

MAMMOET

Massive MIMO for Efficient Transmission



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Consortium:

The MAMMOET consortium is well-positioned to achieve its objectives by bringing together a European team of leading industrial and research companies, a research-oriented SME as well as highly respected universities. These 8 project partners from 4 different countries form a complete chain stretching from basic research and service design, via applied research, up to end-user oriented service providers.



Technikon Forschungs- und Planungsgesellschaft mbH (Austria)



Interuniversitair Micro-Electronica Centrum VZW (Belgium)



Ericsson AB (Sweden)



Infineon Technologies Austria AG (Austria)



Katholieke Universiteit Leuven (Belgium)



Lunds Universitet (Sweden)



Linköpings Universitet (Sweden)



Telefonía Investigación y Desarrollo SA (Spain)

Mission of MAMMOET:

- Is to advance the development of Massive MIMO (MaMi), a new and highly promising trend in mobile access.
- Is to show the benefits and to overcome the practical limitations of MaMi.
- Is to develop complete technological solutions leveraging on innovative low-cost and drastically more efficient and flexible hardware.

Motivation:

The Internet of the future will, to a large extent, rely on mobile networks. Mobile data grew by 70% in 2012 and is predicted to grow 13-fold in the next 5 years. This puts very high demands on the development of mobile access technology. Multiple-antenna (MIMO) technology for wireless communications is becoming mature and incorporated into emerging wireless broadband standards like long-term evolution (LTE).

Basically, the more antennas the transmitter and the receiver are equipped with, the higher the number of possible signal paths and the better the performance in terms of data rate and link reliability. The price to pay is increased complexity of the hardware (number of RF amplifier front-ends) and the complexity and energy consumption of the signal processing at both ends.

Therefore, MAMMOET investigates the practical limitations of MaMi and develops a complete technological solution leveraging on innovative low-cost and drastically more efficient and flexible hardware.

Objectives:

MAMMOET aims to bring MaMi from an initial promising concept to a highly attractive technology for usage in future broadband mobile networks.

In order to achieve its overall goal, the project has five main scientific and industrial objectives which include fundamental, experimental and standardisation elements:

Elaborate system concepts and approaches

The MAMMOET project provides an understanding of the statistical nature of relevant channels, traffic and additional channel measurements and validates already drawn conclusions in a broader range of scenarios. Investigation will focus on exploring which antenna configurations are most attractive and the analysis of possibilities and limitations.

Flexible and effective signal processing

To achieve this objective, the MAMMOET project provides algorithms

- for distributed and scalable processing and
- for hardware-friendly processing.

This helps to achieve constant envelope signals to transmit from each of the antenna elements.

Efficient implementation

The project investigates which hardware components are suitable for building the large array of transmitters and how these can work together. Power-hungry hardware will be made more efficient when the specific properties of MaMi are taken into account.

Prove overall innovative concepts and enabling hardware (HW)

The aim is to create an attractive operational technology by bridging the gap between theoretical and conceptual MaMi.

Propose MAMMOET solutions to standardisation bodies

The standardisation focus of MAMMOET will be on 3GPP (3rd Generation Partnership Project). The goal is to report the high potential of MaMi and to promote its use in future 3GPP standards.

Technical Approach:

The whole project of MAMMOET is broken down into five work packages:

WP1 System approach, scenarios and requirements

WP1 analyses and proposes deployment scenarios of MaMi consistent with the service provision needs expected for the future and characterises MaMi channels through new measurements, resulting in new models.

WP2 Efficient front-end (FE) solutions (Integrated Circuit (IC) solutions, Compensation/Calibration)

The aim of this WP is to create two fundamental enablers:

- efficient and flexible transmitter modules suitable for systems with a large number of antennas, including silicon prototypes;
- algorithms for dealing with non-reciprocity in time-division duplex (TDD) access.

WP3 Baseband Solutions (Algorithms, Architectures & Design)

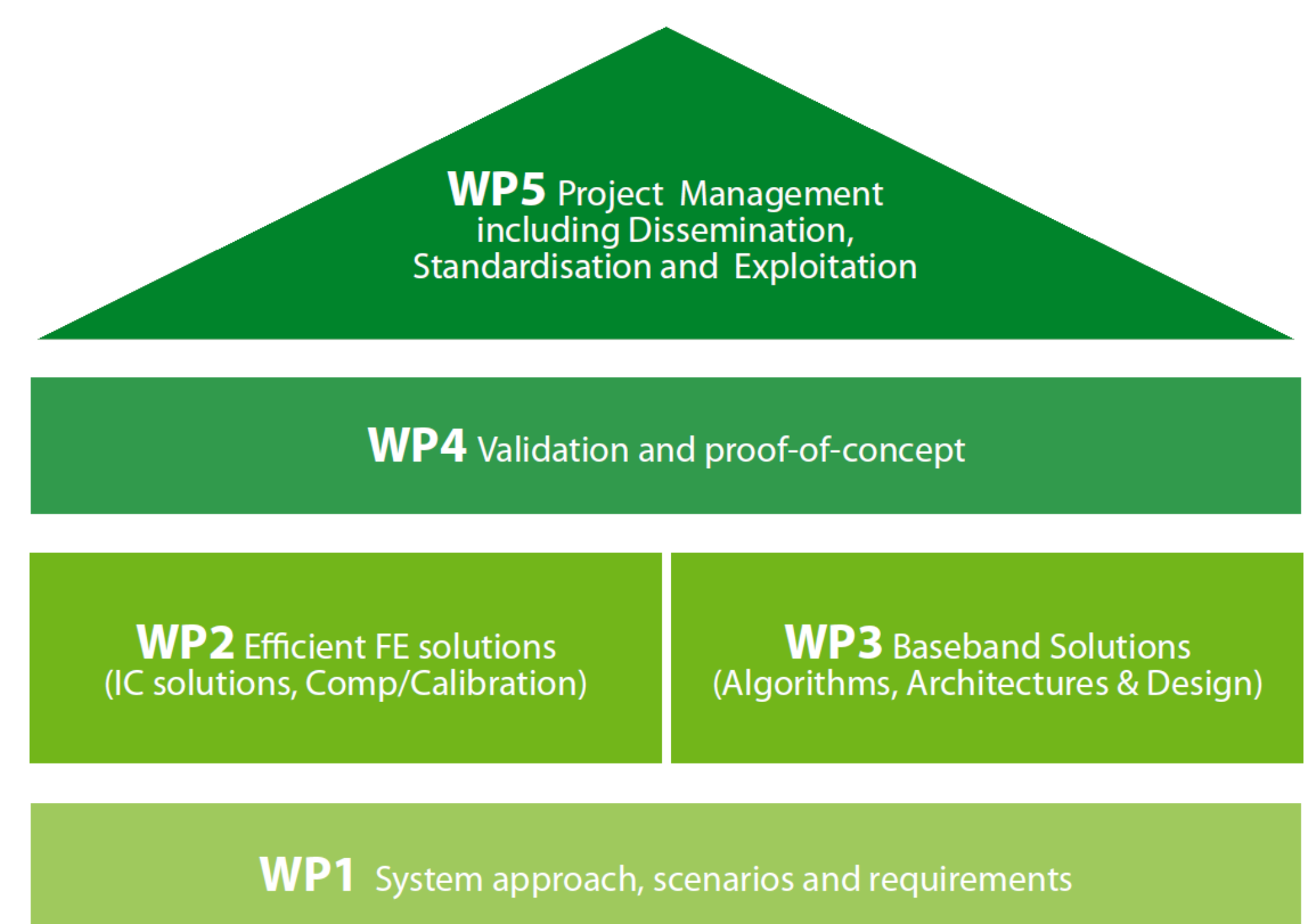
WP3 develops new methods for hardware-friendly signal shaping in multiuser MaMi systems, including new computationally efficient algorithms and hardware solutions for MaMi baseband signal processing.

WP4 Validation and proof-of-concept

WP4 validates the project's overall goals regarding system performance vs. power and cost, and delivers a proof-of-concept for the major innovation, both for the digital signal processing (DSP) solutions and the energy (power) efficient front-ends.

WP5 Project Management – Dissemination, Standardisation and Exploitation

WP5 covers the management of the project, the dissemination of the results in publications and the cooperation with standardisation bodies.



Massive MIMO Info Point: www.massivemimo.eu

The massive MIMO Info Point page provides several lists of research papers that address different research problems in the emerging area of very large MIMO systems. This might serve as an accessible entry-point for those who want to study this field. The page has grown out from a literature survey website originally created and hosted by the communication systems group at Linköping University. The page is now maintained by the FP7-MAMMOET project.

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