

The Medicina Station Status Report

Alessandro Orfei, Andrea Orlati, Giuseppe Maccaferri, Franco Mantovani

Abstract

General information about the Medicina Radio Astronomy Station, the 32-m antenna status, and the staff in charge of VLBI observations are provided. In 2010 the data from geodetic VLBI observations were acquired using the Mark 5A recording system with good results. Updates of the hardware have been performed and are briefly described.

1. The Medicina 32-m Antenna and General Information

The Medicina 32-m antenna is located at the Medicina Radio Astronomy Station. The Station is run by the Istituto di Radioastronomia and is located about 33 km east of Bologna. The Consiglio Nazionale delle Ricerche was the funding agency of the Istituto di Radioastronomia until the end of 2004. Since January 1, 2005 the funding agency has been the Istituto Nazionale di Astrofisica (INAF).

The antenna, inaugurated in 1983, has regularly taken part in IVS observations since 1985 and is an element of the European VLBI network. A permanent GPS station (MEDI), which is part of the IGS network, is installed in the vicinity. Another GPS system is installed near the VLBI telescope (MSEL) and is part of the EUREF network.

2. Antenna Description

The Medicina antenna has Cassegrain optics, consisting of a primary mirror 32-m in diameter, and a secondary mirror, called the subreflector, of convex shape and about 3-m in diameter. The subreflector, mounted on a quadrupode, is placed opposite the primary mirror and focuses the radio waves at its center, where the receiver system is located. For some observing frequencies, a simplified optical system is enough. The subreflector is therefore shifted from its normal position, and the receiving system is placed at the primary focus. This is the case for the S/X observations. The antenna can operate in the range between 327 MHz and 22 GHz.

The receivers are cooled with cryogenic techniques to improve the system sensitivity. The antenna's operative receiver is easily changed; only a few minutes are needed to change the observing frequency. A recent picture of the antenna is shown in Figure 1.

3. The Staff

Many scientists and technicians take care of the observations. However, a limited number are dedicated to maintaining and improving the reliability of the antenna during the observations: Alessandro Orfei is the Chief Engineer, expert in microwave receivers; Andrea Orlati, Software Engineer, takes care of the observing schedules and regularly implements SKED, DRUDG, and the Field System. At the end of 2010 Giuseppe Maccaferri took a one-year sabbatical period. Marco Bartolini and Simona Righini have been temporarily included in the staff helping Andrea Orlati for the VLBI preparation and observation.



Figure 1. View of the Medicina 32-m dish taken during geodetic VLBI observations. Note that the subreflector is shifted to allow the use of the S/X receiver located in the primary focus of the radio telescope.

4. Current Status and Activities

The operating system was updated to Debian Etch and kernel 2.6.18. The sdk 8.3 and StreamStorm driver version 9.20 were also installed. Switching between e-VLBI and vlbi on disk is now straightforward.

The Mark 5 has been equipped with a new 10-Gbit network card. Our disk pool for geodetic sessions is still 33 TB. No other purchases are planned by now.

As regards the receivers, the 22-GHz multifeed receiver will be no longer available in Medicina by spring 2011, when it will be sent to the SRT site. We have under construction a dual feed system as its substitute.

The S/X receiver cooling system, including the helium pipeline, needs a complete refurbishment. We are preparing the maintenance and substitution of the S/X cooling system; in the meantime the receiver will be used uncooled. INAF has procured enough money to make heavy maintenance on the 32-m antenna. It will be a long work, and we foresee we will repair the elevation wheel, paint the antenna structure, and change the subreflector drives.

The upgrade to 10 Gb/s is still work in progress, as is the creation of a 10 Gb/s POP center at Bologna Headquarters. The needed devices have been bought but not installed yet. Negotiations with a local network consortium are still the main issue. Data from EUROPE experiments have been transferred to the Bonn Correlator through the network on a regular basis since 2009.

5. Geodetic VLBI Observations

In 2010 Medicina took part in 24 (24-hour) routine geodetic sessions (namely two IVS-T2, eighteen IVS-R4, one IVS-R1, two EUROPE, and one R&D experiments).