



Owens Valley, California



Hancock, New Hampshire

RDBE / PFB Commissioning Status



Jon Romney

Los Alamos, New Mexico

US-EVN VLBI Telecon

2012 May 2

Kitt Peak, Arizona

Pie Town, New Mexico

Fort Davis, Texas

St. Croix, Virgin Islands



RDBE/PFB Operational for "2048-Only"* Observations

*Projects requiring 2-Gbps data to achieve scientific success; shared-risk basis.

PIs prepare schedules.

Updated SCHED documentation; some require specialized assistance. Overall, scheduling seems to be working quite well.

Total of 20 observations to date, for 7 projects, since 2012/2/19.

14 correlated; 12 released. Only 1 abandoned.

Very positive feedback from some PIs.

L. Loinard: Theoretical noise level achieved; source detected.

J. Miller-Jones: A great success; in-beam calibrator worked well.

A. Marscher: Successfully spliced 512 & 2048 data.

[piggyback carried over from earlier commissioning phase.]

Operators making effective use of monitor and alert screens.

Operational status taking hold.



"512/2048" Transitional Piggybacks Remain on Hold

Only 2-3 projects are ideal candidates

Science benefit of 2048 Mbps / Simplicity / VLBA-only.

But sufficient media may not available

... to expand beyond current commitments to 2048-only runs.
Explained further in subsequent talk.

A few isolated piggybacks being done

Carryover from previous commissioning phase.
Willing test subject for experimental DDC run.



Recently Encountered Problems

Most have been diagnosed and fixed quickly

RDBE personality load failures

Computer replaced at HN; RDBE MIB not re-booted.

RMS level alerts

Executor timing error in changing setups.

Bank switch failures

Observation failed to start at some stations

Pcal extractor errors

Sched commanded wrong frequencies.

Some remain mysterious

“Marscher Effect”: Unexplained quasi-simultaneous data gaps of 2-3 hours at most/all stations. Has happened 4 times now in APM runs.

Another Marscher Effect (!): Unexplained 50% low amplitudes in recent run; not seen in several previous cases.



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RDBE/DDC Tests & CH₃OH Maser Fringes



Hancock, New Hampshire

A map of the United States with several purple satellite dish icons placed across the country to represent VLBI sites. Red lines radiate from the map to various locations. A horizontal black line is drawn across the map.

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Overview of Recent DDC Tests

Current version:

4 sub-bands / Sub-band BW 64 MHz ◦ ◦ 1 MHz (or 250 kHz).
Output rate proportional to overall bandwidth.
Band-edge frequencies specifiable to 10-kHz precision.

Recent tests:

TD030:

Full range of sub-band widths.
Sub-bands overlapped in frequency; offset by BW/4.
Continuum & H₂O maser line sources.

TD031:

Narrow sub-band widths only: 1 MHz / 500 kHz / 250 kHz.
Sub-bands set adjacent in frequency; line in 3rd sub-band.
Continuum & CH₃OH maser line sources.

VLBA's first methanol fringes using new C-band receiver systems!



DDC Tests: Mixed Results

The Good News:

- Bandpass shapes reasonable.
- Line shapes apparently correct.
- Frequency tuning approximately correct.

The Bad News – Primary:

- Mirror-imaged aliases of line signals appear in adjacent sub-bands.
- Effect sets in at 32-MHz BW, worsening with narrowing BW.
- Alias is not coherent: wrong frequency, no fringe detection.
- But still, spoils template calibration method, and adds noise.

Minor problems:

- Severe aliasing in 32-MHz BW only (believed fixed).
- Intermittent failure in 3rd sub-band, at KP only.



Reconsideration of DDC Design

Current design's out-of-band rejection inadequate

... for narrow-band spectroscopic applications.

Could still be used for continuum at 64 MHz.

Test of 128-MHz BW pending.

Revised design concepts under consideration

Complex sampling (next talk).

Narrower filter profiles: begin roll-off farther from band edges.



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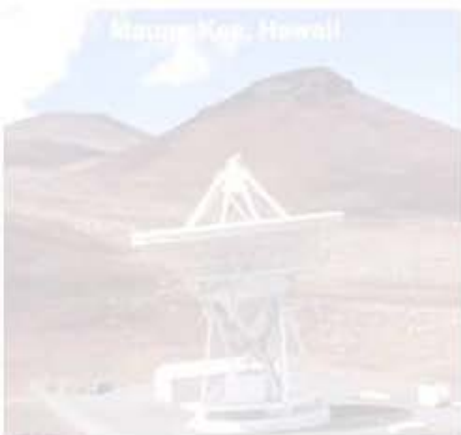
Brewster, Washington



North Liberty, Iowa



Hancock, New Hampshire



Maunakea, Hawaii



Thank you



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