EVN Tog Meeting, TCFA, Torun, Poland
Friday, April 17, 2009

Introduction

The EVN Technical & Operations Group (TOG) held a meeting on 17th April 2009 at the Torun Centre for Astronomy (TCfA) at Piwnice near Torun, Poland. Approximately 30 people attended the meeting. Andrzej Kus and Kazimierz Borkowski welcomed the participants and outlined the local arrangements. Reports and presentations from the meeting are available on the web at `http://www.mpifr.de/div/vlbicor/tog_chair/togreps09/`

1 Approval & last minute additions to Agenda

The agenda was approved without any additions.

2 Review of Action Items from last meeting

1. Following approval by the Director, Gunn to produce documentation for the Mk2/Lovell phase referencing technique. . *A document for users has been produced, which must now be approved by the Director.*

2. Polatidis, Lindqvist and Burgess to define standards for RFI monitoring and report at the next meeting. *Lindqvist has produced a CRAF document. CRAF will produce a database. Lindqvist will send information to telescope friends about what they should enter in the database.*

3. Polatidis and Walker to incorporate frequency agility information in SCHED. *Polatidis replaced by Olnon until his retirement. Current SCHED activity is to support Mark5B/C, agility is not a priority.*

4. Owners of mixed astronomical/geodetic disk pools to give database information to Whitney with a copy to the Bonn/JIVE correlators. Add astronomical/geodetic disk labelling information to the TOG wiki *Done! Alef has entered information to TOG Wiki, no information available for Nt, Sh. TOG Wiki must be moved from non-maintained site to somewhere where all can access. Campbell should invent Geo/Astro label scheme.*

5. Campbell to look into producing phasecal plots at JIVE. *Investigation is done: but there is no pcal data. New Action: Campbell should investigate this.*

6. Polatidis to sort out how to make Westerbork and Effelsberg flux densities available to the users. *Done: at PI request, Small extracts WSRT FITS files, Bach publishes flux densities at* `http://www.mpifr-bonn.mpg.de/div/effelsberg/EVN_cal/`

7. Campbell to look at Westerbork automatic flagging problem. *No action possible! Limited to 10 sec intervals.*

8. Stations to produce opacityfree gain curves at Kband before the next session. Lindqvist and Graham to produce and deliver a document describing what stations and users need to do. JIVE support scientists to inform users. *Document delivered, but FS gain curve cal difficult at short wavelengths. Stations can also use local methods to get gain curves (e.g. cross-scans).*

9. Stations with bad calibration at 6cm to investigate the reason and report back to Cimo. *Done: calibration has improved. Yang replaces Cimo.*

10. Gunn to consult Graham concerning calibration at 22 GHz. *Jodrell engineers say K-band cal not possible.*

11. Stations to inform Cimo whether their gain curves are 'opacity free' or not. *Done by most stations.*

12. Orlati & Himwich to separate LCP and RCP receiver temperatures in the FS and GNPLT, as they are different. *Done for coming FS release.*

13. Alef to ask Bachiller if Directors can donate money to purchase spare Mark 5 backplanes, and any other spare parts if needed. *Not done yet.*

14. Himwich to implement a warning in scan_check and/or 'system status monitor' for slow disks. *Done in next release.*

15. Whitney to send information on Mark 5 OS and control code package upgrade procedure. *Done*

16. Whitney to consult Conduant as to whether it would be possibly to modify their software so that a new module could be inserted at any time without interrupting recording. *Probably done.*

17. Whitney to make sure that Haystack Web pages containing recommended Mark5A software/firmware are updated. *Not done: Ruszczyk may take over this action.*

18. Whitney to investigate Mark 5C backward compatibility. *???*

19. Whitney to investigate how NRAO handle the Mark5A 'communication problem'. This refers to the Mark 5 having a tendency to be slow responding to requests. *This is probably OK in latest releases. Ruszczyk will contact W. Brisken on that.*

20. JIVE to investigate whether their version of the Mark5 software could be used also in production at the stations. *Not done.*

21. Station to upgrade their Mark5 to 'Debian Etch' as soon as possible. *Done by most stations, but not Eb*

22. Stations to present themselves and the station status (weather, telescope etc) at the beginning of the Skype chats in the NMEs. *Done*

23. Mühle to inform Alef which stations can reach 23.8 GHz. *Done: many stations still cannot reach 23.8.*

24. Alef to ask CBD for advice concerning disk logistics. He will present the following possible solutions:

   - Increase disk pool by another 50 TB per station. This should however be a buffer! We should run at about 75% capacity not 99% as we do now.

   - Increase amount of eVLBI. Observe projects not scheduled due to lack of disks (assume less efficient use of disk pool) but with acceptable grades in eVLBI sessions.

   - In normal VLBI sessions change projects to eVLBI if requirements of PI can be fulfilled that way. This assumes however, that we should use one Mark5 program for normal and eVLBI sessions.

   Done: CBD defined the recommended disk pool for 'busy' stations as 150TB, for others about twice their session usage. CBD also approved the suggested use of eVLBI.

25. Alef to inform the CBD about the frequency agility the stations. *Done: CBD has also been reminded that wide bandwidths are needed.*

26. Stations to send updated contact information to jive@jive.nl. *Done*

27. Alef to inform the CBD about the dynamical scheduling project. Small to inform Alef before the next CBD meeting. *Not done, no CBD decision, difficult legal issues.*

3   Reliability of EVN (JIVE)

Jun Yang reported on reliability. The detailed report is on the web. Packs should certainly be erased at stations, but also conditioned (permanent action). Effelsberg does not condition packs until now, but might do it in the future. Jodrell does also not; not enough manpower. Disk-packs for VLBA should be conditioned at Correlator.
JB problem with hanging recordings after a failure. It is impossible to append further data. iThe final DirList entry shows a '+'. This is probably a due to the use of 2005 software. This problem of packs not appending is fixed by newer SDK, also 'recover=2' is available.

4   Calibration

Jun Yang: results are better than ever before. For Cm a 'RAD' file is available, a conversion method to antabfs format must be introduced. JB had something wrong in EF012B, EB037D, problem being investigated. For Cm, carousel change can give different Tcal values. Kaz worried about bad cals for Tr reported last time (this was resolved in an email discussion with Cimo after the meeting). Jun Yang is updating antabfs to take care of mark5B, also wants to include frequency on plots. Pipelining s often done rather late following sessions. Opacity free gain curves from Ef/On/Sh/VLBA, not from Robledo/Ys, unknown status for Cm/Jb Mc/Nt/Mh.
New Action: Gunn and Lindqvist to invent something that stations can more easily access calibration data.

5 DBBC-2

Walter Alef reviewed dBBC progress. 2 systems at Wettzell, money from Wz has helped things along. Nz, Yebes systems ready in about 1 month. Arcetri, Irbene are dBBC-1 which can no longer be used. MPI, INAF are constructing units currently. Spinoff company HAT-lab to be set up: problem with INAF Jouko reminds us that universities may get chips cheaper or for free. Production plan: 3 units every 1/4 year.

The idea to write down a sequence of how and when to update stations to dBBC was postponed to the next meeting when more information will be available.

¿From experience in Effelsberg: Stations should check that all required signals for dBBC are available with the required quality (flat band pass, 10 MHz, 1pps).

Actions: Alef will discuss with Tuccari about dBBC acceptance test. Stations to think of smooth switch over: Build up 2nd system in parallel instead of upgrading/replacing the old.

6 Field System, status and new features

Ed Himwich gave an overview what can be expected with the next FS Linux and Field System (FS) releases. The Presentation is available on the web.

Current FS is Linux 7 based on Debian "etch". Newer Linux versions have problems supporting older GPIB hardware. A solution is to use an RS232 to GPIB interface. The current FS version is 9.10.3. The new version will be 9.11 planned for Summer 2009, which will include e.g, slow disk warnings, reload of RXG files during operation, a new version of GNPLT based on python, C++ include files for development, a new periodic MIDTP procedure called BEOB, new python based LOGPL, sampling of PCal for Geo-exp., and an updated PLOTLOG. Support for Dymo printers is provided, als a better gnplt. FS 9.11.1 is planned for late 2009 and should include the new remote interface IDL2RPC which is being developed by Alexander Neidhardt et al. from Wettzell. In addition there will be more support for PCal extraction, the new digital systems dBBC and DBE, and the use of multiple recorders. 80Hz radiometry may be included, also the code should be made compatible with gfortran.

Most of the points from the FS Priority List from the previous meeting will be implemented in FS 9.11, and some are waiting for FS 9.11.1 (see presentation for details). Support of new VLBA digital hardware is not planned. Collaboration with Wettzell is going on to set up the remote server/client architecture. Mark5C support is in progress. An update of the documentation planned and a WIKI will be set up for interactive documentation and discussion.

7 Report from regular EVN-US telecons

Dave Graham summarized the discussion on current developments that were held between NRAO, Haystack, Bonn, and JIVE. See `http://www.mpifr-bonn.mpg.de/div/vlbicor/tog_chair/togreps09/minutes_of_EVN_US_telecon0904.txt` for more details.

The VLBA plans to equip all stations with 'roach' hardware, with VDBE firmware for line observations, and the Haystack 'DBE2' for continuum. VDBE firmware is under development, the software correlator is ready to use. NRAO plans to update the array within a month, that is a few days per station.

Haystack is testing their DBE2 and Mark5C with 10GE daughter-boards. Cross testing with all available digital backends are planned.

European dBBC development is going on. A 'Fila10G' 10 GE interface is being developed to support Mark5C, until this is ready, Mark5B will be used. DBBC units are installed at Wettzell and Effelsberg and are being tested. A company is being formed to construct further units to equip EVN stations. Station/Correlator compatibility: VLBA software correlator will support VLBA, Mark5A, Mark5B to 1Gbps, LBA. Perhaps later VDIF. JIVE support Mark5A and Mark5B formats. NRAO plans to use packet firmware in 'roach'. This means Mark5C can be read on correlator as Mark5B. HSA: GBT will get new hardware, VLA also but not available as phased array, Effelsberg waiting for pricing of VDBE/DBE2.

8 Mark5

Status: Mark 5A/B/B+/C, software, firmware, SATA: Chester Ruszczyk reported via telecon from Haystack. Debian "etch" is now the recommended operating system, since "sarge" is out of date now. Mark5 software will be available as deb-packages, which allows updates with apt-get. Recommended SDK version is 8.2. The bug which prevents modules recorded in bank B not recording further in bank A should be fixed in SDK 8.2. Alastair Gunn reports a problem that their Mark5A is sometimes losing track of the pointer. The disk-pack is then not usable anymore. Ruszczyk needs to see the MarkA log to give an answer.

Might be a good idea for every stations to start their Mark5A software, so that the output is stored in a log. Makes debugging easier:

e.g., > Mark5A -m0 -f1 — & LLogr >>& /logs/m5a.log &

then > tail -f /logs/m5a.log &

to have a continues view on the log.

EVN Mark 5A program: status d-VLBI/e-VLBI Arpad Szomoru reported. Presentation is on the web. Most Mark5A run on Debian "etch", and were upgraded with new motherboards, memory, power supplies, and some with 10G cards. Some Mark5A+ units to play back Mark5B disks. Works fine.

Several units were converted from Mark5A to Mark5B and back depending on correlation needs. Conversion can be done in half an hour (ask M. Leeuwinga for details). Mark5A and Mark5B work both fine in sending data during e-VLBI experiments. As receiving units until now only Mark5As work properly. No fringes detected on Mark5B yet.

Internal network upgraded to 10 Gbps. 5 stations can do 1024 Mbps e-VLBI (Ef, Tr, Mc, On, and Jb).

Ar & Sh participate regularly in e-VLBI observations. For test and demos also Tigo, Australian stations, Kashima, and Urumqi produced fringes. VERA and KASI test are planed. To enable more reliability, online checks, and on the fly calibration a tool to provide and analyse the station logs at JIVE has been developed. Stations are encouraged to look at the online correlator status monitor on the JIVE web page during e-VLBI experiments to see if their station behaves well.

Under development at JIVE are OTF fringe fitting, log monitoring, anid RSS feed to warn of new schedules. Software correlator developments will enable FITS generation, use FUSE, and give performance similar to DifX. Grid-based correlation is also being developed, which can be

used for 4Gbps.

The 'Uniboard' is the subject of a JRA in FP7. This will enable construction of a next-generation hardware correlator, but can also be used for digital receivers, pulsar binning, and as an APERTIF beamformer. One of these boards could replace the whole EVN correlator. It has 8*FPGA, DDR3 memory and 4*10Gbps in.

Mark 5 problems encountered during last 2 sessions Mark5A at Jodrell lost track of the pointer. Several observatories made the bank B to bank A experience: disk packs that were not fully recorded in bank B cannot be put in bank A for further recording, but must be placed back to bank B. Strange recorder behaviour at UR: their Mark5 recorder ran at 1400 Mbps during a 1024 Mbps experiment.

Disk inventory and purchase status *New action: Alef is asking everybody to send him his stations disk inventory.*

Disk throughput at JIVE, balancing with NRAO, status Bob Campbell shows Figure 1 about increasing use of EVN. For more details see also EVN correlator report on the web.
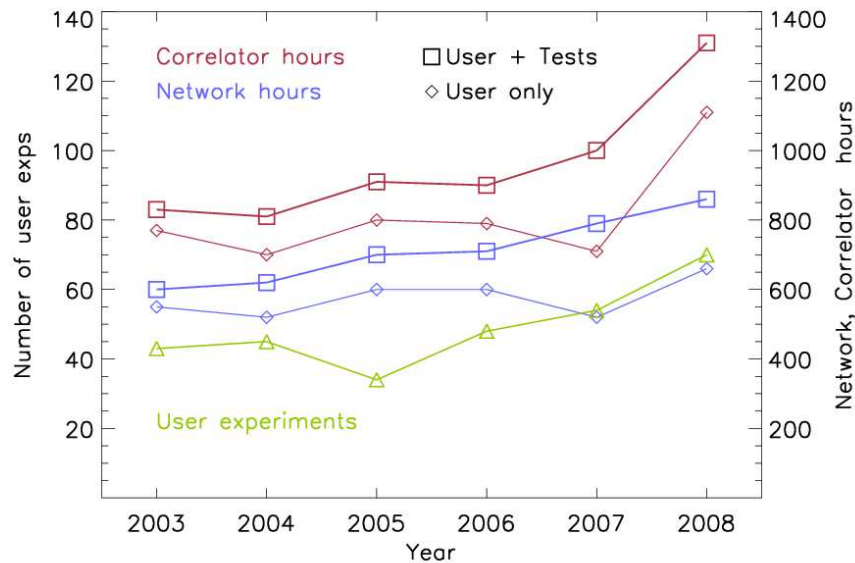

Figure 1: Increasing network and correlator hours since 2003.

Mark 5 logistics (repairs, shipping, boxes, labels, etc.) Recommendations:

- Make sure to have bank_check when packs are changed.

- Report unusual high shipping costs to JIVE.

- A discussion on large disk packs follows, since 12TB packs are now available:
  - dangerous because of many exp. on one disk, but unavoidable. Disk now larger!
  - make more e-VLBI
  - e-VLBI and disk VLBI in parallel for backup
  - e-VLBI can become expensive if we have to pay for fibre connections
  - when dBBC available, could consider recording on a 'buffer', such as Jouko's BOTB pack, then stream to JIVE.

- Don't send disk for repair if there are no spares. Useless to replace small disks. 'Small' is $< 3\,\mathrm{TB}$ at the moment.

- Tagging with 'luggage tags' is OK.

- Conditioning large packs is quicker with an 'Amazon' card (Mark5B+).

- Always check VSNs disk packs that were conditioned together. If SSErase did not finish correctly bank B gets the same VSN than bank A.

9 Data acquisition system for 4 Gbit/s, wide IFs EVN status

Walter Alef summarizes the needs to go for 4 Gbps recording. 500 MHz wide IF, Mark5C with Amazon board. On and Eb are planning to purchase such system, Jb maybe. 1.3cm: Mh IF is sufficiently wide, WSRT only with single dish, TADUMAX is limited to 160MHz. Tr will work on its K-band receiver. DSN stations have wide IF, K-band system will have 1GHz bandwidth.

10 e-VLBI status

Is becomming more and more successful. Less downtime more proposals. Several live demos were performed for special events of the International Year of Astronomy 2009 (IYA09). See also the presentation of Arpad Szomoru.

11 Technical Operations Workshop (TOW)

The Fifth IVS Technical Operations Workshop will take place at Haystack Observatory, Westford, MA, USA, between April 27 and April 30, 2009. With more than 60 registered participants it will be one of the largest TOW. About 20 of them are from Europe.

12 SCHED Developments

Current version of SCHED is 8.1, released in early 2009. SCHED developments for the EVN are done by Olnon. EVN will continue to support VEX components, and provide table entries for new stations.

13 AOB

Arpad Szomoru showed a presentation about the opening of the International Year of Astronomy 2009 (IYA09) in Paris. The e-VLBI demo that was performed for this was a great success.

14 Time and place of the next meeting

The next meeting will be held in Bonn, likely in November.

15 List of new action items

1. Alef to ask Bachiller if Directors can donate money to purchase spare Mark 5 backplanes, and any other spare parts if needed.

2. JIVE to investigate whether their version of the Mark5 software could be used also in production at the stations.

3. Alef to inform the CBD about the dynamical scheduling project. Small to inform Alef before the next CBD meeting.

4. Gunn and Lindqvist to invent something that stations can easier access calibration data.

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6. Stations to think of smooth switch over to dBBC: Build up 2nd system in parallel instead of upgrading/replacing the old.

7. Lindqvist to send information to telescope friends about what they should enter in the RFI CRAF database, when it is ready.

8. Someone from EVN and Walker to incorporate frequency agility information in SCHED.

9. Campbell to invent something to produce phasecal plots at JIVE.

10. Ruszczyk to make sure that Haystack Web pages containing recommended Mark5A software/firmware are updated.

11. Ruszczyk to contact W. Brisken to investigate how NRAO handles the Mark5A 'communication problem'. This refers to the Mark 5 having a tendency to be slow responding to requests.

Summary of "Permanent" Actions/TOG recommendations

SESSION PREPARATION:

Gunn to send email before each session when the final versions of all schedules are ready for download.

All should check that Mk5 modules are placed squarely on a flat surface when received, otherwise connectors are easily damaged when bent 8packs get inserted in Mark 5 units.

All stations should condition disk packs if time permits, especially those which are to be used for 1Gbps recording.

If a disk pack is found to be not suitable for 1Gbps recording, the label can be changed to 512 Mbps.

All stations which do both astronomy and geodesy should clearly distinguish between astronomical and geodetic 8packs and ensure there is no "leakage" into the wrong pool, as mixing pools can create problems for scheduling.

Disk packs should be shipped with one European and one US address on covers so they can be easily returned in case a shipment is lost in transit.

DURING SESSIONS:

All stations should look at data regularly with chchk program, use it to locate significant RFI and report the results to Polatidis and CRAF representatives, and use it to check phasecal throughout the session. The chchk program can be run in gaps, or for example on ftp data files.

All stations should monitor Tcal throughout sessions. This can be done by running ANTABFS and plotting the results.

All stations should forward FS error log files to Himwich in the event of a crash, including details of what the FS was doing when the crash occurred.

All stations should try to run the FS diagnostic tests and investigate the results. All stations should ship disk packs as soon as they are full, at least once per week, following the Bologna rules.

SESSION FEEDBACK:

All stations should look at pipeline results available from the EVN data archive pages at JIVE, in particular amplitude corrections found by selfcal on strong, compact calibrators. JIVE support scientists should include a comment on the quality of amplitude calibration results, especially to indicate cases where a problem may have occurred and the amplitude correction factors are unreliable. NME calibration files should be made available as early as possible. All stations should look at NME reports sent by JIVE. NMEs should be pipelined as early as possible and email sent to EVNtech when the results are available, to ensure feedback is provided well in advance of the next session.

Stations must aim to produce ANTAB and RXG files within 2 weeks after the end of a session. For eVLBI, RXG files from the previous session can often be used. ANTAB files for eVLBI experiments should be produced as soon as possible as rapid analysis is often a high priority for these experiments. JIVE should inform Alef of any problems, so that Directors can be asked to prioritise calibration if insufficient time is available at stations.