Concepts for the Virtual Satellite Command and Control Network

Jim Brady
Raytheon E-Systems

A major obstacle to widespread deployment and use of small satellites is the cost of access to command and control facilities. While low-cost satellite earth stations are commercially available for receiving signals in bands associated with weather satellite broadcasts, the software and equipment required to upgrade these stations to perform command and control functions are prohibitive for many small satellite users. One alternative requires the leasing of satellite control facilities from commercial providers. By spreading the operating cost over several users, these facilities are less expensive, but often prone to logistical problems - there isn't usually one nearby. This paper presents an alternative where the satellite command, control, and data downlink operations are provided by a system accessible to the experimenter by the Internet. The virtual command and control network becomes transparent to the user as data are available as down-loadable images or data files, and dynamic status updates are available with a graphical user interface. Commands can be uploaded directly, or be generated from graphical or written instructions from the user. Access controls in the service provider allow a hierarchy of users to be developed from those who can control the intricacies of the spacecraft operation down to those who can only control their specific instruments. The simplest user class can not issue commands, but can only download current or historical data. The network service itself can be composed of any combination of ground stations, relay satellites, and centralized or distributed processing centers depending on usage.

For more information contact:

Jim Brady
Raytheon E-Systems
ECI Division
MS-05 Dept. 625
P.O. Box 12248
St. Petersburg, FL 33733-2248
813-381-2000 x 2773
813-343-9605 fax
email: jlbc@eci-esyst.com