

SOUND INNOVATION™



Welcome to *Sound Innovation*™, the quarterly newsletter created by Akustica to keep you abreast of technology advancements that can help you deliver the voice improvements demanded by your customers. Each quarter, we explore topics affecting voice communications and provide you with leading-edge information that will help you understand emerging trends and evaluate new offerings.

Voice Starts Here™

Despite the growing popularity of e-mail and instant messaging, voice is still the most popular mode of communication. Unfortunately, while much effort has been spent to improve the user experience for text based messaging using PCs, cell phones, and other mobile devices, voice quality in communications has remained fundamentally unchanged for more than 50 years.

Today, the combination of next generation HD microphone technology from Akustica, with wider bandwidth communication networks is moving the industry towards a new level of voice quality that we call HD (High Definition) voice. HD voice technology dramatically improves intelligibility and allows users to hear the nuances and sense the emotions that are absent from phone calls today. Similar to the shift from watching an analog television to watching digital cable on a high definition television, HD voice quality provides:

- Realistic sound quality that is comparable to face-to-face conversation
- Better intelligibility which leads to less user fatigue
- More than 10% additional accuracy for speech recognition

**Yesterday
(PSTN)**



**Today
(HD voice)**

This issue of *Sound Innovation* discusses the benefits of HD voice technology and how Akustica is working with industry leaders to make HD voice the new standard in voice quality.

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AKUSTICA NEWS and ARTICLES

- Akustica Microphones Enable High Definition Voice Quality on Laptop PC's, Internet Phones
- Akustica's Digital Microphone Wins Innovation Award from EDN Magazine
- Akustica's Ken Gabriel is Finalist for Two Electronics Industry 'Innovator' Awards.
- Loud and Clear: Akustica Digital Microphones Showcase Voice in New Mobile PC's
- Windows Vista Drives Demand for Akustica Microphones in Mobile Computers
- *Sound Innovation* Vol. 2, No. 4 - Akustica Making Waves in the Industry

WHAT OTHERS ARE SAYING

- *Electronic Products*: Product of the Year Story Behind the Story
- *MEMS Investor Journal*: A Universal MEMS Process?
- *Electronic Design*: Interconnecting Mini MEMS Spawns Max Challenges
- *EE Times*: MEMS Exec Sees Billion-Dollar Markets

INDUSTRY EVENTS

- **Computex Taipei**
June 4-8
- ➞ [Click here to meet with Akustica at this event](#)

MORE INFORMATION?

- ➞ [Let us know how we can help you?](#)

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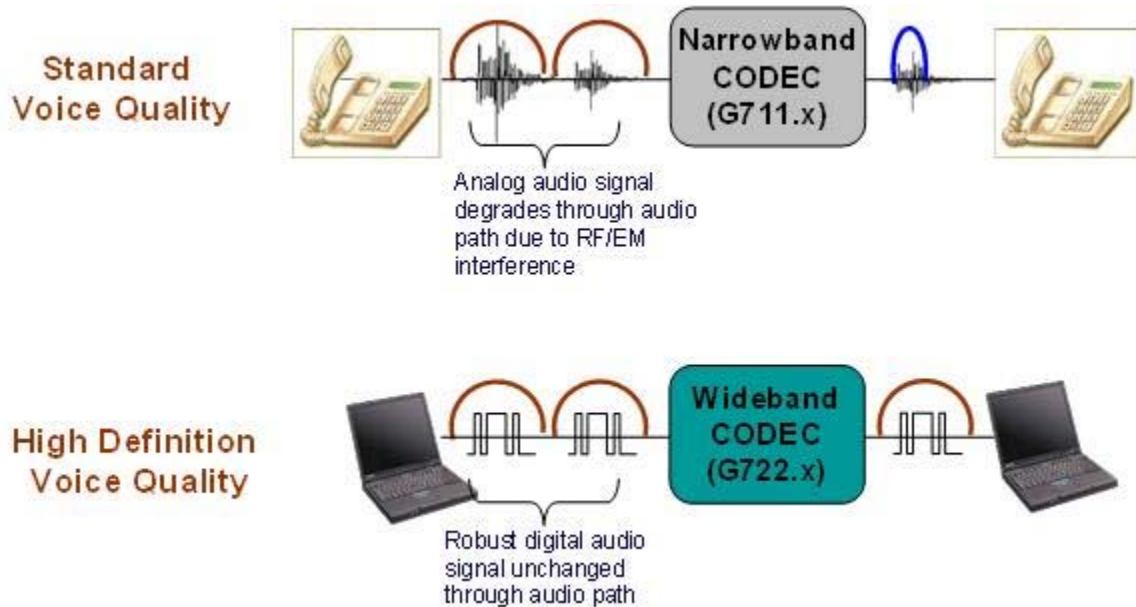


Voice Starts Here™

By Dr. Marcie Weinstein, Director of Strategic Marketing

The combination of narrow bandwidth and analog audio signals—which are highly susceptible to electromagnetic (EM) and radio frequency (RF) interference—has resulted in the poor voice quality that users get today on a phone. It was not until recently that new digital, wideband audio technology has become available to overcome the transducer and network limitations that have resulted in the poor voice quality that we have all come to expect from the PSTN (Public Switched Telephone Network).

To achieve HD voice quality, a wideband, digital audio input is essential through the entire audio signal chain.



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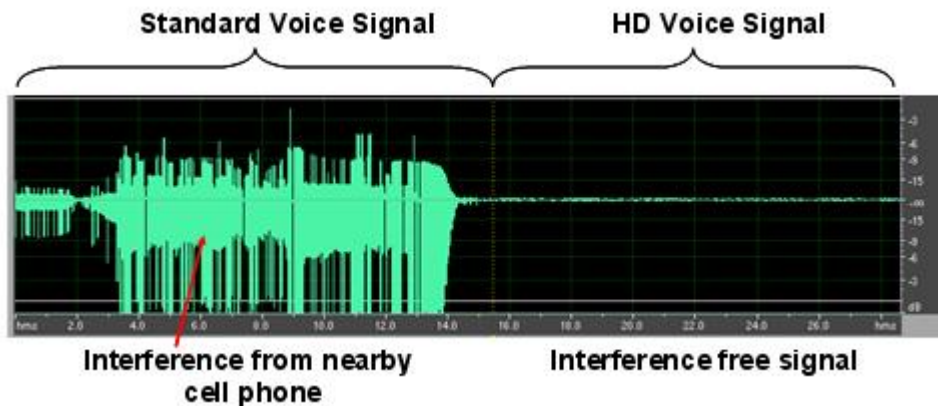
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DIGITAL AUDIO INPUT

HD voice quality begins at the location of the voice input, *the microphone*, with the goal being to maintain the original voice input quality as closely as possible throughout the signal chain. The first step to preventing corruption of the audio path is to convert the signal to digital as near to the microphone transducer as possible to prevent degradation of the tiny electrical signals from the microphone element. Think of this as analogous to the first step towards HDTV - moving from analog to digital cable. Since digital signals are more robust and are immune to electromagnetic and radio frequency interference sources in the environment, “static” from nearby electronic devices is eliminated and signal integrity is not compromised.

An example of audio signal interference from a cell phone that is transmitting data is shown in the picture below where we compare the intrusive amount of cell phone interference on the audio signal coming from a standard analog microphone to the absence of interference from that same cell phone on the audio signal coming from an Akustica CMOS MEMS digital output microphone. It is clearly seen that the cell phone has virtually no impact on the audio signal coming from the digital microphone.



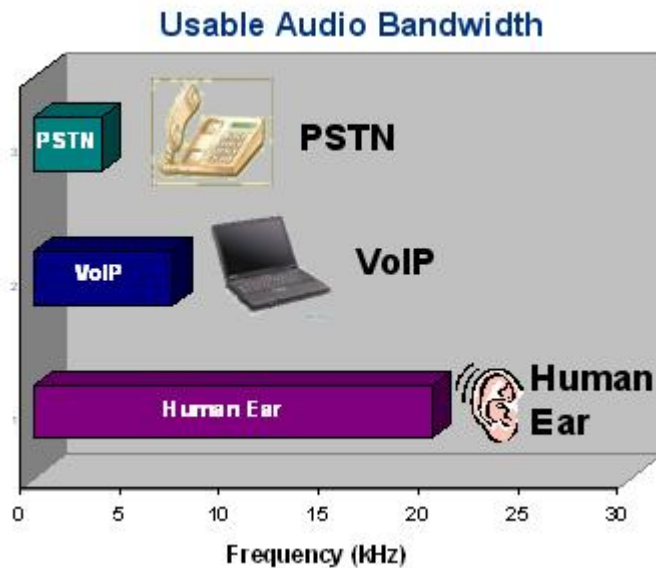
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WIDE BANDWIDTH SUPPORT

As mentioned, a robust digital microphone signal is just the first part of the solution for delivering HD voice quality. The remaining requirement is that the microphone, the network, and the application all support wider bandwidth voice transmission. While the human ear can hear up to 20kHz, the PSTN transmits only a 3.4kHz bandwidth during a standard phone call. Despite the fact that this bandwidth contains the majority of speech content and covers the regions where the ear is most sensitive, many consonant sounds are actually above this frequency range. This means that in order to fully understand a conversation using the PSTN, a good amount of processing is required by the brain to understand a word in its context as opposed to just being able to understand the word on its own. This heavy lifting leads to user fatigue and the need for “telephone language” such as saying “N as in Nancy” and “M as in Mary” when stand-alone letters are used without a context.

The good news today is that not only does new HD microphone technology from Akustica support wideband operation, but wideband networks (DSL, cable, 3G wireless, etc.), wideband CODECs, and VoIP (Voice over Internet Protocol) applications. Industry leaders such as Skype and Texas Instruments offer hardware and software solutions that are capable of supporting at least a 7kHz bandwidth which is double the bandwidth that is available on the PSTN as shown below.

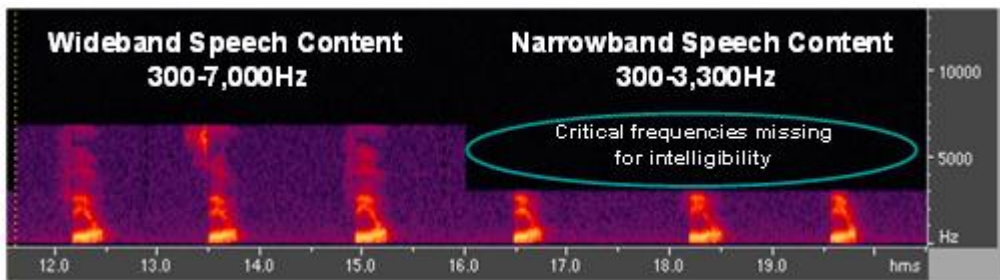


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The overall result using HD voice technology is that consonants in the upper frequency ranges can be clearly heard regardless of context. As shown below, the wider bandwidth content not only includes consonant sounds that were previously lost, but also allows nuances and subtle changes of the voice which are located in the lower frequency ranges to be heard clearly, leading to a more life-like voice quality.



WORKING TOGETHER TO DELIVER HD VOICE

Akustica is helping to move the industry towards an HD voice standard by introducing a new class of products called the HD Microphone family. Only Akustica's HD Microphones are single-chip microphones that can convert the small transducer signal from analog to digital after going just a few microns. The result is the cleanest audio signal possible with the least interference from environmental noise sources. Additionally, Akustica's HD Microphones are designed specifically to support wide bandwidth operation to insure that the entire signal chain, starting at the microphone and all the way through the transmission network.

HD voice is the new standard that end-users should come to expect. Together with service and application providers as well as laptop and mobile phone manufacturers, Akustica is working to enable the more realistic sound quality and higher intelligibility that result from using an HD voice solution for day-to-day voice communications.

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