

TOG web pages

EVN pages: <http://www.evlbi.org/>

Radionet wiki:

<http://www.radionet-eu.org/radionet3wiki/doku.php?id=na:eratec:tog>

Radionet indico: <https://events.mpifr-bonn.mpg.de/indico/event/72/>

MPIfR Deki: https://deki.mpifr-bonn.mpg.de/Working_Groups/EVN_TOG

Agenda

Action Items

- **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 (last updated Nov 2017: Bd, Sv)
- **All:** Upgrade to **SDK9.4** first at the correlators then at the stations.
- **All:** 80 Hz **continuous calibration**. Update the table:
https://deki.mpifr-bonn.mpg.de/Working_Groups/EVN_TOG/Continuous_calibration_%2880_Hz%29 (last updated April 2017!!)
- **JIVE:** set up a **wiki** page, summarizing problems per station. **Done**
- **All:** Provide frequency information of the stations to de Vicente
- **All:** If a station is not buying a FlexBuff, purchase disk packs (**Stations being contacted**)
- **Szomoru:** ask Keimpema to re-send email to stations requesting beam maps
- **All:** Pay attention to autocorrelation plots
- **Blanchard:** Collect cases of bandpass dips to present to G. Tuccari
- **Rottman:** define proper release policy for release of firmware versions

Action Items

- **Vicente:** Talk to Himwich possibility to inject opacity information in FS logs.
- **Vicente:** Ask directors to provide funds for purchasing a DBBC/Fila test setup for Tuccari
- **García Miro:** Find a suitable date for real time fringe-test, probably during next e-VLBI on June 20.

Action Items

Tables with current status at stations:

[https://deki.mpifr-bonn.mpg.de/Working_Groups/EVN_TOG/Continuous_calibration_\(80_Hz\)](https://deki.mpifr-bonn.mpg.de/Working_Groups/EVN_TOG/Continuous_calibration_(80_Hz))

https://deki.mpifr-bonn.mpg.de/Working_Groups/EVN_TOG/Beam_maps

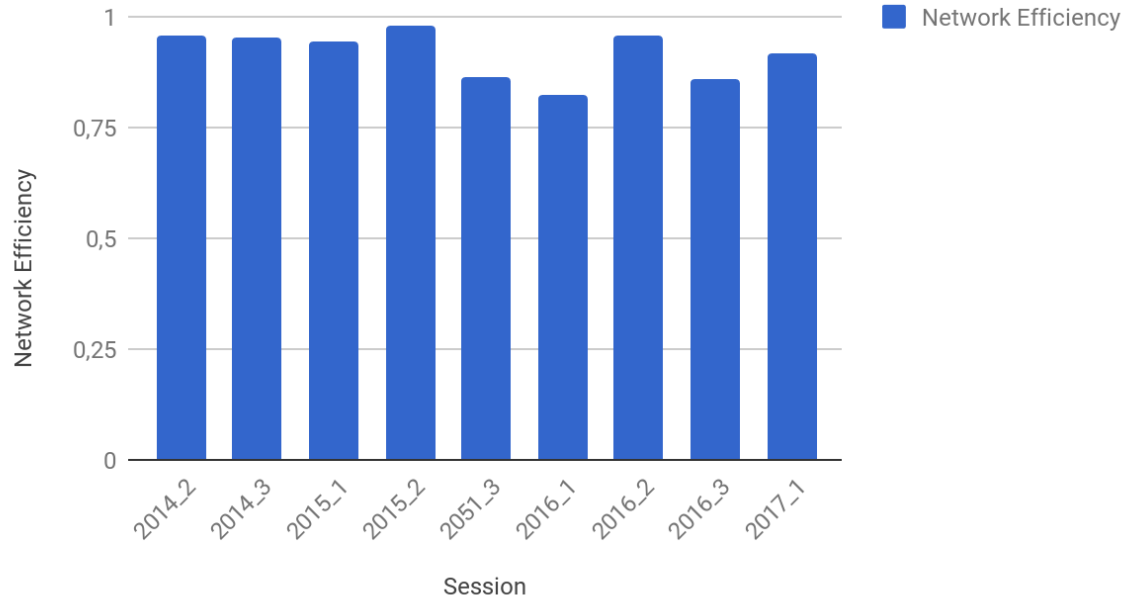
Permanent Action Items

https://deki.mpifr-bonn.mpg.de/Working_Groups/EVN_TOG/Permanent_Action_Items

- Contact information
- EVNtech e-mail exploder
- TOG-meetings
- The block schedule
- EVN disk-pack pool
- Disk-pack shipment
- GPS-Maser reading
- In advance of session
- Session preparation
- During sessions
- Post session feedback
- Post-processing
- e-VLBI
- EVN spare parts
- Receiver Frequency Information

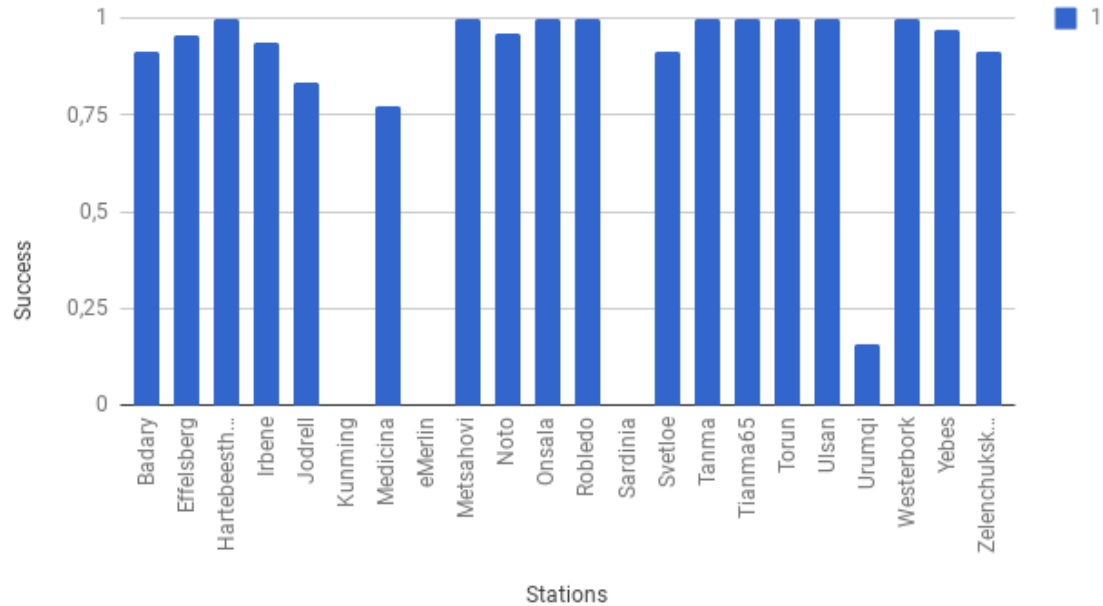
Network efficiency

Network Efficiency



Network efficiency

EVN session 2017-1. Percentage of success



Network efficiency

Information for **2017-2** to be
get from Grafana

Issues from last session

1) More instances of "empty-looking" packs arriving:

- record and play pointers at 0;
- sometimes overwritten packs when the record pointer had actually gone back to zero during the course of observing

Possible causes:

- Older firmware/SDK versions. Recoverable after some laborious work

2) **Missing** daily **GPS** (esp. outside sessions for e-, but also sometimes in sessions)

Network efficiency

3) Missing FS logs. Important within the log:

- establishes pack-arrival expectations
- the data_valid=on/off expectations
- flagr 'acquired', 'new-source', 'off-source' lines
- calibration

4) Multiple versions of schedule files.

- Stations pass along patching changes different from previously discussed
- Cause: want to try out multiple backends?
- To be done well in advance before the session.
- Problems/omission in the block schedule. Please say right away.

Network efficiency

5) Frequency agility table in the TOG wiki. It has an impact in the Programme Committee. [Nt]

6) Check your EVN contact periodically and pass the information to update it. [KVZR, T6/Sh, Ar]

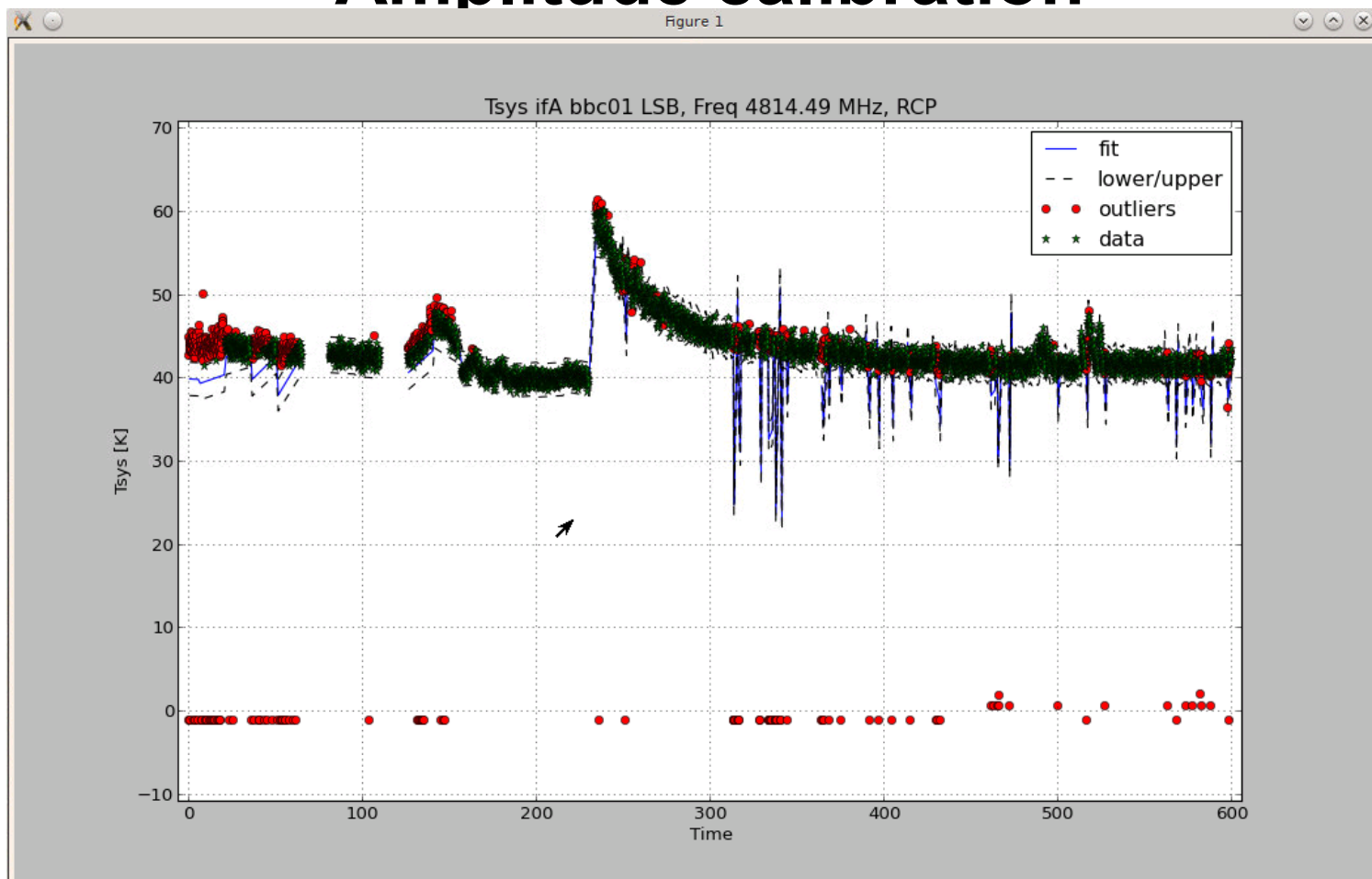
Continuous calibration

- Continuous calibration
 - Ef, Mc (1/2), Mh, On, Ro, Ys, Hh (1/2), Sr (not tested)
 - Most of the station reports mention it. Slow progress, but on the way
- What is required:
 - a switched controlled noise diode
 - a reference signal: 10 - 100 Hz
 - a backend that can detect synchronously the signal:
 - DBBC2, DPV
 - MDBE should support it. CDAS? OCTAD?

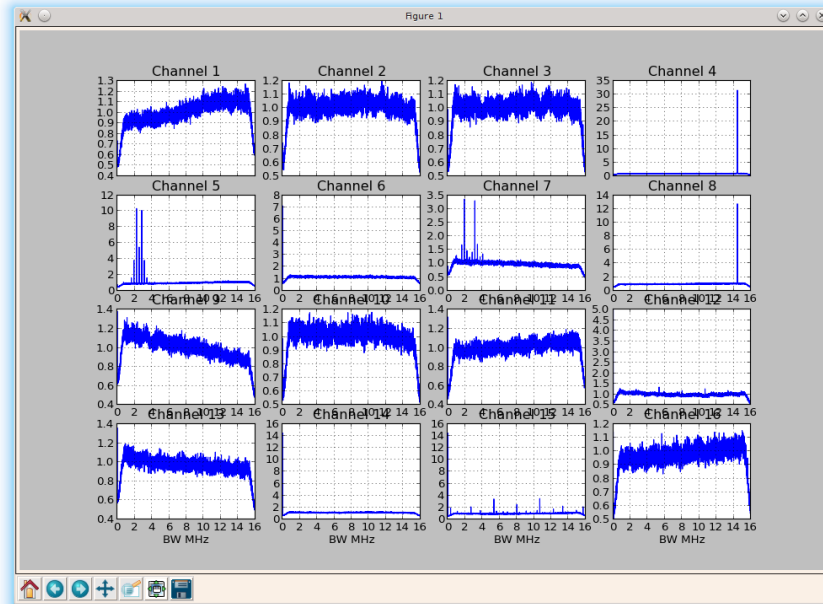
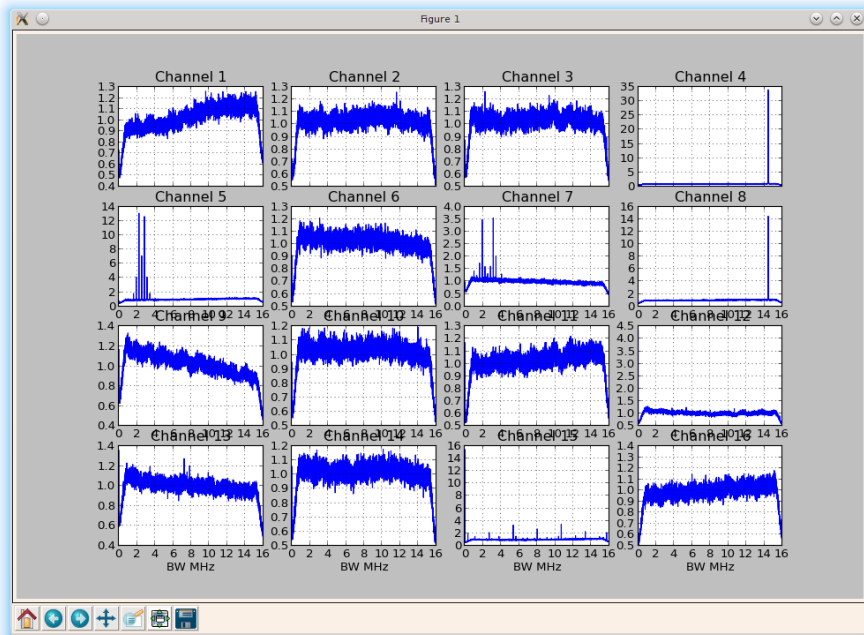
Amplitude calibration

- antabfs.py
 - Maintained by Yebes (F. Beltrán)
 - Upload new versions to mpifr deki **without** announcing it
 - Supports:
 - PFB & DDC modes
 - Continuous cal and single shot cal
 - Multifrequency in the same log
 - Hot & and cold loads (Chopper Wheel)
 - Created a subversion repository at Yebes that we will populate with some software.

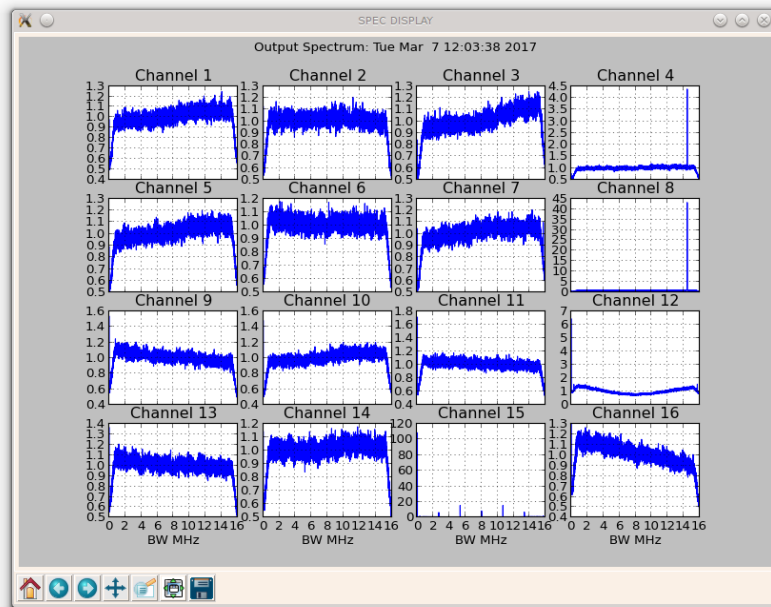
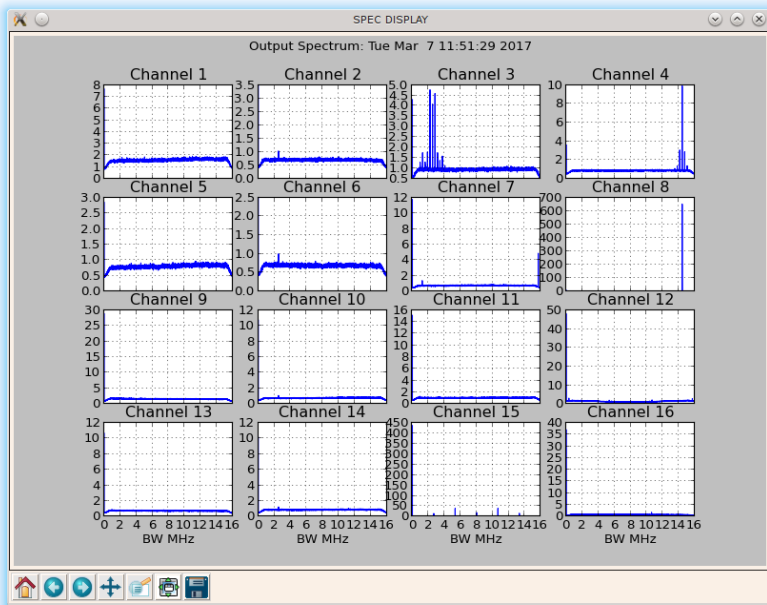
Amplitude calibration



DBBC2 Issues



DBBC2 Issues



2 Gbps versus 1 Gbps experiments

EVN session	2048 Mbps exps.	1024 Mbps exps.	< 1024 Mbps exps.
2016-1	1	11	12
2016-2	1	11	19
2016-3	5	17	6
2017-1	3	30	6
2017-2	4	19	7
2017-3	4	15	9

Used disk space at EVN sessions

EVN session	average space per station	Operational efficiency
2015-2	~ 120 TB / station	50%
2015-3	~ 68 TB / station	38 %
2016-1	~ 60 TB / station	40 %
2016-2	~ 77 TB / station	53 %
2016-3	~ 110 TB / station	
2017-1	~ 70 TB / station	
2017-2	~ 40-90 TB /station	
2017-3	~ 70-130 TB /station	

Estimation of required space

2 Gbps

- Bob Campbell's estimation of required disk space for 2 Gbps observations assuming all continuum experiments are done at 2 Gbps. Units are TB

Session	Ef 2Gbps	Ef aprov.	Ef obs.	All 2gbps	All aprov.	All obs.
2016-3	183	109	103	2609	1547	1481
2017-1	178	91	86	3008	1628	1544
2017-2	174	97	94	2572	1491	1436
2017-3	258	147	135	4282	2359	2166

Disk investment & Flexbuff upgrades

- The budget is 7000 € / year for disk space.
- Ideally for 2 Gb/s there should be: 200 TB x 2 session / station => Upgrade the Flexbuff correlator
- Use 4, 6, 8 or 10 TB disks to populate disk packs.
- Please fill in **both** tables:

https://deki.mpifr-bonn.mpg.de/Working_Groups/EVN_TOG/Disk_Inventory

Disk investments

Year	Ef	Hh	Jb	KVAZAR	Mc	Mh	Nt	On	Sh+T6	Sr	Tr	Ur	Wb	Ys	Total (TB)
2011	32	80	48	48		12								24	196
2012	64	40	80	112	32		64	80					32		504
2013	80	64	80		48	32	64	80		16	40	96	32		632
2014	96		150		32	16	72	150		112			152	72	848
2015		160	192		64		32	192					96	96	832
2016					96						64		288*		448
2017	160		288								40		120*		40
2018															
Total (TB)	272	344	838	160	272	60	232	502		128	144	96	720	192	3840

Flexbuff adoption at stations

Station	Local capacity	Capacity at correlator
Effelsberg	256 TB	101 TB
Metsähovi	95 TB	-
Hartebeesthoek	110 TB	202 TB
Onsala	324 TB	101 TB
Yebes	216 TB	252 TB
Medicina	160 TB	168 TB
Noto	160 TB	
Westerbork	288 TB	
Jodrell	144 TB	202 TB

2 Gbps status

Station	Recorded	Limitation	eVLBI	Limitation
Arecibo	2 Gbps	Backend	512 Mbps	Connection
Badary	2 Gbps		1.5 Gbps	Tested with iperf
Effelsberg	2 Gbps		2 Gbps	
HartRAO	2 Gbps		2 Gbps	
Irbene	2 Gbps		2 Gbps	
Jodrell	2 Gbps		2 Gbps	More testing
Kunming	2 Gbps		?	Backend/Conn
Medicina	2 Gbps		2 Gbps	
Metsähovi	2 Gbps		2 Gbps	
Noto	2 Gbps		2 Gbps	
Onsala	2 Gbps		2 Gbps	
Robledo	2 Gbps		?	Connection

2 Gbps status

Station	Recorded	Limitation	eVLBI	Limitation
Sardinia	2 Gbps		1 Gbps	Connection
Svetloe	2 Gbps		64 Mbps?	Never tested
T6 (Shanghai)	2 Gbps		2 Gbps	Needs testing
Tamna	2 Gbps		2 Gbps	Not tested
Torun	1 Gbps	Backend	1 Gbps	Backend
Ulsan	2 Gbps		2 Gbps	Not tested
Urumqi	2 Gbps	Not tested	1 Gbps?	Connection
Westerbork	2 Gbps		1 Gbps	Fila10G
Yebeş	2 Gbps		2 Gbps	
Yonsei	2 Gbps		2 Gbps	Not tested
Zelenchukskaya	2 Gbps		1.5 Gbps	Tested with iperf

Towards 4 Gbps operations

- **Hardware requirements:**
 - 512 MHz x 2 pols
 - DBBC2 (2/4 COREs) + Fila10G (2 COREs > no cont. cal)
 - PFB firmware
 - Common LO at the stations (Please fill in the table at the TOG wiki)

Towards 4 Gbps operations

- No new direct tests in the last 6 months.
- Proved to have worked in previous tests.
- Limitations:
 - Calibration in PFB mode (FS issue). Possible work around.
 - Enough resources at the correlator? Uniboard, bandwidth?
 - Lack of disk space.
- We will discuss about the road to implement 4 Gbps at EVN stations in the next TOG and how to overcome the limitations.
- Uniboard tests: Much work done at the correlator, further work pending?

Backends

- **EVN:**
 - **DBBC2, DBBC3**
 - VLBA
 - RDBE, R2DBE (VGOS)
 - DPV
 - KDAS, **OCTAD**
 - CDAS, CDAS2 (VGOS)
 - DAS R1002, BRAS (VGOS), **MDBE**
- **What we should advise for all backends:**
 - Same sampling rate
 - DDC mode BWs: 1, 2, 4, 8, 16, 32, 64 MHz /channel
 - PFB mode: 2 Gb/s and 4 Gb/s
 - VDIF
 - Continuous cal detection. Flexible: 10 - 100 MHz
 - Phase cal detection
 - Standard commands

FS (Himwich)

SCHED staggered start

Client/server

VEX2

Priorities to be defined.

FS Priorities

- **Priorities:**
 - PFB Continuous cal
 - Opacity injection
 - Hot/cold loads
 - “resetall” dbbc2 command

Developments. Long term plan

Overall EVN goals need to be adapted to each individual station

- Possible goals for **2018**:
 - All EVN telescope capable of doing e-VLBI at least @ 1 Gb/s
 - Upgrades at the correlator. Using the Uniboardd
 - RFI studies at stations
 - Start first DBBC3 tests (high recording rates) at some telescopes

Developments. Long term plan

- Possible goals for **2019**:
 - All EVN telescopes capable of doing e-VLBI @ 2 Gb/s
 - VDIF implementation at all telescopes.
 - Non DBBC backends: RAS, CDAS & KDAS
 - Continuum cal at all EVN telescopes
 - Recorded VLBI at 4 Gb/s
 - Storage: 400 TB / station (2 sessions)
 - Tunable LOs to be able to use PFB mode

Developments. Long term plan

- Possible goals for **2020**:
 - 4 Gb/s eVLBI
 - 32 Gb/s recording rates at as many EVN telescopes as possible (DBBC3)
 - Optical fiber high bandwidth IF transmission at the telescopes
- Possible goals for **2021**:
 - Low frequency Broad band Receiver (prototype): 2-15 GHz
 - High frequency broad band receiver: 22/43 GHz