Swissaudec showcases the first implementation of ECMA-407, which yields unrestricted NHK 22.2 satellite and Internet transmission at 256kb/s.



Ecma International is a non-profit industry association of technology developers, vendors and users. Since its inception in 1961, Ecma International has developed standards for Information and Communication Technology (ICT) and for Consumer Electronics (CE) applications. Experts from industry and other organizations work together at Ecma to develop and maintain standards and technical reports. Ecma collaborates with, and contributes to the technical work of, ISO, IEC, ISO/IEC JTC 1 and ETSI. Ecma makes significant use of the fast-track process in these organizations to elevate its specifications to the status of International or European Standards. Due to the personal initiative of the Secretary General, István Sebestyén, and the General Assembly's decision, Ecma has established an audio group TC32-TG22 in 2012 and launched the international standard ECMA-407.



ATEME is a global leader in advanced video compression solutions for the broadcast industry and a world leading provider of HEVC, MPEG-4 / H.264 and MPEG-2 bandwidth efficient compression technology. ATEME encoding solutions are deployed widely for broadcast contribution links, distribution, multi-screen live streaming, OTT and VOD applications. For more information, see www.ateme.com.



Mayah Communications, founded in 1997 offers high quality broadcast solutions for streaming audio to the public and connecting studios and journalists. Its Centauri series has become a major success inside and outside EBU and with its latest showcased version Centauri VI 5000 is able to transmit up to 64 channels simultaneously. All major codecs like Ogg or the AAC family are supported. Due to the initiative of Detlef Wiese and the technical expertise of Hans-Heinrich Hansen, the next Centauri VI 5000 generation will include Swissaudec's extended ECMA-407 codec - enabling any type of broadcasting scenario over satellite, antenna or IP up to NHK 22.2.



New Audio Technology, founded by well-known 3D audio producer Tom Ammermann, is an early provider of fully-grown 3D content production and binaural simulation tools, which have found their way to Hollywood cinema and to the game industry. New Audio Technology's focus is user-centric and via its headphone speaker virtualization system allows unrestricted 3D experience on the fly without artistic compromise. Tom Ammermann's thoroughly crafted 3D speaker virtualizations are highly stable with respect to head movements and therefore have been chosen to showcase NHK 22.2 at IBC 2014.



The **EPF Lausanne** SCI-STI-MM group, directed by Marco Mattavelli, focuses on methodologies for specification and modelling of complex systems, architectures for video coding (in particular the multimedia architectures of MPEG-2, 4, 7 and 21), high speed image acquisition, video processing systems, and applications of combinatorial optimization to signal processing. Scientific results on RVC-CAL, as support of design flows for high level data flow modelling, represent part of the MPEG standardization framework. Besides research activities, STI-GR-MM is particularly oriented to transfer of innovation to several major industrial partners and has implemented and integrated extended ECMA-407 in close co-operation with Swisssaudec, McGill University and Mayah Communications.



The **Virtual Acoustics Technology Laboratory (VAT)**, directed by Wieslaw Woszczyk, is one of the foremost spatial audio research institutions in North America, which combines fundamental research with state-of-the-art 3D sound engineering. Its „Studio 22“ has become a model for electroacoustics research in the North American hemisphere.

McGill University has been a major driver in ECMA-407 standardization and assessment. In co-operation with Swisssaudec and EPF Lausanne, Wieslaw Woszczyk and his team have tuned ECMA-407. Results have been the basis for the present extended ECMA-407 codec as is used for the present UHD TV NHK 22.2 test broadcast.

ECMA-407

Please see Ecma International's press release and <http://www.ecma-international.org/publications/standards/Ecma-407.htm>.

Devices



The **Centauri VI 5000**, besides streaming, scouting, extensive error correction and concealment or format conversion, integrates as a world premiere Swissaudec's new extended ECMA-407 codec. The devices at the same time handles multiple scalable channels with up to 64 mono or 32 stereo programs combined in one unit. Applications range from an answering machine for scouts, reporters and journalists, to a communication centre for e.g. hot spot sport events, handling extensive data traffic.

The Centauri VI 5000 incorporates a highly flexible algorithm toolbox, supporting all relevant IP protocols including VoIP features with limitless compatibility. Beyond backup and standard gateway functions, incoming IP/ISDN calls can be transferred to e.g. livewire or, as a file, to and from a broadcast server.

In the „Future Zone“ and at Swissaudec's booth 10.F45, two Centauris VI 5000 decode an ECMA-407/HEVC satellite live stream with NHK 22.2 audio.



ATEME's Kyrion DR line of professional integrated receiver decoders (IRDs) is a set of cost-effective solutions for the contribution and distribution of video services.

The series is fully compliant with DVB and ATSC standards. The Kyrion IRD line offers today's video professional a satellite or MPEGoIP inputs with a standard ASI input. The IRD provides high quality MPEG2 and H.264/MPEG-4 4:2:0 decoding of HD and SD video formats with composite or SDI outputs.

In the „Future Zone“ and at Swissaudec's booth 10.F45, a customized Kyrion DR separates the ECMA-407/HEVC satellite live stream into its compounds and simultaneously feeds the Centauri VI 5000, which decodes NHK 22.2 with ECMA-407, and a consumer device, which directly decodes HEVC.

Further Information

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