RDBE / Mark5C

Jon Romney (NRAO)

Chet Ruszczyk (MIT Haystack)

EVN TOG June 21 Helsenki

Introduction

- RDBE / Mark5C: NRAO / Haystack Joint Project
- RDBE Summary (jon)
- Architecture & PFB bit code (chet)
- Engineering Trials (jon / chet)
- DDC Development (jon)
- Other VLBA Upgrade Topics (jon)
- Mark 5 Update (chet)

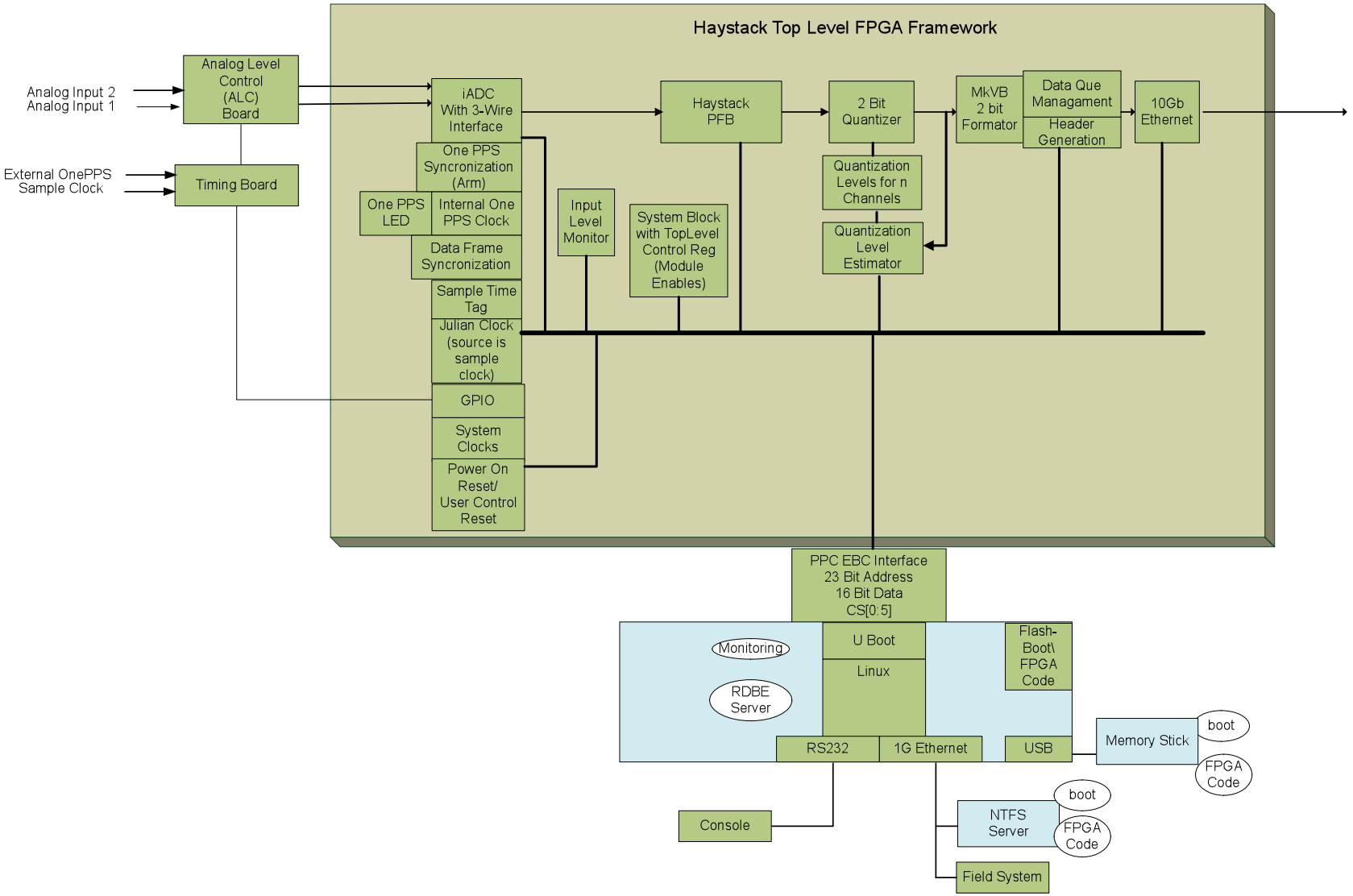
RDBE Summary (jon)

- Roach Digital Backend
  - Complete system.
    - Includes ROACH, Synthesizer and Analog Level Control (ALC) boards.
  - 3U chassis.
  - Developed by NRAO / Haystack collaboration.
- Based on the ROACH Board
  - **"R**econfigurable **O**pen **A**rchitecture **C**omputing **H**ardware".
  - Standalone FPGA processing board.
  - Developed by NRAO / KAT / CASPER groups.
- Commercially Available through Digicom
  - About US $15k.

Architecture – PFB bit code (chet)

- Specs
  - Polyphase filterbank.
  - 32 x 32-MHz channels.
- Status
  - Works!
  - Common development environment at Haystack & NRAO.
  - Channelization (dual-polar alternate-channels).
- Still to be done:
  - Close level-control loop.
  - Implement switched-power (T_s measurement).
  - Phase-cal extraction.

RDBE Bit Code Architecture



Engineering Trials (jon / chet)

- Zero-baseline bench tests:
  - done (RDBE vs. DBE-1)
- End-to-end Engineering test:
  - done (Wf/Mv3 Baseline – see fringe plot next page)
- VLBI demonstration: Westford – Los Alamos
  - Scheduled July 8th
  - RDBE/Mark5C's
  - Correlation
    - Difx (NRAO)
    - MarkIV (Haystack)

Engineering Trial

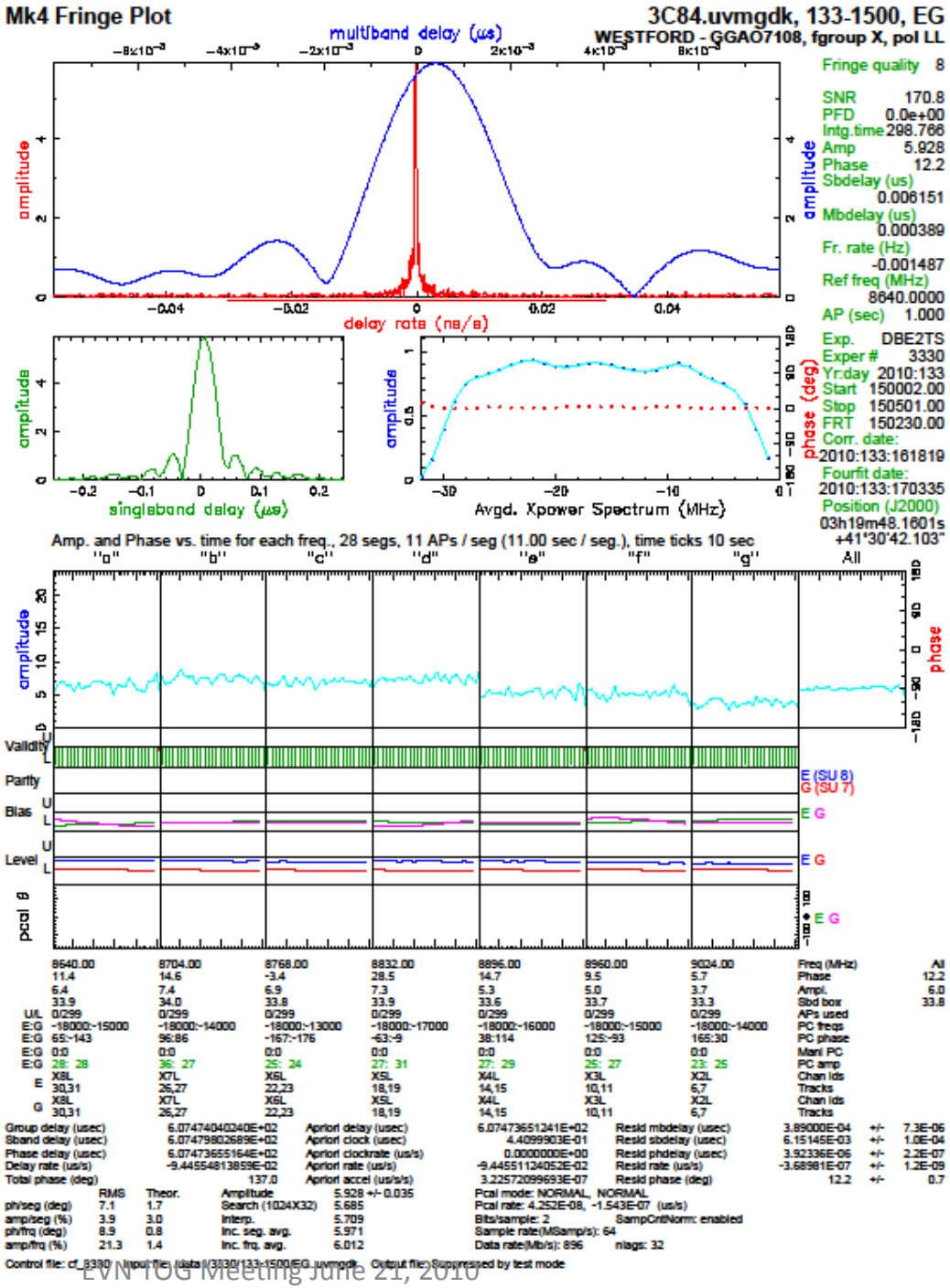
Westford:

RDBE/Mark5C

GGAO:

ibob/Mark5B+

Mark5B Emulation Mode
MarkIV correlator



DDC Development (jon)

- Specs
  - Digital downconverter.
  - 2 IF inputs, each 512 MHz wide.
  - 2 x 4 sub-bands from initial PFB, each 128 MHz.
  - 16 digital filters, any sub-band available to any filter.
    - Filter bandwidths 62.5 kHz – 128 MHz.
- Status
  - Under development.
  - Replacing all elements of PFB personality except:
    - Sampler input interface.
    - VSI (Mark 5B) formatter.
    - 10 Gigabit Ethernet output interface.
    - PPC infrastructure.
  - Initial versions of most new blocks complete.

Other VLBA Upgrade Topics (jon)

- New VLBA Station Control Software
  - Will be installed with RDBE and Mark 5C.
  - Will initially control only those new elements.
  - Status: “Current”
    - Program infrastructure complete and operational.
    - All currently specified tasks/commands/responses implemented.
    - Incorporation of new elements expected to be easy.
- DiFX Software Correlator
  - In operational use since end of 2009.
- Recording Media & Correlation Processors
  - Funding granted by NSF for upgrades to support full-time observing at 2 Gbps.

Mark5C (chet)

- DRS-0.9 Status
  - Packaged
    - Debian (Haystack)
      - Available June 23
    - Red Hat (NRAO)
  - 2Gbps / Bank Mode / Mark5B emulation Mode
  - New Directory Structure
    - (memo series)

Mark5C (chet)

- DRS_utils
  - Clients
    - Graphical
    - Command line
  - Streamstor utilities
    - SSErase, SSReset,
  - 5B packet checking utility
    - PacketChecker

Mark5C (chet)

- FuseMk5 Modifications
  - New directory structure support
  - Coordinate with Jan Wagner
- Mark5C misc.
  - Debian Lenny (2.6.26-2-686 kernel)
    - Base install being created (iso image)
  - SDK 9.0
    - 32 bit kernel support
    - Large disk support
    - Debian package under test

Mark5C (chet)

- DRS-1.0
  - Additional features to be added:
    - Vdif support
      - User Directory Changes
    - 64 bit kernel support (SDK9.1)
      - Expect from Conduant mid August
    - 4Gbps / Non-Bank Mode
  - Target release date -> September

Mark5 (chet)

- SDK-8 to SDK-9 issues
  - SDK9 is not backward compatible
    - Cannot be read with SDK8 machines
  - Can read SDK6/7/8 recordings
  - Requires flashing for 5B+ systems
    - To support larger disks
- MarkIV Correlator
  - Version under test on Mark5B+
  - Have not tested with Mark5A units

Mark5 (chet)

- End Stations
  - Under consideration to support SDK9
    - Mark5A's
    - Mark5B's
  - Requires modification to Mark5A/B code
    - Variable declaration
    - Some XLR function calls modification
    - Debuggery (print outs)

Mark5

- SDK9 discussion point
  - Interest for upgrading to SDK9?
  - Support for larger disks?
  - New hardware?

Questions / Comments?