Full-HD Voice: Redefining the Communications Experience

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Today, we have grown accustomed to consuming HD content in most aspects of our lives. From TV's, PC's, tablets, video games, home theatres with multichannel sound, and even mobile phones, we expect and get high-fidelity content. The only "white spot" in the HD realm is the humble telephone call, which is still largely tied to the limitations of technologies from the last century. At present, the vast majority of phone calls are restricted to an upper limit of 3.4 kHz, making phone calls sound muffled and – frankly – behind the times. However, most people are able to hear audio signals up to much higher frequencies, 14 or even 20 kHz, meaning that we are missing at least three quarters of the audible spectrum. The result is speech that is often hard to understand, can even lead to misunderstandings, especially when talking in a foreign language where intelligibility of every phoneme becomes important, and requires frequent spelling. It is not suitable for music and sounds, and can't really relay an "ambience". Compared to our daily media experiences, it simply stands out as being totally antiquated.

Well, it does not have to be that way.

Narrowband to Wideband- Making a Difference?

Recently, some operators took notice of this shortcoming and worked to improve the call quality for their customers by implementing "HD Voice", using, for example, AMR Wideband (AMR-WB) or G.722. While these emerging HD Voice services indeed provide better quality – the audio bandwidth is around 7 kHz - than our current narrowband phone calls, it still does not come close to matching the quality consumers experience daily with their digital media.
Why, the question needs to be asked, introduce another limitation again?

In addition, the speech codecs used in mobile telephony are only optimized for generic speech signals and cannot deliver high fidelity audio for music and ambience sounds. As a result, consumers generally agree that music - and even

speech- are not really acceptable, especially over mobile phones. As a practical example, think of the problems callers usually have to differentiate the letters “f” and “s” or “b” and “g”, and the resulting “spelling bees”.

Introducing “Full-HD Voice”

At Mobile World Congress in Barcelona earlier this year, Fraunhofer IIS introduced Full-HD Voice as a new level of quality for phone calls. Full-HD Voice will finally bring telephony into the 21st century, on par with our quality expectations for digital media. Full-HD Voice creates a natural communication experience, allowing telephone calls to sound as clear as talking to someone in the same room, including the ambience.

When making a call from a beach vacation to friends and family, why should the waves and birds in the background sound less real than when recording them with a camcorder? The improved intelligibility and fidelity is possible because Full-HD Voice quadruples the audio spectrum of regular phone calls.

The MPEG audio codec Enhanced Low Delay Advanced Audio Coding (AAC-ELD) is a perfect example of a Full-HD Voice audio codec. It was developed to deliver low bitrate, low coding delay phone calls, offering a perceptually transparent speech and audio quality. The AAC-ELD codec is optimized for bit-rates from 24 to 64 kbit/s, which is even lower than landline narrowband calls using G.711, and features an algorithmic delay down to 15 milliseconds. Of course, it supports the full audible audio spectrum, up to 20 kHz if desired, and reproduces music, speech and ambient sounds equally well, enabling completely new services and communications experiences.

The audio quality of AAC-ELD has been evaluated in several independent tests comparing it to other codecs including: G.718, G.719, G.722.1, Annex C (Siren 14), G.722.2 (AMR-WB), G.722, Silk, Speex and CELT. In these tests, AAC-ELD was found to deliver excellent quality at lower bit-rates compared to the other codecs under test.

Additionally, AAC-ELD can produce high quality audio consistently, even under poor network conditions. The codec has the capability to adapt to changing bitrates and can manage transmission errors efficiently.

As a result, AAC-ELD enables phone services to perform at the same level of fidelity that consumers have come to expect in today's Full-HD world. Only Full-HD Voice allows the delivery and exchange of music (e.g. music on hold, ring back tones), sounds and "ambience" in Hi-Fi quality, thus enabling new services such as integrative music, rich live chat or augmented audio for gaming.

This is not a pipedream, it is already reality today; Millions of phone calls are already taking place in Full-HD Voice quality. For example, Apple's FaceTime and most video- and teleconference systems from companies such as Cisco and Tandberg already make use of Fraunhofer's Full-HD Voice capable audio codecs.

Implementing Improved Communication

The Full-HD Voice codec AAC-ELD is available as product ready software from Fraunhofer IIS for all major platforms. This allows efficient and straightforward integration into communications applications, such as VoIP, videoconference or telepresence systems.

As the communications industry continues to make major improvements to their networks, including low latency all IP networks such as LTE, and devices, Full-HD Voice is the next, natural step to bring telephony on par with the quality level of state-of-the-art digital media.

Feel free to compare the codecs firsthand, listen to the differences between "classic" telephone quality, HD Voice and Full-HD Voice by visiting: www.full-hd-voice.com [1]

Posted by Janine E. Mooney, Editor

March 27, 2012

Source URL (retrieved on *04/17/2014 - 3:15pm*):
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