A propos du centre ou de la direction fonctionnelle

The Inria Sophia Antipolis - Méditerranée center counts 34 research teams as well as 8 support departments. The center's staff (about 500 people including 320 Inria employees) is made up of scientists of different nationalities (250 Foreigners of 50 nationalities), engineers, technicians and administrative staff. 1/3 of the staff are civil servants, the others are contractual agents. The majority of the center's research teams are located in Sophia Antipolis and Nice in the Alpes-Maritimes. Four teams are based in Montpellier and two teams are hosted in Bologna in Italy and Athens. The center is a founding member of Université Côte d’Azur and partner of the I-site MUSE supported by the University of Montpellier.

Contexte et atouts du poste

Work environment:

The postdoc candidate will be hired by Inria and will carry out her/his research in the Diana team at Inria Sophia Antipolis Research Centre, Sophia Antipolis, France.

The assignment will be conducted in collaboration with YDATA, a company developing a website for the general public (2M visitors per month) and specialised in the comparison of telecom offers and networks.

This mission is important to the development of YDATA which will make available technical and human resources to the researcher.

Duration: 18 months minimum. Starting date: as soon as possible

Application: Candidates are requested to send their CV and the list of publications + a motivation letter + a link to PhD manuscript or summary of the manuscript + recommendation letters to the contact persons below.

Contact persons:

Academic contact points

- Chadi Barakat, Senior Researcher, Inria
  Chadi.Barakat@inria.fr / +33 4 92 38 75 96
- Thierry Turletti, Senior Researcher, Inria
  Thierry.Turletti@inria.fr / +33 4 92 38 78 79

Entreprise contact point

- Benjamin Gervais, Chief Executive Officer at YDATA
  bgervais@zoneadsl.com / +33 6 78 29 53 49

Mission confiée

Context:

Understanding the coverage and performance of cellular networks has gained lots of attention in the recent period, especially in view of the importance of these networks for our internet daily usage. Several wave propagation models have been proposed by the research community [1,2,3,4] and integrated in simulation and visualization tools [5,6,7]. These models provide RF coverage maps for different 2D and 3D scenarios and an estimation of the received signal power. On the other hand, several studies leverage data driven approaches to obtain global coverage information based on local measurements [8,9]. However, these studies do not reach the level of providing general estimation of the bandwidth available to mobile users, which is finally the information most appropriate to them as it directly relates to their quality of experience. Indeed, it is known that providing such general information on the available bandwidth is a difficult task as it relates to the underlying technologies. Several tools exist to get directly this information on the available bandwidth by actively probing the network as with Speedtest, MobiPerf, XTR-Nettest and ACQUA. The YDATA company has also a long experience in measuring upload and download bandwidth for fixed and mobile users on the French territory. The problem of these bandwidth measurement solutions is that they have difficulty to scale in terms of their coverage even if deployed by many users, in addition to the overhead they incur on the network.

Objective:

Propose a model to estimate the performance of mobile networks over the French territory, with a particular focus on the bandwidth proposed by these networks in both the upload and download directions. The different technologies 3G, 4G and 5G will be considered. The model will be calibrated with measurements collected by YDATA and will provide time and position-based estimates of the different technologies 3G, 4G and 5G. The model will be also used to help users identify the best mobile network for them, depending on their position and their usage with measurements collected by YDATA and will provide time and position-based estimates of the bandwidth available to mobile users, which is finally the information most appropriate to them as it directly relates to their quality of experience. Indeed, it is known that providing such general information on the available bandwidth is a difficult task as it relates to the underlying technologies. Several tools exist to get directly this information on the available bandwidth by actively probing the network as with Speedtest, MobiPerf, XTR-Nettest and ACQUA. The YDATA company has also a long experience in measuring upload and download bandwidth for fixed and mobile users on the French territory. The problem of these bandwidth measurement solutions is that they have difficulty to scale in terms of their coverage even if deployed by many users, in addition to the overhead they incur on the network.

References:


Principales activités

The main tasks will include:

- Propose a propagation model (e.g., based on the 3GPP propagation model) calculating the power of the signal at any location, by decomposing the French territory into areas of different characteristics (input data: antenna positions and power, spectrum, etc.).
- Use the above model to estimate the theoretical bandwidth at any location by taking into account the interferences generated by surrounding antennas and active cell phones, as well as estimators of network utilization along the day.
- Improve and calibrate the model by comparing the bandwidth results with field measurements (ARCEP and proprietary tests) in a continuous improvement process.
- In parallel, proceed with a pure data-driven approach on the available measurements and fill the gaps with interpolation techniques that exploit neighbouring measurements. Then, compare the output of the two approaches.

Compétences

Required competencies:

- The candidate will hold a PhD and have a strong background in mobile access network performance modelling and metrology.
- She/He will have an expert knowledge of 3G, 4G and 5G radio access network (RAN) technologies and a thorough understanding of radio interference issues (SINR).
- Basic knowledge of signal propagation modelling tools (e.g. 3GPP) would be a plus.
- Basic knowledge in Machine Learning and data analysis techniques.
- Excellent autonomy, organization and written presentation skills are mandatory. Fluency in both spoken and written English is essential.

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 Salary: 2653 € per month