Osen Loigc OSD10 H.264/AVC Baseline Video Decoder

Rev1.1 2017/05/21

1.General Description

Features

♦ ***The*** Osen Loigc OSD10 ***core is a hardware implementation of the H.264 baseline video compression algorithm.***
It is Simple, fully synchronous design with low operating freqency.

♦ ***Supports up to the highest HDTV video resolution (1920x1080 @ 30 fps progressive) on FPGA.***

♦ ***Simple, fully synchronous design.***

♦ ***Single core HDTV support in FPGA : 720p (1280x720) at 60 fps or 1080p(1920x1080) at 30fps in High end FPGAs (Zynq7020 lowest speed grade).***

♦ ***Fast Deblocking Filter:Only 60 Clocks are needed to deblock a 16x16 block.***

♦ ***No CPU required for decoding.***

♦ ***Very low latency decoding***

♦ ***Any Motion vector is supported.***

♦ ***Support for all of intra4x4 and all intra16x16 modes except IPCM.***

♦ ***Multiple slices supported.***

♦ ***Deblocking filter for better quality.***

♦ ***External memory interface tolerant of high latencies and delays, ideal in a SoC system or in a shared bus with a CPU. The memory interface can be clocked at a different frequency from the core for easier integration.***

♦ ***Supports YUV 4:2:0 video output.***

♦ ***Min Clock speed = about 1.4 x the raw pixel clock speed.***

♦ ***Very low operational frequency : from 15 MHz for VGA @ 30 fps to ~75 MHz for 1920x1080 @ 30 fps.***

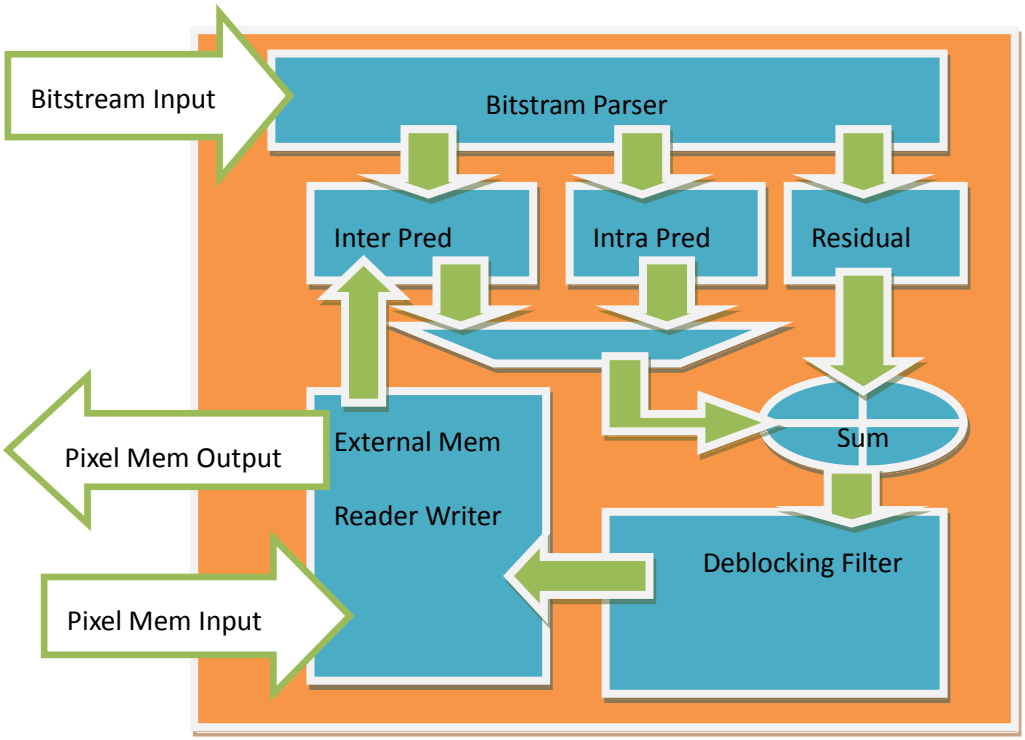
♦ ***Available as synthesizable Verilog Netlist.***

2.Function Overview.

Osenlogic OSD10 receives the h.264 NAL stream from a FIFO from external memory, and it decodes it to YUV 4:2:0, then store to external memory.

OsenLogic OSD10 includes bitstream parser(expglomb and CAVLC), IDCT/Iquant(residual), Intra predictor and inter predictor and deblocking filter.

All are implemented in Verilog HDL. The decoder can work without CPU or with CPU.



3.Interface Signals

Signal Name	Direction	Description
rst_n	Input	Global reset
clk	Input	Main decoder clock
ext_mem_rd_clk	Input	The clock associated with the external memory reader
ext_mem_wr_clk	Input	The clock associated with the external memory writer
ena	Input	Enable the decoder
stream_mem_data_in	Input	The stream data from stream fifo
stream_data_valid	Input	High when stream data is avialible from stream fifo
stream_mem_rd	Output	High when the decoder request data from stream fifo
ext_mem_init_done	Input	High when external memory finished initialization
ext_mem_writer_burst	Output	Indicate the start of write burst
ext_mem_burst_len_minus1	Output	When ext_mem_writer_burst_len_minus1 is High, indicated the length of write burst
ext_mem_writer_ready	Input	High wehn external memory is able

		to accept data from memory
ext_mem_writer_addr	Output	Valid when ext_mem_writer_burst is high,indicate the address writing to external memory
ext_mem_writer_data	Output	The data from the decoder to external memory
ext_mem_writer_valid	Ouput	High wehn the data from the decoder is availible to external mem
ext_mem_reader_burst_ready	Input	High when external memory is ready to accept data from the decoder
ext_mem_reader_burst	Output	Indicate the start of read burst
ext_mem_reader_burst_len_minus1	Output	When ext_mem_reader_burst_len_minus1 is High, indicated the length of read burst
ext_mem_reader_ready	Output	High when decoder is able to accept data form exterl memory
ext_mem_reader_data	Input	Data being read from external memory
ext_mem_reader_valid	Input	High when external memory data is availible
pic_width_in_mbs	Output	Total MBs in width
pic_height_in_map_units	Output	Total MBs in height
total_mbs_one_frame	Output	Total MBs in frame

start_of_frame	Output	High when start of decoding frame
end_of_frame	Output	High when end of a decoding frame
pic_num	Output	Total decode frames
mb_index	Output	Current decoding mb_index

4.Specifications

Model	Osen Logic OSD10 h.264 decoder
Profile	Baseline
Level	3.1
Input Format	H.264 NAL stream
Output Format	YUV4:2:0
Slice type supported	I,SI,P,SP
Entropy Coding	CAVLC
Supported frme sizes	Max: 1920x1088 Min:640x480
Supported bitrate	0 to 10Mps No decode rate control
Max supported resolution at max frame rate	1920x1088 @ 30fps, decoder clock working at 75M
Required external memory size	32Mbyte
External memory reader interface data width	64bit
External memory writer interface data width	32bit