National Weather Radar Testbed

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NWRT System Overview

REALTIME CONTROLLER

STIMS, TIMING

STATUS

RADAR SCHEDULER

OPR INFC

DISPLAY TEST TOOL

WEATHER DISPLAY

OPR INFC

UF HARD DRIVE

UF FILES

EXTERNAL LAN

FILE HARD DRIVE

UF FILES STATUS

EXTERNAL DATA STORAGE DEVICE

I/Q, STIM

EP INTERFACE SOFTWARE

CONTROL / DATA

I/Q, STIM

DIGITAL SIGNAL PROCESSOR

SPECTRAL MOMENTS

SIGNAL PROCESSOR

WDP SW

I/Q DATA RECORDING DEVICE

FIBER

DR SW

REMOVABLE DATA STORAGE DEVICE

I/Q DATA RECORDING DEVICE

DIGITAL RECEIVER

IF SIGNAL

DIGITAL RECEIVER

I/Q, STIM

FIBER

EP INTERFACE

I/Q, STIM

ENVIROMENTAL PROCESSOR

I/Q, STIM

ANALOG RECEIVER

ENVIRONMENTAL PROCESSOR

ENVIRONMENTAL PROCESSOR
Environmental Processor Hardware Architecture

- Radar Scheduler
- System Disk
- RAID
- Test Display System
- Force GT SBC
  - I/Q Data and Stims from Digital Receiver
  - Ethernet
- Systran FibreX
  - FPDP
- Myriad FibreCh
  - FPDP
- SKYbolt II
  - P74010
  - FPDP

- Ethernet
- Processed UF Data
- 8 Slot SKYchannel Crossbar Backplane
- VME Backplane

NATIONAL WEATHER RADAR TESTBED

LOCKHEED MARTIN
Environmental Processor COTS Hardware

- **Uses SKY Computers SKYbolt II Architecture**
  - Merlin Daughtercards - 4 PPC 7410
  - 5 Cards - 20 PPCs Total
  - 1 Gbyte RAM per Merlin

- **SKYrider FPDP Interface To Outside Data**

- **SKYchannel 8 Slot Interconnect**
  - 320 Mbytes/sec

- **Force 54VT SBC For Downloading And NFS**
  - 512 Mbyte RAM
Environmental Processor COTS Hardware

- **Echotek GC-814 Digital Receiver**
  - Echotek Raceway Interconnect
  - Echotek Raceway to PCI Module
  - 80 Mbytes/second radar data transfer to Environmental Processor

- **Systran FibreXtreme VME Card**
  - Receives FibreXtreme From Digital Receiver
  - Capable of 105 Mbytes/second - 80 Mbytes/sec used
  - Converts To FPDP (Copper)
  - Sends To Myriad and SKYrider
  - VME Supplies Power Only
Environmental Processor COTS Hardware

- **Myriad FC-1930 RAID Controller**
  - Receives Data Through FPDP
  - Writes Data To Raid in Real-Time
  - Reads Back RAID Data For Post Processing

- **Ciprico RAID**
  - 648 GByte Storage
  - Removable Disks
Environmental Processor Software

- All software coded in C
- Optimized for PowerPC with SKYvec compiler
- DSP algorithms use VSIPL API for portability
  - Three basic data processing modes
    - Reflectivity Only
    - Pulse Pairs
    - Pulse Doppler
  - Types of processing
    - Matched Filtering
    - Clutter Filtering
    - N-point FFTs
    - Range/Channel Averaging
    - Spectral Moment calculations (reflectivity, velocity, SNR, spectrum width)
Environmental Processor Data Flow

Digital Receiver → Radar Data and Stims → Controller → Averaging and Sorting Data → Spectral Moment Processing

Radar Data Packets and EP Stims -> Digital Signal Processors (16) -> Spectral Moments