

White Paper

Are You Ready for HD Voice?

Dialogic White Papers

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Executive Summary

A new excitement has entered the mobile industry with the advent of wideband audio, commonly known as HD Voice. Although enterprises have gradually been moving to HD VoIP within their own networks, tight budgets and PSTN connections, which utilize narrowband audio codecs, have minimized widespread acceptance. Early research (accidentally through studies for video conferencing and directly through trials by Ericsson and T-Mobile in Germany) has shown that consumers react very favorably (93%) to HD Voice, which provides significantly superior natural sound and a dramatically increased sense of participating in a live conversation.

With the introduction of mobile HD Voice, consumers can finally experience this new technology firsthand, and adoption is likely to move forward quickly. Because mobile users normally adopt new technology rapidly, replacing their mobile devices on an average of every 24 months, demand for HD Voice is expected to be high, and availability across mobile networks is expected to accelerate.

This white paper provides an introduction to HD Voice and discusses its current adoption rate and future potential. It also describes research trials and implementation issues, and sets HD Voice in its industry context.

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The Promise of HD Voice

Even though voice services are ubiquitous and have seemingly become as ho-hum a commodity as milk, voice quality is still a critical measure for carrier success. In many cases, minor improvements in voice quality have had significant impact. For example, Sprint's famous "pin drop" ads, first aired in 1986, lauded the long-distance carrier's improved voice service, occasioned by the launch of its coast-to-coast fiber-optic long-distance network. The ads created brand awareness and excited consumer interest, while the improved voice service bolstered the corporate image and increased market share.

More recently, television, another "boring" commodity, took on new excitement (and benefitted from significantly increased revenue) with the introduction of digital transmission and HDTV. Consumer willingness to invest in expensive new HDTV equipment to enjoy more "life-like" viewing suggests that improved quality of experience is important.

Today, a similar revolution is gathering strength in the form of high-definition voice communications, or HD Voice. This paper will explore HD Voice, which is expected to spread quickly once wideband audio becomes widely available to mobile customers.

What Is HD Voice?

HD Voice uses wideband audio connections to more accurately reproduce the human voice. The result is significantly more natural speech, and some early users liken it to "being in the same room" with the person on the other end of the phone line. Early users also report an increased ability to recognize people by their voices and to understand highly accented speech more easily.

One reason new users experience such a marked improvement in quality with HD Voice is that traditional telephony is constrained by dated standards. Digital telephony standards (for example, ITU-T G.711) are based on 1960s digital circuit technology and 1930s microphone technology. Until the advent of HD Voice, G.711 was the standard of quality, with mobile telephony typically providing less than G.711 quality.

What do these limitations "sound" like? A major issue is that older standards severely limit the range of audio frequencies to ~300Hz to 3400Hz. The limitations in adhering to this narrow range are:

- Difficulty recognizing "fricative" sounds like "s" and "f" (higher frequencies needed)
- Problems distinguishing "m" from "n" and "p" from "t" (again, higher frequencies needed)
- Inability to hear the fundamental resonances in spoken vowels (lower frequencies needed)

The resulting "telephone speech" sounds harsh and unnatural, but with HD Voice, the limitations of a narrow range are removed, even on mobile phones.

Mobile HD Voice Likely To Outpace HD VoIP

HD Voice has been spreading slowly, matching the gradual pace of business telephone system adoption of VoIP technology. Although telephone handsets from Avaya, Cisco, Grandstream, Gigaset, Polycom, Snom, and others support wideband audio and incorporate a variety of higher-quality audio components, most enterprise IP telephony systems operate as islands of VoIP. They connect to calls on the traditional PSTN, which adheres to dated voice standards and delivers only a narrow frequency range. As a result, HD Voice is usually restricted to internal connections.

In addition, and perhaps more importantly, enterprise IT departments generally make these telecom purchase decisions, and these departments are typically under severe budget pressure and thus unwilling to provide "soft" benefits, such as markedly improved voice quality, even if the incremental cost is modest.

The best hope for more widespread adoption of HD Voice lies with the consumer, and the consumer's demonstrated willingness to purchase new and improved mobile devices frequently (today, approximately every 24 months). As it becomes available on mobile handsets supported by upgraded mobile networks, HD Voice is likely to find an eager public, willing to pay for the higher standard of voice quality. With wideband audio built into mobile phone chipsets, incremental costs will plummet. The size of mobile user acceptance should quickly take the market for HD Voice far beyond today's slow pace of enterprise adoption, allowing HD Voice to reach large numbers of early adopters, followed by mass market acceptance worldwide.

Once mobile HD Voice is available, the tipping point is estimated to be 12 to 24 months for widespread adoption. Also, markedly superior voice quality on mobile phones is likely to result in even more rapid fixed-to-mobile migration.

HD Voice Research Fuels Excitement

In the early 1990s, the video telephony industry made a startling discovery. Through its research, it found that user perceptions of video calls were improved by sacrificing video bits in order to provide wideband audio! This discovery led to wideband audio (the basis of HD Voice) becoming part of the widely adopted H.320 video conferencing standard (also known as Px64), and appearing in almost every video conferencing system since.

In 2006, Ericsson and T-Mobile conducted a joint trial of wideband audio mobile services in Germany [Ericsson]. The response was extremely encouraging — 93% were positive about the new audio quality, while 71% reported a distinct improvement in voice quality and clarity. Users commented that the new voice service made it easier to place and conduct calls in noisy environments and that the service provided a greater sense of privacy, discretion, and comfort.

Implementation Issues

Mobile wideband audio (HD Voice) service has been fully standardized by the 3GPP since 1998. The service uses the AMR wideband (AMR-WB or G.722.2) codec, which must be supported in handsets, the core network's gateways, and the GSM TRAU units (part of the Base Station Controller) to work effectively. Although AMR-WB requires more DSP processing than today's standard (AMR-NB), the extra horsepower is a small fraction of what a handset needs (because of radio requirements) and can typically be supported as a software upgrade on any recently deployed core network equipment.

A mobile operator's core network must also be able to support TFO and TrFO signaling. This signaling is already available in core network equipment, or can be implemented as a software upgrade for most systems deployed recently.

Most encouraging of all, no added radio resources are required, which means no radio re-planning is needed. Although AMR-WB doubles the audio bandwidth, its bit rates are similar to AMR-NB, especially when operating in the mandatory configuration (set 0). The bottom line is that AMR-NB and AMR-WB can easily co-exist and operate side-by-side in today's radio infrastructure.

HD Mobile Service Launches

Since mid-2006, France Telecom Orange has been offering HD Voice as an option to its telephony customers in its triple-play broadband bundles. Although adoption was slow at first, customers have since responded very favorably to the markedly improved voice quality. FT-Orange is now promoting its triple-play service with ads that praise the increased clarity and sense of intimacy of its voice service — without explicitly mentioning wideband audio or HD Voice.

At the HD Communications Summit in New York in September 2009, FT-Orange announced that it was already providing mobile HD service in Moldova, and planned to launch HD Voice service on its mobile networks in the UK, France, and Belgium in 2010. Other mobile carriers are rumored to be working on their own HD Voice services, but no official announcements had been made as of September 2009.

Reference

[Ericsson] Christina Birkehammar, Stefan Bruhn, Peter Eneroth, Karl Hellwig and Stefan Johansson, "New high-quality voice service for mobile networks," Ericsson Review, No. 3, 2006. Available at http://www.ericsson.com/ericsson/corpinfo/publications/review/2006_03/02.shtml.

For More Information

HD Voice Community at
<http://hdvoice.tmcnet.com/>

Pete Wylie, Is HD Voice ready for its moment? August 13, 2009 blog at
<http://www.fiercevoip.com/story/hd-voice-ready-its-moment/2009-08-13>

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