SPEEX

PRODUCT DESCRIPTION

The Speex codec is a flexible speech compression algorithm that can be used in a wide variety of voice applications including Voice over Internet Protocol (VoIP).

The following features are included in the Speex codec. These features can be configured by the host application.

FEATURES

- Perceptual Enhancement
- Packet loss concealment
- Constant, Average, and Variable bitrate operation
- Sampling Rate: Narrowband (8 kHz), wideband (16 kHz), and ultra-wideband (32 kHz) compression in the same bit-stream
- Configurable complexity AND quality enables user to tradeoff between CPU utilization and voice quality
- Wide variety of user-specified bit rates
- Voice Activity Detection (VAD)
- Discontinuous Transmission (DTX)

AVAILABILITY

ADT Speex is available on the following Platforms: Other configurations are available upon request.

Product Number	Platform	Memory Model	Endian	Code Gen Tool Version
ADT_speex_c64xp	TI TMS320C64x+	Mml3	Little	CC6_1_19
ADT_speex_c674x	TI TMS320C674x	Mml3	Little	CC6_1_19
ADT_SPEEX_dll	Win32 dll	N/A	Little	VS2010
ADT_SPEEX_lib	Win32 static lib	N/A	Little	VS2010
ADT_SPEEX_i686	I686	N/A	Little	gcc
ADT_SPEEX_cortex-m3 / m4	Cortex-M3/M4	N/A	Little	2011_09-69_BareMetal
ADT_SPEEX_cortex-a8 / a9 / a15	Cortex-A8/A9/A15	N/A	Little	2011_09-70_linux
ADT_SPEEX_arm9e	ARM9E	N/A	Little	2011_09-70_linux

Endian, byte order: “Little Endian” means that the low-order byte of the number is stored in memory at the lowest address, and the high-order byte at the highest address. "Big Endian" means that the high-order byte of the number is stored in memory at the lowest address, and the low-order byte at the highest address.
Acronyms

Mm – Memory Model: Memory Model is specific to Texas Instruments processors.

N/A – Not applicable

SPECIFICATIONS

TMS320C6000

Speex C674x

MEMORY REQUIREMENTS

All Memory usage is given in units of byte.

Software	Program Memory	Data Mem	Tables	Scratch
Encode	170K	1508	19256	64080
Decode				32080

- PER CHANNEL

All Memory usage is given in units of byte.

Mode	Encoder	Decoder
Narrowband	6461	5773
Wideband	7709	6840
Ultra-Wideband	9117	8067

Speex C674x

CPU UTILIZATION

Narrowband Mode CPU Requirements (MIPS = MHz)

			Current		Target	
Quality	Complexity	Bit Rate	Encode MIPS	Decode MIPS	Encode MIPS	Decode MIPS
10	10	24600	175	8.3	58	3
10	4	24600	69	8.3	23	3
4	10	8000	75	7.5	25	3
4	4	8000	42	7.5	14	3

Wideband Mode CPU Requirements (MIPS = MHz)

			Current		Target	
Quality	Complexity	Bit Rate	Encode MIPS	Decode MIPS	Encode MIPS	Decode MIPS
10	10	42400	363	14	121	4
10	4	42400	156	14	52	4
4	10	12800	129	14	43	4
4	4	12800	71	14	23	4

Ultra-Wideband Mode CPU Requirements (MIPS = MHz)

			Current		Target	
Quality	Complexity	Bit Rate	Encode MIPS	Decode MIPS	Encode MIPS	Decode MIPS
10	10	44000	375	23	125	8
10	4	44000	167	23	55	8
4	10	22375	164	22	55	8
4	4	22375	85	22	28	8

ARM® Devices

Speex Cortex-A8/9/A15

CPU UTILIZATION & MEMORY REQUIREMENTS

All Memory usage is given in units of bytes.

Speex Cortex-A8/9/A15
Memory Requirements

	Program Memory	Data Memory	Scratch
Encode	152k	12k	32096
Decode			16096

Speex Cortex-A8/9/A15 CPU Utilization
Narrowband Mode (8Khz)

Quality	Complexity	Bit Rate	Encode MIPS	Decode MIPS
10	10	24600	116	5
10	4	24600	65	5
4	10	8000	72	4
4	4	8000	41	4

Speex Cortex-A8/9/A15 CPU Utilization
Wideband Mode (16kHz)

Quality	Complexity	Bit Rate	Encode MIPS	Decode MIPS
10	10	42400	298	13
10	4	42400	153	13
4	10	12800	129	11
4	4	12800	72	11

Speex Cortex-A8/9/A15 CPU Utilization
Ultra Wideband (32khz)

Quality	Complexity	Bit Rate	Encode MIPS	Decode MIPS
10	10	44000	311	25
10	4	44000	166	25
4	10	22375	136	24
4	4	22375	86	24

Speex ARM9E/ Cortex-M3/M4

CPU UTILIZATION & MEMORY REQUIREMENTS

All Memory usage is given in units of bytes.

Speex ARM9E/Cortex-M3/M4
Memory Requirements

	Program Memory	Data Memory	Scratch
Encode	152k	12k	32096
Decode			16096

Speex ARM9E/Cortex-M3/M4 CPU Utilization
Narrowband Mode (8Khz)

Quality	Complexity	Bit Rate	Encode MIPS	Decode MIPS
10	10	24600	193.8	6.05
10	4	24600	85.4	5.95
4	10	8000	99.9	53.5
4	4	8000	59.2	5.3

Speex ARM9E/Cortex-M3/M4 CPU Utilization
Wideband Mode (16kHz)

Quality	Complexity	Bit Rate	Encode MIPS	Decode MIPS
10	10	42400	371.1	14.6
10	4	42400	167.9	14.5
4	10	12800	153.2	13.0
4	4	12800	88.0	12.9

Speex ARM9E/Cortex-M3/M4 CPU Utilization
Ultra Wideband (32khz)

Quality	Complexity	Bit Rate	Encode MIPS	Decode MIPS
10	10	44000	387.9	28.1
10	4	44000	184.2	28.2
4	10	22375	193.4	27.0
4	4	22375	106.5	26.9

LINUX

I686

CPU UTILIZATION & MEMORY REQUIREMENTS

All Memory usage is given in units of bytes.

Speex i686 Memory Requirements

	Program Memory	Data Memory	Scratch
Encode	152k	12k	32096
Decode			16096

Speex i686 CPU Utilization
Narrowband Mode (8Khz)

Quality	Complexity	Bit Rate	Encode MIPS	Decode MIPS
10	10	24600	86.7	2.55
10	4	24600	32.3	2.38
4	10	8000	35.02	2.04
4	4	8000	19.72	2.04

Speex i686 CPU Utilization
Wideband Mode (16kHz)

Quality	Complexity	Bit Rate	Encode MIPS	Decode MIPS
10	10	42400	182.9	5.95
10	4	42400	73.44	5.44
4	10	12800	59.5	3.74
4	4	12800	31.9	4.08

Speex i686 CPU Utilization
Ultra Wideband (32khz)

Quality	Complexity	Bit Rate	Encode MIPS	Decode MIPS
10	10	44000	182.9	8.33
10	4	44000	79.7	8.0
4	10	22375	79.9	10.2
4	4	22375	38.2	9.86

WINDOWS

Win 32 (Dll and static lib)

CPU UTILIZATION & MEMORY REQUIREMENTS

All Memory usage is given in units of bytes.

Speex Win32 (Dll & lib) Memory Requirements

	Program Memory	Data Memory	Scratch
Encode	66k	12k	32096
Decode			16096

Speex Win32 (Dll & lib) CPU Utilization

Narrowband Mode (8Khz)

Quality	Complexity	Bit Rate	Encode MIPS	Decode MIPS
10	10	24600	130.36	2.65
10	4	24600	47.54	3.15
4	10	8000	53.17	2.65
4	4	8000	29.82	2.32

Speex Win32 (Dll & lib) CPU Utilization

Wideband Mode (16kHz)

Quality	Complexity	Bit Rate	Encode MIPS	Decode MIPS
10	10	42400	266.35	9.61
10	4	42400	109.49	7.45
4	10	12800	91.10	5.80
4	4	12800	47.04	6.63

Speex Win32 (Dll & lib) CPU Utilization

Ultra Wideband (32khz)

Quality	Complexity	Bit Rate	Encode MIPS	Decode MIPS
10	10	44000	270.66	12.59
10	4	44000	117.44	11.59
4	10	22375	120.59	15.4
4	4	22375	60.13	19.05

FUNCTIONS

API function call summary

```
SPEEX_ADT_initEncoder()

SPEEX_ADT_initDecoder()

SPEEX_ADT_encode()

SPEEX_ADT_decode()

SPEEX_ADT_deleteEncoder()

SPEEX_ADT_deleteDecoder()

SPEEX_ADT_getStatus()
```

Deliverables

The deliverable items are platform dependent. In general, there is one library. (Sometimes multiple variants of the library are included in the deliverables.) There are also header files, some of which are specific to the product and others are common across many of Adaptive Digital's products. Also included in the deliverables is product documentation, which includes a users guide and usually includes release notes and a data sheet. Sample/test code may be included as well.

Adaptive Digital is a member of the Texas Instruments Developer Network, and ARM Connected Community.

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