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Technical capabilities of SDR based ground station for multi-satellite communications

Ghulam Jaffer University of the Punjab, 54590, Lahore, Pakistan

Universities and other organizations involved with satellites always desire a quick communication link upon launch and deployment to verify orbit insertion and initial telemetry. For this paper, we developed prototype of a Software Defined Radio based Ground Station (SDR-GS) as an internet-to-orbit gateway built at the author's site. We discuss the technical details of this gateway that virtually connects participating clients remotely to access LEO amateur satellites both with data and voice transmissions. Experiments were carried out to verify the technical capabilities of the SDR-GS in preparation of its use as a remote and automatic satellite GS. The data collected regarding automatic operations is critical for future missions. With proposed/ calculated stations operating automatically, a user anywhere in the world can connect, monitor and control a formation of satellites from their single laptop computer, a capability that has not been realized by the CubeSat / Small Satellite community. Until now, results were obtained by remotely controlling and simultaneously downloading real-time data and voice by remote users worldwide. Results of these coordinated studies will be presented in this paper to inform the community about latency effects and the advantages that automatic operations may provide. We close the paper with a case-study, using SDR-GS data, of a coordinated GS network, operated remotely, that can be utilized for formation satellite communications.

gjaffer.spsc@pu.edu.pk

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