OAN - Yebes station report
Shanghai TOG meeting 19 March 2018

VLBI Equipment

All EVN experiments are recorded using a 216 TB Flexbuff plus a DBBC2. Details of the equipment are:

- DBBC2
  - 4 CoMo boards (Unica 4).
  - 4 ADB2.
  - 4 Core2.
  - Internal Fila10G.
  - Software available:
    - DDC:
      - v105_1 (June 10 2015) (v106 is also available but not yet used regularly).
      - v105e_1 (June 11 2016) (v106e is also available but not yet used regularly).
    - PFB:
      - v16_2 (October 13 2017).
    - Fila10G:
      - fila10g_v3.3.3_1 (reported as 2.8.0, December 8 2014).
- Flexbuff
  - 36 disks of 6 TB capacity.
  - Software version: jive5ab : 2.8.1-k : 64bit : dev : flexastro : 15-feb-2017

We use a Harrobox running Debian Jessie (8.2) as a proxy between the FS and the DBBC to allow concurrent connections to DBBC2. JIVE correlator uses this feature to control the flow of data from the Fila10G when doing eVLBI. This host is in the public LAN but allows connections from the private LAN.

Besides the nominal EVN equipment, Yebes' 40m radiotelescope is equipped with a secondary DBBC2 unit (same characteristics as the main one), a DBBC3 still not in use, another Flexbuff system with 144 TB of capacity (36 disks of 4 TB each) wich is mainly used for non-EVN experiments and a Mark5B+ which is not presently used.

The 13 meters telescope is equipped for VGOS experiments with four RDBE's and a Mark6. A secondary Mark6 is available at the station. Disk space available for Mark6 units amounts a total of 768 TB (24 packs x 32 TB/pack). Our experience is summarized in report: **http://www1.oan.es/informes/archivos/IT-CDT-2016-21.pdf**

As frequency and time references, the station houses two active H-masers (main one and backup unit) and also a pair of GNSS receivers (active and backup). Several frequency and time distributors (some of them manufactured in Yebes labs) are installed to supply reference signals to all the systems that need it. Switching between active and backup systems is possible in a fast way thanks to a switching matrix deployed in a dedicated rack.

Field System

We are running three FS computers:

- RT40m: FS version 9.11.19 on Debian 7.11 Wheezy, kernel 3.2.0-5-686-pae
- RT13.2m: FS version 9.12.11 on Debian Jessie 8.10, kernel 3.16.0-4-686-pa.
- A test computer which can be connected to any of the non-used backends. Debian Jessie and FS 9.11.19

We have developed a script for plotting the autocorrelation spectra that uses libraries from DifX and runs in the FS computer. The procedure downloads the data from the Flexbuff and copies it to the FS hard disk where it is shown continuously. This script is also available for VGOS data recorded in a Mark6.

Fran Beltran maintains a Python script to generate antabf files from the log files. The script supports single shot diode calibration, continuous calibration, hot load (chopper wheel method), DDC and PFB mode and multi-frequency experiments.

EVN observations

EVN session 2017-2:

- 5 cm: 1/1 succesfully observed.
- 6 cm: 10/11 succesfully observed. 1 observed with minor failures.

EVN session 2017-3:

- 3.5 cm: 1/1 succesfully observed.
- S/X: 1/1 succesfully observed.
- 6 cm: 4/5 succesfully observed. 1 observation with partial scan loss. Severe RFI. appeared, affecting the observations. It is under investigation.
- 1.3 cm: 1/1 succesfully observed.

EVN session 2018-1 (on going):

- 5 cm: 4/5 succesfully observed. 3 scans lost from 1 observation.

EVN Out of Session: Taken part in ~15 OoS observations.
EVN eVLBI: 12 observations during 2017.

VLBI observations

We regularly run several VLBI programs at Yebes: EVN, IVS (geodetic observations), GMVA (Global millimeter VLBI), and Radioastron observations. Since June 2011 the telescope is managed by operators during 80% of the time. The rest of the time operations are done in an unattended and automatic way.

Fringe tests: Participated in several fringe tests at different frequencies: KVN, GLT, Uniboard, Santa María (Azores).
Radioastron: 176 observations during 2017
GMVA: 15 observations (including tests) during 2017 (Two sessions, Mar-Apr and Sept-Oct)

Continuous calibration

Continuous calibration mode (80 Hz applied to a noise diode) works in C, X and K bands.

Disk purchases

In 2017 we purchased 36 10TB-disks to upgrade the Yebes' Flexbuff at JIVE. 32 of the 36 old 4TB disks that were replaced were used to populate 4 Mark5B modules and inserted into the EVN pool.

Spares

14 BBCs are available from the VLBA terminal decommissioned on 2014. 3 of them are faulty. We also have some IO Mark5B+ boards and some main boards for the Mark5B+.

We have lent temporarily one Fila10G unit to Torun.

Gigabit connection

Yebes is connected to RedIris, the spanish NREN using a 10 Gb/s dark fiber since May 2012. In 2017 we introduced a new Aruba-3810M 10G switch to interconnect all Gigabit systems in the backend room that eliminated the necessity of plug/unplug some of the fibers when switching between recorders.

40m radiotelescope

As mentioned in the previous Station Report for Ventspils EVN TOG, last year the 22 GHz and 45 GHz receivers have been overhauled again. As a result the RF output for both of them is directly sent via fiber optic link and downconverted in the backends room to several bands from DC-2.5 GHz. Both receivers have been tested in VLBI observation succesfully. Both receivers can observe simultaneously.

13.2 m radiotelescope

The 13.2m radiotelescope has been taking part in VGOS test observations since April 2016. Current observations with 4 RDBEGs + 1 Mark6 are 24 hour long and are performed every 2 weeks.

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