

Minutes of Meeting LOFAR Software

Date:	2008-08-06
Next meeting:	2008-08-13 9:15-10:15
	Multimedia room
Present:	
Andre Gunst	Yes
Ronald Nijboer	Yes
Ruud Overeem	Yes
John Romein	Yes
Michael Wise	Yes

cc: Arnold Meijster, Rob van Nieuwpoort, Arthur Coolen, Jurjen Sluman, Pieter Donker, Chris Broekema, Martin Gels, Joris v. Zwieten, Marcel Loose, Adriaan Renting, Ger van Diepen, Max Avruch, 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

- We closed the Step 5 successfully.
- Station roll out will be delayed. The exact delay will be communicated next week! There are multiple causes, but most of them boil down to the delivery time of components.
- Phase 1 WAN roll out started. Stations in the field will be connected via the 10 GbE technology but not via CWDM equipment (waits for the concentrator node).
- Jan David Mol will be hired by Astron for the software group from November.
- Joe will stay within the LOFAR project for one day a week.

Action item overview

ID	Date submitted	Description	Owner	Planned date	Status
66	20080723	Make "Towards 20 Stations" development plan. Done.	Andre	20080730	Closed
67	20070723	Should the station beamformer data reader written by Joe also support 4 bit and 8 bit data? Yes, it is in the LOFAR20 plan.	Michael	20080730	Closed
68		TBB dumps			

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Progress

Stations (André):

Achieved since last meeting:

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Problems / current activities:

- Dips: Michiel Brentjens can currently predict the dips and the cause appears to be in the BeamServer software. The problem has not been solved yet.
- Long distance delay tracking observations have been done. James Anderson will look for fringes.

Next actions:

- Start with LOFAR20

OLAP (John):

Achieved since last meeting:

- There is a fringe detected with the new WAN network, BG/P equipment and CS001 and CS016 in the microstations mode for 12 hours. The passband is reduced to the 5 % level. John will now turn the code into production ready code.
- The software can handle now four RSP boards on one IO node, but not at the full rate.
- Taking raw data does not work yet.

Problems / current activities:

- John has worked on the ZOID for the BG/P which is now defined as FCNP (Fast Collective Network Protocol).
- Online bandpass correction showed an error of 5% which is too much.
- Rob is busy implementing the TAB mode, especially for the superstation. The issue of how to best handle data drop-outs is still being explored.
- Robustness for failing disks is not included yet (Arnold Meijsters).

Next actions:

- Start with LOFAR20

Offline pipeline (Ronald):

Achieved since last meeting:

- DPPP: Adriaan found a little bug in the framework. Pandey came up with a new algorithm which was integrated in the framework and came to the conclusion that it is quite sensitive.
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Problems / current activities:

- Marcel is busy porting the offline software to 64 bit machines.
- Pandey will commission the Global Solver.
- Treatment of parameters in BBS and mapping of parameters to grid needs to speed up.
- Ronald is continuing with the strategy document and has identified four different approaches. This is on a hold. Currently there are too many uncertainties. Instead the focus is MSSS which is more clear.
- Maaijke will implement SPAM in BBS (needs fitting on non-UV data). Is still busy testing if you have to do peeling or making simultaneous solutions.
- Pandey will test the HBA dipole beam model in BBS

Next actions:

- Start with LOFAR20

SAS + MAC + SHM (Ruud):

Achieved since last meeting:

- Ruud is working on the RSP Driver modifications for station assembly tests.
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Problems / current activities:

- Issue: 7 seconds per subband. Optimization is already made. Three seconds can be gained with this.
- The information of the MCU should be connected to the database too.
- As it stands now: real significant different observations on BG/P has as a consequence that the RSP Driver must be restarted with another configuration file. This is the case if the station data must be send to different IOs of the BG/P from observation to observation.
- Metadata flow work is ongoing. Arno is busy with a mechanism to distribute the static meta data from SAS to the stations. It would be great if that can be finished as well in Step 5.
- 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.

Next actions:

- Start with LOFAR20

User Software (Michael):

Achieved since last meeting:

- Joe is working on documentation for the DAL library and data writers.

Problems / current activities:

- Near field imager work is ongoing.
- Lars is also continuing to support Martin's efforts with CMAKE.
- Joe is also working on the draft of the beam-formed data ICD.
- Members of the Magnetism KSP are exploring using the VisIVO package to visualize RM synthesis cubes.
- Alexander started with a radio image mosaicing script for casacore.

Next actions:

- Start with LOFAR20

Holidays

John: From ~26 August 3 weeks and structural one day off from ~26 August onwards.

Ronald: 25 August to 12 September

Software integration

Achieved since last meeting:

- Martin, Marcel and Lars are busy to compile LOFAR code with cmake. Some issues are not solved yet. The compile times have been significantly improved. No reconfiguration done: 9 times as fast. Reconfiguration necessary then 16 times as fast. There is no integration with the SVN server yet. We need a recommendation /assessment on how to proceed from Martin, Lars, Marcel and Ger.

Problems / current activities:

- A request of Michiel Brentjes was to keep a clean trunk. John suggests to tag the production release.
- 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

After Step 5, one full week will be used to update the documentation of the software.

Current list of tasks to do and when (**now ordered by step**):

Stations:

- Definition of test suite to be run by the LCU. Step 1.
- ARP in the TBB. Step 1.
- Conversion to ITRF coordinates. Step 1.
- Change that RSP boards only send data if the LCU says so each e.g. 10 seconds. Step 1.
- For the stations the split HBA field boards must be produced and tested in the field. Step 2.
- The firmware for the HBA field split must be written. Step 2.
- Additions in the LCU software for the HBA field split are required. Step 2.
- One central clock should be implemented in the super station. Step 2.
- Bit for beam exchange mode in firmware, LCU. Step 3.
- Station HBA calibration. Functional: Step 2. Operational: Step 3. Optimized: Step 3+.

OLAP:

- Conversion to ITRF coordinates. Step 1.
- Script on central machine to check station broadcasts (Chris). Step 1.
- Making the storage section fault-tolerant and more efficient by using multiple compute cores. Step 1.
- Tied-array beamforming implementation for super station. Step 1.
- Snapshot imaging support (changing beams in time). Step 2.
- Possibly optimizations in the IO nodes to cope with four RSP data streams on one BG/P IO node. Step 2.
- Multiple TABs: Step 3+
- Multiple observations or one observation with multiple beams which change as a function of time. Step 3+

Offline:

- Conversion to ITRF coordinates. Step 1.
- DP³ online bandpass correction. Remainder of Step 5 (on hold). Step 1.
- DP³ offline clock phase correction definition. Step 1.
- BBS global solver testing and commissioning. Step 1.
- BBS implementation of solution based flagging. Step 1.
- BBS parameter handling. Step 1.

- BBS ionospheric SPAM implementation. Step 1.
- Integration of DP³ and CImager. Step 1.
- Update of parameter database. Step 1.
- Commissioning of CImager. Step 1.
- Script for parallel imager. Step 1.
- Image N channels into M channels instead of 1 channel. Step 1.
- Profiling of CImager. Step 1.
- BBS beam model testing. Step 1.
- DP³ offline clock phase correction implementation. Step 2.
- BBS ionospheric SPAM test. Step 2.
- BBS station beam testing. Step 2.
- Imaging for full stokes parameters. Step 2.
- Integration of DP³, BBS and CImager. Step 2.
- DP³ global bandpass correction. Step 3.
- Facet corrected imaging. Step 3.
- Integration of DP³, BBS, CImager and source finding. Step 3.
- Weighting schemes. Step 3+.
- Integration with MAC/SAS. Step 3+.
- GSM/LSM: ?
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SAS/MAC:

- Station LBA calibration optimization. Step 1.
- Updating to Navigator 2.0 to enhanced functionalities in Step 1.
- Station test scripts for station acceptance. Step 1.
- Proof reaction times and trigger performance measurements. Step 1.
- MAC uses feedback from SHM. Step 1.
- Conversion to ITRF coordinates (BeamServer modifications). Step 1.
- Coordinates centrally available. Step 1.
- Temperature control. Step 1.
- LCU trigger code integrated and connected to MAC/SAS. Step 1.
- TBB dumps under control of MAC/SAS. Step 2.
- TBB data writer under control of MAC/SAS. Step 2.
- Making screens for the 20 station configuration. Step 2.
- MAC/SAS screens for known pulsar mode. Step 2.
- Ring splitter control. Step 2.
- Write TBB metadata to database. Step 2.
- Write BF data to database. Step 2.
- BF data writer under control of MAC/SAS. Step 2, 3.
- Switch MAC addresses flexible. Step 2, 3.
- Hardware monitor and software monitor for central machines. For BG/P it is necessary to check if it is still up. Step 2, 3.
- Control to enable switching between 4 bit, 8 bit or 16 bit station data. Step 3.

- Reconfigure international switches for stand alone mode (starting SNMP script). Step 3.
- Scheduler. Step 3++.
- Wish list: horizon vector in the stations, beamtracking suitable for the solar system. Step 3++.
- Station calibration and trigger information metadata available. Step 3+.
- Control of off-line processing. Step 3++.

USG:

- TBB data writer capable of accessing databases to retrieve metadata. Step 1.
- CR tools ready to read and process TBB HDF5 files. Step 1.
- Skymapper ready to make images from TBB HDF5 files. Step 1.
- Version of beamformed data writer which can accept BF data stream either from BG/P or from stations directly. Step 1.
- BF data writer capable of accessing databases to retrieve metadata information. Step 1.
- Native support in DAL for PRESTO/SIGPROC formats. Step 1.
- Updates to PRESTO to use DAL HDF5 BF data natively. Step 1.
- Data product content definition document. Step 1.
- Pipeline framework definition. Step 1.
- Implement dedisperse, period fold and pulse search algorithms in offline pipeline. Step 2.
- GSM/LSM implementation. Step 2.
- Data product definition implementation. Step 2.
- Lightweight mosaicing tool. Step 2.
- DAL update to support 4 bit and 8 bit mode. Step 3.
- Source finding: ?
- Commissioning tasks: ?
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Decisions

ID	Date submitted	Decision
02	20061220	Every Step will start with a Kick-off meeting, in which the complete software team participates.
03	20061220	The project team starts immediately with the preparations of the next CDR in order to preserve progress of the CS1 realization
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 μ 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, only the angle, subbands and beamlets can be modified per beam.
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.
33	20080528	The position of all individual dipoles will be made available centrally in the database.
34	20080603	The data format of the positions will be delivered in ETRS coordinates by the roll out team. However, the data format of the positions will be stored in ITRF format in the LOFAR databases. Hence, all software and configuration files dealing with coordinates must be made compatible with the ITRF dataformat. Hans van de Marel

		is responsible to convert the ETRS coordinates to ITRF coordinates for the LOFAR system.
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Table round

- After Step 5, one full week will be used to update the documentation of the Software: Marcel can distribute already the instructions how to update the documentation to all software engineers. Marcel needs one week to update the build environment such that the engineers can see the result of adding comments. Last week of August will be scheduled for this. After that all engineers can check if the software packages are documented correctly.