

EVN TOG Meeting, INAF, Bologna, Italy, 22nd September 2008

Introduction

The EVN Technical & Operations Group (TOG) held a meeting on 22nd September 2008 at the Istituto di Radioastronomia (INAF) in Bologna, Italy. Approximately 50 people attended the meeting. Franco Mantovani welcomed the participants and outlined the local arrangements.

Reports and presentations from the meeting are available on the web at http://www.mpifr-bonn.mpg.de/div/vlbicor/tog_chair/togreps08/

1. Approval & last minute additions to Agenda

The agenda was approved without any additions.

2. Review of Action Items from last meeting

The TOG reviewed action items from the previous meeting.

1. Action: Following approval by the director, Garrington to produce documentation for the Mk2/Lovell phase referencing technique. Still open. Garrington replaced by Gunn.
2. Action: Polatidis, Lindqvist and Burgess to define standards for RFI monitoring and report at the next meeting. Still open. Lindqvist reported that CRAF is working on a web-based tool for entering RFI-information. Lindqvist suggested that the EVN should use the same database.
3. Action: Format of wx information in the logs to be checked for Torun. This has been done.
4. Action: De Vicente to report on implementation of continuous tpi on VLBA systems. This has been done. See report below.
5. Action: Reynolds and Walker to incorporate frequency agility information in SCHED. Still open. Reynolds replaced by Polatidis. Next release will be finished in a couple of months. See discussion below.
6. Action: Paragi and Foley to produce a guide for polarization calibration using WSRT local interferometry data. This has been done.
7. Action: JIVE software correlator group to implement labeling of fringe plots with sky frequency and sideband. This has been done.
8. Action: Owners of mixed astronomical/geodetic disk pools to give database information to Whitney. Foley to add a wiki page for astronomical/geodetic disk labeling information. Still open. We have problem with disk leaking.
Action changed to: Owners of mixed astronomical/geodetic disk pools to give database information to Whitney with a copy to the Bonn/JIVE correlators. Alef will ask NRAO if this information could be added to TRACK. Add astronomical/geodetic disk labeling information to the TOG wiki.
9. Action: Campbell to look into producing phase-cal plots at JIVE. Still open. Phase-cal is an important diagnostic tool according to Whitney.
10. Action: Stations to produce opacity-free gain curves for the next session. Lindqvist and Graham to produce a document describing what stations and users need to do. JIVE support scientists to inform users. Still open. Action changed to: Stations to produce opacity-free gain curves at K-band for the next session. Lindqvist and Graham to produce a document describing what stations and users need to do. JIVE support scientists to inform users. Stations to inform Cimo which gain curves are opacity free. See discussion below.
11. Action: Alef to ask Mantovani if directors can donate money to purchase spare Mark 5 backplanes, and any other spare parts if needed. Still open. Mantovani replaced by Bachiller.
12. Action: Himwich to be contacted regarding implementing slow disk warnings in the Field System. Contact has been done. Implementation not completed. See discussion below.
13. Action: EVN Scheduler to try to schedule future NMEs in the early part of the day in Europe, to better facilitate rapid response to fringe test feedback. This has been done.

14. Action: Reynolds to discuss with Craig Walker a change to the current 90-minute no gap warning in SCHED, to reduce the maximum interval for EVN stations. This has been done.
15. Action: Orlati to contact Himwich regarding separation of LCP and RCP receiver temperatures in the FS and GNPLT, as they may be different. Still open.
16. Action: Bach, Zsolt, Paragi and Tony Foley to sort out how to make Westerbork and Effelsberg flux densities available before the next session. This has been done. However, it was not clear how they are distributed to the astronomers. Polatidis will check.
17. Action: Reynolds to look at Westerbork automatic flagging problem. Still open. Campbell will contact Reynolds.

3. Reliability/Performance of the EVN (JIVE)

Cimo reported on reliability and performance of the EVN. The detailed report is available on the web.

The median EVN reliability indicator (ERI*) stays at a high level, 0.85. The ERI* for e-VLBI experiments has improved considerably since 2006 and has now reached 0.95 which includes time lost at the correlator due to restarts being needed, as well as occasional station failures. Thus e-VLBI is already effectively matching the reliability of disk recording.

Some stations have reported brief data losses due to problems with either Mark 5 or FS control computers which required rebooting. This problem seems to occur less frequently than previously reported. However, when Himwich asked about problems requiring reboot of the FS-system computer no one could answer. Several issues related to hardware problems (from power supplies to antenna drives) have occurred. It seems that the stations have more and more problems with Mark 5 disk modules, including slow disks. A possible cause is aging of the disks.

Maccaferri requested a change in the Mark 5 software so that a module could be inserted at any time. In some schedules it is very difficult to find time for a module change.

Action: Himwich to implement a warning in scan_check and/or 'system status monitor' for slow disks.

Action: 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.

Data throttling during 1Gb/s experiments at Cm (cause identified, solution enacted). Phase jumps in Tr (lasted for 2 sessions, solved in April 2008). Some stations had problems with VCs. This could be spotted by the ftp tests in some cases. Cimo reminded the friends that the NME reports give information about the VC statistics.

All the ftp tests have been successfully done using the JIVE software correlator. An informative web page is available shortly after each ftp test. Skype conference during the NME/FTP tests has been very helpful to quickly communicate with the stations. FTP tests spotted a number of (quickly fixed) problems. However, some stations are slow to respond in Skype conferences.

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

In EA038, more Merlin stations were used. Cambridge, Defford, Darnhall and Knockin recorded on the same disk pack. The Yebes 40m telescope participated in K-band 2/2008.

Lindqvist reported on the CRAF RFI-database initiative and recommended that the EVN should use the same database and format. Lindqvist will report back from CRAF when the database is ready to use. A description of the CRAF adopted format can be found on the web page.

Pazderski reported on RFI-monitoring at Torun.

4. Amplitude Calibration

Cimo reported on the amplitude calibration of the EVN. The detailed report is available on the web.

Some stations still fail to deliver ANTAB-files two weeks after the session. The importance of timely calibration data for e-VLBI experiments was again emphasized, particularly as rapid analysis is often important for e-VLBI experiments. RXG files from the previous session can be used. Lindqvist noted that some NMEs from the latest session are still not pipelined. It is very important for the stations to have the NME result fast. He also urged JIVE to contact the friends directly when a problem is found.

Results are similar to those reported previously. Besides general slight improvements, some worsening is clearly noticed at 6 cm. At L-band, RFI remains the major source of errors. Calibration at this frequency is quite variable with occasional experiments having quite large errors. However, most L-band experiments give reasonable results at most stations.

Action: Stations with bad calibration at 6cm to investigate the reason and report back to Cimo.

Opacity free gain curves was discussed. It is unclear which stations produce opacity free gain curves according to Cimo. This must be solved. The meeting decided that opacity free gain curves at K-band must be ready before the next session. Graham had some ideas how to obtain Tsys at K-band for Jb Mk2. N08K3 tested some EVN stations at the new

VLBA frequency at 23.8 GHz. Alef requested more information on this matter.

Action: Stations to produce opacity-free gain curves at K-band for the next session. Lindqvist and Graham to produce a document describing what stations and users need to do. JIVE support scientists to inform users.

Action: Stations to inform Cimo whether their gain curves are 'opacity free' or not.

Action: Gunn to consult Graham concerning calibration at 22 GHz.

Action: Mühle to inform Alef which stations can reach 23.8 GHz.

Stations continue to produce their own ANTAB files using the 'antabfs' scripts. The ANTAB script has been written and maintained by Cormac Reynolds. From the last session, Giuseppe Cimo is in charge of maintaining and updating the code. Stations should consult Cimo for improvements and suggestions for updates.

De Vicente reported good progress on the continuous cal with VLBA terminals, see report on the web. Implementation status for DBBCs was discussed.

5. Mark 5

Whitney reported on the Mark 5 development. The detailed report is available on the web.

Whitney gave a thumbnail summary of the different versions of Mark 5. All Mark 5 types are compatible with standard Mark 5 disk modules. Mark 5C is under development and it will support 4 Gbps sustained recording. A first prototype (version 1) is expected later this year. The final version (version 3) is expected in the middle of next year. There were questions regarding Mark 5C backward compatibility.

Action: Whitney to investigate Mark 5C backward compatibility.

SATA is now fully supported but the stations must install correct software and firmware versions. It was unclear whether this information was available on the Haystacks web pages.

Action: Whitney to make sure that Haystack Web pages containing recommended Mark5-software/firmware are updated.

Action: Whitney to send information on Mark 5 OS and control code package upgrade procedure.

There was a question whether PATA-module could be upgraded to SATA. This can not be done according to Whitney. Significant differences have been noted between disks from different vendors (Seagate best, WD OK, Maxtor poor).

A Debian Etch Mark 5 distribution is available. It replaces Red Hat with freely distributed Debian. Use the latest SDK 8.1 release from Conduant. It has proven to be quite stable according to Whitney. The only known issue is somewhat an edge case of switching between 2 SATA modules and 2 PATA modules.

Whitney described VDIF (VLBI Data Interchange Format). A panel discussion at the Shanghai e-VLBI meeting led to the formation of a VLBI data standards committee (Mark Kettenis, JIVE; Chris Phillips (ATNF), Mamoru Sekido (NICT), Alan Whitney (MIT, chair). The intent is to allow easy transfer of data among heterogeneous systems (Mark 5C, PC-EVN, K5, Australian disk system, etc) using real-time e-VLBI, e-transfer and/or disk files. Whitney emphasized that it addresses only the data format, the e-VLBI transfer protocol will be addressed in a separate specification, yet to be written; this combination will replace VSI-E, which was judged too complex.

Szomoru reported on the Mark 5 status at JIVE. The detailed report is available on the web. Recent result indicate green light to upgrade to Mark 5B at the stations. Szomoru indicated problems obtaining B-data. He had to convert A-data to B-data which is not optimal. De Vicente asked whether we all should move to SDK8. That should not be a problem according to Szomoru. There was a suggestion from Neil to write a label with the SDK version on the module if an update has been done at the station. The meeting discussed whether the JIVE version of the Mark5-software could be used also in production at the stations, i.e. for recording.

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

Mark 5 problems encountered during the last 2 sessions were discussed. The standard Mark5-'communication problem' was mentioned.

Action: Whitney to investigate how NRAO handles the Mark5-'communication problem'. This refers to the Mark 5 having a tendency to be slow responding to requests.

Alef presented the disk inventory and purchase status. The detailed report is available on the web.

600 TB/session is needed according to the Scheduler. Not all stations have reached the 150 TB limit.

Campbell presented the disk throughput at JIVE. The detailed report is available on the web. It is important to send packs to JIVE as soon as possible. The Bologna rules still apply! Stations were also urged to look at the web page and update their contact information.

Action: Stations to send updated contact information to jive@jive.nl.

Gunn suggested that we purchased more disks to solve the logistic problem with modules. The meeting discussed this and the following action item was formed.

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

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

The meeting also discussed the frequency agility of the stations. Alef should investigate frequency agility within the EVN and bring up potential problems and solutions to the CBD.

Action: Alef to inform the CBD about the frequency agility at the stations.

In summary, it is clear that 1 Gbps as default for continuum observations is not yet met due to disk shortage.

Leeuwinga gave a presentation how JIVE deals with broken disk packs. The detailed report is available on the web. First indication is a missing or dim LED which points out where the slow/broken disk is located. The broken disk is replaced with a new one from the supply of spares. When there is still warranty on the broken disk, it is sent back to the manufacturer and replaced for a new one. When the warranty has expired, JIVE will send the broken disk back to the station (owner). The station will be asked to send JIVE a replacement disk of equal or bigger capacity. Whitney asked how often does JIVE see bad disks also with the manufactures software. Most of the time according to Leeuwinga. Whitney asked about the failure rate, at Haystack they have seen 0.5%. Probably something similar is seen at JIVE according to Leeuwinga.

6. Digital BBCs status

Tuccari gave a presentation on the Digital BBCs status. The detailed report is available on the web.

The hardware of the Core2 board is ready and has been tested. Further tests with the DBBC firmware are still needed, which should take about one month. The 10 GE interface card is still under development. The firmware in its present version can provide 4 DBBCs (U+L) on one FPGA. The filter shapes have been improved. The tuning precision will be increased via a floating point LO. A fixed filter-bank firmware with real output is available, too, but requires testing. The control software has to be upgraded from the Core1 to the Core2. Wetzell is working on the integration in the FS. MPI has joined that effort, which should allow easy integration of new hardware in the FS and also remote VLBI observing.

The first two DBBC.2 systems will be installed in Wetzell in October. A third system in Wetzell will be upgraded from ver.1 to ver.2 at the end of this year. Additional DBBC.2 prototype backends are under construction to be delivered to Effelsberg, Yebes, Noto. Two DBBC.1 systems already delivered to Arcetri and Irbene will be upgraded to the ver.2.

The backend will be produced by a spin-off company named HAT-Lab which will start operation probably in October, as numerous bureaucratic procedures have been necessary that took much longer than expected. It will take about 3-4 months from order to delivery and the company will be able to build 3-4 units at the same time. There were questions regarding 'plug and play compatibility' of the DBBC when it is delivered from the company. Tuccari then brought up three matters of concern: a) Local oscillator compatibility, b.) FILA10G and c.) Firmware.

Whitney reported on the Digital Backend (ROACH) development. The detailed report is available on the web. It is a joint development with NRAO, Haystack, UC Berkeley and South Africa. Prototype should be ready in the spring of 2009.

Alef reported on the replies to the DBBC survey. The detailed report is available on the web. Unfortunately, several stations did not answer.

The meeting discussed when and how will EVN switch to Mark 5B. There was a consensus to switch when the DBBC is ready/available. Mixed mode observations will not be a problem for JIVE.

7. Field System, status and new features

Himwich reported on the Field System, status and new features. The detailed report is available on the web.

FS Linux 7 Distribution now available. It is based on Debian 'etch'. It uses RAID1 for more robust operations with two disks. The current status of FS 9.10.3 was discussed. The TNX command has been expanded. It supports multiple forms of error messages. FS 9.10.4 will be released in October. The most significant changes since FS 9.10.3 will be: new versions of "logpl" and "plotlog" plotting utilities, a new "monpcal" utility for real-time display of phase-cal at stations with Mark IV Decoders, and bug fixes. The slow disk warning will be implemented in a later version, FS 9.11.0. DBBC/DBE support, as well as 80 Hz radiometry, is planned to be implemented in FS 9.11.1. Longer term development items for the FS were discussed.

The Field System Priority List was discussed and defined:

- Separate LCP/RCP RX temperature in .rxg files
- LO_CONFIG command
- Slow disk warning

- 80 Hz Radiometry
- Periodic monitoring (check) of Mark 5
- DBBC support
- Update Monit/Expanded Status Reporting/erchk
- GNPLT Update

Neidhardt reported on a suggestion for an extension of the VLBI field system. The detailed report is available on the web.

He discussed how to remotely control the VLBI antenna at O'Higgins/Antarctica. Communication will be done with Remote Procedure Calls via ONC RPC over SSH. As a general approach it could serve as a general field system extension.

Small reported good progress on the dynamic scheduling project. The detailed report is available on the web.

He described the first dynamically switching between the sources DA193 and 4C39.25 during an e-VLBI run (28 August 2008). The switch was made at Torun and Westerbork (in single dish mode), with Jodrell remaining on the first source. Fringes were obtained to all three telescopes before, and again between Tr and Wb after the switch.

An updated schedule file was created at JIVE, then copied to and 'drudg'ed at the stations and the field systems updated with the new schedule, all of this being done by 'remote control'. The two schedules were identical except for the target sources.

This first attempt at EVN dynamic scheduling shows that in principle on-the-fly schedule changes are feasible - with the caveat that the observing setup remains the same.

The TOG considered this project important but some friends were worried for the safety of the telescopes. More tests are needed and exact procedures need to be worked out.

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

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

Alef reported on the 4 Gbps initiative. The detailed report is available on the web.

The main conclusion is that the EVN can at some moderate cost upgrade the VLBI backends to 4 Gbps. The recorder of choice is the Mark 5C, as it can record in Mark 5B format and in addition can record 4 Gbps. The DBBC with at least four Core2 boards will provide compatibility with all present geodetic and astronomical VLBI which is based on Mark IV and VLBA record terminals. It will also be compatible with NRAO's and Haystacks sampler/filter units. EVN's recorded 4 Gbps VLBI (like eVLBI at that rate) requires additional efforts on the correlator side. The implementation of slow-down should become a priority at JIVE. As an alternative such data could be correlated with a software correlator.

A number of EVN stations have receivers and IF systems which will allow VLBI at 4 Gbps (C-band X-band, K-band and Q-band). All stations should plan for upgrades of IFs and receivers to allow higher VLBI data rates. Bandwidths of 2 GHz should be the aim, in particular at 22 and 43 GHz. Frequency ranges etc. must be discussed with the VLBA.

Alef was charged, at the CBD-meeting in Bordeaux, to coordinate the creation of an implementation group to upgrade EVN to 4 Gbit/s, and set up regular teleconferences between EVN TOG and NRAO. Alef reported on the kickoff teleconference, September 16. Alef, Graham, Lindqvist, Romney and Tuccari participated in the first meeting. It was agreed that regular consultations between the technical bodies of the EVN and NRAO would be useful. They should be organized as telecons to be held every two months. Involved parties should be NRAO, EVN and Haystack. TOG suggested that Whitney and Szomoru should be invited.

9. VSOP-2

Hagiwara and Kono reported on the ASTRO-G/VSOP-2 project. The detailed report is available on the web.

ASTRO-G/VSOP-2 will operate dual polarization receivers at 8, 22 and 43 GHz. The launch will take place in January/February 2013. Target life time is expected to be 3 years. The antenna diameter will be 9.3 m with a surface accuracy of 0.4 mm rms. The pointing accuracy will be 0.005 deg. Participation of international partners in the ASTRO-G/VSOP-2 project was discussed.

The TOG stated that the compatibility of the EVN for recording with VSOP2 can be achieved by upgrading the stations to the DBBC and Mark 5B (or 5C) and implementing firmware for 128 MHz sub-bands. Mark IV correlators cannot be used to correlate VSOP2 data.

10. Sched Developments

Polatidis reported on SCHED developments. Main points were:

- There will be a new release of SCHED (planned for December 2008)
- PIs should make sure that they use the most recent versions of the SCHED catalogs: stations.dat, locations.dat, freq.dat. Preferably PIs should contact JIVE, for any recent developments. When the Yebes 40m came online, there was no official update of the SCHED catalogs but things were distributed from JIVE. The same is also true for non-standard frequencies. In theory JIVE could have an updated version of the catalogs on the JIVE web site, but this will definitely diverge from the official catalogues and will lead to even more confusion.
- Other longer term developments of SCHED will be: Mark 5B support (does not concern users) and proper "astronomical" S/X scheduling (but this is a can of worms that gets worse with time).

11. e-VLBI status

Szomoru reported on EVN e-VLBI efforts and EXPReS developments. The full presentation is available online.

Since November 2007 a number of successful e-VLBI science experiments has been observed. Many technical developments has been tested and several high-profile demos has been performed. The April 8 session featured a record-breaking >12 hours uninterrupted subjob at 512 Mbps, demonstrating the greatly improved stability and reliability of the correlator system.

The JIVE-developed Mark5 control code (with the option to interactively drop packets to fit the data stream to the available bandwidth) has been improved and has become the de facto operational control code for e-VLBI operations. The use of the UDP protocol (modified to take account of missing and/or out-of-order packets) made reliable 512 Mbps transfers possible. Packet dropping has pushed the data rates to near-Gbps, at least to the stations with upgraded Mark5 motherboard/CPU combinations.

Arecibo made its re-appearance in e-VLBI on 5 February, with data transfers of up to 100 Mbps (with packet dropping). Later that year a lightpath between Arecibo and JIVE was put in place, allowing 512 Mbps transfers, (at least during pre-agreed time-slots). Effelsberg joined the e-EVN in February 2008, with a successful transfer of formatter data at 256 Mbps. First fringes followed on 1 April, both at 512 Mbps and at near-1 Gbps. In an unexpected development Hartebeesthoek became the next station to join the e-EVN. A 1 Gbps connection between Hartebeesthoek and the nascent South African NREN, SANReN, in Johannesburg, and from there at 64 Mbps via London to JIVE, became available in May 2008. Hartebeesthoek then participated in two very successful demos, of which one was rather ad-hoc, organized for the visit of a high-ranking EC delegation to the Hartebeesthoek telescope site, and the other the high-profile TERENA 2008 demo, in Bruges, Belgium. This last demo produced fringes between TIGO, Hartebeesthoek, Arecibo, Effelsberg, Westerbork, Medicina and Onsala, effectively a 4-continent correlation.

Transfers at a full 1024 Mbps from Westerbork, Effelsberg and Onsala in a user experiment will be done soon. Initial tests look promising.

Action: Station to upgrade their Mark 5 to 'Debian Etch' as soon as possible.

Whitney reported on the e-VLBI status at Haystack. The detailed report is available on the web. Main points were:

- Increasing use of e-transfer for geo-VLBI
 - All daily UT1 'Intensive' observations
 - All geo-VLBI data from Japan and Antarctica
 - Fortaleza connected at ~ 600 Mbps; under test
 - Kokee Park (Hawaii) to be connected soon
 - USNO correlator to be connected soon at ~ 600 Mbps
 - e-transfer is critical for verification of mm-VLBI setup
- No support for e-VLBI from NSF; some possibility of NASA support for e-transfer from some VLBA stations for precision spacecraft tracking, but far from certain; very expensive to connect VLBA stations.

Ritakari gave a presentation on 8-Gbps eVLBI howto. The detailed report is available on the web. During the summer they finished the iBOB UDP development. Together with Onsala they have done demo transfers at 2, 4, 6 and 8 Gbps rates and streamed a true 8bit digitized IF signal at these rates from Metsähovi over the common Internet to Onsala over many hours and on several days. It worked perfectly with no packet loss. No lightpaths were involved. They have developed a new data storage system (4GEXPReS) that is capable of 4-6 Gbps today and 8 Gbps in the near future.

Together with Pogrebenko et al., software for Intel and Playstation3 was developed that can be used as a versatile classic spectrometer at realtime rates. They also created new sample processing software for phaselocked satellite tracking that is based on the phase referencing method. JIVE developed the analysis tools. They could achieve highly promising results in several ESA Venus and Mars Express observation sessions, see report for details.

12. AoB

The Fifth IVS Technical Operations Workshop will take place at Haystack Observatory, Westford, MA, USA, between

April 27-30, 2009. Input and suggestions should be sent to Himwich. Alef urged stations to send people there.

Lindqvist reported on EVN activities during the International Year of Astronomy. The report is available on the web.

Alef reported that there will be a continuation of TOG support in FP7.

13. Time and place of the next meeting

The next meeting will probably take place in April 2008, at a location to be decided.

Alef thanked all for a productive and good meeting.

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.
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15. Whitney to send information on Mark 5 OS and control code package upgrade procedure.
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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.
22. Stations to present themselves and the station status (weather, telescope etc) at the beginning of the Skype chats in the NMEs.
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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.
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

13.1 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.

13.2 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.

13.3 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.