Key Technologies (7)
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DATASAT – GROUND STATION NETWORK FOR TRACKING, TELEMETRY AND COMMAND OF SPACECRAFTS

Abstract

Abstract: This paper presents a Ground Station Network (DATASAT) designed and developed in Brazil for automatic tracking, telemetry and command of spacecrafts. Each Ground Station from DATASAT is nominated as ADA (Automatic Directional Antenna) which consists of an external module where goes the antenna and tracking mechanism and an internal module where it goes the controller, the transceiver and software's for TTC, signal processing and data dissemination through web by its own Mission Data Center (http://datasat.space). The DATASAT solution was developed using private and free software concept where its goal is to stablished a partnership between CRIAR SPACE with Private or Public Institutions that can use it for Educational purposes, well known as STEM initiatives (Science, Technology, Engineering and Mathematics). The Ground Station is developed in order to keep the system online in a hazard environment including severe weather condition. The modular concept of the Ground Station allows a reliable and quick setup assembly, configuration and operation. The Ground Station will be available for free of charge by consignment for those Educational Institutions. The success of DATASAT/ADA it is in their operationality that allowed the automatic tracking of satellites with optimized telemetry acquisition, storage, processing and dissemination of data. It includes encryption and compression of data which allows the interoperability and integration with others systems as remote access and controlling. The DATASAT/ADA comes together with the know-how and support of the experience team for Research Development or corporative projects that needs ground-to-space, ground-to-air or ground-to-ground communications. Beside others initiates as GENSO (Global Educational Networks for Satellite Operations) and SatNOGS (Satellite Network Open Ground Stations), the DATASAT Network aims to provide the complete solution of the hardware and software, including the assembly and training of whom is interested. For STEM purposes the Ground Station is fully recommended for mechanics, sensors and materials, computer, electronic, aerospace engineer, satellite operations and correlated areas. The Ground Station ADA can operate in VHF, UHF, L, S and X Bands. Until now tests were already performed in real scenarios for VHF and UHF Bands while S and X Bands are in designed, simulation and manufacture phase. The downlink and uplink are made by Software Defined Radio (SDR) technology that allows flexibility and reconfiguration of the Ground Station transceiver. The unit responsible to control, process and storage the data is the ADASERVER, that was designed to provide a reduction of human efforts during and after operation and more reliable data in order to avoid human failures. The modularity of hardware and software in terms of interoperability and capabilities including procedures of operations and costs that makes ADA an innovative product for Educational and Corporative purposes.

Studies have been conducting in order to tracking and telemetry acquisition for amateur radio satellites on LEO (Low Earth Orbit), MEO (Medium Earth Orbit) or GEO (Geosynchronous Orbit) as a proof of concept and scientific educational purposes. keywords: ground-station, antenna, network, TTC, STEM