NRAO VLBA Status

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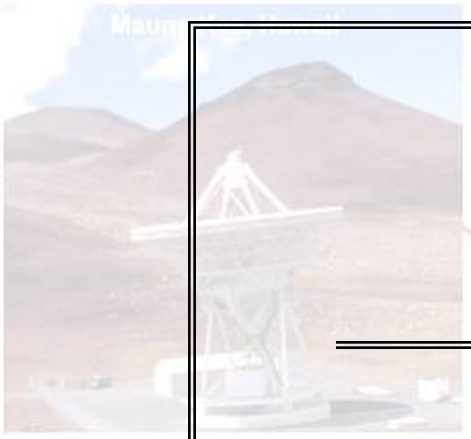
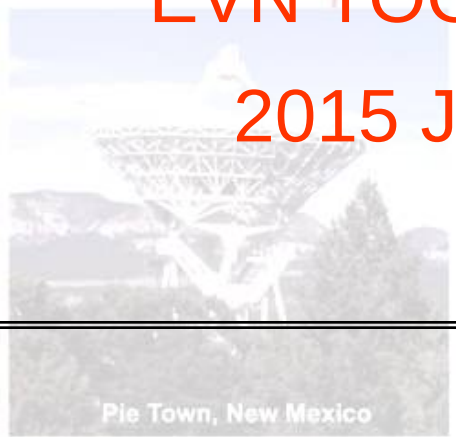
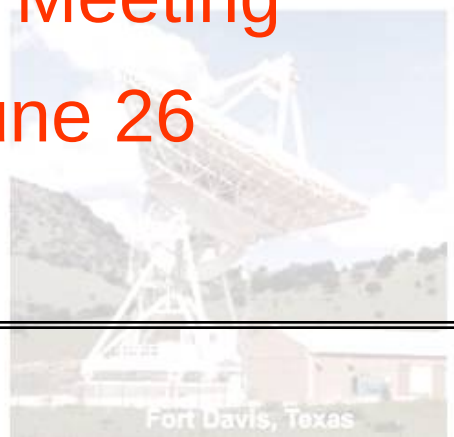
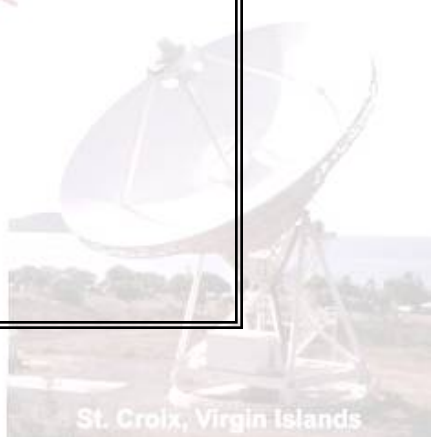
EVN TOG Meeting
2015 June 26







Overview

I gave a broad report on the VLBA Sensitivity Upgrade

... at your last meeting (2014/10/6).

Now fully operational on the VLBA, plus VLA, GBT, and Effelsberg.

Documented in VLBA Observational Status Summary:

https://science.nrao.edu/facilities/vlba/docs/manuals/oss

This presentation is largely incremental from last year.

- Bug fixes, etc.
- 4-IF tests.
- Replacement for ‘track’ module-logistics system.
- New LO synthesizer design.
- Personnel changes.

Bug Fixes

"Last Bug" (Announced in October) Followed by Two Minor New Effects:

Delay jumps

- Occur occasionally, (mainly) in DDC.
- Magnitude 4*n nanoseconds.
- Only affect first use of each setup in the schedule.
- Blamed on VDIF formatter timing; fix under test as of yesterday.

Setup failures

- Occur mainly in 4-IF cases or other complex receiver situations.
- Usually affect only first scan in the schedule.
- Blamed on too many incoming commands overwhelming 'MIB' control units, switches in receivers not being set as required.
- Fix designed, tried out yesterday.

Four-IF Tests

VLBA Sensitivity Upgrade Instrumentation Supports 4-IF Modes

- Used within VLBA for several multi-frequency dual-polarization modes.
  - S/X; “50/90” low-frequency bands; and new 4 – 8 GHz C-band system.
  - Tests complete; modes operational.
- Recently extended to GBT.
  - Same 4–8 GHz C-band receiver (but different conversion to circular polarization).
  - Tests under analysis.
- Hope to extend tests to other HSA stations.
  - Effelsberg next.

'track' Replacement

Original VLBA tape-logistics software written ~23 years ago.

- Has been overlaid several times with new user interfaces, and migrated to new database platforms.
- But has retained same difficult-to-maintain basic structure. Changes that should be trivial – adding new users, stations, correlators – still require re-compile.
- Basic table of data units (tapes and disk modules) has become seriously cluttered with unknown, probably erroneous, entries.

Development of completely new version began ~20 months ago.

- Required upgrades to VLBA operational database led to complete restructuring of entire system.
- 'packtrack' now nearing initial release, scheduled for 3rd calendar quarter.
- New features include: individual usernames & passwords; variety of roles & permissions; correlator-dependent shelving definitions; ability to create new users, stations, & correlators.
- Validation of disk module entries will require match of VSN owner-id to registry.
- Tapes will *not* be carried forward from old database.

New LO Synthesizer Design

Original VLBA LO settings were quite coarse.

(500*n ± 100) MHz

OK since BBCs had 10-kHz tuning resolution, bandwidth ≤16 MHz.

Upgrade system's RDBE was planned to have similar resolution.

BUT sample-rate reduction was required to process 512 MHz in available FPGA; imposed fixed non-crossable "zone boundaries" in IFs, at 640 & 896 MHz.

Current system — coarse LO + channels with restricted tuning flexibility — is difficult to schedule at 64- & 128-MHz bandwidth.

SCHED does a fairly good job for most receivers.

New, very flexible LO synthesizer has been designed.

Nominal frequency range & resolution: 2 – 16 GHz in 10 kHz steps.

Two separately specifiable frequencies generated.

Three units built for test/demo purposes, excellent performance in tests.

But no funding available to build full complement (20) required for VLBA.

Personnel Changes

Retirements & Departures

Joan Wrobel retired from NRAO quite recently.

VLA scheduler role taken on by Gustaaf Van Moorsel. (Mark Claussen still VLBA scheduler.)

Craig Walker retired from NRAO at the beginning of this year.

Many previous VLBA support activities remain in limbo; one very important exception, below.

Walter Brisken left NRAO 1.5 years ago.

Still supports VLBA on a part-time basis; visits Socorro for 1-2 weeks every few months.

Continuing VLBA Science Support Staff

Amy Mioduszewski recently designated to take over support for SCHED program.

Also continues her user support for the "Y27" phased VLA in HSA observations.

Vivek Dhawan continues as a VLBA support scientist, at about 25% of his time.

Includes technical support for the "Y27" phased VLA.

Jon Romney. Yes, I'm still here, too.

Only remaining full-time VLBA scientist.


Owens Valley, California
Brewster, Washington
Hancock, New Hampshire
Los Alamos, New Mexico
Kitt Peak, Arizona
Pie Town, New Mexico
Fort Davis, Texas
St. Croix, Virgin Islands

Thank you