ACTS PROPAGATION TERMINAL UPDATE

Warren L. Stutzman
and
Tim Pratt

Satellite Communications Group
Bradley Department of Electrical Engineering
Virginia Polytechnic Institute and State University
Blacksburg, Virginia 24061-0111

Abstract - This paper summarizes the activities at Virginia Tech in preparation for the February 1993 launch of ACTS. ACTS propagation terminals (APT) are being constructed to receive the 20 and 27.5 GHz ACTS beacon signals. Total power radiometers operating at the same frequencies are integrated into the terminal for use in level setting. This paper reports on recent progress and plans for APTs.

1. INTRODUCTION

NASA is providing earth terminals for seven propagation experiments across the U.S. Virginia Tech, under a NASA contract, has designed and constructed a prototype ACTS propagation terminal (APT). The prototype is currently undergoing final testing. Construction of the production units will begin this summer. A common hardware and software set reduces the cost of the terminals and improves data collection reliability. Individual experimenters will be able to focus on their experiments and will not have to design and construct their own terminal.

The terminal uses a single antenna with a waveguide diplexer for frequency separation followed by separate 20 GHz and 27.5 GHz receivers. Co-polarized attenuation and scintillations at these frequencies are to be measured. A simplified block diagram of the APT is shown in Fig. 1.

The Olympus experiment at Virginia Tech offered an excellent test bed for many of the systems to be used in the APT. The four beacon receivers at 12.5, 20, and 30 GHz, which were designed and constructed at Virginia Tech, have been very stable and reliable. The simple total power radiometer, which is built into the Olympus terminals, has proved to be extremely accurate. The ACTS RF system differs from that used in Olympus. A complete RF downconverter block replaces discrete components. This greatly reduces the time required for construction of production terminals. The IF (Intermediate Frequency) and DACS (Data Acquisition and Control System) subsystems are very similar to those used in the Olympus project. The ACTS digital receiver is totally different from the analog FLL receiver used in Olympus, which required a long time to develop and is rather complex.