



Voice Processing Library

Preliminary Product Brief

Voice Processing Solution Libraries

- Conformance to ITU bit-exact standards
- G.711, G.723.1A, G.726, G.729AB vocoders available
- Supports serial and parallel interfaces to host processor
- G.168 echo cancellation
- DTMF Tone generation and detection
- Call Progress Tones (CPT)
- Voice Activity Detection (VAD)
- Comfort Noise Generation (CNG)

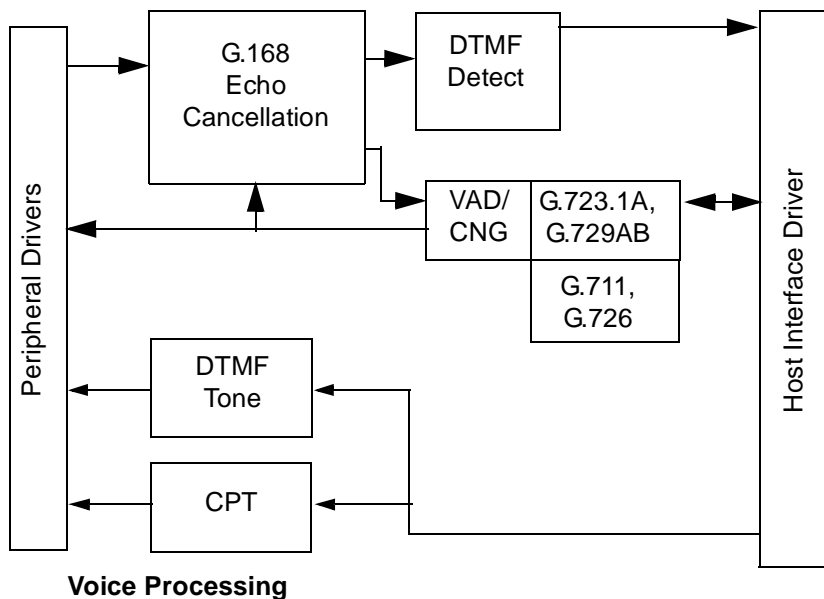


Figure 1. Voice Processing Library Block Diagram

Software Product Descriptions

The voice processing product is comprised of a comprehensive set of library elements that can be integrated to meet a variety of packet telephony needs. The library represents a different mix of vocoder modules combined with other commonly used functions such as DTMF, VAD/CNG, and echo cancellation. These modules are currently available as premium components of the Motorola Software Development Kit (SDK) for DSP56800E.

G.711 Log-PCM encodes voice frequency signals to yield a bit rate of 64Kbits/s at an 8000Hz sampling rate.

G.726 Adaptive Differential Pulse Code Modulation (ADPCM) Speech Codec converts a 64Kbits/s A-Law or Mu-Law Pulse Code Modulation (PCM) channel to and from a 40, 32, 24, 16Kbits/s channel.

G.723.1A Dual Rate Speech Coder provides a coded representation used for compressing speech in either 6.3Kbits/s, producing higher quality reproduction, or in 5.3Kbits/s, providing additional flexibility. Includes Amex A which implements silence compression techniques to reduce the transmitted bit rate during the silent interval of speech.

G.729AB--The G.729 Recommendation describes an algorithm for speech coding at 8kbps. The G.729A is a less-complicated version of the G.729 vocoder, while the G.729B is used to reduce the transmission rate during silent periods of speech.

G.168 Line Echo Canceller is a voice-operated device which reduces the echo by subtracting the echo estimate from the circuit echo.

DTMF Detection and DTMF Generation--The DTMF signal, also known as a Touch Tone signal, is comprised of two frequencies which represent a single digit on the telephone keypad. DTMF signaling is used to set up a call to control such features as call forwarding, conference calling, etc.

Voice Activity Detection (VAD) detects voice activity and activates or deactivates the transmission of packets to optimize bandwidth.

Comfort Noise Generation (CNG) generates background noise during silence frames of phone calls.

Call Progress Tones (CPT) are a set of tones used to indicate the current status of a call.

Implementation Example

Figure 2 is an example implementation using these libraries.

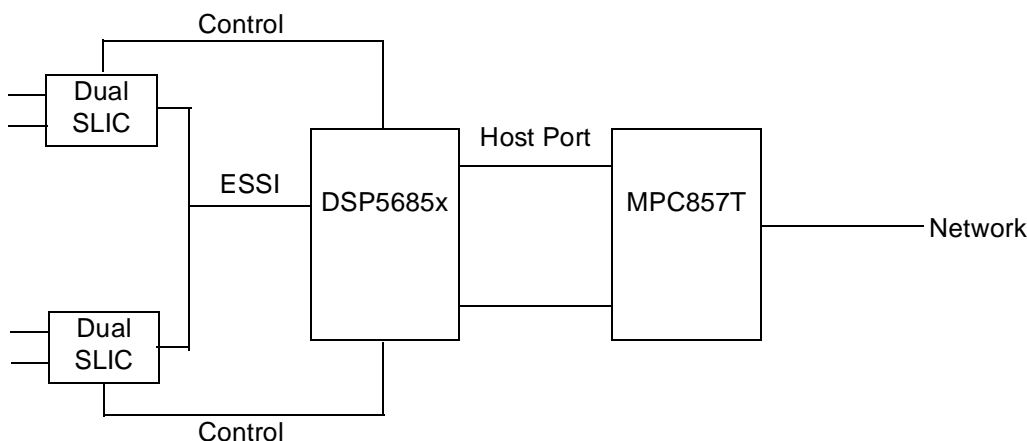


Figure 2. Implementation Example

Performance

Component	Program	Data Memory				MIPS (Typical)
	Code (words)	Total (words)	Table (words)	Stack (words)	Channel (words)	
G.711	164	26	0	26	0	0.50
G.726	1,205	382	220	16	146	15.58
G729AB	8,516	4,911	2,665	1,108	1,138	12.97
G.723.1A	7,749	11,745	9,439	1,366	940	18.50
G.168 (16ms)	2,211	234	0	20	384	6.01
DTMF Detection	1,285	323	48	29	246	0.67
DTMF Generation	447	35	0	10	25	0.69

More-detailed performance information may be found in the SDK documentation under SDK software solutions and Targeting manual.

Embedded SDK (Software Development Kit)

The Voice Processing Library contains components of Motorola's comprehensive Software Development Kit (SDK) for its Digital Signal Processing (DSP) devices. In each library manual, you will find all the information required to use and maintain the library interface and algorithms.

Motorola provides these algorithms to you for use on the Motorola DSPs to expedite your application development and to reduce the time it takes to bring your own products to market.

Motorola's SDK libraries are licensed for your use on Motorola processors. Please refer to the Software License Agreement in the library manual for license terms and conditions.

Channel Density Estimates

Software Combination		Channel Density					
Device		56852	56853	56854	56855	56857	56858
Program RAM		6K	12K	16K	24K	40K	40K
Data RAM		4K	4K	16K	24K	24K	24K
Example 1	G.711/G.726/G.168/DTMF	0	1	4	4	4	4
Example 2	G.711/G.723.1A/G.168/DTMF	0	0	1	3	3	3
Example 3	G.711/G.729AB/G.168/DTMF	0	0	4	4	4	4
Example 4	G.711/G.726/G.723.1A/G.729AB/G.168/DTMF	0	0	0	0	4	4
Example 5	G.711/G.168/DTMF	2	2	8	8	8	8
Assumptions: 1) MIPS and Memory Estimates as shown above 2) Running All Internal Memory 3) G.168 (16ms Echo Span) 4) Peripheral and Device drivers included		Notes: 1) Example (4) is running four different vocoders, one per channel					

Product Documentation

The following documents are required for a complete description and proper design with the Voice Processing Software Solutions. Documentation is available from local Motorola distributors, Motorola semiconductor sales offices, Motorola Literature Distribution Centers, or online at www.motorola.com/semiconductors/.



Topic	Description	Order Number
DSP56800E Reference Manual	Detailed description of the 56800E architecture, 16-bit DSP core processor and the instruction set	DSP56800ERM/D
Voice Processing User's Manual	Describes Voice Processing Libraries in detail	Available on SDK CD Order # RE10118SI
DSP56852 User's Manual	Detailed description of memory, peripherals, and interfaces of the DSP56852	DSP56852UM/D
DSP5685x User's Manual	Detailed description of memory, peripherals, and interfaces of the DSP5685x family of devices	DSP5685XUM/D

Ordering Information

These modules are currently available as premium components of the Motorola SDK for DSP56800E. Please consult a Motorola authorized sales representative for ordering information.

Part Number	Description
ENGRCHG711	G.711 Log-PCM
ENGRCHG726	G.726 Adaptive Differential Pulse Code Modulation (ADPCM) Speech Codec
ENGRCHG723	G.723.1A Dual Rate Speech Coder
ENGRCHG729	G.729AB
ENGRCHGECHO	G.168 Line Echo Canceller
ENGRCHGTEL	DTMF Detection
	DTMF Generation
	Voice Activity Detection (VAD)
	Comfort Noise Generation (CNG)
	Call Progress Tones (CPT)

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