Offre n°2026-10290

Post-Doctoral Research Visit F/M Cross-Layer Machine Learning for Physical and MAC Layer Optimization in 5G Broadcasting

Le descriptif de l'offre ci-dessous est en Anglais

Type de contrat : CDD

Niveau de diplôme exigé : Thèse ou équivalent

Autre diplôme apprécié : PhD degree in Computer Science, Electrical Engineering, Telecommunications, or a related field.

Fonction : Post-Doctorant

A propos du centre ou de la direction fonctionnelle

The Inria Rennes - Bretagne Atlantique Centre is one of Inria's nine centres and has more than thirty research teams. The Inria Center is a major and recognized player in the field of digital sciences. It is at the heart of a rich R&D and innovation ecosystem: highly innovative PMEs, large industrial groups, competitiveness clusters, research and higher education players, laboratories of excellence, technological research institute, etc.

Contexte et atouts du poste

Funding Context: ROBIN Project – Bpifrance i-Démo

The Bpifrance i-Démo program, funded under the France 2030 investment plan, supports ambitious collaborative research, development, and innovation (R&D&I) projects with strong technological and economic impact. It aims to accelerate the development of breakthrough technologies and their transfer to the market by fostering collaboration between industrial companies and research organizations.

The ROBIN project is funded under this program and brings together a consortium of two academic partners (INSA Rennes and the University of Rennes) and three industrial partners (TDF, Ateme, and ENENSYS). Together, they are developing innovative solutions for 5G broadcast technologies, with a particular focus on the delivery of broadcast services to 5G terminals.

Scientific Context

The evolution of digital broadcasting and mobile networks has led to the emergence of 5G Broadcast technology, enabling the delivery of high-quality multimedia services, including TV and video content, directly to 5G-enabled terminals. This technology relies on a combination of advanced terminal architectures, communication protocols, and standardization frameworks defined by organizations such as 3GPP.

However, several scientific challenges remain to be addressed, including the optimization of physical and protocol layers, the design of efficient and robust 5G Broadcast base station architectures, and the development of adaptive transmission strategies capable of addressing heterogeneous and dynamic propagation conditions across indoor and outdoor environments.

Artificial Intelligence (AI) and Machine Learning (ML) techniques offer promising approaches for improving system performance through data-driven optimization, intelligent resource management, and adaptive configuration. Nevertheless, challenges related to robustness, generalization, reliability, and computational complexity must be considered to ensure the deployment of AI-based solutions in real-world 5G Broadcast systems.

Mission confiée

The postdoctoral researcher will contribute to the development of advanced 5G Broadcast technologies by investigating AI-driven optimization approaches for improving system performance, robustness, and adaptability. The mission will focus on the design, evaluation, and optimization of communication strategies across the physical and MAC layers, considering heterogeneous deployment scenarios, including indoor and outdoor environments.

The researcher will work on the development of intelligent algorithms for resource management, transmission optimization, and system configuration, while addressing challenges related to robustness, scalability, and real-world deployment constraints. The work will involve theoretical analysis, algorithm design, simulation, experimental validation, and collaboration with academic and industrial partners within the ROBIN project consortium.

Principales activités

- Develop AI/ML-based optimization algorithms for 5G Broadcast physical and MAC layers.
- Analyze and optimize 5G Broadcast architectures, protocols, and transmission strategies.
- Evaluate robustness and performance of AI-driven solutions in heterogeneous indoor/outdoor environments.
- Conduct simulations and experimental validation on 5G Broadcast platforms.

- Collaborate with academic and industrial partners and contribute to scientific publications.

Compétences

- Strong background in 5G/6G wireless communications, including physical and MAC layer concepts.
- Experience with Machine Learning (ML) and Artificial Intelligence (AI) techniques applied to communication systems.
- Knowledge of optimization methods, resource allocation, and adaptive transmission strategies.
- Familiarity with 5G standards, protocols, and broadcast/multicast communication systems is highly desirable.
- Experience with simulation tools (e.g., MATLAB, Python, NS-3, or equivalent) and performance evaluation of communication systems.
- Strong programming skills, particularly in Python and/or C/C++.
- Ability to conduct independent research, analyze scientific problems, and publish results in international journals and conferences.
- Good communication skills and ability to collaborate with academic and industrial partners.
- Proficiency in English (written and spoken).

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

Monthly gross salary amounting to 2788 euros

Informations générales

- **Thème/Domaine :** Réseaux et télécommunications
  Système & réseaux (BAP E)
- **Ville :** Rennes

- **Centre Inria :** Centre Inria de l'Université de Rennes
- **Date de prise de fonction souhaitée :** 2026-11-01
- **Durée de contrat :** 1 an, 6 mois
- **Date limite pour postuler :** 2026-11-30

Contacts

- **Équipe Inria :** ERMINE
- **Recruteur :**
  Jelassi Sofiene / sofiene.jelassi@irisa.fr

A propos d'Inria

Inria, l'institut national de recherche dans les sciences et technologies du numérique, est en appui de l'État pour les stratégies nationales de recherche et d'innovation du numérique en tant qu'Agence de programmes. Inria mène plus de 300 projets de recherche et d'innovation avec ses 3500 scientifiques, ingénieurs et personnels d'appui, en partenariat avec les universités et l'écosystème numérique (entreprises, entrepreneurs, acteurs publics). Ensemble, nous explorons des domaines clés comme l'intelligence artificielle, la cybersécurité, l'informatique quantique, le Cloud, la transformation numérique de la santé, les jumeaux numériques ou encore les technologies numériques pour la défense. Nous construisons des solutions concrètes telles que des logiciels, des startups technologiques, des partenariats avec les entreprises du tissu national et des formations de pointe. Notre objectif : l'impact scientifique, technologique et industriel au service de la souveraineté numérique de la France.

L'essentiel pour réussir

More than a checklist of technical skills, what will make this assignment a success is a particular mindset and a certain way of engaging with research and engineering work.

The ideal candidate is someone who **genuinely enjoys operating at the boundary between systems and ideas** — someone who finds satisfaction not only in making things work, but in understanding *why* they work and what they reveal about the underlying problem. This role sits at the crossroads of distributed systems, AI, and networking: an intellectual appetite for all three, even without deep expertise in each, will go a long way.

We are looking for someone with:

- **A taste for experimentation and hands-on work.** You enjoy building things, running experiments, and letting measurements guide your thinking. You are not deterred by a system that does not behave as expected — you are curious about why.

- **Comfort with open-ended problems.** The scope of this project will evolve. The right candidate embraces this flexibility rather than seeking rigid task definitions, and is able to self-direct their work within a broader research agenda.

- **A collaborative and communicative nature.** The project involves a multi-partner national programme (PEPR NF-MUST). You will interact with researchers from different institutions and backgrounds, and you are able to share your progress, your doubts and your findings clearly and constructively.

- **Cross-disciplinary curiosity.** Whether your background is closer to systems, algorithms, or networking, what matters is a genuine interest in the neighbouring fields and a willingness to build bridges between them.

- **A research-oriented mindset.** You are comfortable reading technical literature, situating your work in a broader scientific context, and contributing to written outputs that go beyond code documentation.

A thesis or significant project in the areas of network function virtualisation, edge computing, machine learning systems, or distributed optimisation would be a genuine asset. What matters most is the drive to produce rigorous, reproducible, and impactful work within a stimulating and supportive research environment.

Attention: Les candidatures doivent être déposées en ligne sur le site Inria. Le traitement des candidatures adressées par d'autres canaux n'est pas garanti.

Consignes pour postuler

Please submit online : your resume, cover letter and letters of recommendation eventually

Sécurité défense :
Ce poste est susceptible d'être affecté dans une zone à régime restrictif (ZRR), telle que définie dans le décret n°2011-1425 relatif à la protection du potentiel scientifique et technique de la nation (PPST). L'autorisation d'accès à une zone est délivrée par le chef d'établissement, après avis ministériel favorable, tel que défini dans l'arrêté du 03 juillet 2012, relatif à la PPST. Un avis ministériel défavorable pour un poste affecté dans une ZRR aurait pour conséquence l'annulation du recrutement.

Politique de recrutement :
Dans le cadre de sa politique diversité, tous les postes Inria sont accessibles aux personnes en situation de handicap.