Paper ID: 19326
oral
student

SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)
Fixed and Broadcast Communications (5)

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SIGNAL ANALYZER FOR DVB-S2 SATELLITE COMMUNICATION LINKS

Abstract

Signal propagation at high frequency bands such as in the Q/V-band range suffer from significant fade events. For satellite communications implementing a traditional link design approach this would require high link margins. The latter are impractical especially for very high frequency bands, because the necessary link margins would be significant requiring high EIRPs and high figures of merit (G/T) of the ground stations, which in turn increase their cost. ACM concepts can tackle that issue; theoretically they would allow zero link margins. Practically this cannot be met, but performing dynamic link adaptations according to the current channel propagation conditions is well known in that respect. Prominently adaptive coding and modulation schemes are applied therefore. Hence, knowledge of the current channel conditions is imperative; the Signal-to-Noise Ratio (SNR) is often used for that purpose considering slowly varying channel conditions. This paper addresses the design and implementation of a signal analyzer built to measure the current SNR for a DVB-S2 satellite communication link. The signal analyzer is based on a GNU Radio SDR platform that uses open source hardware and software. The developed receiver architecture will be presented and data-aided and non-data-aided variants of SNR estimators will be evaluated. Practical results and a laboratory test setup will be presented.