DBE V2 Requirements

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Agenda

• Background
• Application Assumptions
• Features
  – Application
  – Initialization
  – Timing
  – General
  – Data Mode Setup
• Conclusion
Background

• Draft Software Requirements Document
  – Preliminary list of features for a Digital Data System (DDS) Command and Control Application
  – Framework for initial command set
  – Aid in preliminary software design
Application Assumptions

• Application is resident on DDS
  – Running a version of embedded Linux
• Manages the DDS hardware
  – FPGA Personality
    • Initializes
    • Configures
  – Two operating modes
    • Poly phase filter bank (PFB)
      – Haystack
    • Baseband converter (BBC)
      – NRAO
• Provides capability to set / query features during operation
• Queries on general state of DDS
System Configuration
Application Features

- Commands processed by a single application
- Command line interface to application
  - Local connectivity
  - Remote connectivity
- Communication via TCP port
  - Standard Ethernet interface or local host
- Support multiple connections
- FIFO processing of received commands
- Command syntax defined by VSI-S standard
- Application starts at bootup
  - stop, restart capabilities
Initialization Features

• Specify how the application handles the FPGA bit code, specifically
  – Loading
  – Querying
  – Changing

• The bit code is under development
  – Therefore, the features will change
Initialization Features (cont)

- Bit codes personalities
  - BBC
  - PFB
    - Geodetic
    - Astronomy
    - Pulsar
- Channel width \{8, 16, 32\} Mhz
- Bits / sample \{1,2,4,8\}
- Quad Data Rate (QDR) SRAM Statistics
  - Mark5C only
  - Buffer states (Number of buffers, overflows)
Timing Features

• Only time critical commands processed
• Must be updated before next 1pps tick
• Communication to application will support only one time format
  – Mark5C and Mark5B headers contain different timing formats
  – Application will convert to the proper format
    • Data- mode configuration
Timing Features (cont)

• Support access to configure / monitor
  – Sampling clock frequency
  – Synchronized time (integer seconds)
    • Arming
    • Synchronizing
  – Start / Stop times, or duration, for valid data
General Features

• Features common to both BBC and PFB
  – Digital channel gain
    • Automatic
    • Manual
  – Statistics
    • ADC samples
    • Channel sample

• VDBE Features
Data Communication Features

• Configuration of 10G Ethernet core
  – MAC Address
  – Packet length in bytes \(64 \leq X \leq 9000\)
  – Destination MAC address
  – Relationship between
    • Channel ID
    • Destination MAC Addresses
  – Statistics

• Mark5C / Mark5B Data Frame Format configuration
  – According to the Mark5C Data Frame Memo 058
Conclusion

• DDS software requirements document goal
  – Specify features that the application must support
  – Framework for initial command set
  – Aid in preliminary software design