

Master Thesis Subjects

Title: Development and evaluation of inter-band carrier aggregation algorithms for LTE-A systems

Location: University of Surrey

Home Department: Centre for Communication Systems Research

Contacts: Professor Rahim Tafazolli (r.tafazolli@surrey.ac.uk), Professor Klaus Moessner (k.moessner@surrey.ac.uk)

Targeted training: Master

Duration: 6 months.

Context:

Carrier Aggregation (CA) is one of the most distinct features used in LTE-Advanced (LTE-A) systems in order to increase the offered bandwidth (bitrates). The feature allows for scalable bandwidth expansion up to 100 MHz by aggregating two or more individual component carriers (CCs). These carriers can be configured with different bandwidths and can be in the same (intra-band) or different (inter-band) frequency bands (either contiguous or noncontiguous) so as to provide maximum flexibility.

Carrier aggregation enables a user to be scheduled on multiple CCs simultaneously, each of which may exhibit different radio channel characteristics and thus, the selection of CCs plays a pivotal role for the optimization of system performance. This introduces new challenging issues, with respect to the modification and/or design of new algorithms and functionalities in the Radio Resource Management (RRM) of LTE-A systems for supporting CA.

Objectives:

In this context, the proposed internship is aimed to study, implement and evaluate a set of CA algorithms for LTE-systems. The main focus shall be placed on inter-band algorithms where the CCs are configured in different frequency bands. In that case, the radio channel characteristics of each carrier can be relatively different and accordingly they also need to be taken into account apart from QoS, User Equipment (UE) capabilities, cell/traffic load etc. The implementation of the algorithm(s) shall take place in either Universal Software Radio Peripheral (USRP) [1] or Wireless open-Access Research Platform (WARP) [2] platforms. The latter comprise programmable, scalable and flexible radio platforms, that can be used to build from scratch new protocols and mechanisms in the PHY/MAC layers based exclusively on software. The end of the internship will be devoted to the preparation of the report summarizing the evaluation results and a research paper to be submitted for publication.

[1] <http://www.ettus.com/>

[2] <http://warp.rice.edu/>

Expected competencies:

- Autonomy in programming and computing lab experimentation
- Previous experience in programming skills with tools/languages, in particular MatLab, C/C++, PERL, Python
- Good knowledge of Wireless Broadband

Για περισσότερες πληροφορίες παρακαλώ επικοινωνήστε με τον κ. Παναγιώτη Δεμέστιχα (pdemest(-at-)unipi(-dot-)gr) και τον κ. Κωνσταντίνο Τσαγκάρη (ktsagk(-at-)unipi(-dot-)gr).

Title: Development and evaluation of intra-band carrier aggregation algorithms for LTE-A systems

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Context:

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Carrier aggregation enables a user to be scheduled on multiple CCs simultaneously, each of which may exhibit different radio channel characteristics and thus, the selection of CCs plays a pivotal role for the optimization of system performance. This introduces new challenging issues, with respect to the modification and/or design of new algorithms and functionalities in the Radio Resource Management (RRM) of LTE-A systems for supporting CA.

Objectives:

In this context, the proposed internship is aimed to study, implement and evaluate a set of CA algorithms for LTE-systems. The main focus shall be placed on intra-band algorithms, where the CCs are configured in the same frequency band and they also take into account variant parameters such as QoS requirements, User Equipment (UE) capabilities, cell/traffic load and even operator spectrum policies. The implementation shall take place in either Universal Software Radio Peripheral (USRP) [1] or Wireless open-Access Research Platform (WARP) [2] platforms. The latter comprise programmable, scalable and flexible radio platforms, that can be used to build from scratch new protocols and mechanisms in the PHY/MAC layers based exclusively on software. The end of the internship will be devoted to the preparation of the report summarizing the evaluation results and a research paper to be submitted for publication.

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Title: Simulation modeling of LTE Release 11 emphasizing on traffic management

Location: University of Surrey

Home Department: Centre for Communication Systems Research

Contacts: Professor Rahim Tafazolli (r.tafazolli@surrey.ac.uk), Professor Klaus Moessner (k.moessner@surrey.ac.uk)

Targeted training: Master

Duration: 5-6 months.

Context:

Long Term Evolution (LTE), marketed as 4G LTE, is a standard for wireless communication of high-speed data for mobile phones and data terminals. It is based on the GSM/EDGE and UMTS/HSPA network technologies, increasing the capacity and speed using a different radio interface together with core network improvements. The standard is developed by the 3GPP (3rd Generation Partnership Project).

LTE Release 11 (LTE Advanced) is a mobile communication standard, formally submitted as a candidate 4G system to ITU-T in late 2009, was approved into ITU (International Telecommunications Union), IMT-Advanced and was finalized by 3GPP in March 2011. It is standardized by the 3rd Generation Partnership Project (3GPP) as a major enhancement of the LTE standard. The technology received its first commercial implementation in October 2012 by Russian network Yota.

Until today little work has been done in developing an LTE Release 11 simulator. Therefore, in the context of this internship/ master thesis, the emphasis will be placed on developing, testing and validating an LTE Release 11 simulator, emphasizing on traffic management techniques.

Objectives:

The objectives of the internship/ master thesis are to:

- Develop modeling techniques of LTE Release 11.
- Develop traffic management techniques for LTE Release 11.
- Apply the techniques developed in simulation environment
- Validate the techniques developed in the context of a demonstration

Expected competencies:

- Good knowledge of algorithms and modeling.
- Good knowledge in networking / telecom
- Ability to quickly grasp the context and content of design features.
- Autonomy in programming and computing lab experimentation

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Title: Simulation modeling of LTE Release 11 emphasizing on mobility management

Location: University of Surrey

Home Department: Centre for Communication Systems Research

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Targeted training: Master

Duration: 5-6 months.

Context:

Long Term Evolution (LTE), marketed as 4G LTE, is a standard for wireless communication of high-speed data for mobile phones and data terminals. It is based on the GSM/EDGE and UMTS/HSPA network technologies, increasing the capacity and speed using a different radio interface together with core network improvements. The standard is developed by the 3GPP (3rd Generation Partnership Project).

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Objectives:

The objectives of the internship/ master thesis are to:

- Develop modeling techniques of LTE Release 11.
- Develop mobility management techniques for LTE Release 11.
- Apply the techniques developed in simulation environment
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Expected competencies:

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