



**VoiceAge**<sup>®</sup>  
www.voiceage.com

The World's Premier Supplier of Speech and Audio Codecs





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Next-generation  
services **NOW** ...

with the latest  
hi-fi compression technology



*The latest standardized speech and audio compression technology capable of very low bit rates opens the door to a broad range of innovative services. Now mobile operators have an opportunity to boost revenue – at minimal cost – by deploying outstanding high-fidelity telephony and a variety of new services that deliver hi-fi audio content enabled by VoiceAge state-of-the-art speech and audio codecs!*

VoiceAge, the people who brought you the innovative and widely deployed Adaptive Multi-Rate (AMR) narrowband speech codec, now offer the next generation of speech and audio codecs:

- **AMR Wideband (AMR-WB)**
- **Extended AMR Wideband (AMR-WB+)**, the audio extension of AMR-WB
- **Variable Rate Multi-Mode Wideband (VMR-WB)** for cdma2000® systems

## Hi-fi telephony...recommended for wireless and wireline networks

Hearing is believing! With AMR-WB technology enabling wideband telephony, callers have an experience that's equivalent to talking face to face. And this applies to both wireless and wireline networks thanks to the AMR-WB codec family, the standardized recommended compression technologies for both networks (3GPP/3GPP2 and ITU-T). Imagine hi-fi communication that makes traditional telephony pale by comparison!

## New hi-fi audio services

AMR-WB and its audio extension, AMR-WB+, are the only technologies that can provide an exceptional user experience at very low bit rates. They're first-class technologies for winning broad-based acceptance of services that deliver speech, music, and sound effects – services that are both functional and fun. What's more, because the codecs can adapt to limited and fluctuating bandwidth, sound quality is not compromised even in varying network conditions.

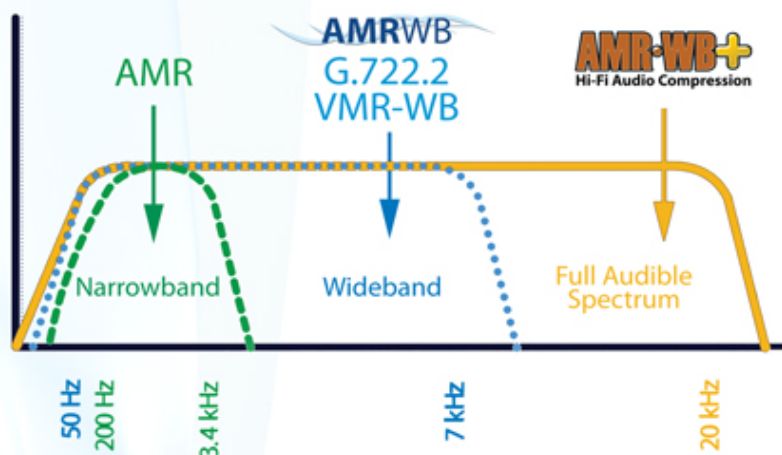
- **Hi-fi ringtones**  
Operators can now deliver a new class of natural-sounding ringtones with voice, voice over music, music and other audio effects.
- **Music downloads**  
AMR-WB+'s low bit rates provide fast download times and also ensure small file sizes so the same amount of storage goes further, holding more music. Meanwhile, the sound quality is unbeatable.
- **PSS (Packet-switched Streaming Service)**  
AMR-WB+ is the only recommended codec that delivers high-quality music and other audio content at low bit rates. Quality is very good at high rates and unmatched at low bit rates, producing minimal stress on existing networks. AMR-WB+ is the codec of choice for all types of streaming speech/audio applications, for example, news programming, sports events, audio books and video clips.
- **MMMS (Multimedia Messaging Service)**  
Delivery of high quality at low bit rates is critical to the broad acceptance of this enhanced messaging service. AMR-WB+ is the best codec for delivering mixed voice/music content at the lowest bit rates, and it's the most cost-efficient solution to deploy.
- **MBMS (Multimedia Broadcast/Multicast Service)**  
Because video and forward error correction (FEC) can take up most of the available channel bit rate in MBMS, efficient audio compression is critical to deployment of this service. Plus, the low complexity of the AMR-WB+ decoder is crucial considering that simultaneous video and FEC decoding must be manageable on mobile terminals with limited computational resources.

## A Complete Suite of Low Bit Rate Audio and Speech Coding Solutions

**AMR:** 3GPP mandatory standard codec for narrowband speech and multimedia messaging services over GSM and WCDMA networks.

**AMR-WB (G.722.2)/VMR-WB:** 3GPP (AMR-WB), ITU-T (G.722.2) and 3GPP2 (VMR-WB) mandatory standard codec for wideband speech over GSM, WCDMA, cdma2000® and VoIP networks.

**AMR-WB+:** 3GPP-recommended hi-fi audio codec for multimedia services (PSS, MMS, MBMS & IMS Messaging and Presence) over GSM and WCDMA networks. Also recommended for DVB-H.



## The hi-fi compression technology revolution Hi-fi audio compression for all your needs

Believe it or not, until now, we've been forced to live with technology dating back to 1915, when the first transcontinental telephone service was established between New York and San Francisco.

The traditional telephony speech spectrum of the PSTN is nominally limited to about 200-3400 Hz. But in a speech frequency spectrum, the low frequency signals below 200 Hz contribute significantly to the naturalness, presence, and comfort of speech. And a lot of speech information occurs above 3400 Hz, where the higher-frequency signals are critical to voice quality and intelligibility, for example, allowing callers to differentiate between sounds like "s" and "f." How many times have you had to respell your name or postal code or had to repeat a sentence during a phone conversation?

AMR-WB, the breakthrough in wideband speech coding technology, increases the speech spectrum to 50-7000 Hz, significantly improving the intelligibility and naturalness of speech and adding a feeling of face-to-face communication. The variable bit rate VMR-WB wideband codec stems from the same ACELP® technology base as AMR-WB and interoperates seamlessly with it.

For **hi-fi audio and mixed content** such as voice plus music, AMR-WB+ creates new opportunities for increasing revenue. It's the only technology today that scales from low bit rate mono to high-quality stereo ("approaching CD quality") without sacrificing the user experience – translating into cost savings and a maximum ROI for operators.

### Hi-fi audio coding, the key differentiator

The name of the game is competition, and it's fierce. Mobile operators need to find ways to reduce churn and to increase ARPU. Hi-fi audio coding enables innovative operators to offer compelling multimedia services that stand out from the competition by raising customers' service quality experience – and expectations – to a new level.

- The wideband speech spectrum delivers more natural and intelligible speech, boosting customer satisfaction.
- Hi-fi audio drives multimedia and other new applications, creating opportunities to substantially increase revenues.
- Adaptive bit rate scalability enables service continuity under varying network conditions, allows service offerings across different network types, and eases service transitions from 2.5G to 3G networks.

### AMR-WB/G.722.2 for telephony

Adopted as a standard wideband codec by both 3GPP and ITU-T (as recommendation G.722.2), AMR-WB is the first codec to be adopted for wireless as well as wireline services. What's more, through upsampling, even legacy narrowband signals can be carried by AMR-WB. AMR-WB thus eliminates the need for transcoding and eases the implementation of wideband applications and services across a wide range of wireless and wireline communication systems and platforms, while its wide range of bit rates from 6.6-23.85 kbps ensures signal robustness.

### AMR-WB+ for multimedia content

Adopted as an audio codec standard in September 2004 by 3GPP, AMR-WB+ utilizes a hybrid of ACELP® speech coding technology and TCX audio coding technology to deliver unsurpassed speech and audio for multimedia services. AMR-WB+ can reproduce the full audible spectrum up to 20 kHz, and its wide bit-rate range scales from 6-36 kbps for mono signals and 7-48 kbps for stereo.

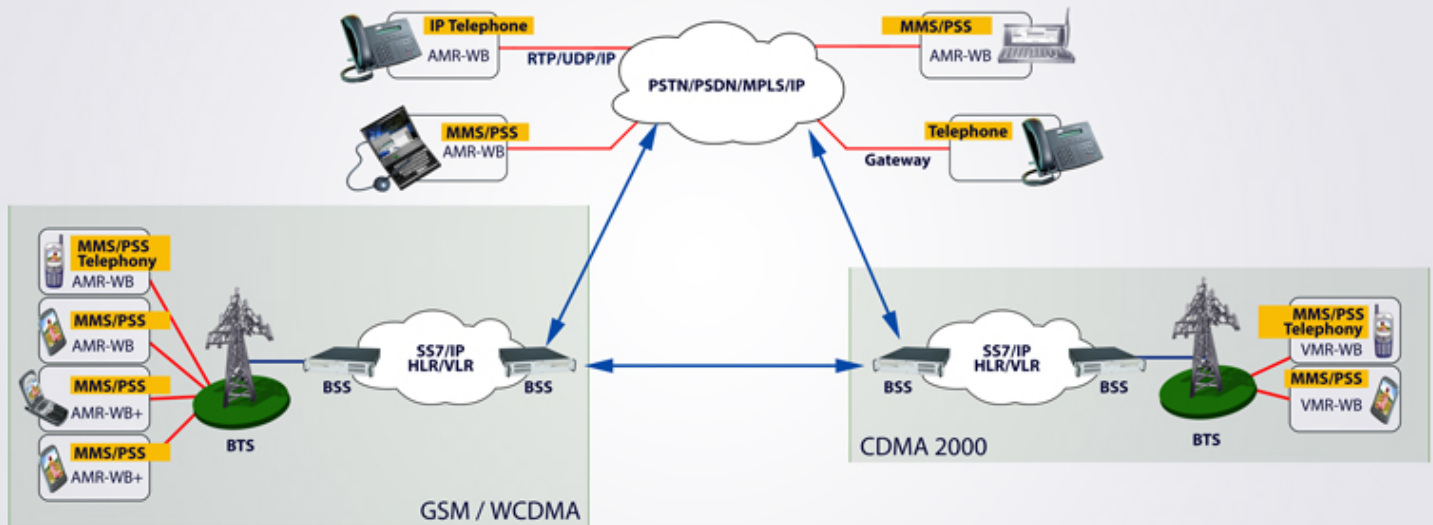
Coded AMR-WB+ media can be encapsulated in 3GP or MPEG-4 file formats and used along the entire delivery chain in multimedia applications. Plus AMR-WB+ is backward compatible with AMR-WB, enabling the playback of AMR-WB content such as ringtones.

### VMR-WB for cdma2000® telephony

Approved as a standard by 3GPP2 in July 2004, VMR-WB is the mandatory speech codec for cdma2000® wideband telephony and multimedia streaming services. This variable rate multi-mode wideband codec operates in a range from 0.8-13.3 kbps, including one mode of operation that is interoperable with AMR-WB (at 12.65 kbps and below).

Application	Adopted Codec Standards
Wideband telephony (Mandatory)	✓ AMR-WB (3GPP, ITU-T)
	✓ VMR-WB (3GPP2)
Multimedia content (Recommended)	✓ AMR-WB+ (3GPP)

# The networks are ready, are you?



Reap the benefits of being an innovator by offering a new generation of sound quality!

Get ahead of the pack and realize multiple benefits with **AMR-WB** and **VMR-WB** wideband speech coding:

<b>Wideband speech spectrum</b>	<ul style="list-style-type: none"> <li>✓ Delivers mobile communication voice quality that substantially exceeds (narrowband) wireline quality – “near-CD-quality voice”</li> </ul>
<b>Bit rate scalability</b>	<ul style="list-style-type: none"> <li>✓ Makes efficient use of network capacity: for voice, the predominant rate for AMR-WB is 12.65 kbps (close to narrowband bit rate of 12.2 kbps), while the average bit rate of VMR-WB is around 9 kbps</li> <li>✓ Is adaptable to network conditions, maximizes QoS</li> </ul>
<b>Interoperability across networks 3GPP, 3GPP2, ITU</b> (See the network diagram on this page)	<ul style="list-style-type: none"> <li>✓ Is easy to integrate (current infrastructure supports wideband deployment)</li> <li>✓ Provides interoperability between packet-switched and wireless networks</li> </ul>
<b>Carries narrowband signal</b>	<ul style="list-style-type: none"> <li>✓ May well be the only speech compression technology required in your network</li> <li>✓ Delivers voice quality that’s equal to that delivered by state-of-the-art narrowband speech codecs</li> </ul>
<b>Codec complexity</b>	<ul style="list-style-type: none"> <li>✓ Lowest complexity for the quality delivered</li> <li>✓ Can be implemented on low-cost mass-market processors</li> </ul>

Set yourself ahead of your competitors with these benefits of **AMR-WB+** audio coding:

<b>Hi-fi audio spectrum</b>	<ul style="list-style-type: none"> <li>✓ Excellent reproduction of the full audio spectrum – up to 20 kHz</li> <li>✓ Mono at 6–36 kbps and stereo at 7–48 kbps</li> <li>✓ Supports both speech <i>and</i> music with high quality</li> </ul>
<b>Bit rate scalability</b>	<ul style="list-style-type: none"> <li>✓ Adaptable to a broad range of audio services and available bit rates, so this codec is all you need</li> </ul>
<b>Decoder complexity</b>	<ul style="list-style-type: none"> <li>✓ Can be implemented on low-cost mass-market processors</li> <li>✓ Extends battery life of mobile handsets</li> </ul>
<b>Codec complexity</b>	<ul style="list-style-type: none"> <li>✓ Low complexity version available for implementation on low-cost mass-market processors</li> </ul>

# Delight the next generation with speech and audio compression from VoiceAge



## The VoiceAge product portfolio

Available now – implementations for a variety of platforms and environments

Implementations	
Narrowband codecs	AMR-NB
	G.729(a,b,d,e)
	G.723.1
	EVRC
	QCELP
	GSM-HR
	GSM-FR
	GSM-EFR
	G.726
	G.728
G.711	
Wideband codecs	G.722
	G.722.1
	G.722.2
	AMR-WB
VMR-WB	
Audio codecs	AMR-WB+

Audio tools	Variable playback
	Pitch shifting
	Noise reduction
Network robustness	Frame loss recovery
	Decoder update
	Adaptive jitter buffer
Features	Resampler
	Transcoding
	DTX/VAD/CNG

Platforms	
General-purpose floating-point	X86 (Intel®, AMD™)
	PowerPC™
	Sparc®
DSP	TI™
	Analog Devices
	Freescale™
	StarCore™
RISC	ARM®
	MIPS®
	Hitachi SHx
	Blackfin®
	ARC™
Specialized ASIC	Sunplus
	ARC™
	Sensory®
	Actions

## About VoiceAge

VoiceAge Corporation is the forerunner in the development and dissemination of speech and audio compression technologies and solutions at the convergence of the Internet and wireless, 2.5G, 3G and Wi-Fi networks.

Using designs based on our flagship ACELP® compression technology platform, VoiceAge® codec solutions deliver unsurpassed quality experienced daily by hundreds of millions of users worldwide.

OSs	
General-purpose floating-point	Windows®
	Linux
	Mac OS®
	Solaris™
Embedded	WinCE/
	Win Mobile
	Symbian™
	Linux
	Palm™
RTOS	VxWorks®
	QNX®
Java	jar
	jni
	jmf

Frameworks	
General-purpose floating-point	Helix™
	CodecLib
	ACM
	DirectX®
	OpenMAX™
	JMF
Embedded	Helix™
	ACM
	OpenMAX™
	BREW®
	XDAIS

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