EVN Technical and Operations Group Meeting

St. Petersburg, Russian Federation, September 19, 2016

Minutes

Participants:
http://www.ipa.nw.ru/TOG2016/participants.html

Agenda:
http://www.radionet-eu.org/radionet3wiki/doku.php?
id=na:eratec:tog:tog-meeting-06_2:tog-agenda-sept2016

1. Local Arrangements/Opening Remarks (Bondarenko, Vicente (chair))
Bondarenko presents logistics of the meeting. Presentation by de Vicente,
used throughout meeting: [Notes from the TOG chair]

2. Approval & last minute additions to Agenda (all)
No additions to the agenda and the agenda was approved.

3. Acceptance of minutes from last meeting (all)
Minutes of the previous TOG, Madrid 9 Feb 2016, were approved without
comments.

4. Review of Action Items from last meeting (all)
   1. All stations to measure beam-maps at L- and C-band (provided
      appropriate software is available at the telescopes) and send them to
      Keimpema. Update the table at https://deki.mpifr-
      bonn.mpg.de/Working_Groups/EVN_TOG/Beam_maps
      - Vicente urges all stations once again to provide beam maps and
        update the table.
      - Action: remains
   2. Upgrade to SDK9.4 first at the correlators then at the stations.

- Tr still at SDK9.3, Sr will upgrade next month together with operating system upgrade
- Irbene is missing from http://mark5-info.jive.nl/
  - i. **Action**: maintainer add Irbene
- Action: remains

3. All stations (except Wettzell): implement 80 Hz continuous calibration and update table at https://deki.mpifr-bonn.mpg.de/Working_Groups/EVN_TOG/Continuous_calibration_%2880_Hz%29

   - Installed at On, Ef, Ys
   - Mc: working on it
   - Ir: after session
   - Tr: installed but not used yet
   - Jb: hardware is there but test time is needed
   - Rb: only unavailable in K-band
   - Action: remains.

4. All stations: contact Vicente for explanation on method how to improve K-band calibration using sky-dips

   - Vicente: did not receive any e-mail from anybody; no activity.
   - Action: removed.

5. JIVE: set up a wiki page, summarizing problems per station. Stations must give response before each TOG.

   - Not done yet, there is funding in the Jumping Jive proposal to address this
   - Action: remains

6. Vicente: move action "All fill out & review the table with frequency information in the TOG wiki to permanent action items: https://deki.mpifr-

bonn.mpg.de/Working_Groups/EVN_TOG/Frequency_ranges_for_2%2F%2F4_Gbps

- Done
- New action: stations provide the numbers to de Vicente.

7. Quick, Cambell, Vicente discuss SCHED, contact Amy Mioduszewski and Cormac Reynolds about Pointing sector and DBBC version handling.

- Campbell: DBBC version handling in SCHED will be addressed in the Jumping Jive project
- Action: remains

8. All stations: measure discrepancy between actual tracking of source and log information.

- Action: remains

9. All stations: provide ANTAB and RXG files to correlator.

- Action: remains

10. All stations: stations provide correct numbers of disk inventory.

- Vicente: will refer to this issue later. A very small investment was done in 2016 and the directors would be informed and Flexbuff purchase does not require a continuous disk investment. See TOG Chair notes for a graph about investment.

11. Campbell to update tables of disk inventory

- Action: removed

12. All stations that wish to to participate in 2 Gbps e-VLBI: have a functional BBC proxy before the call for proposals in May.

- Action: removed

13. Verkouter: send out description of DBBC proxy system.

- Action: removed

14. Mc, Ef, Ys: send FR028 data to Campbell.

- Ef, Ys have done this, Mc erased data accidentally

- Action: removed

15. Vicente: organise a 4 Gbps PFB test before end of 2016.

- Several tests were organized
- Action: removed

5. Review of Permanent Action Items (all)
The permanent action items are here: Permanent Action Items
and all are invited to check if still up-to-date

6. Reliability/Performance of the EVN
- Reliability/Performance of the EVN (Blanchard)
- NME results (Blanchard)
- Feedback from last sessions

Presentation by Blanchard: evnperformance.pdf

- Alef: influence of DBBC Control software on triangular-shaped amplitudes? Not known but seems prominent.
- 2015 Session III: Nt funny bandpass in SB3 and higher 16MHz amplitudes from 32MHz firmware
- At 18/21 cm many telescopes have lower amplitudes in LCP
  - Alef: were the state counts reasonable? According to Blanchard they're OK.
- Tr: observed phase jumps in ES079A (2015 Session III)
- And there were many more small issues reported

The presentation triggered an animated discussion as de Vicente observes that there seem to have been more than the usual amount of problems – what's happening / what to do?
Alef: there's a lot of new hardware (Digital Back Ends) and firmware versions and no systematic testing. Maybe it's time to organize a testing group?

de Vicente: at Ys each new firmware version is put through a set of 'standard' tests.

Campbell: the rollout of versions at stations seems to be rather random.

Verkouter: is it already clear what the cause of these issues is?

Alef: Observed issues correlated with firmware changes (e.g. in PFB mode) so it's likely DDC firmware is also affected. It would seem that e.g. if state counts are wrong and the amplitude is low that a reboot of the DBBC may fix this.

de Vicente: the wiki page at JIVE should be the place for centralizing this knowledge (see Action item 5).

Alef: Is it an idea to get NME feedback results quicker?

Campbell: we already have operational issues; last NMEs have already been correlated twice, in order to get results out whilst waiting for T6 disk packs to arrive.

Burns: In fact, the 2s ftp fringe tests already catch many of the problems. The 10s post-NME dumps reveal almost all of the issues.

> Action: Send e-mail to stations with problems after results of Session II, 2016 have been published, as some/many of the problems were already reported and may have been fixed (suggestion: Marcote).

Rottman/Alef: observed many issues with DBBC control software, time to correlated issues agains firmware version(s)?

> Action (not necessary): Ask Ed Himwich to include "dbbc=version" in experiment initialization [Later Ed confirms this is already done in FS 9.11.8], so NO Action required.

7. Amplitude Calibration
- Quality of calibration (Blanchard)
- Any issue with ANTAB-files to comment (Blanchard)

Presentation by Blanchard: evnampcal.pdf
Shows table of ratio between measures performance compared to what stations predict. Arbitrary upper limit of 0.2 shows few stations deviate by more than this factor. Minor error in the table; for two stations entries exist for receivers they do not have (Tr, Jb: no 3.6cm). Ur is missing from the tables altogether but performed OK. Tr mentions lot of RFI in L-band.

Gunn: Jb gain curve is not a polynomial, as has been mentioned at every TOG. Thus expectations are based on erroneous assumptions

Lindquist: suggest to change threshold to 0.1.

Action: If station's deviation > 0.1 must do on/off measurement.

Lindquist: send mail to station's director if amp cal really bad?

Gunn: Jb engineers will not agree on actual numbers.

de Vicente: Jb director was asked to clarify but got ethereal answer. Besides, the actual receiver could change over time/between sessions.

- Diode cal trigger and recording start times (Campbell)

SCHED inserts cal diode firing in the pre-ob, which is triggered at nominal scan start time; i.e. when the recording starts. Quite often stations are still slewing and thus not on-source, hampering usefulness of the tcal.

Suggestions:
- Campbell: do tcal in post-ob; guaranteed to be on-source? Alef: already tried that. Himwich: it would be awkward to have some stations perform tcal in pre-ob, others in post-ob.
- geodetic approach: stop recording early, fire cal diode, then slew. Big dishes have more sensitivy so stopping early doesn't matter too much (signal-to-noise already reached). Geodetic VLBI has different observational goal, for imaging/astronomy this approach is likely suboptimal.
- Verkouter: why not let SCHED insert tcal at data-good? It already knows when a telescope is on-source?

Discussion was short-circuited as the EVN should aim for continuous cal anyway.

Action: Move tcal to post-ob; discuss with Himwich to do this as post-ob is rarely included in the procedures.

Action: Cambell to provide list of stations that have not yet fully implemented data valid on/off.

- Continuous cal: availability at stations, issues processing antab during last sessions? (all)

No problems processing ANTAB were reported.
Continuous cal situation was already mostly discussed in the action items.
Kvazar network support of continuous cal needs to be developed in the back-end, which would take on the order of two years.

8. VLBI backends
- Summary from the DBBC master? (Alef)
  Presentation by Alef: DBBC2 status.pdf

Campbell: DBBC cont_cal frequency is very flexible, be aware that SFXC can only handle harmonics of 80Hz.

- DBBC Status at the telescopes: number of COREs, Fila10G (All)

Tr: need to secure funding first, then FiLa10G will be ordered
Wb: FiLa10G will be ordered and potentially extra CORE boards
Jb: 2 CORE boards and a FiLa10G available

Action: please update the table on the wiki. Reminder to all: in case of problems with the DBBC contact Gino Tuccari.

de Vicente reports on recent PFBv16 tests at 4Gbps (FR037) where fringes were obtained to all. Hh-Ef baseline weak fringe on account of source.
Tests with v15_2 at 2- and 4Gbps resulted in fringes although V-shaped amplitude versus frequency was observed. v16 seems to perform better.

9. Recorders: Mark 5,6, Flexbuf
- Adoption of VDIF for Mark5C, Flexbuff and Mark6. Status and future plans.
  Five stations deliver FiLa10G/VDIF data: On, Ef, Ys, Mc, Nt.

- jive5ab & m5copy news? (Verkouter)
  Presentation of Verkouter: tog-stpetersburg-2016-verkouter-jive5ab.pdf

Feiler: could jive5ab do md5sum on the fly such that not all data has to be read twice?

Verkouter: you're not the first to ask. Technically it is possible, it is on the todo list but has very low priority at the moment.

- Status: Mark 5A/B/B+/C software, firmware, SDK9 (all)
- Disk inventory and purchase status (Vicente, all)

Onsala remarks they have disk packs and a FlexBuff but not all disk packs are usable for observations. This may be true for other stations as well. Suggestion: stations with superfluous disk packs send to other stations in need?

Observation: disk packs ≤ 2TB are hardly sent at all, so disk space table on the wiki might exaggerate available disk space.

- Flexbuff & Mark6 issues (all)
- Future flexbuff purchases at the EVN (all)

See Notes from the TOG Chair: tog_chair_stpetersburg_2016.pdf

There has been very little investment in disk space. This table from the presentation will be presented to the directors.

Ir, Tr say they can participate/deliver data but have no funding for purchasing a FlexBuff system at JIVE. Before deciding to switch to a FlexBuff system make sure there is funding for a FlexBuff at JIVE.

Action: if a station is not buying a FlexBuff, purchase disk packs

de Vicente: suggests that Ir sends FlexBuff to JIVE and records VDIF on Mark5C, then e-ship to FlexBuff at JIVE.

- OoS diskpack inventory (Requested by Kvazar)

A problem is that FlexBuff stations cannot send disk packs to Bonn and bandwidth to the Bonn correlator is too small.

de Vicente: OoS experiments to be correlated at Bonn can't be e-transferred because of lack of space at the correlator. Data are recorded in Ys Flexbuff and later m5copied to a local diskpack which will be sent to Bonn.

Alef: Offer to copy the data remotely to a Mark5B unit at the correlator.

For OoS observations, please use disk packs sent by JIVE for shipping to Bonn; keep them earmarked for that purpose.

10. Stations

- Irbene

Presentation by Bezrukovs: irbene_rt-32_tog_evn_2016_bezrukovs.pdf

- eMerlin in the EVN

Gunn: Ongoing testing of getting VDIF from eMerlin, though limited test time is available. Regarding FieldSystem support for eMerlin it is questionable wether the eMerlin operational mode is compatible with VLBI at all.

The new director's pressure may help in pushing things along depending on where said pressure will land.

All in all: there is progress but the work on VLBI is not finished. Keeping eMerlin itself running takes up the bulk of the time.

11. EVLBI

- Current correlator capabilities and future ones.
  Szomoru [for Kettenis]: SFXC can handle 8 stations @2Gbps or 14 @1Gbps. Mixed mode is also possible, somewhere between 8 and 14 stations. It is always possible to trade off number of stations versus bandwidth/station.

- KVAZAR network integration
  512Mbps e-VLBI was demonstrated with Bd and Zc Kvasar stations succesfully.

- 2 Gbps and mixed mode.
Jb, T6: not have enough bandwidth for 2Gbps observations
Tr, Wb: not enough CORE boards for 2Gbps observations

Gunn: There is 10Gbps Ciena equipment in the basement. It would take on order of five to six days to put into use and such a window might be very difficult to find. Maybe for the short time solution it would be possible to use the 3x1Gbps links in bonded mode to carry 2Gbps e-VLBI traffic.

Action: include Ir into the e-EVN in 2017

- Proxy status at the stations

12. Technical Developments

▪ 4 Gbps. Technical requirements and current status.
For 4Gbps observations use either Mark5C or FlexBuff. Several tests were conducted, whose results were discussed earlier today.

▪ Triggered observations. What is the current status?
One proposal was accepted but it did not trigger yet.

▪ Flexbuff & Mark6. Utilities: vbs_ls and vbs_fs (Verkouter)
Presentation: tog-stpetersburg-2016-verkouter-vbs_stuff.pdf

de Vicente: could vbs_ls get an option to aggregate by experiment? Yes that is possible.

▪ m5copy graphical tool for transfers (Leeuwinga)
Skipped on account of presenter having been taken to hospital earlier today.

▪ VGOS lessons: 4 gbps PFB mode (Vicente)
See Notes from the TOG Chair: tog_chair_stpetersburg_2016.pdf

Petrov: would it be possible to get FITS-IDI files from those VGOS observations? Yes, it should be possible, need to ask Haystack.

▪ DBBC3. Current status and developments (Alef)
Second half of presentation: [tog_sep._2016.pdf](tog_sep._2016.pdf)

13. JIVE

▪ Technical Operations and R&D at JIVE, (Szomoru)

Presentation by Szomoru: arpad_tog16_2.pdf

14. NRAO

Presentation from Romney is shown: vlba-tog_160919.pdf
Colomer: Anything known about which frequency bands will be targeted? The plan is to have more bandwidth at higher frequencies. With Mark6 recorders from Europe it might be possible to get 4Gbps / VLBA station.

15. Haystack
Report by Ruszczyk: haystackstatus_sept_2016.pdf

Petrov: is it possible to get the FITS-IDI files from the VGOS test observations?
Ruszczyk: will have to ask the people here and ask them to contact you.

16. Field System, status and new features
Report by Himwich for Himwich, Gipson and Quick: fs_tog_sept_2016.pdf
In the report Himwich already addresses and thus closes the action item re. "dbbc=version" that was started earlier today.

Verkouter: (on the subject of the recently introduced 'if' statement in SNAP) Would it be possible to implement logical conjunction or disjunction in stead of complex nesting of 'if's?

Himwich: maybe at a later time.

At this point in the meeting two ex-agenda items are presented.

Do-Young Byun from the KVN presents the work on their Field System equivalent: kvnfs_evn2016.pdf

Verkouter: is the software downloadable? No.
Lindquist: is it easy to add support for new equipment? Yes.
Colomer: what was the investment in man-years? 4 year x 2 persons

Leonid Petrov presents improving calibration using sky-dipping. Presents software that allows accurate prediction of atmospheric opacity if time (past and far future), observing frequency (1GHz-1THz), position and direction are given. The radiative transfer solution is integrated by layers of the atmosphere.

17. Mid term future

- Technological developments for 2016-2018. How should we prepare: 1 GHz IFs? Optical fibers from Rxs?

Several stations already have multiple GHz IFs. There is a Joint Research Activity in RadioNet4 for development of a wideband receiver in the 4-15GHz range.

- Developments with geodetic community?

The CBD asks the TOG if there is enough cross-development between the geodetic and astronomy communities.

Alef: Yes, for example Mark6 software support (jive5ab), DBBC deployment and participating in the geodetically oriented Technical Operations Workshop (TOW)

There are only three EVN stations not participating in geodetic observations.

18. Radionet4
In RadioNet4 there is some funding for organising TOG meetings.

19. Single point of failures (human resources at stations)
A concern was raised that there potentially are single points of failure, where for a particular station only one person knows the how + what.

Alef: it's the same situation as always, some stations give a higher priority to VLBI than others.

So, "yes, there are single points of failure".

Colomer: directors may not be aware that there have to be backup(s) for certain personnel. Even if they don't have money for hiring more staff, it should be possible to train other staff at the very least.

Alef: would it be an idea to train students as backup?

20. Date and place of the next TOG meeting
The next TOG should be a joint GMVA + TOG meeting. No date or place was announced yet.

21. AOB
Kuper: this is my last TOG before I retire next year. Started VLBI in 1984 when the FS was still running on HP1000. It was a pleasure working with you since attending my first TOG in the year 2000, thanks everyone and please keep the VLBI alive.