ATF Status Report for September, 2007
4 October 2007

Management:
The ALMA Test Facility was transferred to Computing IPT management on 1 September 2007 as per the ATF Extension CRE. Before handover, the primary planning agreement between stakeholders was written and is available on the ATF Twiki site at:
http://almasw.hq.eso.org/almasw/pub/ATF/WebHome/atf.planning.doc

A new management system was put into place on 1 September 2007. The ATF Twiki site holds all planning tools:
- ATF goals – steps leading to major observatory goals with a rough timeline (to date, only the principle goal of achieving dynamic interferometry is well-defined).
- ATF roster – a support roster to track who will be available for support from CIPT, PSI, Sci IPT, BE IPT, Ant IPT and others.
- Google spreadsheet – a daily schedule of events showing what is happening each day, who is responsible, and who in the Sci IPT is at the ATF. The ATF activities are negotiated every Thursday by PSI and CIPT (with Sci IPT inputs) for the following week.

Daily activities and downtime log are tracked in the ATF journal, again available on the ATF twiki.

Major Accomplishments:
In the first week of September Science, Computing and PSI achieved static fringes on planets and a quasar using the new BE equipment and new correlator in TDM and TFB modes. Later in the month, we were made a significant step toward dynamic fringes by achieving and tracking "semi-dynamic" fringes on Mercury and 3c279 for nearly 3 hours. The system still has to be manually configured and delays calculated using a polynomial however the coarse delays in the correlator and fine delays in the digitizer clock worked correctly and the fringe rotation was done in the 1st LO. The next steps needed before we can say we have dynamic fringes is to interface automatically to the Correlator and implement a sky delay server that will translate sky coordinates of a source to a calculated delay (details of exactly what it means to achieve first dynamic fringes is in the ATF goals document on the ATF Twiki).

The pointing of the AEC and VA antennas have improved significantly with a number of software bug founds and corrected. The AEC antenna pointing is good to within a few arcseconds. The VA antenna pointing is good at low elevations but it has been found to have a ~20" pointing offset at high elevations. This offset appears to have been introduced in late September and the solution is being actively sought.

The antenna efficiency was determined from 5-point scans on Mercury combined with tipping curve data. Both antennas have a total aperture efficiency of ~51% +/- 10%. This is considered reasonable given the expected illumination pattern and receiver noise.

The CIPT have made significant progress toward a system that delivers tested software to users on a 2 week release cycle. While the software is not yet stable enough to be given to users without substantial support, it is getting there. Time is being allocated to CIPT to improve development, deployment and delivery to users however, this time is being balanced against the primary goal of dynamic fringes.

The first draft documentation for commissioning activities is being written by the Science IPT visiting scientists. This has already proven to be very useful for cross-training and has the promise to help increase operations efficiency even at this early stage.

Issues/Concerns:

The beginning of a new way of operating the ATF had a rocky start as groups adjusted to the new system and learned to work within it to accomplish their goals. The ATF time is now scheduled in specific blocks of time and each user must ensure that the system is operational for the next user of the system. Given that we are actively working with the system or collecting monitor data 24 hours a day now, increased communication and responsibility within each group and between groups is essential. The last two weeks of September has shown an improvement in coordination and cooperation between groups. This is expected to continue to improve.

The software stability is still a significant issue and is the number one cause of ATF down time. It also causes the most frustration with visiting scientists. The CIPT have changed/ improved their procedures to get the software to be more stable. Some improvements have been achieved in this area and more are expected in the next month. Achieving better software stability and usability is the second highest priority behind achieving dynamic fringes.

The BE group have discovered a problem with the metaframe delays in the DRXs going unstable intermittently (this destroys all phase information). This problem will impact dynamic fringes if it is not solved. All requested time is being given to the BE IPT to track down the cause of this problem.

It was found that the VA quad leg repair will take 2 weeks out of the schedule. The proposed repair dates are either the last 2 weeks of October or the 2 weeks before Christmas holidays. The schedule impact and the risk of the repair causing more problems than it solves are very real. However getting the forensics of the joint failure combined with the ability to do fast switching offset the risk enough that the repair is going forward.

ATF efficiency:

The ATF usage per day is shown in the figure below. Roughly 54% of the time was used for active development (hardware and software) and science observations (primarily total power pointing), 21% of the time was used for passive data collection (archiving monitor points to troubleshoot hardware problems), 23% was down time (due to software crashes, hardware failures, power outages or weather), and about 2% was unscheduled.
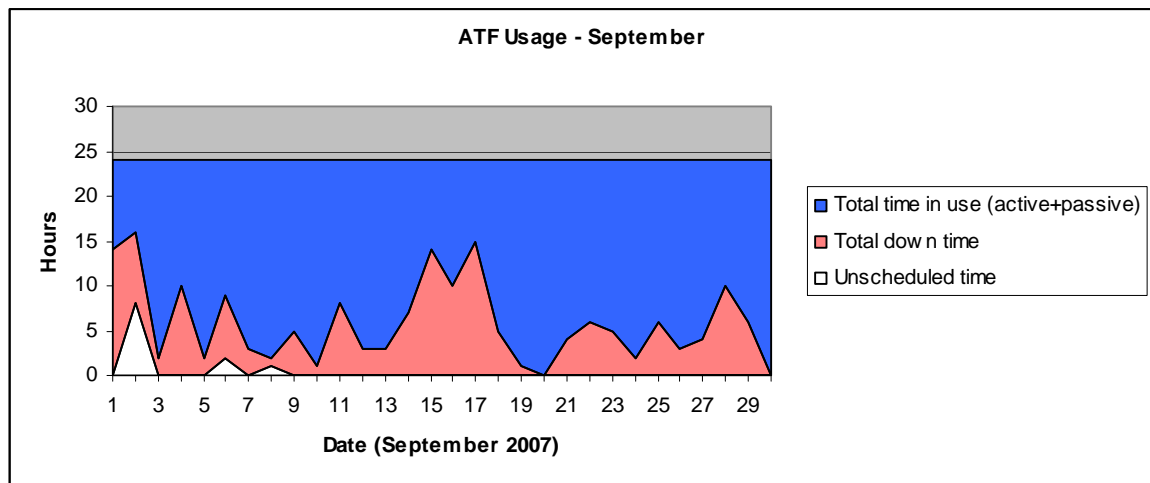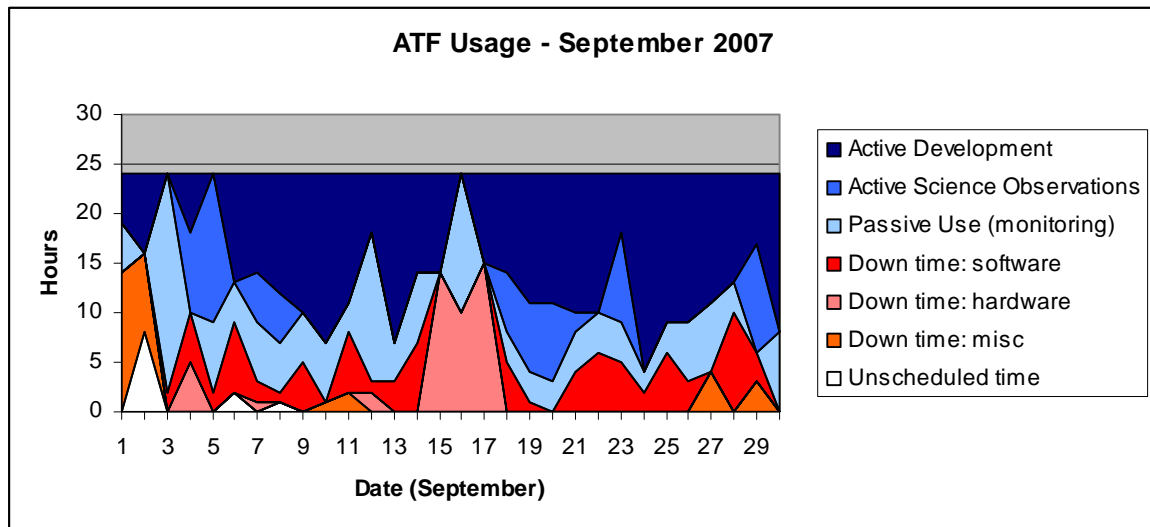
Figure: ATF Use for September 2007. Top: ATF use broken into the following categories: Active use (development time and science observations); Passive use (archival of monitoring data to troubleshoot hardware); Down time due to software, hardware and miscellaneous (weather, power outages) failures; and Unscheduled time. **Bottom**: ATF use broken into 3 categories: Total time in use (active + passive); Total down time; and Unscheduled time.

ATF Viability:

While it is still a bit early to determine if the ATF should remain open until 1 June 2008, it is clear that the ATF is, at this moment, valuable to software development, hardware verification and commissioning. Individual reports from the Computing IPT, AIV and the Science IPT discuss the usefulness of the ATF from their perspective.

Appendix – Reports from ATF Stakeholders

Computing IPT:

This month saw several firsts for CIPT at the ATF. For the first time CIPT software assumed continuous control of the hardware delay and fringe tracking. Although substantial work remains on this path this is an important milestone toward the goal of Dynamic Interferometry. CIPT also delivered ALMA-4.1.2 and ALMA-4.1.3 this month, marking the beginning of approximately bi-weekly software deployments at the ATF. The goal is to refine deployment and testing procedures, provide rapid response to software requests, and provide a stable platform for the PSI and Science Groups. We have uncovered a number of pitfalls and are designing methods to prevent them in the future. The Telescope Monitor Database has been deployed for the first time and monitor data for selected devices and monitor points are now being stored in the Archive. The revamped antenna servo control system (Mount) has been deployed and pointing measurements made by the Science team. Several subtle pointing errors were identified, and are being corrected. Rapid position reporting from the frame grabber (10 Hz rate) has been refined and is entering [hopefully] final testing, as has the new frame grabber driver, which is necessary to make spares available of the optical pointing computer.

Assembly, Integration & Verification:

As a result of the priority change, PSI has switched from a dire shortage of manpower to what now seems an overabundance. PSI has over fifty outstanding projects but has only finished twelve the past three weeks. The outlook is improving, though, as they adapt to the limited access.

Nearly all nonrecurring hardware and electronic system-level failures are either diagnosed or resolved by Jack or Gene. Since Jack plans to stay with NRAO through September 2008 CIPT will benefit from his unmatched experience and indefatigable dedication for the life of the ATF. Gene will move to Chile in early 2008 and while still available remotely . Drew Medlin has already moved to Backend and Juan Pablo Caram returns permanently to Chile in December. This could limit comprehensive electronics support. In mitigation, starting in early October Gene will provide detailed training for CIPT and PSI staff, including Sarmad who is expected to remain at ATF through to closure. This training will cover ATF electronics with a focus on using the alarm tool, understanding the tool diagnostic features and recovering system issues using the PSI configuration scripts. It is expected this work when combined with the support of Peter, Jack and Sarmad will provide prompt resolution for the majority of problems.

BE has had some nagging problems with the LO timing to the antenna and the metaframe delay reporting in the DRXs, but things are generally looking up at this time. BE has had no real problems dealing with the change in ATF management, but they are concerned that CIPT's agenda may possibly leave other IPTs to compete for a limited amount of ATF time each week. I should stress that for BE, this **has not** yet been a problem.

Science IPT/Commissioning:

Science IPT has provided support for the testing at the level agreed (or above) and has played a key role in diagnosing some of the problems found. A lot of work has been done on documenting procedures and improving our ability to analyze test data.

The need has been identified for specialist help to CIPT in a couple of areas (positional astronomy and aspects of the implementation of delay and phase tracking). This has been arranged, at least in the short term. It has been noted that spectral-line single-dish pointing would be a very valuable tool at both the ATF and in Chile so a detailed set of requirements for this is being prepared.

Viability: All those involved from the Science side regard the software testing at the ATF as critically important work. Reliability of both hardware and software is still a serious problem and, on the evidence so far, it seems essential that a high level of technical support should continue throughout the test period.

Concerns: The experience so far has been a frustrating one for all involved. New elements are being added rapidly to what is already a complicated system with insufficient testing at sub-system level. The new arrangements have not yet been in place for long, but in subsequent reports we will need to look at whether the efficiency of the test process is improving at the rate that is needed if we are going to achieve the essential targets.