Mission confiée

---Research scope---

The recruited person will join the FUN Team at Inria Lille. The mission of the group is to work on Future Ubiquitous Networks. A way to pursue the ubiquitousness of systems, is to be able to consider the environment with a completely new and different perspective. Indeed, the environment has always been considered as a passive component in “traditional” communication systems to undergo. The integration of it in the design of wireless networks could pave the way for matching the most important requirements for the evolution of the Internet of Things (IoT) towards the Internet of Everything (IoE) paradigm. The new requirements of mobile wireless networks in terms of very high throughput per device, the capability to handle a huge amount of data with a low delay, in a heterogeneous context (i.e. connected heterogeneous devices) with different resource capabilities, equipped or not with mobility need a completely different paradigm, by controlling and manipulating the electromagnetic (EM) waves in a smart fashion. This topic is traversed and pertinent to several projects, both national and international that are being developed at FUN Team. Moreover, this is a very hot topic, which is attracting attention from the scientific community, industry, etc.

---Research Objective---

The main objective we wish to tackle on this topic is a completely different perspective of the environment in the context of a data communication system [1]. Indeed, the environment has been always considered a passive and uncontrollable component altering the propagation of electromagnetic (EM) waves. Contrariwise, by considering the environment as part of the communication system, it can be controlled by controlling and manipulating the waves impinging on obstacle objects, etc. A key-enabler of such a type of new paradigm is represented by metasurfaces, artificial material presenting specific types of features, such as high chirality [2], [3], [4] and the capability of controlling the EM wavefront [5]. This type of approach requires the design of a new communication paradigm by explicitly integrating the environment as primitive design of the communication system. The network softwarization approach is the basis for software reconfigurable intelligent metasurfaces in order to design wireless channels able to adapt to the networks and not vice-versa as in the conventional communication systems. One of the most important open issues for realizing such a type of system is the fact that there are not channel models explicitly integrating this type of (meta)material and explicitly accounting for them. The main task for the post-doc candidate will consist in the derivation of reconfigurable intelligent metasurfaces and radio waves interaction models. Based on these models, new channels models will be proposed and evaluated both theoretically and through experimental test-beds.

---References---


Principales activités
The postdoc will be in charge of
- Contribute on the design and implementation of innovative communication paradigms by considering the specific interactions between the impinging EM waves and the material;
- Design and implement new channel models that explicitly integrate and account the interactions of the EM waves with the environment;
- The evaluation of the models will be realized by the means of simulation tools and real experiments.

Compétences
- Good knowledge of wireless communication systems
- Signal Processing and Information Theory skills
- Skills in Simulation tools and development
- Skills in C and python
- Knowledge on metasurfaces
- The ideal candidate should hold a recently obtained PhD in electric/electronic/wireless networks with an expertise on metasurfaces and wireless channel models.
- Ideally the candidate should have a good knowledge of Linux operating systems and a good level of programming experience with Electromagnetic Tools

Avantages
- Subsidized meals
- Partial reimbursement of public transport costs
- Leave: 7 weeks of annual leave + 10 extra days off due to RTT (statutory reduction in working hours) + possibility of exceptional leave (sick children, moving home, etc.)
- Possibility of teleworking (after 6 months of employment) and flexible organization of working hours
- Professional equipment available (videoconferencing, loan of computer equipment, etc.)
- Social, cultural and sports events and activities
- Access to vocational training
- Social security coverage

Rémunération
Gross monthly salary (before taxes): 2653 €