Offer #2023-06761

Distributed Learning for 5G-IoT

Level of qualifications required: Graduate degree or equivalent

Fonction: Temporary scientific engineer

About the research centre or Inria department

The Inria Saclay-Île-de-France Research Centre was established in 2008. It has developed as part of the Saclay site in partnership with Paris-Saclay University and with the Institut Polytechnique de Paris.

The centre has 39 project teams, 27 of which operate jointly with Paris-Saclay University and the Institut Polytechnique de Paris. Its activities occupy over 600 people, scientists and research and innovation support staff, including 44 different nationalities.

Context

The position is part of the 5G-mmTc research project aiming at deploying a 5G cellular network oriented "massive IoT", compatible with 4G technology. The use cases are the Smart-Grid, in partnership with EDF and the connected bike, in partnership with the French Cycling Federation (FFC).

Assignment

As part of the project 5G-mMTC, some of the work is the orchestration and resource allocation in cellular networks, more specifically on the virtual core networks (slices) possible in 5G. The key advantage of a native 5G network is the ability to create on-demand and on-the-fly slices for each virtual operator. This allows multiple networks from distinct operators to coexist at the core of the 5GC network with heterogeneous quality of service needs, such as mMTC, URLCC, and eMBB.

Main activities

This position focuses on the study of orchestration and resource allocation in virtual core networks (slices) of cellular networks. We will focus on the case of IoT networks such as LTE Cat-M and NB-IoT, and their 5G equivalents.

The task of the position will be to study the literature on this topic, then propose new orchestration and resource allocation algorithms, and finally implement a proof of concept through simulation. An initial objective is to perform the implementations and simulations based on the OpenAirInterface (OAI) codebase, an open-source implementation of 4G/5G base stations.

More precisely, the objective is to develop intelligent algorithms to enhance the slicing service (NSSF, "Network Slice Selection Function") and ensure efficient resource allocation. The steps will include analyzing the quality of service requirements for IoT applications, understanding the NSSF function, drafting a state of the art of related topic, developing algorithms, implementing through simulation on a free software cellular system base, and finally evaluating performance.

Skills

- Knowledge of one or more programming languages, preferably Python and C/C++.
- Understanding of Open Air Interface
- A good command of technical English

Benefits package

- 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
Remuneration

Income in regards to professional experience

General Information

- Theme/Domain: Networks and Telecommunications
  System & Networks (BAP E)
- Town/city: Palaiseau
- Inria Center: Centre Inria de Saclay
- Starting date: 2023-11-01
- Duration of contract: 1 year
- Deadline to apply: 2023-12-31

Contacts

- Inria Team: TRIBE
- Recruiter: Adjih Cédric / Cedric.Adjih@inria.fr

About Inria

Inria is the French national research institute dedicated to digital science and technology. It employs 2,600 people. Its 200 agile project teams, generally run jointly with academic partners, include more than 3,500 scientists and engineers working to meet the challenges of digital technology, often at the interface with other disciplines. The Institute also employs numerous talents in over forty different professions. 900 research support staff contribute to the preparation and development of scientific and entrepreneurial projects that have a worldwide impact.

The keys to success

- A thesis in telecommunication is a useful asset.
- Knowledge of the 5G protocol stacks, especially the 5G Core
- Some knowledge of the architectures proposed in OpenRAN

Warning: you must enter your e-mail address in order to save your application to Inria. Applications must be submitted online on the Inria website. Processing of applications sent from other channels is not guaranteed.

Instruction to apply

- CV
- Cover letter
- Letter(s) of recommendation, where applicable

Defence Security:
This position is likely to be situated in a restricted area (ZRR), as defined in Decree No. 2011-1425 relating to the protection of national scientific and technical potential (PPST). Authorisation to enter an area is granted by the director of the unit, following a favourable Ministerial decision, as defined in the decree of 3 July 2012 relating to the PPST. An unfavourable Ministerial decision in respect of a position situated in a ZRR would result in the cancellation of the appointment.

Recruitment Policy:
As part of its diversity policy, all Inria positions are accessible to people with disabilities.