



Communication Systems : Microwave and Photonics
M.Sc. Research Internship offer - 4 to 6 months



2012 Internship
Université Paris-Est
ESYCOM – ESIEE Paris



Development of SiGe OE-MMIC for Radio-over-Fiber Applications

Context:

SiGe Microwave Phototransistors are developed from 2001 in the target of being developed into Radio-over-Fiber systems. Main market is the home area network (HAN). The demand in high data rate and wireless connectivity puts more constraint on the wireless network. New wireless network standards arise such as the IEEE802.11.ad which the extension of the WiFi toward the 60GHz bands. The coverage of the radio cell is narrow, limited to few meters, and an infrastructure is needed to cover the whole home area. Fiber optics technologies are developed on that purpose with key players being Orange labs, Acome, Prysmian/Drakka in France. As cost is a primary issue together with performance, ESYCOM lab proposes from 2003 a new device, named as SiGe Microwave Phototransistors (HPT, heterojunction bipolar photo transistor) that should come up on the scene today. While actual vision is to down-convert RF signal to intermediate bands before transmitting through the fiber channel, development of 60GHz direct-RoF which would avoid down- and up-conversions noise limitations is of tremendous interest. SiGe HPTs are good candidate to address this issue as well, associated to analog VCSEL. Still improvement in frequency is vital.

Work description: “development of OE-MMIC through simulations and characterizations”

The purpose of the internship is to contribute actively to the development of opto-electronics microwave monolithic integrated circuits (OE-MMIC) made with a HBT SiGe 80GHz technology. Based on a previous run, the work will be first focus on a bibliographic study on the modeling of bipolar phototransistors and passives, mainly transmission lines, through compact-circuit models. The intern will then contribute to the development of a novel semi-distributed compact circuit model for the phototransistor. Then, through extensive characterization of some circuits previously fabricated at 5.GHz and 17GHz (focus given on LNA and mixers), feedbacks between experiments and simulations will be provided. Results will finally be exploited to design novel HPT-based circuits. The intern needs to have team skills, to be rigorous and to have the motivation for research. He will collaborate also with 2 PhD students, an engineer and 2 other interns.

Location: Université Paris-Est – ESYCOM – ESIEE Paris, Cité Descartes, 93162 Noisy-le-Grand, France

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*This internship has the purpose to be continued on with a PhD grant on the topic of:
“SiGe Microwave-photonics devices on a Silicon platform in the millimeter wave range:
EM/HDD combined simulations and circuits for further rise in frequency”*