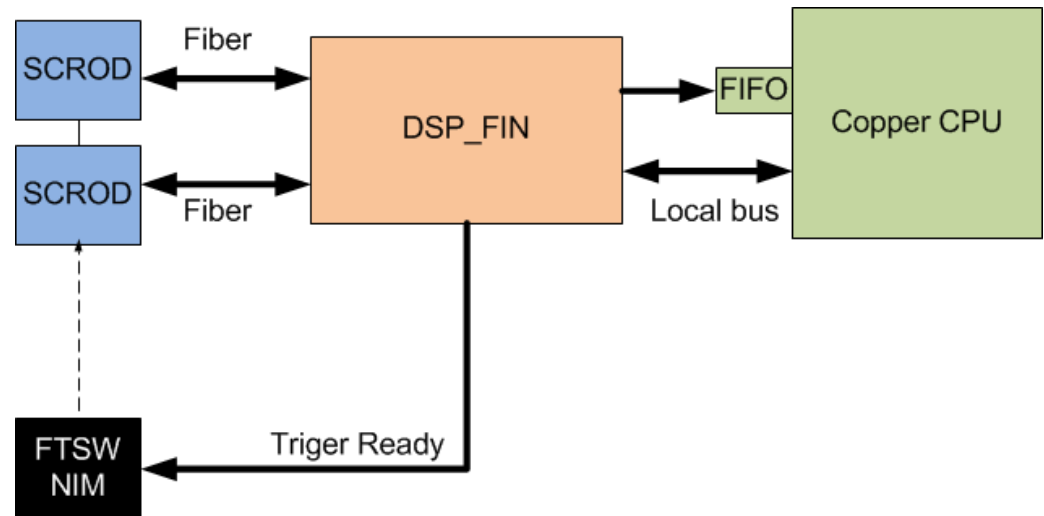


► Current design has:

- Limited throughput between FPGA and DSP
- Outdated components
- Clunky DSP support

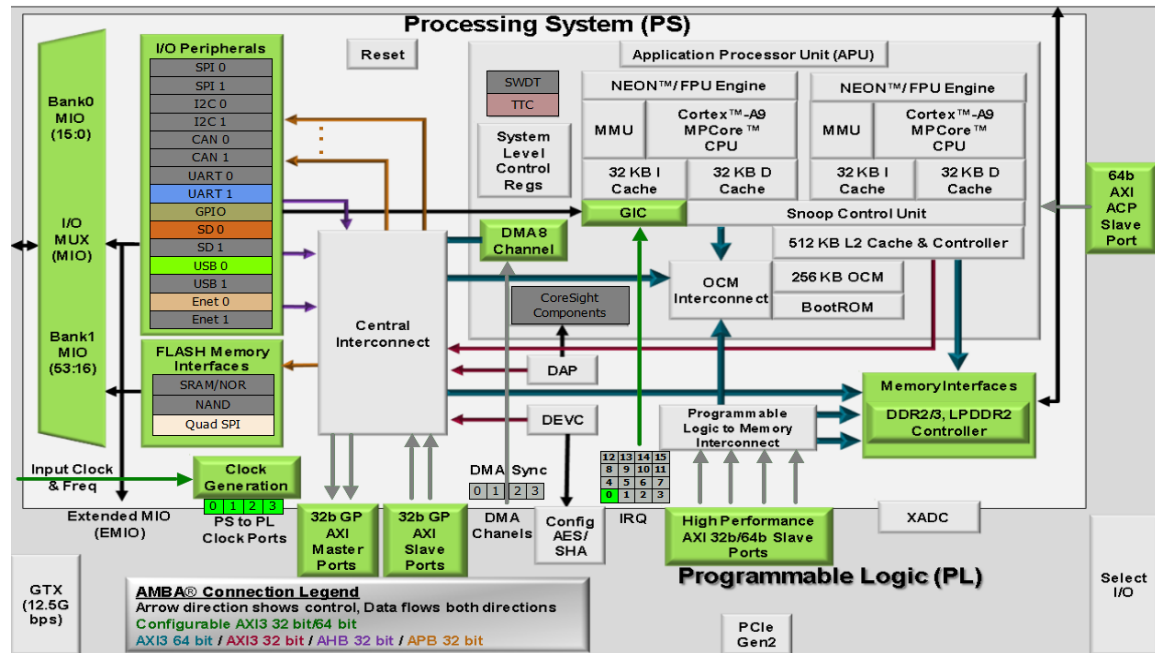
► Goal of redesign:

- Simplify design/layout wherever possible
- Flexible processing capabilities
  - Looked at Zynq, Virtex-5 w/ PowerPC, Virtex-7, CPUs

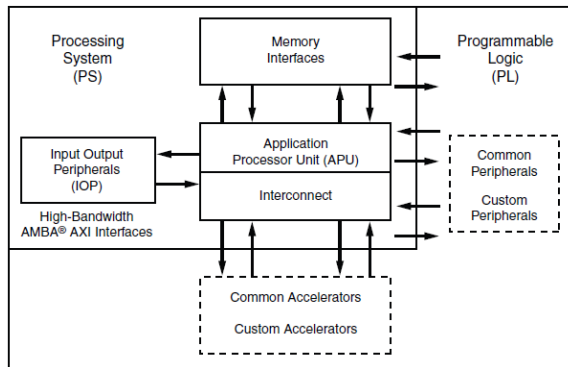


# Proposed Processing Unit

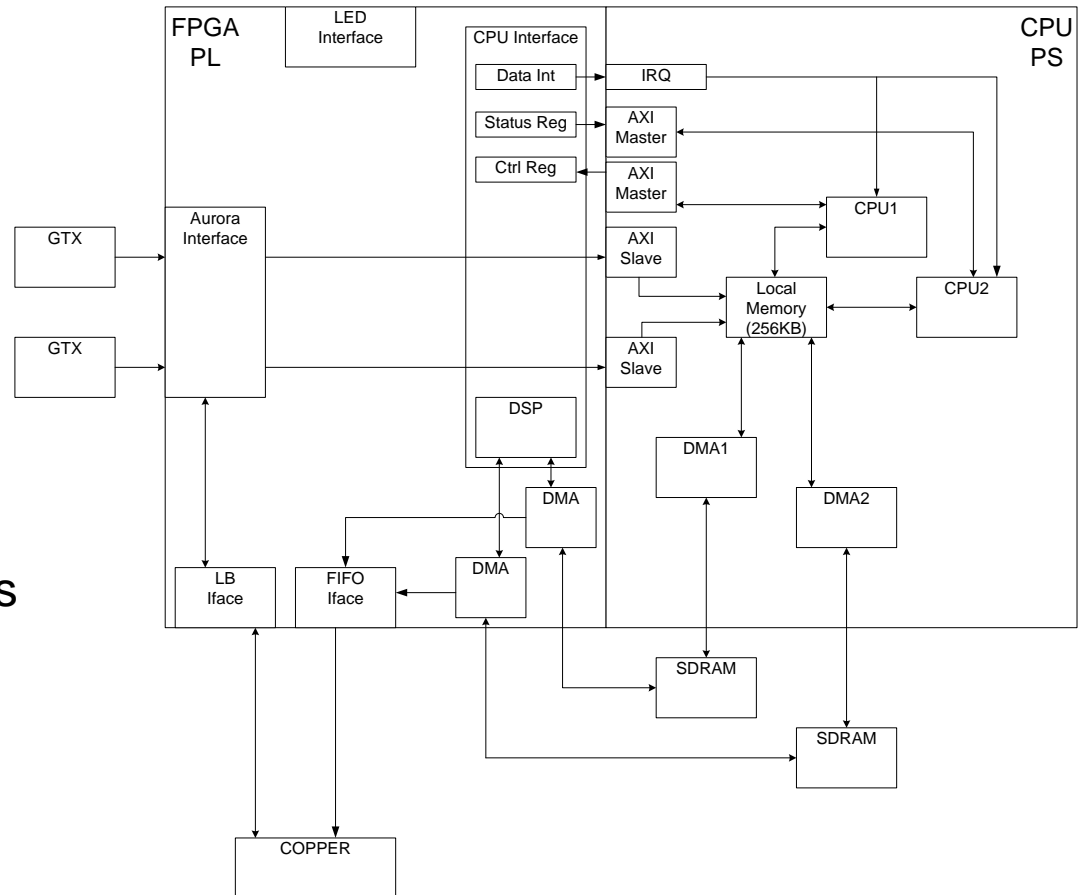
- ▶ Based on Xilinx Zync SoC (XC7Z045 or XC7Z030)
  - Kintex-7 FPGA (125-350K logic cells)
  - 667MHz up to 1GHz dual-core ARM Cortex-A9 (depends on speed grade)
  - 256KB on-chip memory, 8 DMA controllers
- ▶ Interconnect between FPGA and processor
- ▶ Support for bare metal, minimal kernels, Linux
  - XilKernel
  - $\mu$ C/OS
  - eCos



# Data Handling

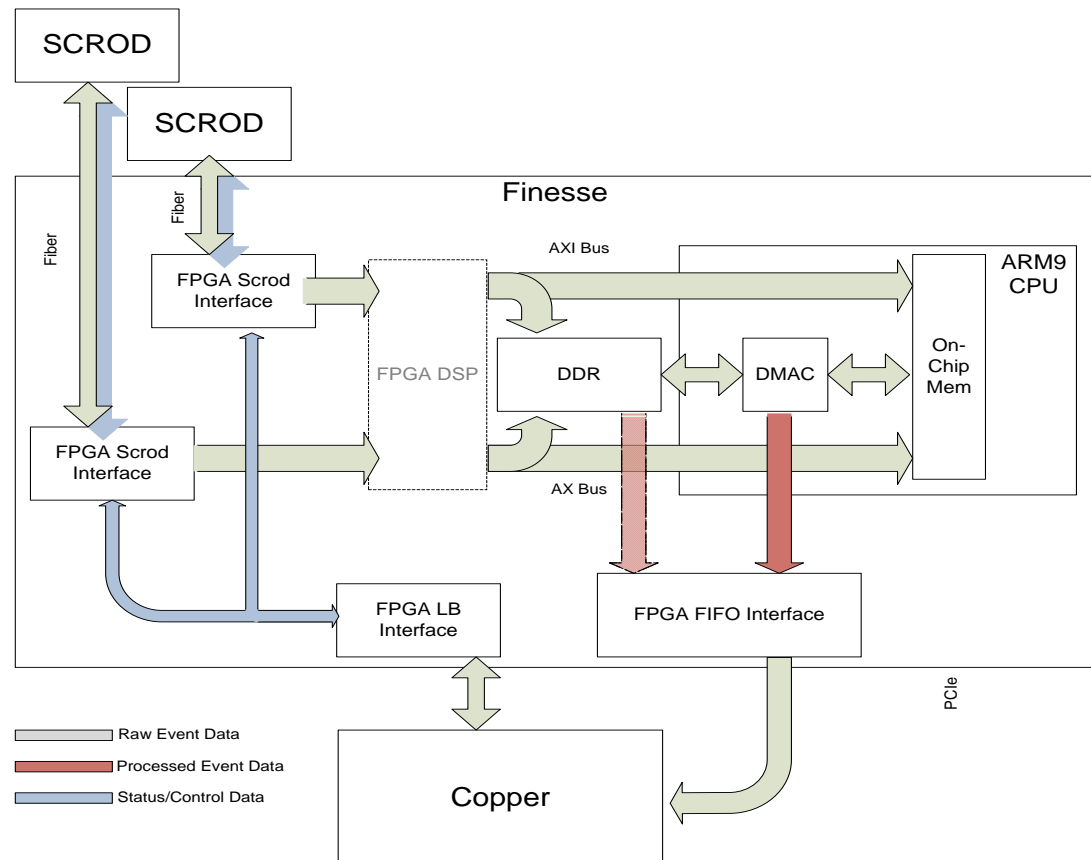


- ▶ AXI interface to FPGA
- ▶ DMA controllers on both sides
- ▶ “heavy lifting” by FPGA,  
“steering” by CPU



# Data Handling

- ▶ Can combine FPGA- and CPU-based processing
- ▶ FPGA receives data and stores to memory via DMA, notifies CPU
- ▶ CPU manages data, passes commands to FPGA for dedicated processing
- ▶ FPGA writes data to COPPER FIFO



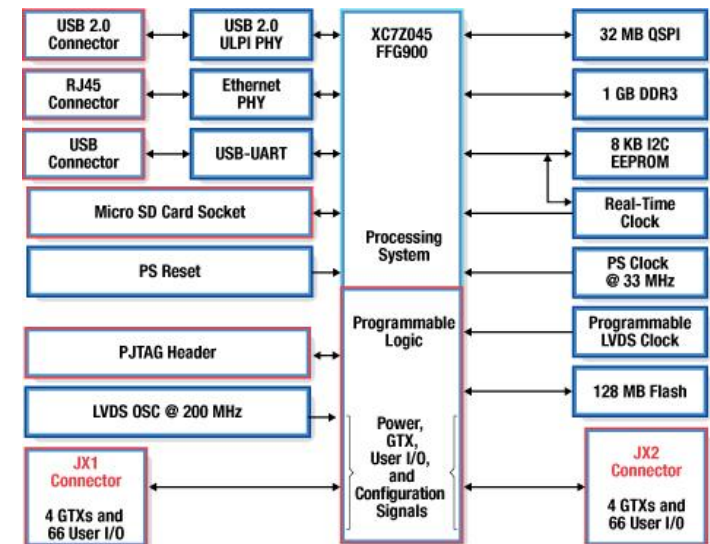
# Potential Design Simplification

- ▶ Use existing Zynq “module”
  - Simplify layout, memory, etc.
  - **BUT** most designed with XC7Z020 = no high-speed serial :v(
    - (talked to Enclustra, looking for large order to trigger design)



- ▶ Only vendor with Zynq > 020 is Avnet: “Zynq-7000 Mini-Module”
  - XC7Z045-1 (667 MHz)
  - 1GB DDR3, 128MB parallel flash, 32MB QSPI flash
  - All GTX ports come off board
  - Debug: microSD, USB/UART, JTAG, CPU JTAG

- ▶ Possible concerns:
  - Size: width, height?
  - Heat dissipation?
  - Power?
  - Cost (spendy, \$1400 = FPGA cost)
    - Nice if we could find a 030-based board (~\$300?)



# Next Steps

- ▶ First draft of design document complete
  - Posted to indico page for this meeting
  - Just a first pass, looking for lots of discussion
  
- ▶ Need better understanding of:
  - Data rates
  - Required processing