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Título:

UDMSim: A Simulation Platform for Underwater Data Muling Communications

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Abstract:

The use of Autonomous Underwater Vehicles (AUVs) is increasingly seen as a cost-effective way to carry out underwater missions. Due to their long endurance and set of sensors onboard, AUVs may collect large amounts of data, in the order of Gbytes, which need to be transferred to shore. State of the art wireless technologies suffer either from low bitrates or limited range. Since surfacing may be unpractical, especially for deep sea operations, long-range underwater data transfer is limited to the use of low bitrate acoustic communications, precluding the timely transmission of large amounts of data. The use of data mules combined with short-range, high bitrate RF or optical communications has been proposed as a solution to overcome the problem.In this paper we describe the implementation and validation of UDMSim, a simulation platform for underwater data muling oriented systems that combines an AUV simulator and the Network Simulator 3 (ns-3). The results presented in this work show a good match between UDMSim, a theoretical model, and the experimental results obtained by using an underwater testbed when no localization errors exist. When these errors are present, the simulator is able to reproduce the navigation of AUVs that act as data mules, adjust the throughput, and simulate the signal and connection losses that the theoretical model can not predict, but that will occur in reality. UDMSim is made available to the community to support easy and faster evaluation of data muling oriented underwater communications solutions, and enable offline replication of real world experiments.