

**TECHNOLOGY 2004
PAPER ABSTRACT**

Name: Martin J. Agan
Position/Title: Member Technical Staff
Affiliation: NASA / Jet Propulsion Laboratory
Address: MS-238-420
4800 Oak Grove Drive
Pasadena, Ca 91109

Phone Number: 818-354-3426 **Fax Number:** 818-354-6825

Gov't Agency/Lab The Subject Technology Was Developed By/For: NASA

Paper Title: Broadband Aeronautical Satellite Communications Terminal

Category: Electronics

Description: The Jet Propulsion Laboratory (JPL) is developing a **Broadband Aeronautical Terminal (BAT) for full-duplex** video other broadband satellite communications on a variety of aircraft, The BAT is designed for use with NASA's **K/Ka-band** Advanced Communications Technology Satellite (ACTS). This paper will address the overall BAT system and the experiments currently planned for its demonstration. Examples of how such a system may first be introduced as a commercial product are given. Functional descriptions of the BAT subsystems are given, with an emphasis on the antenna. The capabilities of the ACTS satellite that the BAT system will utilize are summarized.

The BAT system will provide the systems and technology groundwork for an eventual commercial **K/Ka-band** aeronautical satellite communication system. NASA has sponsored JPL to develop this communications terminal to demonstrate the efficacy of high data rate satellite aeronautical communications, with the intention of stimulating commercial investment in this field as a result of the demonstrations. One of the first commercial applications may become live video in the passenger cabin, or in the cockpit, video could convey information to the pilot in a graphical format that is easily interpreted, such as a revised runway or gate assignment and weather maps. These capabilities will exist while flying over ocean as well as land since the system uses a satellite to relay the signals, unlike the airline telephones today which only function while over the mainland.

The BAT system is denoted "broadband" in the sense that it will provide communication rates that far exceed that offered by voice systems using rates on the order of 10 Kbps. The BAT will demonstrate data rates of 384 Kbps in the forward link (to the aircraft) and 112-384 Kbps in the return link (from the aircraft). These rates allow full-motion, compressed video communication. A video codec/decoder (codec) translates between the video signals and a digital communication link.

With industry and government partnerships, three main goals will be addressed by the BAT task: 1) develop, characterize and demonstrate the performance of an ACTS based high data rate aeronautical communications system; 2) assess the performance of current video compression algorithms in an aeronautical satellite communication link; and 3) characterize the propagation effects of the K/Ka-band channel for aeronautical communications.

Two partnerships have already been established for the demonstration of the BAT system: one with Rockwell Collins, and another with the NASA Ames Research Center. Rockwell has made available a Saber 50 business class jet in which to install the BAT in return for participation in the communication experiments. NASA Ames has a large C-141 cargo jet dedicated to airborne astronomy in which the BAT will be installed. The BAT will allow remote telescope operation from a ground station while the C-141 is flying. It is planned that the live video link will allow a group of students to participate in their classroom with their teacher as he flies along with the scientists operating the telescope.