



ESR Project title: Mobility aware communication, computation and caching-based resource allocation for MEC [ESR12]

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Institution: CEA Leti, Grenoble, France

Application deadline: May 31, 2021

ESR Project Description:

Low-latency, ultra-reliable and energy efficient MEC support is a fundamental pillar for 5G and future 6G networks. Nevertheless, optimal and reliable joint Communication, Computation and Caching (C3) resource allocation over time and space is still a challenging and open topic of research. Objectives are: (1) To investigate means to improve reliability, latency and the energy consumption related to computational offloading in the presence of user mobility and unreliable millimetre-wave links, exploiting learning, caching and dynamic cluster formation techniques for (caching-capable) small cells. (2) To distribute/proactively allocate C3 resources and design innovative proactive caching policies that avoid redundant/repetitive processing of the same tasks. (3) Energy efficiency: to reduce the MEC traffic over the uplink and backbone network for terminals and network by applying adaptive techniques such as discontinuous transmission (DTX).

Expected Results:

(1) Design and validation of energy efficient resource management and reliable multi-link transmission techniques to jointly optimize C3 resources in MEC networks of small cells endowed with computation, caching capabilities, and millimetre wave connectivity. (2) Design and implementation of novel computational caching mechanisms for EH-MEC mobile networks. (3) Development and integration into the design of UE mobility prediction and clustering of small cells. (4) Analysis and Simulation-based evaluation.

Supervision and Mobility Program:

Once hired, the candidate:

- will work at CEA Leti, performing full-time research under the supervision of Dr. Emilio CALVANESE STRINATI.
- will be enrolled in the PhD program at Telecom SudParis, under the supervision of Prof. Mireille Sarkiss.
- will additionally pursue two secondments at CTTC (Barcelona, Spain) and (NBL,), for a duration of five months each.

Required, Preferred and Desired Prerequisites/Skills:¹

¹ **Required**, means mandatory to pass the eligibility check. **Preferred**, means highly welcome and recommended. **Desired**, means additional, not strictly needed, but still very much appreciated.



- **Required:** At the time of recruitment, the applicant must not have lived in France for more than 12 months in the previous 36 months (3 years).
- **Required:** No more than 4 years spent in research/work activities after the achievement of the MS degree.
- **Preferred:** A Master's degree in Telecommunications, Computer Science, Data Science or equivalent.
- **Preferred:** Very good communication skills in oral and written English.
- **Preferred:** Programming skills, knowledge of SUMO simulator.
- **Preferred:** Knowledge on Information Theory.
- **Preferred:** Open-mindedness, strong integration skills and team spirit.
- **Desired:** good command of the Python programming language.
- **Desired:** good mastery of mathematical tools.
- **Desired:** previous training MS-level training on machine learning techniques.

Additional requirements for this position

The candidate must hold a MS degree, that is equivalent to a five-year MS degree in the EU.