MASTER'S THESIS INTERNSHIP OFFER

DESCRIPTION

› **Title :** Energy efficiency Analysis of a Power Amplifier for Ka-Band 5G Active Antennas (30GHz)

› **Hosting organization:** University of Limoges – UMR CNRS 72 52

› **Lab:** XLIM Laboratory

› **Research Team:** Non Linear Components Circuits and Systems

› **Scientific pole:** RF Systems

› **Starting date (month/date):** 3 janvier 2023

› **Short description of the internship offer (up to 5 sentences):**

The proposed internship topic is in the context of RF amplification systems for massive 5G MIMO and aims more specifically at reducing the power consumption of solid state millimeter wave power amplifiers in GaN technology.

› **Objectives (up to 5 sentences):**

In the framework of this internship, the student will first have to familiarise himself/herself with the operation of bias modulation circuits through simulations (ADS tool). The objective of the internship will be to analyse the coupling between a bias modulator and a power amplifier in Ka band (30GHz) in GaN MMIC technology from the OMMIC foundry.

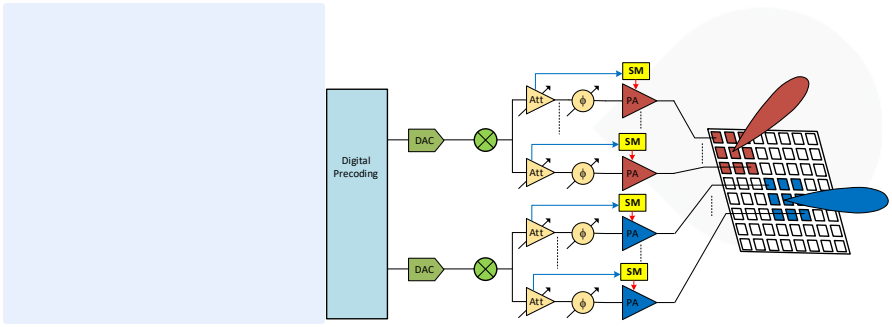
› **Description of the internship offer:**

5G mobile telecommunication systems are structured around an antenna architecture known as "massive MIMO" (Multiple Input Multiple Output), which makes it possible to connect several users simultaneously with, a priori, better connection

quality and optimisation of radiated energy. The MIMO system requires the deployment of array antennas (APAA: Active Phase Array Antenna) which allow the forming of directional beams in order to concentrate the radiated energy mainly towards the connected object. The development of these APAA antennas requires the design of medium-power amplifiers (a few watts are sufficient) but with large bandwidths (several hundred MHz) in the millimeter range (Ka band) and the best possible energy efficiency.

During the course, a 4-level bias modulator in GaN technology will be designed and simulated with the ADS tool. In addition, an existing Ka-band power amplifier will be characterised with the measurement benches available at Xlim laboratory. These characterisations should make it possible to decide on the possibility of using this amplifier in an envelope tracking context in order to optimise its consumption.

Photo (optional)



Description of the research team:

The CCSNL team focuses on the analysis, modelling, design and characterisation of the active functions of the RF front end. To cover this scientific field, it is structured in 3 research projects:

- IN-OV project - INstrumentatiOn aVancée

- SIM3RF project - Multi-scale/Multi-physics simulation/modelling of the RF front-end

- ACT-RF project - Architectures and Design of RF Transmitters.

SKILLS

Expected skills of the applicant:

Skills in non-linear active circuits, knowledge of CAD tools (SPICE, ADS, ...), power amplifier design and RF characterisations, HF electronics

PHD THESIS OPPORTUNITIES

PhD thesis opportunity after the Master course:

☒ Yes ☐ No

If yes, financing already obtained:

☒ Yes ☐ No

If yes, what kind of funds: Cliquez ou appuyez ici pour entrer du texte.

Region NoA funding + ministerial funding

CONTACT & APPLICATION

Surname and first name of the internship supervisor(s):

MARTIN Audrey et BOUYSSE Philippe

Email of the supervisor(s): audrey.martin@xlim.fr et philippe.bouysse@xlim.fr

Phone number of the supervisor(s): 05 55 45 72 95

The application shall be sent to the email: Cliquez ou appuyez ici pour entrer du texte.

Closing date for applications: Cliquez ou appuyez ici pour entrer une date.