



DRAGON

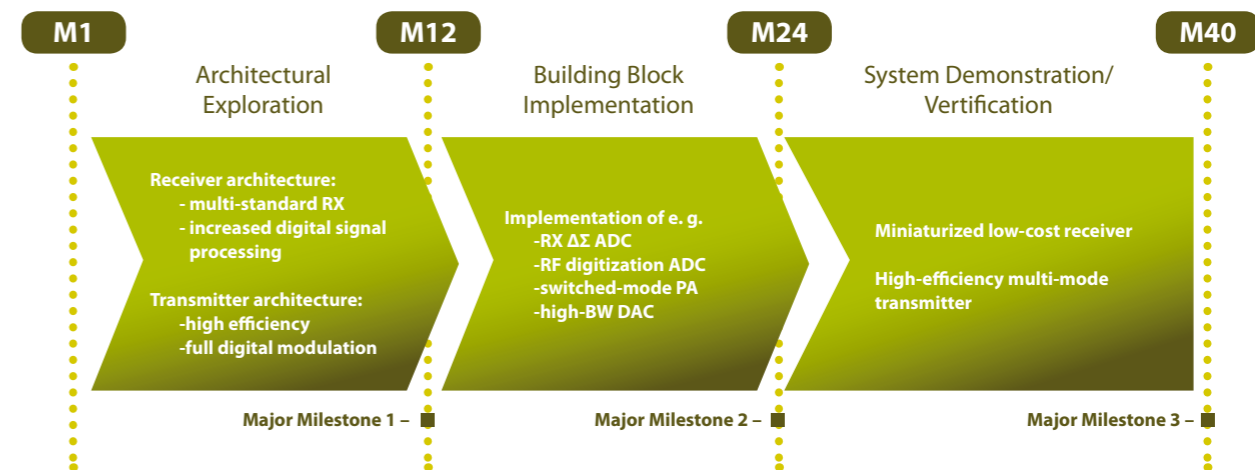
Design Methods for Radio Architectures GOing Nanoscale

Project number: **248277**
Project web-site: www.dragon-project.eu
Project start: **February 2010**
Project duration: **02/2010 – 05/2013**
Total Cost: **€ 5.088.435.-**
EC Contribution: **€ 3.480.000.-**



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Objectives:

The performance offered by wireless standards has improved steadily over the last decades. There are two main reasons:

- 1. Society today increasingly asks for wireless systems since they have the potential to enhance comfort and pleasure. More importantly even, wireless technologies can help to support independent living and save costs in health care for an ageing society.
- 2. Industrial progress relies on continued growth of wireless capacity. Not only more and more people count on mobile broadband services in their professional activities, also the number of objects connected by wireless interfaces is dramatically increasing.

Objective 1 – Miniaturisation of Complex Radio Systems

Future terminals will need radios that support multiple standards and data rates up to 1 Gbit/s. In order to avoid a serious impact on cost, size and weight of the terminal due to increasing numbers of radios and their capacity, miniaturization through design of innovative reconfigurable architectures in nanoscale technologies is crucial.

Objective 2 – Design Methodologies for Energy Efficient Solutions for High Performance Systems

The new, innovative designs should be capable of reaching the same level of average power consumption as dedicated solutions. DRAGON aims at obtaining a 50% energy reduction compared to classical systems.

Objective 3 – Multi-Functional / Multi-Purpose Devices

The proposed multi-functional designs in DRAGON should allow paying off non-recurring engineering costs (NRE) in chip design by re-using the same system in a broad range of applications. Further, DRAGON aims at supporting more than two standards in one building block, which is currently the maximum number that can be achieved.

Objective 4 – Proof of Concept by Silicon Demonstrators

The design of innovative architectures in the most advanced commercial CMOS technologies should not only be used to illustrate and prove the DRAGON project results, but, more importantly, should give European companies the confidence that the disruptive design paths are ready for adoption, and convince them of their significant added value.

Mission of DRAGON:

The main idea of the DRAGON project is to research and use new design methodologies and architectural innovations, based on reconfigurability and state-of-the-art digital CMOS technology, in order to break the barriers imposed by the lack of scaling properties of analog components. With this concept, distinct reductions in cost, size and energy consumption for multi-standard cellular handsets can be achieved, while higher demands on data rate can be met.

Data rates are increasing every day, therefore, the energy consumption per transmitted or received data bit has to be reduced in order to save energy and avoid thermal problems. Wireless data services will become an attractive low-cost alternative to be used in novel applications.

The DRAGON Project:

In the DRAGON project a design platform comprising multi-standard transceiver specifications and novel flexible architectures is developed. The number of required external components, like analog filters, are replaced by reconfigurable digital CMOS (Complementary Metal Oxide Semiconductor) circuitry; and critical building-blocks are implemented to demonstrate proof of concept, both of the architecture and design methodology. All critical building-blocks are fabricated, tested, and demonstrated in state-of-the-art CMOS technology. The project results are also being provided to standardisation bodies, allowing an alignment of requirements to technology limits.

Overall strategy:

The results of DRAGON are achieved in multiple steps and marked by three major milestones, which constitute central points in the course of the project and span across the technical work packages.

Milestone 1 – Architectural Exploration

Architectural innovative ideas are identified, explored and used as a high level tool to realise project targets. The focus of the according design experiments is being defined.

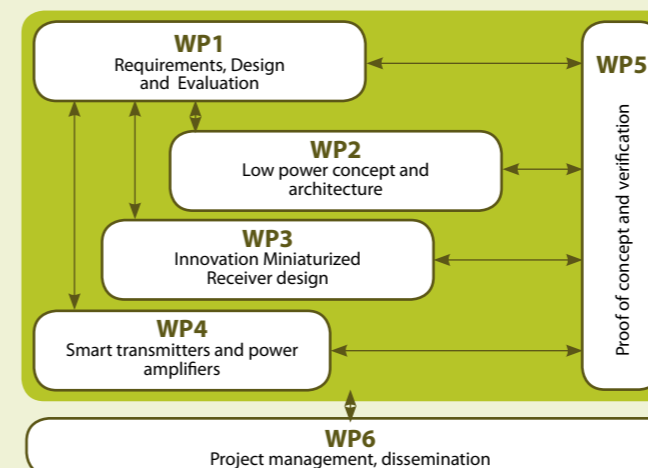
Milestone 2 – CMOS Building Block Design and Implementation

The most critical building blocks for the targeted multi-standard radio systems with novel architectures are implemented and measured, using state-of-the-art digital CMOS technology.

Milestone 3 – System Demonstration

Silicon system demonstrators are realised and measured. The overall project results are consolidated and contrasted with the initial goals.

Work-Plan of the DRAGON Project



Technical Approach:

The project work in DRAGON is divided into five technical and one project management work packages listed hereafter, including the following sub tasks structure:

WP1: Requirements and Standardisation

- Use cases and target applications
- Definition of scope and compilation of link budget
- Propose and evaluate architecture solutions
- Standardisation

WP2: Low Power Concept and Architecture

- Receiver architecture
- Transmitter architecture

WP3: Innovative Miniaturised Receiver Design

- Selective RX ADC
- Miniaturised RF digitisation receiver

WP4: Smart Transmitters and Power Amplifiers

- Design of burst-mode switched-mode power amplifiers
- Design of high bandwidth modulator and digital driver

WP5: Proof of Concept and Verification

- Organisation of test chips on state-of-the-art silicon technology
- Lab setup and silicon verification

WP6: Project Management and Dissemination

- Project management
- Dissemination
- IPR and exploitation framework

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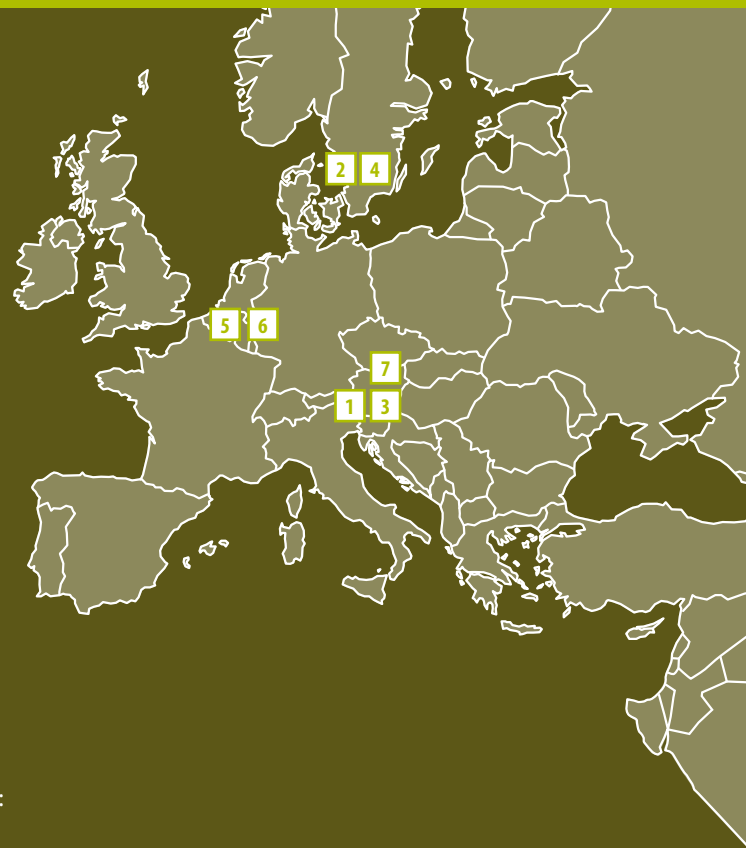
Project Management Leader

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Consortium:

The DRAGON consortium will bring together partners and competencies from Europe's leading companies in the areas of nano electronics and wireless communications, one research institute and three universities, with radio chip designers and system experts.

The consortium is covering the full design chain from customer requirements over system integration to hardware design. Top universities are included to achieve optimum innovation and move the current boundaries of the state-of-the art. The combination of all this guarantees the high quality and optimal industrial exploitation of the project outcomes. This will strengthen the European telecom equipment and semiconductor industry.



Project Partners:

The consortium is constituted of 7 partners from 3 different countries:



Technikon Forschungs- und Planungsgesellschaft mbH (Austria)



Ericsson AB (Sweden)



Infineon Technologies Austria AG (Austria)



Lund University (Sweden)



Katholieke Universiteit Leuven (Belgium)



imec (Belgium)



Graz University of Technology (Austria)