**Station report to the EVN TOG meeting.**
**Irbene station, Ventspils.**

**Receivers**

Currently Irbene RT-32 can operate in four bands:

327 MHz (92 cm) (prime focus with offset);
1.6 GHz (18 cm) (secondary focus);
5 GHz (6 cm) (secondary focus);
12 GHz (2.3 cm) (secondary focus);

92cm and 5 GHz provide dual circular polarization; 18cm receiver currently provides only one circular polarization, 12 GHz one linear polarization. All receivers work on ambient temperature and not cooled. Ongoing work for install and connect cryogenic equipment for 5 GHz receiver.

**Data acquisition systems:**

In 2011 a new DBBC was obtained in Irbene. DBBC work within six months revealed what 2 core boards from 4 are not stable and introduce problems to DBBC work. We decided to remove faulty boards. Currently DBBC work with 2 IF channels. This is completely enough for our current needs.
For data recording IRBENE use Mark5b (with Debian Etch OS version) and connected to DBBC via one VSI interface.
Additionally Irbene for data acquisition use TN-16 data recorder, it record one channel data with bandwidth up to 8 MHz in NRTV format to PC.
In 2013 Mark5c has obtained and configuration of it is in progress.

**Antenna control system:**

For antenna control we use adapted Field System, which able to control movement and Mark5b, but no DBBC control implemented. FS version is 9.10.4

**Time and frequency synchronization:**

Hydrogen Maser "Quartz" CH-75A (5 MHz and 1 PPS)
Symmetricom X-GPS receiver for 1 PPS signal to maser.

Receivers LO heterodynes synchronized directly with Hydrogen maser 5 MHz signal. For heterodynes we use R&S signal generators. DBBC receive 10 MHz synchronization from R&S generator which in turn synchronized with maser. All PC's (DBBC, MARK5b, FS, telescope control computers) obtain NTP time from local time server, integrated into GPS receiver.

**VLBI observations**

Since last report Irbene participated in several NME experiments at 5GHz dual pol:
N12C3 http://www.evlbi.org/tog/ftp_fringes/N12C3/
N12C4 http://www.evlbi.org/tog/ftp_fringes/N12C4/
Due to problems with receiver LCP channel, these observations were only in RCP polarization.
F13C2 http://www.evlbi.org/tog/ftp_fringes/F13C2/
N13C1 http://www.evlbi.org/tog/ftp_fringes/N13C1/
In the beginning of session N13C1 were problems with 1PPS synchronization in DBBC and accordingly in MARK5, but overall session were successful.

We have also participated in several L band NME experiments, N12L3, N13L1. L-band receiver which originally is designed for navigation satellites with relatively strong signals is not enough sensitive for EVN observations and, accordingly, no results were obtained. Our purpose of participation in this experiment was to test our systems together with EVN.

In 2012 December 7 experiment named BAL03 with Irbene and Torun participation was occurred and the data were properly correlated with DiFX software correlator at Torun. The parameters of the experiment – 5GHz receiver, 2 channels 8MHz; 2 bit 64 Mbps.

**E-VLBI observations**

In the second half of 2012 VIRAC staff made preparations of the RT-32 data receiving systems and network infrastructure for the work in the e-VLBI mode. The latest version of jive5ab utility was installed and tested with the SFXC correlator (deployed on Ventspils University College cluster). Network tests with the colleagues from Torun Radio Astronomy Observatory were implemented and as the results of tests indicate the maximum of the data rate is 700 Mbit/s by small loss of data, which limited by Mark5b hardware part, total bandwidth available is 1 Gbps.

In 2013 March 19 the Irbene telescope took part in real-time e-VLBI observations with the rest of the e-EVN participants at 5 GHz. Fringes with good signal-to-noise ratio were produced. The total data rate of 512 Mbit/s was sent from the telescope to JIVE correlator in real-time.

Experiments have shown that RT-32 is able to observe at 5GHz and transfer data in the e-VLBI mode with data speed rate up to 1 Gbps.

**Future plans**

We have ordered wide band cryogenic receiver 4.6-8.8 GHz and planning to major update/change our antenna control system, which will improve tracking and pointing accuracy as well as movement velocity.

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