

## SPIRIT ALCWI Vocoder

ALCWI, a new class of speech codecs developed by SPIRIT, opens up a new level of quality, providing Near-Toll Quality speech at low bit rates in the range of 2000 to 3000 bps and even lower.

Until recently, this level of speech quality couldn't be achieved at bit rates lower than 4000 bps. Now this is possible by virtue of new and efficient speech coding technology developed by SPIRIT.

The new technology is similar to the Waveform Interpolation (WI) model, where the signal is decomposed into two components (SEW and REW), which are then encoded separately. However, the new SPIRIT technology uses unique proprietary signal decomposition and parameter encoding methods, ensuring high speech quality at high compression ratios, while requiring low computing resources.

The speech quality of ALCWI-class codecs, as estimated by independent listeners, is similar to that provided by standard codecs running at bit rates above 4000 bps, while the computational complexity is only slightly increased in comparison with the complexity of other widely used codecs running at similar bit rates.

At the moment, two ALCWI-based codecs are available from SPIRIT:

- SPIRIT ALCWI 2400 bps Speech Codec: basic codec version
- SPIRIT Robust ALCWI (RALCWI) 3600 bps Speech Codec: developed according to the DMR (Digital Mobile Radio) specifications. The integrated FEC (Forward Error Correction) algorithm makes RALCWI highly robust to channel errors. It has three operating modes, with different degrees of tradeoff between speech quality and error robustness.

### Benefits

- Easy portable
- Highly optimized

### Key Features

- Model similar to Waveform Interpolation
- Low bitrates (from 2400 to 3600)

### Applications

- Trunking systems
- Wireless communications
- Digital voice over HF
- Call-logging systems
- Answering machines
- Terminal equipment for DMR based systems (RALCWI)

### Availability

- PC Now
- Hyperstone Now
- TI C55xx Call

## Specifications

CODEC	ALCWI 2400 bps	3600 bps Robust ALCWI
Rate	2400 bps	2050/2400/2750 bps
Frame Size	20 ms	20 ms
Algorithmic Delay	40 ms	40 ms
Sampling Rate	8 KHz	8 KHz
Speech Signal Format	Linear 16-bit	Linear 16-bit PCM
Bit Stream Format	48 bits	41/48/55 bits

ALGORITHM	FEC bit stream format (uncoded data)		
	41x3=123 bits	48x3=144 bits	55x3=165 bits
Superframe Size	60 ms	60 ms	60 ms
FEC Algorithmic Delay	60 ms	60 ms	60 ms
FEC bit stream format (encoded data)	216 bits	216 bits	216 bits

## Resource Requirements

PLATFORM	TI C5xx			
CODEC	ALCWI 2400 bps		3600 bps Robust ALCWI	
	Encoder	Decoder	Speech Encoder + Decoder	FEC Encoder + Decoder
Peak MIPS	22	10	32	5
Program Memory, KWords	16		16	1
Constant Memory, KWords	17		17	1
Dynamic Memory, KWords	1		1	0
Scratch, KWords	1		0	3,5

### CONTACTS

General: 1-408-540-6033  
[www.spiritdsp.com](http://www.spiritdsp.com)

Russia: 7-495-661-21-78  
 France: 33-623-021-563  
 Israel: 972-3-736-9763  
 Italy: 39-02-6680-2557

Germany: 49-641-48-08300  
 USA: 1-888-374-4410  
 Canada: 1-888-374-4410  
 Japan: +81-3-6361-8080

Taiwan: 886-2-2888-1010, 886-2-2696-0055  
 Korea: 82-70-7780-9910, 82-2-33473-5080  
 China: 86-21-63502288-820  
 Singapore: 65-6744- 9789