Experimental G.729 Codec

(NON-COMMERCIAL use only)

Technical Documentation

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Contents

Revision history

October 2013 First release of this document.

References

Numerous articles on “Standardization and Characterization of G.729” are available in the September 1997, Vol. 35, No.9, issue of *IEEE Communications Magazine*.

Experimental G.729 Codec

We have chosen to offer a free G.729 codec implementation that enables the developer community to better appreciate the strengths and capabilities of this technology.

The source code published by the standardization body is copyrighted by many organizations. Consequently, contributions to open forums are made in the form of object code, under specific licenses that place certain restrictions on the object code but do not prevent the implementation from being used in harmony with the typical open-source project licenses.

Please note that this Experimental G.729 Codec is intended for personal or community experimentation usage. It cannot be used for commercial purposes as specified in the license terms to which it was agreed to during the download process from CodecPro's web site. For a commercial version please contact CodecPro at sales@codecpro.com.

G.729 codec

Based on the renowned Code Excited Linear Prediction (CELP) coding model, the G.729 speech compression standard delivers toll-quality speech, similar in quality to 32-kbps ADPCM but at one-quarter the bit rate.

G.729 operates on 10-ms frames, allowing moderate transmission delays, so applications such as teleconferencing or visual telephony, where quality, delay and bandwidth are all important, will benefit substantially from this codec.

G.729 Annex A: a low-complexity version of the G.729 standard.

G.729 Annex B: VAD/CNG/DTX (Voice Activity Detection/Comfort Noise Generation/Discontinuous Transmission) defines the VAD/DTX/CNG features for G.729 and G.729A.

Data input/output format

The input to the encoder and output from the decoder is 16-bit linear PCM speech, sampled at 8 kHz.

Each G.729 frame that is output from the encoder and input to the decoder is 10 bytes long. Each frame contains the bitstream data and represents 10 ms of compressed speech.

Bad Frame Indicator (BFI)

To hide the effects of a corrupted or lost speech frame, the decoder can perform error concealment, using information from previous good frames. The parameter `bfi` is used to indicate the quality of each frame to the decoder and to enable error concealment.

Package Contents

cp_g729.lib	Single channel, 32-bit static library of the G.729 codec for Windows. Built using Microsoft Visual Studio 2012 and the following command line options: /GS /GL /analyze- /W3 /Gy /Zc:wchar_t /Zi /Gm- /O2 /Fd"Release\vc110.pdb" /D "WIN32" /D "NDEBUG" /D "_LIB" /D "_UNICODE" /D "UNICODE" /errorReport:prompt /WX- /Zc:forScope /Gd /Oy- /Oi /MD /Fa"Release\" /EHsc /nologo /Fo"Release\" /Fp"Release\g729_lib.pch"
cp_g729.h	Header file with API prototypes to cp_g729.lib and constant definitions used by cp_g729_decoder.c and cp_g729_encoder.c.
cp_g729_decoder.c	Sample application that demonstrates how to use the cp_g729.lib decoder API.
cp_g729_encoder.c	Sample application that demonstrates how to use the cp_g729.lib encoder API.

G.729 API functions

codecProG729_EncoderInit

Description

Initializes resources needed for the encoder. To “reset” the encoder during normal operation, call this function again.

Syntax

```
#include "cp_g729.h"

void codecProG729_EncoderInit(
      void
);
```

Arguments

none.

Return value

none.

codecProG729_Encode

Description

Encodes one frame of 16-bit linear PCM speech data.

Syntax

```
#include "cp_g729.h"

Word32 codecProG729_Encode(
      Word16 *pSpeech,
      UWord8 *pBitstream

);
```

Arguments

pSpeech	(Input) Buffer containing one frame of speech samples.
pBitstream	(Output) Buffer containing one frame of encoded bitstream data.

Return value

none.

codecProG729_DecoderInit

Description

Initializes resources needed for the decoder. To “reset” the decoder during normal operation, call this function again.

Syntax

```
#include "cp_g729.h"

Word32 codecProG729_DecoderInit(
       void
);
```

Arguments

none.

Return value

none.

codecProG729_Decode

Description

Decodes one frame of encoded bitstream data.

Syntax

```
#include "cp_g729.h"

Word32 codecProG729_Decode(
       UWord8 *pBitstream,
       Word16 *pSynthSpeech,
       Word32 iBadFrame
);
```

Arguments

`pBitstream`	(Input) Buffer containing one frame of encoded bitstream data.
`pSynthSpeech`	(Output) Buffer containing one frame of speech samples.
`iBadFrame`	(Input) Set to 1 to indicate a bad frame to the decoder, 0 otherwise.

Return value

none.

FAQs

Here are some frequently asked questions about the G.729 codec.

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Q. Is G.729 interoperable with G.729 Annex A?

A. G.729 is not bit-stream identical to G.729a. However, a G.729 decoder can be used with a G.729 Annex A encoder, and vice-versa and therefore they are interoperable.

Q. What type of speech input format is required?

A. Raw 16-bit mono PCM sampled at 8000Hz. Do not use .WAV files. They contain a header that will produce distortion at the start of a decoded audio sample because the encoder interprets the header as speech data.

Q. When I compress and decompress a file, why is the output file not the same size as the input file?

A. The G.729 codec operates on speech frames of 80 samples/frame, 16 bits (integers), i.e., 160 bytes/frame. The output file is always a multiple of 160 bytes, the size of one frame.

Q. Can I get libraries to link on platforms other than Pentium or compatible?

A. The object code provided in this package is Microsoft Win32 compatible and the library was build using Visual Studio 2012.

Q. Is the G.729 codec able to handle multiple channels?

A. No, only a single instance of the coder (or decoder) can be used at a time.