



ITU G.722 Speech Coder



Processor

Texas Instruments TMS320C6000 DSP range.

Background

The algorithm implemented is the ITU-T recommendation G.722 variable rate audio coder. The encoder compresses linear wideband audio input data, at a sample rate of 16kHz, to data rates of 48 000, 56 000 or 64 000 bps. G.722 is a mandatory coding scheme for wideband audio under the ITU specification H.320 for videoconferencing applications. The G.722 specification uses a sub-band ADPCM (adaptive differential pulse code modulation) algorithm.

Features and Performance

- TI eXpressDSP™ Compliant software available
- 17 channels of G.722 on 200MHz device
- Less than 10Kbytes program memory required
- Passes all ITU-T test vectors

G.722	Program Memory		Data Memory			Interrupt Latency (Cycles)	Typical call Period (ms)	Processing Load (MHz)
	Code (Kbytes)	Tables (Kbytes)	Static Memory		Stack Memory (Kbytes)			
			Heap (Kbytes)	Tables (Kbytes)				
Encoder	6.13	0.052	n * 0.19	0.96	0.13	200	1	n * 6.12
Decoder	6.41	0.052	n * 0.20	0.96	0.14	200	1	n * 5.07
Encoder + Decoder	9.00	0.052	n * 0.39	0.96	0.14	200	1	n * 11.19

Table 1 : DSP Requirements for G.722

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.

Technical Notes

The software is written using only fixed-point instructions and is compatible with both the TMS320C6000 fixed-point family and the TMS320C6700 floating-point family. It is supplied in both big-endian and little-endian variants.

In G.722 the input samples are split in the frequency domain into a low and a high band covering 0-4kHz and 4-8kHz using quadrature mirror filters. The samples for each band are then fed into independent ADPCM encoders. Despite only using 2 bits for the high band, the improvement to the speech quality over G.711 and other narrow-band speech coders is very significant.

Like G.711, G.722 is also often used at rates less than 64 000 bps, namely 56 000 and 48 000 bps, with a slight reduction in speech quality. This allows an 8 000 bps or 16 000 bps auxiliary data channel. However, unlike G.711 is it necessary to inform the decoder of the received bit rate, as it uses different quantisation tables for the different rates.

Interface Details

The eXpressDSP™ G.722 software uses an interface defined by **SIGNALS+SOFTWARE** that is similar to the other vocoder interfaces specified by Texas Instruments in the eXpressDSP™ developer's 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 TMS320C6000 is available for a full range of vocoders including G.711, G.722.1, G.723.1, G.726, G.728, G.729, G.729A, G.729B, G.729AB, and for other communication algorithms.

SIGNALS+SOFTWARE

SIGNALS+SOFTWARE was founded in 1992 as a developer of high quality Digital Signal Processing application software for the communications industry. Supplying to a whole range of customers, including large blue chip corporations, **SIGNALS+SOFTWARE** has quickly established itself as the world leader in DSP software design and production.

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