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DESIGN AND IMPLEMENTATION OF COMMUNICATION SYSTEM FOR TWIN NANO
SATELLITE STUDSAT-2

Abstract

STUDSAT-2 is a student satellite program with the objective to build nano-satellite to demonstrate inter-satellite communication. The dimension of each satellite is 30 x 30 x 15cm and weighing approximately less than 5Kg. Communication system is one of the prominent subsystems in the satellite. This consists of 2 links: uplink (Ground Station to satellite) and downlink (satellite to Ground Station). In STUDSAT-2 On-board communication system there are 3 modules: uplink, downlink and beacon, each of them functioning at amateur frequencies.

This paper explains the basic architecture of the on-board communication system of Project STUDSAT-2. The uplink module operates at VHF (144-148MHz) and is used to command the satellite whenever it appears in our cone of window. Data for this is uplinked at a rate of 1.2kbps with FSK modulation. The downlink module operates at UHF (434-438 MHz) and is used to download the telemetry data followed by the payload data. This operates at a data rate of 9.6kbps with FSK modulation technique. The beacon module also functions at UHF and is used to convey the basic health parameters of the satellite. This has a data rate of 20bps with CW modulation technique. The beacon and the receiver module have a 100

All the 3 modules are interfaced with the main controller which consists of the code, payload and telemetry memory. All the data frames for transmission as well as reception are encoded in AX.25

format. The transmitter and beacon module is interfaced with the main controller using USART. In order to maintain uninterrupted communication with the ground station the antennas are chosen with an Omni-direction pattern. Thus, 3 monopole antennas are simulated for the required frequencies, gain and other parameters.