

A Software Defined Radio Approach to Ground Operations of Small Satellites – IAA-LA-09-02

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ABSTRACT

In order to reduce costs on the ground segment for small satellites projects, Software Defined Radio (SDR) technology is advantageous as it reduces the amount of hardware components while adapting for different modulation schemes, link budget requirements while supporting different satellites. This work briefly presents this proposal and discusses some of the issues it entails. The SDR technology uses a processor, a special receiver and software that plays the main parts of the receiver (mixer, filters, amplifiers, modulators, demodulators, etc.) to listen to radio, television and almost all transmission modes, whether digital or analog. A first trial with this configuration was implemented to receive signals sent from a Brazilian picosatellite named Tancredo-1 and obtain the engineering value of the telemetries sent by the same. For this purpose, specific software was developed, named UbaTM - Decoder for obtaining the hexadecimal value of each of the telemetries, perform the operations necessary for the conversion to engineering value and present them friendly on a screen to the user. A series of support software packages is presented so that one can pipeline various operations which can lead to ground stations automation.

Keywords: Software Defined Radio. Ground Stations. Small Satellites. Automation.