EVN Technical and Operations Group Meeting

By Zoom teleconference (COVID-19), Hosted by MPIfR/Bonn, May 5, 2020

Minutes

Participants:
The number of online participants peaked at 44, from 15 countries/17 institutes. Screenshots of the participants list are attached at the end of the minutes.

Agenda:
https://radiowiki.mpifr-bonn.mpg.de/doku.php?id=na:sustainability:tog:2020_05:tog-agenda-2020-05

1. Local Arrangements/Opening Remarks (Bach (chair))
Bach welcomes everyone to the teleconference. No local arrangements necessary.

2. Approval & last minute additions to Agenda (all)
In order to fit the TOG meeting into a three-hour teleconference slot the agenda was shortened to include only the most important topics. No additions to the shortened agenda were suggested and the agenda was approved.

3. Acceptance of minutes from last meeting (all)
Minutes of the previous TOG, Jodrell Bank Observatory, UK, June 26, were approved without comments.

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

1. **All:** Beam-maps at L- and C-band and send them to Keimpema https://deki.mpifr-bonn.mpg.de/Working_Groups/EVN_TOG/Beam_maps
   - **Bach** suggests to move this Action Item to the Permanent Action Item list
   - **Bach** Should there be a FS procedure to help with this? **Himwich** FIVPT is an option, but HOLOG is a more generic procedure, can use all detectors

   Action: move to permanent action items list

   New action Bach investigate use of HOLOG for creating beam maps

2. **All:** Upgrade to SDK9.4 first at the correlators then at the stations.
   Only a few Mark5 stations remain. Proposal to keep this action item until next TOG, then remove
   Action remains for next TOG, delete after that

3. **All:** 80 Hz continuous calibration. Update the table:
   `https://deki.mpifr-bonn.mpg.de/Working_Groups/EVN_TOG/Continuous_calibration_%2880_Hz%29`
   SRT and Hh have implemented continuous calibration at some bands.
   Action remains

4. **Vicente:** talk to Himwich about possibility to inject opacity information into FS logs.
   Neither remember what this was about for sure, but at Ys the `atm` program is used to log opacity information.
   Action remove action item
   New action Vicente: find `atm` binary or preferably source code for distribution

5. **All:** everybody to switch to DBBC firmware version 107
   Done
   Action remove action item

6. **All:** everybody to use latest Fila10G firmware
   Done
   Action remove action item

7. **Bach:** set up new 43 GHz receiver test with 2 GHz for VLBI, define frequency range
   There was some discussion on exactly what this test was about (given the 8 Gbps test and the 32 Gbps task force); it is a receiver test, which was done
   Action remove action item

8. **Bach:** send out details of solution, setting ports in SCHED, to stations
   Done
   Action remove action item

9. **Bach, Rottmann:** look at EHT station set-up document and see if it could be modified for use in the EVN
   Not done

Action item remains

10. **Bach:** investigate how Tsys and opacity are determined at K band and higher at stations
    Not done. **Alef:** suggest to form a subgroup to actually solve this because it's been on the list for a long time. It might tie in with **Action item 4**
    New action Bach to contact subgroup of interested/experts and solve this

11. **Rottmann and Leeuwinga:** send emails to owners of 2 – 4 TB modules and ask what should be done with them.
    For JIVE not done, also not a big problem, not many packs. **Rottman:** Should this be a permanent action item? Consensus: no; but the action remains on this list.
    Action item remains

12. **Rottmann:** set up meeting with Verkouter, Kettenis, Alef, Rottmann and Wagner, to discuss the best format of VDIF packets.
    Not done. The item is about how to balance multi-thread/multi-channel VDIF output out of e.g. DBBC3 vs optimal correlator use. Multi-thread is probably not unavoidable. **Kettenis:** VDIF streams of ~ 2 Gbps are optimal for SFXC.
    Action item remains

5. Review of Permanent Action Items (all)
For time's sake the review of the permanent action items (which are here: Permanent_Action_Items) was skipped.

6. Reliability/Performance of the EVN
Olga Bayandina presented a condensed report on the EVN reliability/performance for the last sessions.

Discussion points:
Alef Worried that calibration seems to look as bad as it was 20 yrs ago.
Marcote at L-band the RFI situation has worsened a lot; at K-band it is a real issue which should be addressed.

The success overview looks pretty bad – only 15% of experiments are green (no problems). Mostly due to a (very) condensed overview for keeping time short and upon closer inspection: core EVN stations have > 80% success rate.

Suggestion: EVN feedback page have possibility for better reporting of issue(s) and how much time was lost? Seems feasbile to implement.

In the discussion the merits/problems of condensing the EVN performance into a single number were raised (again). There is a reason the EVN Reliability Index (ERI) is not used anymore. The issues are usually too complex; minor issue can ruin science goal whilst there are major issues that have negligible impact.

New action Marcote, Bach, Campbell: Better impact reporting discussion and/or implementation

7. Amplitude Calibration

Bach presented slides, now that SRT and Hh have joined continous cal capable stations there are now eleven (11) stations offering this.

8. VLBI backends

Bach continued presentation from 7. containing DBBC2 and FiLa10G news. v107 is on track but the beta versions have issues dis- and reappearing. Some FiLa10G GPS modules did not properly handle the GPS week number rollover – they can be sent to Bonn for a replacement with one that does.

Paragi got user report of bandpass change during experiment, anything known?
Bach no this typically only happens with a mode change. Hopefully a one-off event.

Marcote in the NMEs mode changes have an effect
Bach this might be a local issue – the DBBC is not commanded correctly. It depends on which IFs are used by the next mode, upon new mode not all IFs are reset

The latest FiLa10G firmware is `v4_1 (nov 2018)`

The KVN uses OCTAD now so can deliver 2 and 4 Gbps.
Marshalov reports on KVAZAR MDBE status: first prototype planned to installed at Svetloe VGOS antenna, produces eight channels. Recorded data will be checked. Funding is sought to install an MDBE at the Sv RT32. An

upgrade for all RT32's is planned where subreflector panels will be replaced, as well as the control system electronics of antenna pointing will be updated.

9. Recorders: Mark 5,6, Flexbuf

Bach continued presentation from 7., now containing recorder/media status. The CBD goal has been increased to 1 PB per station (=500 TB station + 500 TB JIVE). Currently almost all FlexBuff stations have 250 TB on site and 250 TB at JIVE.

4 Gbps observation was tested in N20M1. A worry is the 64 MHz bandpass, but **Rottmann** mentions that it is similar for the GMVA for which it does work.

Mujunen: warns heavily for hard disk vendors silently selling Shingled Magnetic Recording (SMR) disks – i.e. not being explicit or immediately obvious that one is buying such a disk. These disks are **really bad** for continuous disk writing workloads such as for recording VLBI data.

Check carefully before buying hard disks.

Suggestion*: stations and correlator update the Deki page (https://deki.mpifr-bonn.mpg.de/Working_Groups/EVN_TOG/Disk_Inventory) with known-good disks*

10. Stations

Gunn: due to COVID-19 it is not sure when JB will reopen. The Mk2 may return to operational status this week, it might be up for the next session. e-Merlin is not in the planning yet.

As countries across Europe are loosening up, the status for next week's e-VLBI is still unsure.

New stations

Presentation **Sargsyan** on ROT54/2.6 status, currently requesting support in scientific-technical expertise for upgrading the ROT54/2.6.

Presentation **Ulyanov** on RT32 Zolochiv antenna, a lot of progress was made and fringe tests with the EVN are expected this year.

Colomer is positive that the collection of experts will be able to help each other and is looking forward to the cooperation between all stations.

Campbell What is the status of Ka band and plans at the EVN stations? It might be a new band to offer.

- **Ys** has a Ka band receiver
- **Ef** has nothing in Ka band
- **T6** has a 26-40 GHz receiver installed
- Miró mentions **DSN** uses Ka band (which is the background of the request)
- **Kvazar RT-13 VGOS** has a 28-34 GHz receiver installed but has only 512 MHz bandwidth.

11. e-VLBI

Jointly presented with item **12. JIVE**

12. JIVE

Presentation **Verkouter** on Technical operations and R&D at JIVE.

Rottmann: Is the SCHED catalog for pySCHED updated?
Campbell: yes it is.

Rottmann: What about DBBC3 support?
Eldering: it is started.

13. Technical developments

Continued presentation **Bach** on technical developments. Higher bitrate recordings awaits DBBC3 firmware (seems to be going in the right direction) and power supply upgrade; without which DBBC3 cannot run the 16 BBCs-per-core-board firmware.

Rottman gave in impromptu DBBC3 development status update. Development is impacted (delayed) because of the COVID-19 pandemic. The DBBC3 is used in parallel with DBBC2 at Pico Veleta. The comparison gives good results for 4 Gbps observations (DBBC3 bandpass is OK). New firmware[1], enabling 128 MHz bands, was tested in the laboratory and the overheating seems to be under control. A Python DBBC3 control package[2] is available because of COVID-19 time was now available for fixing up and documenting.

[1] https://www.hat-lab.cloud/downloads-dbbc3-ddc/
[2] https://github.com/mpifr-vlbi/dbbc3

Should be released this month. A general problem where the samplers lose synchronization every now and then was found; it seems repeatable. Hypothesis is crosstalk between the bus and synthesizer on the ADB3L board. **Wunderlich** is investigating the cabling.

de Vicente Is this a command shell?
Rottmann No it wraps all DBBC3 commands and provides response parsing into JSON.

González García What about a FS interface to DBBC3?
Rottmann Onsala is working on the continuous cal interface; the new DBBC3 control software can do multicast broadcasts.
Himwich David Horsley has already implemented multicast in the FS and the basic DBBC3 commands are also already supported so it is probably best to continue this effort.

It was decided to form a group of EVN/TOG experts to work on this.

> **New action Bach:** invite group of interested/experts for working on DBBC3 support in the Field System

Presentation **Alef** on BRAND status.
Most important: **sampler crisis**. The sampler chips (one per receiver necessary) are not commercially available and the supplier has discontinued production. Last orders before Aug 31, or spend ≥ one year redesigning + supporting a newer version, which likely won't be available before 2022.

González García Can the ASTRON firmware be used for linear-to-circular polarization conversion?
Alef Yes, but it probably requires a very powerful DBBC3

14. Field System, status and new features

Presentation Himwich about current FS status (FSL10, 32- and 64 bit platform support, now distributed/managed through github). See previous topic: basics of DBBC3 support already in the new FS.

First part of the TOG ended at 12:40 CEST, 10 minutes past schedule.

Session with NRAO, start at 15 CEST (13 UT) for about an hour

1. VLBA, GMVA and Globals

Bach welcomes new participants from NRAO.

Presentation **Brisken** about the current VLBA status and plans.
Funding for 2-3 years of connecting VLBA sites at 200 Mbps, three sites have 1 Gbps and (the town of) Socorro is on a 10 Gbps link. This might enable e-shipping with VLBA; tests should definitely be arranged. The new, all-digital, architecture should be operational by 2022; first tests will be conducted this year.

Presentation **Blanchard** on GMVA 2019 run.
Tested a new pointing method: interferometric pointing. Yields good results.

Bach Is this done before, during or after correlation?
Blanchard It is done after correlation.

Presentation **Bach** about current EVN status and plans, mentions 4 Gbps operational tests and 2 Gbps production.

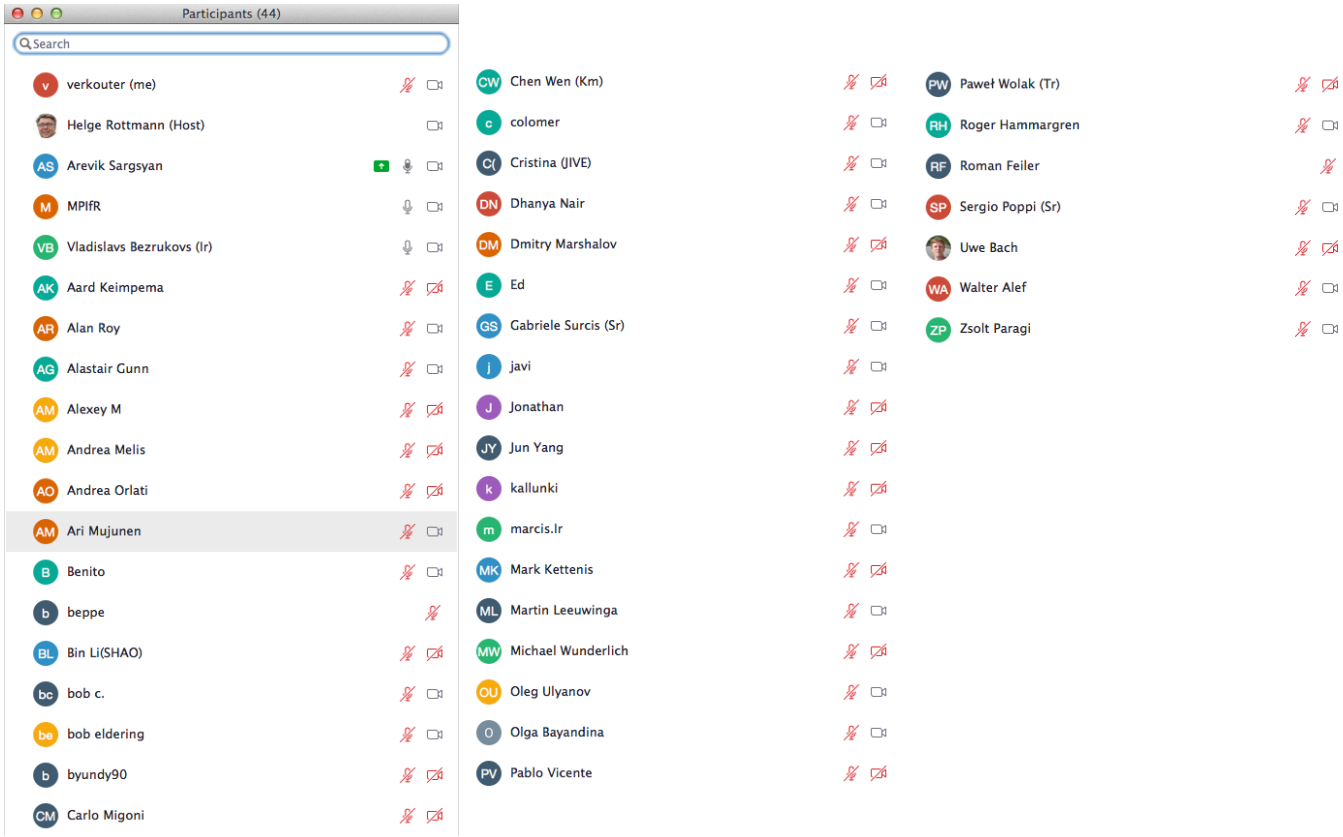
Campbell 4 Gbps globals are difficult because of the current tuning limitations.

Rottmann Is the new digital architecture backwards compatible with the current RDBE-based set up?
Brisken Yes it will be.

Campbell Due to user deferring on account of COVID-19 station dropouts/uncertainties there are no globals in the upcoming May session.

Roy Will the specification documentation for the new system be done by Justin?
Justin Will be updating the old memo and remove references to the legacy system.

Roy There is an early digitization project ongoing at Effelsberg too – removing the analog I/F system, sampler in the receiver and GPU backend processing. Raises the question: where to do the signal processing: in GPU or DBBC3. The two-year time scale of the VLBA matches the Effelsberg time line.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