Minutes v2

Date: 23.1.2014, 24.1.2014
Time: 9:00 – 18:15, 9:00 – 11:00
Location: Geodetic Observatory Wettzell
Attended by: (see separate list), via Skype and telephone: W. Brisken, J. Romney, C. Ruszczyk
Chair: Michael Lindqvist
Minutes: Walter Alef

Subject: EVN Technical and Operations Group (EVN TOG) Meeting

1. Local Arrangements/Opening Remarks

1.1. Welcome by A. Neidhardt & local arrangements

1.2. Welcome by T. Schüler (observatory director)

1.3. Welcome by TOG chairman M. Lindqvist

2. Approval & last minute additions to Agenda

Results:

- No additions to the agenda

- Tuccari could not attend. His presentations will be shown by Wunderlich and Casey.

- The order of items if the agenda was changed somewhat to accommodate the American colleagues who called into the meeting at fixed times. This is not reflected in the minutes.

3. Acceptance of minutes from last meeting

Results: The minutes from the Bonn meeting were accepted without changes

4. Review of Action Items from last meeting

4.1. *Action Items from the Bonn meeting:*

1. Make sure that the SCHED catalogue is updated when a DBBC (or other new equipment) is taken into production. Friends should send information to Campbell.
   - This is a permanent Action Item. — ***Removed.***
2. All stations: check out the spare part list on the wiki and make sure that each institute contributes. https://deki.mpifr-bonn.mpg.de/Working_Groups/EVN_TOG/EVN_spare_parts
   - Many stations have entered their spare parts on the wiki. Missing parts are spares for the DBBC. Move to permanent Action Items. — ***Removed.***
3. Bach/Alef: Look for new possibilities to implement phasecal.
   - ***Done.*** Bach reports on status:
     - There is a new design by A. Rogers. Bach will put a link on the wiki.
     - Agilent offers a comb generator which goes up to 67 GHz and 26 GHz. Bach will put the links on the wiki. Cost < 20 k€.
     - De Vicente reports on their own design. Goes up to 33 GHz with 1 MHz and 5 MHz spacing. Cost ~40 k€.
     - Wettzell has built a unit which goes up to 14 GHz with 5 MHz spacing for VGOS.
4. All L- and C-band stations: determine beam shapes at L- and C-band, if possible at different elevations. Send results, as well as the elevation intervals used, to Keimpema.
   - *see later agenda point and renewed AI.*
5. Leeuwinga: send information to stations on how to include the Mark5 command 'get_stats' correctly in the procedure file.
   - ***Done!***
6. Alef: send information to stations on conditioning code of Brisken.
   - not finished. Rottmann verified that code can easily be changed to work in standalone mode. Has to be programmed still. Will be added to jive5ab (see below).
7. Verkouter: see if the conditioning code can be incorporated in jive5ab.
   - see later agenda point. ***Done!***
8. Yang: write piece on phase errors and determination of accurate positions in next EVN newsletter.
   - ***Done!***
9. All stations: install Burgess' script lgput to send logfiles to vlbeer automatically.
   - ***Done.*** Most stations do this. *Missing stations:* KVN, Noto, Medicina. Separate procedures for GEO/ASTRO have to be used.
10. All stations: send any information on any update of station position to Campbell and/or Yang.

- Same as AI 1. — *Removed.*
11. All stations (except Wettzell): implement 80 Hz continuous calibration.
    - Ongoing.
    AI: Helldner to send info on 80 Hz unit to EVNTECH & wiki.
12. All stations: report Mark5C bugs to Ruszczyk.
    - bugs have been reported to forum. No response from Haystack. Probably busy with Mark 6. JIVE planning to support Mark 5C. Continue using forum but also post to EVNTECH.
13. All stations: upgrade any FS 9.11.x to at least 9.11.2 if they are using a Mark5B (fix of automatic bank switching).
    - latest version 9.11.5 (not yet out) is OK. Most stations have upgraded. Lindqvist will contact those who have not again.

4.2. Permanent Action Items

Selected AIs were discussed (highlighted on meeting agenda):

1. If a disk pack is found to be not suitable for 1 Gbps recording, the label can be changed to 512 Mbps.
   - This is not done in general. Modules are better fixed when they get slow: *Remove AI.*

2. 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.
   - put labels on all covers. Note: NRAO sends modules without covers.

3. All stations should look at data regularly with chchk program, use it to locate significant RFI, report the results to Yang and CRAF representatives and enter them into the RFI-database, and use it to check phasecal throughout the session. The chchk program can be run in gaps, or for example on ftp data files.
   - The chchck program only works for Mark5A. Bach has a script to display the auto-correlation for all modes. He has a wrapper which is not yet ideal and needs some improvements. — *Delete AI.*
   AI: Bach to send description of script to evntech.

5. RadioNet3

Lindqvist mentions support of RadioNet3 of the meeting and thanks the EU taxpayer.

6. Reliability/Performance of the EVN

(for details see presentation by Yang)

Summary

Highlights:

- Successfully demonstrated 4Gbps e-VLBI on Sept 18th,2013.

- The KVN has now became an associate member of the EVN (as from Jan 2014).

- A new C/L band receiver was installed in the Onsala 25m radio telescope after Session 1/2013.

Problems: bad weather in 1/2013, Russian customs, failed receivers. Some human errors
Performance somewhat worse than usual. As before FTP tests helped fixing problems before observing.

7. Amplitude Calibration

7.1. Quality of calibration

(for details see presentation by Yang)

Summary

Lindqvist thanked Yang for his support of EVN calibration.

The DBBC 16 MHz filter has a bandwidth of ~13 MHz. This problem will get the current EVN pipeline fail to give a proper amplitude solutions. Tuccari has fixed this, and the new software has to be tested.

Telescopes with sometimes bad calibration: Jb, Sh, Sv, Mc, Ur, Zc.

- Jodrell Bank 1 and 2

  ◦ No reliable observing system. (this seems to be due to different receivers being used)

- Medicina in Session 1/2013

  ◦ The L-band receiver was not positioned correctly on the focus.

- Urumqi at 18cm

  ◦ Further effort is requested to well upgrade 18cm rxg file.

- Sv, Bd, and Zc

  ◦ Nominal SEFD was used in the antabfs file

  ◦ So far, there is no effort confirmed on providing well-measured Tsys data to the EVN users in the upcoming years.

- Shanghai in Session 2/2013

  ◦ Long baselines, hard to give proper solution.

7.2. Timely delivery of ANTAB-files?

Most stations use Burgess' script for automatic upload of logs. ANTAB files are in general

uploaded in a timely fashion.

AI: Linqvist to change Bologna rules to change responsibility for ANTAB file generation.

AI: Noto to install and use automatic upload of logs.

AI: Quick to send info on new ANTABFS to evntech.

7.3. ANTAB-files new systems

Nothing new to report. JIVE will continue to monitor for ANTAB-files of new backends. ANTABFS now supporting DBBC on-off Tsys measurement thanks to Quick and 80Hz radiometry and mix-mode wide-band VLBI observations. A few improvements to increase the quality of calibration.

7.4. Beam-shapes for calibrating off-axis detections

(for details see presentation by Keimpema)

Background is calibration of multi-field correlations. The theoretical beam-shapes of the telescopes are modified by tapering of illumination and support legs of secondary focus. So far 2 maps of the beams of Effelsberg and Onsala were sent and were used for fits.

Unsolved question are e.g. the elevation-dependance of the beam maps.

Results: Question: how complicated a solution should we go for?

AI: All stations to measure beam-maps at L- and C-band (provided appropriate software is available at the telescopes) and send them to Keimpema.

AI: Keimpema: The difference between the theoretical and measured beam correction for the relevant part of the beam has to be investigated.

8. Digital BBC-systems

8.1. DBBC development and production status

(for details see presentation; presentation of Tuccari given by Wunderlich)

More than 30 DBBC2s have been ordered or built. New firmware versions have been created with improvements and new features. This "EVN" project suffers from lack of EVN support in the form of manpower.

8.2. DBBC experience at stations

- Some SMA cables are not done too well. Can cause failures.
- Yebes has noticed that in comparing 1PPS in and 1PPS out sometimes jumps of 1 s are seen. De Vicente will provide a report with more details. De Vicente thanked Wunderlich for his extensive and good support.

- Wunderlich suggests a Tiger Team to travel to EVN stations to fix DBBC problems and teach local personnel. MPI would be willing to finance working hours, but host would have to finance travel and stay. **Lindqvist will forward this proposal to the CBD.** DBBCs don't like to travel!

- Wettzell still uses MK IV because of internal reasons. Bonn would prefer data from DBBC.

- Torun still uses MK IV. Too little experience? Checking the functioning of DBBC not easy. Monitoring software only rudimentary due to lack of manpower in this EVN project. **AI: Bach, Quick, de Vicente, Verkouter create test specs/procedures for DBBC (possibly including JIVE5abc).**

8.3. *DBBC spare parts*

Spare parts were ordered. Waiting for delivery of parts to manufacture spares.

8.4. *DBBC feedback from JIVE; R1002 and CDAS feedback from JIVE*

No problems with permanent EVN DBBC stations. JIVE haven't received any CDAS data yet for user experiment (have seen test observations).

Station specific IF setups (DBBC stations) are now all in process of being introduced into SCHED and are maintained by Small/Campbell.

8.5. *DSN VLBI Processor*

(For details see presentation by Garcia-Miro)

- System does pre-filtering with 160 MHz PFBs which overlap 80 MHz. Gives more flexibility than VLBA DDC system.

- Has been tested up to 3 Gbps only. Could be due to problems with Mark 5C.

- Backend has a very nice GUI (includes info from JPL field system). It allows a detailed view of the backend performance. Could serve as an example for the DBBC.

- VDIF header has only 16 bytes which causes some problems with some correlators.

- Fringes everywhere.

9. JIVE

(see presentation by Szomoru)

- MK IV correlator switched off.

- Mark 5s with up-to-date SDK, but old kernel.

- JIVE5ab has taken over in the EVN.

- Full 1024 Mbps Internet available from most stations. (up to 13 stations correlated in real-time).

- Correlator can be used in phasing mode now (pulsar observations), has coherent de-dispersion, multiple phase centers.

10. Joint EVN + LBA observing

(see presentation by Szomoru)

There is some common visibility between the EVN (south-eastern stations) and the LBA. The UV-coverage for low-dec sources is reasonably good.

Results:

It was discussed how to best proceed to offer users such joint observations, initially as shared risk observations. JIVE has to implement e-transfer of data as LBA does not ship disks.

11. Technical priorities for the EVN

11.1. Recording/playback systems in the EVN

(for details see presentation and report by Szomoru)

Question: Next recording system after Mark 5?

- Mark6 (open source)

- Xcube (proprietary)

- FlexBuff (open source, minimizing physical shipping of disk packs)

- Any mixture of the above?

Summary:

- FLEXBUFF software can be run on any hardware like Server with RAID, Xcube, Mark 6.

- Possible solutions:

  ◦ Mark 5C (for shipping modules to VLBA/Washington/Haystack/Bonn) + local RAID-server with FLEXBUFF software for EVN e-transfer/eVLBI to JIVE/Bonn, possibly Washington/Haystack

  ◦ Mark 6 for geodesy/mm-VLBI module shipping and as local storage for e-transfer/eVLBI. Mark 6 could either run Haystack Mark 6 software or FLEXBUFF.

Results: The TOG agrees that this proposal should be presented to the CBD.

Mujunen presented an overview with recommendations for RAID-servers. (see presentation)

11.2. Towards 2-4 Gbps operation

A demo with 2 and 4 Gbps was successful. This cannot yet be offered to the community as several items are missing:

- PFB is not yet implemented in the FS. This has, due to lack of financial support from the EVN to Himwich, very low priority with him.

- Suitable LO setting have to be identified (done only for some stations and frequencies).

- Lack of additional recording media.

- The schedule making with SCHED has to be modified to accommodate PFB with the DBBC.

- The PFB-mode is not yet implemented in the FS, e.g. the FS cannot yet calculate TSYS.

- **AI: Lindqvist will schedule a meeting discussing how to move forward.**

11.3. 64 Gbps with ALMA

(see presentation by Alef)

The first application of very high data-rates with recording will be implemented at ALMA and the EHT. 4 Mark 6 recorders with 4 modules each will be used in parallel.

11.4. Development of a Low-noise wide-band integrated amplifier for VLBI antennas, RadioNet3/DIVA Task 1

(see presentation by Alef)

The planned 1-4 GHz receiver could be used in the EVN, later a 1-10 GHz system will become available. The TOG was asked to consider this possibility for their local antenna for VLBI. A suitable VLBI backend would be the DBBC3 (see below).

11.5. DBBC3, RadioNet3/DIVA Task 2

(see presentations by Tuccari given by Wunderlich)

A VLBI backend with 4 GHz is being developed. It will output data at a rate of up to 16 Gbps per sampling/processing unit.

Casey (see presentation) introduced the post-processing unit which will take the output of the DBBC3 and will allow various additional processing of the data. This unit will be realized with COTS computer hardware and software.

12. Out-Of-Session observing

- Porcas had distributed a paper on out-of-session observing. The TOG discussed the implications and doability.

Results and comments:

- Jodrell Bank: reliability will be reduced by additional load. There are already too many activities going on. Sessions plus eVLBI sessions plus TOO should be enough.

- Onsala: More complicated to plan absence from telescopes as friends have to be there for setting up etc. Late schedules as experienced with Radioastron make it much worse.

- JIVE, logistics: no additional problem with module logistics, e-transfer should be used.

- Alef: Suggestion, make eVLBI sessions more flexible. Allow also mixed eVLBI/e-transfer sessions to include non-eVLBI stations, if required.

- Hart: no problem with additional out-of-session observing.

- Chair: need more disk space, Flexbuff.

13. Triggered/interrupted e-VLBI observations

(see presentation by Casey, Onsala)

Results:

It was agreed that interrupting an ongoing VLBI observation by a trigger and change the schedule to observe a transient should be tested further. Also Medicina agrees to join. The VLBA can handle triggered observations now in less than 15 minutes due to enhancements in dynamic scheduling.

A document for the PC and the CBD will be prepared.

14. SCHED Developments

Walker retires at the end of 2014. It is unclear how SCHED can be maintained in the future. NRAO is seeking a new model for maintaining SCHED.

A new release of SCHED was published 2 days before the meeting. Campbell is in the process of checking the DBBC setups for EVN stations.

global Gb/s through SCHED should give no problem; the biggest issue is the looming need for two vex files if EVNs is not running FS 9.11.5.

Walker wants to implement cable wrap into SCHED (this has always been a feature of the geodetic SKED). Cable wrap is presently handled at the stations, and it is a complex problem.

AI:all to look at document written by Himwich to find out consequences for own telescope. ftp://ivscc.gsfc.nasa.gov/pub/TOW/tow2013/notebook/Himwich.Sem2.pdf

15. Field System, status and new features

(see presentation by Quick)

Results and summary:

- The present FS release is 9.11.4. DRUDG crashes on unknown hardware. This is fixed in 9.11.5 to come out real soon.

- Russian backend support is needed. Quick gives advice on how to proceed: provide code that can be implemented in the FS to Himwich.

- Important features needed for the EVN are planned for the spring 2014 release, but as EVN does not financially support Himwich this has low priority: Mark 5C, 2 and 4 Gbps with DBBC.

- Input is wanted for DBBC support and DBBC/FiLA10G support.

  - See also **AI: Bach, Quick, de Vicente, Verkouter create test specs/procedures for DBBC (possibly including JIVE5abc).**

16. NRAO

(see presentation by Brisken)

- VLBA might be able to survive with less than 50% of the funding from NSF.

- Legacy system is not available any more for observing.

- 2 RDBEs can now be used combined in the DDC mode with a so-called "X-cube" switch providing 8 sub-bands (channels).

- VLBI with the VLA is possible with some limited modes.

- VLBA offers ultra-rapid (< 15 min) response for triggered observations.

Romney added some points:

- The track program gets upgraded. This includes also the operational software. A problem is the data-base. Input in the planning phase is wanted. Contact point is Romney.

- There are still some problems in DDC mode observing, PFB works well for more than 1 year now.

- There is a desire to do again more global observing. As the EVN does not have RDBEs, mixed systems have to be used for global observations. A hybrid mode with 16 MHz against 64 MHz sub-bands was tested. ***To work out the final technical details it was agreed to have a EVN/VLBA telecon.***

- Correlation of a global observation in Socorro should be tested. Romney will contact Gunn and Campbell.

17. Haystack

(see presentation by Ruszczyk)

- Mark 6 is available for purchase for $15,285 for a 16Gbps system. Upgrades to Mark 5 are available.

- Software is still being improved. Documentation is being enhanced, and a first version of self-test software is under test.

- First steps have been taken to incorporate Mark 6 into DiFX.

- Mark 6 will be used for VGOS (VLBI2010) tests.

18. Mark 5

18.1. *Status: Mark 5A/B/B+/C, 6, software, firmware, SDK9*

(see presentation by Ruszczyk)

- The latest official Mark 5 SDK version is 9.2. SDK 9.3a is under test. It will allow more than 16 TB, but needs a firmware upgrade.

- For 4 Gbps new erase commands are implemented for Mark 5C (to be used with care):

  ◦ reset = lberase (for large buffer configuration)

  ◦ reset = sberase (for resetting a disk to small buffer)

- With SDK9.x modules use (to be sure to avoid problems):

  ◦ EV2E – Erase, VSN, Erase, Erase

18.2. *Jive5ab*

(see presentation by Verkouter)

- jive5ab used in Session 3/2013 in EVN

- Support for Mark 5C under test.

- Flexbuff will be available in next release.

- Useful tools now available which offer a lot of functionality like conditioning, copying

Results:

AI: to add info on content of module before conditioning is started

AI: speed of conditioning to be displayed during conditioning and summary at the end (min, max, average) as is done by mk5erase (DiFX).

It was suggested to add rate limiting to m5copy. It was deemed a security issue that an open (jive5ab) port to the mark5 can be attached simply and commands be issued from remote to the

mark5. It was pointed out that commands to the mark5 can be tunneled through ssh to increase security.

All stations seem to be using jive5ab now.

18.3. *Mark 5 problems encountered during last session*

Results:

Switching on the module in bank B in a few cases has reset or modified the write pointer in bank A. The origin of this behavior Is unclear.

AI: Quick to send a message about this problem to evntech

AI: Verkouter to also save log file of jive5ab

A persistent problem is that the kernel on the Mark5s cannot be upgraded as this breaks eVLBI.

18.4. *Disk inventory and purchase status*

Results:

As agreed by the directors most stations buy disks for 7000 € each year. As a result there is no major bottleneck in the disk supply in the last couple of sessions.

Half packs should be upgraded by the owners asap.

AI: Upgrade to SDK9.3a first at the correlators then at the stations.

18.5. *Disk throughput at JIVE, balancing with NRAO, Astro/Geo pool*

Results:

MPI should keep track of NRAO modules sent to Bonn for Radioastron correlation.

18.6. *Mark 5 logistics*

Results:

Bonn should send inventory labels of (small) broken modules to Wettzell.

19. Activities at EVN stations

See written reports.

20. Activities at potential new EVN stations

No potential new EVN station asked to make a presentation.

21. Upcoming meetings

Lindqvist informed about upcoming meetings of relevance for the audience (see agenda).

22. Date and place of the next TOG meeting

It was agreed that the next TOG meeting should be held in Cagliari/Sardinia on Monday October, 6th before the EVN Symposium. On Sunday, 5th a tour to the telescope shall be organized.

23. AOB

Nothing under AOB.

ML 04/04/14 11:58 AM