5G Radio Channels
Mobility and Relaying, Sensing and Localization

Hosting University : University Rennes 1
Laboratory : IETR UMR CNRS 6164, www.ietr.fr
Supervisor : Pr Bernard Uguen
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Context : The 5G is on rails. The purpose is to accompany the on-going "data tsunami", caused by the increasing rates of the digital mobility and at the same time to provide an appropriate infrastructure for interconnecting objects (IoT) and machines (M2M). This last aspect is new compared to previous generations and is expecting to enable smart grid and smart cities. Those issues are closely related to the energy efficiency of networks. This point is key for future network optimization where energy and information will be organized gradually as coupled flows. In this context, the function of sensing and/or locating terminals is key to anticipating and sequencing actions required to self organizing networks (SON).

Subject : The collection and use of information on the transmission channel is critical for improving the performance of communication systems. The main issues and preliminary models for 5G channels are described in [1]. With the expected emergence of communication between terminals (D2D) the two ends of the transmission channels would be mobile. This raises a number of issues related to human mobility that will be addressed in this thesis both theoretically and experimentally in different scenarios of interest. The work will consider MIMO systems and mmW channel in femtocells. The thesis will also examine the different ways of operating radio traces in advanced localization in networks of different radii. The work will be conducted using the cross-layer platform open source PyLayers (http://www.pylayers.org) whose thesis will extend to issues raised by 5G technologies, working closely with the guidelines discussed within the COST IC1004.

Keywords : 5G, deterministic and statistical modeling of the transmission channel, spectrum sensing, radio localization, scientific programming, signal processing, data analysis.

Profile Wanted: Training Telecom Engineering or Master Telecom or strong background in mathematics. Good level of English, independence, curiosity, strong interest in sciences and programming (Python skills would be very appreciated).

How to apply:
Send by email: CV, academic achievement, referee letters, motivation letter, TOEIC score or equivalent.

Contact: bernard.uguen@univ-rennes1.fr
Tel +33 2 23 23 60 33
Twitter@BernardUguen
[1] https://www.metis2020.com/wp-content/uploads/deliverables/METIS_D1.2_v1.pdf