

## Minutes of Meeting LOFAR Software

<b>Date:</b>	2008-05-14
<b>Next meeting:</b>	2008-05-21 9:15-10:15
	Paviljoen West room
<b>Present:</b>	
Andre Gunst	Yes
Ronald Nijboer	Yes
Ruud Overeem	Yes
John Romein	Yes
Michael Wise	No

cc: Arthur Coolen, Jurjen Sluman, Pieter Donker, Chris Broekema, Martin Gels, Joris v. Zwieten, Marcel Loose, Adriaan Renting, Ger van Diepen, Max Avruch, Peter Boonstoppel, Michiel v. Haarlem, Jan Reitsma, Ger de Bruyn, Arno Schoenmaker, Hanno Holties, Corina Vogt, Jan Noordam, Joe Masters, Lars Bähren, Dion Kant, Johan Hamaker, Maaijke Mevius

### *Remarks previous minutes*

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### *Announcements*

- Andre Gunst will be responsible for the CEP/WAN roll out (taken over from Mark Bentum)
- WAN technical meetings started last Friday
- Marcel will move the SVN server such that it can be reached externally
- Holidays:
  - Ruud: 26 Juni – 14 Juli 2008
  - John: 15 May – 2 Juni and from ~26 August 3 weeks and structural one day off from ~26 August onwards.
  - Ronald: 19 May to 23 May and from 25 August to 12 September
  - Andre: 19 May – 23 May and 25 June – 18 July
  - Michael: Away 12-16 May and 16-27 June

### *Action item overview*

ID	Date submitted	Description	Owner	Planned date	Status
49	20080116	Simultaneous data storage of TBB and in OLAP to validate inverse poly phase filter bank of Kalpana.  Dataformat should be changed. Although the observation was executed, it is unclear if the data has been made available to the Kalpana and the CR group. A question to be followed up with Observatory personnel.	John/Andre	20080204	Closed
53	20080206	Estimation of work if CS1 is scaled up to 20 stations. See the section before the	John, Ruud, Ronald	20080227	Open
55	20080423	Distribute Step 5 definition to the	Andre	20080501	Closed

	group.			
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## **Progress**

### **Stations (André):**

Achieved since last meeting:

- The cause of the dips in the observations are currently isolated to the BeamServer software, because an observation where all the weights of the beamformer are send manually via a script showed no dips (to be continued).

Problems / current activities:

- Long distance delay tracking is not tested again. No fringe yet. Possible help could be to use the raw data from the TBBs.
- Eric Kooistra is busy investigating the feasibility to increase the number of station output beams with a factor of 4. The penalty is that the amount of output bits is decreased from 16 to 4 bit as well.

Next actions:

- Step 5

### **OLAP (John):**

Achieved since last meeting:

- John and Chris are busy with BG/P issues and porting to test its performance. Porting the software to BG/P is expected to take at least 4 months extra work. One big advantage of the BG/P compared with BG/L is that more stuff is supported which we need to use.

Problems / current activities:

- John is busy to port code to BG/P for tests.
- Martin is a busy with non micro station mode. A quarter of the band is processed by separate partitions. This does support multiple modes at the same time (tied array and correlation). For this reason we also need single partition. A disadvantage of one partition is that if hardware fails than the system hangs (system is not fault tolerant against failing hardware).
- Rob will be investigating the tied array beamforming mode (first adding all the stations of the superstation and correlating that with the other stations). Rob will implement the tied array beamforming and Martin the control.
- Robustness for failing disks is not included yet (Arnold Meijsters).

Next actions:

- Step 5

### **Offline pipeline (Ronald):**

Achieved since last meeting:

- Marcel finished the control of the Global Solver.
- Joris and Marcel will integrate now the Global solver with the control and will start testing the Global Solver.
- Ronald sends around a draft of a calibration strategy document.
- A meeting is held on beam modeling and validation (Johan, Sarod, Joris, Ger de Bruyn and Ronald). Problem to validate the beam accurately is that you have to know the sky also precisely.

Problems / current activities:

- Ger made the build environment suitable to build 32 bit code on a 64 bit machine.
- Pandey is busy to optimize DP<sup>3</sup>.
- Maaijke is busy implementing an ionospheric model in BBS and furthermore she is busy with a peeling test in Meqtrees. Peeling will be compared with a simultaneous solution.
- Pandey will test the online bandpass removal. John will produce datasets with and without the online bandpass removal enabled. Andre needs to verify the current module implements the correct weighting formula for the digital bandpass.

Next actions:

- Step 5

### **SAS + MAC + SHM (Ruud):**

Achieved since last meeting:

- PVSS 3.7 works now on a 64 bit machine (compiled for 32 bit).
- Arthur is updating the Navigator 2.0 screens. These updates are on schedule for Step 5 completion.

Problems / current activities:

- Max is busy modeling the stations for the fault models of SHM.
- Next week Pieter and Stefan will sit together to test the several matrix functions which are implemented by Pieter.
- Metadata flow is ongoing. Metadata infrastructure from MAC to SAS in is place yet and works for the states.
- Extra status registers which are implemented in the FPGAs are not driven yet by the LCU.

- The RCU is currently able to drive the power supply of the HBA independent of the modem (which is desirable from an EMC perspective). The remainder left is that the LCU can also drive this bit.
- Reading back the HBA delays should result in really reading back those values from the Front End (FE) units instead of reading back what was written to the FEs.

Next actions:

- Step 5

### **User Software (Michael):**

Achieved since last meeting:

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Problems / current activities:

- Joe will be upgrading the DAL to use the new version 1.8 of the HDF5 library. This update will make the DAL compatible with the HDF5 image classes Ger v.D. has implemented in the development version of CASACORE.
- Joe will be adding Database access calls to the DAL. Initial testing will utilize the Transient source database at UvA. He will also contact Ruud about accessing metadata in the SAS database.
- Lars has updated the Time Series data format specification to include various metadata. Joe needs to implement these updates in the DAL.
- Alexander is updating the image cube format definition as well as writing up a design for a radio image cube mosaicing tool based on the AIPS++ routine.
- Lars is busy with the near field imager (skymapper).
- Alexander is checking how much work is required to connect DAL to CASA core for using the HDF5 data format.

Next actions:

- Step 5

### ***Software integration***

Achieved since last meeting:

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Problems / current activities:

- A request of Michiel Brentjes was to keep a clean trunk. John suggests to tag the production release.
- Marcel is busy with streamlining the build environment

- Compile a list of anticipated data products and calibration or metadata files associated with each of the pipelines.
- LOFAR development software needs to be build in Kubuntu (Michael has volunteered)

Next actions:

- Define the length of Step 4.
- Step 2+: A test program will be initiated to verify the functioning of the LOFAR software in a more structured way. In OLAP it is possible to store the raw station data and feed this into the pipeline later on. This makes it possible to define a standard data set, which can be applied to the pipeline as soon as major software changes have been taken place.

## ***Scaling up work for 20 stations***

Stations:

- For the stations the split HBA field boards must be produced and tested in the field.
- The firmware for the HBA field split must be written.
- Additions in the LCU software for the HBA field split are required.
- One central clock should be implemented in the super station.
- HBA calibration should be in place.
- Definition of test suite to be run by the LCU.

OLAP:

- Should be made suitable to handle multiple independent RSP datastreams without correlating all of them (now OLAP correlates also the different RSP datastreams from the same station to support microstations).
- The network surrounding BG/L should be modified in order to split BG/L in four independent partitions. Will be done after the BG/L decision.
- Possibly optimizations in the IO nodes to cope with the 32 MHz bandwidth are necessary. Will be done after the BG/L decision.
- Making the storage section fault-tolerant and more efficient by using multiple compute cores.
- Tied-array beamforming definition will be done in Step 5 and implementation in Step 6.
- Performance tests of alternative BG/L solution.
- Snapshot imaging support.
- Multiple observations or one observation with multiple beams which change as a function of time.

Offline:

- Bundle validation
- Ionospheric approach for 20 km distance between stations

- Multi-beam processing for clock calibration
- ...

#### SAS/MAC:

- Finishing Navigator 2.0 in Step 5.
- Making screens for the 20 station configuration
- Proof reaction times.
- Performance measurements triggers.
- Scheduler?

### Decisions

ID	Date submitted	Decision
02	20061220	Every Step will start with a Kick-off meeting, in which the complete software team participates.
<del>03</del>	<del>20061220</del>	<del>The project team starts immediately with the preparations of the next CDR in order to preserve progress of the CS1 realization</del>
04	20070116	This meeting will take place every week on Tuesday 11:00. The existing software team meeting with all developers will stop to exist.
05	20070130	Step 1 will be changed to 16 subbands instead of 32 subbands.
06	20070130	Step 2 will contain a multiple node BBS. 6 $\mu$ Stations/Station will be postponed. Instead of this, 32 subbands measurements will be realized.
07	20070206	Step 1 will support 160 MHz observations. The other steps will support 200 MHz as well.
08	20070424	Step 2 will support 16 subbands @ 200MHz and 24 MHz at 160 MHz
09	20070424	During the rest of step two, OLAP will only support observations during the weekend.
10	20070522	The number of subbands per Measurement Set is set to 6 or 8 default.
11	20070522	Scheduler activities will be preferably activated in Q4 2007.
12	20070522	Procure, three Local Control Units to accommodate 12 microstations in CS010 in a quick way.
13	20070529	Integrate version numbers in all software.
14	20070529	Distinguish the software between a production version and an engineering version (partly now already the case).
15	20070605	All developed software under CVS will be transferred to Subversion. The main reason for this is that Subversion supports the integration of version numbers in the executables. In this way you can always retrieve which software is used for a certain build. First the impact of the transfer will be investigated by Marcel.
16	20070619	Marcel Loose will be the librarian of the LOFAR software. The available time for this will be shared with his BBS work.
17	20070710	The known pulsar survey mode will be the next mode to support (not in its full extent but partly on-line and off-line).
18	20070710	The temporarily off-line part of the known pulsar mode pipeline will not be under control of SAS/MAC. This will be put under control of SAS/MAC as soon as that software is available in the on-line part of the system.
19	20070814	Joe Masters makes the routine to read in the TBB data.
20	20071002	Fault tolerance of the system (mainly OLAP) is put at the top of the priority list after closing the SAS-MAC and CEP integration.
21	20071123	Kubuntu 7.10 desktop 64 bit OS is chosen for all machines except the BG/L and MAC/SAS machines
22	20071123	Station calibration work is smeared out over Step 4 and Step 5.

23	20071123	Global bandpass shape is moved to Step 5 because of its low priority.
24	20071211	Multiple beams per observation will be implemented instead of multiple observations (this is consistent with the plan).
25	20071211	Step 3 will be closed next Thursday. Any open items will be finished in Step 4.
26	20080130	Multiple beams are defined as multiple directions with the same set of antennas. Hence, <u>only the angle, subbands and beamlets can be modified per beam.</u>
27	20080206	Step 4 and Step 5 for MAC/SAS will be changed. The control of the offline pipeline will be postponed because the offline subsystems are not fixed yet. Currently the definition and design of the metadata flows will be set as goal for Step 4 and the implementation of the metadata flow will be the end goal of Step 5. Hence, after Step 5 (part of) the metadata is included in the Measurement Set.
28	20080213	Currently a single subband and single beam is stored in a Measurement Set. As soon as we are ready for mosaicing this probably should be changed in the future.
29	20080220	For storing the raw station beams the sanitizing operations like input buffer will be included in the online part. For this OLAP has to give operational support or instructions to the observers how to start up manually such observations. Since, this is an between solution this will not be automated via SAS/MAC.
30	20080227	Weekly build environment will be updated and automated.
31	20080227	After Step 5 the software documentation will be updated and obsolete packages will be removed.
32	20080423	Basically two Low Band modes will be supported initially: a LBL and LBH mode. The connection between antennas and RCUs have to be chosen such that those to modes make sense.

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### ***Table round***

- Ronald: How stable is the global bandpass? André: That is presented as a function of time and temperature a time ago. André will send this information to Ronald.