EVN Technical and Operations Group Meeting

**Hybrid meeting, hosted online and at MPIfR/Bonn,
24 Jan 2023, 09:30 CET**

Minutes

Participants:
According to the Indico event page[1] thirty-four participants attended in-person, of which nine MPIfR local attendees. Nine participants registered for online participation and twelve showed up: three very welcome last-minute representatives from Urumqi, KVN and QUASAR joined. Online attendance varied during the day and many in-person attendees also joined the Zoom session to be able to chat with remote participants and/or present their slides via screen sharing. A snapshot screenshot of the participants list at one point during the day is attached at the end of the minutes.

Agenda:
The agenda is published online[2] on the Bonn RadioNet wiki.

1. Local Arrangements/Opening Remarks (Bach (chair))
Bach welcomes everyone to the hybrid conference and notes that the last time the TOG was held in Bonn was ten years ago. At that point the DBBC2 made its way into the network; this time it is the DBBC3s that are being commissioned. Directly following the TOG, a half-day DBBC3 workshop is organised by MPIfR for users to get acquainted with the system. Bach introduces **Sergio Poppi** (SRT) as the new TOG chair, who will take over after this meeting.

2. Welcome
Bach welcomes both online/remote and local participants

3. Approval & last-minute additions to Agenda (all)
No last-minute changes to the agenda are proposed.

4. Acceptance of minutes from last meeting (all)
Minutes of the previous zTOG, online, Feb 8th, 2022, were approved without comments.

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[1] https://events.mpifr-bonn.mpg.de/indico/event/297/
[2] https://radiowiki.mpifr-bonn.mpg.de/doku.php?id=na:sustainability:tog:2023_01:tog-agenda-2023-01

5. Review of Action Items from last meeting (all)

1. **All:** 80 Hz continuous calibration. Update the table on the wiki[3]
   Hh, Ur updated the table indicating availability of continuous cal for L- and C-band (Hh) and L- through Q band for Ur. **Request (Campbell):** please remember to change the *Last updated* column in the table to allow correct session setups in VEX/pySCHED.
   Decided to keep the Action Item on this list because of increased visibility with respect to the Permanent Action Item list.
   Action remains

2. **González:** find `atm` binary or preferably source code for distribution, that can be used to calculate opacity from FS weather information and inject it into the log.
   The binary was found. The intent is to add this to the FS. According to **González** and **Himwich** it's 1995 FORTRAN requiring `f2c` to work.
   Action remains for **González** with rewording to *integrate* `atm` into the FS

3. **Bach, Rottmann:** look at EHT station set-up document and see if it could be modified for use in the EVN
   Progress: documents were shared by Rottmann; no changes to make an EVN checklist yet. Discussion: several lists already exist (station's own, IVS) - maybe master list with focus on EVN specifics: being online in Mattermost, access to feedback system, upload of (daily) GPS measurements.
   Action remains, remove **Rottman**, reword **Bach** to create master checklist

4. **Bach:** investigate how T_{sys} and opacity are determined at K band and higher at stations. Discussion continues on Mattermost[4].
   No progress, so action remains.
   Action remains, discuss in the Mattermost channel

5. **Marcote, Bach, Campbell:** Improving the session feedback, how to provide better feedback about the "success" of EVN observations in the feedback page and for future TOGs.
   Marcote: developments towards this happening at JIVE; presentation
   Small later on introduces proposed novel approach: old system too insecure, also addressing usability issue(s) for stations.
   Action remains until resolved

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[3] https://deki.mpifr-bonn.mpg.de/Working_Groups/EVN_TOG/Continuous_calibration
[4] https://coms.evlbi.org/tog/channels/antabfs-calibration-files

6. **Paragi, Bach, Kettenis, Campbell:** Discuss reduction of number of BBCs/core board and impact on (future) calibration of wide bands.

    Reducing the number of BBCs on a core board allows for better filter shapes but does not affect availability of different filter widths; e.g. it is not possible to have only 4, 32, and 128 MHz filters; all intermediate filter widths come "for free". Currently, 64 MHz wide filters (32 MHz for DBBC2 on account of bad 64 MHz filter shape) is the sweet spot between not having to break up wider observed bands into smaller fractions for compatible station setups. Mixed bandwidths complicate calibration; exactly how RFI affects this process is still unknown. Several suggestions were discussed, e.g., perform a single calibration scan with 4- or 8 MHz filters for high resolution calibration, exploiting RXG file precision. **Himwich** make it an `antabfs` problem to apply to wider bands by integrating over smaller bands.
    Action remove item

7. **Bach:** compare `gnplt` opacity estimation versus WVR measurement. This slipped under the radar but is still interesting
    Action remains

6. Review of Permanent Action Items (all)
Bach made some updates and there is actually a preliminary pre-session checklist already.

7. Reliability/Performance of the EVN
Presentation by **Oh**[5].
During the presentation:
Feiler *on Tr phase jumps* measure different clock than you find, currently not understood; the LO was replaced but no jumping observed **Campbell** no indication of residual rate; jump between e-EVN sessions; it is possible to track the phase during an "event" so not pure noise and comes back to previous state. Likely local issue. Maybe try using different core board(s)?

Campbell X-band had 2- and 4 Gbps setups; when changing, some stations have FiLa10G 4 Gbps bitmask set for 2 Gbps mode according to FS log? Fixed manually during session, but DRUDG issue? **Bach** could be FS version, `Ef` used 9.13 [During discussion **Campell** checked logs: all stations using `FS10.x` were ok, `FS 9.x` users have this issue, problem solved: upgrade to `FS10`]

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[5] https://radiowiki.mpifr-bonn.mpg.de/lib/exe/fetch.php?media=na:sustainability:tog:2023_01:evn_report_tog_2023_oh.pdf

Oh In EK046H (S/X) find that S-band flux systematically lower than X-band; investigated: no immediate cause identified, T$_{sys}$ comparable. **Bach** S-band receivers are typically less well calibrated, also because of lots of RFI. **Marcote** This should "just work".

Marcote `antabfs.py` updated, please download and use new version.

Alef recording the FS version, have overview of what's used could be useful? **Campbell** this can be harvested from the log files **Verkouter** it might be better to automate this and integrate with the central EVN monitoring system (see presentation **Keimpema** later).

Bach 64-bit FieldSystem (FS10) now working, but 32-bit vsn still works in case people are afraid to migrate. **Himwich** station code is a possible source of problems but there is a 64-bit conversion document to help describe the necessary modifications.

8. Recent difficulties/problems/failures
Some were already discussed under the previous agenda item related to EVN reliability. **Bach** presents new ones (TOG Chair slides[6]):

several stations report schedules arriving (very) late into session: FS pc in Jodrell died causing some incidental delay. **Gunn** EVN not heavily oversubscribed so proposals often run in next session. After PC meeting takes ~ a month before feedback goes to PI, 6-8 wks before session. If global, require coordination w/ other arrays, so ~ 3 wks before session VEX to JIVE. **Campbell** observing efficiency has gone up (~ 67% now compared to 40-45 % previously) and bitrates have gone up means more to check and more checks to do such as for available FlexBuff space. **Bach** provide (template) `setini` for users early? **Marcote** with pySCHED distribute setini's that can be used for scheduling, can modify at last moment to actual configuration. **Campbell** keeping up with two wk before is going to be difficult if flexibility is to be kept. **Marcote** moving deadline an option? **Gunn** not really, maybe better to sketch out session after PC meeting to get feedback to PI quicker; PC chair could start writing to PIs with 2nd day @PC meeting. Dynamic scheduling not very popular in this community but would make EVN more aligned with other instruments. Also, CfP has far too many modes (eight-page CfP). If

moving to ~two days / week would make schedule *a lot* easier, but requires significant effort at stations by VLBI friends. **Surcis** maybe require PIs to attach `planobs` plan after acceptance. (Currently only recommended.) There are many more procedures, options and issues which should probably be discussed at CBD and/or PC level, not at the TOG.

11:05 CET meeting is suspended for a short coffeebreak, to resume at 11:30 CET

Security issues with the vlbeer server[7] by **Stagni**.
During Session III/2022 *vlbeer* server was used for "other purposes". Shared password is not workable anymore, options were discussed, `sftp`, `ssh`, public keys, user accounts? **Himwich** `sftp`, `https` in IVS. Can use fesh - anyone uses it? **All** no. If no one runs scripts on *vlbeer* then `sftp` should be good enough.

+Action Stagni set up `sftp` over summer, try to use for Sept session

Orthogonal issue: propose to change directory structure from mmmyy to YYYY-mm (in presentation mistyped as daily directories, but that is *not* the intent). Nobody objects strongly, there are also symlinks.

+Maybe Action for **All**: update `logput` script to honour new structure.

9. Recorders: Mark 5, Mark6, Flexbuf
Bach continues presentation, very few Mark5's left, very few Mark6's in, mostly FlexBuffs now

*could JIVE monitor FlexBuff space at stations (**Jang**)?* Not on Deki/not often updated. **All** Not sure what the gain is - most systems are full all the time, space freed up just before session. **Jang** scheduler could make more efficient use of space/allow higher data rates. **Verkouter** can easily be put into evn monitor. **Feiler** available space fluctuates rapidly.
All it is better to assume that there is always space available - monitor `.jive.transferred` for experiments that are eligible for removal.

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[7] https://radiowiki.mpifr-bonn.mpg.de/lib/exe/fetch.php?media=na:sustainability:tog:2023_01:matteostagnitog2023.pdf

Discussion on naming conventions for multiple files from multiple threads[8] by **Eldering**

Himwich if VEX2 not available yet, how to predict data stream label?
Eldering suggests following example numbering scheme DS1, DS2, etc. A discussion ensues on how the data stream label may be generated or programmed and whose responsibility it is (various options exist), but by looking inside the VDIF header and decide automatically based on that makes it quite simple, automatic, and robust. The motion to record VDIF threads in recordings with suffix `_dsds{threadid}` is carried.
Because of technical problems with **Verkouter**'s computer **Bach** continues:

10. Stations
TOG Chair slides on *Recorders and FlexBuffs*.
disk space at stations: good progress on 2x500 TB; `Wb` sent replacement; `Km` have sent a Mark6-with-disks to JIVE; `e-Merlin` planning; `KVN` expected to ship disks but current status unknown; `Mh` planning.

Bach continues with TOG Chair slides on *Stations*.
two-day e-VLBI sessions? no 2nd day e-VLBI triggered so far.

Four hour test period? **Leeuwinga** sometimes all that time is necessary. **Bach** if fringes in ~first half hour then change to doing something else, come back later; if not someone must go to the telescope; four hours isn't much overhead compared to the twenty-four hour session.
Long discussion follows on scheduling 2nd day and whether stations can come back, e.g. during scheduled fringe finder at start, but it cannot guarantee this will happen.

Mixing disk recording with e-VLBI? Probably nothing to be gained here.

4 Gbps e-VLBI? Currently rely on DBBC2/FiLa10G for splitting which does not work reliably. **Verkouter** it is always possible to resort to the "harrobox" solution (now "marjobox") where software splits data but is more complex data path. DBBC3 gives multiple streams natively so now that more EVN stations have it, we should go for that approach.

`jive5ab` *updates* by **Verkouter[9]** (wrapping up **9. Recorders &cet.**)

12:50 CET meeting breaks for lunch, to reconvene at 14:15 UT

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[8] https://radiowiki.mpifr-bonn.mpg.de/lib/exe/fetch.php?media=na:sustainability:tog:2023_01:multi-stream.pdf

[9] https://radiowiki.mpifr-bonn.mpg.de/lib/exe/fetch.php?media=na:sustainability:tog:2023_01:verkouter-jive5ab-etal-tog-bonn-jan2023.pdf

11. Improving EVN operations: developments at JIVE

The centralized real-time EVN monitoring system[10] by **Keimpema**.
Several topics discussed as a result of the presentation:
Himwich DOTMON2 is for supporting a 2nd DBBC, e.g. for IVS use.
Bach scope to improve documentation on units for items such as windspeed.
Poppi possible to uload other items? [Yes].

Status of beam-map corrections for wide field imaging[11] by **Keimpema**.
Blaauw script of Bach needs a bit of work (failed at Ⱳb), possibly just an issue in parsing of information.

A new station-feedback tool[12] by **Small**.
The demonstrated prototype Mattermost-based solution is accepted to be built out into a formal tool.

New techniques to schedule observations[13] by **Eldering**.
The Blackhole TOM (Target-and-Observation-Manager) based approach to submitting observing requests triggers a lot of (political) discussion(s), which should probably happen at the CBD and/or Program Committee level; time probably only available at some stations, outside EVN Sessions (which is exactly the goal of the project.)

Technical Operations and R&D at JIVE[14] by **Verkouter**.

15:45 CET coffee break, reconvene at 16:05 CET

1. Technical developments

DBBC2/DBBC3 Updates[15] by **Tuccari**.
Jang does the DBBC3 require more calibration to run PolConvert firmware? [Yes it does, to correct for the X/Y (or H/V) phase offset].
Jang do you have a plot of the filtershape [No].

Update on the BRAND receiver[16] by **Tuccari**.

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[10] https://radiowiki.mpifr-bonn.mpg.de/lib/exe/fetch.php?media=na:sustainability:tog:2023_01:evn-monitor.pdf

[11] https://radiowiki.mpifr-bonn.mpg.de/lib/exe/fetch.php?media=na:sustainability:tog:2023_01:primary-beam.pdf

[12] https://radiowiki.mpifr-bonn.mpg.de/lib/exe/fetch.php?media=na:sustainability:tog:2023_01:a_new_station_feedback_tool.pdf

[13] https://radiowiki.mpifr-bonn.mpg.de/lib/exe/fetch.php?media=na:sustainability:tog:2023_01:tom.pdf

[14] https://radiowiki.mpifr-bonn.mpg.de/lib/exe/fetch.php?media=na:sustainability:tog:2023_01:verkouter-techopsrd-tog-bonn-jan2023.pdf

[15] https://radiowiki.mpifr-bonn.mpg.de/lib/exe/fetch.php?media=na:sustainability:tog:2023_01:dbbc_deployment_and_firmware_development_january_2023.pdf

[16] https://radiowiki.mpifr-bonn.mpg.de/lib/exe/fetch.php?media=na:sustainability:tog:2023_01:brand_evn_status_january_2023.pdf

Triple-Band receivers: Status of development and plans for operation. **(Bach, Rottman)**
On agenda but nothing presented; **Bach `Ef`** system funded, **`Ys`** planned.

Summary of the Fast Frequency Phase Transfer Meeting[17] by **Lobanov**
Request for GMVA technical meeting. **Rottmann** wanted to organise dedicated meeting but not enough time to arrange in time for all participants e.g., Korea. Discussion follows on appropriate time for a GTC meeting or make it an item for the (next) EVN CBD to set up coordination, hopefully before summer. No firm arrangement made on who organises what.

2. Field System, status, and new features
Status and new developments[18] by **Himwich**.

3. VLBA, Globals, and GMVA
VLBA status (presentation not online yet) by **Brisken**
Rottmann is there a bandwidth improvement to e.g. 2 GHz / polarisation.
Brisken VNDA sampler does four inputs at 1 GHz; VLBA IF system limits us to 4 x 512 MHz, spin off small project to see if 756 MHz is possible but electronics may prohibit useful bandpass.
Rottman 43 + 86 GHz simultaneously?
Brisken VNDA does not preclude, receivers do; requires lots of electronics.

*Status on the EVN Technical roadma*p by **Bach** (last of TOG Chair slides)
DBBC2 pushed to edge of capabilities, need to upgrade to DBBC3 (ongoing)

Global operations? by **Bach**
Still lacking disk space to copy VLBA Mark6 disk packs or LBA data. Should move to 64 MHz or 128 MHz filters to make globals easier.
Alef parallel DBBC2/DBBC3 tests? **Bach** Yes, in progress; all DBBC3 stations have DBBC2, can send to JIVE.

4. AOB
Campbell FS VEX2 status?
Himwich it's on John Gipson's ToDo list.
A long discussion without decisions or conclusions follows.

Decision on date & place of the next TOG is left TBD by the next TOG Chair.

The TOG ended around 18:10 CET

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[17] https://radiowiki.mpifr-bonn.mpg.de/lib/exe/fetch.php?media=na:sustainability:tog:2023_01:lobanov_evn_tog_230124.pdf

[18] https://radiowiki.mpifr-bonn.mpg.de/lib/exe/fetch.php?media=na:sustainability:tog:2023_01:weh_tog_jan_2023.pdf

List of participants, sampled around 24 Jan 2023 17:00 CET