

Review of Narrabri/Mopra on-line software

16 November 2005

A review of the on-line software for the ATCA and Mopra telescope was convened by Bob Sault. The review panel comprised Bob Sault, John Reynolds and Dave McConnell. On-line software for the ATCA and Mopra is primarily the responsibility of the Computer Group at Narrabri, led by Mark Wieringa and with group members Euan Troup and David Brodrick.

Aim

The aim of the review is to consider the current state of the systems, and to help develop broad direction for the medium term (~5 years).

This broad direction should include

- optimising the millimetre capabilities of the ATCA and Mopra;
- consider the affect of changes over this period (CABB, 7mm receivers, ATCA cm receiver upgrade, eVLBI and broadband link);
- possible involvement and support of other facilities (eg Parkes and NTD/xNTD);
- support of remote observing (both other telescopes being controlled at Narrabri, and the ATCA and Mopra being controlled elsewhere), and
- VO-related issues and pipeline reduction.

Topics/systems to be reviewed include

- General architecture;
- Completion of Linux port;
- SCHED;
- CAOBS plus Legacy Server and role of TCS;
- ACCs;
- mon/MoniCA;
- OBSCOM, and
- CAMON/ASSISTANCE.

The Group

The Group's main roles are to maintain and develop the software and computing hardware that make up the ATCA and Mopra on-line systems. Group members have other responsibilities, including maintaining components of the Narrabri and Mopra off-line systems and strategic SKA-related research. In total there is about 2.0 to 2.5 FTE of effort expended in the on-line and off-line software/hardware development and maintenance, with about 40% of this effort being operational and 60% developmental.

Presentations

The review consisted of presentations by Mark, Euan and David. Mark provided draft project reports and a concept plan as part of the documentation of the review.

Mark's presentation gave an overview of the current state and broad future paths. The next major milestone for the Group is the completion of the ATOMS/Linux project that will remove the dependence on the old VMS operating system and computers. The two components of this are

the main user interface to the control system CAOBS and the new monitoring system. Mark introduced this work in the context of the overall architecture of the on-line software and showed how the architecture will be simplified by the completion of the current work. Possible future work aimed at addressing

- Increasing the immunity to future (market driven) hardware and software changes;
- Ensuring software support for CABB, NASA tracking and the remote operation of the Mopra telescope;
- Maximising the reusability of telescope control software, firstly across the current ATNF telescopes but ultimately in future instruments (xNTD etc).

Detailed presentations on the LINUX port and monitor system work were made by Euan and David respectively.

Comments and recommendations of the panel

Current work

- The panel is pleased that the ATOMS/Linux project seems to be on target to complete on time. The switch to the Linux-based observing system (CAOBS and friends) is scheduled for 21 November, with a backup date in January, both ahead of the scheduled project completion in March 2006.
- The panel advises the Group to make a clear division of remaining tasks between those that must be done for project completion and those that can be done in the post-commissioning maintenance portion of the products' life cycle. The former must provide the core functions essential for telescope operation. The latter may improve efficiency, maintainability, portability and ease of use, and provide advanced functionality. The Group would benefit from external input in helping to prioritise the remaining tasks in the project. The panel recognises that the expected maintenance load on the completion of the project will be, in the short term, higher than with the current (very mature) system. The Group should plan for this extra workload in making future commitments of their time. The panel recognises that teething problems with the CAOBS Linux port might result in extra downtime.
- The panel is impressed with the functionality of the new monitoring system and with its potential for portability to other observatories. The Group is encouraged to explore a trial installation at Parkes of the monitoring software.
- The panel recommended that the few remaining Mopra dependencies on VMS should be eliminated so that the VMS system at Mopra can be moved to a "standby" mode before being switched off.

Future work

- The panel was pleased with the overall approach to future planning taken by the Group members and encourages them to continue with both the medium-term (CABB, NASA tracking, 7mm upgrade, Mopra remote operation) and the long-term future in mind.
- The panel recognises the need for incremental improvements over the life of the software products to allow them to adapt to the changing hardware and software environments available. Additionally changes will be desirable to keep the ATNF telescopes capable of exploiting new approaches and to allow the software to meet the demands of innovative projects. The effort put into supporting the AT20G project and Mopra on-the-fly mapping, for example, are seen to be of high value.
- The Group has developed an appreciable body of software to control telescope hardware, and has an expertise in the control and monitoring of complex systems, such as synthesis

arrays and single dishes. It has a wide range of expertise in semi-real time systems and software/hardware interfacing to both commercial products and ATNF-specific hardware. The panel felt that it was important for the Group and the ATNF to capitalise on this software and this expertise. The panel agreed with the direction of simplifying and improving the on-line system as a way to reduce the effort involved in the ATCA and Mopra systems in the longer term. At the same time this software should be seen of as the base for developing control software for future generations of ATNF telescopes. The prospect of the ATNF operations expanding to include new generation telescopes should influence the planning of all on-line software.

- The panel heard of the ATNF's vulnerability arising from the current reliance on the real-time operating system pSOS. To quote from Mark, "*A move to Linux would bring us into the mainstream for on-line/real time control, giving access to better development tools and ensuring support of current hardware (interface cards etc)*". Although pSOS was previously used in a number of ATNF systems, its use in the ATNF is now largely confined to the ATCA and Mopra ACCs and there is only one active pSOS developer (David). The ATDCs are the only other example of its use within the ATNF. The pSOS environment is no longer being developed by Wind River, and device drivers to support new hardware are not being written. Consequently the ACCs are locked into old hardware. In addition to the risks this introduces into the operation of the ATCA and Mopra, new projects would baulk at using obsolete software and hardware in a new system. The panel supported the Group defining a new project to transfer ACC software to a Linux operating system. This would follow and benefit from code developed by a similar transfer of correlator control software made by the Marsfield Electronics Group several years ago. The panel considers this transfer to be important for the medium to long-term viability of the ATCA and Mopra on-line system and important in allowing the ACC software to be re-used in future projects.
- Other potential vulnerabilities were discussed. The dependence of TCS on glish will become a concern in the future and will impact Mopra and Parkes. The panel recommends that ATNF as a whole needs to develop an exit strategy for glish. The panel noted that the Scientific Computing review recommended support for TCS be moved from the Scientific Computing to the operational software groups. The panel recommended that manpower and glish issues associated with this would need to be clarified before a move is implemented.
- The panel heard of the unsatisfactory state of the ATCA scheduling software arising from the move away from VMS and increasing difficulties with the web-based scheduler. The introduction of OPAL and its convenient source listing function was mentioned in this context. The Group was encouraged to explore the possibility of proposing a new project that would:
 - Provide a modern web-accessible scheduling interface of the standard set by OPAL;
 - Give users access to the source list files prepared by the OPAL system;
 - Unify the "scheduling language" used by CAOBS and TCS, allowing a uniform scheduling interface across ATNF telescopes.

If successful, such a project could result in a package readily adopted for future ATNF telescopes, such as the xNTD. The panel recommends that possible future paths be discussed with the OPAL developers.

- The on-line imaging pipeline was discussed by the group and panel members. A pipeline based on AIPS++ was partially developed by Marsfield staff with the aim of providing a "quick-look" image facility on the ATCA data archive. A version capable of running on-line at Narrabri was planned. This project was terminated before public release of the

archive version. The Group suggested that there is demand for an on-line pipeline. The panel suggests that resources do not exist at present to develop the pipeline, but that it would be useful to quantify the effort required. Given the expertise of the Group, the panel did not feel an on-line pipeline was a priority area for them at this time.

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