



THE HD FIFO IMAGING EDGE

With high density buffering

HD FIFO: AN INTRODUCTION

Cypress introduces High Density FIFO memories of up to 72 Mbits for buffering high bandwidth signals. Cypress's HD FIFOs outperform competing solutions in video and imaging applications with features like very high densities (for buffering large video frames), enhanced signal integrity, ease of design and high operating frequency.

CYPRESS HD FIFO: UNMATCHED FEATURES

The HD FIFO Advantage	Competing solution	Competitor Drawback
Very high densities: 18M, 36M, 72M	SRAM FIFOs	Density limited to 18M
Reduced pinout: Addressing pins are not required	FPGA + Memory	Block I/O pins and RAM resources
Programmable flags	Other FIFOs	Limited programmability
Limited FPGA resources used - Hence low-end FPGA sufficient	FPGA + Memory	High-end FPGA required
Multi Queue feature: Configurable depth with random access between queues	Other FIFOs	Do not support multi queuing
Reduced latency (no write latency, no min FIFO depth for 1st read)	DRAM FIFOs	Latency issues (write latency: 4, min 1.5kb before 1st read)
Superior signal integrity	DRAM-based solutions	Signal integrity issues
Easy to design	DRAM-based solutions	Difficult and time consuming to design DRAM interface

Here we cover HD FIFO application for the Video, Medical imaging and Networking markets.



THE VIDEO MARKET

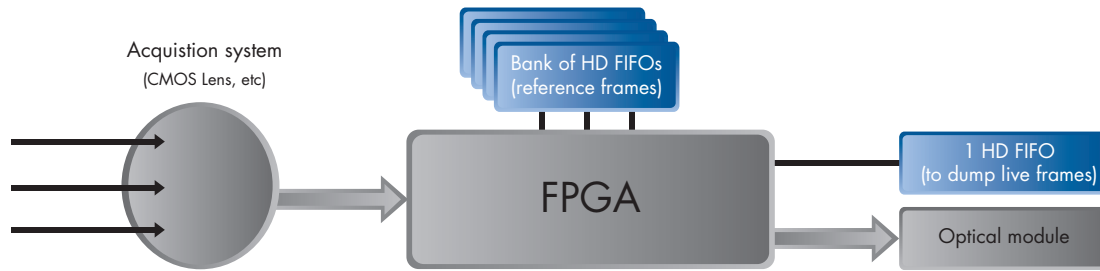
Target Applications: Video servers, broadcast imaging, high resolution/speed cameras.

HIGH SPEED CAMERAS / HD CAMERAS

HD / XD Cameras are high-end video recording and broadcasting devices used during live events, film making, television broadcast, etc. These cameras are capable of capturing over 1000 frames per second to allow for slow-motion playback and replays.

HD FIFO is the preferred solution for video applications because of these unmatched features:

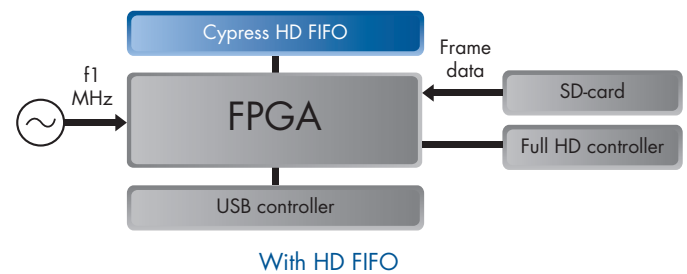
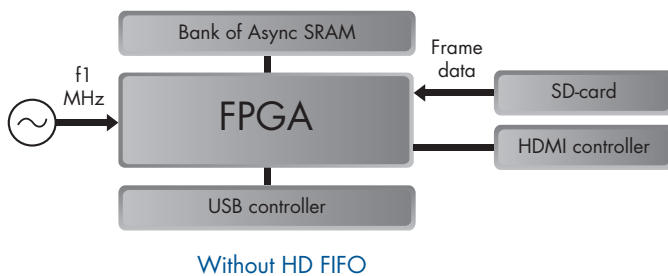
- HD FIFO's high densities provide the buffer needed to store pixel data sent by HD cameras. The acquisition system captures high density images at a fast rate, while the processing unit (performing complex algorithms) operates at a slower rate.
- CMOS cameras also need a white balance for which the reference frame (taken under certain ambient light) is used to eliminate the noise from each frame (captured in the same environment). HDFIFO can be used to store the reference frame for this white balance. The retransmit feature helps to access data repeatedly for each frame.
- HD FIFO is very useful for frame synchronization and frame storage.



VIDEO BUFFERING

Target Applications: Broadcast imaging equipment, video switchers, image processing cards.

- Data handling in video processing is sequential - hence FIFOs are the ideal solution.
- HD FIFOs offer reduced latency and superior signal integrity. Hence, the buffering solution will not affect image quality.
- The multi-queue capability of HD FIFO makes it easier to implement processing features such as interlacing /de-interlacing of video signals, PIP implementation, and interlaced signals.

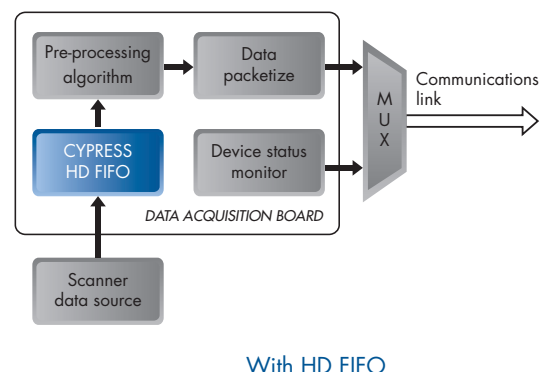
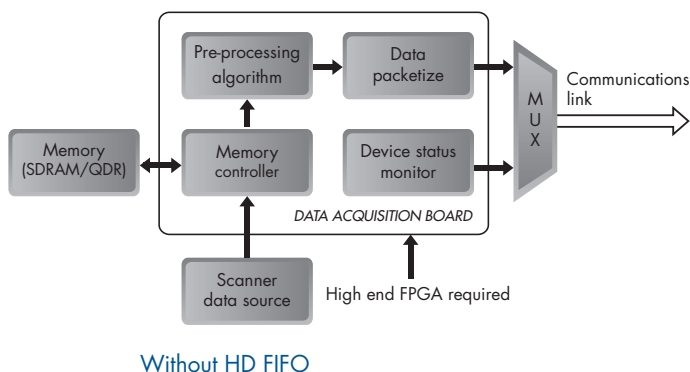


THE MEDICAL IMAGING MARKET

Target Applications: Scanners – PET, CT, MRI, Ultrasound, Photo Acoustic and various other medical scanners.

The requirement: Modern medical scanners used for diagnosis collect a large number of samples during tests. This data is used to reconstruct 2D or 3D images for analysis. The rate of data collection is very high and the data must sometimes be pre-processed. The system may have data pre-processed at a remote location and then sent to a larger system for further processing.

For example, in a PET scanner, the data acquisition system may have initial processing steps such as sensitivity corrections and noise reduction algorithms at the remote node.



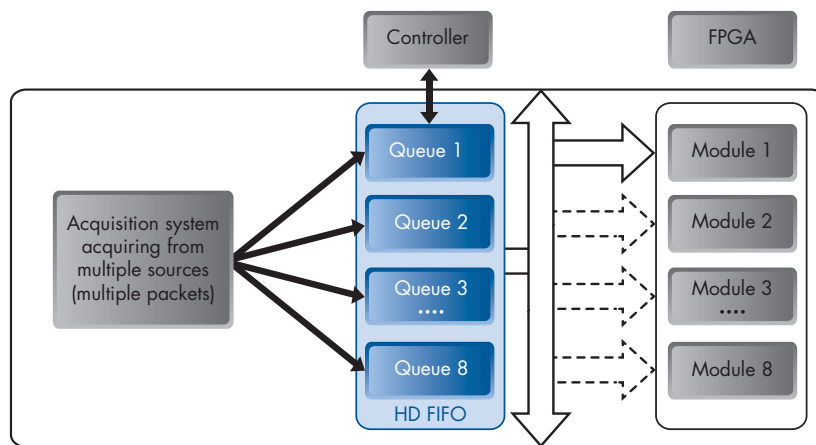
HOW HD FIFO FITS IN:

The requirement in medical scanners	The HD FIFO solution
High density buffering solution	Densities upto 72 Mb Bus width upto X36 Speed upto 133 MHz Hence, throughput upto 4.8 Gbps
Interface between acquisition system and processing unit	Independent clock domains - read and write ports completely independent
Flow control - scanners acquiring from multiple sources	HD FIFO multi queue solution - divided the memory up to 8 queues with random access between queues. Customize the number of queues and order in which data is written into queues
Secure transmission - no packet loss	Retransmit feature of HD FIFO
Do not wish to retransmit entire data. Wish to configure starting point	Mark and retransmit feature of HD FIFO - starting point user configurable
Flags to indicate status of data available for transfer	Status flags available. User programmable and can be configured based on rate of data acquisition

NETWORK / COMMUNICATION MARKET

Target applications: 3Gx/3.5G/4G BTS, DSP filters

In networking applications, high priority packets should not be dropped during transmission. These packets can go into a higher number queue (say queue 1), while lower priority packets can go into lower number queue (say queue 2). The multi queue HD FIFO buffer allows random access between packets (queues), and sequential access within the packets (queues).



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