March 8, 2018

# Effelsberg Station Report

## General Information

Effelsberg has participated in EVN session II and III 2017 and is currently running session I 2018. We participated in all of the e-EVN sessions since the last report. Most of the observations were successful and down times were mainly due to weather (strong wind, thunderstorms or snow fall). In Session II 2017 the noise diode and the RCP channel of the 6cm were broken. The calibration was done with theoretical Tsys values.

After a longer transition phase of about 2 years all receivers and frontend devices are upgraded to a new control infrastructure, the so called InteRCoM (Integrated Receiver Controlling and Monitoring). The old receiver control system DÜSY (Digitales ÜbertragungsSYstem) was successfully used at the Effelsberg telescope for more than 40 years. However, discontinued components, new technologies in digital data communications and increasing requirements for control and monitoring receivers made it necessary to develop a replacement.

The InteRCoM consists of a central server and controller cards that are installed in every frontend device. The server communicates to each device via Ethernet. Thereby all the controlling hardware has moved closer to the receiver and significantly reduces the signal path. The new components are RFI shielded, have real-time capabilities and the central server includes a timing generator that produces the blank/sync signal to switch noise diodes and calibrations cycles in the backends. In addition the InteRCoM controller cards provide its own digital continuum backend for every receiver. Because of this modular and extensible concept, the integration could be done in parallel and full operation and new components can easily be integrated in the future.

The local antenna control software was also upgraded and adapted to the InteRCoM. It provides now a large set of predefined settings for each receiver and observing mode to simplify the access for the general observer.

## Current Status

Effelsberg uses the DBBC2, Fila10G and a Mark6 recorder for all EVN, global, RadioAstron, and geodetic VLBI observations. Most of the recorded data is e-transferred to the correlators in Bonn, at the ASC in Moscow, and JIVE. In addition there are two NRAO RDBEs and a Mark5C recorder (SDK 9.2.1) that are used for observations with the VLBA, HSA, and GMVA. Mark5 diskpacks to Socorro are still being shipped. Both VLBI backends and their recorders are controlled by the Field System (current release FS-9.11.19) and use continues calibration at a rate of 80 Hz for the amplitude calibration. The DBBC2 uses the latest DDC (v106, v106e) and PFB (V16_1) firmware and the Fila10G is running firmware v4.1.

The two Mark6 recorders currently provide about 290 TB of disk space in a raid configuration (like a flexbuff). The Effelsberg raid at JIVE currently provides only 110TB, but with the planned increase of space at Effelsberg and higher security (see below) it should be possible that data stays longer at Effelsberg and JIVE fetches data only for immediate correlation.

## Technical Developments

It is foreseen to build up some Mark6 modules with 8x10 TB disk, so that the disk capacity at Effelsberg can be increased to 450 TB to cover full time 2 Gbps recording in EVN sessions. For safety reasons the new modules should be mounted as raid 5, so that a disk failure should not cause any loss of data.

The installation of the new Q-band receiver is planned for March 21$^{st}$. After commissioning it should be available for VLBI observations soon.

To keep the weight balance in the secondary focus the old Q-band receiver has to be removed before the new receiver can be installed. Because the old Q-band belongs to an integrated multi-frequency receiver for Ku, K, and Q-band all three receivers will be removed at once. For K-band there is already the new receiver available and it in use since several years, but the replacement for Ku-band will be installed only later this year. There will be at least several month where Effelsberg cannot participate in 15 GHz (2cm) observation with the VLBA or HSA.