



## Why reinvent the wheel ...

... when you can get an implementation that's already optimized by experts in speech and audio compression technology? VoiceAge<sup>®</sup> is proud to offer a wide selection of standard and proprietary codecs and off-the-shelf implementations for speech and audio applications.

### Is time-to-market important to you?

Then consider VoiceAge **turnkey** codec solutions. They're **already optimized** for various platforms, processors, and environments. We've solved the development and integration problems, so you don't have to. Our solutions work right out of the box, saving you valuable time and giving you an advantage over the competition.

Implementations		Platforms		OSs	
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	General-purpose floating-point	X86 (Intel <sup>®</sup> , AMD <sup>™</sup> ) PowerPC <sup>™</sup> Sparc <sup>®</sup>	General-purpose floating-point	Windows <sup>®</sup> Linux MAC OS <sup>®</sup> Solaris <sup>™</sup>
Wideband codecs	G.722 G.722.1 G.722.2 AMR-WB VMR-WB	DSP	TI <sup>™</sup> Analog Devices Freescale <sup>™</sup> StarCore <sup>™</sup>	Embedded	WinCE/ Win Mobile Symbian <sup>™</sup> Linux Palm <sup>™</sup>
Audio codecs	AMR-WB+	RISC	ARM <sup>®</sup> MIPS <sup>®</sup> Hitachi SHx Blackfin <sup>®</sup> ARC <sup>™</sup>	RTOS	VxWorks <sup>®</sup> QNX <sup>®</sup>
Proprietary codecs	ACELP <sup>®.net</sup>	Specialized ASIC	Sunplus Sensory <sup>®</sup> Actions	Java	jar jni jmf
Audio tools		<p><i>Optimized implementations straight from the team that invented the ACELP<sup>®</sup> technology platform</i></p> <p><i>Enabling solutions to speed your applications to market with best-in-class speech and audio quality</i></p>			
Network robustness					
Features					
Pitch shifting		<p><b>Frameworks</b></p>			
Noise reduction		General-purpose floating-point		Helix <sup>™</sup> CodeLib ACM DirectX <sup>®</sup> OpenMAX <sup>™</sup> JMF	
Frame loss recovery		Embedded		Helix <sup>™</sup> ACM OpenMAX <sup>™</sup> BREW <sup>®</sup> XDAIS	
Decoder update					
Adaptive jitter buffer					
Resampler					
Transcoding					
DTX/VAD/CNG					

## Introducing our unique solutions...

### CodecLib, the integration tool for speech and audio codecs

The CodecLib API (library API) is a common application programming interface, developed as an integration tool to deploy multiple combinations of speech and audio codecs. The OS-independence and open interface enable easy integration on any floating-point platform running under the Windows®, Mac®, Linux or Solaris™ operating system.

Features include:

- Buffer management
- Library query
- Optional enhancements such as
  - **DTX** mode, in combination with
  - **VAD** on the encoder and
  - **CNG** (Comfort Noise Generation) on the decoder
  - **BFI** (Bad Frame Indicator) mode

Additional enhancement features are available depending on your application and environment.

### ACM driver

Designed for Windows® Audio Compression Manager (ACM) applications, our ACM drivers were developed and tested within the Windows 2000/NT®/98 and XP environments and are delivered as an installation file for the driver update. They're truly plug and play: if your application uses the ACM framework in Windows, then all you need to do is install our codec and then select the corresponding codec function via the ACM.

And should you need them, VAD (Voice Activity Detection), Discontinuous Transmission (DTX) and CNG (Comfort Noise Generation) features and SID (Silence Information Descriptor) frames are included with G.722.2/AMR-WB and AMR and are available for our G.729 implementation.

Only VoiceAge® offers a G.729b ACM driver customized to work directly with the Microsoft® **RTC** (Real-Time Communications) layer. RTC provides an interface to the RTP (Real-Time Transport Protocol) layer, which supports transmission of voice over IP (VoIP) and instant messaging.

### Texas Instruments™

A long-term development partner of Texas Instruments™, VoiceAge® offers optimized codec solutions for a fixed- and floating-point family of products and for the OMAP platform for low-consumption handheld devices. Our DSP expertise plays a valuable role in the development of our implementations. Our implementations are available with XDAIS/eXpressDSP™ certification from Texas Instruments.

What's more, custom implementations and optimizations are available for certain applications.



VoiceAge is a member of the Texas Instruments DSP Third-Party Network.

### Applications

- Softphone
- Test & measuring equipment
- Media gateway
- Call center
- Call recording/monitoring
- Conferencing and conferencing bridges
- IP PBX
- Voicemail
- VoiceXML

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- IP phones
- Voicemail
- Test & measuring equipment
- Conferencing and conferencing bridges
- PDA/handset hosted applications

## ARM®

As a partner in the ARM® Connected Community of developers, VoiceAge® offers speech and audio codecs that are optimized for low-resource devices (low memory and computational resources) powered by ARM processors such as ARM7, ARM9, ARM9E and Intel® XScale®. Our off-the-shelf implementations of these key, high-quality standard codecs are ideally suited for integration in a variety of handheld devices. Written in C or C++, a compiled implementation is available for any ARM-powered platform. Support for a variety of operating systems including Symbian™, WinCE/Win Mobile, and Palm™ OS® 5 and OS 6 guarantees the applicability of this turnkey solution to a broad range of manufacturers' devices.

The VoiceAge® team has rewritten and optimized the codec standards specifically for the ARM platform. Our implementations have been validated against the reference test sequence for bit-exactness, and they work right out of the box.



VoiceAge is a member of the ARM Connected Community.

### Applications

- Softphone
- IP phone
- PDA/handset hosted applications
- Media gateway
- Voicemail
- Test & measuring equipment
- Conferencing and conferencing bridges

## Symbian™

VoiceAge® offers implementations of various codecs to software developers who are building applications running under Symbian™ and advanced services for a global mass market of advanced, open, programmable, mobile phones. Symbian is an open, standard operating system for data-enabled mobile phones and is available to licensees.

Our codecs work with all versions of the Symbian OS, regardless of user interface (UI), such as the Series 60 software platform for Nokia® smart phones that support services like rich-content downloading and MMS. As well, our codecs work with UIQ, which provides a flexible, large screen UI for small, pen-based phones.

### Application

- PDA/handset hosted applications
- Softphone
- Dual-mode phone
- Audio books

## Java™

Its OS-independence and platform-independence make Java™ a widely used environment for application development. VoiceAge® is pleased to offer various optimized codec solutions for Java, commonly used in web-based softphone and call center applications.

In addition, we offer a Java JMF solution that enables applications running under JMF to connect to objects provided by the codec. And in another offering, we've added a Java JNI wrapper so that applications running under Java can access our DLLs written in C to test the codec *before* we build a custom implementation for your application.

### Applications

- Softphone
- Call center
- Voicemail
- Test & measuring equipment
- VoiceXML
- PDA/handset hosted applications

## Optimized solutions for your application

We invite you to try our codec implementations now—evaluation versions are available to integrate and test with your design. For information about our codec implementations, contact us at [sales@voiceage.com](mailto:sales@voiceage.com)

Application	Available Platforms	Recommended Codecs/Modules
Softphone	ACM (RTC) ARM CodeLib Java JMF	G.722.2/AMR-WB G.729
IP phone	ARM Texas Instruments	G.722.2/AMR-WB G.729
IP PBX	CodeLib	G.722.2/AMR-WB G.729b
Multimedia streaming	CodeLib Helix ARM Texas Instruments	AMR-WB AMR-WB+
Media gateway	CodeLib	AMR G.722.2/AMR-WB G.723.1 G.729 AMR-WB+
Call center	ACM (RTC) CodeLib Java	G.722.2/AMR-WB G.729 G.729b
Voicemail	ARM CodeLib Java Texas Instruments	G.722.2/AMR-WB G.729
Test & measuring equipment	ACM (RTC) ARM CodeLib Java Texas Instruments	G.711 G.722.2/AMR-WB G.723.1 G.729 AMR-WB+
VoiceXML	ACM (RTC) CodeLib Java	G.722.2/AMR-WB G.729
Conferencing and conferencing bridges	ACM (RTC) ARM CodeLib Java Texas Instruments	G.722.2/AMR-WB G.729
PDA/handset hosted applications	ARM Java Texas Instruments	AMR G.722.2/AMR-WB G.729 AMR-WB+

## 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® technology platform, VoiceAge® codec solutions deliver unsurpassed quality experienced daily by hundreds of millions of users worldwide.

Our mission is to maintain our global leadership in low bit rate, high-quality digital speech and audio compression. Our business activities focus on three areas:

- **Codec Solutions.** Adapting existing codecs to custom environments, optimizing codecs for specific processors, and—as leaders in our field—always offering the best quality
- **Technology R&D.** Maintaining our leadership in the research and development of narrowband and wideband low bit rate speech and audio coding technology so we can offer state-of-the-art standardized and proprietary codec solutions to meet specific market requirements
- **Licensing.** Creating and managing, with other patent holders, patent pools to facilitate access to licenses that are required for the use of standardized codecs

Our ACELP® technology platform is at the core of numerous international standards. Most recently, it was adopted at 3GPP and 3GPP2 as the core wideband speech/audio coding technology for wireless applications and at 3GPP as the audio codec for mobile multimedia. It was also adopted at ITU-T for teleconferencing and voice-over-packet applications. Today, VoiceAge occupies a strategic position in the sphere of emerging wideband speech and audio compression technologies.

### International Standards Using ACELP®

Organization (Scope)	Recommended Codecs
ITU-T (Global)	G.722.2/AMR-WB, G.729 and its annexes, G.729.1, G.723.1
ETSI (Europe)	G.722.2/AMR-WB, AMR, TETRA, GSM EFR
ISO (Global)	MPEG-4 CELP
3GPP (Global)	G.722.2/AMR-WB, AMR, AMR-WB+
3GPP2 (N. America, Asia)	EVRC, SMV, VMR-WB, EVRC-B (4GV)
TIA (United States)	EVRC, SMV, EFR-TDMA, PCS 1900
ARIB (Japan)	G.729 and its annexes, PDC-EFR

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