

MPEG Surround Performance and Application overview

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Overview

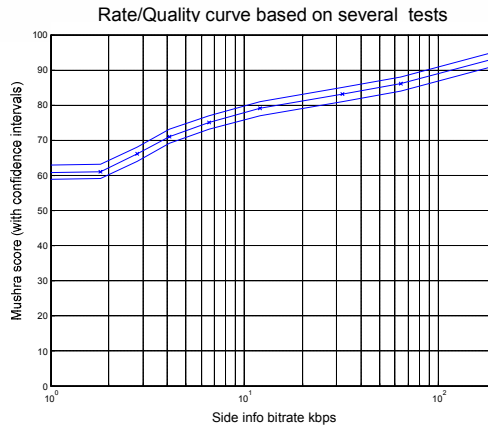
- Performance of MPEG Surround at various operating modes
- Applications and use-cases for MPEG Surround

Performance - introduction

- Important design-goal: *Provide flexible trade-off between quality and bitrate.*

Accomplished by:

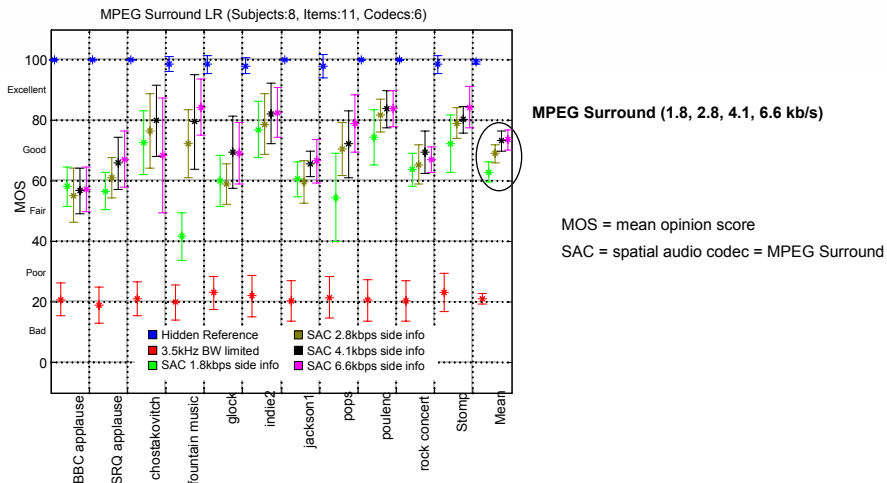
- **Spatial parameters**
 - Temporal update rate
 - Frequency resolution
 - Quantization
- **Residual coding**



Two important objectives are reached:

- ✓ Very low-bitrate overhead by means of parametric models
- ✓ Scaling towards transparency by means of residual coding (avoids limitation of parametric model)

Listening test results – Low bit rates

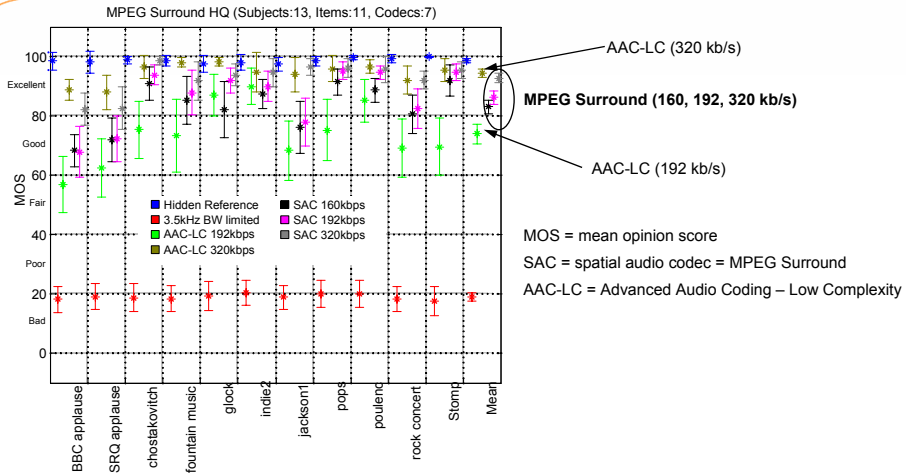


Bit rates in legend are **side information** bit rates. Stereo downmix coded at 160 kb/s.



MPEG Surround scales gracefully to very low side information bit rates

Listening test results – High bit rates



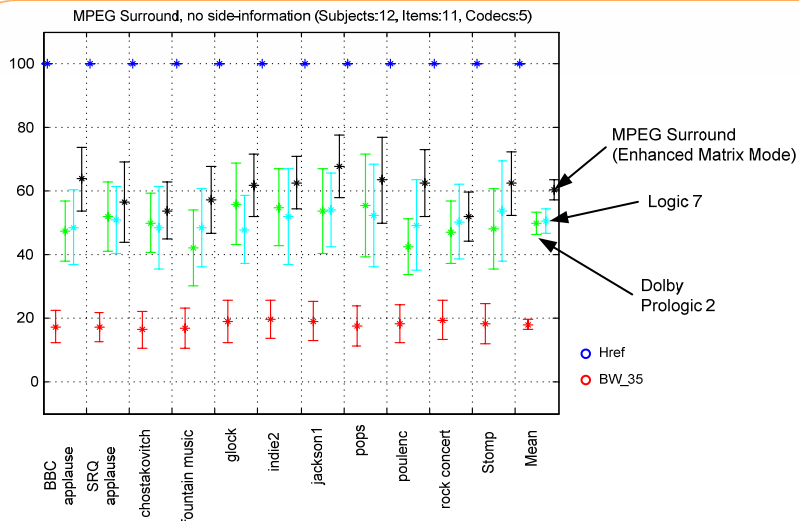
Bit rates in legend are **total** bit rates. Stereo downmix coded at 128 kb/s.

>MPEG Surround performs better than AAC-LC at low bit rates

>MPEG Surround performs equal to AAC-LC at higher bitrates

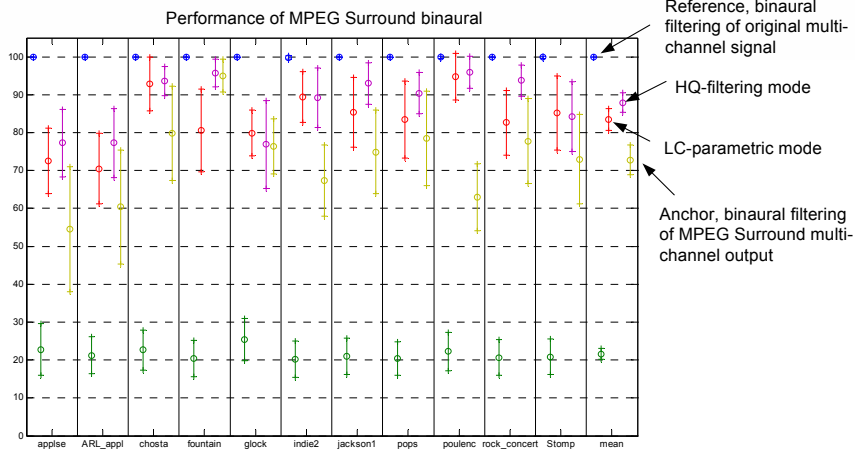
➔ **MPEG Surround scales gracefully towards transparency**

Listening test results – Enhanced Matrix Mode



➔ **Enhanced Matrix Mode MPEG Surround performs significantly better than "matrixed" surround**

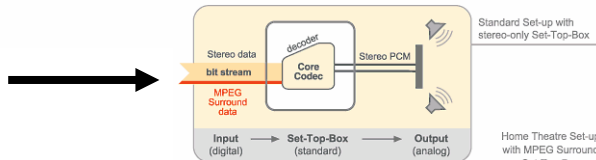
Listening test binaural



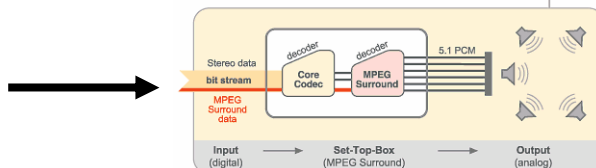
➔ MPEG Surround binaural gives a significantly better result than a pure post process based on the MPEG Surround multi-channel output

Applications and Use-cases

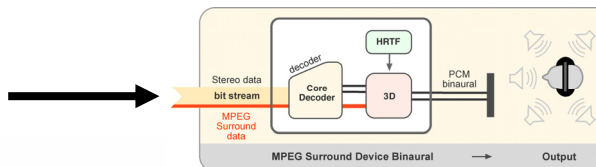
A legacy stereo decoder ignores the MPEG Surround data and plays back the stereo signal.



An MPEG Surround decoder makes full use of the MPEG Surround data.



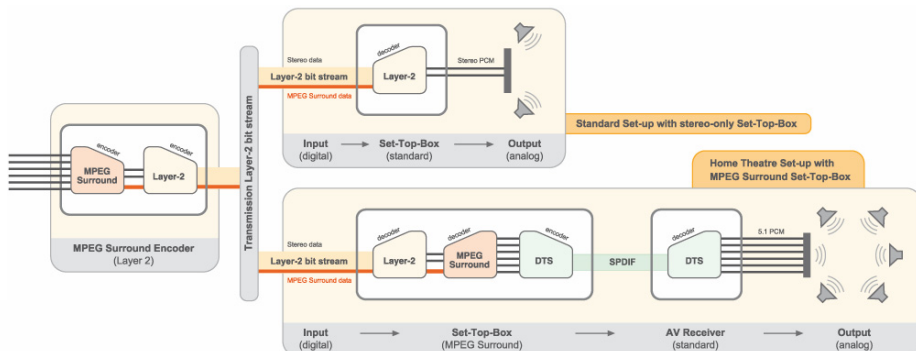
An MPEG Surround binaural decoder enables surround sound over headphones



- MPEG Surround – system aspects
 - Provides multichannel coding at very low overhead compared to stereo (starting from 0 kbps, scalable towards near-transparency)
 - Provides 100% stereo compatibility (including matrixed systems)
 - Can be used with any stereo codec
 - Supports two decoding methods:
 - Standard decoding for multichannel playback
 - Binaural decoding for headphone playback
- MPEG Surround – content aspects
 - Supports automated downmix
 - Supports artistic downmix (within certain limits)
 - Provides an „Enhanced Matrix Mode“ in case MPEG Surround data is not available

Applications: DVB

- MPEG Surround over DVB-T demonstrated at Mediantage in Munich 2005
 - Layer 2 (208kbps) + MPEG Surround (16kbps) over the air transmission
- Enables surround sound for DVB-T without simulcast of discrete surround
- Overcoming the SP/DIF bottleneck by transcoding into high bitrate DTS in the set-top-box.



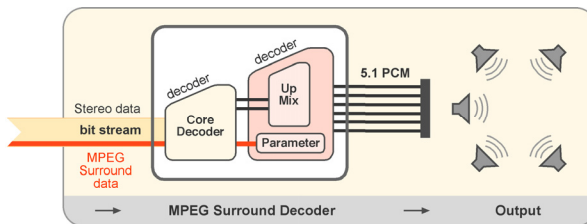
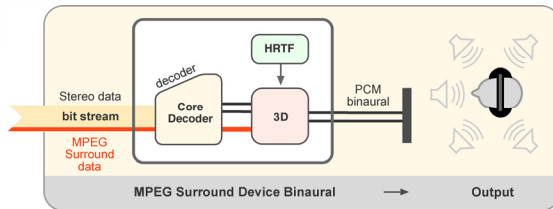
Applications – Radio

- MPEG Surround over DAB was demonstrated in 2005 with Bayern Digital Radio, Swedish Radio and Danish Radio
 - Sample configuration: Layer 2 at 186 kbps + MPEG Surround at 6kbps
- MPEG Surround over HDC (iBiquity) was demonstrated at NAB 2005 and 2006
 - Codec: HDC at 90kbps + MPEG Surround at 6kbps

Applications – Mobile

- Background:
 - Efficiency and compatibility with existing stereo playback devices are key aspects.
 - Playback devices are usually used with stereo headphones.
 - Core Codecs in use: aacPlus (MPEG-4 HE-AAC), AAC and mp3.
- Application Scenario for MPEG Surround:
 - Lowest overhead Surround introduction.
 - Legacy receivers/content won't notice.
 - Binaural decoding will dominate on mobile devices.
 - When using the content at home or in the car, full multichannel decoding can be used.

- DVB-H
 - aacPlus (HE-AAC) + MPEG Surround at total bitrate of 48-96kbps
- Portable Music Player
 - aacPlus or AAC + MPEG Surround



- Portable player in docking-station connected to home receiver or in a car equipment gives full MPEG Surround decoding and a multi-channel experience from the portable player.

Summary

- Performance
 - MPEG Surround quality scales gracefully with bitrate.
 - MPEG Surround Enhanced Matrix Mode performs better than “matrixed” technology e.g. Dolby prologic 2 or Logic 7
 - MPEG Surround binaural decoding is significantly better than a pure post-process binaural filtering method.
- Applications
 - The inherent stereo compatibility and low overhead for the surround data enables surround sound “to boldly go where no surround has gone before...”
 - Fully compatible to existing DVB Set-Top-Boxes (STBs)
 - Multichannel DVB from new STBs (through existing A/V receiver via DTS)
 - Content on mobile devices that can be decoded into a surround sound experience over headphones or speakers enables music downloads and DVB-H applications using surround sound
 - No chicken-and-egg problem due to the low overhead

That's all Folks!

Thank you for your attention!

Visit Agere/Coding Technologies/Fraunhofer/Philips
in room 258 to hear what MPEG Surround can do!