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Laboratory Performance Analysis of a 5G NTN K/Ka band link for LEO SATCOM

5G Non-Terrestrial Networks (NTN) offer the potential to connect regions previously inaccessible or economically unviable for traditional terrestrial communication networks. K/Ka band satellite communications can achieve higher channel capacity compared to satellite services operating at lower frequency bands. This study examines the laboratory validation of a satellite link as part of the ESA ARTES Project 'Demonstration of direct 5G broadband access from LEO to small satellite terminals'. The testing setup incorporates two channel emulators to simulate real-world conditions, including link attenuation, LEO satellite Doppler effects, and latency. The objective of the project is to develop and validate a communication experiment demonstrating direct 5G broadband access from Low Earth Orbit (LEO) to very small aperture mobile terminals. The proposed communication architecture comprises a commercial Amarisoft software radio-stack and Ettus B200 SDR to generate a 5G FR1 signal, subsequently converted to K/Ka band using Block Up Converters (BUC) and Block Down Converters (BDC). Two transparent transceivers integrated aboard a LEO satellite are used in the bi-directional bent-pipe satellite link. The presented results will detail the throughput performance of the validated satellite link, providing crucial insights into the feasibility and efficacy of K/Ka band 5G in satellite communications, thus paving the way for enhanced connectivity solutions.

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