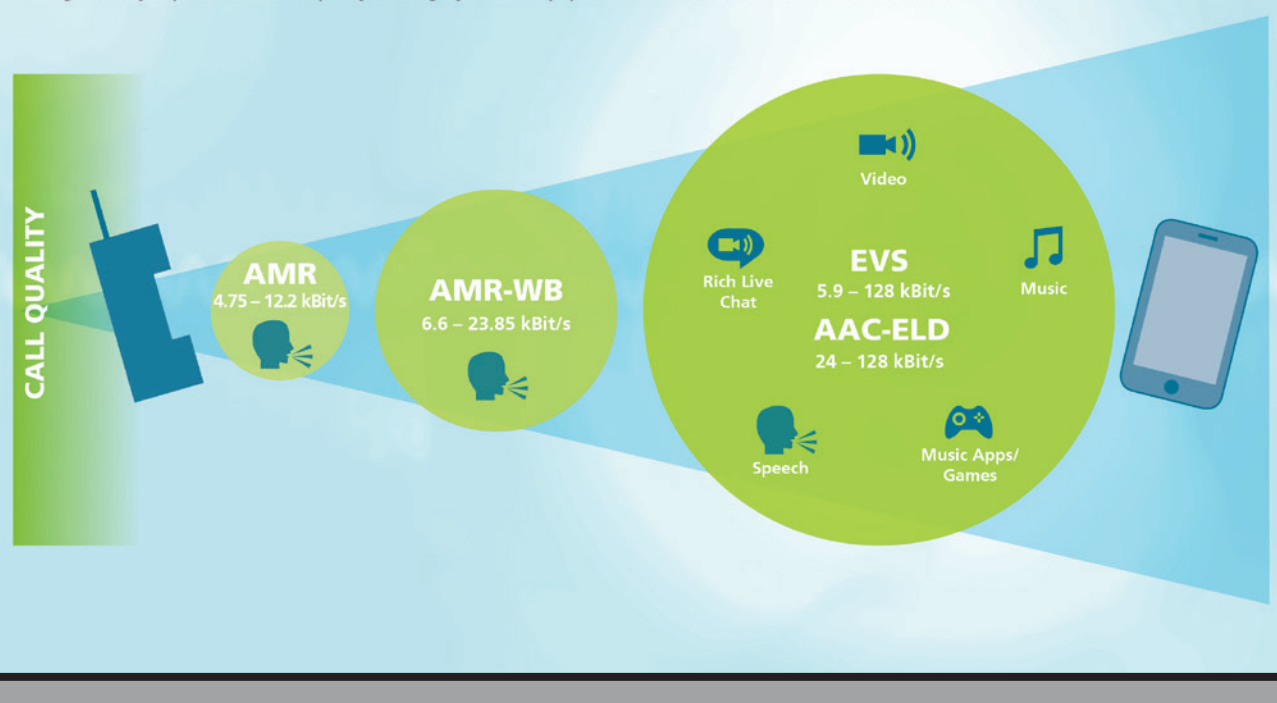
Fraunhofer IIS

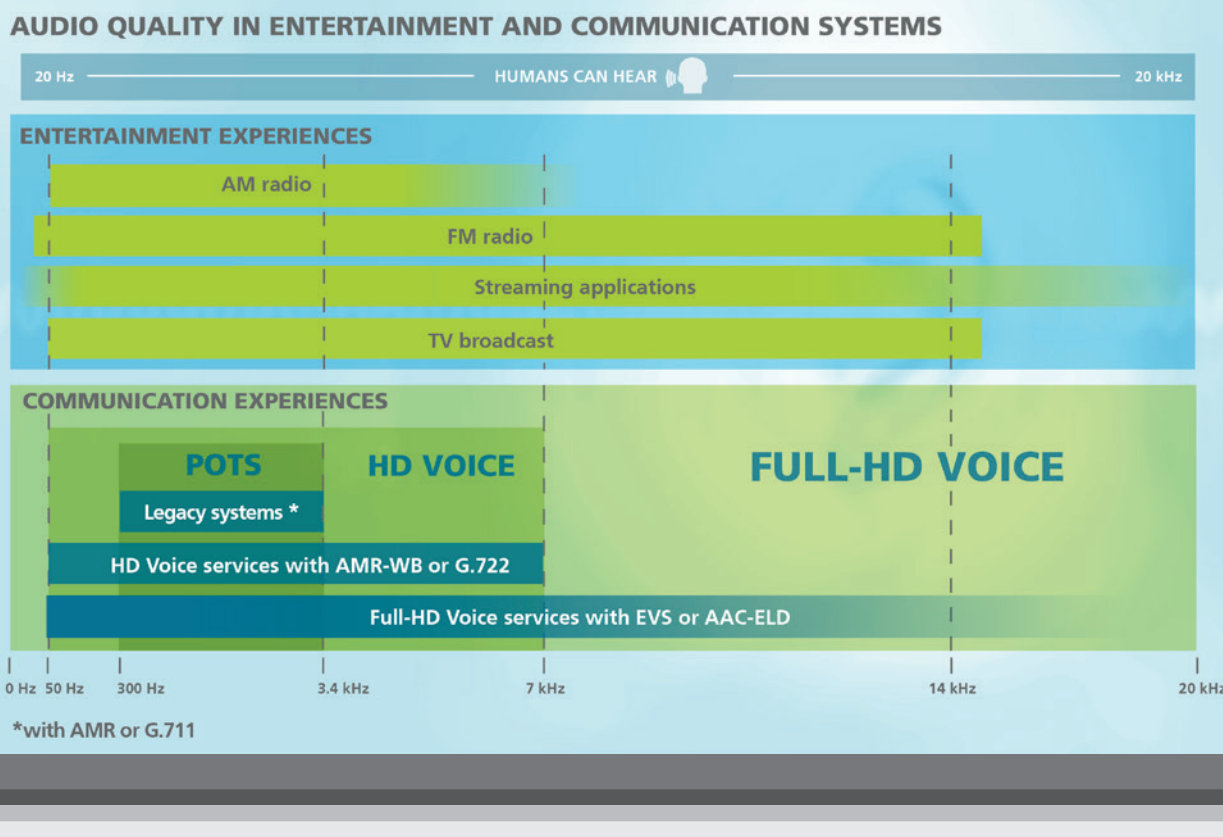
EVOLUTION OF MOBILE COMMUNICATIONS

CALL QUALITY AND CODECS USED TODAY IN MOBILE COMMUNICATION

EVS significantly improves the audio quality over legacy codecs at popular mobile bit rates such as 13.2 and 24 kbit/s.



AUDIO QUALITY IN ENTERTAINMENT AND COMMUNICATION SYSTEMS



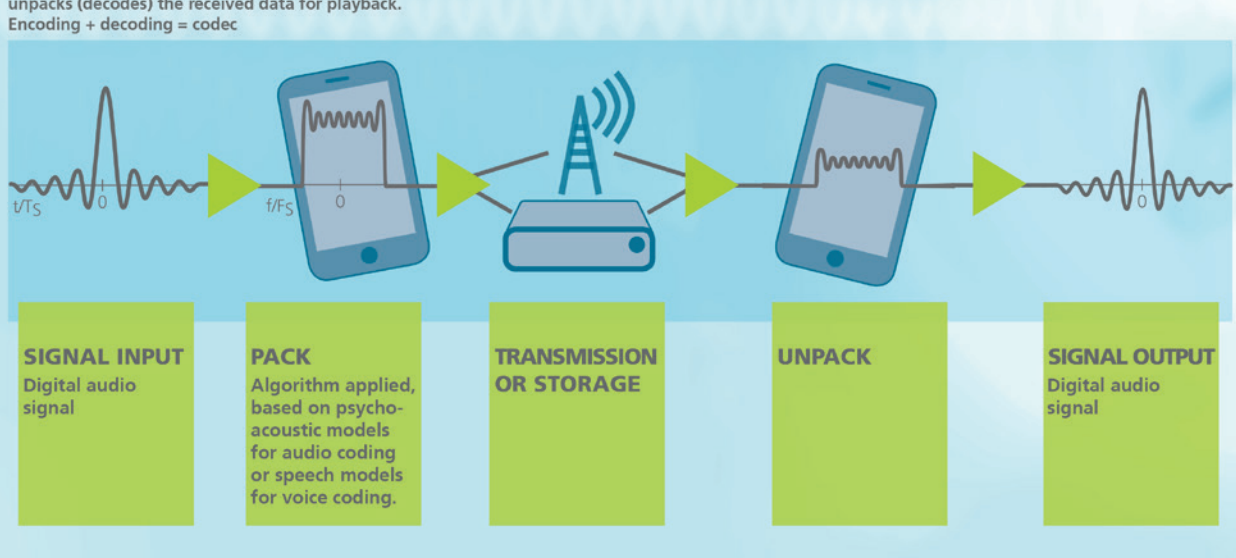
*with AMR or G.711

COMPARING MOBILE COMMUNICATION SYSTEMS

	2G/3G	4G/VoLTE	OTT
	2G and 3G are based on GSM and CDMA which are digital cellular technologies used for the transmission of mobile voice and data services.	VoLTE or Voice over LTE is recognized as the industry-agreed progression of voice service, facilitating richer multimedia voice services and increasing the service quality.	OTT applications are offered by third party (non-operator) developers as download from app stores. They can be used over the network services of your service provider.
CODECS	AMR, AMR-WB	AMR, AMR-WB, EVS	AAC-ELD and others
IN USE BY	Most wireless carriers	Emerging technology *Majority of wireless carriers expected to adopt by 2020*	Skype, FaceTime, Google Hangout, Voice over Wifi and others
CHALLENGES	▪ Low audio quality ▪ Poor spectrum utilization ▪ No native video services available	▪ Requires significant capital investment, time to build ▪ Network must be IMS ready	▪ Lack of interoperability/ closed applications ▪ Unmanaged networks often lead to dropped calls
BENEFITS	▪ Dedicated connection (switch network) ▪ International standard: interoperability	▪ Efficient spectrum utilization ▪ Dedicated connection (IP-based) ▪ International standard: interoperability	▪ Free calls ▪ Video capabilities ▪ Higher quality than GSM/CDMA possible (in case of higher network capacity)

AUDIO CODING IN A NUTSHELL

CO-DEC: noun: A device or program that packs (encodes) data to reduce its size for faster transmission or storage and unpacks (decodes) the received data for playback.
Encoding + decoding = codec



SIGNAL INPUT	PACK	TRANSMISSION OR STORAGE	UNPACK	SIGNAL OUTPUT
Digital audio signal	Algorithm applied, based on psycho-acoustic models for audio coding or speech models for voice coding.			Digital audio signal

Enhanced Voices Services (EVS): 3GPP's High Quality Communication Codec for VoLTE

EVS is the next-generation 3GPP communication codec designed for VoLTE (Voice over LTE) services. It enables phone calls with Full-HD Voice quality, bringing call fidelity up to the same level as today's other digital media services. Integrating state-of-the-art speech and audio coding technology, EVS removes the limitations of bandlimited and voice-centric codecs that were previously used in mobile communications.

Full-HD Voice audio quality

EVS delivers unprecedented quality for speech, background music and mixed content for narrow-, wide-, superwide- and full-band services, outperforming the audio quality of today's mobile phone calls and over-the-top communication services.

High efficiency and versatility

EVS offers a wide range of bit rates from 5.9 kbit/s to 128 kbit/s, allowing service providers to optimize network capacity and call quality as desired for their service. Bit rates for narrow- and wideband start at 5.9 kbit/s, while superwideband Full-HD Voice audio quality is supported from 9.6 kbit/s on. EVS also significantly improves the audio quality over legacy codecs at popular mobile bit rates such as 13.2 kbit/s and 24 kbit/s.

Reliable service

Mobile network services such as VoLTE or Voice over WiFi can be affected by packet loss issues, resulting in a negative impact on speech intelligibility. EVS utilizes unique concealment techniques to minimize the impact of packet loss caused by adverse conditions in the transmission channel.

Backward-compatible to existing VoLTE services

The codec's integrated AMR-WB interoperability mode eliminates the need for a separate AMR-WB implementation allowing the signal to quickly switch between VoLTE (4G) and circuit switched networks (3G) when network conditions warrant a transition.

The AAC-ELD Family: The Audio Codecs of Choice for High Quality Communication Services

The AAC communication codec family with its three members AAC-LD, AAC-ELD and AAC-ELDv2 stands for maximum speech and sound quality, raising the audio quality for any communication application to the same level we expect today from our digital media.

Established

The codecs of the AAC-ELD family define the standard for high quality audio in video conferencing systems, as well as in consumer video telephony applications such as Apple FaceTime. Thanks to the native integration of AAC-ELD in iOS and Android, app developers and service providers can easily build communication apps with CD-comparable communication quality.

Efficient

AAC-ELD delivers the best combination of low delay, low bit-rates and excellent audio quality for your telecommunication devices, services and applications. The codec supports the full audio frequency range and is entirely compliant with Full-HD Voice quality expectations.

Available

Fraunhofer IIS offers optimized implementations for all major platforms. AAC-ELD is available in iOS, OS X and Android.

About Fraunhofer IIS

When it comes to innovative audio technologies for the rapidly evolving media world, Fraunhofer IIS stands alone. For more than 25 years, digital audio technology has been the principal focus of the Audio and Multimedia division of the Fraunhofer Institute for Integrated Circuits IIS. From the creation of mp3 and the co-development of the AAC standards to the future of audio entertainment for broadcast and mobile communications, Fraunhofer IIS brings innovations in sound to reality. Technologies such as AAC-ELD and EVS for Full HD Voice quality phone calls are just two examples of the division's pioneering work for the media world of tomorrow.

Fraunhofer IIS technologies enable more than eight billion devices worldwide. The audio codec software and application-specific customizations are licensed to more than 1,000 companies. The division's mp3 and AAC audio codecs are now ubiquitous in mobile multimedia systems.

Fraunhofer IIS is based in Erlangen, Germany and is a division of Fraunhofer-Gesellschaft. With more than 24,000 employees worldwide, Fraunhofer-Gesellschaft is comprised of 66 institutes and research units making it Europe's largest application-oriented research organization.

For more information, please visit:
www.iis.fraunhofer.de/audio
www.full-hd-voice.com
www.audioblog.iis.fraunhofer.com

Fraunhofer-Institute for Integrated Circuits IIS

Director
Prof. Dr.-Ing. Albert Heuberger

Am Wolfsmantel 33
91058 Erlangen
www.iis.fraunhofer.de

Contact
Matthias Rose
Phone +49 9131 776-6175
amm-info@iis.fraunhofer.de