



VLBA in the GMVA

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Mark6



Note: slots 1,2,3,4 in a line; custom cable tray/slots

Mark6



Mark6 implementation notes

- Will retain Mark5C at all VLBA sites for 1 year after complete Mark6 deployment
 - Mostly for compatibility with JIVE / other correlators
 - After that year, convert Mark5C units to expansion units
- Record data using Jive5AB software
- Correlate using “native mode” within DiFX
- Wide-band modes available:
 - 2 Gbps using PFB (16 channels, each 32 MHz)
 - 2 Gbps using DDC (8 channels, each 64 MHz)
 - 2 Gbps using DDC (4 channels, each 128 MHz)
 - 4 Gbps using DDC (8 channels, each 128 MHz)

Mark6 at 4 Gbps

- VLBA will be highly constrained in 4 Gbps modes
- For most bands, this corresponds to 2x 512 MHz
 - Entire IF bandwidth
 - Each must be split into 4x 128 MHz
- At 86 GHz, could tune as follows
 - 85512-86024 MHz
 - 85712-86224 MHz
 - 86012-86524 MHz (Most likely scenario)
 - 86312-86824 MHz
 - (and others...)
- New synthesizer would allow fine selection of LOs
 - Hopefully to be deployed in late FY2019

Mark6 schedule

- FY2017: Performed most of the development work
 - Integration with antenna control system
 - Demonstration of fringes
- FY2018: Began mass deployment
 - Integrated into correlator GUI
 - Completed missing capabilities
 - Purchased all equipment needed (VLBA sites, correlator)
 - Purchased media for approx. 33% duty cycle at 4 Gbps
- FY2019
 - Switch one station to full time use
 - Deploy equipment at all VLBA sites (by March)
 - Work with GBT to get Mark6 deployed
 - Execute first user experiments (by June)
 - Acquire additional media
 - Perform test with GMVA (perhaps in Jan or Feb for use in April session)

Possible DiFX change to discuss

- Zoom bands are becoming increasingly used
- Zoom bands adversely affect autocorrelation corrections when used in conjunction with T_{sys} measured across full band
 - Error related to ratio of full band average to zoom band average
- Proposed change: pre-scale the autocorrelations by an amount that would yield correct amplitudes after T_{sys} correction
 - But amplitudes prior to ACCOR and APCAL will not be meaningful
 - This should yield correct amplitudes if T_{sys} is frequency-independent over the recorded band

VLBA 3mm performance

- We know it is not optimal and want to improve
- We appreciate the feedback, but it is not always in usable form
- Until new scientific staff are on-board, we won't be able to take on considerable new efforts
- Recommendations:
 1. Maintain a web page / wiki / bug tracking page to organize the concerns; maybe this can be generalized to all GMVA?
 2. Ensure each concern is well documented, including description of processing, explanation of what is seen vs. what is expected
 3. Avoid guessing the cause, unless it is obvious; presenting evidence of problems is most useful
 4. Characterizing general trends is useful, but need data to back that



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