Ittiam AAC Multichannel Decoder

AAC Multichannel Decoder

MPEG-2/4 AAC-LC (Advanced Audio Coding - Low Complexity version) is a popular audio coding technique recommended by MPEG committee. The codec handles audio signals sampled in the range of 8 kHz to 96 kHz. It operates on a frame of 1024 samples. The bit-rate can vary in the range from 8 to 576 kbps / channel (depending on the sampling rate). Low Complexity version of AAC provides good compromise between the codec complexity and the audio quality.

Features

Features supported:

- MPEG2 and MPEG4 AAC LC (Low complexity).
- Supports all sampling frequencies & bit rates for AAC only bit-streams.
- Multi-channel Decoder Features
  - Channels: Upto 8 channels.
  - LFE (Low Frequency Element) Decoding
  - Decoding of Independent switched CCE (Channel Coupling Element)
  - Supports down-mix of multi-channel stream to stereo.
- Supports decoding the following optional Tools: TNS (Temporal Noise Shaping), PNS (Perceptual Noise Shaping), Intensity Stereo & Mid/Side Stereo
- File formats supported: ADIF, ADTS, GA Header
- Compliance: ISO/IEC 13818 - 4, 14496 – 4 (MPEG AAC and PNS Conformance)
- Supports TI XDMI API
- Robust against erroneous bit-streams
- Optimized for low footprint & processing power
- 16 bit WAV Output format support
- Supports memory allocation based on max number of channels to be decoded
- Skips the unused Independent CCE & DRC elements.

Features not supported:

- More than 8 channels of audio.
- SBR & PS decoding
- Dependently switched CCE
- DRC

Decoder Validation

The MPEG-4 AAC LC Multichannel decoder implementation has been validated using the latest conformance tool given by MPEG-4.

Resource requirements on C64x+ Processor

Decoder mode	MCPS	Pgm	Tables	Static	Scratch
	Peak	ROM (kB)		RAM (kB)	
AAC 5.1.0.1	14.3	44.3	19.5	11.6	14.0

Note: Input/ Output buffers details are given in the next page.

MCPS measurement done on 0 wait-state memory access

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Details of C64x+ Resources required

CPU Loading

Description	Simulator		Hardware Configuration	
	MCPS	MCPS	MCPS	MCPS
	Ave	Peak	Ave	Peak
AAC 2.0	4.3	5.2	8.2	8.7
AAC 5.1.0.1	13.0	14.3	22.9	24.5

Memory Usage (kB)

Description	Program	Tables	Stack	Scratch	Static	Input	Output
Upto 2 ch. decode	44.3	19.5	1.3	8.0	3.8	1.5	4.0
Upto 6 ch. decode				14.0	11.6	6.0	12.0

Note:

- Simulator performance generated on *CCS 3.2.93.5 with C64x+ Cycle Accurate Simulator with 0 wait state memory access*
- Hardware Configuration performance generated on a DM6446 processor with all data and program memory sections placed in the external memory, with cache configuration of 32 kB L1 P Cache, 16 kB L1 D Cache & 64 kB L2 Cache, and cache thrashed after decoding each frame.
- MCPS numbers on the hardware will vary with the I-Cache and D-Cache size and with the memory configuration/placement
- MCPS/MIPS indicate the CPU usage for processing following music streams (AAC 2.0, al05_48.adts, stereo, 48 kHz, 128 kbps, without TNS) and (AAC 5.1.0.1, al15_48.adts, 5.1 + 1 Independent CCE, 48 kHz, 384 kbps, with TNS, without applying DRC)
- Program memory doesn't include the code size of the test bench and standard library functions
- Codec memory usage (Static, Scratch, Input, Output) is based on the max channels init time input parameter.
- Data memory should be aligned to desired byte-boundary to meet the performance/functionality requirement