



European VLBI Network Newsletter Number 3 September 2002

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[1. Report from the Chairman of the Consortium Board of Directors \(CBD\) of the EVN](#)

The summer has been a busy one for both engineering and scientific staff of the EVN. Major engineering work has been undertaken at various telescopes:

1. The Lovell Telescope at Jodrell Bank Observatory is emerging from its two-year upgrade programme. The surface has been replaced, and is currently being painted; the drive system has also been replaced and the track and foundations repaired. Over the coming months the surface will be adjusted eventually resulting in the telescope becoming available at 5 and possibly 8 GHz (www.jb.man.ac.uk/tech/lovellupgrade).
2. The 100-m at Effelsberg has seen its surface adjusted over the summer. A novel holographic test using the VLBA terminal, fed by a small secondary dish, and a new MkV terminal, fed by the 100-m demonstrated that the adjustments had been successful (www.mpifr-bonn.mpg.de/EVN/m5.html).
3. Finally, following the theme of surface work, the 32-m at Noto also has a new surface. This one is a fully active, computer controlled surface, for which measurements have demonstrated a major improvement in telescope gain at 22 GHz.

Other technical efforts have focused on the development and first successful demonstration of the new PCEVN VLBI disk system. This is discussed below in the article by Steve Parsley, but I would like to take the opportunity to thank all those involved in this project. Meanwhile, the scientists were busy at a variety

of meetings over the summer. One of which, the 6th EVN Symposium, focused on the science being done with VLBI. This was a highly successful meeting, involved over 120 scientists and is reported on in more detail later in this newsletter.

Finally, I would like to report one impending personnel change. Simon Garrington's term as chairman of the EVN Programme Committee comes to an end in December of this year. On behalf of the EVN community I would like to thank him for his tremendous efforts over the last three years in ensuring that the Programme Committee remains an independent peer-review body with a strong reputation. Simon will remain on the committee as the Jodrell Bank Observatory representative. He is replaced as Chairman by Patrick Charlot of the Observatoire de Bordeaux.

Phil Diamond (pdiamond@jb.man.ac.uk)
Chairman, CBD of the EVN

2. Call for Proposals - Deadline 1 October 2002

Observing proposals are invited for the EVN, a VLBI network of radio telescopes in Europe and Asia operated by an international Consortium of institutes. The EVN is open to all astronomers, and encourages use of the Network by astronomers not specialised in the VLBI technique. The Joint Institute for VLBI in Europe, JIVE (www.jive.nl) can provide support and advice on project preparation, scheduling, correlation and analysis. See www.evlbi.org/support/evn_support.html.

PIs can apply for time by completing a coversheet (www.evlbi.org/proposals/prop.html) and attaching a scientific justification (maximum 2 pages). The detailed call for proposals (www.jb.man.ac.uk/vlbi/EVN/evncall-long-oct2002.html) has further information on Global VLBI, EVN+MERLIN and guidelines for proposal submission. The EVN User Guide is available at www.evlbi.org/user_guide/user_guide.html, the EVN Status table (www.oso.chalmers.se/~vlbi/EVN/EVNstatus) gives current antenna capabilities and the on-line VLBI catalogue (www.ira.bo.cnr.it/~tventuri/cata.html) details sources observed by the EVN and Global VLBI.

EVN Observing Sessions in 2002

2002 Session 1	Feb 06 - Feb 27	18/21cm + MERLIN, 1.3cm, 6cm, S/X + ...
2002 Session 2	May 22 - Jun 12	18/21cm + MERLIN, 6cm, 5cm + ...
2002 Session 3	Nov 06 - Nov 27	(provisional dates) 6cm + MERLIN, 18/21cm, S/X +...

Proposals received by 1 October 2002 will be considered for scheduling in

Session 1, 2003 or later. Finalisation of the planned observing wavelengths will depend on proposal pressure. Most proposals request 12-48hrs observing time. The EVN PC also encourages larger projects (>48 hrs) but these may be subject to additional scrutiny, and the EVN PC may, in some cases, attach conditions on the release of the data. Special features for Sessions in 2003;

- Further 1.3cm session in February 2003 should include Noto and Torun
- Hartebeesthoek normally available for all observations south of declination 30
- 512 Mb/s capability at 6cm and 18cm
- Shorter integration times now available with the EVN Correlator at JIVE: 1 second minimum dump time for the entire correlator
- Phase referencing performance of the EVN is now greatly improved with new telescope positions (see www.evlbi.org/user_guide/stapos.html)
- The EVN Data Analysis pipeline (www.evlbi.org/pipeline/user_expts.html) is now in operation
- Lovell Telescope resurfacing (www.jb.man.ac.uk/tech/lovellupgrade/topping.html) is now complete; surface adjustment should be completed next year ready for 6cm observations in session 3/2003.

3. Report on the EVN Users Meeting

An EVN Users Meeting was held during the EVN Symposium in Bonn on 26 June 2002. Simon Garrington chaired the meeting and the following summary is based on notes kindly provided by Andy Biggs (JIVE) and Ed Fomalont (NRAO).

Phil Diamond outlined his 'Action Plan' for the EVN. This is an 'end-to-end' strategy, which aims to broaden support for the EVN and make it easier to use; all the way from proposal preparation to data analysis and archive access. Michael Garrett summarised technical progress on the network, stressing the better-than-expected performance of the 512 Mb/s tests at 18cm, and encouraging users to capitalise on the high sensitivity that the combination of routine 512 Mb/s recording and large total collecting area of the EVN provides. Cormac Reynolds described the operation of the EVN pipeline, which automates almost all of the steps required in AIPS to go from a tape received from the EVN correlator to a final calibrated data set. This procedure can be used for the majority of EVN projects and the results are posted on the www.evlbi.org/pipeline web page. In this way detailed feedback on the performance of the network can be generated. There was broad support for this initiative, although many users did not want the target images to be posted on the web. Bob Campbell reported on improved station positions for EVN telescopes which are not normally part of a geodetic network. These new positions are largely based on a 6cm EVN experiment by Patrick Charlot (Bordeaux) and make a dramatic improvement to the phase referencing capability of the EVN at 6cm.

To stimulate discussion, a questionnaire was sent out by Simon Garrington. A summary of the responses is available at

www.jb.man.ac.uk/~stg/evnusers2002.pdf. The discussion raised the following issues:

- The EVN deadline is 23:59:59 UT on 1 June, October and February for proposals, regardless of the day of the week. Proposals are normally collected and processed at MPIfR Bonn during the next working day. There is no formal guarantee that proposals received in the intervening period will be accepted. The contact for all matters regarding the receipt and processing of electronic proposals is Walter Alef (walef@mpifr-bonn.mpg.de)
- EVN and NRAO are working on a new LaTeX coversheet. There was little support for other formats (e.g. MS Word) or web-based submission.
- To help users schedule EVN experiments, a set of template schedules and example set-ups should be made available. These should follow a 'house style' which includes observations of phase calibrators, amplitude calibrators and fringe finders.
- The issue of 'central scheduling' was discussed at length with a wide range of opinions being expressed. It should be stressed that the EVN support group at JIVE will give any user as much help as they need to prepare their schedule. Users should, however, make their needs known well in advance of the deadline for schedule deposition.
- Both WSRT and Effelsberg can in principle provide good independent measurements of calibrator flux densities to check the flux scale. Users can access the WSRT local interferometry data - contact Rafaella Morganti (morganti@astron.nl or see www.astron.nl/wsrt). For Effelsberg flux density measurements contact Alex Kraus (akraus@mpifr-bonn.mpg.de) before making your schedule.
- An EVN observational status report would be very useful.

Simon Garrington (stg@jb.man.ac.uk)

4. First Fringes on the EVN VLBI Disk System

In July 2002, JIVE and Metsähovi Radio Observatory were pleased to announce the detection of 'first fringes' from the PCEVN disk system. In a special test observation, data were recorded on tape at Jodrell Bank and on disk in parallel with tape at Westerbork (thanks to Paul Burgess and Tony Foley). Later tape-tape and tape-disk correlations on the JIVE Data Processor yielded identical fringes at 256Mb/s data rate.

The prototype system used for this demonstration comprises an ordinary, office PC equipped with the VSI interface card and software developed by Jouko Ritakari and Ari Mujunen at Metsähovi Radio Observatory. The interface to the correlator was engineered by Sergei Pogrebenko at JIVE.

The design philosophy for the PCEVN is fundamentally different from that of other disk-based data recording systems for VLBI. While other teams are designing single PC solutions for Gb/s data rates, the PCEVN gets maximum performance from a commodity PC to make a scalable system. The required

data rate is achieved using multiple units. Low cost and unlimited scalability to multi-Gb/s speeds are not the only benefits of the PCEVN approach. It is especially well-suited to e-VLBI because it stores VLBI data in regular Linux files on ordinary PC hard disks.



Figure 1: The Metsähovi VSI Interface Board.
(click on image for larger version)



Figure 2: JIVE Data Distribution and Mk4 Interface Boards.
(click on image for larger version)



Figure 3: First Fringes - group photo: Back, left to right: Cormac Reynolds, Steve Parsley, Sergei Pogrebenko, Ari Mujunen, Bauke Kramer. Front: Martin Leeuwina.
(click on image for larger version)

At the heart of the system is a low-cost VSI interface board designed by the Metsähovi team. This is a standard half-size, 32-bit, 33MHz PCI expansion board that stores incoming data to PC main memory using Bus-Master DMA. The 32-bit, VSI-H standard LVDS bi-directional interface is duplicated allowing several units to be cascaded, each recording a sub-set of the input data. Further details of the VSI interface and associated software are available at <http://kurp-www.hut.fi/vlbi/instr>.

In the PCEVN the Metsähovi VSI core units are augmented with a Mk4 'wrapper' designed by JIVE. This unit handles the electrical interface to the Mk4 formatter and the correlator and implements a general purpose, cross-point switch allowing arbitrary routing of signals to the multiple PCs.

MRO has manufactured a sufficient number of VSIB boards to allow for testing and evaluation of the PCEVN concept. For the next phase of the project, four complete units are being assembled at JIVE and additional software created to allow two-station disk-disk record and replay tests in October. A live test alongside a normal VLBI session is planned in November.

Steve Parsley (parsley@jive.nl)

5. EVN User Support at JIVE

The EVN Support Group at JIVE is able to provide comprehensive support for all EVN users, including Global VLBI users. In particular, support scientists and other staff are on-hand to guide new, inexperienced (or lapsed!) users through all stages of the VLBI process:

- Proposing: assistance is available (on request) to ensure that inexperienced users submit technically sound proposals
- Scheduling: several new users have visited JIVE in order to quickly

become proficient in using SCHED. Extensive remote support is also provided by e-mail, especially if the observations require non-standard features

- Calibration & Data Analysis: once the data has been correlated to completion (and the data quality assessed), users are invited to visit JIVE in order to calibrate and analyse their data. Since May 2002 all user projects are pipelined - the default is to pipeline calibrator data only, but the user (on request) may choose to have their target pipelined too. Most recently we pipelined our first spectral line data set (including the target) with excellent results. Users are of course able to calibrate and analyse their data manually, in most cases this will produce the optimal result. Again, support scientists are on-hand to provide all levels of support, including simple logistical support for experienced users

There are various sources of financial support for users who wish to visit JIVE. In particular, users that are affiliated with an EU or EU Associate State can be funded via the European Commission's Access to Research Infrastructures programme (see [EVN Newsletter No. 1, January 2002](#)). Some travel funds may also be available to users that are affiliated to an EVN institute. More information on travel support (and user support more generally) can be obtained from the author.

Mike Garrett (garrett@jive.nl)

6. Report on the 6th European VLBI Network Symposium

The 6th European VLBI Network Symposium took place in Bonn, Germany, from 25th to 28th June this year, and was hosted by the MPIfR. The meeting was held at the Gustav Stresemann Institut, a conference centre located between Bonn and Bad Godesberg, and was well attended by around 120 scientists from around the world. The program reflected well the Symposium sub-title, 'New Developments in VLBI Science and Technology', with around 100 contributions, ranging from the latest results from astronomical observations with the EVN and other VLBI arrays, to geodesy, new VLBI methods, hardware and software, and reports from planned or upgraded telescopes. As with most previous EVN Symposia, there are written proceedings of the oral and poster presentations. But, departing from normal practice, the Symposium organisers demanded the written contributions some 2 weeks beforehand and, indeed, managed to distribute hard copies to participants at the start of the Symposium. Only a handful of the presentations are not included. The proceedings are available online at www.mpifr-bonn.mpg.de/div/vlbi/evn2002/book/.



Figure 4: Participants of the 6th European VLBI Network Symposium hosted by MPIfR in Bonn, Germany, 25th to 28th June 2002.
(click on image for larger version)

Very fortunately the Bonn weather played along, with the scientific sessions and - more importantly - the related cultural events benefiting from four days of sunshine. These included a MPIfR versus Rest-of-the-World football match, won 4-0 by the home team. Another was a visit to, and tour of, the 100-m radio telescope in Effelsberg, followed by the Symposium Dinner held in the old town of Bad Muenstereifel. Financial support for the Symposium came from the MPIfR, the European Commissions IHP program, and from the Max Planck Research Prize for International Collaboration.

Broad categories covered in the Symposium were Geodesy, Telescopes, Software & Hardware, New Methods, AGN & Variability, AGN & Their Environment, Gravitational Lenses, Circumstellar Masers & Star-Forming Regions and the Life & Death of Stars. Important technical issues discussed included the improved EVN station positions, the US-led Mark 5 Disc-Based Gbps VLBI system and the practicalities of phase-referenced VLBI observations. To begin the conference proceedings Eugen Preuss has provided an interesting and extremely valuable guide to the development of the VLBI technique, paying particular attention to MPIfR and the Effelsberg 100-m telescope's involvement.

Studies of AGN and their host galaxies were well represented at the conference. Reports concentrated on observations of variability, proper motions, evolution and structure. Some highlights included recent VSOP polarisation images of two BL Lacs (Gabuzda) which showed longitudinal magnetic fields with rapid reversals in field direction on scales of milliarcsecs or smaller. Krichbaum et al. reported a new world record in the detection of three bright AGN at 147 GHz (2 mm), which achieved an angular resolution of ~ 18 microarcseconds! An encouraging paper, presented by Garrett, summarised the capabilities of the next generation of radio astronomy facilities, with particular attention to the study of distant star-forming regions. Gravitational lenses continue to be

popular targets within the EVN user community. As well as hearing of recent work on the systems B0128+437, MG2016+112 and B1422+231, Bradac et al. discussed a method of extracting magnification matrices from VLBI observations. Biggs et al. also give a fuller discussion of the EVN/Global 8.4 GHz observations of the lens B0218+357 first reported in the [EVN Newsletter No. 1](#) (January 2002). The conference also highlighted recent observations of maser sources, particularly those associated with Miras, AGB stars and star-forming regions. Other stellar objects, including pulsars, active stars, X-ray binaries (e.g. SS433; Paragi et al.) and supernovae (e.g. SN 1986J; Pérez-Torres et al.) were also well represented.

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The European VLBI Network (EVN) website (<http://www.evlbi.org/>) is hosted by the Joint Institute for VLBI in Europe (<http://www.jive.nl/>).