Minutes of Teleconference to discuss ALMA OSF Holography

Wednesday, June 29th 2005, 19:00 UT.

Participants: Donoso, Emerson, Glendenning, Lucas, Mangum, Perfetto, Webber, Wootten, Seichi

AGENDA:

1. Introduction.
2. Holography tower. Siting, specifications, budget.
3. Electronics:
   a. Transmitter, receiver
   b. Backend
   c. Cabling
   d. Miscellaneous
4. Control software
5. Analysis software
6. Action items.

1. Darrel gave a very brief introduction. Prior to the meeting Dick Sramek pointed out some fairly good documentation on EDM from the Holo CDR in 2000-Oct-10. [From the top level forum on EDM follow .. Meetings and Design Reviews / Design Reviews/ Design Reviews - Archive/ ATF / There's a folder for the CDR.]

The objective over the next few weeks is to ensure that the ALMA budget contains sufficient funds for our holography at OSF, and to do that we need to have a description of the overall system as well as an understanding of who (what budget) is responsible for each part.
As a starting point, the OSF holography system should copy that used successfully at ATF and only change where necessary.

2. Holography tower. This should be not less than 300 meters from the antenna. The top of the tower should be seen from the antenna with an elevation angle with respect to the slope of the local terrain of not less than 9 degrees. This implies a tower height of ~50 meters, the same as the ATF. Spec on stability is the same as for the ATF holography.
The most promising potential site for the tower is towards the SE corner of the ALMA OSF site, which should illuminate both the ALMA antenna pad and the contractor's. Darrel and Eduardo

Donoso agreed to investigate the local elevation profile to confirm and refine this choice.
Issues that arose: in the original budget estimate from the Site IPT, an antenna height of only 30 meters had been assumed. Increasing this to 50 meters will add 20-30 k$ to the budget.
An environmental statement will be needed.
The holography transmitter feed at the top of the tower should be rotatable remotely.
In choosing the tower location, potential blockage and reflections of the transmitter signal should be considered.

3. Electronics.
General: There is as yet no overall block diagram of the holography system, although diagrams of individual components do exist. System Integration should take the lead in assembling a complete holography system block diagram.

Need for a perpetual OSF holography capability: how well astronomical holography will work, even with 30 or more antennas, depends on the strength of astronomical calibration sources, which is variable and unpredictable. Accordingly, it would be wise to consider the OSF holography a permanent ALMA capability, rather than just something to cover delivery and setting of the first few antennas. This also implies that the environmental paperwork should be prepared for a permanent, rather than temporary, tower.

a. **Transmitter, receiver:** The main antenna feeds will need to be remade and measured, as the ATF feeds were over-tapered, leading to degraded precision at the edge of the dish. This is not in the current budget estimate. The temperature regulation of the holography receiver needs to be improved, and made compatible with the lower temperatures at the OSF.
The transmitter will be redesigned, as the photonic system is considered too expensive and potentially unreliable. A duplicate, backup system will also be constructed - especially important in view of the likely permanent holographic capability.
The holography sysem will need 48V DC power, and 25 MHz and 48 ms clock signals. Data and control interface is through the AMB; computer interfaces will be unchanged from the ATF installation.

b. **Holography backend** is included as part of the receiver.

c. **Cabling.** Site IPT has responsibility for cabling (fiber, power etc.) out to the holography tower, and this is already

included in their budget estimate.
No-one at this meeting knew who is responsible for holography cabling on the antennas. In view of the likely operating scenario, it was thought important that all antennas should be equipped with holography cabling (in particular up to the prime focus), even though this will only infrequently be used. Is this responsibility of the Antenna IPT, System Integration or who? Must be clarified.

4. R**ealtime Software.** The only change over the existing ATF system is to adapt the holography data format to the planned long-term ALMA science data format. Some work for the Computing IPT, but all agreed this was worth doing. This will allow the data to be archived, but will necessitate some changes in post-processing (change in filler) and data production. Planning should be based on the assumption that beacon holography will be required at least occasionally for all ALMA antennas over the lifetime of ALMA. The same package (CLIC/Gildas) will be used for data reduction and analysis. The new system should be tested and debugged at the ATF.

5. Analysis Software. No change over the ATF system, other than adapting to the eventual new, ALMA science data format.

GENERAL DISCUSSION: It was thought desirable to test the complete, revised holography system at the ATF, prior to deployment at the OSF>

6. ACTION ITEMS:
(i) Antonio will arrange for the new holography feeds, and make a budgetary estimate in a very short timescale.
(ii) An overall block diagram will be created by System IPT, making use as far as possible of existing material. [System IPT hasn't yet been given the opportunity to agree to this.]
(iii) Environmental issues: Eduardo will list what will eventually be required to allow the tower.
(iv) Tower siting: Eduardo and Darrel will work on this together, use a detailed local terrain model. Budgetary revision for the 50-meter height to be made by Eduardo.
(v) Antonio will work on the holography receiver temperature regulation issue.
(vi) Darrel will endeavour to clarify who is responsible for the antenna holography cabling.
(vii) The decision on holography adopting the ALMA data format needs to be disseminated. A responsibility of Systems?
(viii) The intention to test the revised holography system at the ATF should be disseminated. Systems.

(ix) The new holography transmitter is to be designed and built by Antonio.
(x) Rick Murowinski will work with Darrel (Rick he doesn't know this yet) to produce the needed schedule and milestone for all these, and other, activities.

FUTURE MEETINGS:

This same group will meet by telecon in 3 to 4 weeks to review progress, with continuing email correspondence before then.

DTE.