



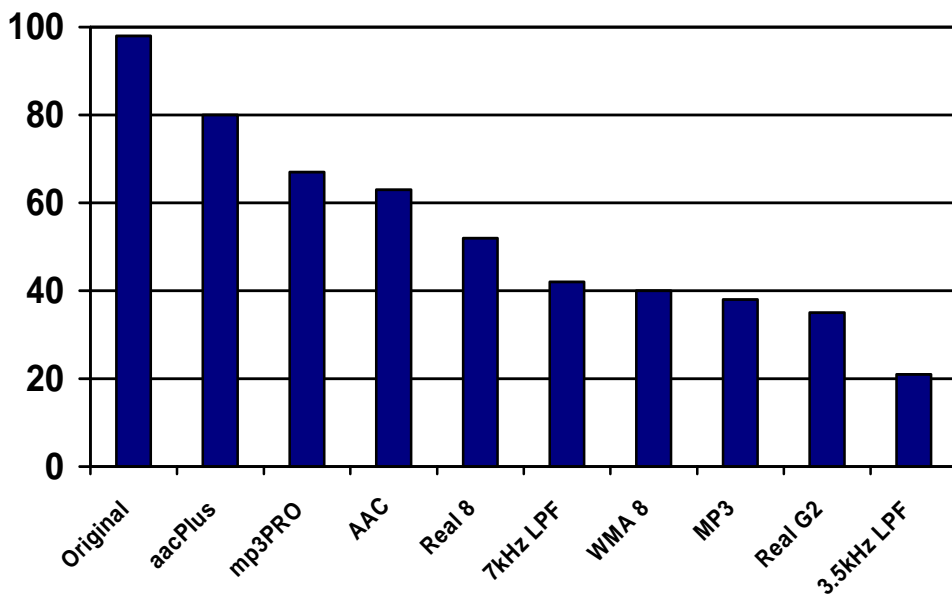
MOST POWERFUL AUDIO AVAILABLE TODAY

MPEG-4 Advanced Audio Coding (AAC) is the most powerful audio codec available today. The near CD quality MPEG-1 Layer 2 audio codec (used widely in digital video applications) delivers high-quality stereo at 128kbit/s/channel while MPEG-4 AAC (Advanced Audio Coding) offers the same quality at 64kb/s/channel.

MPEG-4 audio is capable of coding 5.1 and 7.1-channel surround sound very effectively and will allow transmission of wave field audio data that extends the listening sweet spot to the whole room in future sound systems.

HIGH EFFICIENCY AAC

The original MPEG-4 AAC has recently been extended with a technique called Spectral Bandwidth Replication, which gives spectacular bandwidth savings for applications like Internet Audio and digital broadcast. MPEG-4 AAC with SBR also known as "High Efficiency AAC" can deliver high quality stereo audio at a mere 48kbit/s.



EBU listening test results for 48Kbps stereo using the MUSHRA¹ method (aacPlus is Coding Technologies' (www.codingtechnologies.com) brand name for High Efficiency AAC)

The SBR extension is both forward and backward compatible: an existing MPEG-4 AAC decoder can decode the extended signal (without the enhancement of course) and a decoder with SBR understands a classic AAC signal that makes no use of the SBR technique.

¹ MUSHRA: Multiple Stimulus Hidden Reference and Anchors
LPF: Low Pass Filter

FEATURES OF MPEG-4 AAC

Advanced Audio Coding offers the following features:

- **High Quality Compression:** At a data rate of 96 kbps for a 44.1kHz/16bit stereo signal, AAC provides CD audio quality. Furthermore, AAC fulfils the requirements for studio sound quality, as defined by the European Broadcasting Union (www.ebu.ch), at a data rate of 64 kbps per channel. High Efficiency AAC offers stereo, near-CD quality at a mere 48 kbps
- **Multichannel Support:** In addition to mono and stereo, AAC supports various surround sound configurations (e.g. 5.1 or 7.1 channels), up to 48 audio channels.
- **Low Computational Complexity:** Most AAC encoder implementations are real-time capable. Low computational demands make AAC the ideal codec for high performance audio archiving as well as for mobile applications.
- **Wide Application Range:** AAC supports a large set of audio sample rates, ranging from 8 kHz up to 96 kHz. Thus it ideal for high quality audio in many applications with limited channel or memory capacities.

SCALABLE AUDIO CODING

MPEG-4 Audio is inherently scalable. If, for example, a transmission uses an error-prone channel with limited bandwidth, an audio stream consisting of a small base layer and a larger extension layer provides a robust solution. Strong error protection on the base layer (adding only little overhead to the overall bitrate) makes sure there is always a signal, even with difficult reception. The extension layer (with little error protection) and base layer together give excellent quality in normal conditions. Any errors lead to only a subtle degradation of quality but never in a total interruption of the audio stream.

WIDELY ADOPTED

- The Japanese **Association of Radio Industries and Businesses (ARIB)** selected MPEG-2 AAC as the only audio coding scheme for all of Japan's digital broadcast systems. Services started in 2000. (www.arib.or.jp/english/index.html)
- The satellite based **XM Radio** which started service in 2001 uses AAC-SBR, a backwards compatible extension to MPEG-4 AAC, which will soon be taken into the MPEG-4 standard. (www.xmradio.com)
- The **DRM Consortium (Digital Radio Mondiale)** develops new digital services for the current analog services in long-, medium-, and shortwave bands. DRM also selected AAC-SBR for the audio coding. Services will start in 2003. (www.drm.org)
- The **Digital Video Broadcasting Project** has announced on several occasions that it plans adopt AAC. (www.dvb.org)
- The **Internet Streaming Media Alliance (ISMA)** has adopted AAC (www.isma.tv)
- The **Third Generation Partnership Programme (3GPP)** has adopted MPEG-4 AAC (www.3gpp.org)
- The **Bluetooth Special Interest Group** (www.bluetooth.com) has adopted the MPEG-4 AAC Advanced Audio Distribution Profile (A2DP)
- AAC decoder solutions are available from numerous chip manufacturers and DSP providers. There are already several portable AAC players available, and some of the decoders also support MP3, to provide high compatibility.