Robledo Station Report

EVN TOG Meeting June 2012
Onsala Space Observatory, Sweden

1. Hardware and Software status.

The DSN supports VLBI observations using the Field System version FS-9.9.0 and the Mark5A recorders. Our current Mark5 s/w version is the following (SDK 6):

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DTS_id? 0 : Mark5A : 2005y147d17h : 1 : Mark560a : 1 : 1 : 2.7x : 0xb8 : 0x19 ;
mk5/!OS_rev1? 0 : "Linux version 2.4.20-8 (bhcompile@porky.devel.redhat.com) (gc" ;
mk5/!OS_rev2? 0 : " version 3.2.2 20030222 (Red Hat Linux 3.2.2-5)) #1 Thu Mar 13 17:54:28 EST 2003" ;
mk5/!SS_rev1? 0 : "BoardType PCI-816VXF2, SerialNum 8270, ApiVersion 5.21, ApiDateCode Apr  7 2005" ;
mk5/!SS_rev2? 0 : "FirmwareVersion 10.84, FirmDateCode Apr 06 2005, MonitorVersion 6.02, XbarVersion
3.18, AtaVersion 1.05, UAtaVersion 0.00, DriverVersion 623" ;
form/m,16,1:2,off,,3,pass,41,0x44,okay
```

K-band receiver status: As a result of a power plant failure several components of the DSS-63 70m antenna K-band receiver failed. The communication with the K-band system was lost and it was necessary to replace the GPIB-lan gateway and the IO-tech unit. The control over the noise diode and the post-downconverter attenuators was recently recovered. The MMS1 (downconverter) was sent to JPL to repair but currently there is no remote control. The ambient load is still at JPL being debugged.

2. Calibration.

a. **K-band calibration.** Currently there is no ambient load available so calibrations are performed using the noise diode. Noise diode calibration was checked using the ground. Antabfs file is generated using the antabfs.pl application.

b. **K-band pointing.** K-band pointing model (AC1) was checked before our participation in the EVN observing session #2 2012.

c. **GPS data.** We will be able to provide continuous gps-fmout values during the observations from now on.

3. Immediate and Future Plans.

DSS-63 Robledo 70m antenna downtime in July 9th-23rd 2012 for *depot level* maintenance tasks, including regrouting of the AZ track. Overall K-band receiver performance will be check, including subreflector optimization, measurement of gain curve and efficiency and derivation of pointing models for both autocollimators.

DSS-54 Robledo 34m antenna downtime in September 9th-November 28th for AZ track and wheels replacement among other tasks. The Q-band receiver will be sent to JPL in August for the

cryogenic system replacement with a DSN standard and will be installed back in the antenna during the downtime.

DSN 70m antennas L-band receiver will be upgraded during summer 2012 from 90 MHz bandwidth (1625-1715MHz sky frequency) to 500 MHz (1400-1900MHz sky frequency).

The Deep Space Network (DSN) is replacing the aging MarkIV Data Acquisition Terminal (DAT) with a digital backend, the DSN VLBI Processor (DVP). It is based on the Wideband VLBI Science Receiver (WVSR), a custom made open-loop digital receiver developed at JPL that is successfully supporting differential-VLBI for spacecraft navigation (DDOR) and other radio astronomy applications, e.g. Earth orientation, astrometry, and spectroscopy observations. The new acquisition terminal has inherited from the WVSR the Intermediate Frequency (IF) digitizer module, the firmware architecture and monitor and control software. Among the new features, the DVP improves considerably the recording rate providing at least 2 Gbps with the goal of achieving 4 Gbps, uses a CASPER ROACH board for real-time Digital Signal Processing and channelization and streams the data into a Mark5C recorder. The DVP is compatible with similar digital developments (e.g. RDBE, DBBC). As the new backend will not use the standard Field System environment to perform the VLBI observations, efforts are under way to make it compatible with non-JPL correlators, providing monitor and calibration data in the appropriate format. Lately an important effort has been made in the DSN towards automation of VLBI data acquisition using the Automation Language for Managing DSN Operations (ALMO). The automation process will be adapted for the new DAT. A Mark5C recorder and a DVP will be installed shortly in Robledo and Goldstone; first fringe tests will be conducted between these two complexes.

The DSN K-band broadband receiver (18-26.5GHz, with only 70MHz baseband bandwidth per polarization) is currently being upgraded from three to four IF channels with a goal of 10 GHz instantaneous usable bandwidth at each polarization (17-27GHz), and beam switching capability for single dish spectroscopy. The actual downconverter (MMS) will be replaced by a design from the EE Department at Caltech that will down convert the IF channels into either into 1GHz wide USB and LSB, or into 2 GHz wide in-phase/quadrature-phase analog data channels. It will also allow selecting linear or circular polarization. Phase I of the receiver (only 8 channels for 21-23GHz frequency range) has been installed in Canberra 70 m antenna (DSS-43) during 2011. Goldstone and Madrid receivers will be upgraded in a timely manner.

Robledo e-VLBI plans: actual connection from Robledo to the Spanish Research and Educational Network (RedIRIS) has been recently upgraded to 300Mbps. There are plans to connect to 1Gbps but the upgrade has not yet been approved.

4. Robledo support to EVN observations.

For EVN session#2 2012 Robledo participated in following observations:

EE008D (K-dual band; DSS-63 70m antenna): successful 128 Mbps Mark5 recording; both polarizations were calibrated using the noise diode as the ambient load is not available; antenna controller was not able to clear tracking errors of about 5mdeg, expect impact on pointing; antabfs file was derived using antabfs.pl application and sent to the EVN archive with the observing log including flagr information and the uvflag file.

ED038 (L-LCP band; DSS-63 70m antenna): successful 1024 Mbps Mark5 recording; scan_check failed for first 3 scans due to a formatter miss-configuration, problem solved for rest of scans; VC05 affected by RFI; antabfs file was derived using antabfs.pl application and sent to the EVN archive with the observing log including flagr information and the uvflag file.

Best regards,

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