



Welcome to the fourth issue of *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 for your products. Each quarter, we will explore the timeliest topics affecting voice communications and provide you with access to leading-edge information that will help you understand emerging trends and evaluate new offerings.

## END USER BENEFITS OF EMBEDDED DIGITAL MICROPHONE ARRAYS

The previous issue of *Sound Innovation* focused on the laptop PC market and the implementation of digital-microphone arrays. In particular it discussed how using digital microphones can overcome the typical microphone array integration challenges and enable the highest voice quality solution. This issue, we focus on the benefits that will be experienced by typical laptop PC users when using an embedded microphone array as compared with other audio input device options.

There are many features that are important to the end-user when selecting a microphone for use with their laptop for a Voice over IP (VoIP) application, the most obvious of these being price, size, quality, style, and ease of use. This issue of *Sound Innovation* explains why an embedded microphone array in a laptop ranks at the top in each of these categories as compared with other audio input devices, making it the optimal solution for the laptop user for VoIP applications.

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### AKUSTICA NEWS

- Akustica Works to Solve PC VoIP Voice-Quality
- Akustica Joins Development Alliance to Help Create New Digital Interface Standards for Mobile Devices
- CMOS MEMS Activities at Akustica
- *Sound Innovation* No.3 - Embedded Digital Mic Arrays for Laptop PC's

### INDUSTRY NEWS

- Google, Skype Race Toward Next IM Frontier
- Skype 2.0 Offers Free Video Calling
- Intel Working with Skype
- Experts Say Applications Will Drive VoIP Growth
- Market Adoption of Silicon Microphone by Mobile Phone Makers Has Been Very Swift

### INDUSTRY EVENTS

- **IEEE MEMS2006**  
January 22-26
- **SpeechTEK West**  
January 30-February 1
- **3GSM World Congress**  
February 13-16
- **Intel Developers Forum - USA**  
March 7-9

[➔ Click here to meet with Akustica at any of these events](#)



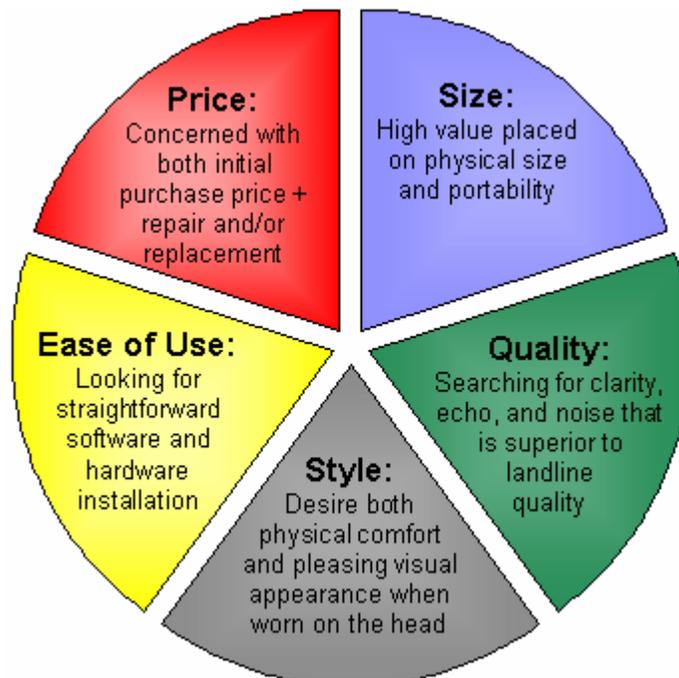
## END USER BENEFITS OF EMBEDDED DIGITAL MICROPHONE ARRAYS

By Marta DePaul, Product Marketing and Dr. Marcie Weinstein, Director of Product Marketing

Voice over IP (VoIP) usage has begun to enter the mainstream as Skype, the leading VoIP provider, hit 200 million downloads in November 2005 (1). According to Frost & Sullivan, this number will continue to grow and Residential VoIP End Point Service will account for more than \$400M in revenue by 2010 (2). Skype is not alone in this marketplace as several other major players such as Microsoft, Yahoo, Google, and AOL have stepped up to compete for this growing market.

The applications of VoIP come in many forms: direct computer-to-computer VoIP calls, voice chat, and even video chat or conferencing. These applications are used by both the business person and the teenager alike who each have become accustomed to instant communication that offers a faster response than e-mail.

Voice input is done through microphones, which can take many forms. Consumers differentiate microphones based on several convenience factors that encompass the performance and physical characteristics of the microphone. The key features of microphones for VoIP use are listed and described below:



Consumer Voice Input Selection Criteria



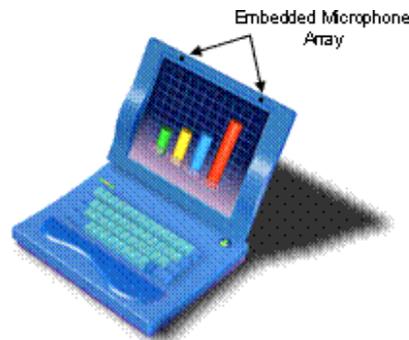
### Existing VoIP Accessories

To cater to the variety of business and consumer VoIP users, computer and computer accessory developers offer several types of microphone products that can be used with existing laptop and desktop computer systems:

- **Headset microphones** are an integration of headphones and a microphone. They are either worn as a headband, with two earphones, or over-the-ear with one earphone. Headsets can either be wired or wireless headsets equipped with a technology such as Bluetooth® that can allow untethered communication with a laptop or desktop computer.
- **Boom microphones** are available as stand alone microphones that sit on a table or desk or alternatively with a mount for a monitor.
- **Array microphones** are an external combination of two or more microphones that work together to sample sound. They typically sit on top of a desktop monitor.

### Next Generation Microphone Solutions

The latest in audio input technology is an embedded microphone array for laptop PCs. The array consists of two or more microphones that are typically located in the display of the laptop.



- **Embedded microphone arrays** are ideally suited to improve the end-user experience, particularly when it comes to convenient usage:

<b>Price</b>	<ul style="list-style-type: none"> <li>• Cost built into laptop cost</li> <li>• Unlikely to need repair or replacement - more robust and less susceptible to damage</li> </ul>
<b>Size</b>	<ul style="list-style-type: none"> <li>• No need to carry additional equipment with laptop when traveling</li> <li>• Aesthetically pleasing - eliminates need to wear headset during video conference</li> </ul>
<b>Quality</b>	<ul style="list-style-type: none"> <li>• Embedded arrays leverage noise and echo suppression algorithms running on the laptop giving unparalleled performance in the voice quality that is transmitted through the system.</li> </ul>
<b>Style</b>	<ul style="list-style-type: none"> <li>• Embedded array does not require additional space or interfere with outer design of laptop</li> </ul>
<b>Ease of Use</b>	<ul style="list-style-type: none"> <li>• Require no installation by end user. Already part of system out-of-the-box.</li> <li>• Completely untethered solution</li> </ul>



For the above reasons, an embedded microphone array is the optimal audio input device to use for notebook applications when considering price, performance, style, and ease of use.

➤ [Click here to hear a sample recording of an embedded digital microphone array \(4 MB MP3 file\)](#)

For more information, click on the links below:

- [Skype hits 200 million downloads \(1\)](#)
- [Frost & Sullivan VoIP Market Projections \(this is also the reference for the internal number quoted in the newsletter\) \(2\)](#)
- [Instant Messenger applications that include VoIP capability](#)
- [Request samples and/or technical product information](#)

Please contact Akustica if the above links are inactive.