



The World's Premier Supplier of Speech and Audio Codecs

AMR Speech Codec

The **Adaptive Multi-Rate speech codec (AMR)** is the most widely deployed narrowband (200-3400 Hz) compression technology in the world today. This widespread deployment together with its high quality and robustness make AMR the codec of choice and the baseline for narrowband multimedia services.

In rigorous comparative testing by standardization bodies, AMR out-performed all competitors and exceeded all requirements for robustness to packet loss, bit errors, and background noise, also demonstrating consistent performance across multiple languages, including English (US and UK), French, German, Italian, Mandarin, and Spanish. AMR supports dynamic adaptation to network conditions, using lower bit rates during network congestion or degradation while preserving audio quality.

AMR operates at very low bit rates from 4.75 to 12.2 kbps and provides **toll quality speech starting at 7.4 kbps**, with near-toll quality at lower rates and greater robustness and better reproduction of non-speech sounds at higher rates.

Benefits

Widely deployed

- AMR operating at various bit rates is built into every GSM, US-TDMA, PDC and WCDMA phone, ensuring that content generated by AMR can be played by virtually any wireless phone in the world – a total of 1.7 billion phones.
- AMR's widespread implementation in 2G and 3G networks eliminates the need for transcoding – preserving quality and reducing complexity and delays.
- AMR content is supported by popular media players, streaming architectures, and content creation tools.

Robust

- Provides consistent quality across multiple languages.
- Works well in background noise conditions, whether in the car, in the office or on the street.
- Includes built-in efficient packet loss concealment.
- Very robust to high bit error rates (BER).
- Superior performance across various operating conditions at all bit rates was proven in the selection

and characterization phases of the ETSI and 3GPP standardization processes.

Feature rich

- Coded AMR media can be encapsulated in 3GPP (.3gp, i.e., MMS) or MPEG-4 (.mp4) file formats and used along the entire delivery chain in multimedia applications.
- Built-in voice activity detection/discontinuous transmission/comfort noise generation (VAD/DTX/CNG) dramatically frees up network resources and prolongs terminal battery life.
- RTP payload and file storage formats defined by IETF, supporting forward error correction (FEC), interleaving, and VAD/DTX/CNG for enhanced VoIP service efficiency and robustness.
- 8 different bit rates, enabling seamless, dynamic link adaptation to network congestion or degradation on a frame-by-frame basis, ensuring consistent high service quality.
- Low complexity encoder and decoder.

The AMR standard

Designed to allow transcoder-free connectivity between GSM, US-TDMA and PDC networks, AMR was standardized by the European Telecommunications Standards Institute (ETSI) in 1999 and adopted by the 3GPP as the mandatory codec for narrowband telephony in 3G WCDMA networks. It is also the mandatory codec for 3G H.324M (26.111) terminals supporting video telephony and the default codec for Multimedia Messaging Services (MMS) as defined by the Open Mobile Alliance (OMA).

References: • 3GPP TR 26.090 • OMA Multimedia Messaging Service specification

AMR at a Glance

Standardization	Approved by ETSI in 1999 Adopted as the mandatory codec for 3G Release 5 wireless systems by 3GPP in 2001
Technology	Algebraic Code Excited Linear Prediction (ACELP®)
Bit rates (kbps)	12.2*, 10.2, 7.95, 7.4*, 6.7*, 5.9, 5.1, 4.75, plus CNG rate of 1.75 kbps (in GSM)
Delay	Frame size: 20 ms Lookahead: 5 ms
Quality	At 7.4 kbps and above: Toll At 4.75 to 6.7 kbps: near Toll
Complexity	15–20 MIPS
Fixed-point	Bit-exact C code available (for both DSP and ARM platforms)
Floating-point	C code available
VAD/DTX/CNG	Included
* Bit rates of the main second-generation mobile standards: GSM EFR (12.2 kbps), North American TDMA EFR (7.4 kbps), and PDC EFR (6.7 kbps).	

Applications

Telephony

- GSM and 3G circuit switched telephony
- VoIP
- Wi-Fi telephony
- Satellite telephony
- Push to talk
- Video telephony

Multimedia and Internet

- Audio and video conferencing
- Chat and virtual reality immersion environments
- Streaming
- Content

- downloads
- Multimedia Messaging Services
- Digital radio broadcasting
- Audio books
- Multimedia real-time collaboration tools
- PDA/handset-hosted applications
- Portable audio devices
- Ringtones
- Content creation tools
- Multimedia transcoders
- Multimedia gateways
- Interactive gaming

Others

- Satellite applications
- Network analysis and simulation tools
- Test and measuring equipment
- Static answering machines
- Voicemail/Unified Messaging
- Consumer electronics
- Toys

Hearing is believing . . .

Hear AMR for yourself. Visit the Listening Room at <http://www.voiceage.com> to experience toll-quality speech delivered by AMR at 12.2 kbps and below.

About VoiceAge

VoiceAge Corporation is the forerunner in the development and dissemination of speech and audio compression technologies and solutions at the convergence of wireless, 2.5G, 3G, Wi-Fi, and Internet protocols. Using designs based on our flagship ACELP® technology platform, VoiceAge® codec solutions deliver unsurpassed quality experienced daily by hundreds of millions of users worldwide.

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