DMR Vocoder

DSP Innovations

DSP Innovations Inc. (DSPINI) offers its own implementation of the DMR Vocoder (ETSI TS 102 361) 3600 bps.

Accordance and interoperability with the standard. The DMR Vocoder is implemented as software in exact accordance with the following documents:

- *TIA/EIA-102.BABA Vocoder Description (December 2003)*
- *TIA-102.BABA-1 APCO Project 25 Half-Rate Vocoder Addendum (April 2009)*

This software completely satisfies requirements of the standard and provides full compatibility and interoperability with DMR vocoder (AMBE+2) from DVSI, as for transmission of speech, as well as for tone signals.

To enhance speech quality and technical characteristics of the vocoder, IMBE-method of analysis and synthesis, which is described in documents mentioned above, was significantly modified in part of more accurate estimation of the MBE-parameters and more accurate synthesis of speech.

Additional functionalities. The following additional functionalities are developed by DSPINI and integrated into the vocoder:

- Automatic Gain Control (AGC),
- Noise Cancellation for Speech Enhancement (NCSE)
- Voice Activity Detector (VAD),
- Tone Detection/Generation (Single tones and Dual tones). The tones are transmitted through the vocoder

Technical characteristics and resource requirements are presented in the following tables:

Technical characteristics

Bit Rate w/o FEC / with FEC (bps)	Algorithm	Frame size (ms)	Algorithmic delay (ms)	Sampling rate (kHz)	Signal format	Bit stream format (information bits)
2450/3600	AMBE+	20	32	8	Linear 16-bit PCM	49/72

Additional functionalities

Name	Functionality	Technical characteristics	
		Name	**Value**
AGC	Automatic Gain Control	Control range:	0 ... +20 dB
NCSE	Noise Canceller- Speech Enhancer	SNR increasing	> 6 dB
		Speech quality improvement	> 0.1 PESQ
Tone Detector	Single/Dual tones detection	In accordance with international standards	
Tone Generator	Single/Dual tones generation	Special generator, kept continuity of signal (phase and amplitude of signal of previous frame)	
VAD	Voice Activity Detection	Reliable detection speech in background noise	
CNG	Comfort Noise Generation	Type of noise	«white»
		Level	- 60 dB

Resources for Blackfin DSP platform

Module	MIPS peak [average]	Memory (KBytes)				
		Program	Data			
			Constants	Channel	Stack	Heap
Voice Encoder	61 [57]	14.9	5.1	5.6	2.8	9.2
FEC Encoder	0.2	3.1	0.6		0.1	
AGC	0.3	0.2	0.0		0.1	
NCSE	5	2.8	0.1		1.5	
FEC Decoder	5	8.3	9.0	2.6	0.5	
Voice Decoder	55 [24]	12.6	6.2		2.9	
Voice Encoder + Voice Decoder	116 [81]	27.5	11.3	8.2	2.9	
Encoder + Decoder	127 [92]	41.9	21.0			

Guarantee and support. DSPINI guarantees a quality and accordance of all technical characteristics of the product to requirement of current specifications. Testing and other method of quality control are used for guarantee support.

A little history. This software is developed by experts of DSPINI in C-language in arithmetic with float-point, then during a few years it was repeatedly modified to embed new functionalities, enhance speech quality and other technical characteristics of the vocoder, was

rewritten then into arithmetic format with fixed-point and hand-optimized (in several iterations) to get high-performance object code, intended for a work on Blackfin platform.

Any platform. DSPINI can port this vocoder software also into any other DSP, RISC or general-purposes platform in short time: 2-3 months.

Licensing terms. To use the vocoder, customer should:

- obtain *code-license* from DSP Innovations Inc., a developer and IP-holder of this software,

- obtain *technology-license* from Digital Voice Systems Inc., a developer and IP-holder of the MBE technology.

Low price is an advantage of this vocoder. Please contact to check it out.

Related software. This vocoder may be effectively used in a bundle with other DSPINI's products:

- Linear and acoustic echo cancellers,
- Multichannel noise cancellers (including two-microphone adaptive array),
- Wired or radio modems for any types of channels and bitrates,
- Other products.

Please visit DSPINI's websites to get more information about other products:

www.dspini.com

www.twelp.pro

Alternative. Newest TWELP^{TM} vocoder from DSPINI provides much better and more natural speech quality in comparison with AMBE+2 vocoder. Moreover in contrast to any LBR vocoder, including AMBE+2, TWELP vocoder provides good quality of any non-speech signals. For example, police sirens, ambulance and fire sirens, etc. Please visit www.twelp.pro website for details.

Please contact to evaluate and purchase:

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