

The North American ALMA Technical Advisory Committee (ANATAC): Recent Activities

July 21 2004

Meetings:

The ANATAC holds regular teleconferences, approximately once per month, with continuous email correspondence between members, and occasional special presentations from key NA ALMA technical staff on engineering topics of concern.

Membership: Darrel Emerson (chair), Barry Clark, Larry D'Addario, Peter Napier, John Payne, Dick Sramek, Art Symmes and Dick Thompson.

Note that Art Symmes has now joined ANATAC, bringing mechanical expertise to the group.

Minutes: Minutes and other material from the ANATAC's activities are available at <http://www.tuc.nrao.edu/~demerson/anatac.html>.

Recent Activities:

- **ALMA Budget:** ANATAC has passed on all material collected in its earlier investigations, to Marc Rafal; Marc is organizing a Programmatic Audit. This completes ANATAC's efforts on the budget investigation, although ANATAC is expected to be represented within Marc's group.
- **Photonics and LO:** 6 months ago, ANATAC was concerned with certain aspects of the photonic LO distribution. After investigations and a presentation from Bill Shillue, ANATAC now considers that the LO, photonics and round trip system are in reasonable shape, although system tests are need to confirm experimentally that everything works. This is no longer a major concern, but ANATAC will continue to watch developments.
- **ALMA LO phase switching:** ANATAC considered whether there might be advantages in choosing a different phase switching scheme for ALMA; currently this is a nested Walsh function switching scheme, with pi switching nested inside pi/2 switching of the outer Walsh loop. Alternatives include multi-state phase switching schemes that might relax the bandwidth requirements of the first LO phase lock (PLL) – e.g. complex Walsh functions of shifted m-sequences. ANATAC felt that the existing baseline scheme is adequate, and that PLL bandwidth does not after all seem an issue; only if significant problems are found later on, would a more detailed investigation of alternate switching schemes warranted.
- **Cloudsat Radar:** this is due to be launched in April 2005, with a probable lifetime of several years. The peak power from the downwards-looking 94 GHz radar transmitter is sufficient that physical damage to ALMA's receivers is likely if an ALMA antenna looks directly into the radar. ANATAC is preparing a detailed technical document to outline the risk, how ALMA should be protected, and what changes in ALMA requirements (e.g. of software) are required. The short summary is that the radar cannot be ignored, but provided reasonable and fairly straightforward operational precautions are taken, ALMA should not be at serious risk.

- **Other potential technical problem areas for ALMA:** there are several areas where ANATAC has some concerns, and intends to conduct a more in-depth investigation as time permits:
 1. Digitizers: the responsibility of Bordeaux, but no working model is yet available
 2. AMBSI bus interfaces: Currently poor documentation, and we now have no expert on the interfaces within ALMA.
 3. Electronics packaging: there are some inconsistencies between Frontend and Backend construction.
 4. DC Power Generation: some inconsistencies in design between FE & BE groups.
 5. Software: current control software seems to be in an unfinished state, with functionality at a relatively low level.
 6. LO fiber cable wraps design & implementation may be a larger job than anticipated.

More details are available in recent ANATAC minutes. See in particular the minutes at http://www.tuc.nrao.edu/~demerson/anatac/atac_2004-07-07.pdf , and other material available from <http://www.tuc.nrao.edu/~demerson/anatac.html> .