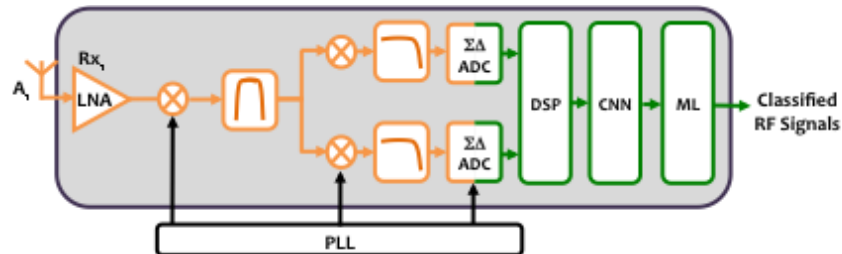


Wireless Signal Identification Receiver Based on a Bandpass $\Sigma\Delta$ ADCs



CONTEXT:

5G wireless communication systems require portable devices capable of analyzing the spectrum congestion and establishing communication on the available frequency bands using the appropriate standards [1,2]. Deep Learning is used for RF signal identification and classification [3]. As illustrated in the figure above, an RF signal classification receiver then requires:

- Reconfigurable RF front-ends capable of operating at different frequency bands and satisfying the specifications of several wireless communication standards.
- Deep learning circuits for RF signals classification.

Seamless Waves, a Spin-off company from Sorbonne University, is specialized in the design and implementation of tunable and reconfigurable RF transceivers [4-7].

The proposed RF receiver converts the RF signal directly to the digital domain using a power-efficient Bandpass Sigma-Delta ($\Sigma\Delta$) ADC. In this highly digitized architecture, down-conversion and filtering is performed in the easily programmable digital domain.

OBJECTIVE:

The objective of this Graduation Project is:

- Modeling of Bandpass $\Sigma\Delta$ -based RF Transceivers for different digital modulation techniques.
- Introduction channel and circuit non-idealities into these models.
- System-level design of Deep-Learning techniques to classify received RF signals.
- Circuit-level design of Deep-Learning techniques to classify received RF signals.

REQUIREMENTS:

- Experience in the design and implementation of Mixed-Signal CMOS integrated circuits.
- Good Knowledge of Wireless Communication Systems and Digital Modulation techniques.
- Interest for circuits used to implement Machine Learning algorithms.
- Familiarity with IC-design CAD tools (CADENCE, SYNOPSIS, MENTOR, MATLAB, ...)

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SPONSORSHIP:

- Seamless Waves, Paris, France.
- Sorbonne University, Paris, France.

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