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SATELLITE-BASED EXPERIMENTS FOR A GRADUATE PROGRAM IN TELECOMMUNICATIONS ENGINEERING TECHNOLOGY

Abstract

There are many reasons to include space- and satellite-based projects and laboratory assignments in graduate telecommunications courses, even those not otherwise focused on space research. Such assignments are motivational, since it involves receiving and processing actual signals from educational pico- and nano-satellites such as the FUNcube, Vellox-II, CANX 4 and 5, and AMSAT, which operate on the VHF-band (144 MHz to 147 MHz). It can also inspire students to pursue a career in space engineering. It is also highly educational, since it involves solving real-world problems, such as link margin calculations, real-time processing, synchronization, data decoding and error-control coding, all while working at low signal to noise ratios.

In this paper, we present educational materials and assignments developed for a graduate course on wireless communications in an engineering technology program. These assignments complement other, more traditional assignments, and provide a hands-on component to the course. Students learn to calculate link margins, predict a satellite's position, configure and operate the ground station, and process the received signals, both in real time and offline. Students use existing software tools to decode the satellite's data, or can develop their own tools from scratch.

We summarize the challenges we faced when designing the material, as well as lessons we have learned so far. We also present an initial assessment of our experience with this educational approach.