

ATA-7 Host IP Core

INTRODUCTION

A ATA-7 compliant host controller core to interface to ATA devices like hard-disks, CD and DVD drives. This core is targeted for SOC implementations in ASIC and FPGA.

FEATURES

Features supported are:

- PIO modes 0-4
- Multi-word DMA modes 0-2
- Ultra DMA modes 0-6
- Programmable timings for PIO and DMA modes
- Support for Ultra DMA pause and termination
- Standard slave Wishbone interface to microprocessor/microcontroller

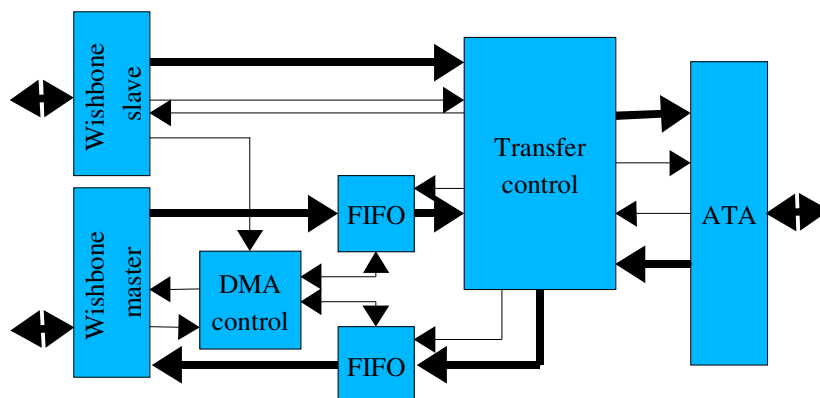
- Interrupt generator for IRQ driven software driver implementation
- Transparent (pass through) access from processor interface to device task registers
- DMA engine and master Wishbone interface for data transfer
- Small register FIFOs for transmit and receive data
- 66MHz clock for UDMA133 (mode 6) operation

Additional functions or customization can be easily done per customers request.

ATA host controller core is written in Verilog.

ARCHITECTURE

ATA host core architecture with its main sub blocks is shown on a figure bellow.



VERIFICATION

ATA host core has been thoroughly exercised. A self checking Verilog test bench with a test suite is supplied with the core. The test suit includes all major modes of core operation : configuration, PIO transfers, multi-word DMA, Ultra DMA with examples of device and host terminating/pausing data-in/ data-out bursts.

A ATA host core reference design is also available, demonstrating core usage in Xilinx MicroBlaze based SOC implemented on Xilinx Virtex V4LX25LC. Demo is a fully functional ATA7 hard drive controller that can be connected to standard hard disks, demonstrating basic file handling.

SIZE AND SPEED

Sample Synthesis results for an 0.18u process. The goal was smallest and fastest implementation.

Bridge	Gate Count	Max Operating Frequency
UMC 0.18	9620 Gates	> 150 MHz
Spartan 3e (xc3s500e-ft256-4)	909 Slices	82 MHz
Virtex 4 (XC4VFX20-ff672-10)	837 Slices	> 110 MHz
Virtex 5 (XC5VLX30T-ff665-1)	492 Slices	> 110 MHz

These synthesis results are provided for *reference only*. Please contact us for estimates for your application.

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