

Master Project 2020

IETR Lab, SCEE Team, Centralesupélec (campus of Rennes)

Experimental study for time and phase synchronization in a radio transmission using USRP

Synchronization is purposed to make the different realizations of many objects as same as possible. In a communication system, poor synchronization may lead to disastrous results. Nowadays, a vast type of approaches regarding the frequency, time and phase estimation problem, have been developed. One class of approaches is based on the maximum likelihood estimation (MLE). The MLE can have very high accuracy using the Cramer-Rao Lower Bound (CRLB), which is the minimum possible error for the unbiased estimator, over a wide range of Signal-to-Noise Ratio (SNR) values.

Therefore, in this project, the objectives are twice:

- To study the joint maximum likelihood (ML) algorithm for the estimation of symbol timing, carrier phase, and frequency offset. The algorithm has to be suitable for continuous phase modulated signals, a constant envelope signal type.
- To evaluate the performance of the proposed algorithm in practical environments (using SDR (Software Defined Radio)-based platform).

The considered SDR-based system will use universal software radio peripheral (USRP) for the hardware platform and GNU Radio for software framework. This part will rely on the expertise of the IETR SCEE team in this research area and will benefit from their available Testbed (<http://www-scee.rennes.supelec.fr/wp/testbed/>).



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