The Design and Implementation of a Carrier Card for the Karoo Array Telescope

David George - MSc (Elec Eng)

Supervisor: Prof M R Inggs

**KAT Prototype:**

XDM Digital Back-End Plan A

- Input Signal: 1400-1650Mhz
- Sample and processed with ADC Cards
- ADC Cards plug into the Carrier Card
- This project involves the design and development of the XDM Carrier Card [XCC] design
- Carrier Card Transmits processed data via Ten Gigabit Ethernet

**XCC Requirements**

- Include 2x 10 Gigabit Ethernet link
- Support up to 4GB DDR2 Memory
- Include Reconfigurable Logic to operate memory, communications and perform processing
- Include Controller Capable of running Linux
- Implement System Health Monitoring

**XCC Key Features**

- 2 x Xilinx Virtex-4 FX60 FPGAs
  - Includes support for direct Implementation of 10Ge
- 2 x DDR2 SODIMMs
- FX12/PowerPC -based computer-on-module
- Actel Fusion AFS600 Mixed-signal FPGA
  - include ADC for measuring voltages/current/temperatures

**XCC Key Deliverables**

- XCC Schematics
- XCC Layout [Contracted]
- Gateware for Fusion FPGA
- Gateware for FX60 FPGAs
- XCC related Gateware for Controller FX12
- Integrated and Tested System

**Primary References**

- Handbook of Digital Techniques for High-Speed Design, Tom Granberg
- High-Speed Digital Design: A Handbook of Black Magic, Howard Johnson & Martin Graham
- Numerous Data-sheets