



ITU G.723.1 Speech Coder

SIGNALS+SOFTWARE



Processor

Texas Instruments TMS320C5000 DSP range.

Background

The algorithm to be implemented is the ITU-T G.723.1 recommendation; dual rate speech coder for internet and multimedia communications. The encoder compresses linear-PCM (Pulse Code Modulated), speech input data at a sample rate of 8kHz, to 5 300 and 6 400 bps with an audio bandwidth of 300-3400Hz. The encoder includes an optional High Pass Filter and the decoder includes an optional Post Filter, which will enhance performance.

The G.723.1 algorithm implements silence compression techniques to reduce the transmitted bit rate during the silent intervals of speech. Systems allowing discontinuous transmission (DTX) are based on Voice Activity Detection (VAD) algorithms and Comfort Noise Generator (CNG) algorithms that allows the insertion of Silence Insertion Descriptor (SID) frames during the silence intervals. This also provides the additional advantage of using lower processing loads and DSP bandwidth resource during silence frames.

Features and Performance

- TI eXpressDSP™ Compliant software available
- 5 channels of G.723.1 on 100MHz device

G.723.1	Memory			Processing Load (MHz)	
	Program (Kbytes)	Tables (Kbytes)	Static Memory (Kbytes)	5.3 kbps	6.3 kbps
Encoder	18.0	18.4	n * 1.4	17.8	19.4
Decoder	8.8	17.6	n * 0.4	1.7	1.8
Encoder + Decoder	23.0	18.4	n * 1.8	19.5	21.2

Table 1 : DSP Requirements for G.723.1

Note: Processing loads quote worst-case scenarios with n representing the number of channels.
Program memory table values are initialisation values. Kbytes equals 1024 bytes.
The above decoder figures are with the Postfilter enabled. Disabling this would save around 1 MHz.

Technical Notes

The G.723.1 specification encodes speech and audio signals using linear predictive analysis-by-synthesis coding. The higher 6 400 bps data rate requires the use of a Multiple Maximum Likelihood Quantisation (MP-MLQ) excitation signal. The lower 5 300 bps data rate uses Conjugate-Structure Algebraic-Code-Excited Linear Prediction (CS-ACELP).

Interface Details

The eXpressDSP™ G.723 software uses the IG723 interface specified by Texas Instruments in the eXpressDSP™ developers' kit.

The software is also available in a non-eXpressDSP version with a basic multi-channel interface. The DSP requirements for this version are similar to those given in Table 1.

Availability

The code is available now, for a one-off payment and/or royalties depending on the commercial application.

Software for the TMS320C5000 is available for a full range of vocoders including G.711, G723.1, G.726, G.728, G.729, G.729A, G.729B/G.729AB, and for other communication algorithms. G.723.1 is also available for the TMS320C6000.

SIGNALS+SOFTWARE

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For further information please contact:

SIGNALS+SOFTWARE Ltd.
The Heights,
Lowlands Road,
Harrow,
HA1 3AW
United Kingdom

Tel: +44 (0) 20 8872 9000
Fax: +44 (0) 20 8872 9001

www.signalsandsoftware.com

sales@signalsandsoftware.com