



MAMMOET

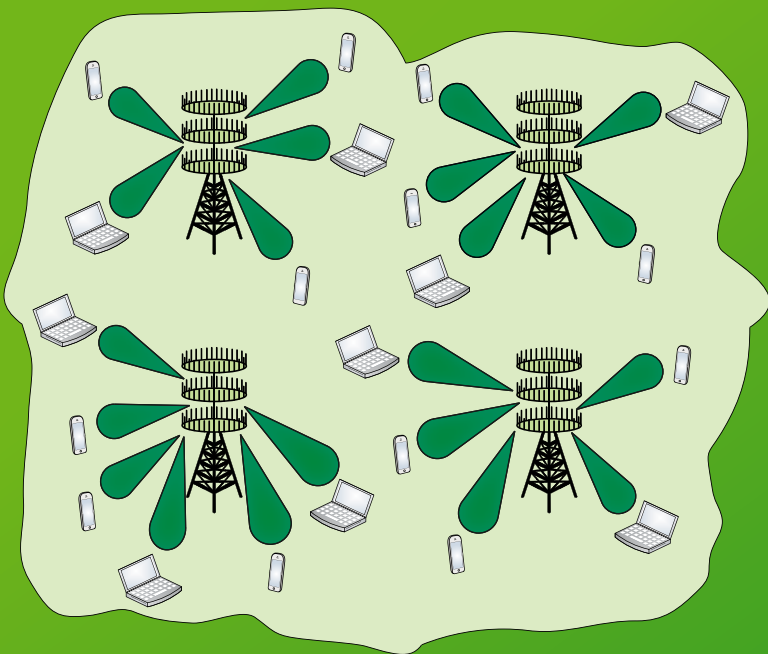
Massive MIMO for Efficient Transmission

Project number: **619086**
Project website: **www.mammoet-project.eu**
Project start: **1st January, 2014**
Project duration: **3 years**
Total costs: **EUR 4.384.904**
EC contribution: **EUR 3.047.000**



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Mission of MAMMOET:

The mission of MAMMOET is to advance the development of Massive MIMO (MaMi), a new and highly promising trend in mobile access. MAMMOET will show the benefits – and will overcome the practical limitations – of MaMi and 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 frontends) and the complexity and energy consumption of the signal processing at both ends. Therefore MAMMOET will investigate 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 a number of important scientific and industrial objectives. These include fundamental, experimental and standardisation elements. The five main objectives are:

Objective 1: Elaborate system concepts and approaches

Provide an understanding of the statistical nature of the relevant channels and traffic and further additional channel measurements and validate 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.

Objective 2: Flexible and effective signal processing

Provide algorithms for distributed and scalable processing and hardware-friendly processing algorithms that allow to trade some of the extra degrees of freedom that MaMi provides to achieve constant envelope signals to transmit from each of the antenna elements.

Objective 3: Efficient implementation

Investigate 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.

Objective 4: Prove overall innovative concepts and enabling hardware (HW)

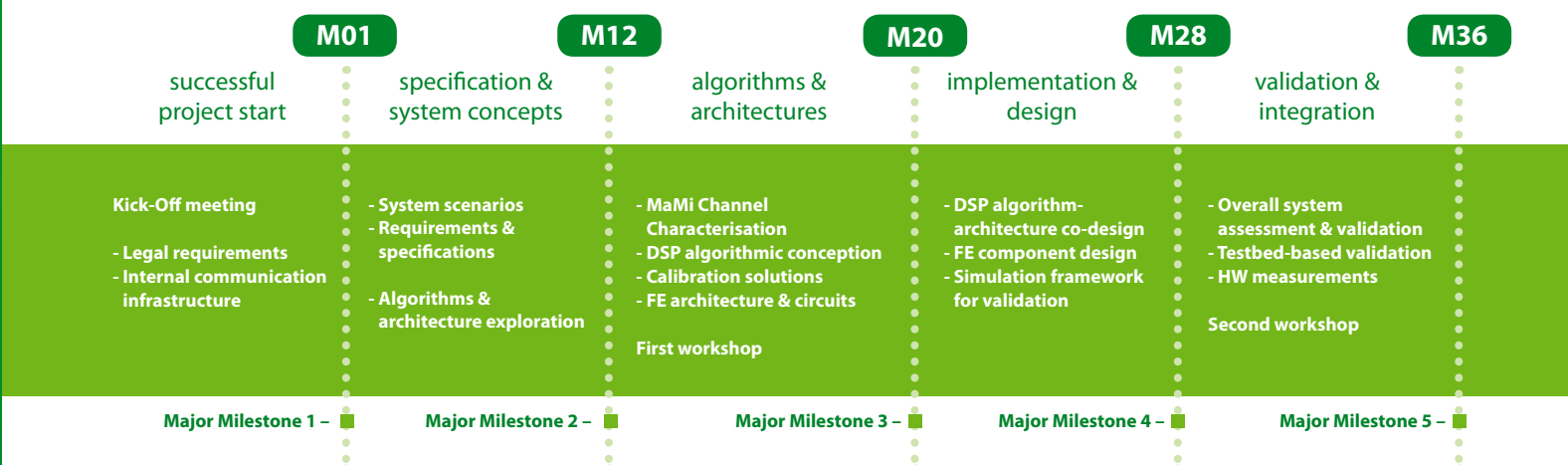
Create an attractive operational technology by bridging the gap between theoretical and conceptual MaMi.

Objective 5: Propose MAMMOET solutions to standardisation bodies

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



Stages of the MAMMOET Project



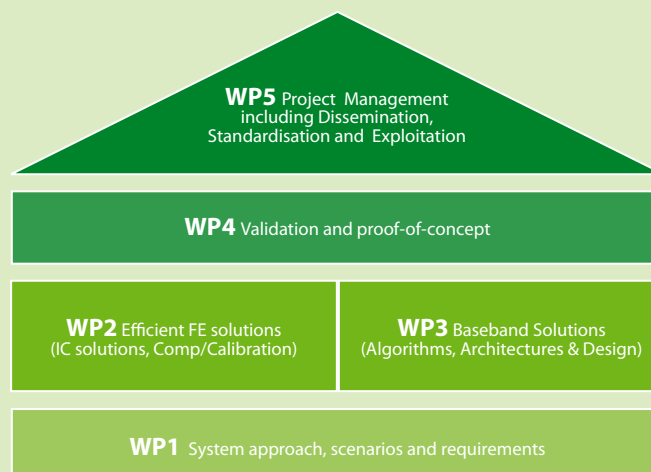
Technical Approach:

MAMMOET will develop key enabling technology for wireless access based on MaMi, with the goal of enabling a radical increase in the spectral and energy efficiency of the future, and characterise MaMi channels through new measurements, resulting in new models. The whole project is broken down into 5 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 characterise MaMi channels through new measurements, resulting in new models.
- WP2 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; and secondly algorithms for dealing with non-reciprocity in time-division duplex (TDD) access.
- WP3 Baseband Solutions (Algorithms, Architectures & Design)**
The objective in WP3 is developing 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 will validate the project's overall goals in terms of system performance vs. power and cost, and deliver 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**
The aim of this WP is to disseminate the results in publications, cooperate with standardisation bodies and take care of the overall administration of MAMMOET.

MAMMOET structure and work packages





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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.



Project Partners:



Technikon Forschungs- und Planungsgesellschaft mbH (Austria)



Interuniversitair Micro-Electronica Centrum VZW (Belgium)



Ericsson AB (Sweden)



Infineon Technologies Austria AG (Austria)



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