Station report for EVN TOG
Irbene (Ir) station, Ventspils
2016.02.09. - 2016.09.19.

Summary of recent observation sessions

During this last period Irbene participated in test observations of May-June EVN session at L band and C band. NME observations showed fringes at all frequencies.
RT-32 also is continuing to participate at RadioAstron observations. Couple of experiments showed fringes with satellite.

Progress regarding to station software and hardware

A lot of time has been devoted for setup of Field System and development of station specific software. RT-32 system is now fully controlled by FS and can generate all the necessary logfiles:

- Antenna control unit integrated (ANTCN)
- Custom snap commands developed for C-band and L-band receivers. FS has control over NS switching and LO setup now.
- Misc. snap commands implemented, including gps-fmout, wx. Pcal on/off remote switching still pending.
- Field system antenna pointing model integrated in ANTCN. Pointing data acquired and successfully applied.
- Preliminary DPFU curve obtained using acquire and gnplt. Generation of legit ANTAB files from FS logs is now possible. But it should be mentioned that Tcal vs Freq. still needs to be hot-cold calibrated.

New MARK5C and DBBC2/Fila10G systems arrived, were successfully tested and right now are installed at RT-32 waiting for next RA/EVN sessions. New meteorological station installed – meteo information now will be provided in FS logfiles. Automated logfile uploading scripts have been implemented, so hopefully there will be no delays anymore.

Summary of current installed software:
Field System: Version 9.11.8
Mark5: DTS ID: Mark5C: 12-Nov-2015, Board Type: AMAZON-VP, Api Version: 12.06, Firmware Version: 16.31, Linux version: 3.2.0-4-amd64.
Jive5ab ver:
DBBC: DDC,105_1,February 25 2016

RT-32 Tsys:
       L band: ~100 K ;
       C band: ~ 30 – 35 K both polarizations; DPFU 0.1 K/Jy; SEFD ~ 350 Jy.

About RT-16

New tracking system is now finished/tuned and tested. Maximum Az and El slewing speeds of 4.5 deg/s can be reached. Tests showed azimuth and elevation encoder RMS errors of 5.7 and 15.2 arcsec respectively.

First performance test sessions shows repeatable efficiency of ~0.6 and Tsys of 30 K at 8 GHz which translates to SEFD of ~700 Jy.

First GNSS VLBI observations were carried out at March 2016 in collaboration with scientists from Nizhny Novgorod.

Problems encountered in last period

During first quarter of 2016 RT-32 C band receiver cooling system instability versus elevation was present. Dewar was replaced with one from RT-16. Right now repairs of faulty dewar have been organized together with manufacturer (TTI).

One of the Irbene H-maser sources malfunctioned this spring. Problem is already identified as fail of one of electronics modules and hopefully it will be repaired soon. Right now at RT-32 we are using spare maser source.

In last few months our old Mark5b started to crash (freezes after scan_check?). Unfortunately it corrupted two disk packs with few EVN/ RA recordings. While we are using new Mark5c at RT-32 right now, we will upgrade Mark5b to 5c as soon as possible.

Future plans

- Upgrade of old DBBC/Mark5b to Fila10g/Mark5c which will be used at RT-16 antenna.
- Implementation of continuous calibration in C band system. At this moment only technical feasibility is understood.
- Hot-Cold calibration of Tcal. We are planning to use absorber material and cold sky.
- RT-32 Secondary mirror adjustment is still in the process. New two channel total power meter was developed to obtain beam patterns more conveniently. At this moment initial direction of adjustment is identified and practical adjustments are planned.

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Appendixes:
Frequency ranges for 2/4 Gbps:
https://deki.mpifr-bonn.mpg.de/Working_Groups/EVN_TOG/Frequency_ranges_for_2%2F%2F4_Gbps

Irbene:
L band (rhc):
BW: 100 MHz (IF: 380..480 MHz)
Range: 1.37 - 1.72 GHz
LO step: 1 MHz

C/M/X band (rhc&lhc):
BW: 1100 MHz (IF: 300 - 1500 MHz)
Ranges:
4.5 - 5.5 GHz; LO = 4100 MHz;
5.4 - 6.4 GHz; O = 5000 MHz;
6.4 - 7.6 GHz; LO = 6100 MHz;
7.6 - 8.8 GHz; LO = 7300 MHz;
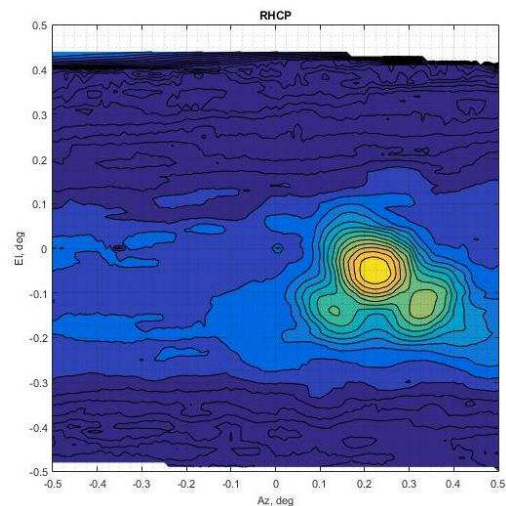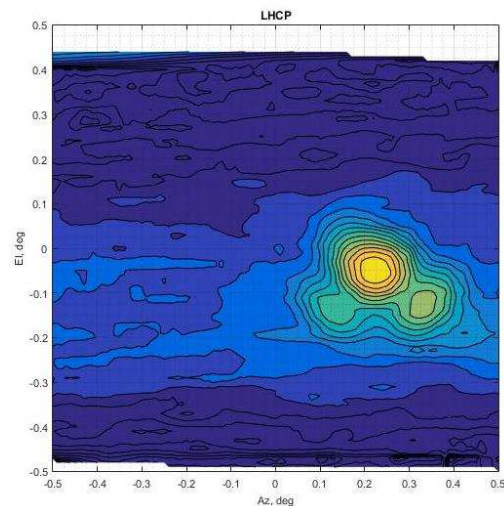LO step: 8 MHz

Beam maps
https://deki.mpifr-bonn.mpg.de/Working_Groups/EVN_TOG/Beam_maps

Irbene tools for beam maps developed and available, need advice about map format and map making tool.
X band: data acquired (jpeg format);
L C M bands: work in progress.

Source Casa; no pointing model; Elevation 30 deg; Freq: 7.6-8.8 GHz; (total power); Countours 1dB; Max 64 dBi.   Date 24.08.2016.

Continuous calibration (80 Hz)

Irbene RT-32:
L/C/M/X band: No (work in progress).
For L/C/M/X band Noise Diode switch between scans is available for Tsys measurements.

Status in the EVN

Backends at the EVN stations

Irbene RT-32: DBBC2; 4 IFs; 4 Cores; DBBC FILA10G Internal; GLAPPER optical to cx4; Mark5C;
Irbene RT-16: DBBC2; 4 IFs; 4 Cores; one VSI interface to Mark5 B; DBBC FILA10G and GLAPPER ordered, Mark5C upgrade kit available.

Disk Inventory

https://deki.mpifr-bonn.mpg.de/Working_Groups/EVN_TOG/Disk_Inventory
Provided to EVN 2 disk packs 3.4TB each (2013 – 2016).
Inventory (since 2015):
2 x 16 TB disk packs ready for EVN observations;
2 x 16 TB faulty? disk packs, repair needed.

e-VLBI information at the EVN stations

Irbene RT-32: 10 Gbps line bandwidth; Max tested rate 760 Mbps (Mark5b bottleneck). DBBC proxy No; DBBC FILA10G available; Router with optical connection available. Successful e-VLBI tests with RT-32 @ 512 Mbps.
Irbene RT-16: 10 Gbps line bandwidth; not available for e-vlbi, work in progress.