

## EVN Technical Operations Group (EVN TOG)

### Report

<b>Title</b>	1 <sup>st</sup> EVN Technical and Operations Group Meeting	
	<a href="http://www.astro.uni.torun.pl/vlbi/tog2009/index.php">http://www.astro.uni.torun.pl/vlbi/tog2009/index.php</a>	
<b>Date</b>	17 April 2009	
<b>Location</b>	Torun, Poland	
<b>Host institute:</b>	Nicolaus Copernicus University (UMK) Torun Centre for Astronomy (TCfA)	
<b>Participants</b>		
	<i>Number</i>	27
	<i>Countries</i>	DE, FI, IT, NL, PL, SE, SP, UK, USA
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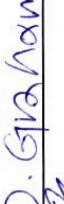



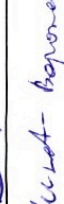

## **PARTICIPANTS LIST**

<b>No.</b>	<b>Name</b>	<b>Institute</b>	<b>Country</b>
1.	Walter Alef	MPIfR, Bonn	Germany
2.	Uwe Bach	MPIfR, Bonn	Germany
3.	Dmitrijs Bezrukovs	VIRAC, Ventspils	Latvia
4.	Kazimierz Borkowski	TCfA, Torun	Poland
5.	Bob Campbell	JIVE, Dwingeloo	The Netherlands
6.	Pietro Cassaro	IRA, NOTO	Italy
7.	Cristina Garcia-Miro	MDSCC, Madrid	Spain
8.	Marcin Gawronski	TCfA, Torun	Poland
9.	David Graham	MPIfR, Bonn	Germany
10.	Alastair Gunn	Jodrell Bank Observatory	United Kingdom
11.	Roger Hammargren	Onsala Space Observatory	Sweden
12.	Ed Himwich	GSFC, Greenbelt	USA
13.	Miks Klapers	VIRAC, Ventspils	Latvia
14.	Magdalena Kunert-Bajraszewska	TCfA, Torun	Poland
15.	Geert Kuper	JIVE, Dwingeloo	The Netherlands
16.	Andrzej Kus	TCfA, Torun	Poland
17.	Martin Leeuwinga	JIVE, Dwingeloo	The Netherlands
18.	Inese Libiete	VIRAC, Ventspils	Latvia
19.	Michael Lindquist	Onsala Space Observatory	Sweden
20.	Guifre Molera Calves	Metsahovi Radio Observatory	Finland
21.	Nicolas Pradel	ASTRON	The Netherlands
22.	Jouko Ritakari	Metsahovi Radio Observatory	Finland
23.	Ivars Smelds	VIRAC, Ventspils	Latvia
24.	Arpad Szomoru	JIVE, Dwingeloo	The Netherlands
25.	Hans Tenkink	JIVE, Dwingeloo	The Netherlands
26.	Jun Yang	JIVE, Dwingeloo	The Netherlands



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	Name	Address	Signature
1.	Walter Alef	MPIfR, Bonn, Germany	
2.	Uwe Bach	MPIfR, Bonn, Germany	
3.	Dmitrijs Bezrukovs	VIRAC, Ventspils, Latvia	
4.	Kazimierz Borkowski	TCfA, Torun, Poland	
5.	Bob Campbell	JIVE, Dwingeloo, The Netherlands	
6.	Pietro Cassaro	IRA, Noto, Italy	
7.	Roman Feiler	TCfA, Torun, Poland	
8.	Cristina Garcia-Miro	MDSCC, Madrid, Spain	
9.	Marcin Gawronski	TCfA, Torun, Poland	
10.	David Graham	MPIfR, Bonn, Germany	
11.	Alastair Gunn	Jodrell Bank Observatory, UK	
12.	Roger Hammargren	Onsala Space Observatory, Sweden	
13.	Ed Himwich	GSFC, Greenbelt, USA	
14.	Miks Klapers	VIRAC, Ventspils, Latvia	
15.	Magdalena Kunert-Bajraszewska	TCfA, Torun, Poland	

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**1<sup>st</sup> TOG Meeting**  
**RadioNet-FP7 Engineering Forum**

	<b>Name</b>	<b>Address</b>	<b>Signature</b>
16.	<b>Geert Kuper</b>	JIVE, Dwingeloo, The Netherlands	
17.	<b>Andrzej Kus</b>	TCfA, Torun, Poland	
18.	<b>Martin Leeuwinga</b>	JIVE, Dwingeloo, The Netherlands	
19.	<b>Inese Libiete</b>	VIRAC, Ventspils, Latvia	
20.	<b>Michael Lindqvist</b>	Onsala Space Observatory, Sweden	
21.	<b>Guifre Molera Calves</b>	Metsahovi Radio Observatory, Finland	
22.	<b>Eugeniusz Pazderski</b>	TCfA, Torun, Poland	
23.	<b>Nicolas Pradel</b>	ASTRON, The Netherlands	
24.	<b>Jouko Ritakari</b>	Metsahovi Radio Observatory, Finland	
25.	<b>Ivars Smelds</b>	VIRAC, Ventspils, Latvia	
26.	<b>Arpad Szomoru</b>	JIVE, The Netherlands	
27.	<b>Hans Tenkink</b>	JIVE, The Netherlands	
28.	<b>Jun Yang</b>	JIVE, The Netherlands	
29.			
30.			

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**PHOTO**



The participants of the EVN TOG Meeting in Torun (Poland) on 17. April 2009.

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## AGENDA

**09:00 Friday 17th April 2009 (Walter Alef)**

Local Arrangements/Opening Remarks (Borkowski & Alef)

1. Approval & last minute additions to Agenda [All]
2. Review of Action Items from last meeting (all; see appended list)
3. Reliability/Performance of the EVN (JIVE)
  - "near-realtime" fringe checks, status report (JIVE)
  - NME results
  - feedback from last sessions (reports from all stations, JIVE)
  - Interference monitoring, status? (all)
4. Amplitude Calibration (Cimo?)
  - Timely delivery of results? (JIVE)
  - Quality of calibration: feedback from pipeline and NMEs (JIVE, all)
  - Quality of pipeline results for feedback? (all)
  - GNPLT and calibration problems (separate receiv. temp for L and R)
  - gain curves free of opacity corrections, status?
  - Continuous calibration with the DBBC (Tuccari, Graham)
  - Cambridge calibration, status (Burgess)
5. Digital BBC status (Tuccari/Alef)
  - development status
  - production plan
  - priorities for roll-out (all)
  - First test results (Graham)
  - experience with installation at Effelsberg (Graham)
6. Field System, status and new features (Himwich)
  - Status report
  - Priority list from last meeting
    - LCP/RCP RX temperature in .rxg files
    - LO\_CONFIG command
    - Slow disk warning
    - 80 Hz Radiometry
    - Periodic monitoring (chekr) of Mark 5
    - DBBC support
    - Update Monit/Expanded Status Reporting/erchk
    - GNPLT Update
  - VLBA field system?

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- Collaboration with Wettzell
- Mark 5C, VDIF

7. Report from regular EVN-US telecons (Graham)

8. Mark 5

- Status: Mark 5A/B/B+/C, software, firmware, SATA (Haystack)
- EVN Mark 5A program: status d-VLBI/e-VLBI (Szomoru)
- Mark 5B/C in the EVN.
- Mark 5 problems encountered during last 2 sessions (all)
- Disk inventory and purchase status (Alef, all)
- Disk throughput at JIVE, balancing with NRAO, status (Campbell)
- Mark 5 logistics (repairs, shipping, boxes, labels, etc.) (all)

9. Data acquisition system for 4 Gbit/s, wide IFs EVN status (Alef)

- introduction, status of planning
- stations plans for participation (all)

10. e-VLBI status

- EVN e-VLBI operations (Szomoru)

11. TOW

- program (Himwich)
- EVN participation, comments, wishes

12. Sched Developments (??)

13. AOB

14. Continuation of TOG support in FP7; time and place of the next meeting.

15. Please provide written Station and Correlator reports by April 13!

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### LIST OF ACTION ITEMS

1. Following approval by the Director, Gunn to produce documentation for the Mk2/Lovell phase referencing technique.
2. Polatidis, Lindqvist and Burgess to define standards for RFI monitoring and report at the next meeting.
3. Polatidis and Walker to incorporate frequency agility information in SCHED.
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
5. Campbell to look into producing phase-cal plots at JIVE.
6. Polatidis to sort out how to make Westerbork and Effelsberg flux densities available to the users.
7. Campbell to look at Westerbork automatic flagging problem.
8. Stations to produce opacity-free gain curves at K-band 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.
9. Stations with bad calibration at 6cm to investigate the reason and report back to Cimo.
10. Gunn to consult Graham concerning calibration at 22 GHz.
11. Stations to inform Cimo whether their gain curves are 'opacity free' or not.
12. Orlati & Himwich to separate LCP and RCP receiver temperatures in the FS and GNPLT, as they are different.
13. Alef to ask Bachiller if Directors can donate money to purchase spare Mark 5 backplanes, and any other spare parts if needed.
14. Himwich to implement a warning in scan\_check and/or 'system status monitor' for slow disks.
15. Whitney to send information on Mark 5 OS and control code package upgrade procedure.
16. Whitney to consult Conduant as to whether it would be possible to modify their software so that a new module could be inserted at any time without interrupting recording.
17. Whitney to make sure that Haystack Web pages containing recommended Mark5-software/firmware are updated.
18. Whitney to investigate Mark 5C backward compatibility.
19. Whitney to investigate how NRAO handle the Mark5-'communication problem'. This refers to the Mark 5 having a tendency to be slow responding to requests.
20. JIVE to investigate whether their version of the Mark5 software could be used also in production at the stations.
21. Station to upgrade their Mark5 to 'Debian Edge' as soon as possible.

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

23. Mühle to inform Alef which stations can reach 23.8 GHz.

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 e-VLBI. Observe projects not scheduled due to lack of disks (assume less efficient use of disk pool) but with acceptable grades in e-VLBI sessions.
- In normal VLBI sessions change projects to e-VLBI if requirements of PI can be fulfilled that way. This assumes however, that we should use one Mark5-program for normal and e-VLBI sessions.

25. Alef to inform the CBD about the frequency agility the stations.

26. Stations to send updated contact information to [jive@jive.nl](mailto:jive@jive.nl).

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

### **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 8-packs 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 8-packs 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.



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### 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 phase-cal 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 e-VLBI, RXG files from the previous session can often be used. ANTAB files for e-VLBI 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.

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## SUMMARY

### **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/](http://www.mpifr.de/div/vlbicor/tog_chair/togreps09/)

### **Approval & last minute additions to Agenda**

The agenda was approved without any additions.

### **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/](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 opacity-free gain curves at K-band 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:*

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*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. Brinken 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.

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*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.*

### **Reliability of EVN (JIVE)**

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. The final DirList entry shows a '+'. This is probably due to the use of 2005 software. This problem of packs not appending is fixed by newer SDK, also 'recover=2' is available.

### **Calibration**

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 is 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.*

### **DBBC-2**

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.*

### **Field System, status and new features**

Ed Himwich gave an overview what can be expected with the next FS Linux and Field System (FS)

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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.

### **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](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.

### **Mark5**

#### **Status: Mark 5A/B/B+/C, software, firmware, SATA:**

Chet 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



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disk-pack is then not usable anymore. Rusczyk 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, and 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

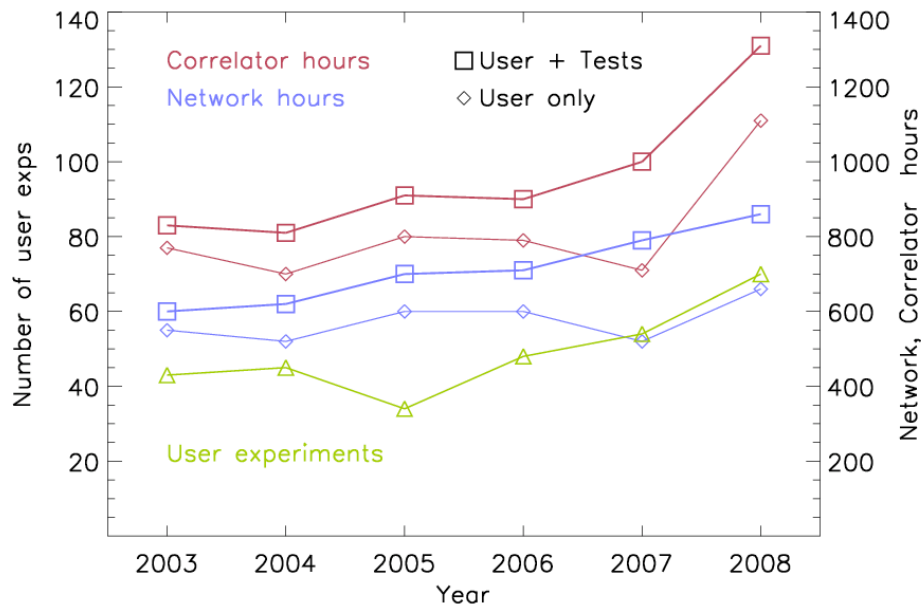
*New action: Alef is asking everybody to send him his stations disk inventory.*

### Disk throughput at JIVE, balancing with NRAO, status

Campbell shows Figure 1 about increasing use of EVN. For more details see also EVN correlator report on the web.

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**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 <3TB at the moment.
- Tagging with 'luggage tags' is OK.
- Conditioning large packs is quicker with an 'Amazon' card (Mark5B+).

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

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.

### *e-VLBI status*

Is becoming 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

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presentation of Arpad Szomoru.

### ***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.

### ***SCHED Developments***

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

### ***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.

### ***Time and place of the next meeting***

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

### ***List of new action items***

- Alef to ask Bachiller if Directors can donate money to purchase spare Mark 5 backplanes, and any other spare parts if needed.
- JIVE to investigate whether their version of the Mark5 software could be used also in production at the stations.
- Alef to inform the CBD about the dynamical scheduling project. Small to inform Alef before the next CBD meeting.
- Gunn and Lindqvist to invent something that stations can easier access calibration data.
- Alef to discuss with Tucari about dBBC acceptance test.
- Stations to think of smooth switch over to dBBC: Build up 2nd system in parallel instead of upgrading/replacing the old.
- Lindqvist to send information to telescope friends about what they should enter in the RFI CRAF database, when it is ready.
- Someone from EVN and Walker to incorporate frequency agility information in SCHED.
- Campbell to invent something to produce phasecal plots at JIVE.
- Ruszczyk to make sure that Haystack Web pages containing recommended Mark5A software/firmware are updated.
- Ruszczyk to contact W. Briskin to investigate how NRAO handles the Mark5A 'communication problem'. This refers to the Mark 5 having a tendency to be slow responding to requests.

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### ***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 8-packs 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 8-packs 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 phase-cal 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 e-VLBI, RXG files from the previous session can often be used. ANTAB files for e-VLBI experiments

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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.



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## **FINANCIAL REPORT**

The EU-project RadioNet-FP7 (contract no.: 227290) has partially sponsored the TOG Meeting on 17. April 2009 in Torun (Poland). The Nicolaus Copernicus University and Torun Centre of Astronomy hosted the meeting. The local organisation costs were partially supported in the level of ~1.900€, additionally the travel expenses of several participants were supported in the total range of ~4.000€.