

REPORT OF APS W XI PLENARY MEETING

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At the Eleventh ACTS Propagation Studies Workshop (APSW XI), the ACTS Working Groups held the customary Plenary meeting on 23 October 1998 to address project issues related to experiments being conducted with the NASA ACTS Propagation Terminals (APT's). Results of that meeting are reported here.

1. ACTS Experimenter Issues and Concerns

A. Data Collection/Quality

During the meeting, NASA LeRC announced that, consistent with recommendations of the Blue Ribbon Panel, measurements are planned to be continued during the next calendar year in the inclined-orbit mode, but at only two of the ACTS Propagation Terminal (APT's) sites, Oklahoma and Florida. The new configuration will deploy two existing APT's at each of these sites to permit site diversity measurements. Consideration will also be given to incorporating the capability to collect path depolarization data at these two sites.

The APT's to be used during the inclined-orbit phase of ACTS operations will have to be adapted with satellite tracking capability. A tracker designed for this purpose was illustrated during the presentation by NASA LeRC (R. Bauer). A method to minimize the antenna wetting effects for the APT's was also presented by D. Westenhaver. The approach is to machine the dielectric surface to the level of the embedded wire-reflecting surface, and to paint the new surface with conductive paint. Presumably, a shield or blower would also be installed to keep the antenna feed window dry.

The new configuration will require redeployment of two of the seven terminals. NASA also plans to locate another terminal at the site-support contractor's facility to serve for spare parts, so that five of the existing APT's are then obligated under the official NASA measurements program. New Mexico (S. Horan) offered to upgrade, at no cost to NASA, their APT, assuming that the APT can be removed from the current location at White Sands. Colorado (J. Beaver) expressed some interest in retaining an APT as well. Deployment per this arrangement would utilize all seven of the APT's.

Experimenters interested in continuing measurements with upgraded APT's were requested to inform R. Bauer of NASA LeRC promptly. However, it was made clear by NASA LeRC (K. Acosta) that if existing APT's are needed for redeployment in the new measurement configuration, they will be recalled.

With incorporation of an antenna tracking capability, ACTS measurements with the APT's should be feasible until the planned deorbit of the satellite in September 2000.

Mention was also made of the requirement to have all ACTS preprocessed data for calendar year 1998 delivered to the ACTS Data Center by March 1999.

ACTIONS:

Experimenters should inform NASA LCR (R. Bauer) of any interest in upgrading and retaining an ACTS Propagation Terminal for inclined-orbit operations. All experimenters should also be aware of the need to complete delivery of all preprocessed data through December 1998 by March 1999.

B. *Reporting of ACTS Data and Results*

Development and reporting of results and propagation models within the ACTS project was discussed. A general proposal was made that another special issue be planned much like the June 1997 *Proceedings of the IEEE* Special Issue on "Ka-band Propagation Effects on LEO-Satellite Links." N. Golshan, R. Acosta and D. Rogers were proposed as guest editors. Support was expressed to approach the IEEE to determine if another special issue of *Proc. IEEE* is possible for reporting of the ACTS results.

During the discussion, various subject areas and coordinators were identified for inclusion in a special issue as follows:

- signal scintillation - C. Mayer;
- ACTS system overview - D. Westenhaver
- summary of basic ACTS propagation statistics - R. Crane;
- antenna-wetting model/experimental verification - R. Crane
- radar issues - J. Beaver;
- fade durations - H. Helmken;
- fade slopes - J. Pinder;
- fade mitigation - R. Acosta;
- site diversity - H. Helmken;
- cloud effects - C. Mayer.

ACTION:

N. Golshan will approach the IEEE to determine if a special issue of *Proc. IEEE* is possible and what the corresponding schedule will be.

II. Other Topics

During the Plenary, a wide-ranging discussion was pursued on future needs for propagation data. Propagation information for the Q/V-bands, which feature 3GHz of spectrum (37.5 -40.5 GHz downlink, 47.2 - 50.2 GHz uplink) allocated in each direction for earth-space services, was noted as a prime area requiring study and preferably measurements. J. Goldhirsh pointed out the need to validate non-geostationary orbit (NGSO) and Low Earth Orbit (LEO) link calculations with measurement data. S.

t Ioran noted that these two requirements might be met by having a Q/V-band beacon package on the Space Station for a year or two. R. Bauer reported that there is indeed interest in using the Space Station for scientific projects of this nature.

L. Ippolito remarked that the Iridium system has already deployed about 60 satellites in orbit, each with a 20-GHz beacon, which could be used to study LEO propagation characteristics. He suggested that NASA might want to contact Motorola about this possibility. R. Crane concurred that the LEO prediction problems may be important.

N. Golshan stated that for NASA to fund any endeavor, it would have to relate to NASA's requirements (e.g., work related to LEO issues would need to address the interests of Goddard Space Flight Center) or to NASA enterprises. R. Bauer remarked that NASA has prime interests in the 40/50 - GHz band and the bands above 71 GHz (precompetitive technology). L. Ippolito stated that the NAFEX group should try to determine what information is needed at Q/V band. A. Dissanayake recalled that a 40/50-GHz satellite system had been mentioned at the previous NAFEX meeting in Austin, and that it might be usable for some of the requirements.

N. Golshan noted that optical communication issues are also important to NASA (due to the ability to focus the beam). Prime propagation concerns arise related to signal scintillations, cloud effects, etc. Wideband transmission at gigabit rates is also of interest, and might be achieved by using earth terminals situated in desert locations, perhaps with site diversity, etc. He also remarked that NASA's Deep Space Network typically uses 5°- 10° as the lowest operating angle.

R. Bauer stated that NASA hasn't done a good job of explaining its new requirements per the new "roadmap" (mainly because the shift was so **sudden**), and that perhaps NASA/JPL and LeRC can collaborate to get this information to the propagation community.

ACTION:

R. Bauer, R. Acosta and N. Golshan will collaborate to explain the future requirements of the new NASA "roadmap," and try to identify sources of funding for future needs.

III. Next Meeting

The group tentatively agreed to hold the next NASA Propagation Experimenters Meeting in Herndon, Virginia, during 3-4 June 1999. It is hoped that this venue will promote involvement by NASA/GSFC personnel.

IV. Information

E. Smith (U. Colorado) reported that U.S. ITU-R Study Group 3 (Radiowave Propagation), Chaired by Eldon Haakinson of NITL A/TS, is scheduled to meet Wednesday, January 6, 1999, from 0900- 1100 in the Engineering Center at the University of Colorado, Boulder, during the URSI National Radio Science Meeting.