



LifeVibes VoiceExperience 4.0

Product Introduction

June 2013

The challenges...

Noisy environments



- Mobile phones are used in noisy environments
- In the street, outdoor, while driving, in a bar
- The other party can't understand you
- You can't understand the other party
- Noise suppression technology and intelligent volume control will fix this

Limited speech clarity



- Today all calls have limited bandwidth
- General trend towards better audio quality
- Driven by landline quality and VoIP
- HD Voice is being introduced by operators
- HD Voice makes speech sound more natural
- Clearer speech and better intelligibility due to larger bandwidth

The challenges...

Echo



- Speakerphone is more and more used
- Business users or while driving a car
- In speakerphone mode, the sound of the speaker is picked up by the microphone and sent back to the other party ('echo')
- Same problem in handset mode, but less severe
- Acoustic echo cancellation will fix this

Distortion



- Speaker and microphone components tend to get smaller and cheaper
- Speaker and microphone frequency response is typically not flat
- Causing colorization of the voice
- Frequency equalization can correct this

The challenges...

Volume differences



- Some people speak very loud, some very soft
- Distance to microphone not constant
- Mobile network introduces level differences
- Automatic gain control can be applied to maintain a constant listening level
- No need for manual volume adjustments

Traffic noise



- Traffic noise in emerging markets
- Many calls are made in the street
- Vehicles often use their horn
- Dedicated horn suppression technology

VoiceExperience 4.0

- Description
 - Voice call quality enhancement
 - Acoustic Echo Cancellation
 - 1-mic and 2-mic Noise Suppression
- What's new in 4.0?
 - 2-mic noise suppression in speakerphone mode
 - Support for handheld and desktop speakerphone mode
 - Robust against device movements
- End-user benefits
 - State-of-the-art noise suppression
 - Preserves natural voice quality
- OEM benefits
 - GSMA HD Voice compliant
 - Supports CS, VoIP and VoLTE calls
 - Same voice quality regardless of hardware platform
 - Market-proven solution



LifeVibes VoiceExperience

VoiceExperience

HD Voice

Wideband

HornSuppression

Traffic noise

LoudnessMaximizer

Loudness

VoiceClarity

Far-End Noise Suppression
Auto Intelligibility Improvements
Comfort Noise Generation

Rx

NoiseVoid

Echo Cancellation
2-mic Noise Suppression

HandsFree

Echo Cancellation
1-mic Noise Suppression

WhisperMode

Automatic Gain Control

Tx

Product

Configuration

Option

LifeVibes HandsFree and NoiseVoid

- HandsFree and NoiseVoid
 - 1-mic and 2-mic voice enhancements for outgoing (Tx) speech signal
 - Echo Cancellation
 - Enables full-duplex operation without echoes
 - Effective suppression of local background noise
 - Using 1 microphone (HandsFree) or 2 microphones (NoiseVoid)
 - NoiseVoid suppresses both stationary and non-stationary noise
 - Handset and speakerphone mode
 - Handheld speakerphone mode
 - On-table speakerphone mode for conferencing
- Benefits
 - Crystal-clear voice quality gets your message across
 - Make calls in noisy places, effortlessly
 - Global Mobile Operator compliant
 - Enable mobile conferencing



LifeVibes VoiceClarity

- Making calls in noisy environments can be really difficult...
 - Most handsets are not loud enough to make calls in noisy places
 - Emerging Markets: More outdoor calls, more noise...
- VoiceClarity improves the Rx signal to enable call
 - Auto Intelligibility Improvement
 - Enhances speech intelligibility of the received speech depending on near-end noise
 - Far-End Noise Suppression
 - Removes background noise from Rx Signal
 - Comfort Noise Generation
 - Creates constant background noise level in Rx
 - Avoids unwanted effects caused by complete removal of all background noise. For example, the line may sound dead, causing confusing by the caller.
 - LoudnessMaximizer (option)
 - Increases maximum volume level of the speaker
 - More loudness with only minimal distortion



LifeVibes WhisperMode

- Some people speak very soft, some very loud
 - Whispering to call discretely...
- WhisperMode adjusts the near-end speech to a comfortable level
 - Automatically adjustment to set reference level
 - Robust to background noise
 - Make calls possible everywhere at anytime
 - Enhanced microphone capture



HornSuppression

- Ever experienced Indian traffic noise ?
 - *“Auto-rickshaws and scooters in busy cities can be really noisy. They are honking constantly. Making phone calls from the street can be really difficult: People can hardly understand me!”*
- HornSuppression greatly improves the intelligibility and the listening comfort
 - Horn sounds are completely removed from a phone conversation when receiving calls from busy streets
 - Targeting emerging markets. HornSuppression can also be applied in established markets, although honking is typically less frequent.
- Works in two directions
 - Sending: When you are calling from a busy street
 - Receiving: When someone else calls you from a busy street
- Only suppresses horn sounds, limited degradation of speech quality
 - Can be applied in any handset, not only in handsets for emerging markets



Samsung
Guru 139

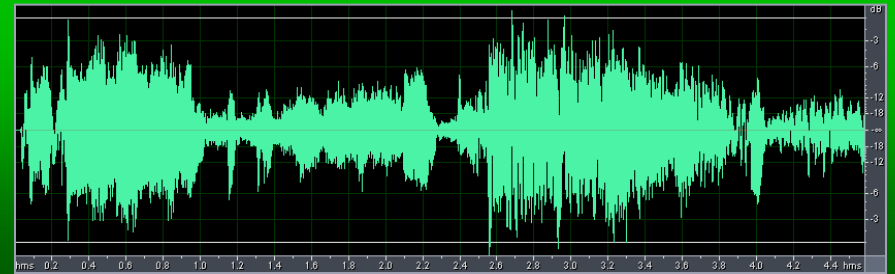


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Guru 539

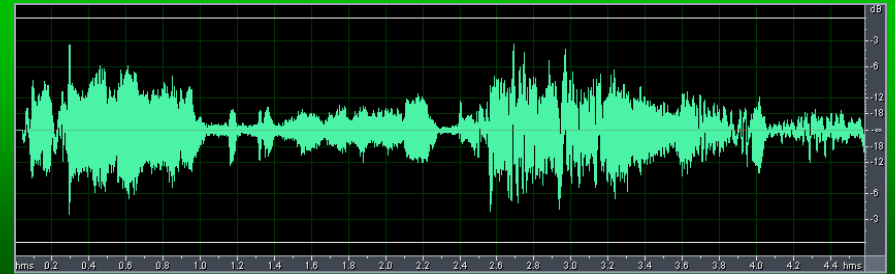


Demo of HornSuppression

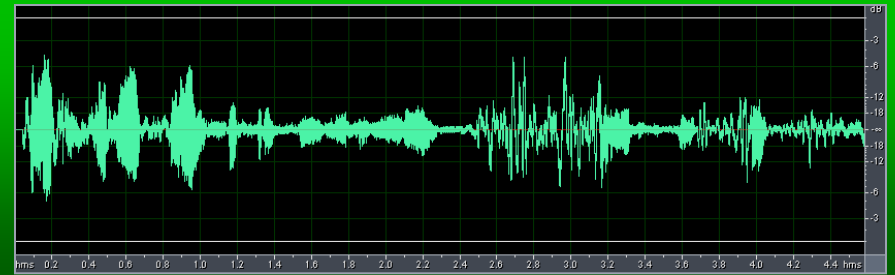
Input signal picked up
by the microphone



Processed with
HandsFree 1.2



Processed with
HandsFree 1.2 +
HornSuppression





LoudnessMaximizer for Voice

LoudnessMaximizer for Voice

- Calling in noisy environments can be really difficult
 - Even the maximum volume setting is sometimes not loud enough
- LoudnessMaximizer increases speaker loudness
 - Optimal intelligibility under noisy conditions
 - With only minimal additional distortion
 - Without requiring more expensive or bigger speakers
- For handset mode and speakerphone mode
 - Additional loudness in speakerphone mode for mini-conferencing in noisy environments
 - Receiver speakers for handset mode are typically not loud enough when it's very noisy



Benefits

- LoudnessMaximizer is optimized for speech
 - Tuned for maximum intelligibility, not just plain loudness increase
 - No pumping artifacts
 - Signal amplitude limited to restrict speaker excursion
- Integrated in LifeVibes VoiceExperience
 - Integrated solution ensures optimal Echo Cancellor performance despite increased loudness
- Perfect fit with other Rx features in VoiceClarity
 - LoudnessMaximizer for improved intelligibility under noisy conditions
 - Auto Intelligibility Improvement for automatic volume adaptation based on local noise
 - Far-End Noise Suppression to reduce noise
 - Comfort Noise Generation to generate constant background noise level, to prevent 'dropped call' confusion

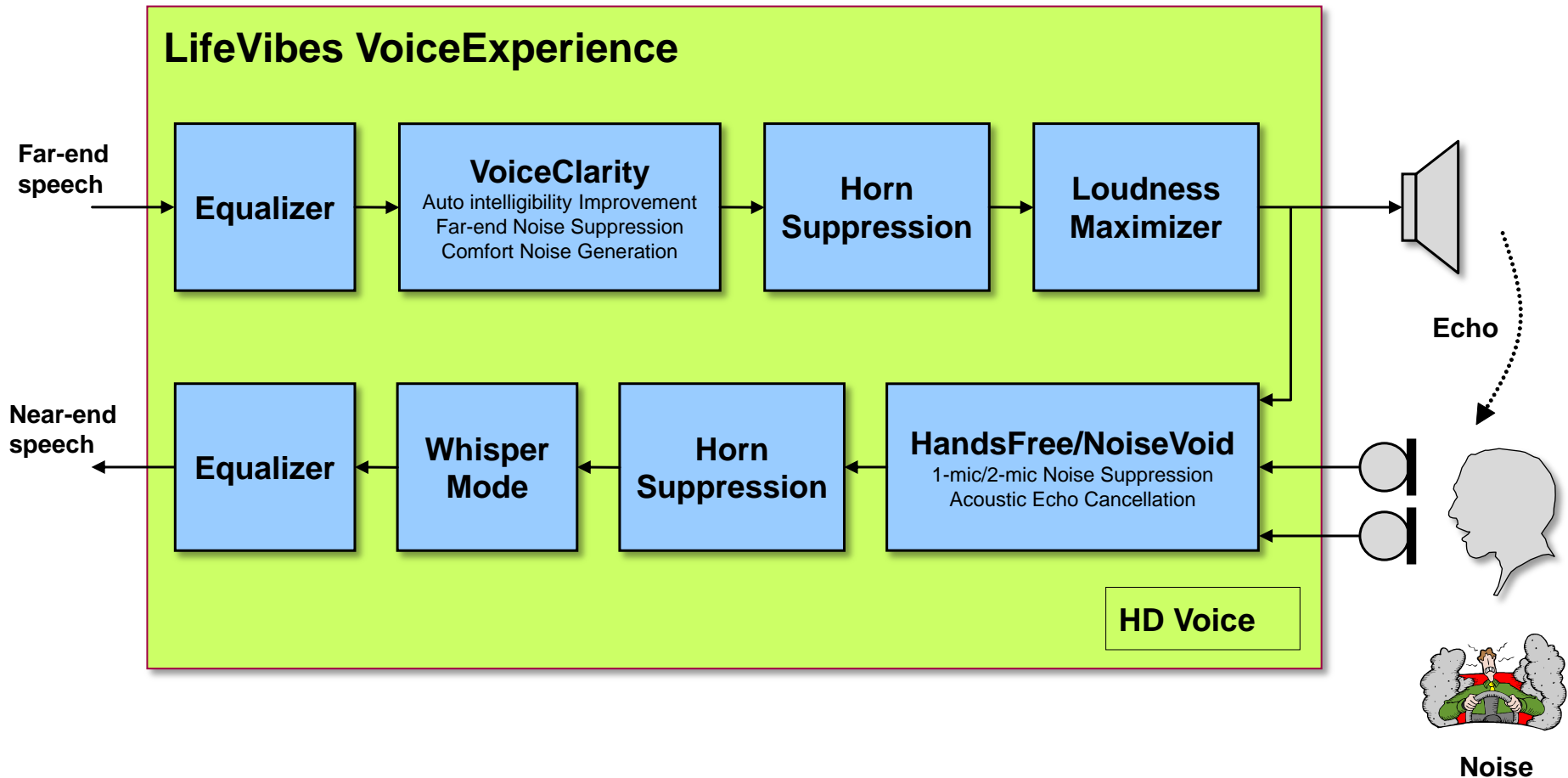


Robust and market-proven speech engine

- LifeVibes VoiceExperience integrated in over 800 Million handsets worldwide, in more than 350 different models



Architecture





Premium experiences everywhere