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THE USE OF VIRTUAL GROUND STATION TO SUPPORT MIDDLE AND HIGH SCIENCE EDUCATION IN INDIA

Abstract

Space communication systems are plagued by complexity resulting in limited access to orbiting satellites and high mission operation costs that ultimately reduce mission yields and capabilities. Small satellites gain more and more interests from both educational and academic institutions, but also from the industry. They constitute a cheap alternative to large, more expensive and more complex satellites. With the advent of small satellites and affordable communications hardware, there has been an increase in academic interest in space education. Small satellites are often created with an educational purpose, and they transmit strong signals that are easy to detect. They pass over large areas of the planet a few times a day, providing increased opportunities for successful communication. To meet the need of a Virtual Ground Station Service in India for the Educational Research sector, Lovely Professional University's Student Satellite Team in collaboration with Ecuadorian Civilian Space Agency (EXA) has designed a ground station with an internet to orbit gateway to encourage and meet the needs of higher education and the research community in India. The ground-satellite communications are expensive yet highly significant for the success of a space mission and to envisage its end-of-life by continuously monitoring its health and all sub-systems One cost-effective possibility for honing skills is to use amateur satellite service and an online internet-to-orbit gateway. This gateway has a maximum range of tracking and detection of 22000 km and sensitivity down to 0.1 watts, capable enough to receive the faint satellites in even omnidirectional reception scenario. The gateway allows the connectivity of remote users involving in the processes like orbital control, communication control, real time simulations and data/ image processing and analysis. Through the usage of this facility, along with the coursework in orbital mechanics, Engineering research students will effectively be benefited with hands-on experience in learning satellite tracking, ground station operations and data analysis. We have devised a concept of virtual ground station available over the Internet. A virtual ground station can be used by any client with a computer attached to the Internet which augments the degree of accessibility. Besides, a virtual ground station and its clients don't have to be collocated. A client can access a satellite as long as a remote virtual ground station has access to it. As long as there are several virtual ground stations distributed at several locations, this architecture augments the degree of accessibility to satellites.