



Vianix* and Intel XScale® Technology

Company	Vianix*, LLC is a fast-paced technology licensing company that specializes in voice compression.
Business Challenge	Eliminate the traditional trade-off between voice quality and voice compression.
Technology Solution	Managed Audio Sound Compression (MASC*) voice compression technology delivers high voice quality at low bit rates, enabling significantly increased recording times and efficient use of bandwidth.
Enabled By	Intel XScale® Technology

Powerful Solutions for Speech-Centric Applications

Technology growth is often punctuated by advances in user interfaces. In the 21st century, people are starting to talk to their computers and their computers are starting to talk back. The next frontier of technology growth will leverage speech-centric capabilities.

Intel understands the challenges associated with voice-centric computing. Putting this knowledge to work, Intel is designing embedded processor architectures ideally suited to this class of applications. With Intel XScale® technology, companies can now bring increasingly innovative speech-centric solutions to market.

The Challenge

Moving toward speech-centric systems does not come without challenges. New and innovative system solutions are often limited by storage space, bandwidth, the desire for high file transfer speed, and a need for small file footprints. These smaller file sizes are achieved through the use of voice compression codecs (COder DECoder).

Voice compression is a complex process, with the performance of the application layer often limited by the underlying enabling technology. Unfortunately, voice compression has typically been an “either/or” choice. An application developer could choose between high voice fidelity or high compression levels (quality vs. bit rates.)

When a speech centric application sacrifices quality, voice files that are difficult to understand degrade the user experience. This becomes even more important in applications employing automatic speech recognition, as recognition rates are lowered.

The sacrifice of file size is equally dangerous, as large bit rates produce large file sizes. Decreased file transfer speeds, increased costs for bandwidth, and reduced storage space (or maximum allowances for stored voice) are a common result.

The Power of MASC on Intel XScale®

Application developers no longer need to make this difficult choice today. Vianix* Managed Audio Sound Compression (MASC*) enables enhanced speech centric applications by delivering both low bit rates and high voice quality. “MASC compresses data at up to 22X smaller than 8kHz 16 bit PCM WAVE, providing near toll-quality speech at 5.0–6.5 kbps data rates. This frees application developers from the win-lose situation of compromising quality for file size or file size for quality, establishing a win-win scenario in the trade-off between quality and file size,” said Ken Wagner, Vice President of Sales and Marketing at Vianix. With the superior performance of XScale technology, Intel has achieved phenomenal success in speech-centric market segments. Wagner believes MASC on Intel XScale technology-based processors can be a critical differentiator in these markets.

Another advantage is with Automatic Speech Recognition (ASR), which is being used increasingly in a broad range of markets. Typically, there are trade-offs between word/error rates and file sizes. In digital dictation and transcription markets, for example, this trade-off has a profound impact. High word/error rates decrease efficiency, and large file sizes create additional costs in bandwidth.

MASC helps eliminate the trade-off by providing industry-leading results in terms of file size and recognition rates for automatic speech recognition. Reza Hashampour, Vianix President and CEO states: "In extensive tests by the major speech compression companies, MASC delivers the word/error rates of high quality WAVE files at up to 22 times smaller file sizes."

By choosing MASC on Intel XScale technology, application developers can deliver enhanced performance and a superior user experience.

MASC Speech Codec Sets the Standard

MASC is a variable bit rate codec using a proprietary Codebook Excited Linear Predictive (CELP) speech-coding algorithm to achieve high speech quality at low bit rates. The codec dynamically adjusts the compression ratio based on the measured speech energy in a given 20 ms window. Frames with low speech energy are encoded at lower bit rates, maintaining the overall high speech quality.

Recognizing the Intel XScale platform as an ideal blend of high performance processing and low power consumption, Vianix ported MASC to the Intel® PXA27x. According to Nihal Naidu, Vianix Engineering Manager: "Vianix optimization estimates indicate that the MASC Codec will allow eight-channel, full duplex vocoder operation in real time, at an average peak of about 65 MIPS."

Optimized Specifications (estimates are +/-15%)

Mr. Naidu also states: "Full Duplex MIPS (peak), Program Memory, and Data Memory are 65, 50 KB, and 13KB respectively." Compiling MASC with the Intel® C++ Compiler takes advantage of Intel XScale architecture features to build highly optimized and efficient code, and will utilize a runtime library with optimized I/O and floating point functions.

The Intel® VTune™ Performance Analyzer is being utilized to identify further opportunities for optimization. Loop level optimizations such as cache blocking can be performed and source code algorithms can be optimized for memory access. Vianix plans to utilize the Intel® Integrated Performance Primitives (Intel® IPP) software library which can be utilized in a broad range of applications. The library includes functions for vector manipulation, matrix math and general signal, image, speech and audio processing, as well as sophisticated primitives for construction of speech codecs. By incorporating Intel IPP library, Vianix can precisely optimize processor usage for numerical operations with MASC and dynamically rescale, in real-time, an audio stream without loss of performance..

MASC Technology on Intel XScale® Adds Value in Key Market Segments

Intel and Vianix are currently working together to provide MASC-enhanced Intel XScale technology-based processor solutions to a broad range of market segments and applications. The advanced features and performance of the Intel PXA27x product line yield innovative solutions for digital voice recording in dictation, transcription, health information management systems, and wireless communications markets, where Vianix has a strong presence. Intel and Vianix also intend to leverage Intel XScale processor benefits in telematics, VoIP, and converged devices handling speech-centric content downloads.

"The combination of raw processing power in a low power package provides a superior platform on which to showcase MASC speech compression technology," says Reza Hashampour, Vianix President and CEO.

Summary

The marketplace is moving towards speech centric applications. With MASC technology both voice quality and voice compression are possible. According to Reza Hashampour, CEO and President of Vianix, Intel XScale technology is helping MASC to reach its full potential and ensure that anyone recording, transmitting, storing or retrieving speech does not have to sacrifice file size or quality.

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