

Haystack Status

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Ventspils, Latvia

Projects

- Haystack 37 Meter Status
- Operations
- Mark6 Status
- RDBE-G
- R2DBE-G

Haystack 37 Meter

- 37 Meter continues to regain function after a full body transplant
 - High aperture efficiency @ 3mm
- Participated in GMVA session in October
 - Technical problems
 - Poor weather
 - No useful data
- Expect to try with the GMVA again in the fall of 2017.
- Fringe tests are planned before participation
- Goal is to become regular participant in astronomy sessions

VGOS Operational Evaluation

- Advancing complete end-to-end operational integration / verification of VGOS antennas
- Station participation with PCFS control of systems
 - Wettzell, Yebes, Westford, GGAO, Kokee, Isioka
- Correlation at Haystack
 - Working to transition knowledge to Bonn, USNO
- Successful fringes with all stations
 - 8Gbps / 30 sec scans ~36TB / session
- Continue to work with stations on identifying anomalies and smooth out procedures

Geodetic Operations

- Started Spring 2016
- Goals are
 - Interoperability
 - Ease of operations
 - Repeatability sessions to session
 - Minimize users errors
- Presently bi-weekly -> weekly -> daily (CONT17)
- Controlled with PCFS
- Stations are working at standardizing operating procedures

EHT Operations

- Uses it's own methodology
- Last campaign started to standardized procedures
 - Due to inconsistencies in previous sessions
- Starting to unify approach

EHT April Session

- Observed with dual-pol 4-GHz bands, split into 2 GHz sections at 6 sites/8 stations
 - 5 nights of observation over 8 days
- Correlation
 - Load split between Haystack and Bonn
 - Efficiency in parallel processing
 - DiFX 2.5 (which was just tagged, but not yet released)
 - Initial fringe-finding has started
 - Fringes on calibrators have been confirmed between most stations
 - Completion of ALMA QA2 is required
 - likely mid-summer
 - SPT data doesn't appear until late fall

Mark6 Status

- In successful operations since 2015 for Astronomy / Geodesy
 - Using Mark6 software
 - Used regularly for both VGOS / EHT / Correlator
- New team member – John Barrett
 - PhD MIT Physics
 - Working with R. Cappallo and taking over software responsibilities
 - d-plane is now one of John's responsibilities
 - Along with other software (fourfit, etc.)

Mark6 Status

- High altitude issues
 - Overheating causing system shutdown
 - Memo and recommendations on cooling kits presented
 - Deployed before last EHT / APP observations
 - No issues reported
 - Evaluating 3 failed systems from CFA
 - 1 Mark6 failure verified (motherboard)
 - Two others good, at sea level, with initial stress testing
 - Initially looks like configuration problems
 - Will place in hyperbaric chamber to determine if systems are starting to failure

Mark6 Status

- **New Operating System under test**
 - Debian Jessie 64 bit
- **New Host Bus Adapter card (12Gbps)**
 - Due to end-of-life
 - Under evaluation
- **New features / usability being discussed with EHT members.**
- **RAID5 support for correlators**
- **Expect release July 2017**
 - OS
 - Mark6 software suite / New command set
 - Support software

RDBE-G Features

- VSI-S command set published
 - Interfaced to PCFS
- Multi-cast monitoring data broadcast 1 per second
 - Two types of data
 - Immediately after 1pps pulse
 - Other data calculated the previous second
 - e.g Tsys
 - Data transmitted after packet created
 - Time tagged with DOT time
- `dbe_1pps_mon = <enable> : <multicast IP address> : <port>;`
 - Each RDBE having unique multicast IP and Port

RDBE-G 1pps monitoring

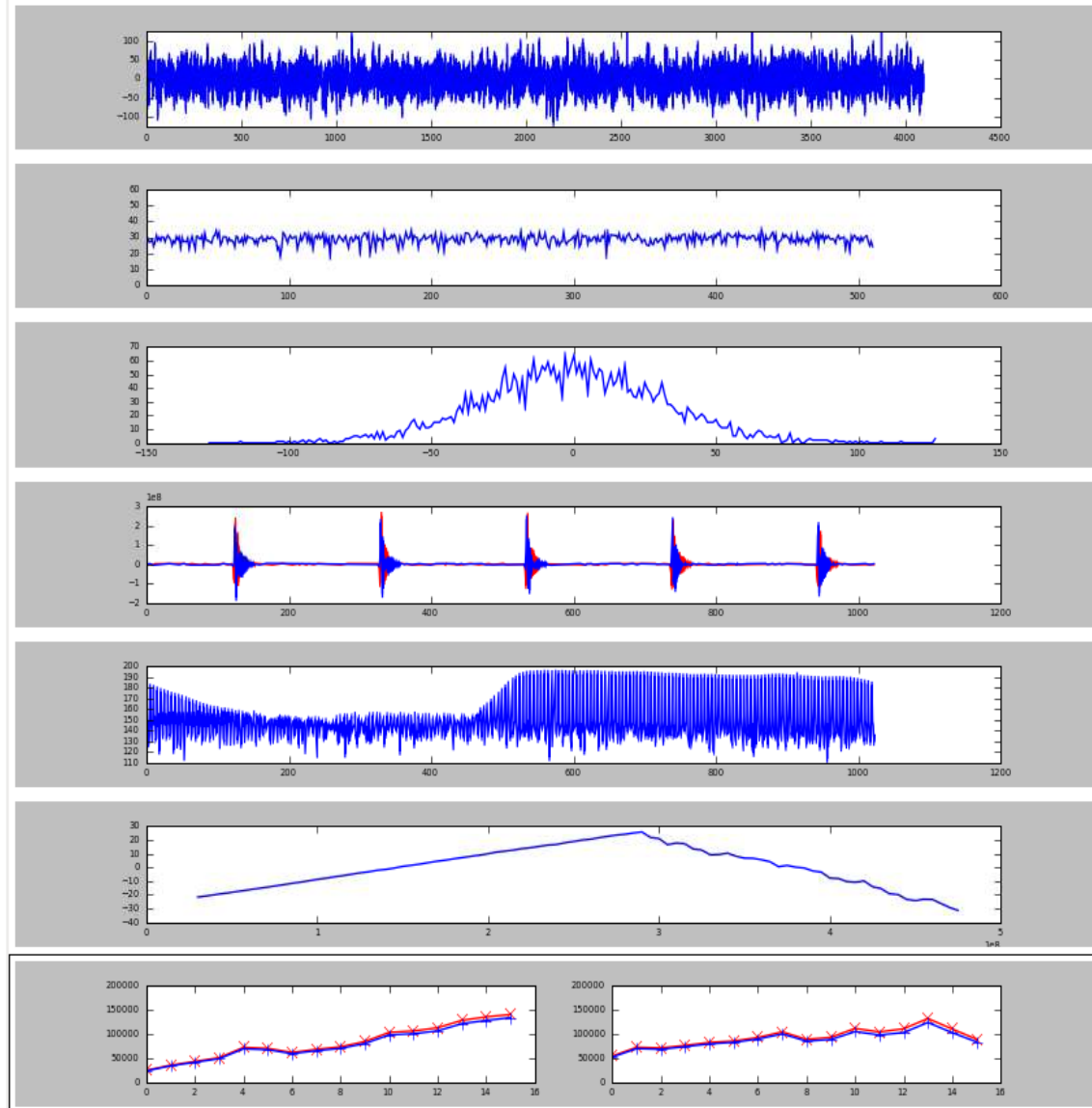
- What receives multicast
 - PCFS – logs the data
 - Independent `rdbe_mon.py` tool on a system attached to same network to receive multicast data
 - Next slide
- Tsys monitoring
 - System temperature measurement
 - On power / off power of the receive chain
 - tsys data is summed every second
- Raw capture mode
 - Provides ability to see the incoming signal from the iADC before it is processed by the FPGA personality
 - 32000 samples are captured

raw interface 1 mu -0.56 sigma 32.50

pcal interface 0 delay -5.183302e-08

Plotting

1.4e6



•Input signal

•FFT of input signal

•Histogram

•Pulse cal extraction

•FFT of pulse cal

•phase of pulse cal tones

•Power of IFX channels

•(on / off)

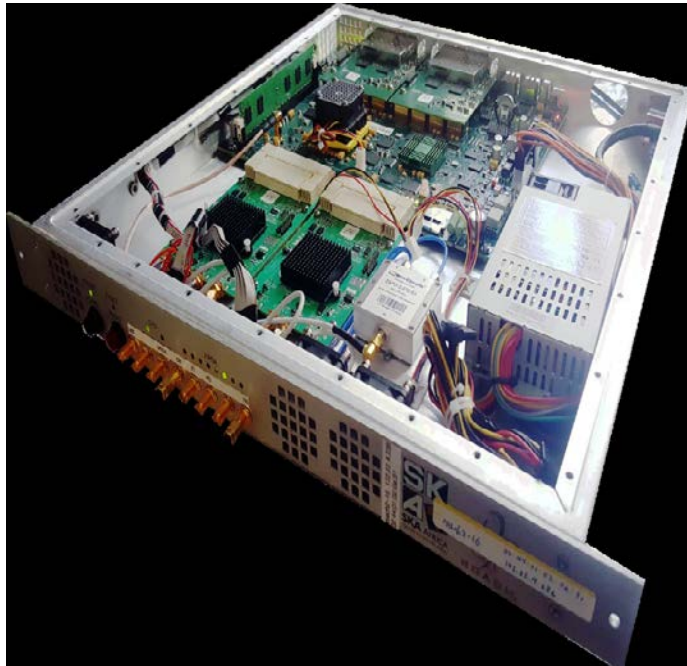
RDBE Next Generation Development

- R2DBE-G (Fully VGOS compliant) :
 - ROACH 2 board
 - Vertex 6
 - 4 SFP+ Connectors
 - Fiber or Copper
 - Leveraged ADC FPGA code from Event Horizon Telescope
 - Code ported (ADC block) extended for Geodetic filter bank features
 - Existing server code must be ported to new platform
 - 2 ASIAA ADC's
 - 2G Samples
 - New GPIO interface board Interfaces
 - Display
 - Noise Diode source (10-100Hz)
 - Attenuator control (0-31.5dB in 0.5 granularity)

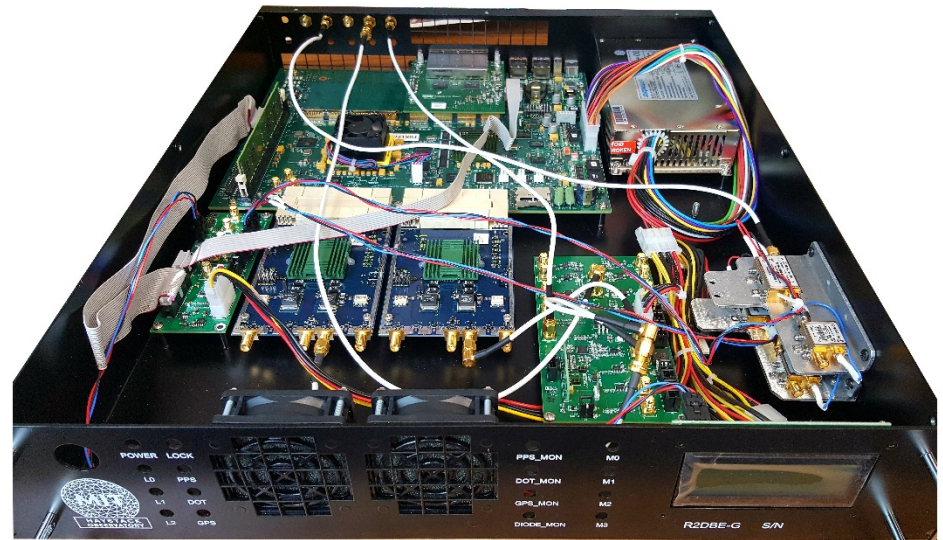
R2DBE-G

- Polyphase filter bank FPGA Code
 - Simulations completed December 2016
 - Under zero baseline test
 - Bench test
 - Move to Westford for live test
 - 16 out of 32 channel selection for each IF
 - Complex data
 - 4Gbps
 - Mode for all 32 channels (8Gbps)
 - Identical features (pcal, tsys, multicast) to version 3.0 deployed

R2DBE-G Prototype



EHT Roach2 (1U)



R2DBE-G Eng. Unit (2U)

R2DBE-G

- After testing / verification of layout (cabling)
 - Usability / repair-ability
 - Lesson learned from KPGO buildout
 - Have Technicians go thru routing of cables before return
- Return unit to Digi-com
 - Will be able to order from Digi-com
 - Haystack will order 4 units
 - Start integration into VGOS backend (GGAO or Wf)
 - Testing as tag along for VGOS trials
- Expected by Sept. 2017

Questions?

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